Consumer Alert: How Phony Vendors Rip You Off

PC WORLD

MAY 1992 $3.95

FROM THE PC WORLD TEST CENTER

BARGAIN 486s BLAST OFF

Intel's New DX2 Chips Put a 50-MHz Desktop in Your Price Range

WINDOWS 3.1 DELIVERS
Multimedia, Great Fonts, App Linking, and More!

CD ROM ROUNDUP
14 Low-Cost Drives Spin 680MB Disks

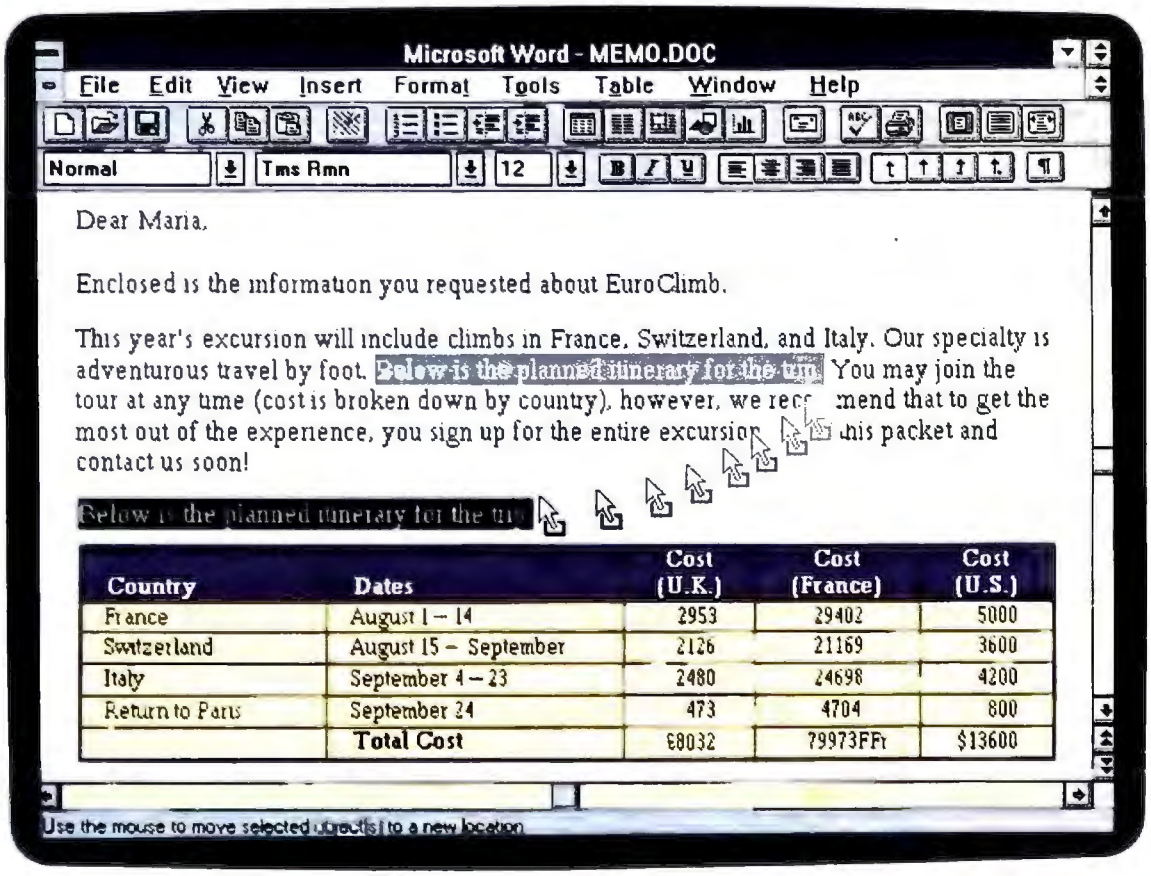
KEYBOARDS, MICE, AND TRACKBALLS
81 Input Devices Fit The Way You Work

The first word processor that works like second nature.

Microsoft

Introducing new Wo

The Toolbar lets you do everyday things with the click of a button.



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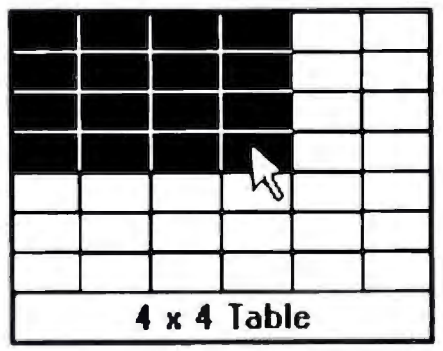
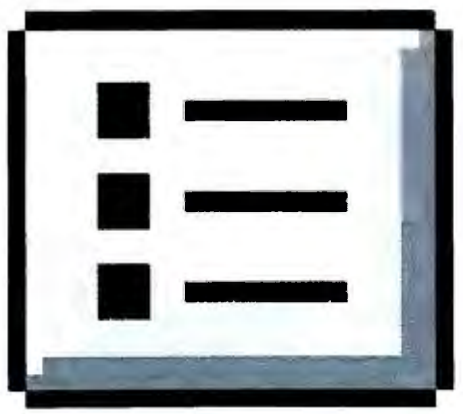
Italy	September 4 – 23	2480	24698	4200
Return to Paris	September 24	473	4704	800
	Total Cost	£8032	79973FFr	$13600

Rearranging a document couldn't be any easier. With new Word 2.0 you can drag and drop text wherever you want.



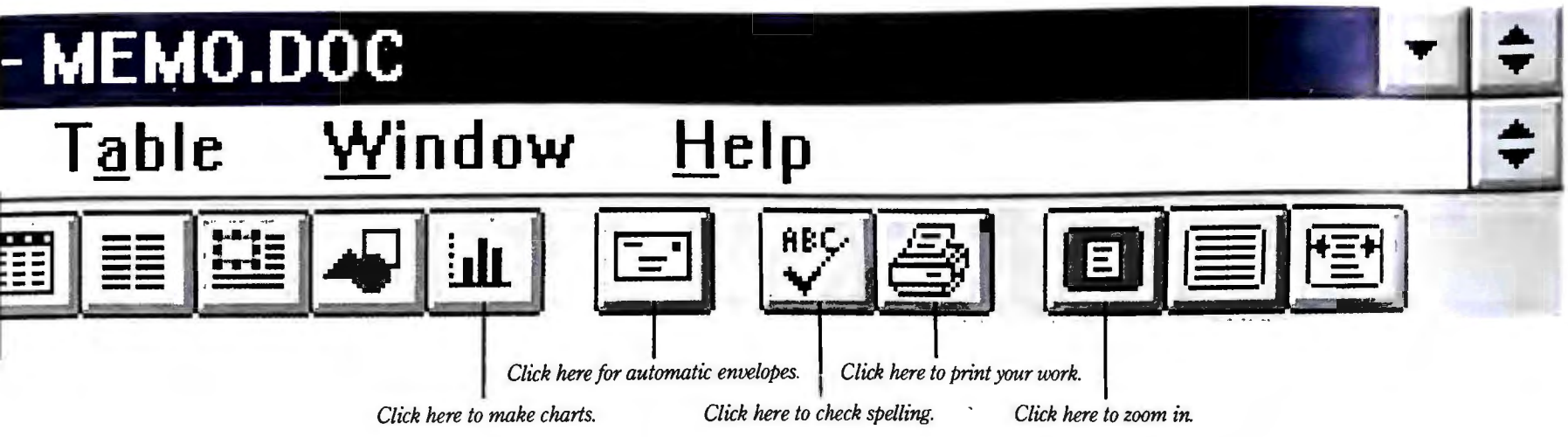
All it takes is one click on the Toolbar and presto, instant tables.

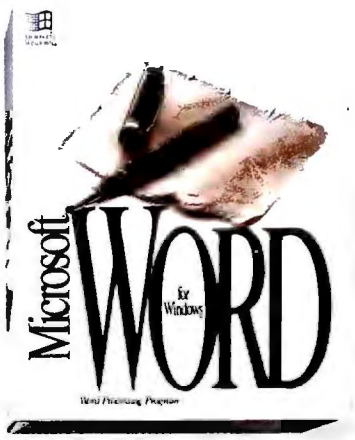


Click this Toolbar button and get instant bullets.

The mouse makes everyday tasks as easy as click, click, click.

ord for Windows 2.0.





When it comes to word processing, really nothing could be more natural than using the all-new Microsoft® Word for Windows™. You see, Word 2.0 makes those everyday word processing tasks easy.

Which means you can now concentrate on what you're actually doing. Rather than how you're actually going to do it.

This is possible for a number of reasons. Like our unique Toolbar™ feature. It lets you do those things you do most often with one simple click of a button.

Of course, looks count for something, too. With Word you can bring in a table of numbers from Microsoft Excel. Or with the new built-in drawing, charting and shading features, along with the ability to move anything on-screen with a drag and drop, you'll find yourself adding some very very cool effects.

Best of all, making the move is easy—so easy there's virtually no downtime.

For instance, if you type in a WordPerfect® keystroke, Word 2.0 will demonstrate the equivalent command right in your document. Plus, all those existing WordPerfect files as well as other popular word processing file formats are perfectly usable in Word for Windows.

You can get all of this and more when you upgrade. And right now it'll only cost a mere $129.* So why not give us a call at (800) 323-3577, Dept. X88.

You will quickly see that nothing could be more natural.

*Offer good for current licensees of WordPerfect, MultiMate, WordStar, MS Word for DOS and DisplayWrite. Please allow 2-4 weeks for delivery upon receipt of order by Microsoft. Offer expires 6/30/92. Limit one per customer. Reseller prices may vary. Call for system requirements. Offer good only in the 50 United States. © 1991 Microsoft Corporation. All rights reserved. Printed in the U.S.A. In the United States, call (800) 323-3577, Dept. X88. For information only: In Canada, call (800) 563-9048; outside the United States and Canada, call (206) 936-8661. Microsoft is a registered trademark and Toolbar and Windows are trademarks of Microsoft Corporation. WordPerfect is a registered trademark of the WordPerfect Corporation.

MAY 1992
VOLUME 10
NUMBER 5

PC WORLD

Shift into high gear: Tandy's and Compaq's "doubled" 486 systems boost performance 20 to 70 percent over standard 486s.

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486 Times 2

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Multimedia

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Caver photograph by Robert Cardin

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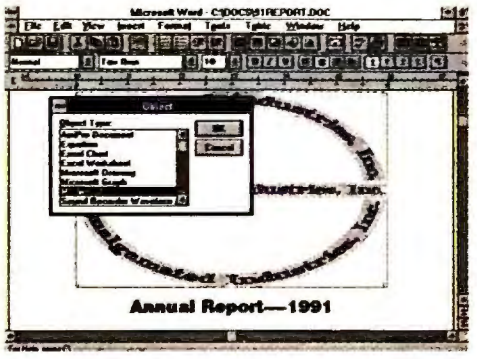

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386SX-16 PC MAGAZINE EDITORS' CHOICE 1-30-90
386-20 PC MAGAZINE EDITORS' CHOICE 5-30-89
386-16 PC MAGAZINE EDITORS' CHOICE 5-30-89
386-16FS PC MAGAZINE EDITORS' CHOICE 2-28-89

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And all of this is just for starters. Because when you turn the page we're going to talk about a lot of other very exciting and important reasons for you to buy from ZEOS. Like 486SX-25s, the new 486DX2-50, your ZEOS *Editors' Choice '486* and more. A whole lot more.
Come on in!

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Go ahead and Pick your Power! ZEOS gives you all the options. You can start out by taking a look at the de facto desktop power standard, the 386DX-33. Our '386-33 workhorse is a great entry point for true desktop power computing. But if it's a '486 you're after, hang on to your hat!

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Because to this we add an *incredibly fast* IDE hard drive and genuine Teac® floppy drives. We have located the ports for these drives right on the motherboard along with your serial, parallel and game

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386DX-33	$1395	$1895	$2395	$2895
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486SX-25	$1695	$2195	$2695	$3195
486DX-33	$1795	$2295	$2795	$3295
486DX2-50	$1995	$2495	$2995	$3495
486DX-50	$2195	$2695	$3195	$3695

Add $200 to any price for a 128K cache. 486DX-50 SpaceSaver case has 6 bays.

Great Prices. Loa

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wer.

Now Pick 2: Lotus 1-2-3 for Windows, Ami Pro 2.0 or Freelance Graphics!

ports. The result? Two slots are saved giving your new ZEOS system a total of *eight.* All this while others are trying to get you to accept fewer slots. It's part of your ZEOS expansion advantage. The slots to expand, how about the room?

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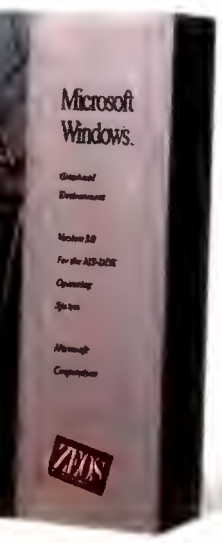
ded!

So go ahead. Pick your Power, your Package, and your Price and give us a call. Your friendly, expert ZEOS Systems Consultant is ready to answer any questions you may have. *Call Now Toll Free 800-423-5891.*



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PC World encourages readers to share technical solutions. We pay $25 for each *Power Tip* published in the magazine, $50 for *User Group Tips,* $25 to $200 for *Star-Dot-Star* items, and $50 for questions used in the How To section. Keep submissions brief (*Power Tips* and *User Group Tips* to 100 words or less). We cannot acknowledge unpublished submissions; accepted submissions will be acknowledged by payment.

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"When the earthquake hit, I watched helplessly as my poor LaserJet went crashing to the floor."

—James Cost, Chief of Police, Campbell, CA

"The LaserJet fell from about four feet," said Police Chief James Cost, recalling the disastrous San Francisco earthquake. "I assumed we'd have to buy another one. But later, my secretary plugged it in and printed a document. It's about the only thing that did work that day."

Reliability is only one of many reasons more people use HP LaserJet printers than all other laser printers combined. Some people cite innovations like Resolution Enhancement technology, which creates sharper edges and better overall print quality. Or genuine PCL5 printer language. Or the range of options, with five printers priced from $1,249 to $5,495.*

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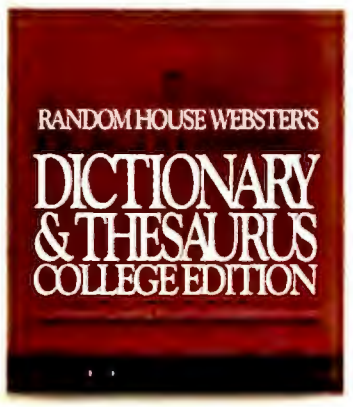

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Circle 243 on reader service card

Call for Action: Shut Down Fraud

Back in October, *Consumer Watch* received a few letters from readers complaining about a couple of Southern California companies. Nothing odd about that—in its four years of existence, *Consumer Watch* has received hundreds of such letters. Associate Editor Roberta Furger usually resolves these grievances easily, because they often stem from simple lapses or misunderstandings.

But as this month's *Consumer Watch* Special Report reveals, this time Furger was onto something completely different. Letters began to pour in about four companies that advertised low-cost hardware but didn't deliver: One Stop Micro, Minuteman Computers, American Computer Technology, and Computer Spectrum—all located in the South Bay area of Los Angeles. Furger saw a clear pattern: "The company would blame the carrier for losing the shipment," she says, "and after supposedly tracing it, claim that it was damaged or missing and that the company was now out of stock."

The volume of mail, along with her inability to get satisfaction for any customer, convinced Furger these weren't merely struggling enterprises trying to keep up with orders. Tens of thousands of dollars were being lost by *PC World* readers alone. Phone calls to the companies yielded abrupt, evasive responses—or disconnected lines. Background checks turned up cooperative links between businesses that should have been competing.

The links and the amount of money involved indicated a major scam. News Editor Mike Hogan, a *PC World* veteran with 15 years of newspaper reporting experience, joined Furger for what would become a full-time, three-month investigation. Furger and Hogan alerted the California attorney general, the Los Angeles city attorney, the U.S. postal inspector, the Secret Service, and appropriate local police departments.

Unbelievably, all but the local police seemed uninformed and uninterested. Meanwhile, Furger and Hogan discovered that one phony company had bilked a single bank of $100,000 in chargebacks, and other operations were surfacing all the time.

With nothing to stop unsuspecting readers from suffering more losses, *PC World* hired the private investigations firm of Palladino & Sutherland and a handwriting analyst, who helped confirm the reporters' worst suspicions. At least eight companies were involved, run by a group of men who used each other as credit references, shut down businesses and reopened them under different names, and regularly used aliases—all in a successful bid to duck creditors and confuse the authorities. Experts estimate that total losses could run into the millions.

The biggest surprise for Furger and Hogan was how easy it all seemed for the perpetrators—with no inventory, no legitimate references, advertisements they didn't pay for, and low-rent storefronts that stayed locked during normal working hours. With businesslike phone manners for would-be customers, they conned experienced and first-time buyers alike. To help you avoid a similar fate, our Special Report explains the basic steps you can take to check out businesses before you buy, along with the safest way to pay.

Furger knows of only a handful of customers who received a refund from the companies investigated. One of them was so fed up with delays and excuses that he got friends to call One Stop Micro three times a day and say, "You took our friend's money, and we're not going to stop bothering you until you pay him back." Furger and Hogan displayed the same kind of

Brought to light: ads for some of the South Bay Los Angeles companies that made a habit of not delivering.

determination during their exhaustive investigation. As Hogan says, "These guys hurt our readers. That's why *PC World* got involved."

By going public with the results of our investigation, *PC World* aims to prevent further direct-sale scams. Copies of this month's Special Report have been sent to the law enforcement agencies that could have joined forces to shut down these operations months ago. A handful of unscrupulous men have defrauded the public and cast doubt upon legitimate direct-sale companies. We hope that reputable vendors and our readers will join us in a call for action by local, state, and federal law enforcement.

Eric Knorr

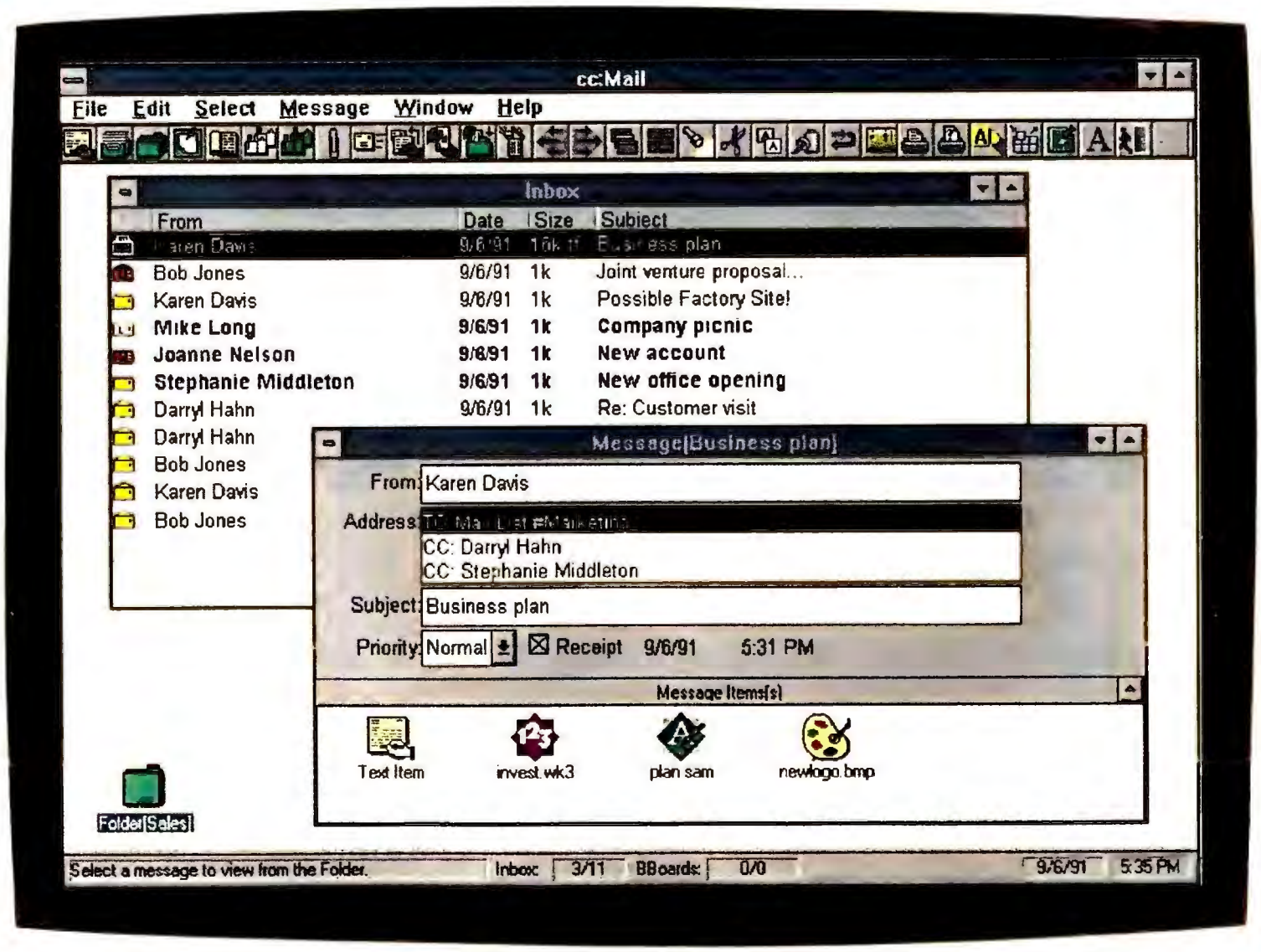
ERIC KNORR
EDITOR

ROBERT CARDIN

Why is cc:Mail the lea

cc:Mail is so easy to install, learn and use, you can have your electronic mail system up and running quickly.

cc:Mail can send information across all of these computing platforms to reach everyone in your organization.



Over a million satisfied customers have already given cc:Mail a first-class rating. For example, Windows users love its easy-to-use interface, SmartIcons™ and application integration. And PC World *says "Sending a cc:Mail message is easier than addressing an envelope and licking a stamp."* 9/91*

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cc:Mail

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LAN TIMES READERS CHOICE 1990 1991

Our newly released cc:Mail for Windows takes full advantage of Windows 3.0. Support of Dynamic Data Exchange lets you easily send other mail-enabled Windows files from within those applications. For example, you can send a report you've written with Ami Pro™ for Windows across the country while the application is still on your desk top.

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For a free demo disk of the cc:Mail Macintosh, Windows or DOS Platform Pack of your choice, call us today at **1-800-448-2500.**

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Circle 262 on reader service card

LETTERS

Reactions and responses from the PC World community

We're Not Un-American

Concerning your March article about the competition between microprocessor vendors in the PC industry ("PC Price War: 486SX vs. 386/40"): I couldn't help but notice what I assume was a Freudian slip by one of your editors, that is, referring to AMD as "American" Micro Devices.

While we like to think of AMD as the quintessential American semiconductor manufacturer, the correct name is Advanced Micro Devices.

DAVID FRINK
EXTERNAL AFFAIRS MANAGER
ADVANCED MICRO DEVICES
AUSTIN, TEXAS

Training Trials

Many managers I know would be elated if their employees could learn to use ever more powerful computers and software packages by watching videos or using tutorial programs, as Alice LaPlante suggested in Manager's File (January 1992).

Better yet, why don't managers simply give employees the user's manual and let them read it, since most of the information they'd ever need is in the manual?

The fact is that employees need to come up to speed quickly when they're learning to use new hardware and software. Managers can't afford to waste staff time on inefficient methods such as videos or training materials. Hiring a professional training consultant makes the most sense in today's time-critical business environment, whether you manage 2 people or 2000.

BRIAN FORD
EAST SETAUKET, NEW YORK

ANTHONY RUSSO

Talking Modems

The "Commuting by Modem" piece in the February 1992 issue was great. It's one of the few articles I've read that a company can really use to start exploring its options. And as someone who is about to use dial-up communications from far-flung corners of the world to keep in touch with business colleagues, I loudly applaud your work.

STEVE LAWRENCE
DENVER, COLORADO

ROBERT RISKO

"High-Speed Modems" (December 1991) was well-written and timely. You cleared up much of my confusion about standards and provided great information on products and vendors.

However, while your article claims that almost all modems are compatible, other articles I've read state that only modems of the same brand can communicate at 9600 baud. It would be wonderful if all V.32 and V.42bis modems could talk to each other at the same high level of performance. Is this really the case, or am I misinterpreting your article?

DON ESRY
DELRAY BEACH, FLORIDA

Our exploratory tests for the buyers' guide showed that compatibility is very good between vendors. A few products had minor difficulties in connecting, but we were able to troubleshoot all of these. Once the modems were connected, throughput was identical with all combinations. However, there are hundreds of V.32 modems out there. Without further testing, we can't say for sure that they'll all work with one another. Usually, if two modems with the same protocols connect at all, they deliver at top speed. —Ed.

Whither First Publisher?

I was disappointed that you did not include *PFS:First Publisher* in your product comparison in "No-Sweat Desktop Publishing" (January 1992). I currently use *First Publisher* and am wondering whether to change desktop publishing programs or wait and see if Software Publishing ports it to *Windows.* Even though *First Publisher* has not been upgraded in two or more years, it would have been helpful if you had included it in your evaluation.

JAMES LABARRE
CHAPPAQUA, NEW YORK

The last time we reviewed this category, August 1990, we gave PFS:First Publisher 3.0 *a low rating. Since then, the package has been sold to Spinnaker Software. As there was no new version available, and many competitive products had improved in the 17 months between articles, we felt it wouldn't be fair to review* PFS:First Publisher *again with what would certainly have been a negative result. —Ed.*

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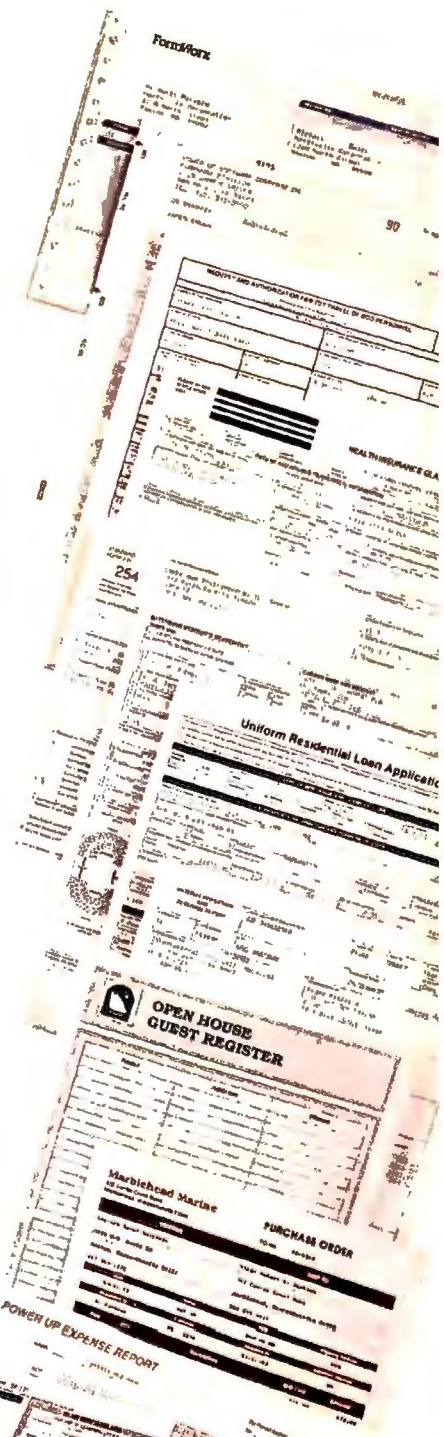

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Circle 206 on reader service card

Index or Info?

One of the nice features of your magazine in the past has been the inclusion of an index listing the articles and reviews published during the preceding year. Now readers are required to pay an additional fee for this formerly free service. Can you please tell me why?

KENNETH WARNOCK
BANDON, OREGON

We thought more readers would benefit from 20 pages of useful information about products, strategies, and how to use applications than from a 20-page index. The price of the index is minimal: We are making it available at cost only ($2.97 for a printed copy, $3.22 for a disk, or $5 for one disk and a printed copy) to those who request it. To order, use the form in the January, February, or March issue, or send us an order with your name, address, disk size preference, and a check for the amount. We'll send your index right away. —Ed.

Font Friends

Catherine Smith's "Buyers' Guide: Fonts" in the January 1992 issue ignored one way of using fonts: From scalable fonts, you can generate bit-mapped fonts to store on disk and then install the fonts from the disk in printer-definition files. One big advantage of this method is that the fonts can be edited before going to the printer. Admittedly, it takes time to download bit-mapped fonts, but that's done only once, when the printer is turned on. I vote for bit-mapped fonts any day.

H. ORLO HOADLEY
ROCHESTER, NEW YORK

Speed Isn't Everything

In your article "25-MHz 386 PCs: Get 'Em While They Last" in the October 1991 issue, I noted one thing that you didn't consider. Your lowest-priced Best Buy machine cost $2599. This is not a good deal when you can find a 486/25 system with 4MB of RAM, super VGA, a 100MB hard drive, and a 128K two-stage cache for $2399. Why should any-

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To upgrade, just remove the cover, snap in the chip, replace the cover and turn on the power. Your 386SX automatically detects the new CPU to become a full-function 486 computer. All for the price of an Intel CPU chip, available from any electronics or computer store.

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PC World, January, 1992

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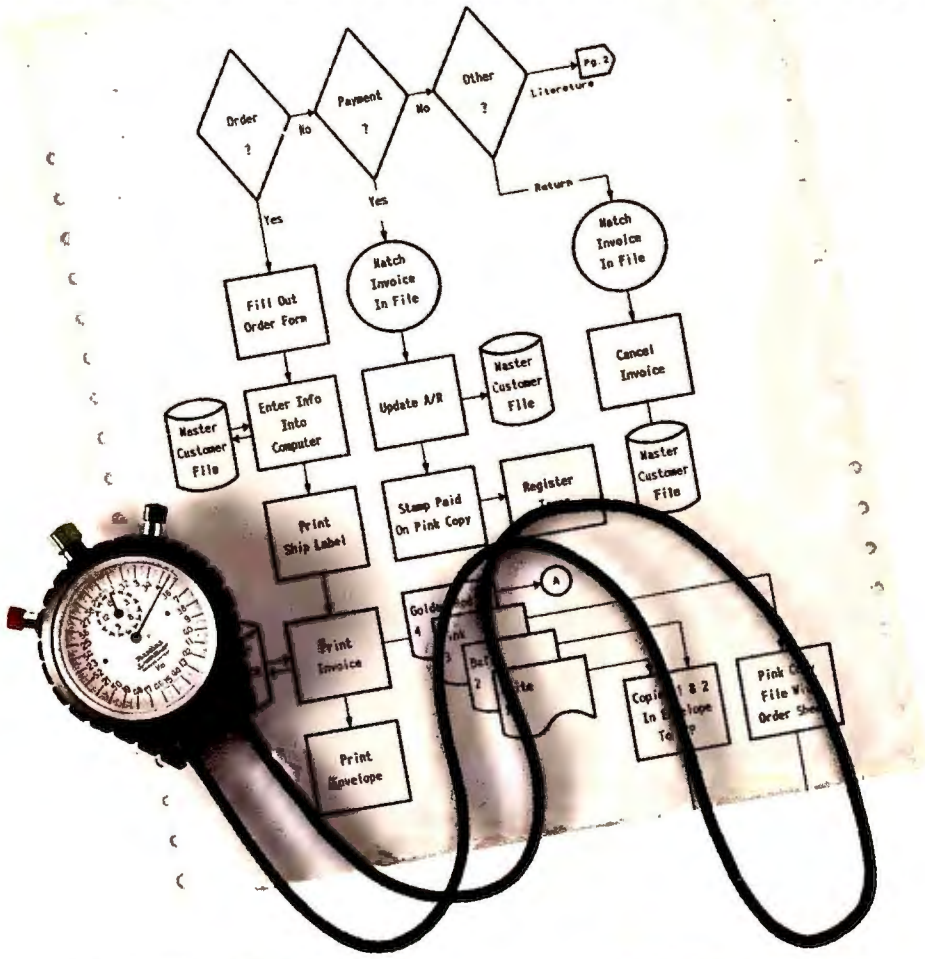
Circle 54 on reader service card

one consider spending $2599 on a 386/25 machine when you seem to place so much importance on speed?

ROBBY RAKESTRAW
WILLOW SPRINGS, MISSOURI

The prices you're citing are quite out of date, but your point is worth noting. As you correctly point out, speed is relative—as are all our descriptions of speed in the text of our reviews. So is price. Prices can drop or rise swiftly, which often results in street prices being quite different by the time one of our roundup reviews hits the street. It's possible that by the date you got that $2399 quote for the 486/25, the price of our Best Buy 386 might have been even lower, as it certainly is today. Furthermore, you have to be careful about choosing a system based on price alone—or even price and speed. Some vendors offer tempting bargain prices by skimping on quality control, tech support, and service. Price and performance are only two factors we weigh when we select a Best Buy. —Ed.

BY HAND. OR BY NOON.



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Circle 233 on reader service card

Corrections and Clarifications

Our January 1992 "50 Tips for DOS and Windows" feature contained errors. Tip 33, "Format Low-Density Floppies," contained incorrect formatting information for one-line batch files. The correct commands for DOS 4.0 and 5.0 are:

FORMAT A:/F:360

FORMAT B:/F:720

Likewise, Tip 21, "Switch Modes Fast," won't work if you've loaded DOS high, which we were unaware of at press time.

Our February 1992 cover story on *Windows 3.1* erroneously stated that the Times and Helvetica typefaces come with the product. The TrueType typefaces shipped with *Windows 3.1* are Arial and Times New Roman. Linotype-Hell, maker of the Helvetica and Times Roman typeface families, has no agreement allowing Microsoft to include Helvetica or Times as part of *Windows 3.1*.

Our February 1992 *Product Outlook* on Micro Solutions' Backpack tape drive should have stated that the speed of the drive ranges from 2MB to 5MB per minute and that all Backpack products can be daisy-chained. However, the Backpack tape backup software will not support multiple tape drives connected to the same computer.

In the December 1991 *Consumer Watch*, we reported that CompuAdd has 5 stores nationwide. CompuAdd has more than 120 stores nationwide.

Our March article "PC Price War: 486SX vs. 386/40" contained several errors. The Executive Summary on page 131 shortchanged two products. The FastMicro FastData 486SX/25 should have a 2½-star rating for price and 3½ stars for overall value. The

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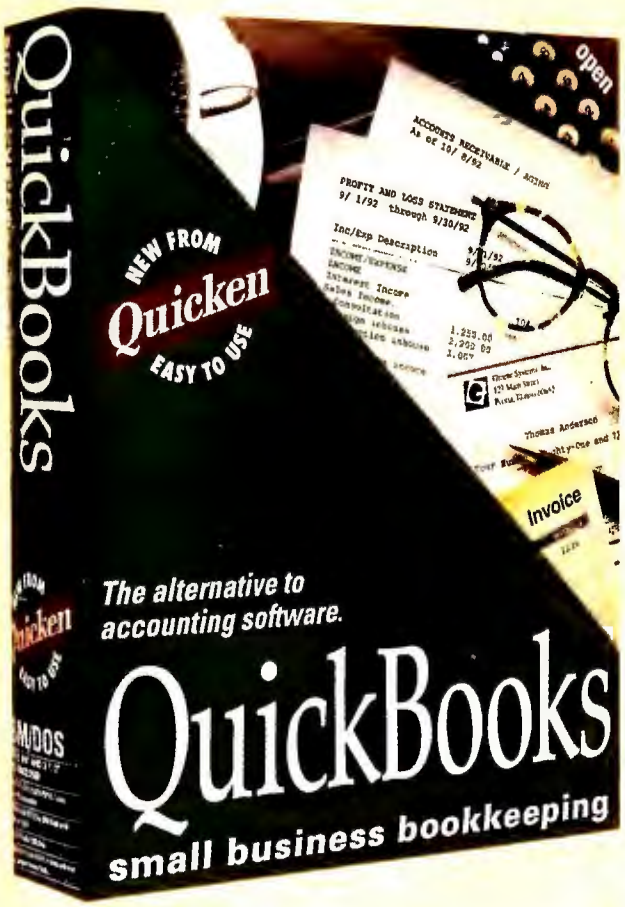

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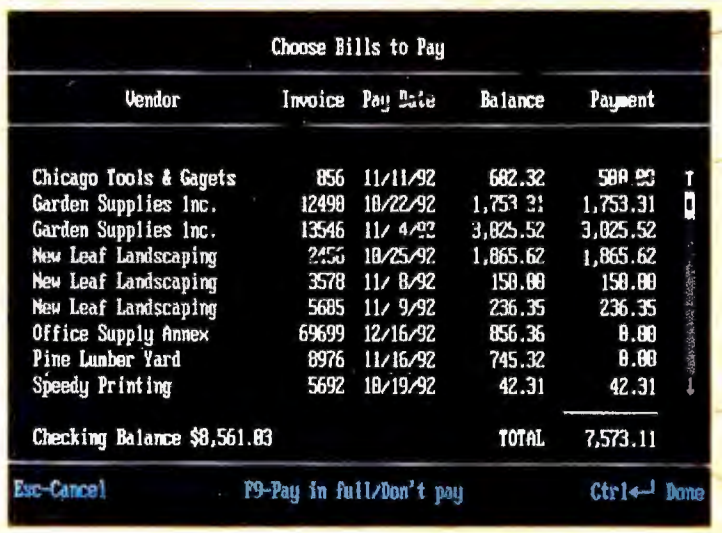

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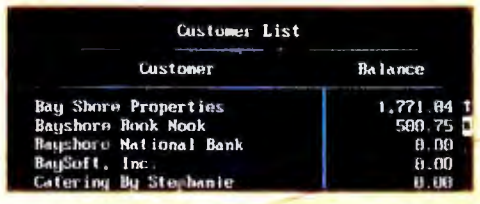

It's entered here.

Sales tax is calculated for you.

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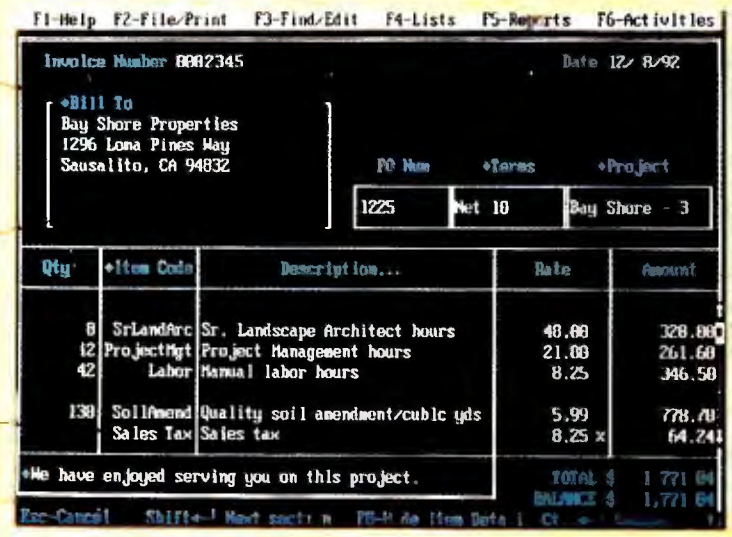

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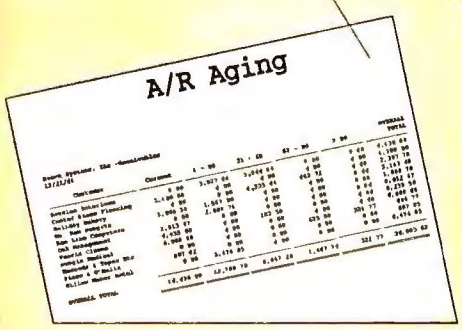

Collections Report

As of 12/31/92

Green Systems, Inc.

Customer	Invoice	Issued	Due	Balance Due
New Line Computers Mr. Ridge Evers (389) 676-9896 ext 124	1825	9/ 2/92	10/17/92	1,888.76
	Total New Line Computers			1,888.76
Oak Management Mr. John Driscoll (309) 673-7897 ext 234	1886	10/ 5/92	12/ 4/92	810.92
	2001	10/12/92	11/26/92	57.75
	Total Oak Management			868.67
Peoria Cinema Mr. Garry Pasweltz (309) 673-9856 ext	1841	9/17/92	11/16/92	6,435.88

Green Systems, Inc.-Receivables

Esc-Create Ctrl-M Memorize F1-Hel Ctrl-P Print

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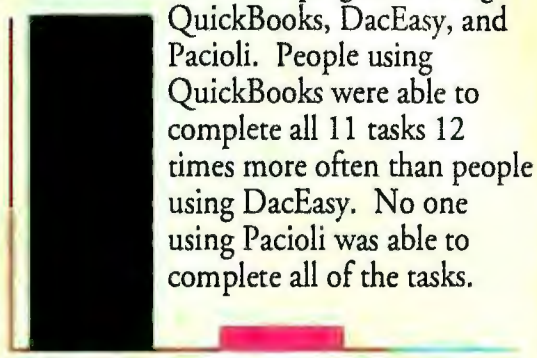
An independent research firm had small business bookkeepers perform 11 of the most common bookkeeping tasks using QuickBooks, DacEasy, and Pacioli. People using QuickBooks were able to complete all 11 tasks 12 times more often than people using DacEasy. No one using Pacioli was able to complete all of the tasks.



QuickBooks DacEasy Pacioli

Source: Merrill Research & Associates

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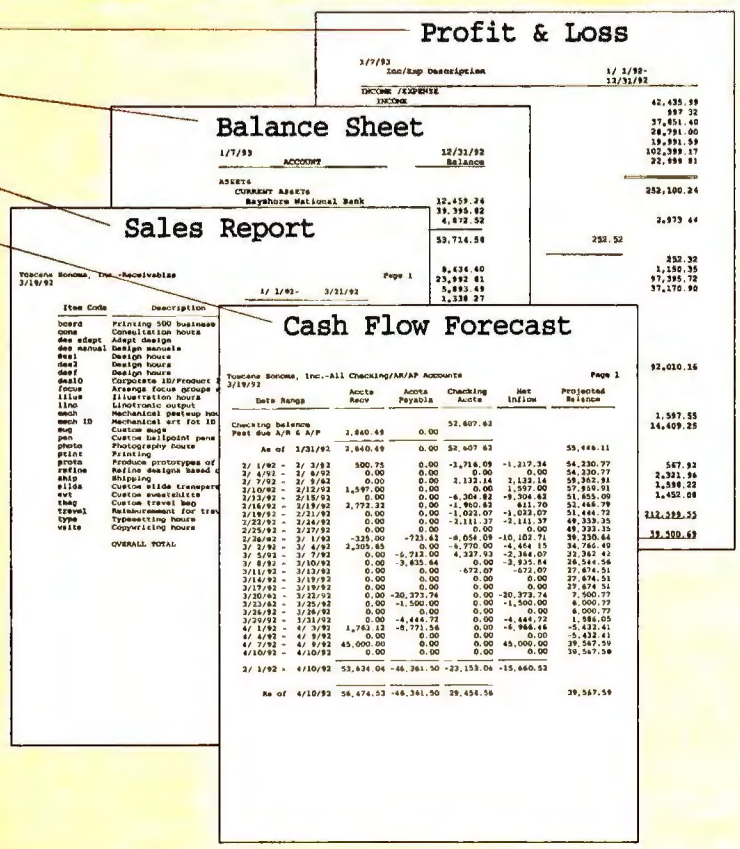
Get control over your bottom line.

Evaluate your financial resources.

See emerging sales trends.

Predict your cash needs.



Complete Financial Reports

- Profit and loss statement
- Sales report
- Accounts receivable aging
- Collections report
- Accounts payable aging
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- 1099 report
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- Budget report
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Touche 5550T 486SX 20's price rating should be 2 stars and its overall value 3 stars. In the ATronics ATI 486SX/20 review on page 122, we hail the $1195 street price as "spectacular." The correct price—$1995—is still quite spectacular. In the *Windows 3.0* bar chart of the Test Report on page 120, the first of the two Eltech 486SX/25 bars should be labeled as the Eltech 386/40. Also, Eltech's October 1991 Best Buy Model 9870 should have been identified in this article as a 25-MHz 386DX.

The March "Buyers' Guide: Super-VGA Monitors" should have indicated that Optiquest of Santa Fe Springs, California, has toll-free support. The toll-free support number is 800/843-6784. In addition, the 15-inch Optiquest 2000 D monitor does have pincushion/barrel distortion controls.

PC World regrets the errors.

Mail your reactions, responses, and ideas to Letters, PC World, *501 Second St. #600, San Francisco, CA 94107; or send them electronically to PC World Online, Letters; CompuServe, 74055,412; MCI Mail, PC World Editorial; 415/442-1891 (fax). Include your name, city, state and phone number. We reserve the right to edit letters.*

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Rex Farrance
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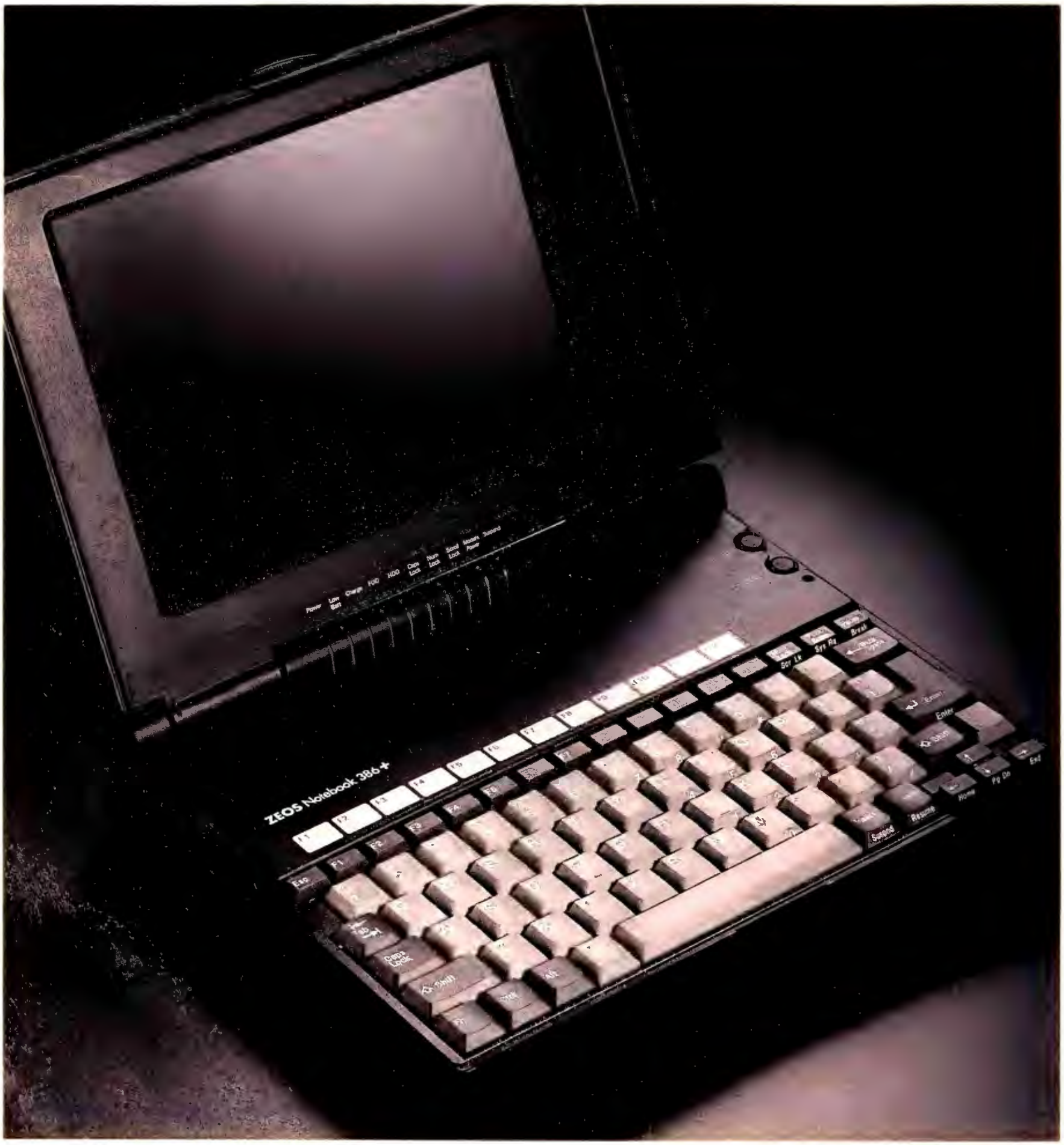

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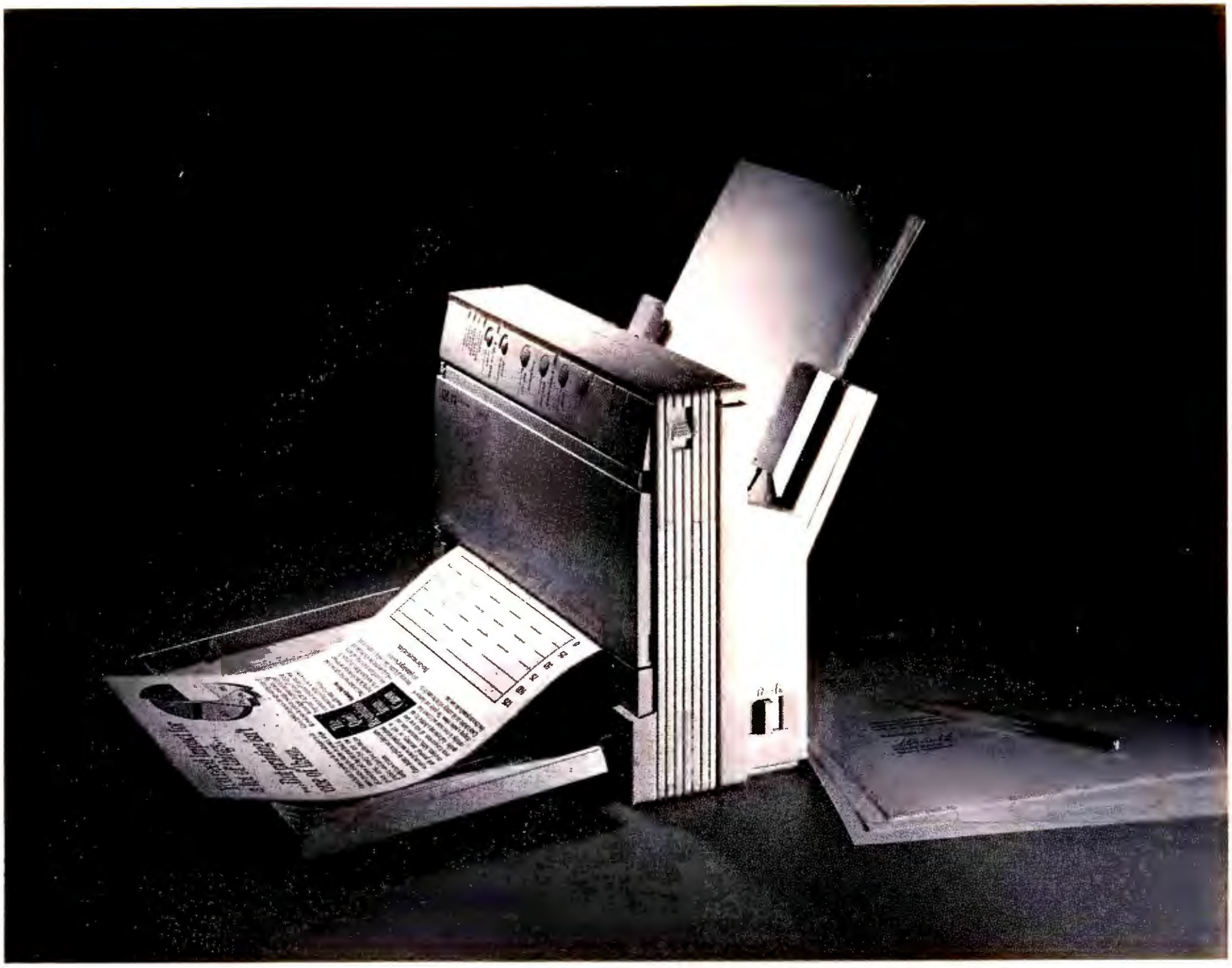

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WHAT ? NEXT

By MIKE HOGAN

Welcome to Work, Dear, Supper's On

Home Computing Isn't About Leisure; It's About Survival

We never promised you a rose garden or, for that matter, time in your rose garden. That wasn't part of the deal. So when IBM advertises its PS/1 home computer as "the first computer to understand you don't just have a job. You have a life," well, it ain't so, Joe.

True, computers make you more productive. True, they unchain you from the office. But home productivity doesn't translate into more time with kith and kin, reports Tom Miller, vice president of Link Resources Home/Office Research. It just gives you the opportunity to do more and better work.

The first woodchuck at the office who used a computer to chuck more wood was a hero. Day two dawned to find him with more wood in his in-box. Likewise, the work you take home *will* expand to fill your discretionary time faster than your stuff expands to fill your closet. Don't believe me? Ask your significant other.

And there's no hiding from it anymore. A computer is one of those tools you need to keep a job these days, notes Miller, and global competition means constantly honing your computing edge by, say, learning new software, such as *Windows,* at home.

That's why you need a full-on, work-kicking, 486-based PC for yourself. Forget about so-called home computers whose expandability and/or power have been reined in to fit some manufacturer's errant vision of the lesser demands of home computing. The dollars you save on a 386SX today will be spent upgrading it to run the big, fat software that vendors have planned for tomorrow. One example: IBM wants you to run its 25MB-gobbling OS/2 on your home PS/1. Now there's a marriage made in hell.

The good news is, life's even tougher for PC makers than for you. No room here to recount how many name-brands' prices have been slashed 30 to 50 percent lately.

Check out Dell's System 486P/20 at CompUSA. It has a 20-MHz 486SX that runs twice as fast as a 20-MHz 386, the minimum 4MB memory and 100MB disk needed to run *Windows* decently, and a *Windows*-enhancing 1024 by 768 color monitor for less than $2600. Circuit City's $2500 AST Advantage has more of just about everything, including a 25-MHz 486DX CPU. You can pay just $2000 at Costco for a similarly configured Packard Bell Pack-Mate 486SX, while CompUSA's 486SX-based Compudyne is only a few dollars more. These are solid brands with a year of free on-site support.

The beefiest PS/1 I can find is a two-slotted, RAM-limited, 16-MHz 386SX at Circuit City for $2199. IBM's name is a worm wiggled in front of clueless novices looking for a safe buy. Lucky ones end up biting on a cheaper 386SX clone. But experienced users zip past both machines, say salespeople, to get the real deal: a do-everything, expand-anywhere, lowball 486.

Go for it. If you're like most home workers, says Miller, you take your work home because you both enjoy it and take pride in making it the best you can.

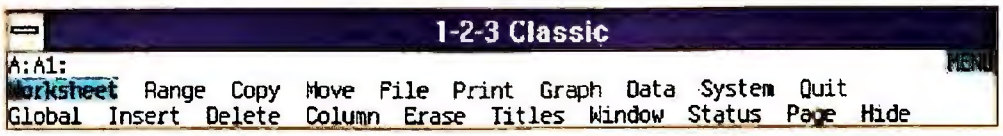
But remember, it's not a life; it's a living.

WHAT TO WATCH

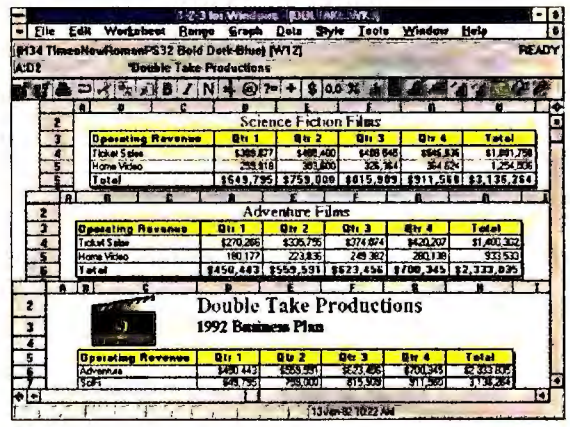
The only reason not to buy a 486 today is that it'll be cheaper tomorrow . . . . New prices on **Compaqs** bring them within a few hundred dollars of **Dell.** But by summer, a new line of modular Compaqs could meet or beat Dell prices . . . . Dell hopes to fire back with technology. It's racing to be the first PC maker out this summer with a 66-MHz version of Intel's clock-doubling **DX2 486**, one that will include Dell's special bus to accelerate graphics . . . . The world's most popular spreadsheet, ***1-2-3***, goes home in the next couple of weeks. Lotus has a specially tailored home version that mass merchandisers will sell for around **$100** . . . . What *Windows* app doesn't have its own tool bar these days? But version 2.0 of **hDC's *Powerlauncher***, due in April, is one for all. It lets you simultaneously launch groups of apps and their files and hop between them . . . . Intel is planning new versions of its **SatisFaxtion fax-modems** with killer prices and 14.4-kbps speeds.

Questions? Contact me at 415/267-1718, 415/442-1891 (fax), PC World Online, or MCI Mail, 329-2648.

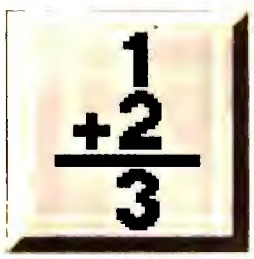
MICHAEL LLEWELLYN



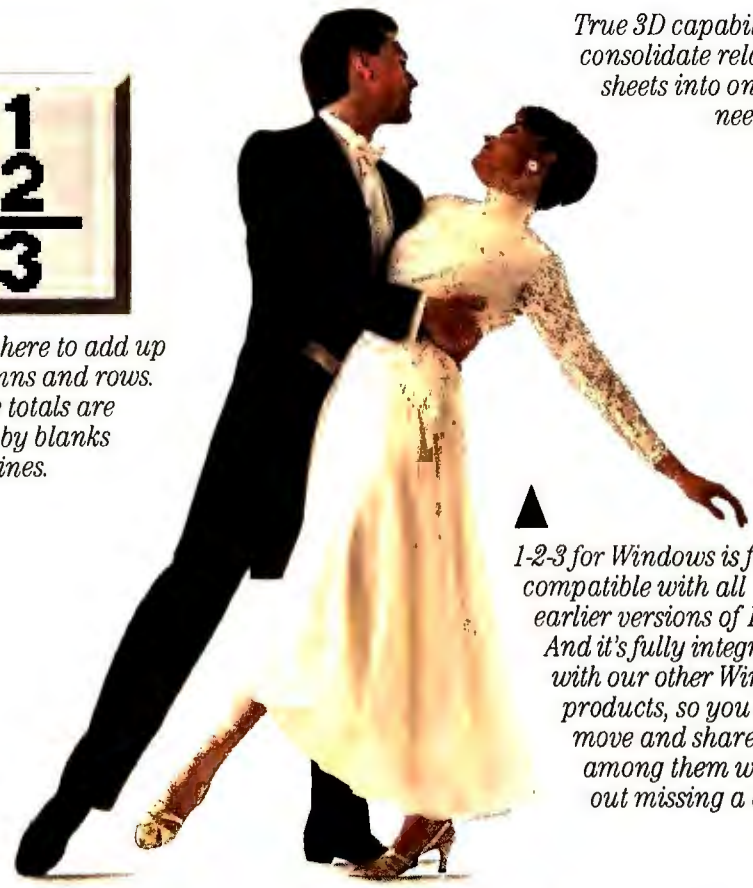
The 1-2-3 Classic® menu helps make the move from DOS to Windows a smooth one. Press the slash key and the familiar 1-2-3 menu appears, fully-functional, on screen.



True 3D capabilities let you consolidate related spreadsheets into one file without the need for file-linking.



Click here to add up columns and rows. Even if the totals are separated by blanks or dotted lines.



1-2-3 for Windows is fully compatible with all earlier versions of 1-2-3. And it's fully integrated with our other Windows products, so you can move and share data among them without missing a beat.

With the new 1-2-3 for Windows Release 1.1, you'll find noticeable improvements in its overall performance. Including faster screen display and printing. As well as support for Windows 3.1.

Some little about a well-kno

Introducing 1-2-3 for Windows Release 1.1.

Most people recognize Lotus® 1-2-3® as The World's Most Popular Spreadsheet.™ But what some people don't know are the unique and useful things we've done with it.

Consider this new version of 1-2-3 for Windows™ Release 1.1. Which now includes performance enhancements that make many of the things you do with it a lot faster. From printing and screen response to file linking and loading the application.

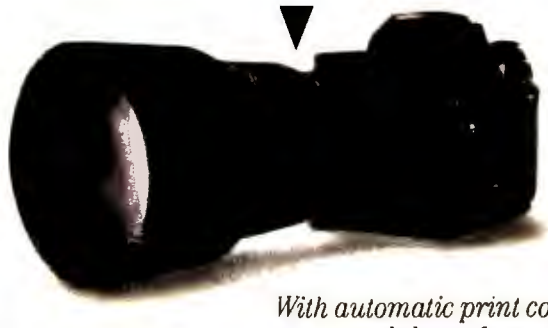
What's more, 1-2-3 for Windows has innovations that other spreadsheets, such as Microsoft® Excel, don't have. Such as dialog boxes that give you the option of selecting a range before a function or a function before a range. The Solver technology that

BUYERS ASSURANCE SEAL PC WORLD

**Direct from Lotus. Offer may expire without notice. **Please have your credit card and product package ready when you call. In Canada, call*
The World's Most Popular Spreadsheet are trademarks of Lotus Development Corporation. Classic is a registered trademark licensed to

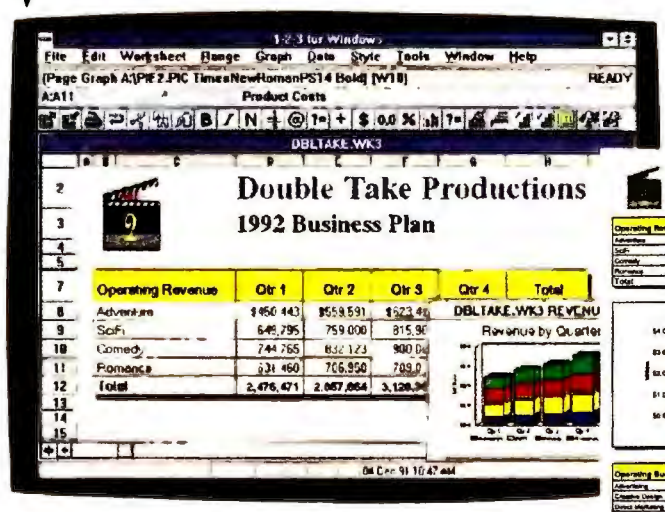
Only 1-2-3 for Windows offers SmartIcons™—our customizable icon palette—for one-click access to your most frequent tasks. And unlike the Toolbar™ in Microsoft Excel, only 1-2-3 for Windows lets you create your own unique icons and place them anywhere on the screen.

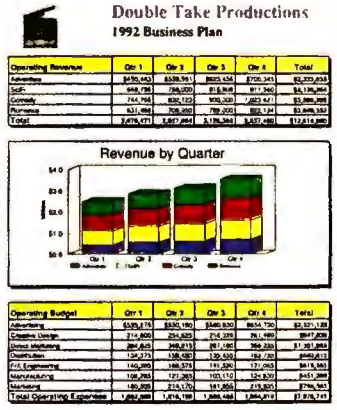
"Zoom in" and "zoom out" of your display to view and work on more or fewer cells.



Lotus 1-2-3

With automatic print compression you can print a worksheet of any size on one page. On all printers.





known facts wn spreadsheet.

helps you find the optimal answer that meets your constraints. The ability to center text over multiple columns. And a unique clipboard function that preserves the data you've cut until your next edit. Along with everything else you see in this ad.

Now if this is all news to you, there's more. Because now you can upgrade from your current version of 1-2-3 to 1-2-3 for Windows for only $129.* To order your upgrade or for a free auto demo, call **1-800-TRADEUP, ext. 6602.****

1-2-3 for Windows Lotus

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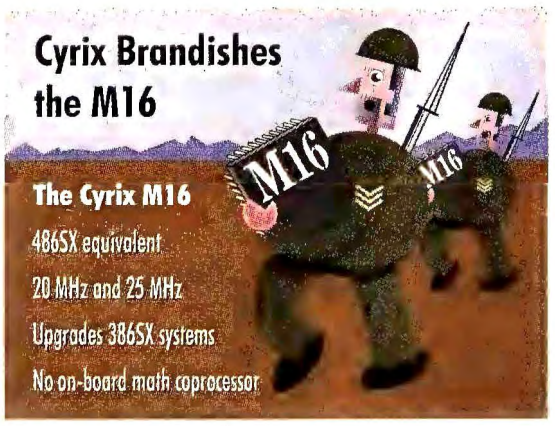
TOP OF THE NEWS

Edited by RUSSELL GLITMAN

Cyrix Plans User-Upgradable 486s

With This 486SX Equivalent, You'll Be Able to Upgrade Your 386SX

Cyrix reportedly plans an announcement in late April of an equivalent to the 486SX processor that will plug into 386SX sockets. Following its successful foray into the math coprocessor market, where it helped break Intel's monopoly and drive prices down, Dallas-based Cyrix has long been rumored to be preparing CPU entries and was reportedly conducting discussions with PC manufacturers at COMDEX Spring.



Cyrix plans to announce a 486SX equivalent, the M16, which can upgrade 386SXs.

According to sources close to the company, the new CPU —code-named M16—will be an Intel 486SX equivalent in 20-MHz and 25-MHz clock speeds. It will be followed later this year by the M32, a 486DX equivalent including RISC processing capability.

Neither chip family will have an onboard math coprocessor. Instead, Cyrix will encourage PC makers and users to install its 32-bit 87DLC and 16-bit 87SLC math coprocessors for the M32 and M16 families, respectively.

The M16 has a 16-bit pinout so it can be plugged into 386SX sockets to upgrade. Cyrix is targeting the huge installed base of 386SX systems with the M16's plug-and-play compatibility. In addition, the chip reportedly offers 486 performance and is compatible with the 486 instruction set.

The M16 will be user installable, but the coprocessor must be surface mounted and installation will require dealer assistance. Both of the chips are small, low-power (3-volt) parts —appropriate for notebooks as well as desktops. Sources say that together they require less motherboard real estate than even an Intel 486DX.

The new CPUs reportedly will be priced at 386 rather than 486 levels. Cyrix would not comment on release dates, but the company is already sampling parts and is expected to ship in volume to PC makers in April. It was unclear when supplies of user-upgradable CPUs will appear.

—Mike Hogan

Microsoft Sends Lotus a Letter Bomb

With the release of the *Windows* version of *Microsoft Mail 3.0* this summer, Microsoft takes the first step in its campaign to unseat Lotus as ruler of the E-mail market and gain a fundamental advantage in groupware.

Mail 3.0 is the first fully rewritten version of Consumer Software's *Network Courier,* which Microsoft purchased last year. It features a faster interface that takes better advantage of the *Windows* environment and offers several improvements over Lotus's *cc:Mail for Windows.* For instance, *Mail 3.0* gives users a split-screen view of files and folders and provides drag-and-drop filing of messages to folders, the out-box, or a wastebasket. *Mail 3.0* is OLE-capable so text, graphics, sound, and animation can be inserted anywhere in a message; double-clicking on an embedded file icon launches the application that created the file.

Much like Beyond's *BeyondMail, Mail 3.0* provides an easy way to filter incoming messages by sender name, subject, and keywords from the text. Like messages are automatically assembled under finder icons at the bottom of the application window for quick review. However, *Mail 3.0* cannot automatically sort mail into folders and doesn't yet include agents to launch other applications upon receipt of triggering messages.

Microsoft Mail 3.0 will include a driver so that it can be used as a front end to *cc:Mail for Windows.*

Lotus is already preparing a response. Look for enhanced versions of its *cc:Mail* for DOS in May, with a *Windows* revision later this year.

Mail 3.0 is Microsoft's first product to include MAPI, a *Windows*-centric application programming interface.

—Mike Hogan

Microsoft Catches the Fox

Microsoft's purchase of tiny Fox Software, maker of the highly acclaimed *FoxPro dBASE*-compatible data base program, should improve the product's marketing and development pace, users and analysts say.

The Fox purchase also fills a hole in Microsoft's product lineup and gives Microsoft the ammunition to battle Borland International, maker of *Paradox,* in the data base market. Last year Borland purchased *dBASE* creator Ashton-Tate, and it now controls more than 70 percent of the data base market, according to industry analysts.

Microsoft plans to incorporate Fox's performance-boosting Rushmore technology into future versions of *SQL Server* and into *Cirrus,* the code name for Microsoft's upcoming *Windows* data base program. The initial release of *Cirrus,* however, is not expected to include Rushmore.

The deal calls for Fox Software president David Fulton to take charge of Microsoft's new data base division. A team of *FoxPro* developers will take up residence in Microsoft's Redmond, Washington, headquarters to work on future data base products.

Data base consultant Pat Adams of Brooklyn sees the Microsoft-Fox merger as a "win win" situation for users and developers. Fox's weakness was marketing, Adams says, but with Microsoft's resources, *FoxPro* will get much greater exposure, and its development team will produce updates much faster, she predicts. *—Jeff Bertolucci*

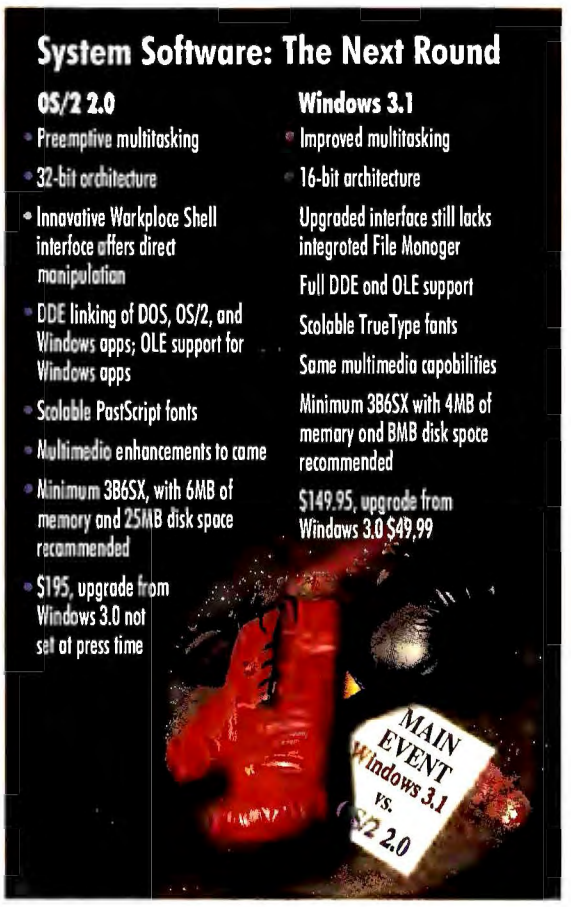
All You Want From Windows and More

The much-heralded OS/2 provides the promised "seamless" support for *Windows* applications (i.e., you can launch multiple *Windows* programs from Presentation Manager's Workplace Shell, and they'll run within PM windows). The ability to run multiple DOS and *Windows* applications unmodified plus improved network support and compatibility with a wide range of non-IBM hardware combine to support IBM's promotion of the new OS/2 as "a better *Windows* than *Windows*," users say.

OS/2 version 2.0 was scheduled to be available for large customers to download directly from IBM at the end of March, and the package was expected to work its way through the retail pipeline during the first few weeks of April. The new release allows full Object Linking and Embedding (OLE) links only between *Windows* applications. However, Lucy Baney, IBM's Personal Systems director for programming systems market development, says that Dynamic Data Exchange (DDE) between DOS, *Windows*, and OS/2 applications is fully supported in OS/2 version 2.0.

The new icon-driven Workplace Shell boasts drag-and-drop capabilities and is LAN aware, simplifying network access, she says. Once an OS/2 2.0 workstation is configured by an administrator on a LAN server, NetWare, or SNA network, the user can access network and host resources simply by selecting an icon on the desktop, Baney explains.

"They have really come a long way," says Cheryl Currid, president of Currid & Co., a Houston-based consulting firm. "They've created something that's technically really darn good." —*Rob Garretson*

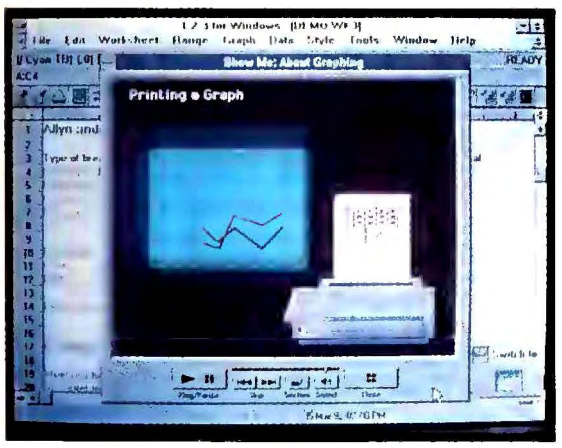


Here's how the operating systems weigh in.

Multimedia 1-2-3: Just-in-Time Learning

Lotus Development is rolling out an ambitious plan to transform its applications into full-fledged multimedia programs, beginning with its flagship *1-2-3*.

1-2-3 for Windows With Multimedia SmartHelp, due later this year on CD, provides a 40-minute guided tour of the application and includes dozens of "show me" help movies that explain concepts, such as what a solver is, and procedures, such as how to create a graph. To run a movie, users simply access help. Watching a procedural movie, you can toggle back and forth, pausing the demonstration to return to your document and complete an action and then jumping back to the movie to see how to accomplish the next step. All documentation is also on the disk, which will be sold for the same price as *1-2-3 for Windows* but will require a CD ROM drive.



1-2-3 for Windows goes multimedia and shortens the learning curve for users.

This type of just-in-time learning is planned for all Lotus products, says Steve Barlow, multimedia product manager at Lotus.

The use of multimedia in training "is fundamental and will touch all users," he says.

Lotus plans to add sound and animation features to *cc:Mail* and *Freelance*. The company also is creating a version of *CD/Networker* that will enable multiple users to access *1-2-3 for Windows With Multimedia SmartHelp*.

—*Russell Glitman*

IBM Opens Direct Line to Users

Aiming to turn direct vendor support into a competitive advantage while laying the foundation for a push into low-margin channels like superstores and direct mail, IBM has opened a nationwide toll-free customer hot line. Big Blue expects a million calls a year on the line, 800/772-2227, which is open from 9 to 5, Monday through Friday.

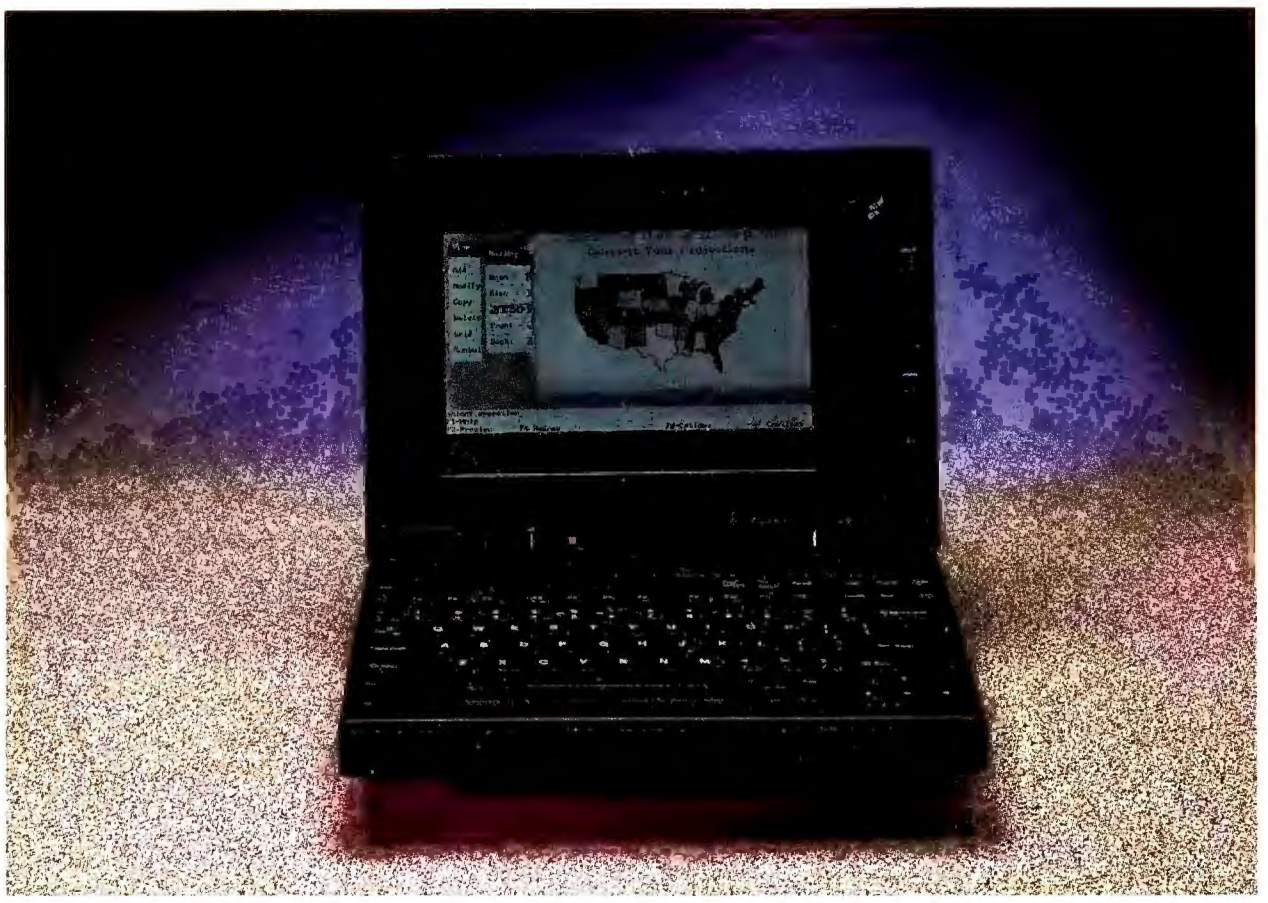
IBM customers seeking technical help traditionally are told to call their dealers, and "sometimes it's very difficult to get access to IBM," notes Larry Deaton, director of Personal Systems services and customer support. The new HelpCenter, located in Atlanta, aims to solve that problem. When you dial in with a question about a PS/2 you're thinking of buying, or when you hit a technical snag after the sale, "the IBMer who answers your call owns your problem until it's solved," Deaton says.

Winnie Briney, vice president for marketing support at IBM's National Distribution division, says the HelpCenter will refer sales leads to dealers and supplement rather than replace dealer support. But "we are looking seriously at alternative channels . . . to have a safety net for support," she acknowledges. "The day may come when we sell direct through an 800 number. We intend to sell where the customer wants to buy."

Analysts said the move makes sense as IBM seeks to reverse its slide in market share. But International Data Corporation's Bruce Stephen cautions that while IBM and other vendors aim to turn support into a competitive weapon, customers won't pay much extra for the added comfort level. —*Eric Bender*

At Last, a Real Notebook From IBM

It's no speed demon, but it's well built and aggressively priced.



IBM's 6.2-pound PS note lists for less than $2500, but it has a base battery life of under 2 hours.

by Rob Garretson

If it were spring 1991, IBM's new PS note (officially the PS/2 Model N51 SX) would be one of the hottest machines on the market. Not only would it be an innovative combination of refinements to portable computing, but its rock-bottom pricing would be turning the PC industry upside down.

It's a year later, however, and IBM's first true notebook PC doesn't push the excitement meter much past the halfway mark. True, IBM has finally gotten a portable PC right with its 6.2-pound PS note—including a price around $2500 (less than $2000 on the street). But it's hard to get excited about a 16-MHz 386SX notebook with a 40MB hard disk when the 20-MHz SX is already a notebook standard and the first 25-MHz SL machines are in users' hands.

Nonetheless, IBM has succeeded admirably in eliminating the primary flaws that marred its bulky and overpriced PS/2 Model L40 SX. At 8.3 by 11.7 by 2.1 inches, the all-black PS note isn't the trimmest notebook around, but it fits comfortably into a full-size briefcase.

The battery is where IBM's technology both shines and disappoints. While the nickel-cadmium cell promises less than 2 hours of power, the machine comes with two batteries that are interchangeable on the fly. IBM also offers optional nickel metal-hydride batteries that last about 15 percent longer. One of the few innovations in the PS note is its hefty 3.3-pound optional external battery pack, which provides up to 6 additional hours of operation—enough for the longest coast-to-coast flights.

Its 9½-inch sidelit LCD screen is significantly brighter and sharper than the Model L40's. The VGA screen streaks when displaying dark shades of gray as background colors, but running *Windows* with lighter screen colors markedly reduces the effect.

As with past IBM portables, the keyboard is among the PS note's best features. The 84-key keyboard maintains IBM's solid, full-travel feel and standard 19mm spacing between keys. It includes the inverted-T cursor-key layout and dedicated <Page Up>, <Delete>, <Insert>, <Page Down>, <Home>, and <End> keys. A numeric keypad, lacking in the L40, is embedded in the QWERTY keyboard.

In light of its dubious ancestry—the IBM Portable PC, the PC Convertible, and the L40 SX—the N51 SX is a competitive product. If only it had shown up last year.

Rob Garretson is a freelance writer in North Andover, Massachusetts.

SNAPSHOT

PS note

This 16-MHz 386SX notebook PC is a bit behind the times, but it's a solid performer that provides most of today's bells and whistles at a competitive price.

KEY FEATURES

- **Sleek, black, 8.3-by-11.7-by-2.1-inch case**
- **Solid, well-designed 84-key keyboard**
- **Improved sidelit supertwist LCD**
- **Optional external battery pack that can stretch battery operation up to 10 hours**

AVAILABILITY

Immediate

PRICING

Still fluid at press time but likely to settle below $2500 list, with retail and volume discounts pushing street prices below $2000

IBM
1133 Westchester Ave.
White Plains, NY 10604
800/426-2468
Reader service no. 762

QuickBooks Opens the Ledger

Intuit's QuickBooks takes small businesses into account.

by Steve Bass

Like a lot of small-business owners, I'd sooner scrub office floors than attempt to use my current accounting program. It's a tedious and often confusing chore. *QuickBooks,* Intuit's new accounting package, doesn't make it fun, but it does offer an easy and painless way to keep your books in order.

With its *Quicken* interface, *QuickBooks* will seem like an old, trusted friend to small-business owners who've relied on Intuit's best-selling personal finance package to manage their books. But unlike *Quicken, QuickBooks* is designed for small businesses, which Intuit defines as firms with fewer than 20 employees.

Although *QuickBooks* is a full-fledged, double-entry accounting package, it insulates users from most standard accounting terminology. It's also remarkably easy to use, boasting plenty of pop-up lists and keyboard shortcuts. *QuickBooks* offers extensive hand-holding, including context-sensitive help, a well-organized manual, and QuickTrainer, a comprehensive online tutorial that pops up how-to information whenever the keyboard sits idle for too long. You can adjust QuickTrainer's response time or disable it altogether. The program can maintain accounts for 1000 customers and 1000 vendors.

One of the most cumbersome and daunting accounting tasks is setting up the books. *QuickBooks* simplifies this chore by offering preset income and expense accounts for 20 types of businesses. And in a move guaranteed to please many small-business owners —and put a few accountants on edge—*QuickBooks* does away with arcane account numbers, relying instead on simple account names.

Money In, Money Out

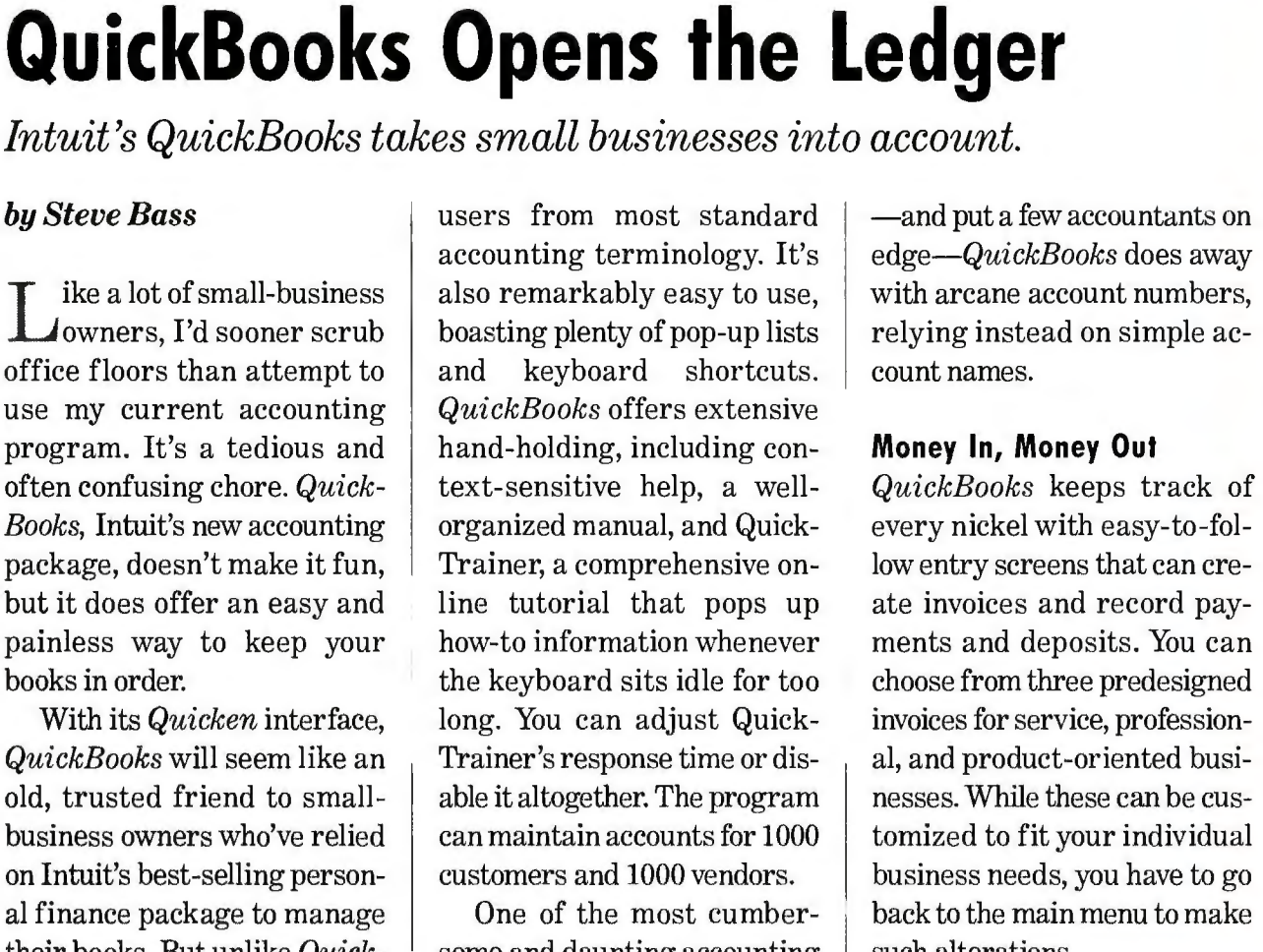
QuickBooks keeps track of every nickel with easy-to-follow entry screens that can create invoices and record payments and deposits. You can choose from three predesigned invoices for service, professional, and product-oriented businesses. While these can be customized to fit your individual business needs, you have to go back to the main menu to make such alterations.

The accounts payable section looks like a checkbook register and is just as easy to fill out. Type in the first few letters of a payee's name: If the information's already in your data base, the program fills in the rest. Otherwise, a payee list appears on screen, which you can amend or use to find the correct account. These lookup tables are available within each module and include lists for customers, vendors, employees, payment terms and methods, and shipping methods.

QuickBooks features standard reports: profit and loss, balance sheet, cash flow, and others. But what sets the report function apart from other accounting programs' is its broad customizing features and the capability to create reports from scratch with only a minimum of effort.

This is a great program if you're more interested in running your small business than becoming an accountant.

Steve Bass is a contributing editor for PC World *and president of PCG Seminars, where he trains psychologists in small-business practices.*



QuickBooks helps you manage your books without resorting to arcane accounting terminology.

SNAPSHOT

QuickBooks

Intuit's easy-to-use and comprehensive accounting package is designed for small businesses.

KEY FEATURES

- **Invisible double-entry accounting**
- **Easy and intuitive; familiar Quicken interface**
- **Plenty of shortcut keys**
- **Comprehensive context-sensitive help**

AVAILABILITY

Immediate

PRICING

$139.95

Intuit
P.O. Box 3014
Menlo Park, CA 94026
800/624-8742,
415/322-0573

NEW PRODUCTS

Edited by RUSSELL GLITMAN

CompuAdd Turns Up the Heat

Two new 486 desktops with a 12.5-MHz graphics slot and card speed up publishing and CAD apps and give Windows extra pep.

Promising faster graphics at competitive prices, CompuAdd Computer's new upgradable 486SX 420s (shown above) and 486DX 433 feature a special 12.5-MHz ISA bus slot for the company's Hi-Rez VGA video controller.

Faster graphics and lower prices typically mix like oil and water. But don't tell that to CompuAdd Corporation. The Austin, Texas, direct marketer has launched two low-priced 486 desktops that feature a high-speed expansion slot and graphics card to boost the performance of graphics programs.

The 20-MHz 420s is CompuAdd's first 486SX desktop. The 33-MHz 486DX 433 is the ISA version of the company's 433E EISA PC. Both systems have what CompuAdd engineers call a "hot slot"—a dedicated graphics expansion slot on the ISA bus designed to work with CompuAdd's Hi-Rez VGA video controller card.

Together, the hot slot and the Hi-Rez controller can boost the performance of graphics-intensive applications such as desktop publishing and computer-aided design by about 30 percent, says CompuAdd. Used with CompuAdd's proprietary Hi-Rez card, the hot slot runs at 12.5 MHz instead of the standard 8 MHz of the AT (ISA) bus. You'll see some performance gains running *Windows* with this graphics combo, but not nearly what you'll get from accelerator chips specifically designed to enhance the performance of *Windows*.

Both the 420s and the 433 have a secondary 64K RAM cache (expandable to 256K) to boost performance. Both come with a Weitek 4167 math coprocessor socket. To push performance even further, the systems also have an OverDrive socket, which accepts the Intel 487SX (unnecessary in the 433) or one of Intel's new speed doubler OverDrive 486 chips. The systems will automatically recognize the new CPU—no jumper, BIOS, or software changes are necessary.

Standard features on the 420s and 433 include 4MB RAM, expandable to 64MB, an IDE floppy/hard drive interface, two serial ports, and one parallel port. CompuAdd preloads both MS-DOS 5.0 and *Windows 3.0* and provides free, on-site service for one year and unlimited toll-free technical support for the life of the product. A wide variety of options including tape backup units, CD ROM drives, modems, and RAM upgrades are available.

Priced at $2195, the 420s includes a 40MB hard drive, 5¼- and 3½-inch floppy drives, and a high-resolution (1024 by 768) VGA monitor. The same configuration with a monochrome monitor costs $1895.

The 433, available with a desktop or tower chassis, is priced at $2795. It includes the same features as the 420s except for its larger 80MB hard drive. With a monochrome monitor the 433 costs $2495.

If these systems are more machine than you need, CompuAdd's existing lineup is priced competitively. For example, CompuAdd's 333 desktop model costs $2195 and features a 33-MHz 386 CPU, 4MB of RAM, a 120MB hard drive, and a high-resolution VGA monitor. Not the cheapest 386 on the block, certainly, but one backed by CompuAdd's respected service and support.

—Jeff Bertolucci

IN BRIEF

486SX 420s, 486DX 433

Two competitively priced 486 PCs from CompuAdd that feature a high-speed, dedicated graphics slot on the ISA bus.

CompuAdd Computer
12303 Technology Blvd.
Austin, TX 78727
800/456-3116,
512/250-2070 (fax)
Reader service no. 620

An Uncommon Scanner for the Common Scan

If you're intrigued by desktop scanners but wary of their cost and complexity, Hewlett-Packard would like a personal word with you. HP's new personal scanner, the ScanJet IIP, makes it easy to add sharp images to your presentations or pull hard copy text onto your hard disk. And at $1295 list—under $1000 on the street—it's at the bargain end of the price range for full-page scanners.

But the real story is the IIP's simplicity. The 300-dpi unit automatically detects what kind of image you're scanning—black-and-white line art or a gray-scale photo—and adjusts resolution, brightness, and contrast settings to achieve the highest quality scan. You can also adjust settings manually, cranking resolution up to 1200 dpi for sharper line art, and capture up to 256 shades of gray per image. You can calibrate scan settings to match your output device, or use one of the custom configurations that ship with the unit. And if you get bogged down, you can always call on the scanner's on-line help.

The best news is yet to come. Because the IIP works with the new Twain imaging standard, you'll be able to scan images directly into your document when using any Twain-supported *Windows* application. Just choose the scan option from the application's file menu, accept the default scan settings, and the image appears at the cursor. (At press time only ZSoft's low-end image editor, *PhotoFinish*, supported Twain; other major *Windows* vendors are expected to ship Twain products before year-end.)

But image scanning is only half the story. If you want to convert scanned text pages into editable files, you'll need optical character recognition (OCR) software. The ScanJet IIP ships with a trial version of Caere's *OmniPage Direct*, good for scanning 25 pages. *OmniPage* lets you scan text directly into any *Windows* word processor, page-layout program, or spreadsheet. The program recognizes virtually any font from 6 to 72 points and can retain text characteristics such as serifs, underlining, and boldface. A pop-up window lets you preview the page as you scan, and the software automatically adjusts settings to compensate for lower quality originals.

Buy the $300 package—discounted from $595—and you'll get a code word that turns the trial version into the real thing. But remember: you'll need a 386 or better with at least 4MB of RAM and *Windows*.

The IIP replaces the HP ScanJet Plus line and comes with *PhotoFinish*. The 12-by-16-inch unit handles originals up to 8.5 by 11 inches; a 20-sheet automatic document feeder costs $395. As usual, HP backs its workmanship with a one-year warranty.

—Daniel Tynan

With street prices under $1000, Hewlett-Packard's new ScanJet IIP makes it affordable to scan in gray-scale photos and text.

IN BRIEF

ScanJet IIP

HP gets personal with a low-cost scanner that's remarkably easy to use.

HP ScanJet IIP
Hewlett-Packard Co.
19310 Pruneridge Ave.
Cupertino, CA 95014
800/752-0900,
208/344-4809 (fax)
Reader service no. 621

Powerful Systems With Your Choice of Options

The Pylon line of PCs from Silicon Valley Computer is built with expansion in mind. These tower and desktop models feature plenty of drive bays and power supplies with enough horsepower to expand right along with your business.

The Pylon Desktop—the lone desktop in the Pylon clan—features five drive bays and eight expansion slots. You choose between a variety of 386 and 486 processors, monitors, RAM, and more to create a PC that's essentially custom-configured to your needs and budget. For instance, a 33-MHz 386DX Pylon Desktop with a floppy drive and 1MB of RAM is priced at $925. Add a 120MB hard drive, a 1024 by 768 VGA monitor, a video controller, and an additional 4MB RAM, and the system cost climbs to $1595.

Designed primarily as a network file server, the Pylon I is a behemoth tower machine with eight drive bays and a 230-watt power supply. The smaller Pylon II tower has six drive bays. The Pylon III, which also stands upright but is small enough to fit on a large desk, has four drive bays. Both the Pylon II and III come with a 200-watt power supply. Prices are comparable to those of the Pylon Desktop. Take the same base 386/33 configuration listed above, and you'll pay $1645 for the Pylon I, $1595 for the Pylon II,and $1575 for the Pylon III.

Standard features of the Pylon line include 1MB of RAM (expandable to 32MB on the motherboard and 64MB total using an add-in board); a math coprocessor socket; and switches for power, keylock, and reset on the front of the machine for easy access. For an extra performance boost, some models have a 64K or 256K RAM cache, which costs a little more. For example, a bare-bones 386SX/25 with no cache costs $685 but runs $745 with a 64K RAM cache, says Silicon Valley Computer.

With plenty of space inside for more drives and boards, the Pylon line of PCs won't run out of room any time soon.

—Jeff Bertolucci

IN BRIEF

Pylon PC line

Four tower and desktop PCs from Silicon Valley Computer that offer plenty of drive bays for expanding businesses.

Silicon Valley Computer
441 N. Whisman Rd.,
Bldg. 13
Mountain View, CA 94043
415/967-1100,
415/967-0770 (fax)
Reader service no. 622

These Clones Stand Alone

The Klonimus line of desktop and notebook PCs from QSI includes the new 486/50 model, which costs just over $3500.

In the realm of meat-and-potatoes PCs, no clone bears its name more proudly than Klonimus, a little-known line of desktop and laptop systems from Brooklyn-based QSI Corporation. Sold through resellers, distributors, and VARs, the Klonimus desktop line includes everything from 16-MHz 286 to 50-MHz 486 PCs. A line of Klonimus Lite notebooks come in either 286 or 386SX varieties.

The latest member of the Klonimus family, and its most powerful machine to date, is the Klonimus 486/50, a workhorse available as either a desktop or tower unit and built around Intel's speedy 50-MHz 486 chip.

Standard features include a minimum of 2MB RAM (expandable to 64MB), a socket for a Weitek 4167 math coprocessor, a 64K RAM secondary cache (expandable to 256K), eight 16-bit ISA I/O slots, and one parallel, one game, and two serial ports.

These systems are competitively priced. For example, the 486/50 PC with 4MB of RAM, a 120MB hard drive, two floppies, a super-VGA monitor, DOS 5.0, and *Windows 3.0* costs $3554—a good price for a fully configured 50-MHz 486.

The other desktop models include a 486/33, a 386/33, a 386/25, a 386/20SX, and a 286/16. Each model is available in a variety of configurations.

The Klonimus Lite notebook line holds up to two battery packs, which together provide up to 6 hours of operation, according to QSI. You can use the extra battery bay for an Ethernet LAN pack ($300) or modem pack ($200).

The 386SX notebook configured with 2MB of RAM and a 20MB hard drive costs $2200. A similarly configured 286 notebook costs $1700.

—Jeff Bertolucci

IN BRIEF

Klonimus

A line of desktop and notebook PCs ranging from 286s to 50-MHz 486s.

QSI Corp.
95 Rockwell Pl.
Brooklyn, NY 11217
718/834-4545,
718/834-5318 (fax)
Reader service no. 627

Epson's ActionPrinter Has Redefined Dot Matrix

Epson claims that when it began work on its new low-cost ActionPrinter 3250 dot matrix printer, it paid no attention to previous printer designs. Instead, the company went directly to buyers and asked them what they wanted in a printer. As a result, the $299 ActionPrinter AP-3250 looks like no other dot matrix on the market.

One thing buyers disliked was a desk-hogging design. So the AP-3250 has a tiny 148-square-inch footprint. If that's still too big, you can stand the printer on its side, cutting the footprint in half. If even that's too big for you, Epson says its designers are working on a caddie that will hang the printer off the side of your desk.

Users also said they don't like complicated front control panels, so Epson has stripped the AP-3250's down to a couple of LEDs and two buttons. Configuring the printer is easy: the machine prints a series of questions with yes/no answers and you answer by pressing the appropriate control button. Thanks to thick foam padding and an enclosed printhead, the AP-3250 is also quiet: its noise level has been reduced to 50db, nearly as quiet as a laser.

The AP-3250 comes with Epson's ESC/P2 control language, which gives you two scalable typefaces; you also get five bit-mapped resident fonts. The printer produces graphics at up to 360-dpi resolution and prints at a respectable 200 cps in draft mode.

—Dan Miller

IN BRIEF

ActionPrinter 3250

The AP-3250 is easy to use and, at $299 list, easy to buy.

Epson America Inc.
20770 Madrona Ave.
Torrance, CA 90503
800/922-8911,
310/782-0770
Reader service no. 628

Epson redesigns the dot matrix. The ActionPrinter 3250 has a tiny 148-square-inch footprint and runs almost as quietly as a laser.

The Experts in Accessories

Manufacturing Company, Inc.
CURTIS

Computer Cleaning Kits Clean Screen anti static wipes #CK 3 Retail $9.95. Clean Mouse with 2 scrubbing balls fits any mouse #MC 1 Retail $14.95. Clean Drive for 3½" or 5¼" disk drives #Ck 4 (5¼") Retail $9.95. #Ck 5 (3½") Retail $9.95

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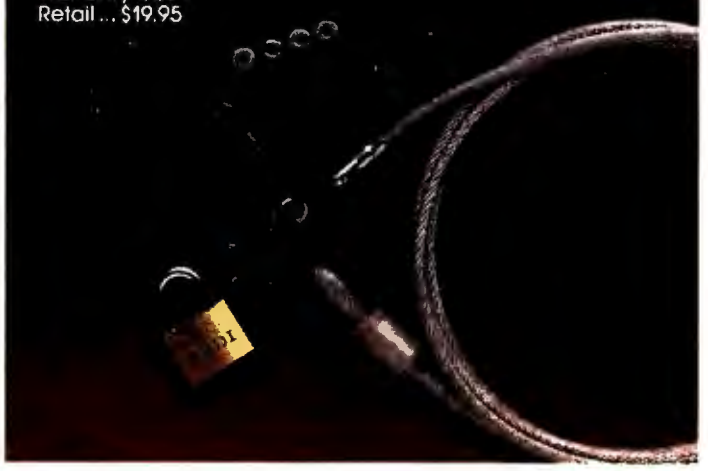

Safe-Fax*: Single outlet AC and phone line surge protection for FAX/telephone/modem/etc. UL 1449 TVSS Listed, CSA approved. Full One Year Warranty. #SF-1 Retail ... $29.95

Keyboard Calculator: Calculate without interrupting your computer program. Solar power, 8 character LCD. Full One Year Warranty #KC-1 Retail ... $9.95

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CURTIS

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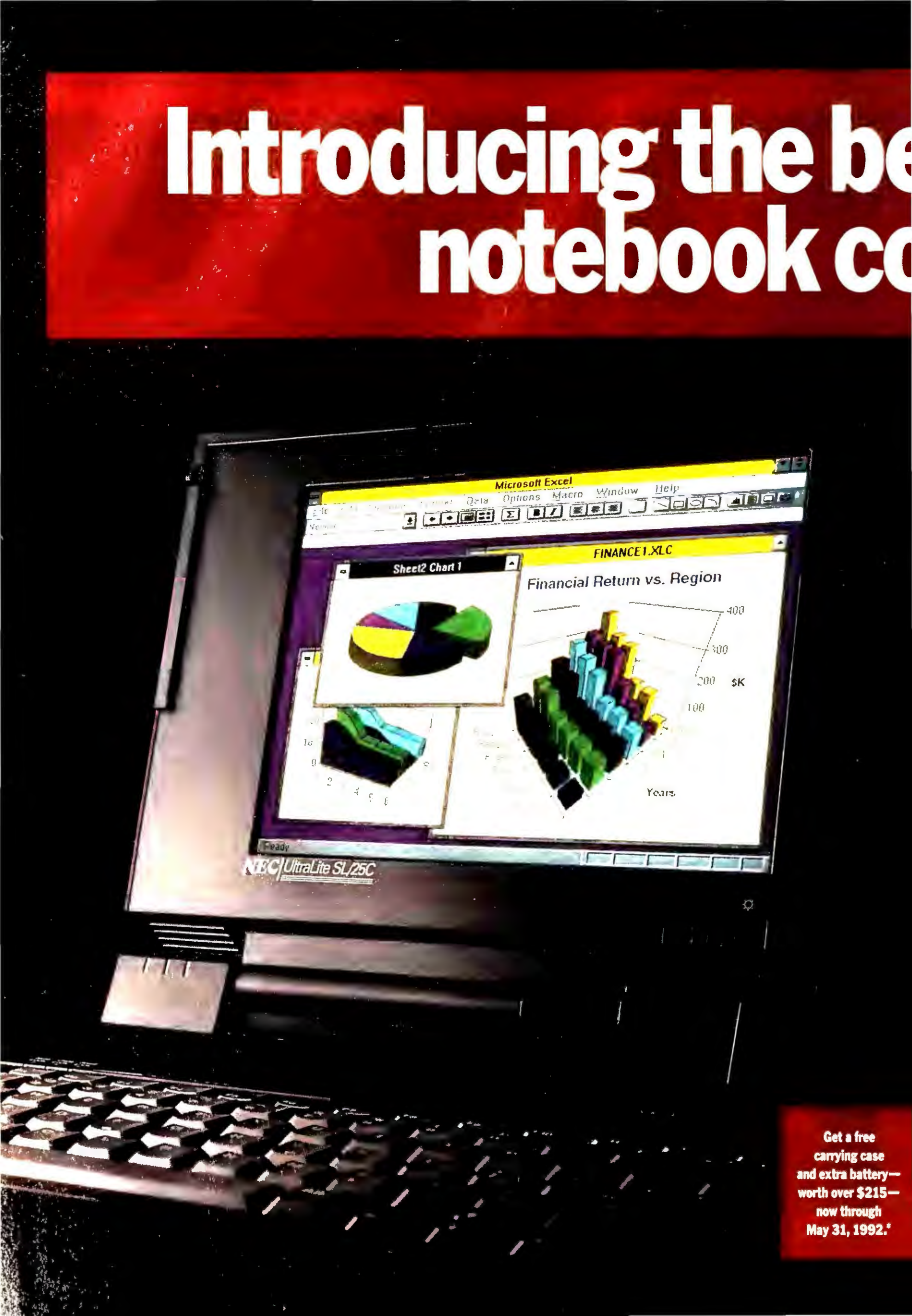
Introducing the be
notebook co



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st color display in a mputer. Ever.

In its review of our UltraLite® SL/25C notebook, *PC Magazine* said, "NEC is about to make the future of portable computing a whole lot brighter."

We couldn't agree more.

The best color display in a notebook. Ever.

The fact is, NEC is the first to offer an active-matrix TFT color screen in a notebook, and yet, in the words of *PC Magazine*, "its price tag rivals lower-quality passive-matrix offerings."

What's the difference between active-matrix and passive-matrix color screens? One looks vivid, sharp and bright, like your desktop monitor. The other doesn't. One can be viewed from wide angles. The other can't. One is clearly the future of notebook computing. The other isn't.

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To quote *PC Magazine* once more, our SL/25C "has more going for it than just spectacular color. It's also one of the first notebooks to use Intel's new 25-MHz 386SL chip set."

The new chip provides all the processing punch of a 386 desktop PC. Offers intelligent power management for longer battery life. And runs even the most complex applications at blazing speed. The 7.5 lb. SL/25C comes standard with 2MB of RAM (expandable to 10MB), an 80MB hard disk, internal floppy and 64KB cache. As well as MS-DOS® 5.0 and Windows,™ loaded and ready to run.

Just what exactly is active-matrix TFT display anyhow?

Active matrix TFT (thin-film transistor) display means that for each pixel on the screen, there is a tiny transistor. In the case of the SL/25C, that adds up to over 900,000 transistors covering the entire screen, forming the image. With each pixel controlled by its own transistor, the image is always in sharp focus, and far brighter than other screen designs permit. NEC has long been a world leader in display technology. And the SL/25C is one example of this.

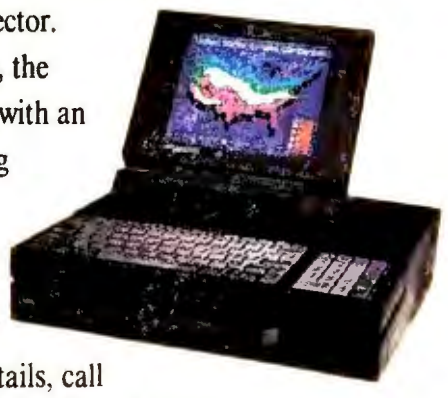
It does everything a powerful desktop does. Except chain you to a desk.

There's a serial port, SuperVGA CRT port, PS/2® mouse port and optional internal modem. An enhanced parallel port allowing improved throughput for network connections. And an optional full-function, portable Docking Station™ unit—with two expansion slots and a 3.5″ drive bay—that not only turns the SL/25C into a desktop you can take anywhere, it also gives you other options, like fully integrating sound and image to create your very own portable multimedia platform.

A powerful argument for color, right here in black and white.

It also has a brilliant VGA display. A palette of over 225,000 colors. A fast screen refresh rate (so you never lose your cursor). And a "simultaneous video" feature—so the image you see on your screen can also be viewed on an external video device, like a big-screen projector.

Shown with optional Docking Station.



What's more, the SL/25C comes with an industry-leading 2-year limited warranty.

Call today.

For more details, call 1-800-NEC-INFO. Or call NEC FastFacts™ at 1-800-366-0476, #ULSL25C (8575252). In Canada, call 1-800-343-4418.

We'll give you enough information about the SL/25C to make you not want to be without it. Ever.

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Circle 188 on reader service card

UltraLite is a registered trademark of NEC Corp. Docking Station is a trademark of NEC Home Electronics, Inc. PS/2 is a registered trademark of IBM Corp. MS-DOS is a registered trademark and Windows is a trademark of Microsoft Corp. Intel and 386SL are trademarks of Intel Corp © 1992 NEC Technologies Inc
*See participating dealers for details. Offer good only with purchase of an UltraLite SL/25C. $215 is suggested retail price.

Shopping for Windows Shareware

These extensive collections of Windows shareware programs ensure that you have the right application at the right time—all the time.

Need the right Windows application at the right time? WinLib Library lets you browse through a wealth of shareware listings.

Would you like access to as many *Windows* programs as you could possibly use? Would you enjoy tinkering around with new software more if you didn't have to buy each program first?

Believe it or not, all this and more could be yours (and you don't need a job at *PC World* to get it). For less than $200, you can buy an amazingly complete collection of *Windows* shareware that will keep you happily playing for days—and productive for a lot longer.

Two such collections are currently on the market. One of them, *Windows Shareware Gold*, is a joint venture by Nuclear Computing and the Digital Publishing Company. *Windows Shareware Gold* is a $179 CD ROM containing 366 programs, 100 bit-mapped images, 120 PostScript fonts, and over 3000 icons. Your other option is the *WinLib Library* collection from EMS Professional Shareware Libraries. It comes on 120 360K floppies, or 30 1.44MB floppies, for $149 (a CD ROM version, priced differently, may be available by the time you read this).

If you don't want the whole megillah, EMS sells smaller collections for $59.50 apiece. These consist of *Windows* applications, utilities, fonts, Visual Basic tools, and fun stuff (icons, games, and wallpaper) from the *WinLib Library* collection.

An important caveat: You're *not* actually buying the software, merely paying for the service of having it collected and sent to you in an easy-to-manage format. If you like a program from the collection and decide to use it regularly, you're expected to register it with the original developer—and pay a registration fee.

If you tend to think of shareware as a good place to catch a virus—have no fear. All the programs included in *WinLib Library* and *Windows Shareware Gold* are scanned for viruses when the packages are assembled.

It seems strange to spend $100 to $200 for software you haven't even bought, but when you compare the cost of one of these collections to what you'd pay in CompuServe on-line charges for the same programs, it quickly becomes apparent that these are good deals. Besides, it's nice to have the program you need at hand when you realize you need it.

—Lincoln Spector

IN BRIEF

WinLib Library

WINDOWS An exhaustive collection of Windows shareware programs and graphics on 120 floppies.

EMS Professional Shareware
4505 Buckhurst Ct.
Olney, MD 20832-1830
301/924-3594,
301/963-2708 (fax)
Reader service no. 629

Windows Shareware Gold

WINDOWS Over 350 programs, 100 bit-mapped images, 120 PostScript fonts, and 3000 icons come together on one CD ROM disk.

Nuclear Computing
P. O. Box 15757
North Hollywood, CA 91615
800/824-1406,
818/764-5374,
818/764-5374 ext. 5 (fax)
Reader service no. 630

Digital Publishing Co.
8100 Wayzata Blvd.
Golden Valley, MN 55426
800/279-6099,
612/595-0802 (fax)
Reader service no. 631

Low-Cost Desktop Publishing

One predictable thing about lists is that they always change. Names are added, affiliations deleted, phone numbers changed, and titles updated. For many of us, it's hard to keep up with all this flux and impractical to print frequent updates.

Instant Directory solves the conundrum of updating and printing phone books, employee directories, and membership lists. This easy-to-use $149 package lets you quickly design a directory, import XBASE (DBF format) files, or input your own data, and then produce professional quality output on Epson dot matrix, LaserJet, PostScript, and compatible printers.

You can choose from more than 35 types of directories in a variety of styles. *Instant Directory* handles the difficult formatting and layout tasks for you and comes with ten fonts.

Designing lists is easy. Select a template and either type in your data or import the information from your *dBASE* files. *Instant Directory* lets you define up to two additional fields, and you can sort your data in a number of ways, all of which gives you a fair amount of flexibility in design. You can also create two- or three-column mailing labels.

Instant Directory requires 480K of RAM, 3.5MB of hard disk space, and a 286 or better to ensure decent performance.

—Mark Brownstein

IN BRIEF

Instant Directory

A simple publishing program that produces quality directories and labels on a variety of printers.

Digital Composition Systems Inc.
1715 W. Northern Ave.
#201
Phoenix, AZ 85021
800/527-2506,
602/870-7668 (fax)
Reader service no. 637

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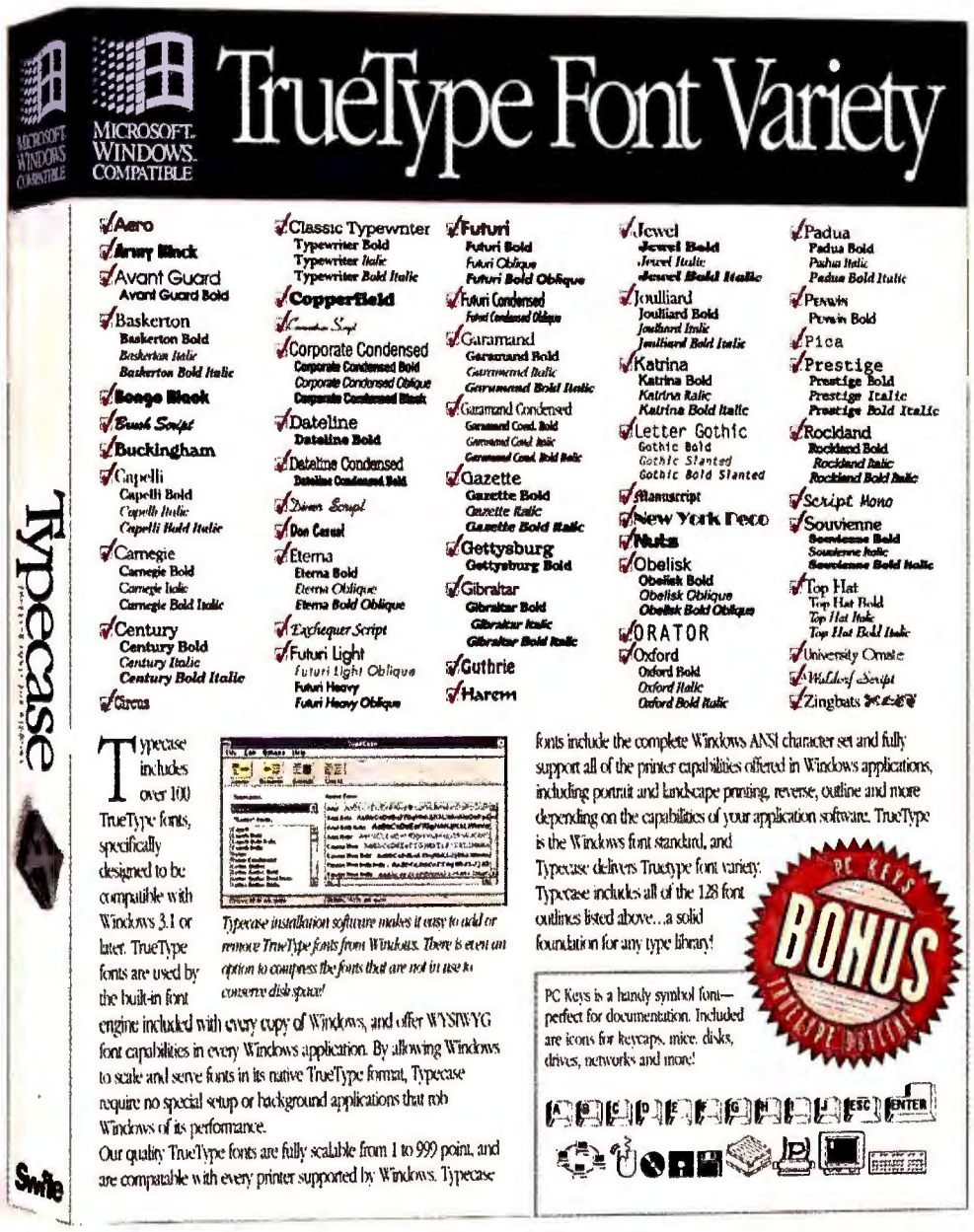

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800-237-9383

Typecase™ is a collection of over 130 TrueType fonts that install seamlessly into your copy of Windows 3.1. Microsoft TrueType is the new font scaling engine that is included with every copy of Windows 3.1, and Typecase delivers a library of fonts that takes advantage of this new font standard today.

Unlike competing font solutions, Typecase fonts require no special setup or applications that can rob Windows of its performance. Best of all, TrueType fonts are scalable from 1 to 999 point, depending on the capabilities of your applications. From scaling to printer and display support...if Windows offers it, Typecase fonts deliver.

In addition to the font library, Typecase includes font management software that allows you to create font collections that make it easy to install or remove fonts from Windows. Typecase also offers an option to quickly archive groups of inactive fonts, saving valuable disk space and system resources.

For a limited time, we're making it easy to upgrade to Typecase. If you're using any competing font product, call us and we can upgrade you to Typecase for $49.95 plus $7.00 for 2nd day air shipping. You get 130 TrueType fonts, Typecase font management software, a bonus PC Keys™ TrueType font and no headaches.

Typecase is backed by our 60 day no-questions-asked money-back guarantee for complete satisfaction.

Call (800) 237-9383 to order, or for the name of an authorized dealer. Typecase will only be offered at this introductory price through June 30, 1992, so don't be left out. Tap the full power of Microsoft TrueType—order your copy of Typecase today!

Swfte

† Offer good for current licensees of Adobe Type Manager®, Bitstream® Facelift™, Morefonts™, Atech PowerPak for Windows™, Hewlett-Packard® Soft Fonts and Painter Font Cartridges, and other Printer Font Cartridges used. Offer expires June 30, 1992. Limit one per customer. Reseller prices may vary. Offer good only in the United States and Canada. ©1992 SWFTE International, Ltd. All rights reserved. Microsoft Windows™ and Microsoft TrueType™ are trademarks of Microsoft Corporation. Adobe Type Manager is a trademark of Adobe Systems. SWFTE International Ltd., Stone Mill Office Park, 724 Yorklyn Rd, Hockessin, DE 19707. For more information call (800) 237-9383. In DE (302) 234-1740. Fax (302) 234-1760.

Circle 292 on reader service card

Three Font Cartridges to Enliven Your LaserJet

Thinking about scuttling your LaserJet for the extra fonts of a low-cost PostScript printer? Well, don't abandon ship just yet. A trio of vendors are shipping a raft of printer cartridges offering plug 'n' play access to fonts, graphics, and more for substantially less than a new laser.

JetType IIP

Computer Peripherals' JetType IIP brings the benefits of scalable fonts to owners of the HP LaserJet IIP and IIP Plus. The $249 cartridge features 13 TrueType outlines, scalable from 4 to 999 points in size.

The JetType IIP comes with the same TrueType fonts that are built into *Windows 3.1*, except you get Garamond instead of Courier, a scalable proprietary script face called Swing Bold, and special bit-mapped fonts for printing spreadsheets. The advantage here is speed: Because the fonts are created inside the cartridge, you don't have to wait for *Windows* to rasterize and download them before you can get back to work.

JetType IIP comes with drivers for *WordPerfect 5.0* and *5.1*.

PacificPage II, PacificPage PE 5.0

For those who want their PostScript and HP too, Pacific Data Products is shipping updated versions of its $499 PostScript emulation cartridges: The PacificPage II (for the LaserJet Series II) and PacificPage PE 5.0 (for the IID, IIP, IIP Plus, and LaserJet III family).

In addition to the standard 35 scalable fonts and graphics wizardry, the cartridges accept simultaneous input from multiple ports—good news for busy work groups sharing a printer—and support more paper and envelope sizes.

To punch up your PostScript performance, the $999 PacificPage II/XL bundles the Series II cartridge with a RISC-based accelerator card containing 4MB of printer RAM. Owners of older PacificPage cartridges can obtain the II/XL package for $499; upgrades to the cartridge alone cost $99.

FontMaster

Finally, for users who like to roll their own, Kelly Computing offers a blank programmable cartridge for the Series II and beyond. The FontMaster Cartridge lets you download bit-mapped or scalable fonts, printer macros, scanned images, and electronic forms to the cartridge for faster printing.

The cartridge comes with disks containing 108 bit-mapped fonts in sizes from 6 to 24 points, as well as drivers for *Windows*, *Word*, *WordPerfect*, and *Ventura Publisher*. But customizability doesn't come cheap. The 1MB cartridge, which can hold about 100 of Kelly's bit-mapped fonts, retails for $445; a 2MB version costs $599.

—Daniel Tynan

IN BRIEF

JetType IIP, PacificPage II, PacificPage PE 5.0, FontMaster

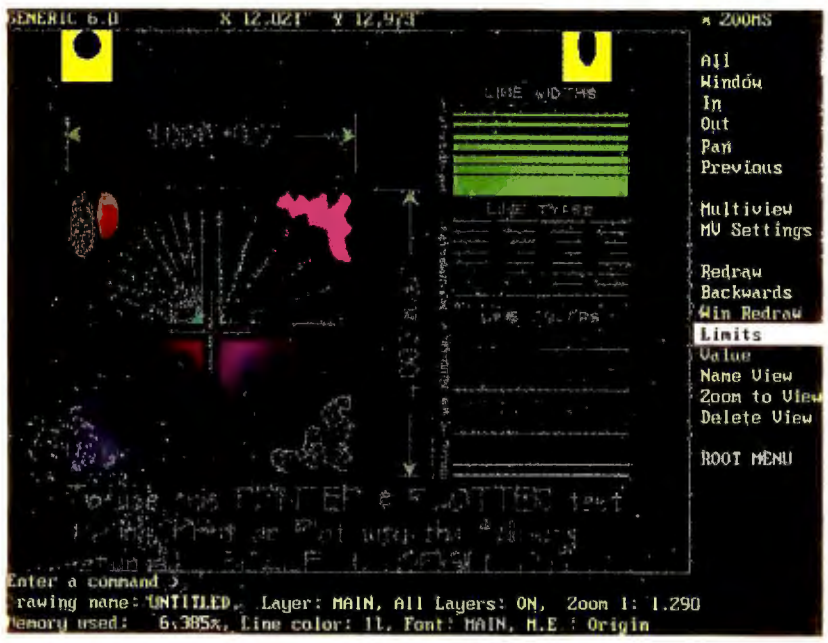
A passel of printer cartridges helps breathe new life into your trusty old LaserJet.

Computer Peripherals, Inc.
667 Rancho Conejo Blvd.
Newbury Park, CA 91320
800/854-7600,
805/499-5742 (fax)
Reader service no. 632

Pacific Data Products
9125 Rehco Rd.
San Diego, CA 92121
619/552-0880,
619/552-0889 (fax)
Reader service no. 633

Kelly Computer Systems
274 Ferguson Dr.
Mountain View, CA 94043
800/627-2000
Reader service no. 634

Generic CADD Draws Attention



Generic CADD 6.0 features a full-featured macro program, faster screen redraws, and extended memory support.

Generic CADD devotees last saw this program revised over a year ago. Power users will find their patience rewarded in *Generic CADD 6.0*, which adds more than 30 enhancements, including direct loading of 2-D *AutoCAD* DWG files. The new release features a built-in DFX file converter to export files to *AutoCAD*, a task previously handled by an optional ($99.95) utility called *Auto Convert*. Moreover, version 6.0 adds support for *AutoCAD* fonts and hatch patterns.

The previous version's limited macro language has been replaced by a full-fledged program that lets a user assign complex functions, such as variables and expressions, to 48 function key combinations. These can be added to the video or digitizer menu.

New is a Bill of Material Generator, a utility that counts and tabulates CADD symbols and attribute information to generate parts and costs reports. It imports and exports WK1 files. Extended memory support, significantly faster screen redraws, better networking capability, metric configuration options, and selectable dimension editing are some other features. Of special note is the new help program, a third-party, context-sensitive hypertext On-Line Manual.

Generic CADD 6.0 costs $495. You can upgrade for $50 if you purchased version 5.0 after November 1991.

—Bruce Kinnaird

IN BRIEF

Generic CADD 6.0

This release vastly expands the capabilities of Generic CADD to accommodate the needs of professional users.

Autodesk
11911 North Creek Pkwy. S
Bothell, WA 98011
206/487-2233,
206/483-6969 (fax)
Reader service no. 635

"Have you driven dBASE lately"

The new 1.5 model of dBASE IV is here

And it's loaded with more standard features. Like mouse support for easy maneuvering through applications. Multi-file view editing for direct updating. Query By Example (QBE) summary operators and pick lists for increased operations. And automatic installation of complex programs and configurations. So whether you're a first-time buyer or a dBASE expert, you can quickly get the best out of dBASE IV v1.5.

Mouse support

Increased performance for faster results

Shift into the information you need sooner with the dBASE IV v1.5 new optimization technology—IQ!™ Now dBASE has three different ways of retrieving data and will automatically choose the fastest one for you.

Superior programmability for complex applications

Now up to 40 open work areas are possible at any one time, offering greater flexibility for more complex applications. Enhanced BLANK support gives you the power to detect empty fields for data validation and statistical operations. Plus, the widely respected dBASE Template Language is now standard in dBASE IV v1.5.

A great product begins with the basics

Behind the new features of dBASE IV v1.5 lies the flexibility of a worldwide standard. No other database software is available on more platforms than dBASE. Add that to the dBASE Control Center with its road-tested design tools and the dBASE Programming Language, featuring integrated IBM's SAA-complaint SQL, integrated debugger, and built-in applications generator, and you have the most well-rounded database management and application development product in the world.

IQ! technology

Technology you can build upon

There are no stop signs ahead for dBASE IV v1.5 thanks to its Open Architecture Control Center, allowing you to add third-party designers to your crew—and access additional tools—at any time.

Borland: the new force behind dBASE

dBASE IV v1.5 marks a return of innovation and pride to the dBASE community. And now that dBASE IV v1.5 is part of the Borland family, you can expect Borland's world-renowned service and support. Now is the time to join the more than three million people who already drive dBASE.

What's new in dBASE IV v1.5?

- Mouse support
- Editable multi-file view
- Calculated field linking
- QBE summary operators & pick lists
- Automatic install
- New optimization technology—IQ!
- Save query indexes
- "INDEX" functions
- 40 work areas
- Template language included
- Enhanced BLANK support
- Browse/edit organize menu toggle
- Conditional compilation
- Low-level file I/O
- Open Architecture Control Center
- Enhanced RUN function

Get dBASE IV v1.5 now!

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Circle 44 on reader service card

Micrografx's Easy Image Editor

Windows users who want to add a photographic touch to their documents and presentations but have been intimidated by the complexity and jargon of professional image-editing software can now unleash their creativity with Micrografx's new *Picture Publisher 3.0*.

Picture Publisher 3.0 is more than just an update of the program Micrografx bought from Astral Development; it's a major overhaul. The new release is a true *Windows 3.0* application, with all the associated ease-of-use features and then some.

With its new icon-ribbon interface modeled after *Micrografx Draw*, a "Hint Line" that provides instant feedback on what you're doing, and an impressive on-line help system, *Picture Publisher 3.0* makes it simple (and even fun) to edit and enhance scanned images.

Yet the program's ease of use lets you quickly harness its power. *Picture Publisher*'s range of special effects and editing functions—including a variety of new masking tools, more than 20 preset filters, and precise controls over color separation—should please all but the most demanding professional photo designers.

The chief time-saver among the masking tools, which let you define an area of the image that will either be modified by your edits or excluded from them, is the Smart Mask function—it automatically draws a mask based on a color range you specify. The program's Color Shields can protect eight color ranges from changes you make to the rest of the image. Mask control can be as fine as pixel by pixel, and you can save masks for use in later editing sessions. Some similar programs annoyingly make you redraw all your masks once you've quit an editing session.

Micrografx has given Picture Publisher 3.0 a major overhaul, adding an easy-to-use icon ribbon interface.

Picture Publisher's color-separation controls let you adjust for impurities in cyan, magenta, and yellow, and let you split, alter, or combine RGB (red green blue) or CMYK (cyan magenta yellow black) color channels for custom effects or "colorization" of images.

Other professional touches include undercolor removal (UCR) and black ink generation capabilities that produce sharper prints. The program now supports a wide range of file formats: In addition to the TIFF and PCX formats previously supported, it now accepts BMP, TGA (Targa), and GIF and can export EPS (Encapsulated PostScript). The new version supports 24-bit color graphics and displays, but runs well on standard VGA and super-VGA, too.

The application also comes with scanner drivers for HP IIC, Epson, AVR, and Howtek scanners. A set of filters and effects lets you quickly change the look of photos. Picture Publisher includes a library of more than 40 photos and textures, and 24-hour technical support is available.

If you're not sure photo design and image editing are worth the hardware and software investment, *Picture Publisher* makes it relatively inexpensive to find out. Through June 30, the $795 software comes bundled with Mustek's ColorArtist hand-held color scanner, which lists for $699.

With the bundle offer, *Picture Publisher* gives you everything you need to scan photographs, graphics, and other images; retouch or edit them; and incorporate them into proproposals, newsletters, or presentations. It's like having a darkroom in your office.

—Rob Garretson

IN BRIEF

Picture Publisher 3.0

WINDOWS

This redesigned image-editing package is easy enough for a novice to learn and use but packs ample power for the professional photo designer.

Micrografx Inc.
1303 Arapaho
Richardson, TX 75081
800/733-3729,
214/234-2410 (fax)
Reader service no. 636

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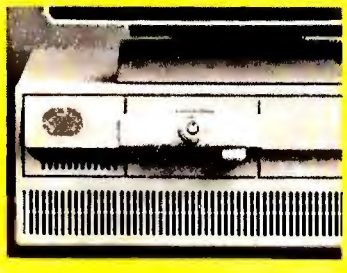

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Circle 256 on reader service card

How Borland's Paradox delivers for DHL Worldwide Express

In 1988, DHL was looking for a competitive edge. They needed a more accurate way to measure, track and calculate shipping costs for destinations around the world.

The database manager they chose for the job was Paradox® from Borland.

Creating such a system was a complex problem that involved handling a tremendous amount of data. And in the supersonic world of overnight delivery, they didn't have any time to waste.

A solution almost overnight

DHL went to work. And in less than a month they used Paradox to create a working "Cost Model" that instantly calculated all cost variables for any customer shipment to any destination.

The Paradox Cost Model was implemented at DHL outlets throughout the United States, and was an instant success. Costs were measured more accurately and people got the information they needed in record time. Today, use of the Paradox Cost Model is Standard Operating Procedure for all DHL sales representatives.

A world-class package

Paradox is the #1 choice among Fortune 1000 companies like DHL because it's designed to solve complex business problems with ease.

Paradox gives you powerful features like the turbo-driven VROOMM™ that lets you take advantage of more memory and utilize existing memory more efficiently. Superior single- and multiuser access. Advanced graphics for outstanding reports. And Query By Example (QBE) for easy access to your data.

On the development side, you get a robust, full-featured database application language that puts the power of Paradox at your fingertips: PAL,™ the Paradox Application Language. PAL was the only language DHL needed to create its comprehensive Cost Model system.

And to complete this exceptional development environment, Paradox includes a robust set of programming tools.

Delivery confirmed

"Paradox is powerful, flexible and easy to use." —*PC World*, "Best Buy" May, 1991

"If [you need] ease-of-use, relational file capabilities and excellent graphics, you'd do well to consider Paradox."

—*Computer Shopper*, June, 1991

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(Inside scoop inside)

Introducing Microsoft Windows 3.1.

The upgrade you've been waiting for is fast, smart, reliable. From the express setup and online Tutorial to a thoughtfully redesigned File Manager, you'll see the Microsoft® Windows™ operating system taken to a new level. And you'll see why your PC is so much easier to use.

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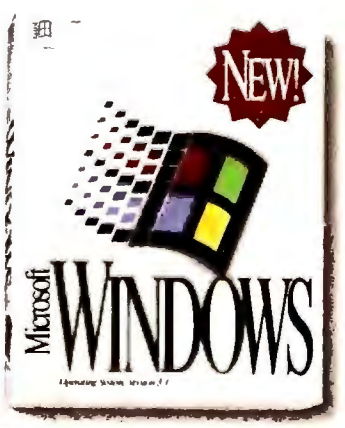
We built TrueType® scalable fonts right into the system. That means you have better-looking type and better WYSIWYG, on-screen and on paper. Those sharper-looking fonts also print faster. And with all types of printers – even dot matrix printers. What could be easier?

This may be the biggest news of all: upgrading to Windows 3.1 is only $49.99. See your local reseller, or to order your upgrade by phone, give us a call at (800) 642-7676, Dept. Z57. It's never been this easy to make your PC this easy to use.*

Fact: Windows 3.1 supports object linking and embedding (OLE), which improves the way your applications work together. And multimedia support lets you embed a voice note, music or sound effects into today's Windows-based applications, as well as run advanced multimedia applications. Mind-boggling but true.



Microsoft

**Special upgrade price of $49.99 is available only through 6/1/92. Offer good for current licensees of Windows only. Limit one upgrade per licensee. If you don't currently use Windows, see your local software reseller for a complete Windows package. Actual reseller prices and availability may vary. © 1992 Microsoft Corporation. All rights reserved. Printed in the USA. Offer good only in the 50 United States and Canada, call (206) 936-8661. Microsoft and MS-DOS are registered trademarks and Windows and the Windows logo are trademarks of Microsoft Corporation. TrueType is a registered trademark of Apple Computer, Inc.*

Point-and-Click Communications

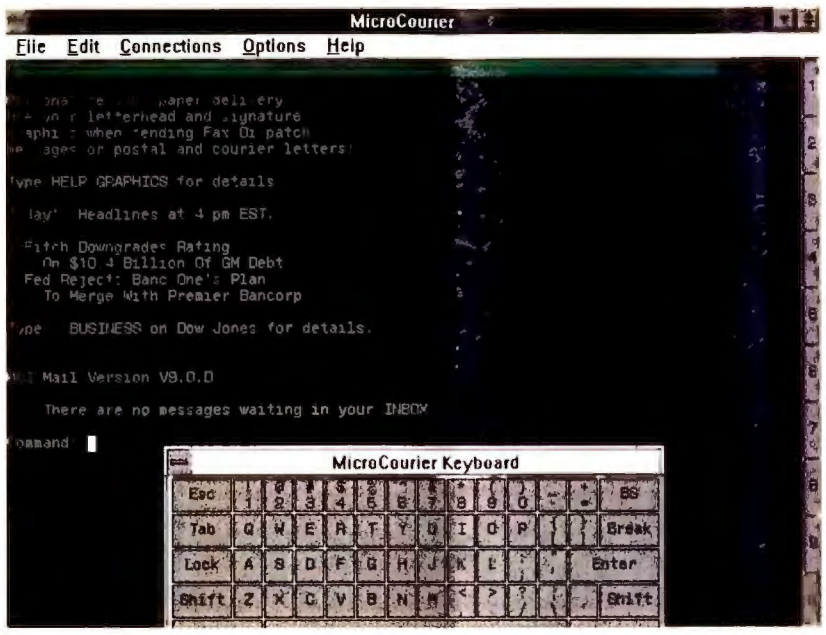
Mousing on line in Windows is now possible with MicroCourier 1.0, which supports an extensive list of protocols and emulations.

Other *Windows* communications packages give you full mouse control—until you go on line with a character-based service, when they bounce you back to the keyboard. While some programs offer a few icons for logging on to popular on-line services and maneuvering to a few popular on-line hangouts, Microcom's new *Windows* communicator *MicroCourier* is the first to let you use your mouse on just about any on-line menu.

Mouse navigation is only one highlight of this $99 bargain. A highly customizable program with a respectable set of features, *MicroCourier* rivals *Crosstalk for Windows* in its sizable roster of terminal emulations (from DEC to IBM 3101), and it includes all the standard error-checking protocols, even ZMODEM. The program supports DDE and offers a script language with over 300 commands, variables, and functions—the same language as can be found in Microcom's high-end *Relay Gold for Windows.*

MicroCourier puts the mouse to work for you with a "hotspot" feature—click your mouse on any letter or word on an on-line menu, and *MicroCourier* makes it a hot command button. You can also program hotspots so that *MicroCourier* will transmit a designated string of characters whenever you click on a particular word while on line. The hotspots aren't foolproof—they work only if you're using TTY emulation, and only if on-line menu choices are set off with a space on either side.

MicroCourier gives you a mini, movable on-screen keyboard that pops up upon connection. You can point and click on its characters, although most users will find the physical keyboard faster. And while on line, you can run a session in a resizable window.



Why not bring your mouse on line? MicroCourier's midget on-screen QWERTY keyboard and mouseable menus do the trick.

MicroCourier is highly customizable and offers a sizable roster of terminal emulations.

Some curious omissions and restrictions mar *MicroCourier* as a multipurpose communicator. It won't answer calls from computers that aren't running *MicroCourier* or *Relay.* The scrollback buffer, the on-line editor, and the log-on learn feature are activated only when the program is running TTY or ANSI emulation.

Despite its rough edges, *MicroCourier* definitely merits a look if you're seeking a *Windows* bargain—especially if you're tired of giving up your mouse when you go on line.

—Judy Heim

IN BRIEF

MicroCourier 1.0

WINDOWS This innovative communications program from the makers of *Relay Gold* offers features that make navigating on line with a mouse easier.

Microcom, Inc.
500 River Ridge Dr.
Norwood, MA 02062
800/822-8224,
617/551-1000
Reader service no. 639

Supra-Fast Is a Compact Fax and Data Modem

The trend toward integrating a fax and data modem in a single unit is well advanced, but only recently have you been able to find the fastest modem and the fastest fax technology in one package. Now, fantastically fast faxmodems are on the way, thanks to new fax standards and low-cost integrated chip sets. One of the first such products out of the gate, Supra's SupraFaxModem V.32bis, delivers this one-two punch for only $399.95.

The SupraFaxModem's fax engine will connect with faxes that support the new V.17, 14,400-baud standard, but it will slow down to communicate with any 9600- and 4800-baud Group III–compatible fax board and machine. The fax is also Class 1 and 2 compatible, so you can use a variety of software packages to control it. For $40 more you can buy the package with either the DOS-based *Mirror* and *FaxTalk Plus* software, or the *Windows*-based *WinFax.*

The modem's V.32bis data pump also transmits at 14,400-baud, yet it can talk to 9600-baud V.32 modems as well as slower Hayes-compatible modems. The data modem's industry-standard V.42bis data compression gives you effective throughput that's much higher than rated. As a bonus, the modem includes MNP 10, designed for especially dirty phone lines and cellular links.

The compact 15-ounce unit measures only 1 by 4.5 by 6.5 inches, and it includes a helpful status display that shows up to 25 messages.

Supra Corporation plans to ship extra-cost, user-installable firmware upgrades for voice mail and caller identification by midyear. Supra also sells a V.32 version for $299.95 that is limited to 9600-baud for both fax and data.

—Eric Brown

IN BRIEF

SupraFaxModem V.32bis

For only $399.95, you get a supercharged V.32bis modem teamed with the speedy new V.17 fax engine.

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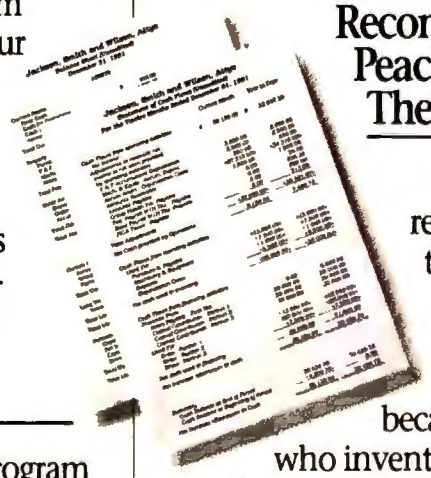
The package includes a Financial Report Writer for customizing your financial statements, and a Custom Forms Generator for designing your own invoices and statements.

On-line help is always available, as well as a complete accounting primer and tutorial. Plus, Accounting for Windows is multi-user capable and fully networkable – right out of the box.

Rave Reviews.

PC Week said our Windows program was "well-designed and well-implemented . . . anyone with limited PC or bookkeeping experience should be able to learn the program quickly." And *PC World* says, "if you're looking for a balance between power and simplicity, this is the program to buy."



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Circle 144 on reader service card

A Cellular Phone With Modem

For PC users on the go, the inevitable wedding of cellular phones and notebook PCs is truly a marriage of convenience. Now comes the Cellular Data Link—a cellular phone with a built-in Microcom modem that lets you connect on line from nearly anywhere.

Plug the CDL into the serial port of your notebook PC, and you can download files as you drive to a meeting or tap into the company LAN from the middle of a cornfield. (FAA regulations prohibit logging on from the friendly skies.)

The 2400-baud modem features MNP 10 error correction. The Hayes-compatible unit employs V.42bis data compression, which speeds effective throughput by up to four times when hooked to a compatible modem.

The CDL comes in three models. For data-only transmission, the Model CDL 100 installs in your car for a cool $1199. The $1499 Model CDL 200 is a full-fledged car phone capable of handling voice or data, with memory functions, auto-dial, and auto-answer. A built-in speaker/microphone lets you keep both hands on the wheel as you deal. For fully portable operation, the $1799 Model CDL 300 comes with a nickel-cadmium battery, good for one hour of on-line use, and cigarette lighter adapter/recharger. All are backed by a three-year warranty.

—Daniel Tynan

IN BRIEF

Mitsubishi/ Microcom Cellular Data Link

This cellular phone/modem gives you access to on-line data no matter how far you are from a phone jack.

Mitsubishi Int'l Corp.
Communication Equipment Sales Division
1500 Michael Dr. Ste. B
Wood Dale, IL 60191
708/860-4200,
708/860-8398 (fax)
Reader service no. 625

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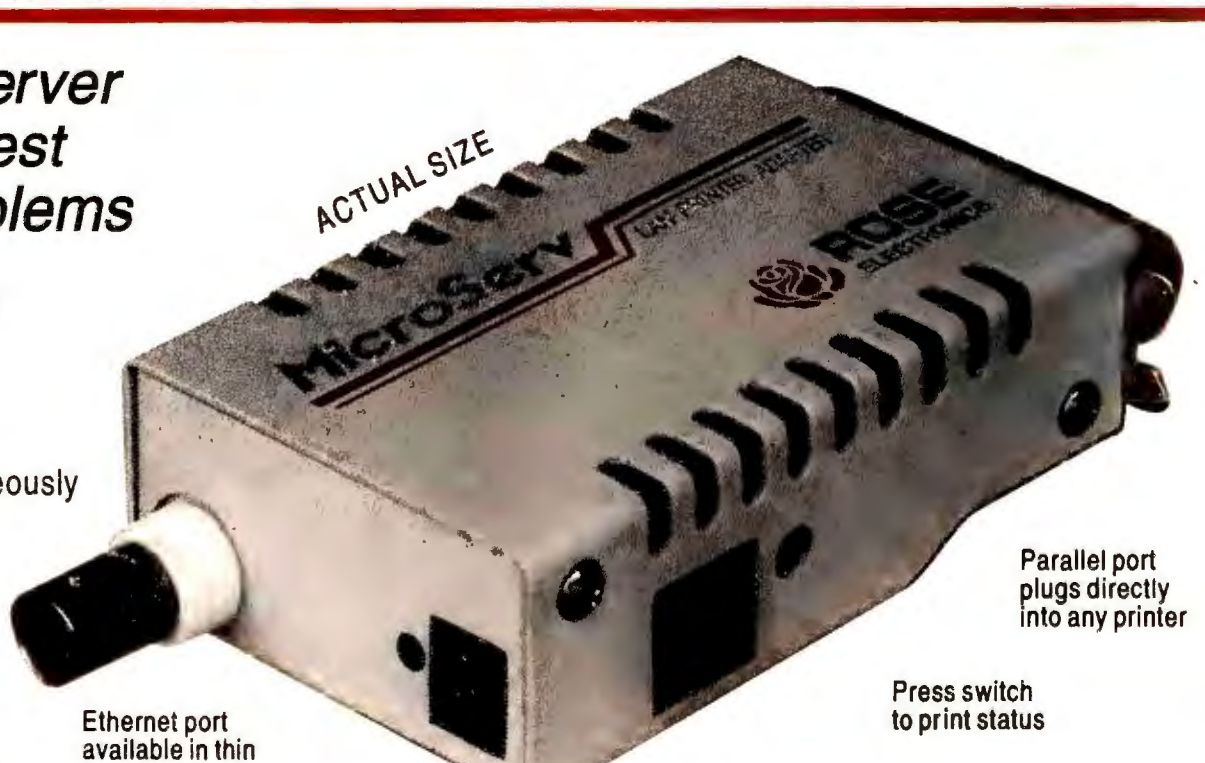

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U.S. Sales 800-824-6000 / 602-431-8200, FAX 602-431-8300

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Circle 100 on reader service card

Turn Your Outgoing Faxes Into Data Collectors

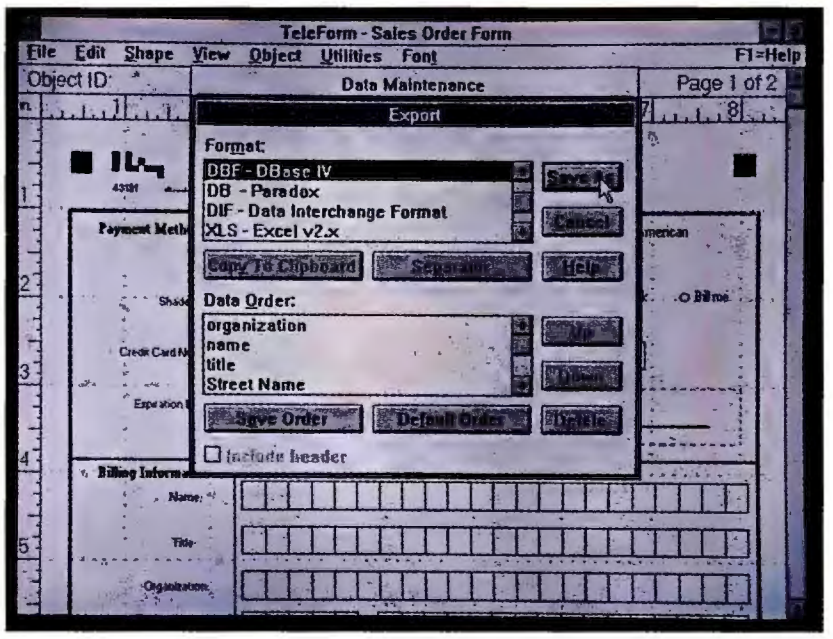
A program that reads faxes? *Teleform*, a combination forms design package and fax program for *Windows*, does just that.

First you design a form using *Teleform*'s form creation module, which includes a number of fonts and predesigned common business forms. The module enables you to create faxes with check-boxes and fields for hand-printed data, which *Teleform* will be able to recognize. You can also create your own custom forms using a combination of included drawing and text tools. Each *Teleform* form has an identification code located in the top left-hand side, as well as anchor blocks in each corner to realign skewed or upside-down incoming faxes.

That done, you distribute the forms to clients, remote employees, or whomever. (You can also fax them from your PC using the program's built-in phone book feature.) When the recipient faxes back the filled-in form to your fax-board–equipped PC, *Teleform* grabs the image and does the necessary handwriting and mark recognition and converts the information into your choice of nine file formats, including *1-2-3* and *dBASE*. Of course, if your recipient has a fax board, he or she won't need to use hard copy.

To run *Teleform* you'll need a 386 PC or better, a minimum of 4MB of RAM, a fax board, a mouse, and *Windows 3.0*. This $995 program supports letter, legal, multipage, and half-page forms.

Teleform is particularly useful for salespeople, market researchers, or anybody who is interested in turning the office fax machine into a data entry tool. —*Jeff Bertolucci*



Use Teleform's Export feature to convert hand-printed and check-box data from faxes into your choice of nine popular file formats.

IN BRIEF

Teleform for Windows

WINDOWS A unique program that converts fax images into popular spreadsheet and data base file formats.

Cardiff Software Inc.
531 Stevens Ave., Bldg. B
Solana Beach, CA 92075
619/259-6444,
619/259-6450 (fax)
Reader service no. 640

One SCSI Interface Fits All

Corel Systems is making an aggressive push into the SCSI interface market with its new CorelSCSI product, an all-in-one kit that includes host adapter, cabling, and software drivers for every SCSI peripheral currently on the market. As if that isn't enough, Corel says it'll support all new SCSI devices as they're introduced.

SCSI—or Small Computer System Interface—lets you connect up to seven computer peripherals to your PC while using only one expansion slot. CorelSCSI transfers data at high speeds (up to 10MB per second, Corel claims) to and from such peripherals as CD ROM drives, DAT, and ¼-inch tape drives.

The CorelSCSI kit includes everything you'll need to connect multiple peripherals to your PC, including a SCSI host adapter, software drivers, and a videotape to ease installation.

The CorelSCSI kit comes in three flavors: an 8-bit ISA version ($150) for single-user PCs, a 16-bit ISA version ($325) with bus mastering capabilities, and an 8-bit Micro Channel version ($195). Each kit includes a SCSI host adapter, software drivers for SCSI peripherals, a SCSI cable, and even a videotape that shows you how to install the product.

Each CorelSCSI kit also includes a copy of *SitBack*, a data backup program that you can configure to do unattended backups—at five p.m., say, or whenever you leave the office. You can use *Sitback* as a TSR to continually back up files while you're away from your system.

According to Corel Systems, you'll be able to buy additional software drivers for SCSI peripherals as they're introduced.

Although not every user currently needs SCSI's fast transfer rates and multiple-peripheral support, future graphical applications like multimedia will require the kind of speedy performance that products like CorelSCSI can provide. —*Jeff Bertolucci*

IN BRIEF

CorelSCSI

Use a single expansion slot to connect up to seven peripherals to your PC with this high-speed SCSI interface kit.

Corel Systems Corp.
1600 Carling Ave.
Ottawa, Ontario K1Z 8R7
613/728-8200,
613/761-8051 (fax)
Reader service no. 641

Get Turbo-Charged

and get your chance to win!

Register for hot prizes in the Get Turbo-Charged Value Sweepstakes.

The Grand Prize includes the incredible new TI microLaser™ Turbo. PLUS…

Grand Prize winner also gets a choice between the TI TravelMate™ 3000 WinSX™ or Apple Macintosh IIsi® PLUS…

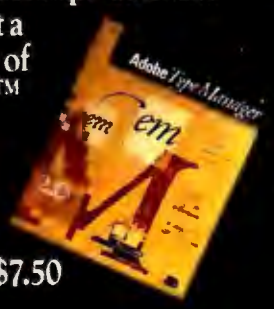
Over $2,000 worth of publishing software: Adobe® Illustrator™, Corel Draw© and Aldus® PageMaker®!

Now between April 1, and June 30, 1992, when you see your TI dealer for a demo of the new microLaser Turbo or microLaser XL Turbo, you can register in the Get Turbo-Charged Value Sweepstakes. There's no purchase necessary.

The lucky Grand Prize winner drives off with a TI microLaser Turbo printer and a choice of the hottest computers on the market – the award-winning TI TravelMate 3000 WinSX or the Apple Macintosh IIsi – together with three of the most popular desktop publishing software packages, Aldus PageMaker, Adobe Illustrator and Corel Draw.

Coming in second looks pretty hot, too. The Second Prize winner can choose between the TI TravelMate 3000 WinSX or the Apple Macintosh IIsi.

After your test drive, if you buy a TI microLaser Turbo or microLaser XL Turbo loaded with PostScript® software from Adobe, you'll get a coupon for a free copy of Adobe Type Manager™ (ATM) software and Adobe Garamond Font Package! That's a total retail value of $346 – you pay just a $7.50 shipping and handling charge. Proving that you're always a winner when you choose TI.



Your dealer has all the details on the Get Turbo-Charged Value Sweepstakes. So sprint in today to see the best value in super-fast PostScript printing race through graphics software faster than other printers. And get your chance to win.

For the name of your nearest TI dealer, dial:

1-800-527-3500

TEXAS INSTRUMENTS

POSTSCRIPT

The Grand Prize has an approximate retail value of $8,350. Second Prize has an approximate retail value of $4,000. Promotion will be supported by all participating dealers in the U.S. and Canada. Void in Quebec. Canadian residents must correctly answer a skill-testing question to win. In Ohio or Michigan, you may also call 1-800-527-3500 for an entry form. microLaser, TravelMate and WinSX are trademarks of Texas Instruments Incorporated. Apple Macintosh IIsi is a registered trademark of Apple Computer, Inc. Adobe, PostScript and the PostScript logo are registered trademarks and Adobe Type Manager and Adobe Illustrator are trademarks of Adobe Systems Incorporated. Aldus and PageMaker are registered trademarks of Aldus Corporation. Corel Draw is a property of Corel Systems Corporation.

1992 TI

71888

Circle 264 on reader service card

Pyro 2.0

Pyro 2.0 is a slightly offkilter but amusing screen saver for DOS users that lets you display your individuality or corporate identity while it protects your monitor from burnout. An eccentric collection of 36 new screen images includes a race car, lightning flashes, a bricklayer rapidly laying bricks, and flying waffle irons being destroyed by Patriot missiles (no, we're not joking).

The program has an enhanced, menu-driven interface, and the setup module guides you through the installation process.

You can use *Pyro 2.0* to display PCX or GIF files—show off a company logo, for instance, or a scanned-in family photo. The TSR requires 5K of RAM. *Pyro 2.0* costs $49.95, and upgrades from version 1.0 cost $15. Fifth Generation Systems, 10049 N. Reiger Rd., Baton Rouge, LA 70809; 800/873-4384.

Reader service no. 642

Home Lawyer 2.0

Sure, everyone should have one, but drawing up your will can be so depressing, expensive, and time-consuming that many of us put it off indefinitely. But there is a relatively easy way to get through this unpleasantness. The latest version of *Home Lawyer* helps you get your last wishes down in plain English and without expensive legal help. It has forms and instructions for preparing a living will against the day when you might become incapacitated and need to have assigned power of attorney.

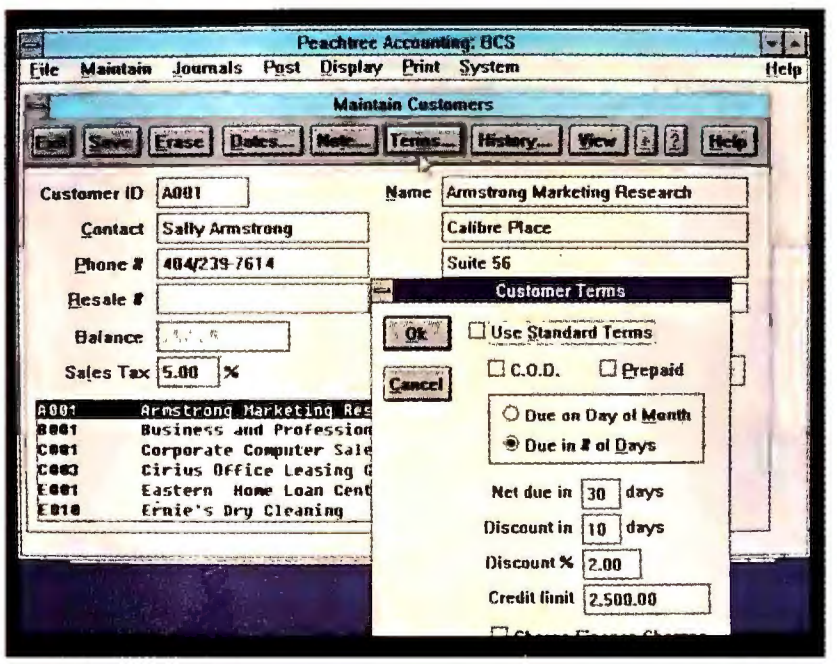
Beyond that, *Home Lawyer 2.0* will prompt you through the completion of over a dozen other ready-made legal documents—bills of sale, residential leases, employment agreements—even a boilerplate product complaint letter. The suggested retail price is $69.95. MECA Software, Inc., 55 Walls Dr., Fairfield, CT 06430-0912; 203/256-5000, 203/255-6300 (fax).

Reader service no. 643

Tree Based 2.0

What happens when a single-entry check-writing program meets a spreadsheet? *Tree Based*—a double-entry accounting system with a spreadsheet's power and flexibility but the ease of checklike data entry. When not writing checks, you can work within your full chart of accounts, whose complexity is artfully disguised by a treelike interface. Zoom down a couple levels for greater detail on, say, receivables; zoom out for the big picture. Double-entry debits and credits appear as positive and negative numbers in your preprogrammed worksheet. Version 2.0 adds an online tutorial and plain-paper invoicing, and its $69.95 price is what you'd pay for a check writer alone. Trigo, 1932 Meyer Pl. B-2, Costa Mesa, CA 92627; 800/669-8733.

Reader service no. 644



What was once Crystal is now Peachtree Accounting for Windows. But more than the name has changed. New features include a tool-bar–like interface to select frequently used functions.

FotoTouch for Logitech's ScanMan

Owners of Logitech's popular Model 256 ScanMan hand scanner will rejoice over the latest update to the Ansel editing software. The new release, *FotoTouch*, has several enhancements, including an audible scanning speed warning that tells you know when you scan too fast.

Best of all, though, you get AutoStitch. In order to scan a large image, you ordinarily must make at least two passes over the picture, then laboriously piece together the segments. With *FotoTouch*, you scan the image in up to four passes, and then you click on the AutoStitch button, and the composite image pops up on screen. Even when you zoom in on the completed image, it's difficult to tell where the software stitched it together.

FotoTouch requires *Windows 3.0* or higher and ships with the Model 256 ScanMan. If you're already a registered owner of a ScanMan, you can upgrade to *FotoTouch* for $49. It's also available for older Logitech scanners for $79. Logitech Inc., 6505 Kaiser Dr., Fremont, CA 94555; 800/231-7717, 510/792-8901 (fax).

Reader service no. 645

Peachtree Accounting for Windows 5.0

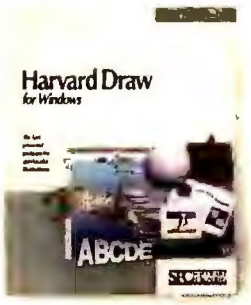
Peachtree has dropped the price and changed the name and the look of its *Windows* accounting package. *Crystal* is now *Peachtree Accounting for Windows*, retailing for a low $99 as part of an open-ended promotional offer. This version includes a tool-bar–like interface for easier access to frequently used functions, and it features several new modules: inventory, job costing, and bank reconciliation. The forms designer lets users create customized invoices and import custom logos via the clipboard. Help functions have been significantly enhanced in version 5.0, which supports the new *Windows 3.1* help features. Users also have on-line access to tutorials, an accounting primer, and a glossary of terms via Lotus's *SmarText*, which is bundled with the package.

Peachtree Accounting for Windows requires DOS 3.1 or later, a hard drive, 1MB of RAM, and *Windows 3.0* or later. Current *Crystal* users can upgrade for $49 for a limited time. Peachtree, 1505 Pavilion Pl., Norcross, GA 30093; 800/247-3224.

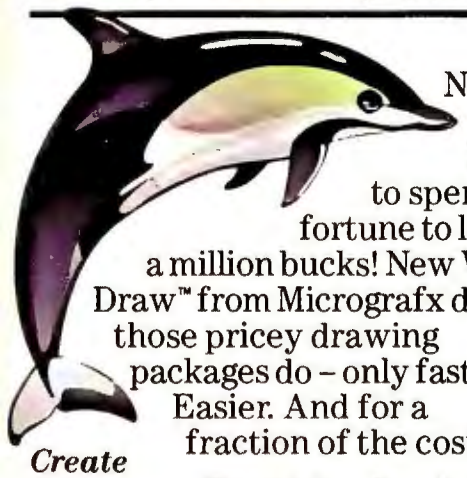
Reader service no. 646

Searcher 2.0/Searcher Professional

WINDOWS Cognitronix is shipping two upgrades to its low-cost file search program, *Searcher*. As with the original,



Do Everything Below For Less Than Any Of The Above.



Now you don't have to spend a fortune to look like a million bucks! New Windows Draw™ from Micrografx does what those pricey drawing packages do – only faster. Easier. And for a fraction of the cost!

"A must-have accessory...a remarkable value."
PC Magazine
12-31-91

"At $149, this program is a real steal."
InfoWorld
9-30-91

Dress up your charts and graphs.

	Arts & Letters	Free-Hand	Harvard Draw	Corel	Windows Draw
Suggested retail price	$695	$595	$595	$695	$149
Gradients	Yes	Yes	Yes	Yes	Yes
Object blend	Yes	Yes	Yes	Yes	Yes
Bézier curve editing	Yes	Yes	Yes	Yes	Yes
Object rotation	Yes	Yes	Yes	Yes	Yes
Text on a curve	Yes	Yes	Yes	Yes	Yes
Outline fonts	Yes	Yes	Yes	Yes	Yes
Clip art	Yes	Yes	Yes	Yes	Yes
24-hr. tech support	No	No	No	No	Yes

Create dazzling graphics with ease.

Graphics for the rest of us.

Already do your own graphics? Windows Draw will make it easier than ever. And if you don't, it's a great reason to start!

Windows Draw isn't for artists or computer wizards. It's for business people like you. People who want to add impact to a proposal. New life to a newsletter. Or flair to a flow chart.

Add impact to proposals, reports and newsletters.

In fact, because it's compatible with your favorite PC programs, you can use Windows Draw to dress up just about *everything* you do.

Easy does it.

With Windows Draw, easy-to-use drawing and color tools are right on the screen. Pull-down menus list an enticing selection of options available to you – including special effects like flip and blend. And "help" information is available at the touch of a button.

A way with words.

You can make your text look as good as your pictures, using Windows Draw in combination with PageMaker 4.0 or your favorite word processing package.

Do your own logos and letterhead designs.

You can curve words, wrap them around pictures, shade them, color them, and much, much more!

A mammoth clip art library – free!

If you don't want to do your *own* drawings, you can choose from more than 2,600 ready-made images that come with Windows Draw. And you can modify and manipulate them the same way you do drawings made from scratch.

You'll never know how much you can do with Windows Draw until you try it. And with our money-back guarantee, what have you got to lose? Call to order today!

For technical illustration, ask about award-winning Micrografx Designer.™

30-day money-back guarantee!

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Circle 183 on reader service card

New Version 8.2

OPEN YOUR EYES

...and SAVE over $6900!!!
on your business accounting software.

When you buy ACT-Plus, you get all the features you need to do full-scale business accounting. With other similarly-priced packages, you get a basic accounting program, but you don't get the power, flexibility, or functionality of ACT-Plus. So, if you want to do full-scale business accounting with them, you have to spend more for expensive add-on features.

Look at the comparison below. We took the information from the summer issue of Peachtree Times. Peachtree informs its customers of add-ons available for their software from third-party developers. Most of their add-ons are standard features in ACT-Plus. We added up the cost of the add-ons that are free in ACT-Plus. As you can see, you would have to pay over $6900 to make Peachtree do what ACT-Plus does!

Standard ACT-Plus Features FREE! No additional charge.	Peachtree Add-on Cost.
GL Reports & Features	$1338.90
Check Rec. Standard Features	405.00
AR Reports & Features	1234.00
Order Entry/Invoicing Features	2512.85
Purchase Order/Inventory Features	298.00
Payroll Reports & Features	1142.90
Total for Peachtree Add-ons	$6931.65

You Save Over $6900!!!

POINT OF SALE, FUND ACCOUNTING, and JOB COST are also available. Single user products are instantly and easily upgradeable to reliable LAN or UNIX/Xenix versions backed by ten years of field-proven experience.

still only $199.50
Plus $12.50 S & H.

Cougar Mountain Software
2609 Kootenai, Box 6886
Boise, Idaho 83605
800-388-3038

Circle 56 on reader service card

both new products look for files across multiple disks, searching by any combination of file name, path, size, date, attributes, and contents. Once you've found your file, you can launch it by simply double-clicking. *Searcher 2.0* is very flexible, allowing you to specify multiple file names, paths, and text strings. Moreover, *Searcher 2.0* keeps a history of your previous day's activities so you can easily pick up where you left off.

To all of these capabilities, *Searcher Professional* adds file management; the program enables you to copy, move, delete, sort, and view selected files, search for files (even by contents) inside of a ZIP file, and decompress ZIP files. You can set up *Searcher Professional* to handle many of your chores automatically. *Searcher* costs $30, and *Searcher Professional* costs $59.95. Cognitronix, 12322 Poway Rd. #120, Poway, CA 92064; 619/549-8955.

Reader service no. 647

MapInfo 1.1.3

If you're using *MapInfo* and plan to upgrade to *Windows 3.1*, then you'll require *MapInfo 1.1.3*. The new version supports digitizing with *Windows* and adds support for *1-2-3 3.0* files and named ranges and title rows in *1-2-3* and *Excel*. In addition, you can now use the *MapInfo* DXF utilities to import attributes, select layers to import, and use coordinate transformations. Finally, Geological Information Survey workers will appreciate a new feature that lets you save the contents of map legends within work spaces so you can keep things in perspective. The upgrade costs $29.95. MapInfo Upgrade Center, P.O. Box 290, Buffalo, NY 14207-0290; 800/234-3650, 716/873-0906 (fax).

Reader service no. 648

PaperLess Filer 2.2

The paperless office is still more myth than reality, but products like *PaperLess Filer 2.2* bring it a little closer. This low-cost document storage and retrieval package now makes it easier to manage fax traffic. Version 2.2 lets users with CAS-compatible fax boards automatically store incoming faxes or fax out documents already stored. As with earlier versions, you can scan documents, compress files to save disk space, and retrieve files using up to seven key fields. You can rotate and print documents and export them as PCX or TIFF files. *PaperLess Filer 2.2* requires DOS 3.1 or a later version and 640K RAM. It costs $495 for single-user and $795 for network versions; single-user upgrade costs $95 and network upgrade is $150. PaperLess Corp., 1750 N. Collins #104, Richardson, TX 75080; 800/658-6486.

Reader service no. 649

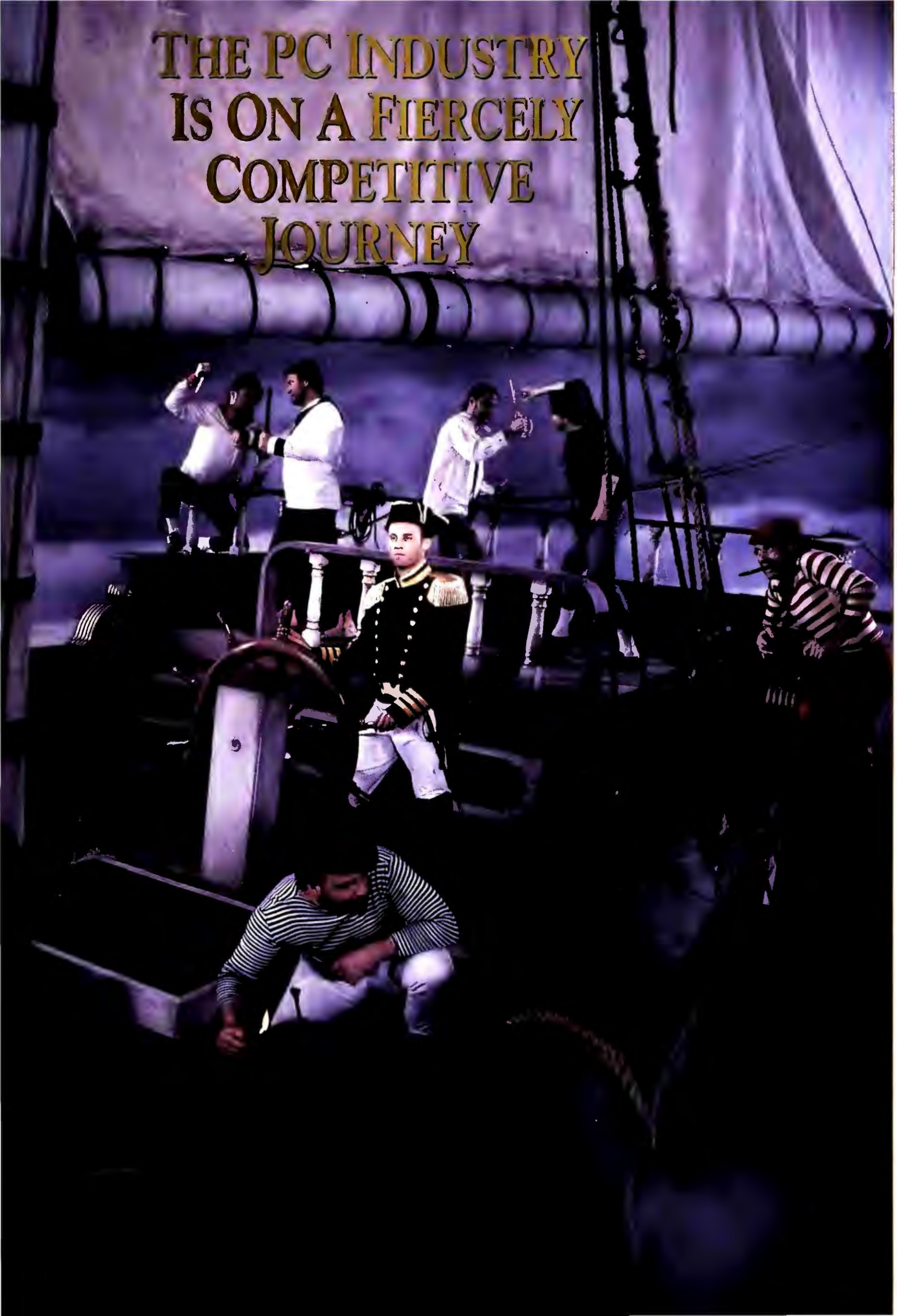
Hollywood 1.0v2

This presentations graphics package, a *PC World* Best Buy in November 1991, gets a modest makeover, from new owner Claris. *Hollywood 1.0v2* users will see a remodeled tool bar and an expanded outliner that can handle up to 13,000 characters. Claris has also added file translators for *Harvard Graphics*, *Excel*, a number of Micrografx packages, and others, as well as support for TrueType and *ATM* fonts. Version 1.0v2 is $499; upgrade from version 1.0 is $15; competitive upgrade is $129. Claris Corp., 5201 Patrick Henry Dr., Santa Clara, CA 95052; 408/727-8227.

Reader service no. 650

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

THE PC INDUSTRY IS ON A FIERCELY COMPETITIVE JOURNEY



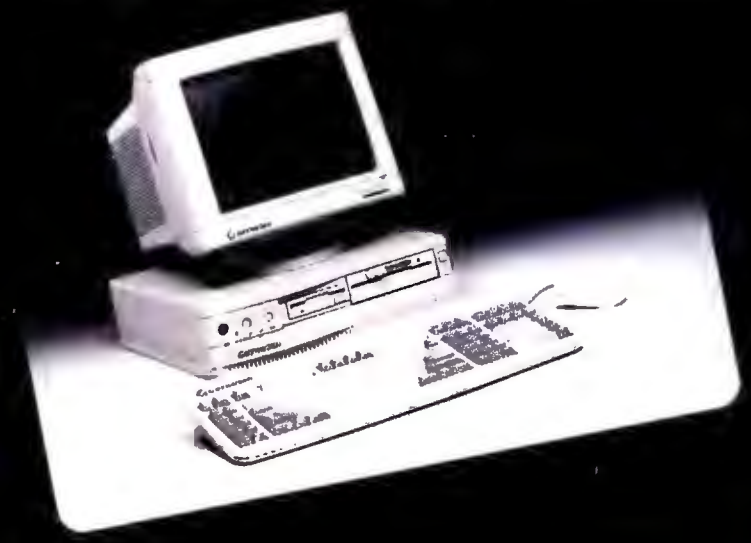
ISN'T IT GREAT?

PC BUYER

Hollywood's finest couldn't write a better drama than the one that is unfolding in the PC industry. The leading characters are embroiled in a competitive battle — and the struggle gets more intense by the month. One company slashes its prices. Another draws its sword and cuts prices, too. Then Gateway 2000 takes the wind out of their sails by continually coming out with unbeatable products and prices. We've been steering the industry toward greater value for years. And what's great about this story is *you're the winner* — especially with Gateway 2000!

GATEWAY2000

"You've got a friend in the business."



NEW 386SX/25

Gateway 2000's new 386SX/25 comes in a compact, mini desktop model. A roomy desktop model is standard on the 386DX/33, or you can order a tower model for an additional $100.

HERE'S YOUR TICKET: GATEWAY 2000 386 PCs

FEATURE PRESENTATIONS
386 SYSTEMS

The two systems in our 386 product cast give you the best price/performance in SX and DX categories. We're introducing some new talent this month — a 25MHz 386SX. This system outperforms 16 and 20MHz 386SX machines, yet it's priced the same or better.

Our 33MHz 386DX, chosen by *Computer Shopper* readers as the Best Buy of 1991 in its category, is a box office favorite. This fully featured system offers the most value on the market for under $2,000.

25MHz 386SX

System Highlights: 4MB RAM ■ 80MB Western Digital® IDE hard drive with 32K read-look-ahead cache buffer ■ 16-bit VGA graphics with 512K ■ 14" Crystal Scan 1024 VGA color monitor, up to 1024 x 768 interlaced resolution ■ five 16-bit expansion slots available in standard configuration ■ mini desktop model ■ **$1,595**

33MHz 386DX

System Highlights: 64K SRAM cache ■ 4MB RAM ■ 120MB Western Digital IDE hard drive with 64K multi-segmented cache ■ 16-bit Diamond Speedstar Plus™ video card with 1MB ■ 14" Crystal Scan 1024NI VGA color monitor, up to 1024 x 768 non-interlaced resolution ■ seven 16-bit slots on motherboard, one 32-bit memory slot and five 16-bit ISA slots available in standard configuration ■ desktop model is standard ■ **$1,995**

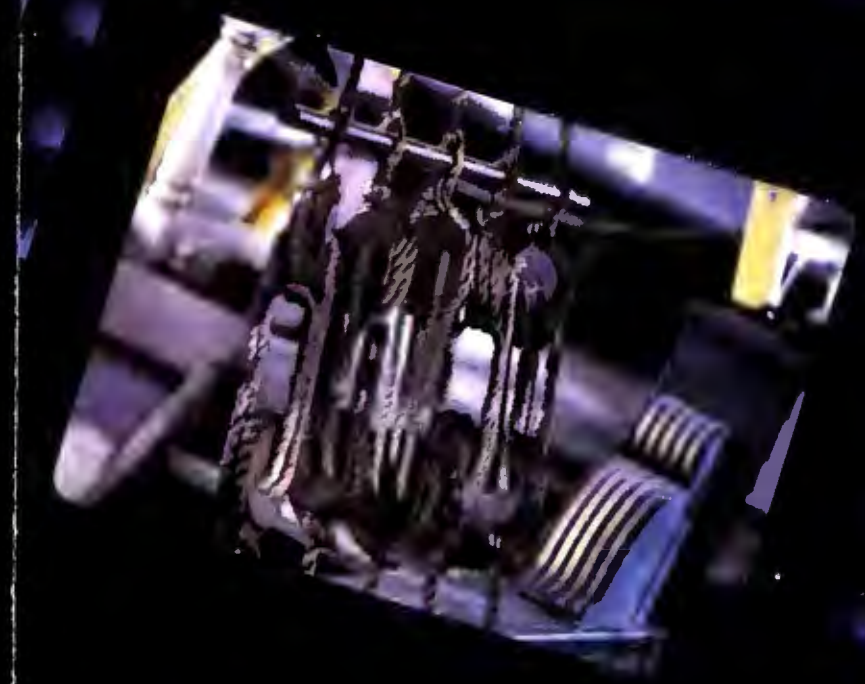
All Gateway 2000 systems come fully configured with all the features you want, including two diskette drives, a programmable 124-key AnyKey™ keyboard, a Microsoft® mouse, MS DOS® 5.0, the new Windows™ 3.1 and your choice of one application software option. See the back pages of this ad for complete configurations and information about software options, upgrades and peripherals.

GATEWAY2000

"You've got a friend in the business."

Gateway 2000's new 486[illegible] comes with [illegible]MB RAM, a 200MB IDE hard dr[illegible] and the ATI Graphics Ul[illegible] video card with grap[illegible] coprocessor for only $2,395.

NEW 486SX/25



BLOCKBUSTERS: GATEWAY 2000 486 PCs

Making its debut some years ago, 486 technology has finally reached a price point at which it is upstaging 386 technology in value. Gateway 2000's 486 systems have always been star performers, but recent price reductions and the introduction of a 25MHz 486SX and two new DX2 systems make the Gateway 2000 486 line more appealing than ever.

25MHz 486SX

Besides being faster than any 386 machine on the market, the 486SX/25 is upgradeable to a 486DX2/50 if you need increased performance in the future.

System Highlights: 4MB RAM ■ 200MB Western Digital® IDE hard drive ■ ATI™ Graphics Ultra ■ 14" Crystal Scan 1024NI VGA color monitor, up to 1024 x 768 non-interlaced resolution ■ desktop model is standard ■ **$2,395**

33MHz 486DX

The 486DX/33, our best-selling system until the DX2s came along, is still an excellent machine, especially with ATI video. Plus, it's upgradeable to a 66MHz DX2 when this CPU is introduced.

System Highlights: 64K cache RAM ■ 8MB RAM ■ 200MB Western Digital IDE hard drive ■ ATI Graphics Ultra ■ 14" Crystal Scan 1024NI VGA color monitor, up to 1024 x 768 non-interlaced resolution ■ desktop model is standard ■ **$2,795**

50MHz 486DX2

This is without a doubt the fastest system at the most incredible price on the market today. The combination of a DX2 dual speed processor, an ATI Graphics Ultra video card and a fast IDE drive, made faster with RIDE BIOS, makes this machine worthy of an Academy Award. Our benchmarks show a 35% increase in performance over a 33MHz 486DX. Coretest benchmarks show large block disk-to-memory operations are over 30% faster with RIDE.

System Highlights: 64K cache RAM ■ 8MB RAM ■ 200MB Western Digital IDE hard drive with RIDE BIOS ■ ATI Graphics Ultra ■ 14" Crystal Scan 1024NI VGA color monitor, up to 1024 x 768 non-interlaced resolution ■ desktop model is standard ■ **$2,995**

EISA SYSTEMS — 33MHz 486DX & 50MHz 486DX2

The 33MHz system is upgradeable to a 66MHz DX2 later this year.

System Highlights: 128K cache RAM ■ 8MB RAM ■ 340MB Maxtor® SCSI hard drive ■ 32-bit EISA SCSI controller ■ Diamond Speedstar Plus™ 16-bit VGA graphics ■ 14" Crystal Scan 1024NI VGA color monitor, up to 1024 x 768 non-interlaced resolution ■ floor-standing tower model is standard ■ 486DX/33 EISA is **$3,795** ■ 486DX2/50 EISA is **$3,995**

GATEWAY2000

"You've got a friend in the business."

BLOCKBUSTERS
486 SYSTEMS

Dakota Smith is determined to save the world . . .

. . if only he can find a notebook with the power of his beloved Gateway 2000 486 computer.

But where, oh where will he find the computing power he needs in a notebook?

Could it be the answer? YES!

In a flash, Dakota is on his way to a rendezvous with the Nomad.

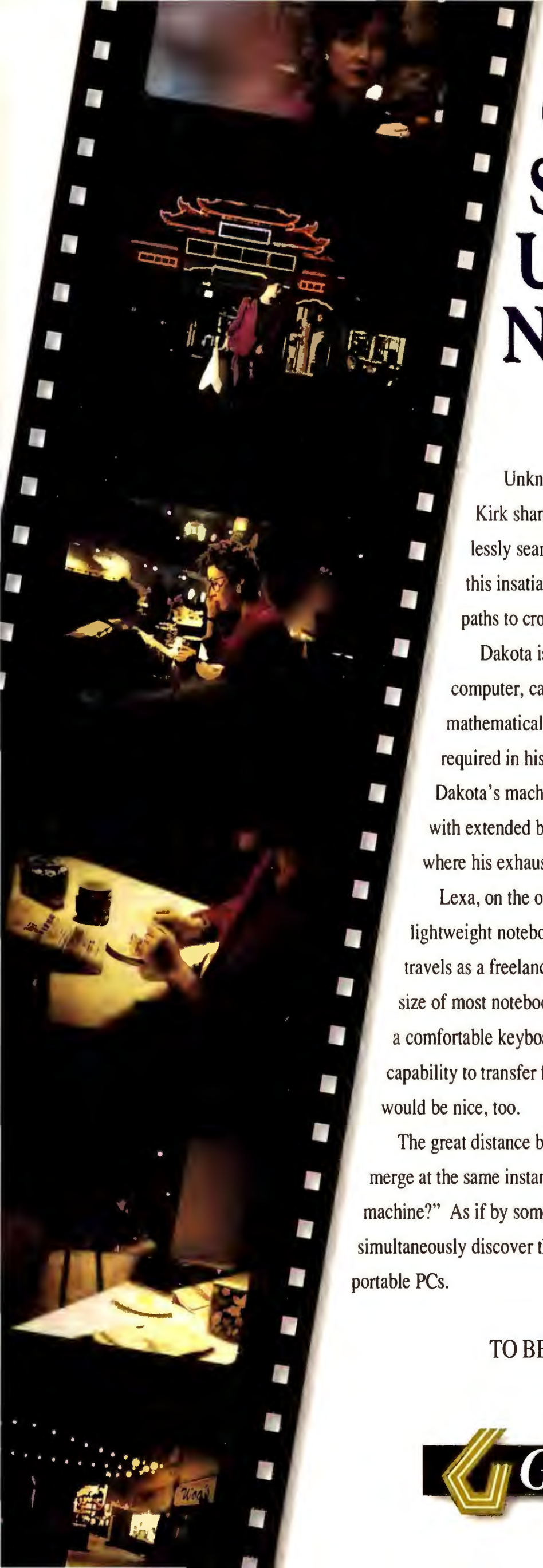
Lexa Kirk faces a dilemma.

She needs to travel lighter on her assignments. She's tried notebook PCs, but alas — they're just too big and heavy for her needs.

Where's the notebook PC that will do the job and fit in her purse. She sighs wistfully.

What's this? There's a HandBook in her future.

Lexa is gone in a wink, setting off to discover her fortune.



COMING SOON: THE ULTIMATE NOTEBOOKS

Unknown to them, Dakota Smith and Lexa Kirk share a common bond. Both are relentlessly searching for the perfect portable PC, and this insatiable drive will ultimately cause their paths to cross.

Dakota is seeking a powerful notebook computer, capable of handling the complex mathematical calculations and large file storage required in his work as a field research scientist. Dakota's machine must also be small and lightweight with extended battery life. He never knows quite where his exhaustive expeditions will take him.

Lexa, on the other hand, is looking for a very small, lightweight notebook that won't be a burden in her travels as a freelance journalist. Something about half the size of most notebook computers would be ideal, but with a comfortable keyboard, good display, hard drive and the capability to transfer files back to her editor. Software would be nice, too.

The great distance between them closes as their thoughts merge at the same instant. "But where will I find such a machine?" As if by some mystical force, Dakota and Lexa simultaneously discover the directions to find the perfect portable PCs.

TO BE CONTINUED

GATEWAY2000
"You've got a friend in the business."

GOODIES TO GO

Free Application Software Options

With the purchase of any Gateway 2000 computer system, you receive your choice of one application software option at no additional cost. We'll install your software on your hard drive, optimally configured for your system and Windows,™ and provide master diskettes and manuals. Additional software packages are also available at extremely competitive prices. Ask your Gateway sales person for complete details.

Choose from the following application software options:

Option #1 — *Microsoft Excel for Windows™ 3.0*

Option #2 — *Microsoft Word for Windows™ 2.0*

Option #3 — *Microsoft PowerPoint for Windows™ 2.0*

Option #4 — *Borland® Paradox® 3.5*, and your choice of either *Borland Turbo Pascal for Windows®* or *Borland C++®*

Option #5 — *The Entrepreneur Pack*, including *Microsoft Works,™ Publisher™* and *Money,™* the latest versions, and an *Entertainment Pack*, all for Windows

Option #6 — *The Windows Programmer Pack*, including *Microsoft QuickC for Windows,™ Visual Basic for Windows,™ Windows Control Development Kit,™ Windows Help Compiler™* and *Windows Programmers' Online Reference™*

Option #7 — *Microsoft Project for Windows™ 3.0*

This offer includes the identical applications contained in retail packages but will not include the retail box. You get all master diskettes and manuals, shrink-wrapped and packaged in a Gateway 2000 box.

Sorry — we sell peripherals only with the purchase of a Gateway 2000 system, or to people who are already Gateway 2000 customers.

Microsoft's Windows 3.1 is now standard with all Gateway 2000 systems. Windows 3.1 includes many new features and enhancements you'll enjoy:

- *Fewer UAEs*
- *Improved performance*
- *Built-in multimedia capabilities*
- *Better network support*
- *Includes four True Type™ font families*

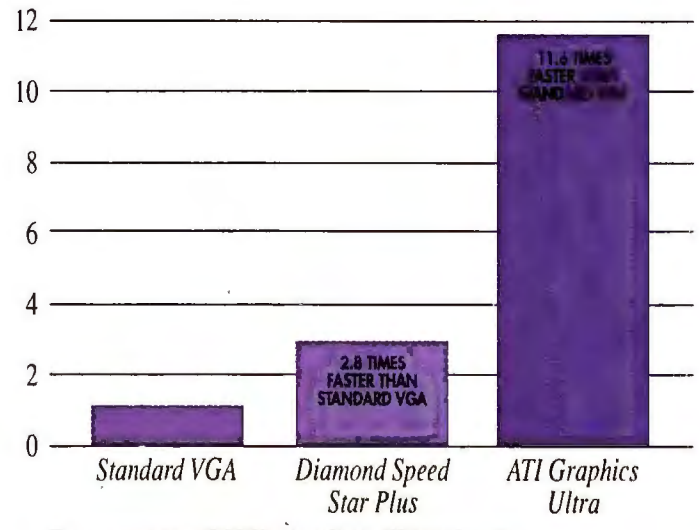
WITH YOUR GATEWAY 2000 PC

Peripherals

The ATI Graphics Accelerator

ATI achieves a quantum leap in performance with its coprocessor-equipped video card. The ATI Graphics Ultra is the fastest video card available in its class — over 10 times faster than standard VGA. The Ultra supports resolutions up to 1280 x 1024. And because it is compatible with many common graphics standards, the Graphics Ultra makes applications easy to install using standard video drivers provided with the software.

The ATI Graphics Ultra video card is standard with all 486 ISA systems. It's an upgrade option with the purchase of a 386DX or a 486 EISA system for an additional $100.



Figures computed on a 486DX/33 and provided by ATI Technologies Inc.

The Gateway 2000 TelePath™ Fax/Modem

The Gateway 2000 TelePath may set a new box office sales record for us. It's no wonder. For only $195, you get the Gateway 2000 TelePath — a 14,400 bps modem, V.32bis, with 9,600 bps fax capability plus WinFax Pro,™ Crosstalk® for Windows, Qmodem® and a free 30-day basic services CompuServe® membership.

- Fax mode: V.17, V.29, and V.27ter
- Data mode: V.32bis, V.32, V.22bis, V.22, V.21, Bell 212A and 103, V.42 and MNP 2-4 error correction, V.42bis/MNP 5 data compression

The 15-Inch Crystal Scan 1572FS

The new 15-inch Crystal Scan color monitor has a flat, square, non-glare screen, reducing distortion around the corners and providing edge-to-edge display area. The refresh rate is higher, 72Hz, for added image stability and flicker-free display. The non-interlaced Crystal Scan 1572FS will support resolutions up to 1280 x 1024. Plus, we've moved the fine tuning controls to the front of the monitor for easy access. The Crystal Scan 1572FS is an upgrade option with the purchase of a 386DX or 486 system for an additional $195. (Availability is limited.)

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Edited by ERIC BENDER

How Easy Will Windows 3.1 Be?

Experts Predict User Love/Hate Relationships Will Continue

"When Windows 3.0 came out, Microsoft was ill-prepared to support it," says WUGNET's Joel Diamond. "With 3.1, users will get crunched again."

Life with *Windows* is not always bliss. Maybe you had no problem installing and using the environment, but most people do. You've almost certainly experienced crashes, unfathomable Unrecoverable Application Errors, and the incompatibilities that send people fleeing back to the DOS prompt.

Like many users, Rita Belserene, a teacher and author in Albany, California, says that *Windows* is easy to use—until it stops working. "Then you get into stuff so arcane it makes basic DOS commands look easy," she remarks.

Don't pin the blame entirely on Microsoft. While pushing DOS's obsolete memory model to the limit and running applications that break all the rules, *Windows* must also work with every semicompatible BIOS, video adapter, and storage device out there. To its credit, Microsoft has fixed all the major problems reported by *Windows 3.0* users, who deluged Microsoft with up to 2400 calls a day.

But why does *Windows* still run out of memory while running only one program? When the minimal documentation doesn't help with problems like this, the only recourse has been Microsoft's *Windows Resource Kit,* which is aimed more at corporate gurus than novices.

Even when *Windows* works straight out of the box, a tune-up can spell trouble. Without a solid understanding of memory usage, disk caching, and the murky workings of INI and PIF files, it's easy to render *Windows* brain damaged. Once you start modifying the base configuration, "you're in danger," cautions developer Morrie Wilson of Seattle's Wilson WindowWare. "You've either got to trust *Windows* completely, or understand it completely so that you can outguess it."

Users typically find solutions through trial and error or from third parties like the Windows User Group Network (WUGNET) in Media, Pennsylvania, which provides on-line help and a bimonthly technical journal for $95 a year. "When *Windows 3.0* came out, Microsoft was ill-prepared to support it," WUGNET technical director Joel Diamond says grimly. "With *3.1,* users will get crunched again."

I Love You, I Hate You

Despite its foibles, many people adore *Windows,* with its snazzy interface, multitasking, and portfolio of powerhouse applications. *Windows 3.1*'s greater stability, bundled fonts, tighter application links, and improved speed should boost its acceptance.

Windows product manager Jonathan Roberts emphasizes that fit-and-finish improvements in *Windows 3.1* also simplify installation and modification. For instance, improvements to the file properties dialog box and control panel mean that many users won't have to edit INI files by hand.

Often the memory problems that haunt *Windows* can be traced to *Windows 3.0*'s 64K resource limit, which restricts the number of windows and icons in use. Happily, *3.1* doubles the resource area.

On the flip side, *Windows 3.1* is less tolerant of applications that contain minor coding errors. "Users will discover that *3.1* is not as compatible as Microsoft claims," says Diamond. "It will require significant upgrades of third-party applications—utilities as well as core applications."

Roberts responds that Microsoft has worked closely with developers to ensure that most applications will run fine. Nevertheless, he adds, compatibility is not job one: "Our primary focus is making PCs easy to use."

—*Scott Spanbauer*

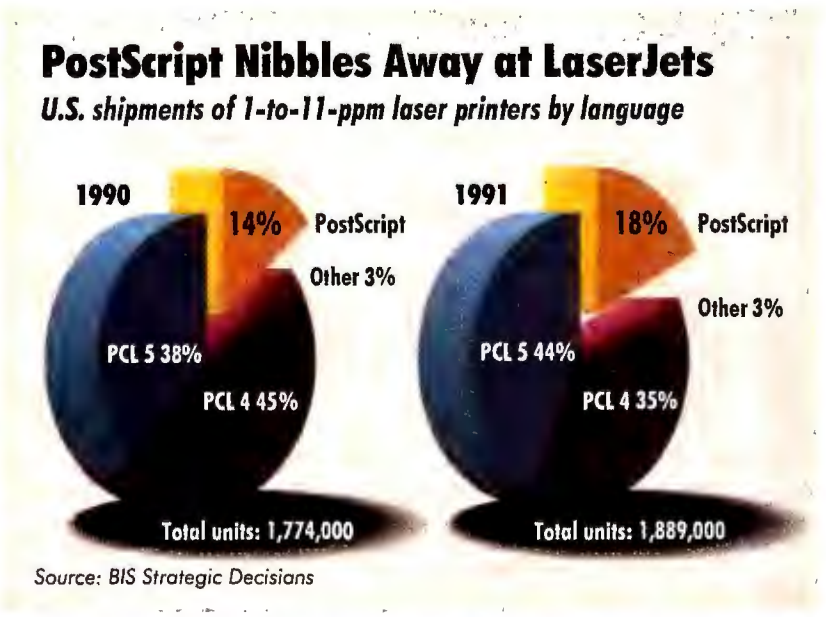
Windows remains the most controversial PC product.

STEVEN FALK

The Buck Stops Here for Lasers

Printers Will Pump Up Features But Hold Steady on Pricing

Users hungry for good deals on printers enjoyed a feast in 1991, as vendors dished up a bounty of low-cost personal lasers. PostScript machines, the caviar of page printers, hit the streets at Hamburger Helper prices. And for the first time since the LaserJet debuted, Hewlett-Packard found its piece of the desktop laser pie significantly diminished—from 60 to 46 percent, according to InfoCorp in Santa Clara, California.



PostScript is taking a bigger bite out of the laser printer market.

Will the prices continue to plunge? Is HP faltering? Don't bet your lunch money on either.

With dealer margins already sliced to the bone, most observers expect list prices for lasers to hold steady at the current floor of around $1000—about $650 on the street. "I wouldn't expect to see much action in pricing until some other breakthrough in technology comes," says Bill Sopp, marketing director for Okidata's nonimpact products in Mount Laurel, New Jersey.

What you will get is more printer for your money, as vendors start to beef up fonts, performance, and resolution. Expect a spate of PCL 5 clones offering scalable typefaces and knockoffs of HP's Resolution Enhancement technology that provides sharper text, as well as some models featuring 600-dpi engines.

"The standard is moving up to 600 dpi," says Rudy Batties, senior product marketing manager for Adobe Systems in Mountain View, California. However, don't expect to dump your 300-dpi machines anytime soon. A 600-dpi page quadruples the amount of data snaking its way through the parallel port, Batties notes. That means greater potential for bottlenecks, especially with shared printers. Vendors will need to respond with faster I/O, more standard memory, and heavy-duty integration of RISC processors with custom silicon.

Shooting From the HP

Last year's introduction of the $1595 LaserJet IIIP boosted HP's sales at the 4-ppm level. The debut of the IIISi, a rugged 17-ppm network printer, had a similar effect at the high end. But the 8-ppm market that was once HP's mainstay has dropped.

"Two years ago if you gave corporate users the choice between buying one 20-ppm printer for their network or three 8-pagers, they'd have chosen the latter," says Batties. "Today they'd go for the big printer. Why? The IIISi."

The $5500 IIISi was the first HP laser to offer an integrated PostScript option and fast RISC processor as well as high-speed network interface cards. "You'll see more [PostScript] integration in our lower-end products," says Steve Simpson, general manager of HP's Boise, Idaho, printer division. "You'll also see us upgrading our processors—possibly RISC, certainly higher performance—and it's safe to assume we'll continue to enhance PCL." HP will also introduce fast networking cards for its 8-ppm line, positioning the midrange printers as a solution for smaller work groups.

PostScript Gains Share

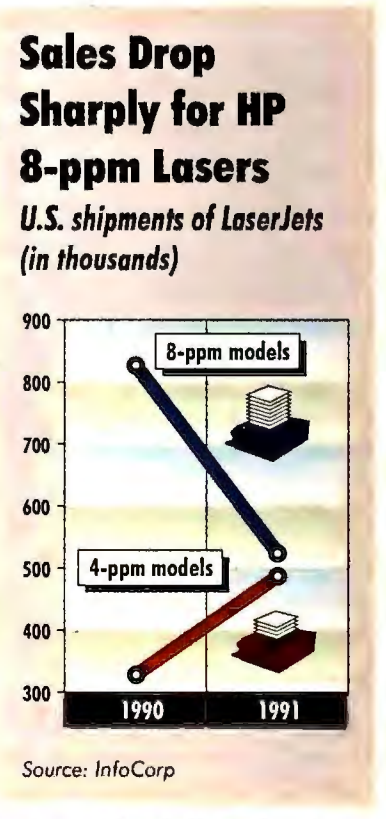
Not long ago you could buy three LaserJets for the cost of one Apple LaserWriter IINTX, the PostScript flagship. Now NEC, TI, and Okidata are selling Adobe PostScript models at street prices only a few hundred dollars higher than the PCL 5–based IIIP's, with a substantial edge in fonts and graphics power. Small wonder PostScript quietly climbed from 14 to 18 percent of the total laser market last year, according to BIS Strategic Decisions in Norwell, Massachusetts.

"What's really driving this move is the graphical interface," says Okidata's Sopp. "For WYSIWYG documents and scalable fonts, PostScript is the optimal solution."

But Adobe's page description language isn't likely to supplant PCL soon. "People buy a PostScript printer because they want a PostScript printer," says Mick O'Rourke, marketing vice president at Pacific Data Products in San Diego. "People buy a PCL printer because it says HP on it. It's not a language-to-language battle at all."

Are low-cost PostScript printers taking a bite out of HP's lunch? "The font cartridge vendors are suffering," says Sopp, "but that's driven more by capabilities within *Windows.*" Pacific Data's O'Rourke agrees that *Windows 3.1*'s scalable TrueType fonts will affect sales of cartridge-based fonts, such as the PacificPage PostScript cartridge. "But one of the effects is that it gets people more excited about scalable type, and then they'll want PostScript. Getting those other 22 TrueType fonts will cost you, and you still have to deal with issues of speed, convenience, and networking."

—Daniel Tynan



Last year Hewlett-Packard saw a dramatic drop-off in sales of the 8-page-per-minute LaserJet III and IIID, while its 4-ppm IIP, IIP Plus, and IIIP gained.

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6 PCs or Printers/Any Combination

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6 PCs to 2 Printers (Typical)

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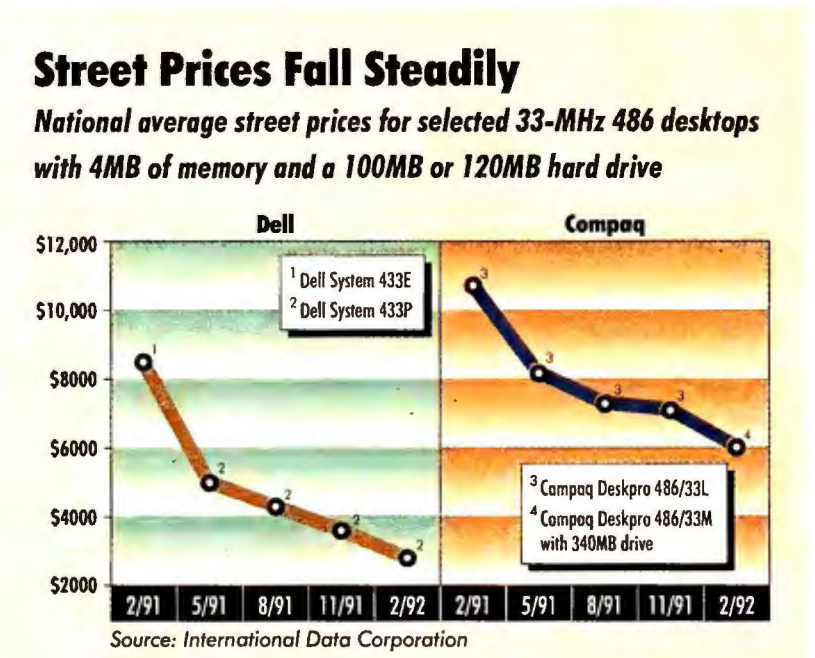
Circle 126 on reader service card

486 PCs Enter the Mainstream

Price Premium Over 386 Machines Has Dwindled Dramatically

Last December Charles Shepard, micro systems manager for Mirage Resorts in Las Vegas, was planning to buy nine PCs. He had recently spent almost $5000 for a 486-based system and expected to save money by ordering 20-MHz 386SXs from Dell Computer. But "all of a sudden the price started dropping on the 486s, and I realized it didn't make sense to buy 386s," remembers Shepard.

A year ago a 486-based PC was considered an expensive high-performance platform that only a true power user could justify. But now "it's a very small jump from the 386 to the 486," notes Phil Deering, senior product manager for Northgate Computer Systems in Eden Prairie, Minnesota. For example, the Northgate 33-MHz 486 ZXP with a 100MB hard drive and super-VGA monitor cost only $2699 at press time. Archrival Dell of Austin, Texas, has slashed the price on its similar 486P to $2898. AST Research, Compaq, Everex, IBM, NEC, and others are following suit.



Costs of 486-based systems have dropped dramatically during the past year, particularly among vendors such as Dell Computer that heavily promote 486 models for ordinary users.

Processor Prices Plummet

Vendors attribute the lower prices partly to improved manufacturing efficiencies, product line changes, and the rise of alternate distribution channels such as mail order and superstores. But the biggest factor, they say, is declining microprocessor costs.

Pressured by compatible 386 chips from Advanced Micro Devices and other rivals, "Intel feels it's got to lower its prices for 486 products," explains Casey Dworkin, general manager of Personal Technology Research in Waltham, Massachusetts. The plan is to move customers to the higher platform before competitors can follow. So a 33-MHz 486 CPU, priced over $800 a year ago, was selling for $417 this winter. At the low end, Intel is fitting its 16-MHz 486SX chip with a cheap plastic package and planning to sell it for as little as $100 by year-end.

Users Climb on Board

The combination of falling system prices and an onslaught of resource-hungry graphical applications is driving corporate America toward the 486. "My network loves them," notes Mirage's Shepard. "With the 486s I'm a hero because the users become so much more efficient."

Paul Bromwell agrees. As director of information systems with Frost and Jacobson, a law firm in Cincinnati, Bromwell was set on buying 30 386DXs a few months ago. Then price tags on 486SXs slid under $2500. "Our feeling was, hey, it's $200 *cheaper* than the 386DXs, it runs *Windows* better, and it's got an upgrade path," says Bromwell.

Truly Upwardly Mobile

Buying into 486 technology may also offer better protection from obsolescence. Most computer manufacturers are offering chip-upgradable systems that allow users who buy an entry-level 486SX to move up to a full-powered 486 without having to replace their entire system. While upgradable PCs have been around for years without users taking much notice, this new scheme promises to change all that because upgrades should be simple, cheap, and effective. "Part of the reason we went with the 486SX was because all we have to do is swap in the 486 chip to upgrade," says Bromwell.

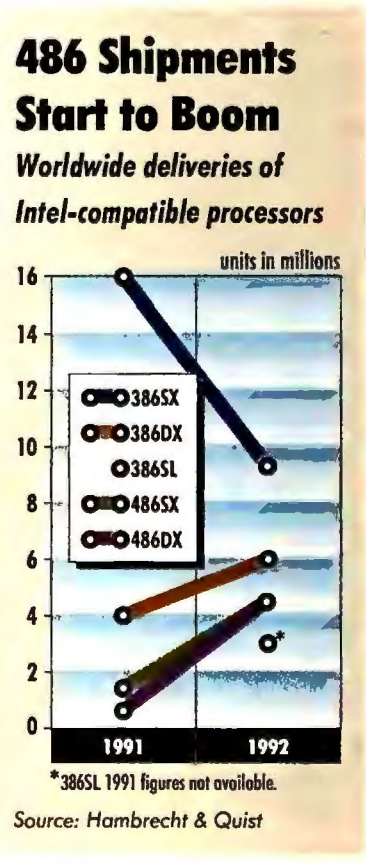
And the upgrade promise doesn't stop there—Intel's new OverDrive chips will run internally at twice the original clock speed in suitably designed systems.

"A lot of people have been burned in the past by buying 286 and 386SX machines," says Dan Shepard, marketing director at AST Research in Irvine, California. "They're looking further into the future today because they want a system that will last two or three years. The 33-MHz 486 has a long way to go before it becomes obsolete."

No longer able to differentiate on price, computer makers keep struggling to gain an edge in innovation. For example, AST integrates super-VGA capability onto the motherboard, Dell exploits flash memory to let you upgrade system BIOS via floppy disk, and Northgate promotes a socket that simplifies chip upgrades. And they're all racing to boost performance with "local bus video" designs, which place the graphics controller on the same high-speed bus as the motherboard.

—John H. Mayer

John H. Mayer is a freelance writer in Belmont, Massachusetts. Scott Spanbauer and Daniel Tynan are contributing editors for PC World.



This is the year when the 486 really takes off in both DX and SX versions, with total deliveries nearly matching those for the market-leading 386SX.

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PC WORLD

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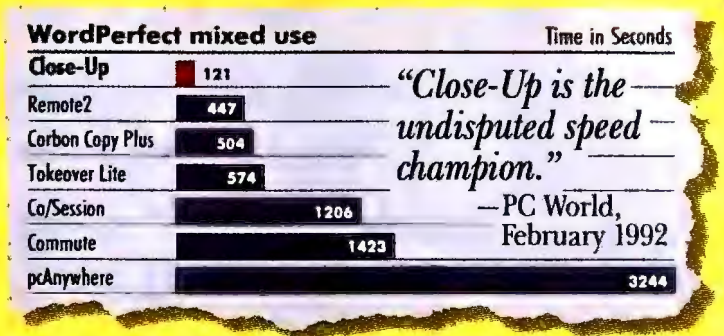

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Close-Up Dual Pack 4.0	672	★★★★	★★★★	★★★★	★★★★	★★	★★★	★★★½	★★★★
CO/Session 6.0	674	☆☆☆½	☆☆½	☆½	☆☆	☆☆☆½	☆½	☆☆☆½	★★½
pcAnywhere 4.03c	675	½	☆☆	☆½	☆☆☆☆	☆☆	☆	☆☆☆½	★½
Remote2 2.1	676	☆☆☆	☆☆☆☆	☆☆½	☆☆½	☆☆☆½	☆☆½	☆☆☆½	★★★
Takeover Lite 2.0	677	☆½	☆½	☆☆	☆☆☆	☆☆☆	☆☆☆	☆☆☆½	★★

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—Reprinted from PC Magazine, January 14, 1992

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"If you're serious about going remote, check out Close-Up. The program's handling of Windows is simply dazzling."
—PC World "Best Buy," February 1992

"Close-Up is one of the fastest products we've seen. It had the fastest file transfer times and the shortest times redrawing the screens."
—LAN Times, November 18, 1991

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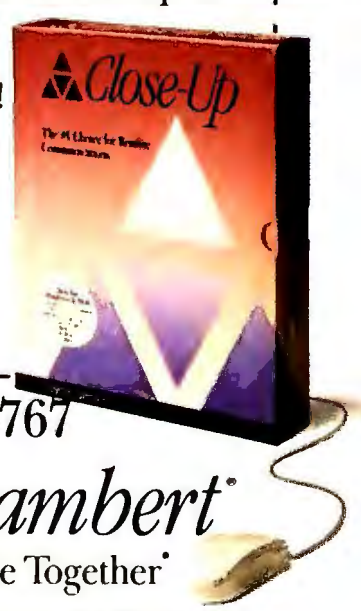

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The Dell System 333P and the Dell System NX20 were the most aggressively priced desktop and portable PCs in the February survey by International Data Corporation.

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Leading PCs sold through computer stores and traditional dealer channels

1. *IBM PS/2 Model 55 SX*
2. *IBM PS/2 Model 70 (20 MHz)*
3. *Compaq LTE 386s/20*
4. *CompuAdd 316s*
5. *NEC PowerMate SX*
6. *IBM PS/2 Model 57 SX*
7. *AST Premium Exec 386SX*
8. *Compaq Deskpro 386/25M*
9. *Epson Equity 386SX Plus*
10. *Compaq Deskpro 386s/20*

Now headed for retirement, IBM's PS/2 Model 55 SX holds on to its sales lead, according to the January survey by InfoCorp's Storeboard Channel Tracking Service.

BARGAINS OF THE MONTH

Over the Counter

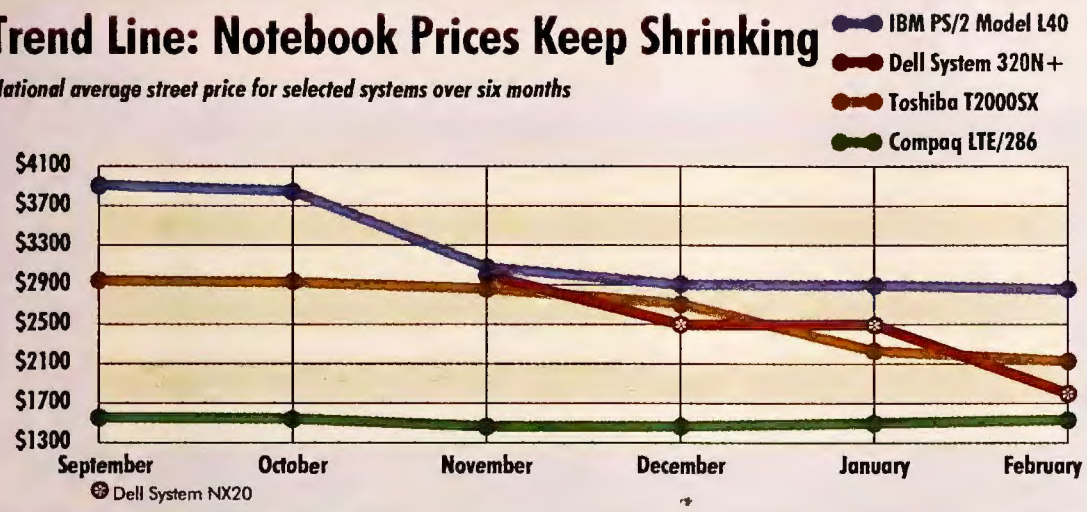
What you pay at retail stores for popular PCs

	Configuration				National				
	Speed (MHz)	RAM (MB)	Hard disk (MB)	Video adapter	List	Average	Boston	Chicago	Dallas/ Ft. Worth
80386SX-based desktop PCs									
AST Bravo 386SX/20	20	2	40	VGA	$1695	$1391	$1457	$1414	$1344
Compaq Deskpro 386s	16	2	40	VGA	$2299	$1879	$1843	$1933	$1899
Compaq Deskpro 386s/20	20	2	60	VGA	$2599	$2101	$2195	$2228	$2177
Dell System 320 SX	20	2	40	VGA	$1250	$1250	$1250	$1250	$1250
IBM PS/2 Model 35 SX-043	20	2	40	VGA	$2255	$1754	$1752	$1778	$1740
IBM PS/2 Model 55-041	16	4	40	VGA	$2745	$1974	$2013	$1881	$1986
NEC PowerMate SX/20i	20	2	60	VGA	$2049	$1596	$1617	$1640	$1629
80386DX-based desktop PCs									
AST Premium II 386/33	33	4	210	VGA	$3795	$3097	$3203	$3301	$3138
Compaq Deskpro 386/25M	25	4	120	VGA	$3999	$3318	$3335	$3411	$3305
Dell System 333P	33	4	100	VGA	$1630	$1630	$1630	$1630	$1630
Epson Equity 386/25 Plus	25	2	100	VGA	$3199	$2424	$2381	$2431	$2607
Gateway 2000 33-MHZ 386VGA	33	4	200	VGA	$2020	$2020	$2020	$2020	$2020
IBM PS/2 Model 70-A16	25	4	160	VGA	$5475	$4085	$4290	$3959	$4062
80486SX-based desktop PCs									
ALR BusinessVEISA	20	5	120	none	$3495	$2853	$2784	$2894	$2709
AST Premium II 486SX/20	20	4	80	VGA	$3495	$2812	$2843	$2973	$2808
IBM PS/2 Model 90XP-OH9	25	4	160	XGA	$6545	$5020	$4734	$4784	$4707
80486DX-based desktop PCs									
AST Premium II 486/33	33	4	210	VGA	$5495	$4469	$4723	$4747	$4416
Compaq Deskpro 486/33M	33	4	340	VGA	$7199	$6022	$5868	$6255	$5950
IBM PS/2 Model 90 XP-OKF	33	8	400	XGA	$12,495	$9611	$9285	$9387	$9305
NEC PowerMate 486/33e	33	4	300	none	$6349	$4803	$5197	$5080	$4975
Portables/laptops									
AST Premium Exec 386SX/20	20	2	40	VGA-LCD	$2395	$2044	$2120	$2036	$2056
AST Premium Exec 386SX/25	25	4	80	VGA-LCD	$3295	$2781	$2921	$2803	$2871
Compaq LTE/286	12	640K	20	CGA-LCD	$1949	$1541	$1678	$1705	$1405
Compaq LTE 386s/20	20	2	30	VGA-LCD	$3599	$3009	$3096	$3188	$3094
Dell System NX20	20	2	60	VGA-LCD	$1799	$1799	$1799	$1799	$1799
IBM PS/2 Model L40 SX	20	2	60	VGA-LCD	$3645	$2857	$2922	$2968	$2881
NEC UltraLite SL/20	20	2	80	VGA-LCD	$4199	$3220	$3208	$3360	$3299
TI TravelMate 2000	12	1	20	VGA-LCD	$1199	$950	$978	$987	$992
Toshiba T2000SX	16	1	40	VGA-LCD	$2699	$2129	$2252	$2278	$2222
Toshiba T2000SXe	20	2	60	VGA-LCD	$3299	$2663	$2880	$2699	$2707

From an IDC survey of more than 180 computer dealers in eight metropolitan areas. Figures based on at least four price quotes for each machine. Prices are based on manufacturer's standard configuration without monitor.

Trend Line: Notebook Prices Keep Shrinking

National average street price for selected systems over six months



While the price of Compaq's aging LTE/286 holds steady, the cost of SX-based notebook computers continues to drop. Dell's aggressive move on the System NX20 is helping to intensify another round of price reductions. Vendors are promoting a new generation of 25-MHz notebooks and trying to get customers to look for fancy extras such as color screens, but fierce price competition continues to rule.

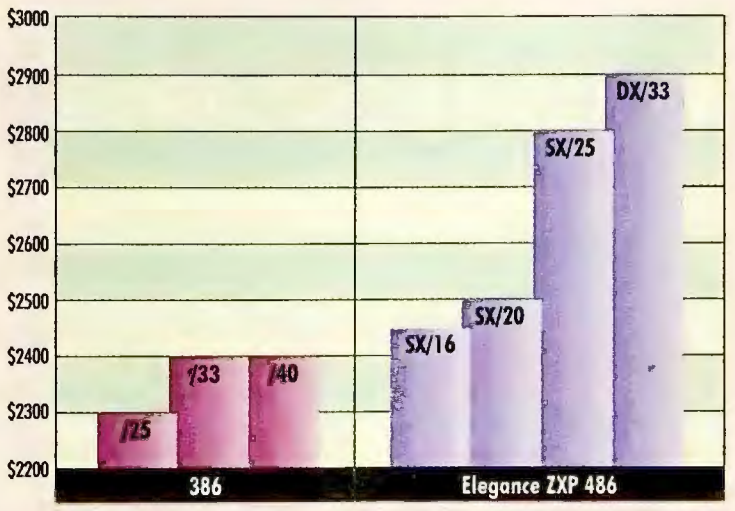
Metropolitan				
Los Angeles	Miami/ Ft. Lauderdale	New York	San Francisco Bay Area	Washington, D.C.
$1372	$1341	$1498	$1401	$1360
$1800	$1894	$1906	$1815	$1845
$2098	$2224	$2123	$1967	$2145
$1250	$1250	$1250	$1250	$1250
$1564	$1540	$1772	$1737	$1884
$1861	$1911	$2036	$1917	$2152
$1557	$1463	$1620	$1587	$1592
$3009	$3067	$3347	$2934	$3115
$3184	$3265	$3319	$3263	$3432
$1630	$1630	$1630	$1630	$1630
$2463	$2475	$2346	$2435	$2578
$2020	$2020	$2020	$2020	$2020
$3795	$3867	$4159	$4041	$4220
$2987	$2846	$2795	$2854	$2963
$2777	$2656	$3010	$2931	$2625
$4918	$4941	$4975	$4872	$4889
$4488	$4439	$4747	$4212	$4222
$5926	$6021	$6039	$5875	$6074
$9348	$9939	$9446	$9524	$9645
$4825	$4965	$4889	$4684	$4542
$2009	$2122	$2019	$2173	$2022
$2680	$2789	$2801	$2888	$2763
$1598	$1485	$1386	$1354	$1341
$2945	$3025	$2981	$2955	$2912
$1799	$1799	$1799	$1799	$1799
$2726	$2726	$2937	$2836	$2987
$3189	$3004	$3282	$2944	$3280
$952	$988	$906	$994	$978
$2164	$2202	$2055	$2082	$2147
$2593	$2794	$2567	$2719	$2704

PC Futures: Down the Slippery Slope

Dell Computer slashed prices in a big way again in February, and its System 333P is the desktop Bargain of the Month[1] while the System NX20 carries off portable Bargain of the Month honors. Starting with this issue, InfoCorp's Storeboard Channel Tracking Service adds computer store sales to traditional dealer sales—which accounts for the sudden appearance of the CompuAdd 316s in fourth place on the best-seller list. IBM's 3-year-old PS/2 Model 55 SX, which is being replaced by various SX models introduced in the past year, will soon retire as champion. Throughout the industry, the steady barrage of price cuts continues. With prices tumbling on high-end CPUs, PCs based on those processors offer greatly improved price/performance. Northgate's Elegance line neatly demonstrates this—a 33-MHz 486 PC costs only 21 percent more than a 33-MHz 386 system.

CPUs Don't Dominate System Costs

Prices on selected Northgate Computer models with 4MB of memory, a 100MB drive, color monitor, and Windows



As CPU types proliferate, their cost has dropped so dramatically that they now play a relatively small role in total system costs. The narrow range of prices on Northgate's top-end PCs illustrates this.

[1] Bargains of the Month are determined by adjusting prices on PCs of a given class for standard memory and storage, then finding which PC compares best.

The award winning T2200SX

If you need any more power than this

If your desire for power is on the scale of say, Louis XIV, consider the Toshiba T2200SX. Weighing a mere 5.5 pounds and taking up just half a briefcase, it possesses an awesome 20 MHz 386SX microprocessor and a 40, 60 or 80 MB hard drive with 2MB RAM expandable to 10 MB. And it's powerful enough to have grabbed both a PC/Computing MVP award and a PC Magazine Technical Excellence Award.

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The new T3300SL

naybe you should get into politics.

If your need for power is on the scale of say, Napoleon, consider the new T3300SL. It offers a 25MHz 386SL microprocessor plus 64 KB cache for blazing speed and longer battery life. Not to mention an 80 or 120MB drive and a PCMCIA-compatible slot. And like its cousin the T2200SX, it offers a Nickel Hydride battery and a carbon-fiber reinforced case. So call 1-800-457-7777. Or if you want even more power, don't forget it's an election year.

In Touch with Tomorrow
TOSHIBA

Circle 257 on reader service card

CD ROM DRIVES

680MB

OR BUST!

TODAY'S SURPRISINGLY INEXPENSIVE CD ROM DRIVES TURN YOUR PC INTO A LIMITLESS INFORMATION STATION. BUT ARE THEY FAST ENOUGH TO HANDLE MULTIMEDIA? OUR TESTS OF 14 DRIVES TURN UP 3 IRRESISTIBLE WINNERS.

BY JOHN WALKENBACH

Is there a CD ROM in your future? Probably. Today's least expensive form of data storage, CD ROM (compact disk read-only memory), lets you read (but not write) as much as 680MB of information from a compact, eminently portable optical medium. The latest drives are faster and more reliable than ever, and prices are tantalizingly low.

CD ROM used to be a technology that was all dressed up with nowhere to go. Today you can find anything on CD ROM from news to financial data—the kind you might collect on line with a modem; not quite as fresh but a lot more economical. If desktop publishing or presentations are your thing, you can spiff up your output with a collection of PostScript fonts or a huge clip-art library that would otherwise fill a briefcase with floppies. And if you're ready to enter the exciting world of multimedia, CD ROM is a must.

This review covers 14 of the hottest new CD ROM drives on the market. We chose either the fastest drive or the multimedia model from each vendor; street prices ranged from around $400 to $1000. If your CD ROM needs are confined to simple text applications, you can find slower drives that can do the job for around $300. The drives we reviewed were external models, which are a bit easier to install, but most vendors will sell you an internal drive for about $100 less that takes up no more room than a 5¼-inch floppy drive.

The Multimedia Connection

While text-only business applications still make up the bulk of CD ROMs, multimedia reference, education, and entertainment disks are already arriving in force, providing high-quality graphics, sound, and animation.

Add one of these CD ROM drives and a soundboard to your home system, and you can enjoy encyclopedias, educational titles, dictionaries, atlases, and games that leave the likes of *Flight Simulator* in the dust. A CD ROM

PHOTOGRAPHS BY PIERRE-YVES GOAVEC

drive will soon be an indispensable accessory for your office PC. Early users of *Multimedia Microsoft Works* CD ROM agree that multimedia tutorials are far more compelling than step-by-step exercises. As the use of on-screen presentations escalates, vanguard presenters are using animation and PC-generated sound to get their points across. Sound and animation clip libraries on CD can help make such productions much easier (see "Multimedia Presents" in this issue).

At log-on, a CD ROM drive looks and feels like a hard disk—with two key differences. You can't write data to a CD ROM, and compared to the faster fixed hard disk, the CD ROM player seems to be stuck in neutral. The typical 300ms to 500ms average access times of most CD ROM players pale in comparison to the 16ms you'll get with a fast hard drive.

Still, just about any CD ROM player will perform adequately for accessing text-only data bases. However, when you start flirting with multimedia—digital audio, high resolution graphics, and motion video—access speed and data throughput become critical. Slower CD ROM drives stumble over animation or video clips and leave you with a jerky or stop-action presentation.

All the CD ROM players here claim sequential data transfer rates of 150 kilobits per second (kbps) or better, which fits the Multimedia PC Marketing Council (MPC) guidelines for multimedia CD ROM drives. To see if our players can handle real multimedia applications, we ran them through a variety of tough application-based performance and raw throughput tests (see "Buying Smart" and the Test Report). Even though our raw throughput tests are more demanding than those used by vendors in rating their drives, most of our drives stood up well to multimedia, playing motion video clips smoothly. The NEC Intersect CDR-73M actually exceeded 150 kbps on *PC World*'s tough data throughput tests.

Three drives earned Best Buys: NEC's CDR-73M and Toshiba's TXM-3301E are the top multipurpose drives, with a winning combination of hot performance, thoughtful design, fair pricing, and solid support; Sony's Best Buy CDU-7205 Laser Library adds a terrific CD ROM bundle for home use. Two other players merit special mention: CD Technology's Porta-Drive T3301 is ideal for notebook users, and the Corel Blockbuster CD ROM Bundle is the desktop publisher's choice. Whether you need to search volumes of demographic data to save your business, zip out a stunning presentation to save your career, or spin through a multimedia encyclopedia to save your kid's education, one of these drives should do the job.

John Walkenbach is a contributing editor for PC World. *He can be reached on PC World Online.*

For more information about all products in this article, circle reader service no. 910.

CD Technology Porta-Drive T3301

PROS: Very fast, small size, automatic lens cleaning, sealed mechanism
CONS: No power-on indicator

If your business card reads "have notebook, will travel," you'll love CD Technology's $599 Porta-Drive. It's a fast, fly-anywhere portable that requires little room for landing. The Toshiba-manufactured drive boasts a 325ms average access time and handled our tests with ease, coming in first on the MPC demo—a selected multimedia sequence combining music, narration, graphics, text, and user input. We ran tests with CD Technology's standard Trantor T128 SCSI host adapter, but for an extra $20, the new T339 parallel-to-SCSI adapter option (unavailable at test time but now shipping) will let you move the drive from notebook to PC without a standard internal adapter. If you're deskbound, CD Technology has an internal model that can save you more than $100.

Documentation, setup, and installation are all straightforward. The drive features an external dust seal and an automatic lens cleaner to protect you on the road. If you need to travel with huge chunks of data—or you're lucky enough to have a custom CD ROM presentation—the CD Technology Porta-Drive is the best portable player you can buy.

Corel Draw Blockbuster CD ROM Bundle

PROS: Very fast; deep competitive discount; bundled Corel Draw, clip art, fonts
CONS: Expensive for general-purpose users

Team up a fast Toshiba 3301 CD ROM drive with Corel's SCSI interface, and toss in *Corel Draw 2.01*. Add a collection of 10,000 clip-art images, 1000 *Corel Draw* images, 52 new fonts, and stir. The Corel Draw Blockbuster CD ROM Bundle is hot and ready to serve. The Toshiba-built drive is a tremendous performer: A virtual twin to the Toshiba TXM-3301E, it passed every multimedia and throughput test with flying colors. And you'll find every design detail done to perfection.

You'll have to pony up a steep $1052 ($100 less for the internal), but over $1000 worth of free software makes this a great deal for graphic artists. If you're a registered user of *Micrografx Designer, Arts & Letters, Aldus Freehand* (PC), *Adobe Illustrator* (PC), *Harvard Draw,* or *Gem Artline,* you can buy the bundle for $695 and nail down a *real* bargain. The average business user might not need all these drawing tools, but if presentations or desktop publishing are part of your business, this package has your name on it.

Buying Smart: CD ROM With an Eye Toward the Future

You buy a CD ROM drive to get easy, affordable access to information—whether in text form or as multimedia sound and video. CD ROM data files are laid down sequentially and never rewritten, so sustained transfer rates are generally more important than average access time, especially when you're dealing with sound and graphics. Quick average access is most meaningful when you're seeking scattered information from text data bases, multimedia dictionaries, and so on. We found drives with the fastest transfer rates had the quickest random seeks.

PERFORMANCE

We found most manufacturers' speed ratings to be a fair indicator of a drive's speed. Our Test Report shows each drive's average data throughput, ability to perform random seeks, and multimedia capabilities running *PC World*'s application suite. You may be able to tell the difference between a fast and a slow drive when retrieving CD ROM text, but you'll really see the difference in multimedia. A sluggish drive is most irksome when you're trying to run motion video—you'll see either bursts of motion interrupted by pauses, or a series of stop-action images.

Most of our drives handled every multimedia application we threw at them. Our overall speed champ, the Best Buy NEC CDR-73M, actually exceeded 150 kilobits per second in our varied data throughput tests.

DESIGN AND CONSTRUCTION

If your system has an open, externally accessible storage bay, consider an internal drive, which costs about $100 less. We chose to review externals because you can easily move them between PCs and you don't have to give up a bay. Although all external drives are portable, some, such as the CD Technology Porta-Drive T3301 and the Liberty 115CD-P, are lighter and smaller and offer special parallel-to-SCSI interface options that let you plug them into a printer port.

All CD ROM players need an interface, whether a card that plugs into an empty slot or an external adapter that plugs into a parallel port. All vendors offer either SCSI (small computer systems interface) or similar proprietary adapters with high throughput capabilities. The two portables offer an external parallel-to-SCSI adapter—unavailable in time for formal tests. Preliminary tests, however, indicate that its throughput will compare well with an internal card. We priced all our drives with their fastest interfaces. But when you query vendors, make sure the adapter is included and ask if higher-performance options are available. Also note that with one exception (the Pinnacle Micro External PCD-102), you can daisy-chain multiple drives.

Unless you work in a dust-free environment, look for a drive with dust protection: a door that seals the motors and optical elements against contaminants, a mechanism that cleans the lens automatically, or both.

All units tested will play audio CDs—most have the necessary software—and all include a headphone jack and volume control so you can listen to audio direct from the drives. If you want to amplify output, look for RCA phono jacks for easy connection to an amplifier or soundboard.

You'll also see a variation in stated capacity, ranging from 540MB to 680MB, but none of the drives in our roundup had any problem reading *Microsoft Bookshelf for Windows*, a CD ROM that contains close to 650MB of data. The Best Buy Toshiba drive tied with the Corel, Hitachi, and Panasonic players for top overall design.

PRICE

There are some terrific bargains here. For every player (except those that sell direct), we call at least three dealers in eight major U.S. cities for street price quotes. We then average the results for each system. We price all players with interface cards, cabling, and the software necessary to install and run them. The Pinnacle Micro External PCD-102 was the low-price leader.

COMPATIBILITY

We tested compatibility with Microsoft's *Multimedia Extensions for Windows*, which adds support for CD ROM, sound cards, and motion video to *Windows 3.0*. We also tested with the ISO 9660 format and the older High Sierra. All drives scored four stars.

SERVICE AND SUPPORT

All the vendors offer at least a 12-month parts and labor warranty, but NEC and Todd give you an exceptional two years. Most players breezed through installation, the most common time to encounter problems. If you need help, each company offers a central support number, and nine vendors offer toll-free support. We evaluated support by calling each company three times and judging accuracy and responsiveness, giving extra credit for long hours, fax lines, and BBS's. Texel scored highest on service and support.

Hitachi/Multimedia Systems CDR-1750S

PROS: Top motion video performance, sealed, dust-free chassis, automatic lens cleaning
CONS: Fairly expensive, slow support response

If you plan to run your CD ROM in hostile, dusty environments, check out the durable Hitachi CDR-1750S. Its dust protection scheme is among the best, with a a double-door external defense combined with automatic lens cleaning. The CDR-1750S is also a 3½-star performer, racking up respectable multimedia scores—including a first place on the motion video sequence—and running fluid motion video.

The superbly designed box has one annoying if relatively minor flaw: The eject button is directly below the power switch, making it too easy to accidentally power down. In addition, Hitachi's technical service was just so-so; the answers we received were accurate and complete, but the technicians were slow getting back to us. Finally, its $760 street price is not likely to attract buyers on a tight budget. Considering its fine motion video performance and protective design features, however, the Hitachi is a very good buy, especially if you need a sturdy drive that can stand up to heavy service.

Liberty Systems Liberty 115CD-P

PROS: Portable, plugs into parallel port
CONS: Expensive, no hardware documentation

The Liberty 115CD-P, like the CD Porta-Drive T3301, is light, small, and designed with the road in mind; Liberty even gives you a built-in SCSI-to-parallel interface. Unfortunately, the vendor was in transition at test time and was unable to supply the new Trantor T339 adapter that boosts throughput and corrects compatibility problems found with the earlier model T338. We tested the 115CD-P configured as an external, bypassing the internal interface and using a standard host adapter installed in our test PC. The speedy drive scored well in all categories, missing first place on the text retrieval test by an eyelash.

Installation was easy, and Liberty throws in a test program to verify that everything is running up to snuff. Oddly, Liberty includes documentation for the SCSI interface but no manual for the drive. And you'll have to watch out for road grime, as there's no dust protection. The drive, with its distinctive black case, is a pricey $999, so it's not a great choice for the desktop. But the internal interface makes it into a nice travel mate.

NEC Intersect CDR-73M

PROS: Fastest drive tested, automatic lens cleaning, two-year warranty
CONS: No external dust seal

Are you looking for a CD ROM drive that can handle any job you throw at it and leaves the path wide open to multimedia? The Best Buy NEC Intersect CDR-73M is our hands-down performance champ. In fact, this is the only drive reviewed that exceeded a 150-kbps average data transfer rate in our tests, resulting in butter-smooth motion video. Moreover, the unit's first-place showing on the random display test reveals that the CDR-73M, with its scorching 280ms average access time, will give you top-speed text searches.

Setup and installation are no sweat, and other perks include a TSR for playing audio CDs, and automatic lens cleaning. The $577 street price is tempting; an internal version could save another $75 or so. We'd like an emergency eject button and a sealed caddy door for better dust protection. But if you want the fastest CD ROM drive you can get—bar none—with a generous warranty and a low price, the CDR-73M is your Best Buy.

PC WORLD BEST BUY

Optimize Your CD ROM Setup

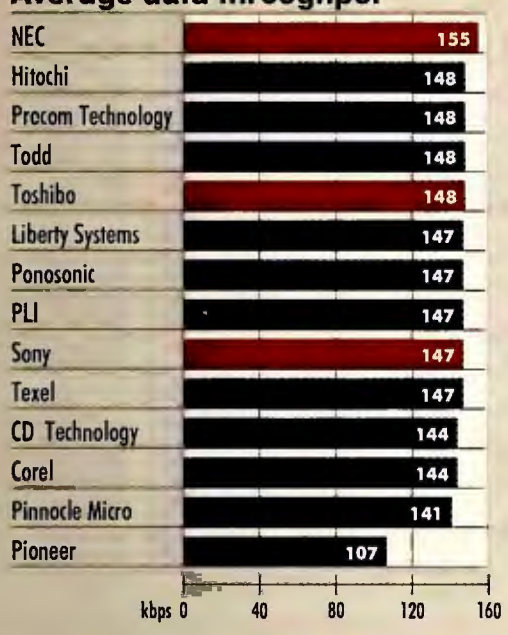
Here are a few speedup tips.

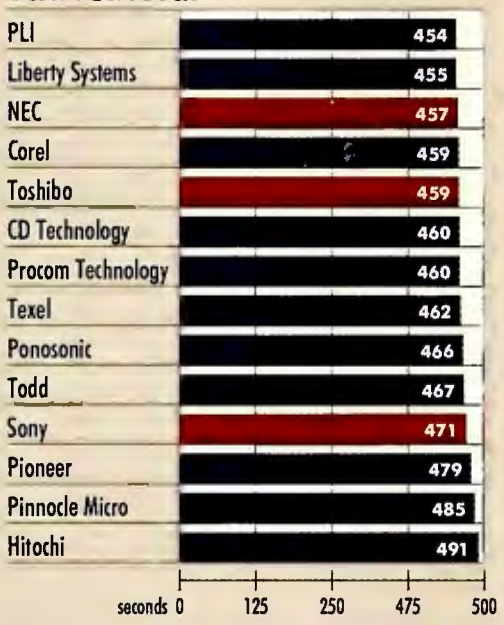
- If your application doesn't install its access software on a hard disk by default, do it manually. This will save time at start-up and while running if the program must read overlays as you work.
- Increase the RAM allocated to cache reads. The amount is specified in the MSCDEX.EXE line, probably in your AUTOEXEC.BAT file. Look for the /M switch and increase the number. If there's no /M switch, you've allocated MSCDEX's default 10 buffers. Each buffer uses 2K of memory; with DOS 5.0, you may be able to move buffers into high memory.
- Use a good disk caching program and allocate as much RAM as you can spare to the cache. Remember that the cache comes out of system RAM, although it will take advantage of extended or expanded memory.
- When you purchase your drive, buy the interface option with the fastest possible throughput.

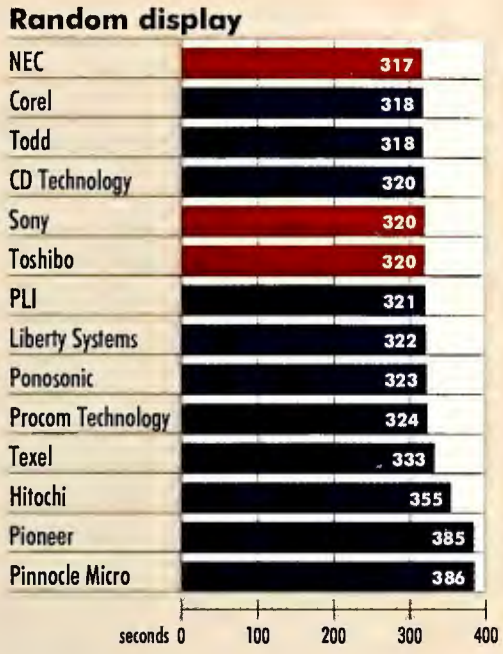
Business CD ROM Drives Get Quick for Multimedia

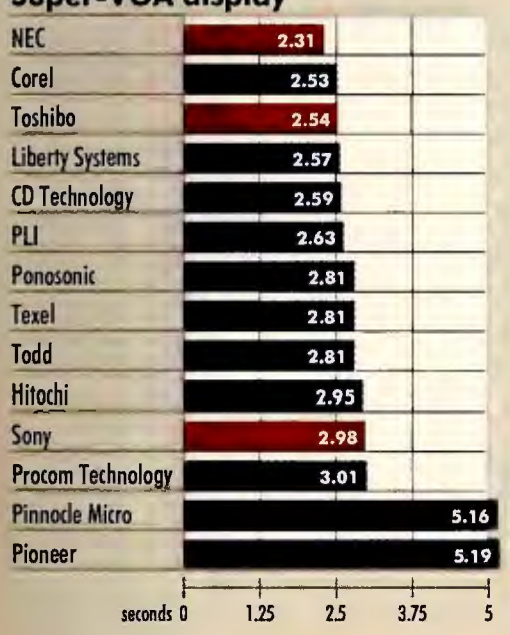
The Best Buy NEC Intersect CDR-73M—followed closely by CD Technology, Corel, and Toshiba—leads a pack of fast, multimedia-ready drives.

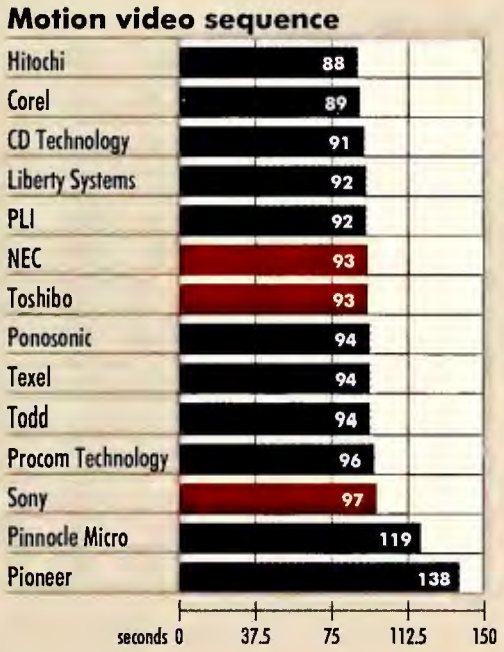
BEST BUY

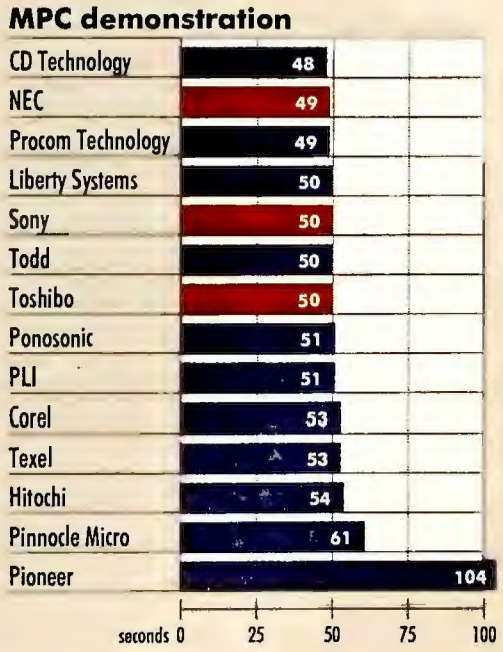












Methadalagy
We test eoch CD ROM drive with its interface and software device drivers configured occording to the manufocturer's recommended settings. CD Technology ond Liberty were unoble to supply o porollel-to-SCSI interface far their portable drives, so we tested them with a Trontor T-128 installed in our test PC. Our test system consists af o 50-MHz 486-bosed PC equipped with 8MB RAM, 256K external cache memory, ond o 239MB hord disk. The test videa subsystem includes a 1024 by 768 VGA cord with 1MB of videa RAM ond o multi-frequency super-VGA color monitor. The test audio subsystem consists of a Saund Bloster audia card. Heodphones ond/or speokers (as equipped) are used to gouge overoll sound quolity.

Average data thraughput
We transfer o 1164K test file using dato block sizes of 8K, 16K, 32K, ond 64K. We meosure the speed of tronsfer for differing block sizes ond calculate the overoge throughput.

Text retrieval
We record the elapsed retrieval time far o 2.5MB text file.

Random display
We compile a library af 36 black-and-white imoges, with the images scottered in different locotions on the CD ROM. Each imoge is retrieved ond displayed in sequence ond the elopsed time measured.

Super-VGA display
We view three super-VGA images. We record the elapsed time to retrieve and disploy each imoge, ond calculate the overage.

Mation videa sequence
We access an animoted sequence ond recard the time af completian.

MPC demonstratian
We initiote a multimedia sequence thot incorpo-rotes music, narrotian, grophics, text, ond user input from the keybaard. We record the elopsed time ta camplete the sequence.

Data based an tests designed and canducted by Praduct Perfarmance Laboratarles af Brick, New Jersey, In coaperatian with PC World Test Center. All rights reserved.

FEATURES EVALUATION

CD ROM Drives Keep Multimedia in Mind

These drives' sequential transfer rates look fast enough for multimedia—our reviews show which of them deliver.

● Yes
○ No
n/a = not applicable

	CD Technology Porta-Drive T3301	Corel Draw Blockbuster CD ROM Bundle	Hitachi/ Multimedia Systems CDR-17505	Liberty Systems Liberty 115CD-P	NEC Intersect CDR-73M
Standard features					
List price (drive and controller)	$995	$1395	$1095	$999	$765
Street price (drive and controller)	$599	$1052 [1]	$760	$999	$577 [1]
Interface type	parallel-SCSI	SCSI	SCSI	parallel-SCSI	SCSI
Interface	Trantar T339	proprietary	CDSCKITF2	Trantar T339	Trantor T128
Manufacturer's specifications					
Average random access time (ms)	325	325	320	380	280
Sequential transfer rate (kbps)	153.2	150	153.6	150	300
Mean time between failures (hours)	50,000 [2]	30,000	20,000	25,000	20,000
Bundled software					
Microsoft CD ROM Extensions 2.2	●	●	●	●	●
Windows Multimedia Extensions	○	○	○	○	●
Audio software	●	●	●	○	●
CD ROM application disks	○	3	○	○	●
Design and construction					
Unit tested	portable	external	external	portable	external
Internal model available	●	●	●	○	●
Power indicator	○	●	●	●	●
In-use (busy) indicator	●	●	●	●	●
Eject button	●	●	●	●	●
Emergency eject	●	●	●	●	●
Uses disk caddy	●	●	●	●	●
Automatic lens cleaning	●	●	●	○	●
Standard RCA jacks	●	●	●	●	●
Headphone jack/volume control	●/●	●/●	●/●	●/●	●/●
Height by width by depth (inches)	2.5 x 6 x 9	2.75 x 8.75 x 9	2.9 x 9 x 12.8	2 x 6.75 x 9.5	3 x 9 x 9.5
Footprint (square Inches)	54 [6]	78.75	115.2	64.13	85.5
Built-in buffer (K)	64	64	64	64	64
Maximum accessible storage (MB)	680	600	680	680	680
Drive runs on side	●	●	○	●	●
Drives can be daisy-chained	●	●	●	●	●
Compatibility [7]					
Works with Macintosh	●	○	○	●	●
Micro Channel bus interface available	●	●	●	●	●
Service and support					
Warranty (months)	12 [9]	12	12	12	24
Central tech support number/toll free	●/○	●/●	●/○	●/○	●/●
Daily support (hours)	8	9.5	7	9	9.5
Weekend support	○	○	○	○	●
Unlimited free support	●	●	●	●	●
BBS/fax	●/●	●/●	○/●	○/●	●/●
Turnaround policy (days)	4	7	○	3	3
					BEST BUY

[1] Estimated.
[2] CD Technalagy estimates 50,000 haurs; drive manufacturer (Toshiba) estimates 30,000 hours.
[3] Includes CD ROM Extensions 2.1.
[4] Push drower in—it pops out with disk.
[5] Includes nanstondord 4-pin oudio output terminal.

	Panasonic LK-MC501S	Pinnacle Micro External PCD-102	Pioneer DRM-600A	PLI CD ROM Drive 10305	Procom MCD ROM650	Sony Laser Library CD ROM System CDU7205	Texel DM-5021	Todd TCDR-7000	Toshiba TXM-3301E
	$875	$499	$1395	$899	$895[6]	$699	$628	$895	$950
	$722	$406	$1045	$648	$492	$577	$459	$607[1]	$704
	SCSI	proprietary	SCSI	SCSI	SCSI	proprietary	SCSI	proprietary	SCSI
	LK-MCS01S	proprietary	Fut. Domain TMC-845	PC QuickSCSI	Procam SCSI	proprietary	Trantor T128	CD/LINK-8x+	Fut. Domain TMC-845
	500	600	600	380	325	340	340	300	325
	150	150	153	150	175	150	153.6	153.6	150
	25,000	25,000	20,000	10,000	25,000	25,000	30,000	45,000	30,000
	●	●	○[3]	○[3]	●	●	●	●	●
	○	○	○	○	○	●	○	○	●
	●	●	●	○	●	●	●	●	●
	○	1	○	1		6	○	○	●
	external	external	external	external	external	external	external	external	external
	●	●	○	●	●	●	●	●	●
	●	●	●	○	●	●	○	●	●
	●	●	●	●	●	●	●	●	●
	●	●[4]	●	●	●	●	●	●	●
	○	n/a	○	●	●	●	○	●	●
	●	○	○	●	●	●	●	●	●
	●	○	○	●	●	●	○	●	●
	●	●	●	●	○	●	○	○[5]	●
	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●
	2.25 x 6.25 x 12.5	2.25 x 9.75 x 10.5	4.5 x 8.25 x 15	2.5 x 9.75 x 9.75	2.25 x 9.5 x 10.5	1.75 x 7 x 12.75	2 x 5.75 x 14.5	2.25 x 6 x 13.75	[5]2.6 x 8.25 x 9
	78.13	102.38	123.75	95.1	99.75	89.25	83.38	82.5	74.25
	64	2.3	20	64	64	8	64	64	64
	540	540	540	680	600	680	680	680	599
	●	○	○	●	●	●	●	●	●
	●	○	●	●	●	●	●	●	●
	●	●	●	●	●	●	●	○	●
	●	○	●	●	●	●[8]	●	●	●
	12	12	12	12	12	12	12	24	12
	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●
	8	12	8.5	9.5	9	8	9	8	10
	○	○	○	○	○	●	○	○	●
	●	●	●	●	●	●	●	●	●
	○/○	○/●	●/●	●/●	●/○	●/●	○/●	●/●	●/●
	2	2	1	2	2	2	2	2	7
						BEST BUY			BEST BUY

[6] Dimensions don't include externol power supply.

[7] All drives support Multimedio Extensions 1.0 ond ISO9660 ond High Sierro formats.

[8] Loser Library opplicotions work only with PCs.

[9] 24 manths on ports.

Panasonic LK-MC501S

PROS: Fast, power-save mode
CONS: Moderately expensive, technical support unresponsive

Are you the type who switches off the light every time you leave a room? If so, the Panasonic LK-MC501S's unique power-saving mode will have special appeal. If the drive sits idle for 5 minutes, it powers down—so you save on electricity and motor wear. When needed, the drive snaps right back on. The LK-MC501S teams up with the Future Domain adapter to produce excellent overall performance, despite a laid-back 500ms average access rating and a poor showing on the random display test. The drive handled multimedia easily—trailing the leader by just 3 seconds on the MPC demo and smoothly playing the motion video sequence.

In addition, you get automatic lens cleaning and trouble-free setup. We do have minor complaints about the 18-inch connecting cable, which was a little short, and the $722 street price, which was a little steep. And we worry that novice users may be put out by long waits for callbacks from Panasonic's none-too-helpful support technicians. Still, the Panasonic's fine design and excellent motion video performance make it a very good value for multimedia users.

Pinnacle Micro External PCD-102

PROS: Best price in roundup, doesn't require disk caddy, good documentation
CONS: Slow, can't daisy-chain units

Bargain hunters: At $406, the Pinnacle Micro PCD-102 is the least expensive drive here. And the Pinnacle's fast, easy pop-out design requires no disk caddy— just like your audio CD player. Installation and setup are easy, and home users will appreciate the free *World Atlas* CD ROM from Software Toolworks. Pinnacle also sells a portable model with a parallel-to-SCSI interface for the same price, or an internal for $100 less.

Pinnacle's Micro External PCD-102 managed a smooth motion video sequence, but the drive's times were too slow to keep up with the action. The unit's average access rating is a sluggish 600ms, and the Pinnacle came in next to last in overall performance. Unlike the other units we tested, the Pinnacle doesn't allow you to daisy-chain multiple drives, so you're out of luck if you want truly massive storage using a single interface. If you're on a tight budget, the Pinnacle may be worth a look. But remember that only $100 more will buy you the much faster Procom MCD-ROM650.

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Circle 283 on reader service card

Pioneer DRM-600A

PROS: Changer automatically loads up to six CD ROMs; programs up to six audio CDs
CONS: Expensive, slowest in roundup

Make way for the undisputed storage champ of our roundup, the Pioneer DRM-600A. The bulky Pioneer unit connects you to over 3GB of data, and you don't have to lift a finger—it works just like an audio CD changer and holds up to six CD ROMs. You can assign a drive letter to each disk or configure all six disks as a single device.

Bigger doesn't necessarily mean faster: The Pioneer was slowest in the roundup, straggling in last on the super-VGA display and MPC demo. Sorry, multimedia fans. Unless you want moving pictures that resemble an early Charlie Chaplin flick, stick to text and still images with this Pioneer. The $1045 price is steep even considering the DRM-600A's mammoth storage. At press time Pioneer announced the fall release of a hot multimedia CD ROM changer drive. For an extra $200, the drive will feature sub-300ms average access times, enhanced throughput, and a whopping 128K built-in buffer. In the meantime, if you need access to a multidisk text data base, this jukebox may be playing your song. Most users, however, will be better off looking elsewhere or waiting for the new drive.

PLI CD ROM Drive 10305

PROS: Fast, automatic lens cleaning
CONS: No power-on indicator, unnecessarily technical documentation

PLI's entry in our multimedia sweepstakes—the $648 CD ROM 10305—is the effective union of a Sony-manufactured drive and a PLI QuickSCSI adapter card. While the drive's 380ms average access rating doesn't take it to the top of the heap, it still managed a four-star speed rating and a first-place finish on the text retrieval test. The PLI also took all our multimedia tests in stride and played the video clips well.

Although there's outer sealing on this unit, PLI also provides automatic lens cleaning. You can daisy-chain as many as seven drives if you need big-time storage. And Peripheral Land throws in a sample CD ROM of *Nautilus*, a *Windows* multimedia magazine on CD ROM.

The PLI's drawbacks include confusing, overly technical manuals, no power-on indicator, and a cable too short to allow placement of the drive on top of a tower system. Despite these minor flaws, the PLI is a very good choice, especially if rapid text access is a must.

Get A Life

Procom MCD ROM650

PROS: Fast, great price, automatic lens cleaning
CONS: No installation program or RCA jacks

Want a speedy drive for a temptingly low street price? The $492 Procom MCD ROM650 has you covered. Its overall performance was excellent, and it tied the Best Buy NEC for second on the MPC demo. Multimedia mavens will be happy with the drive's smooth rendition of motion video.

Procom gives plenty of dust protection with a pulldown door and automatic lens cleaning. Technical support was responsive and accurate, and novices will almost surely need it: There's no installation program, so you have to copy files and revise AUTOEXEC.BAT and CONFIG.SYS manually. Further, this model has no RCA jacks for audio output, so you'll have to connect to a soundboard via the headphone jack. Procom's even cheaper PXCD-650S drive, which is configured for multimedia, has the jacks, but its speed rating doesn't match the MCD ROM650's. Finally, Procom ships the only full-length interface card in the roundup—it requires a completely unobstructed slot. If you can live with these rough edges, the Procom will give you the best price-performance ratio of the pack.

Sony Laser Library CD ROM System CDU7205

PROS: Fast, very good price, easy installation, includes headphones and six CD ROMs
CONS: Spotty technical support

The Sony Laser Library CDU7205 is aimed at home users, and it's bound to be a family pleaser with its free *Compton's Family Encyclopedia*, Software Toolworks' *World Atlas*, National Geographic's *Mammals, Microsoft Bookshelf, Languages of the World,* and *Mixed-Up Mother Goose.* The CDU7205 is an excellent performer. Rated at 340ms for average access, it tied for third on random display and the MPC demo. The proprietary interface card lets you connect up to four drives.

Clear instructions make installation a breeze, and you're rewarded with a slick, smooth multimedia demo that shows the drive at its best. Installation even provides a menu for easy access to the CD ROM applications. The $577 street price is terrific, considering that all the freebies add up to over $1000. Our only complaint is that we had a hard time reaching Sony's tech support line. If you need a CD ROM drive for the whole family, Sony's Laser Library CDU7205 is your Best Buy.

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Choosing a CD ROM Drive

When buying your first CD ROM drive, it's easy to get confused by the variety of available options. To avoid blind alleys, let your needs direct your purchase.

Will the drive be used in a public area?	**Internal drive** **Mechanism to lock CD ROM in drive**
Want to move the drive between computers or use it with a notebook?	**Parallel-to-SCSI interface** **Small footprint** **Light weight**
Will it be used in an adverse environment?	**Dust cover or sealed mechanism** **Automatic lens cleaning**
Need access to several CD ROMs for network applications?	**Daisy-chainable CD ROM disk changer**
Will the drive be used for sound?	**Adjustable volume control** **RCA jacks**
Will it be used primarily for text?	**Fast average access time**
Will it be used for multimedia?	**Fast average access time** **Fast sequential data throughput**

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Circle 106 on reader service card

Texel DM-5021

PROS: Excellent price, fast
CONS: No audio jacks, no power indicator

Texel cut its CD ROM teeth on rugged drives used in industrial applications, but the company's sleek, budget-priced DM-5021 CD ROM drive seems to be more of a racehorse than a workhorse. Aimed at the multimedia market, the DM-5021 pairs its 340ms-rated drive with an efficient Trantor T128 SCSI host adapter and comes up with a solid four-star performer. Adding to the Texel's assets, service and support tested very well, and the DM-5021 drive's $459 street price was the second lowest in the roundup.

Although performance and price are top-notch, design amenities are fairly spare. The Texel DM-5021 lacked some extras like emergency eject and automatic lens cleaning, and the absence of RCA output jacks means you have to use the headphone jack to feed audio signals to a soundboard or amplifier. Texel manufactures several other models, including internals and portable models with parallel-to-SCSI interfaces. Unfortunately, the confusing, poorly translated manuals cover all of the available models in one breath. For many users, however, the DM-5021's speed, price, and support will more than make up for the lack of polish.

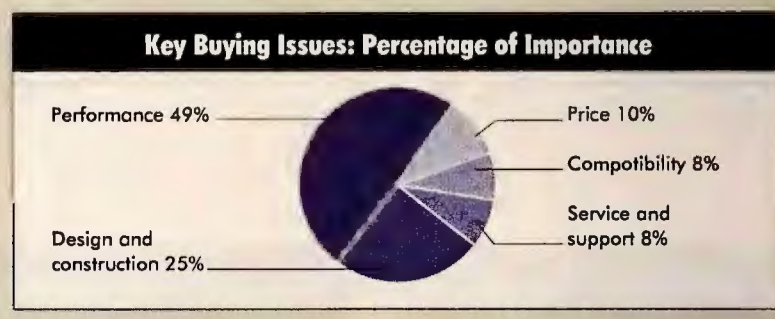
EXECUTIVE SUMMARY

NEC, Sony, Toshiba CD ROM Drives Score Big

CD ROM drives move fast to meet the multimedia challenge.

PC WORLD BEST BUY

Whether you want multimedia capabilities or quick searches of reference text volumes, our three Best Buys—the **NEC Intersect CDR-73M**, **Sony Laser Library CDU7205**, and **Toshiba TXM-3301E**— can handle the job. Other standouts include the portable **CD Technology Porta-Drive T3301**, the choice for notebook users, and the **Corel Draw Blockbuster**, the answer for desktop publishers.



Excellent ★★★★
Good ★★★
Fair ★★
Poor ★

	Reader service number	Performance	Design and construction	Price	Compatibility	Service and support	Overall value
CD Technology Porta-Drive T3301	725	☆☆☆☆	☆☆☆½	☆☆☆½	☆☆☆☆	☆☆☆	★★★½
Corel Draw Blockbuster CD ROM Bundle	726	☆☆☆☆	☆☆☆☆	☆	☆☆☆☆	☆☆☆½	★★★½
Hitachi/Multimedia Systems CDR-1750S	727	☆☆☆½	☆☆☆☆	☆☆½	☆☆☆☆	☆☆½	★★★½
Liberty Systems Liberty 115CD-P	728	☆☆☆☆	☆☆☆½	☆	☆☆☆☆	☆☆☆½	★★★½
NEC Intersect CDR-73M	729	★★★★	★★★½	★★★½	★★★★	★★★½	★★★★
Panasonic LK-MC501S	730	☆☆☆☆	☆☆☆☆	☆☆½	☆☆☆☆	☆☆½	★★★½
Pinnacle Micro External PCD-102	731	☆☆	☆☆½	☆☆☆☆	☆☆☆☆	☆☆☆	★★½
Pioneer DRM-600A	732	☆½	☆☆☆½	☆	☆☆☆☆	☆☆☆½	★★½
PLI CD ROM Drive 10305	733	☆☆☆☆	☆☆☆½	☆☆☆	☆☆☆☆	☆☆☆½	★★★½
Procom MCD ROM650	734	☆☆☆☆	☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆½	★★★½
Sony Laser Library CDU7205	735	★★★★	★★★½	★★★★	★★★★	★★★	★★★★
Texel DM-5021	736	☆☆☆☆	☆☆	☆☆☆☆	☆☆☆☆	☆☆☆½	★★★½
Todd TCDR-7000	737	☆☆☆☆	☆☆☆	☆☆☆½	☆☆☆☆	☆☆☆½	★★★½
Toshiba TXM-3301E	738	★★★★	★★★★	★★★	★★★★	★★★½	★★★★

Overall value is calculated by multiplying each category rating by the category's weight percentage, summing the results, and rounding to the nearest half number.

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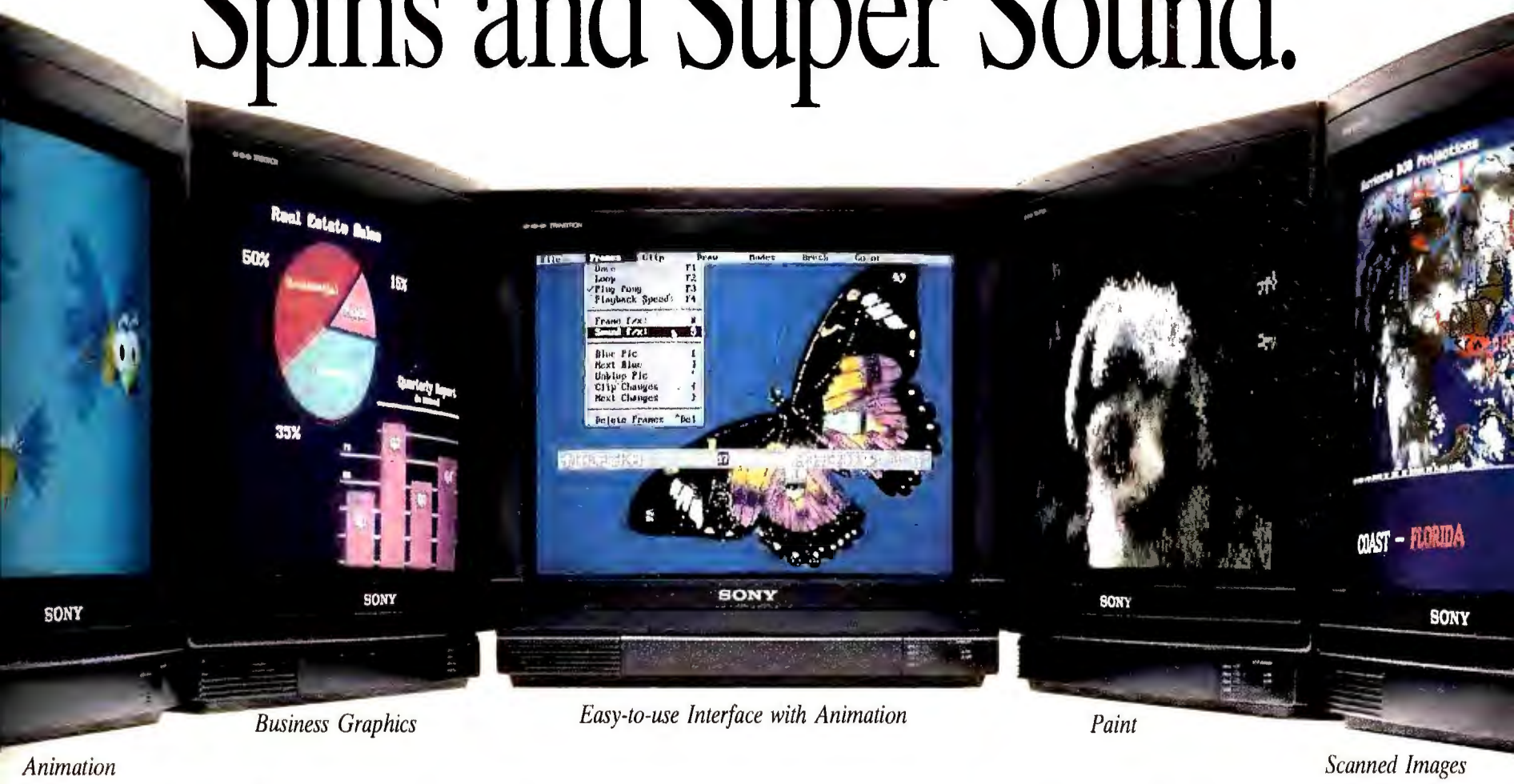

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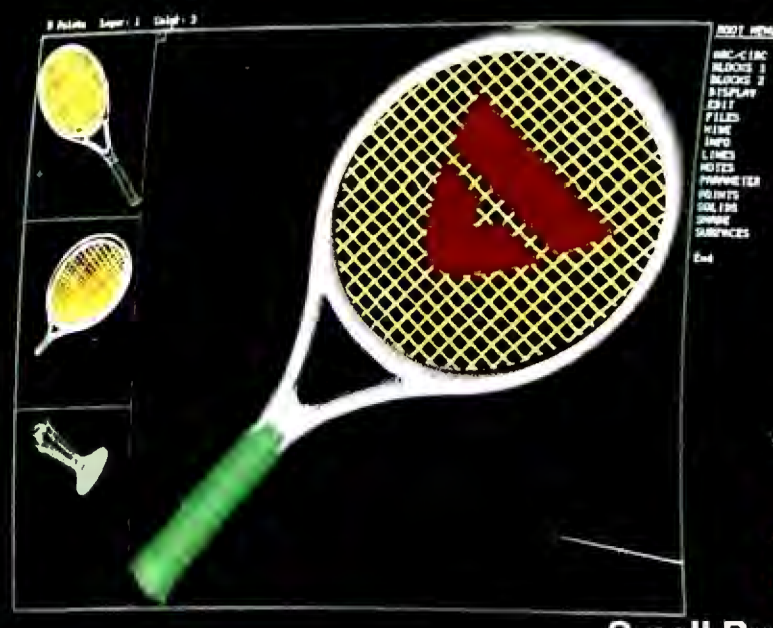

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Todd TCDR-7000

PROS: Fast, security lock-in for CD ROM, automatic lens cleaning, two-year warranty
CONS: No audio jacks, confusing manuals

If your CD ROM drive is performing in public—a multimedia training classroom, trade show booth, or retail kiosk—you have a possible theft problem. Sure, you can bolt down the drive, but that won't necessarily protect your expensive CD ROM applications. Todd's $607 TCDR-7000 lets you rest a little easier with its unusual key-lock setup, which secures the CD ROM disk in the drive. The sturdy player uses the heavy duty 300ms mechanism from the Hitachi CDR-3700 internal drive, and Todd teams it with a proprietary interface that can daisy-chain up to eight drives. The combo yields smooth-running multimedia demos and tied for second place on the average data throughput and random display tests. Unfortunately, there are no RCA phono jacks, so you have to rely on the headphone jack for audio output.

You won't have to worry about dust, as automatic lens cleaning takes care of anything that gets past the clear plastic cover. Todd's service and support are solid, and we had no problems with installation. If you want a real workhorse that gives you an extra security edge, the Todd TCDR-7000 is a top-notch deal.

Toshiba TXM-3301E

PROS: Extremely fast, automatic lens cleaning, sealed mechanism
CONS: Out-of-date CD ROM demo

Take a close look at our top performers—you'll see the Toshiba name everywhere. Three of the four fastest drives, including the Toshiba TXM-3301E itself, use the same Toshiba mechanism. And although the CD Porta-Drive T3301 and Corel Draw Blockbuster CD ROM Bundle use different interfaces, both finished in a virtual tie with Toshiba for second place in overall performance—a few percentage points behind the top-ranked NEC CDR-73M. That's consistency!

Like the NEC, this $704 Toshiba was conceived with multimedia in mind, and its motion video performance was flawless. Toshiba's four-star design includes one of the most effective dust-protection schemes we've seen. Technical support rates high, and installation and setup were no problem. (Toshiba's CD ROM demo disk *is* dated—it shows off the top software of 1987, including *Windows 1.0!*) Toshiba gives you plenty of choices—including an internal version and a four-drive enclosure. When you count up the pluses, you'll see why the TXM-3301E wins a *PC World* Best Buy with points to spare.

WHERE TO BUY

CD Technology Porta-Drive T3301
CD Technology
766 San Aleso Ave.
Sunnyvale, CA 94086
408/752-8500,
408/752-8501 (fax)
Reader service no. 725

Corel Draw Blockbuster CD ROM Bundle
Corel Systems
The Corel Bldg.
1600 Carling Ave.
Ottawa, Ontario
K1Z 8R7 Canada
613/728-8200,
613/761-9219 (fax)
Reader service no. 726

Hitachi/Multimedia Systems CDR-1750S
Hitachi Home Electronics America
Multimedia Systems Div.
401 W. Artesia Blvd.
Compton, CA 90220
800/369-0422,
310/515-6223 (fax)
Reader service no. 727

Liberty Systems Liberty 115CD-P
Liberty Systems
160 Saratoga Ave. #38
Santa Clara, CA 95051
408/983-1127,
408/243-2885 (fax)
Reader service no. 728

NEC Intersect CDR-73M
NEC Technologies
1255 Michael Dr.
Wood Dale, IL 60191-1094
800/632-4636,
708/860-9500
Reader service no. 729

Panasonic LK-MC501S
Panasonic Communications and Systems Co.
CD ROM Sales
Two Panasonic Way
Secaucus, NJ 07094
800/742-8086,
201/348-7000
Reader service no. 730

Pinnacle Micro External PCD-102
Pinnacle Micro
19 Technology
Irvine, CA 92718
800/553-7070,
714/727-3300
Reader service no. 731

Pioneer DRM-600A
Pioneer Communications of America
600 E. Crescent Ave.
Upper Saddle River, NJ 07458
800/527-3766
Reader service no. 732

PLI CD ROM Drive 10305
Peripheral Land
47421 Bayside Pkwy.
Fremont, CA 94538
800/288-8754,
510/657-2211
Reader service no. 733

Procom MCD ROM650
Procom Technology
200 McCormick
Costa Mesa, CA 92626
800/800-8600,
714/549-0527 (fax)
Reader service no. 734

Sony Laser Library CD ROM System CDU7205
Sony Corp. of America
Computer Peripherals Products Co.
655 River Oaks Pkwy.
San Jose, CA 95134
800/352-7669,
408/432-0190
Reader service no.735

Texel DM-5021
Texel America
1080C E. Duane Ave.
Sunnyvale, CA 94086
800/886-3935,
408/736-1378 (fax)
Reader service no. 736

Todd TCDR-7000
Todd Enterprises
224-49 67th Ave.
Bayside, NY 11364
800/445-8633,
718/343-9180 (fax)
Reader service no. 737

Toshiba TXM-3301E
Toshiba America Information Systems
Disk Products Division
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Irvine, CA 92718
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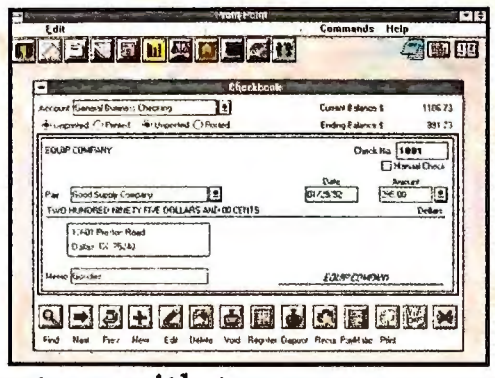
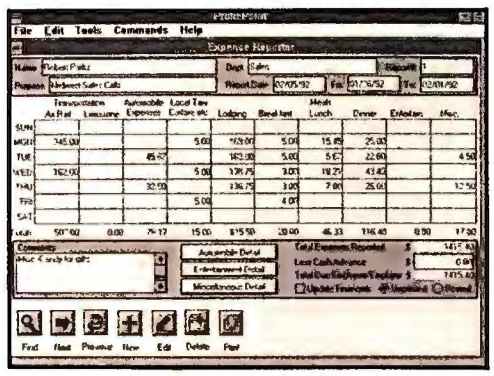


system with ten management and financial tools designed for non-financial types. We've designed PROFIT POINT to make accounting fun and understandable, not laborious and confusing. Our checkbook *looks* like a checkbook. Fill in the blanks and PROFIT POINT does the rest.



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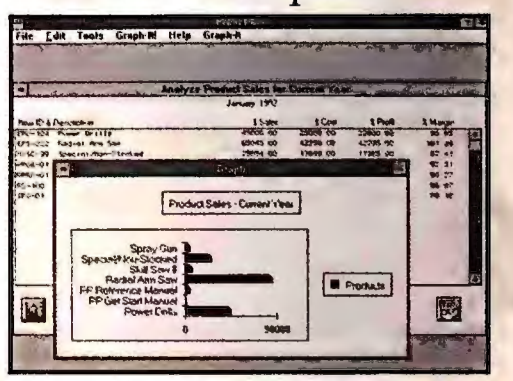

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- Unlimited G/L Accounts
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- Quick Check Writing/Deposits
- Check Register
- Manual Checks
- Void Checks
- Recurring Checks
- Reconcile Bank Statements
- Automatic Checks for Payables

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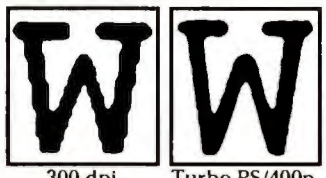

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COLOR

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PRINTERS

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COME

REPORTS AND HAND-OUTS INTO MEMORABLE DOCUMENTS.

THROUGH

With today's business software you can create charts and graphs as colorful as any Disney cartoon. But when it's time to print those graphics, chances are you resort to plain old black and white. Worse, your information is probably being muddled in the process. The bars in your bar charts are rendered in only slightly different shades of gray, you can't tell one dotted line from another in line graphs, and cross-hatching patterns make your pie charts look like plaid nightmares.

It doesn't have to be this way. With one of today's increasingly capable and affordable color printers, you can make those charts and graphs easier to understand by printing them in full, clear color. Plus, if you put a black-and-white copy of a report next to one in color, you'll see how color printing can give your work an edge over the monochrome competition.

What kind of color printer is right for you? For most business buyers, the answer is a color liquid ink jet. With list prices between $895 and $2995, these machines are affordably suited to a variety of everyday business applications.

Liquid ink jets work by spraying droplets of black, cyan, magenta, and yellow ink onto the page. They're best at producing solid blocks of uncomplicated primary and secondary colors—just the ticket for straightforward business graphics. So while the output from liquid ink jets won't win any art contests, it's perfectly serviceable for the transparencies, flip charts, and handouts you use in presentations and for adding color charts and other graphics to in-house reports.

BY DAN MILLER

PHOTOGRAPHS BY MICHAL VENERA

Because they can't compete with black-and-white lasers in output quality or speed, you'll never use color ink jets as everyday printers. (The ink jet printers we tested averaged around 2 pages per minute [ppm] on pure text, while lasers start at around 4 ppm.) If you're doing finely detailed design work or printing materials for an important out-of-house audience, you'll probably want the higher quality output of a *thermal transfer* or *solid ink jet* printer. Thermal transfer and solid ink jet printers are typically faster as well. Unfortunately, these machines cost about four times more than liquid ink jets (see the sidebar "The Next Step Up: Thermal Transfer and Solid Ink Jet Printers").

True Colors

For this review, we looked at six leading color ink jets on the market today, testing their standard, off-the-shelf configurations. We ran them through a series of

Buying Smart: Color Your World

Color printers may seem exotic, but basic printer buying issues still apply. The most important consideration is output quality, and your eyes are the best judge of that. Additionally, you'll want to answer a few fundamental questions: Will the printer work with your software? Is its front panel designed for business users or astronauts? Can it handle a variety of paper sizes and fonts? And does the vendor offer enough customer service and support to get you back to work quickly when things go awry?

OUTPUT QUALITY

Liquid ink jets won't match laser printers in text output quality or thermal transfer printers in color graphics. We noticed surprising variations in quality from printer to printer (see the sidebar "The Proof's in the Printing") and even when printing from different applications on the same printer. But if you shop carefully, you can find perfectly acceptable output. When examining print samples, look for deep, even ink coverage in areas of solid color. Watch for banding (visible strips of ink left by each pass of the printhead) and poor color registration. Compare each printer's handling of fine lines—are they smudged or reasonably sharp?—and check the legibility of text, particularly when it's printed on a colored background.

When judging output quality, we gave some weight to resolution, which can help create fine lines, crisp, smooth text, and dense, well-mixed colors. However, high resolution is no guarantee of great output. HP's DeskJet 500C and Mannesmann Tally's MT92 C, for example, both boast 300-dot-per-inch resolution, but while the 500C excels at output quality, the MT92 C had problems with smudged letters.

PERFORMANCE

Liquid ink jets are not fast. These printers manage between 1 and 3 pages per minute (ppm) on our text tests, compared with the 4-ppm rated speeds of low-end black-and-white lasers. They slowed considerably on graphics. While you can expect 1-to-3-ppm graphics output from non-PostScript lasers, you'll be lucky to break 0.5 ppm on an ink jet; HP's DeskJet 500C took over 12 minutes to print a *Corel Draw* page .

When judging overall speed, we emphasized tasks for which these printers are best suited—printing charts and graphs from spreadsheets and presentation graphics software. As the *Quattro Pro* and *Harvard Graphics* tests indicate, the HP PaintJet scored well on these tasks. If you insist on using these machines for more detailed graphics, note that the PaintJet and the Sharp JX-735 both did well printing from *Corel Draw.* For printing text in color, you can't beat the DeskJet 500C.

PRICE

For street prices, we asked dealers around the country for their prices on standard, off-the-shelf configurations, then averaged those quotes. Prices ranged from $666 for the Kodak Diconix Color 4 to $2857 for the Mannesmann Tally MT92 C.

Initial purchase price isn't the whole story. You'll pay 10 cents or so for each sheet of coated stock (unless you're using the Kodak) and $1-plus for each sheet of special transparency film. Colored inks average around 10 cents a page, depending on how much of the page you're covering: Colored line graphs on white backgrounds require less ink than bar charts on colored backgrounds.

COMPATIBILITY

Software support was a surprisingly common problem with these printers: Three of the six were unable to run at least one of our speed tests. All these printers come with a *Windows* driver, but their support for DOS programs is spotty. Check your user manuals and printer spec sheets to see which printers work with your applications.

If your DOS application doesn't have a driver for a given printer, you

tests using *Corel Draw, Harvard Graphics, Quattro Pro,* and *WordPerfect* and rated the results for print quality and output speed. We averaged street prices from around the country for each machine and tested each vendor's customer service skills. Finally, we took a hard look at software compatibility, which was often surprisingly poor, as well as design and construction, font and color options, and paper handling skills.

In the end, Hewlett-Packard's venerable PaintJet XL emerged as our Best Buy. This burly workhorse produced high-quality output at top speeds with little fuss, making it a great choice for work groups that prepare a lot of presentations. Kodak's Diconix Color 4 was a close runner-up and, with its incredibly low price and intelligent, compact design, would be good for desktop printing. Though the Color 4 lacks the PaintJet's connectivity skills, it has the advantage of being the only printer here that may still be able to print if your printer has a PaintJet emulation. Printers with DeskJet, Epson, and Proprinter emulations can handle most text work, while an HP-GL plotter emulation will help if you're doing CAD work.

SERVICE AND SUPPORT

As with any printer purchase, look for at least a one-year warranty, toll-free tech support, access to tech support by fax or modem, enough daily support hours to fit your schedule, and, ideally, on-site service. To rate service and support, we called each vendor three times to ask typical customer questions. We graded on speed of response and accuracy of answers and factored in the vendors' service policies. Support proved uniformly good, but both Sharp and Tektronix received demerits for their skimpy 90-day warranties.

DESIGN AND CONSTRUCTION

Good design and construction means convenience: snap-in ink cartridges, low-ink indicators, and front-panel controls. Good design also means a buffer big enough to handle the work load—the bigger the buffer, the faster you and your co-workers can get back to work. Plan on at least 32K for simple, single-user work, 100K if you use downloaded fonts, and as much as you can get if you're sharing the printer with your work group. If you're sharing the printer, good design also means having enough of the right kind of ports and a high enough rated duty cycle to give you some idea of whether or not it will stand up to heavy use. Both the HP PaintJet XL and the Kodak Diconix Color 4 earned high marks for their design.

FONTS AND COLORS

None of these ink jets can compete with a LaserJet for font options. While the typical laser comes with at least 14 typefaces, most of these printers offer 1 or 2; the HP DeskJet 500C is the lone exception, giving you 3 bit-mapped fonts and, with its *Windows* driver, an additional 4 scalable typefaces. If you need fancier type, look for a printer that can handle downloaded fonts or font cartridges, but remember that downloading fonts to a small print buffer can slow performance.

When it comes to graphics printing, one of the nicest options an ink jet can give you is a special transparency or high-density mode. In this mode, the printer makes extra passes over each page, producing colors saturated enough for overhead projection. And while all these printers come with four inks—cyan, magenta, yellow, and black—the HP DeskJet 500C and the Mannesmann Tally MT92 C have only two ink cartridges, one for the three colors and a second for black. Four cartridges are better than two because with four, you can replace a single color without replacing others.

PAPER HANDLING

Paper handling is the Achilles' heel of liquid ink jets. For printing on paper, all the printers reviewed but the Kodak require special coated stock. Plain paper absorbs water-based ink like a sponge, resulting in bleeding and washed-out colors. Coated stock eliminates this problem, allowing sharper and more exact ink coverage. For printing transparencies, all the printers require specially treated film that can hold the liquid inks.

Because you'll use a color printer less than you would a regular black-and-white printer, paper capacity is less of a consideration. If you're sharing the printer with your work group, capacity for 100 sheets of paper should suffice to keep you from running to the supply cabinet too often. Adjustable paper trays, which can handle a variety of stock sizes, are handy, as is the ability to use continuous form paper, which is good enough for draft work and cheaper than cut sheets.

prints acceptably on plain paper—the others require expensive coated stock for best results.

A color printer can't guarantee sales or change minds, but it can make your work clearer and more memorable. With prices falling and software support expanding, the day may come when you won't be able to compete without one.

Dan Miller is an assistant editor for PC World. *He can be reached on PC World Online (see page 8 for more information).*

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

FEATURES EVALUATION

PaintJet Connects the Dots

The Hewlett-Packard PaintJet XL's superb paper handling, generous font options, and good software compatibility make it a natural for small work groups.

● Yes
○ No
n/a = not applicable

	Hewlett-Packard DeskJet 500C	Hewlett-Packard PaintJet XL	Kodak Diconix Color 4	Tally MT92 C	Mannesmann JX-735	Sharp ColorQuick	Tektronix
Standard features							
Street price	$767	$1652	$666	$2857	$1676	$1889	
List price	$1095	$2495	$895	$2995	$2195	$2595	
Resolution (dpi)	300	180	192	300	180	216	
Standard/maximum RAM (K)	48/48	206.2/206.2	72/72	10/256	128/128	256/256	
Compatibility							
Emulations							
PaintJet	○	●	●	○	○	○	
DeskJet	●	●	○	●	○	○	
HP-GL	○	●[1]	○	○	○	○	
Epson LQ/Proprinter	●[1]/●[1]	●/●	○/○	○/○	○/○	○/○	
PostScript option	●	●	○	○	○	●	
Drivers							
Windows	●	●	●	●	●	●	
Harvard Graphics	●	●	●	○	○	●	
1-2-3 3.x	●	●	●	○	●	●[2]	
Quattro Pro	●	●	●	○	●	○	
WordPerfect 5.1	●	●	●	●	○	●[2]	
Design and construction							
Snap-in ink cartridges	●	●	●	●	○	○	
Front-panel LCD	○	●	●	○	○	○	
Low-ink indicator	○	●	●	●	●	●	
Parallel/serial port	●/●	●/●	●/○	●/●	●/○	●/○	
Rated duty cycle (pages per month)	1000	12,000	8000	2000	[3]	[3]	
Footprint (square inches)	256	513	274	303	369.2	361	
Weight (pounds)	14.3	39	13	22	28.7	26	
Fonts and colors							
Transparency/high-density mode	○	●	●	●	●	●	
		BEST BUY					

	Hewlett-Packard DeskJet 500C	Hewlett-Packard PaintJet XL	Kodak Diconix Color 4	Tally MT92 C	Mannesmann JX-735	Sharp ColorQuick	Tektronix
Fonts (cont'd)							
Resident typefaces	7[4]	2	2	2	1	1	
Accepts downloaded fonts	●	●	●	●	○	●[1]	
Accepts font cards/cartridges	●	●	○	●	○	○	
Available cartridge fonts	20	20	n/a	7	n/a	n/a	
True blacks on color pages	○	●	●	●	●	●	
Ink cartridges included	2	4	4	2	4[5]	4[5]	
Paper handling							
Transparencies	●	●	●	●	●	●	
Special paper recommended	●	●	○	●	●	●	
Standard/maximum paper capacity	100/100	100/200	60/60	1/200	1/1	100/100	
Adjustable standard tray	●	●	○	●[1]	●	●	
A-size (letter/legal)	●	●	●	●	●	●	
11-by-17-inch paper	○	●	○	●	●	●	
Continuous forms	○	●	●	●	●	●[1]	
Service and support							
Warranty	3 years	1 year	1 year	1 year	90 days	90 days	
Toll-free tech support	○	●	●	○	●	●	
Tech fax/BBS	●/○	●/●	○/○	●/●	○/○	●/●	
Daily support hours	11	11	9	9	11	11	
On-site service	●[1]	●[1]	○	●[1]	●[1]	●[1]	
		BEST BUY					

[1] Extra-cost option.
[2] Third-party option.
[3] Company has not rated this machine.
[4] Including four scalable fonts in Windows driver.
[5] Vials, not cartridges.

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- 230V models available

LAN TIMES READERS CHOICE 1992

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1991, 1990

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	Back-UPS 400	Desktop 386, 486 systems, 286 servers	$249
	Back-UPS 450	Tower 386, 486 systems, servers	$329
	Back-UPS 600	Heavily configured systems, CAD/CAM workstations	$449
	Back-UPS 800RT	Multiple systems, longer runtime applications	$899
NEW! NEW!	Back-UPS 1200VX	Multiple systems, LAN hubs, small minis, telecom equipment	$1199

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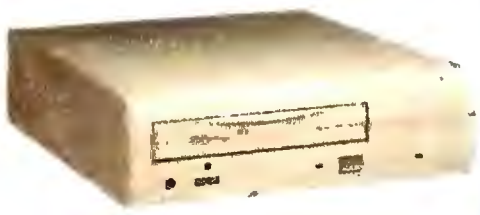

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Hewlett-Packard DeskJet 500C

PROS: Great output quality, low price, high resolution, scalable fonts in Windows
CONS: Slow graphics printing, no true blacks

Despite its low $767 street price, the DeskJet 500C doesn't skimp on output quality. The 500C produces sharp 300-dpi graphics and surprisingly bright, well-mixed colors, making it a good choice for everything from spreadsheet charts to basic illustrations. Text quality is very good, plus you have plenty of font options: The 500C takes font cartridges, and with the *Windows* driver, you get four scalable fonts, something none of the other printers here offers.

The 500C's output does have one major flaw: Because the black ink cartridge can't be used with the color ink cartridge, the 500C is the only printer here that can't produce "true" blacks when printing in color. It's also slow. While it hit a first-place 2.5 ppm printing text, it was dead last on two out of three graphics tests. Still, if you want a cheap, versatile personal color printer but need sharp output, the 500C is a good value.

If you don't mind waiting, the DeskJet 500C delivers top-of-the-line output for a rock-bottom price.

Our Best Buy, the HP PaintJet XL, delivers bright, saturated color quickly.

Hewlett-Packard PaintJet XL

PROS: High-quality output, top-of-the-line print speeds, excellent connectivity
CONS: Low resolution, big footprint, no low-ink indicator

PC WORLD BEST BUY

The PaintJet's been around awhile, but it's still the leader of the ink jet pack. It delivers brilliant, fully saturated output that's just a bit less precise than the DeskJet's, but its blacks and colors are true, deep, and even. The PaintJet is also fast, averaging nearly 2 minutes per page on our *Corel Draw, Harvard Graphics,* and *Quattro Pro* speed tests. Designed for shared use, the PaintJet offers two ports standard and a third optional, a sturdy 12,000-sheet duty cycle, and room for up to 200 sheets of paper. Another work-group plus is compatibility with a wide range of software.

Granted, the XL's 513-square-inch footprint puts it in the behemoth class, and it lacks a low-ink indicator. These quibbles aside, with its combination of speed, output quality, and connectivity, the PaintJet XL is your Best Buy for bringing the power of color printing to your work group.

Kodak Diconix Color 4

PROS: Lowest price in roundup, excellent design, high-quality plain-paper printing
CONS: Slow, not good for shared use

As well as having the lowest price of any printer here, the Diconix Color 4 sports the best design, with a sleek profile, a small footprint, and a cut-sheet feeder hidden away in the back. But the Color 4's best feature is its oil-based inks. Unlike the other printers reviewed here, whose water-based inks require special coated stock, the Color 4 can print on plain bond. Though colors are less brilliant, plain paper costs about 8 cents less per sheet than coated stock.

With its single interface port and small, unadjustable paper tray, the Color 4 is strictly for personal use. It lacks the DeskJet 500C's emulations and font options, and it's on the slow side (the *Quattro Pro* test took over 11 minutes). Despite these shortcomings, the Diconix Color 4 is still the right color printer for the budget conscious—an inexpensive but fully capable machine that will save you money on long-term paper costs.

The incredibly affordable Diconix Color 4 continues to save you money by printing on plain paper.

Mannesmann Tally MT92 C

PROS: High resolution, very good font and color options, solid customer support
CONS: Expensive, slow, requires RAM and paper tray upgrades

The Mannesmann Tally MT92 C could be a great little work-group printer. It has two ports standard and room for up to 256K of RAM and 200 sheets of paper. Its 300-dpi resolution is top of the line, although output quality is only fair. We found Mannesmann Tally's customer service to be fast, friendly, and accurate.

However, to exploit the MT92 C's potential, you have to upgrade both memory and paper capacity substantially—standard RAM is only 10K, and there's no standard sheet feeder of any size. The MT92 C is also slow and incompatible with common software. (At press time, new drivers were due during the second quarter of 1992.) Also, maybe because of its recent introduction, the printer's average street price is just 5 percent off the high list price. Still, if the street price starts to drop, and you don't mind upgrading, the MT92 C could be an option for your work group.

If the cost were a little lower, the MT92 C could be a great network color printer.

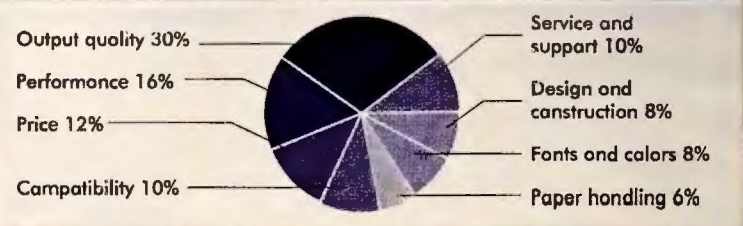
EXECUTIVE SUMMARY

PaintJet Rules the Color Ink Jet Roost

Though they aren't the most technically sophisticated printers around, color ink jets have survived by doing one thing well: adding uncomplicated color to everyday business documents. Our Best Buy, the veteran Hewlett-Packard PaintJet XL shows the rookies how it's done, while the spunky upstart Kodak Diconix Color 4 has a few tricks of its own. Those printers further down in the pecking order lost points for slow speed, high price, and poor software compatibility.

Despite recent advances by smaller, less expensive color printers, the **HP PaintJet XL** still wins our Best Buy by combining top speed with broad software compatibility, flexible font options, excellent output, and the capability to share these talents on a network. The **Kodak Diconix Color 4** is a good personal color printer, earning top marks for an amazingly affordable price, smart design, and the capability to print on plain paper.

Key Buying Issues: Percentage of Importance



Excellent ★★★★
Good ★★★
Fair ★★
Poor ★

	Reader service number	Output quality	Performance	Price	Compatibility	Service and support	Design and construction	Fonts and colors	Paper handling	Overall value
Hewlett-Packard DeskJet 500C	673	☆☆☆½	☆	☆☆☆☆	☆☆☆	☆☆☆☆	☆☆½	☆☆☆	☆☆☆	★★★
Hewlett-Packard PaintJet XL	673	★★★½	★★★	★★½	★★★★	★★★	★★★½	★★★★	★★★½	★★★★
Kodak Diconix Color 4	674	☆☆☆	☆½	☆☆☆☆	☆☆☆½	☆☆☆½	☆☆☆☆	☆☆☆½	☆☆☆☆	★★★½
Mannesmann Tally MT92 C	675	☆☆½	☆½	½	☆☆	☆☆☆½	☆☆☆	☆☆☆½	☆☆½	★★½
Sharp JX-735	676	☆☆½	☆☆☆½	☆☆½	☆½	☆☆	☆☆½	☆☆½	☆☆½	★★½
Tektronix ColorQuick	677	☆☆☆	☆☆	☆☆	☆☆	☆☆½	☆☆½	☆☆½	☆☆☆½	★★½

Overall value is produced by multiplying each category rating by its weight percentage, summing the results, and grading on a curve to the nearest half number.

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February 11, 1992
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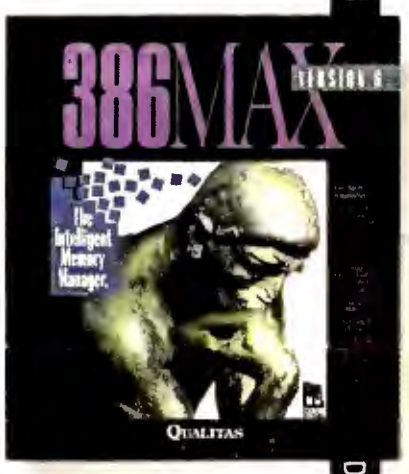

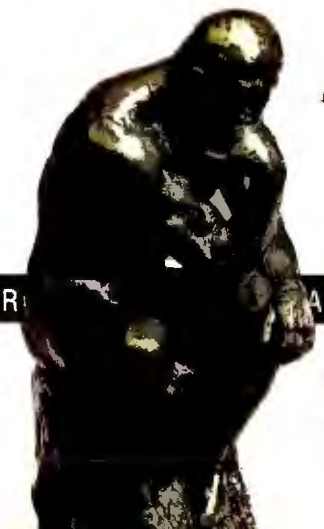

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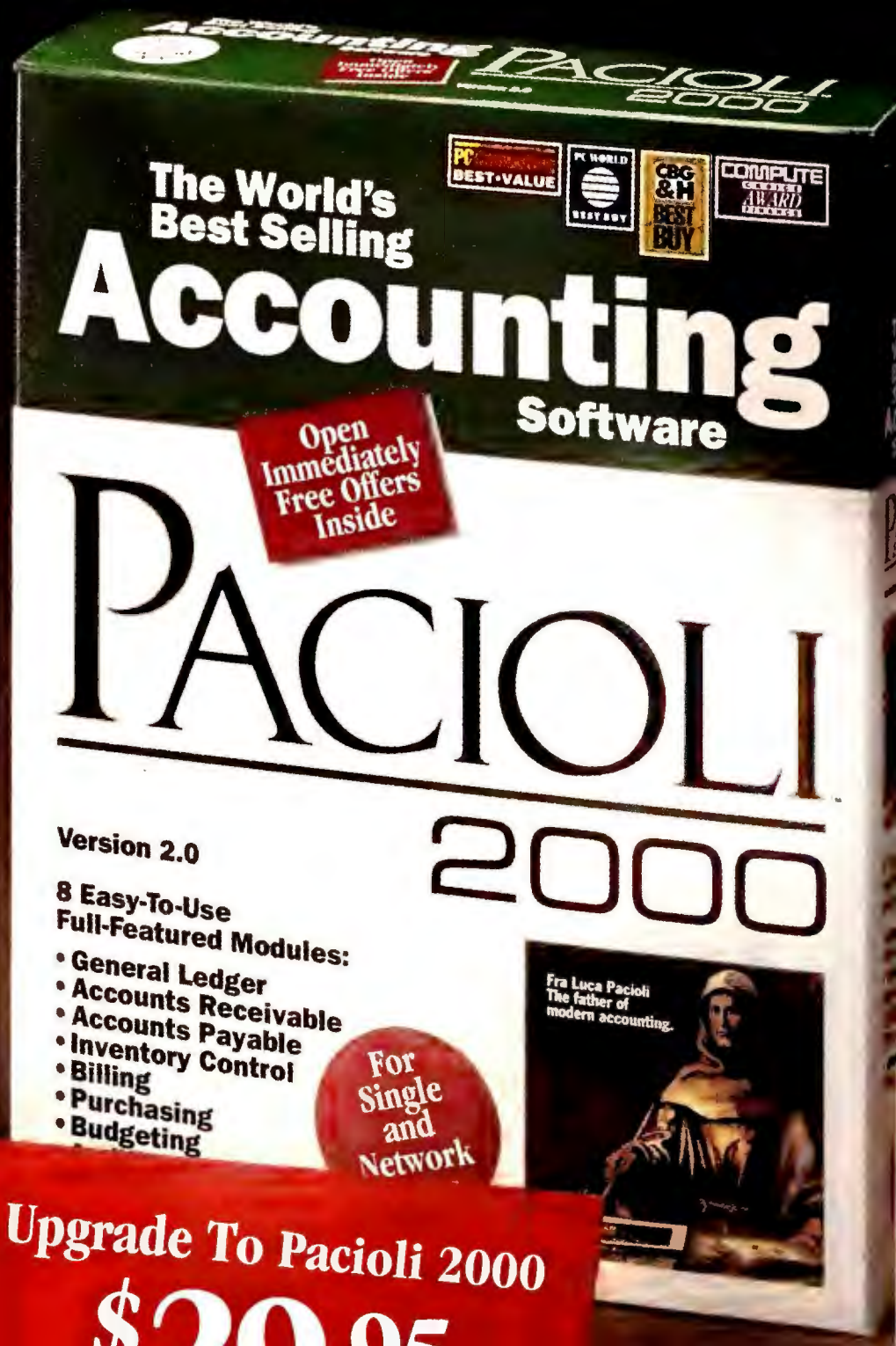

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PCWP2

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Sharp JX-735

PROS: Fast, 128K standard RAM
CONS: Spotty software support, few font options, no ink cartridges

The Sharp JX-735 is built along the same broad-shouldered lines as the Hewlett-Packard PaintJet XL. Like the PaintJet, the JX-735 can crank out color copy quickly—it averaged a second-fastest 2 minutes, 50 seconds per page on the *Corel Draw* and *Quattro Pro* tests.

Both the PaintJet and the JX-735 have relatively low 180-dpi resolution. But the Sharp's output is only fair compared with the PaintJet's, as it suffers from inaccurate color registration, banding, and poor color mixing. Moreover, the Sharp's software support is limited, it lacks most common printer emulations, and it has meager font options. Unlike most of the other printers reviewed, the JX-735 does not use ink cartridges, relying instead on liquid vials that, in the unit we received, had spilled during shipping. If all you want is speed, the JX-735 is worth a closer look, but its lack of software, printer, and font support limits its appeal.

The JX-735 is big and fast, but it has little support for software or fonts.

The Proof's in the Printing

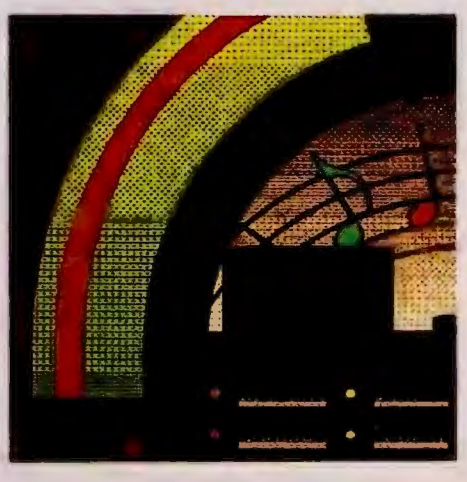
Hewlett-Packard's DeskJet 500C and PaintJet XL both produced top-of-the-line output with bright, accurate colors and sharp lines. The Mannesmann Tally MT92 C, on the other hand, had some problems with smudging, and the Sharp JX-735 had trouble with banding and awkward dithering patterns.

Hewlett-Packard DeskJet 500C

Hewlett-Packard PaintJet XL

Kodak Diconix Color 4

Mannesmann Tally MT92 C



Sharp JX-735

Tektronix ColorQuick

Tektronix ColorQuick

PROS: Lots of memory, flexible paper handling
CONS: Fairly high price, poor software support, liquid ink vials

Like the Sharp JX-735, the Tektronix ColorQuick is a big printer with an emphasis on work-group use. Its 256K of memory is the best in the roundup, it can handle almost any kind of paper, and its sheet feeder holds 100 sheets. Performance is a mixed bag—slow with *Corel Draw,* the ColorQuick came in second fastest on our *Harvard Graphics* test.

Perhaps because it was originally designed for Macs, the ColorQuick suffers from poor support for DOS applications. While it comes with a *Windows* driver, drivers for most non-*Windows* programs are available only through third-party vendors. Also, like the Sharp, the ColorQuick uses liquid inks that are prone to spilling. If you're a *Windows* user and can get past the high buy-in, the ColorQuick's memory and paper handling make it worth consideration as a work-group color printer. But most buyers will prefer the PaintJet.

The ColorQuick could be good for shared use—if you don't mind quirky software support.

The Next Step Up: Thermal Transfer and Solid Ink Jet Printers

Liquid ink jets can't handle every color printing job. If you're doing outside presentations, or if you want to print color proofs, you're going to need the kind of output quality *thermal transfer* and *solid ink jet* printers offer. Both types of printers use solid, wax-based media: Because the inks don't bleed into the paper fibers, lines print sharp and colors stay bright. Plenty of these machines are available, many of them PostScript compatible and a few listing for under $5000. Here are some leading models.

Manufacturer	Model	Price	Technology	PostScript	Resolution (dpi)	Rated speed (ppm)	RAM (MB)	Resident fonts
BROTHER	HT-500PS	$4995	thermal transfer	Y	300	1	5	35
CALCOMP	ColorMaster Plus 6603PS	$5495	thermal transfer	Y	300	1	6	39
DATAPRODUCTS	Jalt PS	$6995	solid ink	Y [1]	300	2	6	35
DIGITAL EQUIPMENT	Calormate PS Calar Printer	$8995	thermal transfer	Y	300	1	8	35
GENERAL PARAMETRICS	Spectra-Star 430	$6995	thermal transfer	Y	300	1	6	35
MITSUBISHI ELECTRONICS	G370-10	$5495	thermal transfer	N	300	1	1	21
NEC TECHNOLOGIES	Colormate PS Madel 40	$5899	thermal transfer	Y	300	3	8	17
OCÉ GRAPHICS	G5241-PS	$7990	thermal transfer	Y	300	1	5	35
PANASONIC	EPL-8543	$7995	thermal transfer	N	203	0.7	3	35
QMS	ColorScript 100 Model 10p	$5995	thermal transfer	Y	300	1.2	4	35
SEIKO INSTRUMENTS	Personal ColorPoint PS	$4999	thermal transfer	Y	300	0.5	6	35
TEKTRONIX	Phaser II PXe	$4995	thermal transfer	Y [1]	300	1	4	17
	Phaser III PXi	$9995	solid ink	Y [1]	300	0.5	10	39

[1] PostScript Level 2.

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

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CalComp
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Digital Equipment
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General Parametrics
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Mitsubishi Electronics America, Inc.
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NEC Technologies
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- Any-port-to-any-port connectivity
- Any-port designation for printer or plotter
- Each port individually programmable
- Windows or DOS pop-up menu software for instant device selection and status
- Uses standard parallel PC-to-printer cables

12 any-to-any ports; buffered from 256 KB to 4 MB .....start at $795

GENERAL

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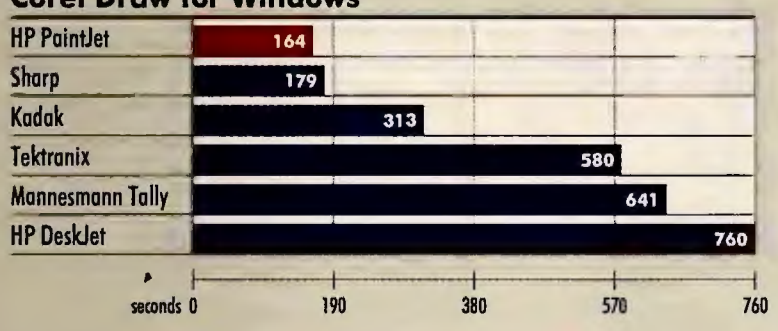
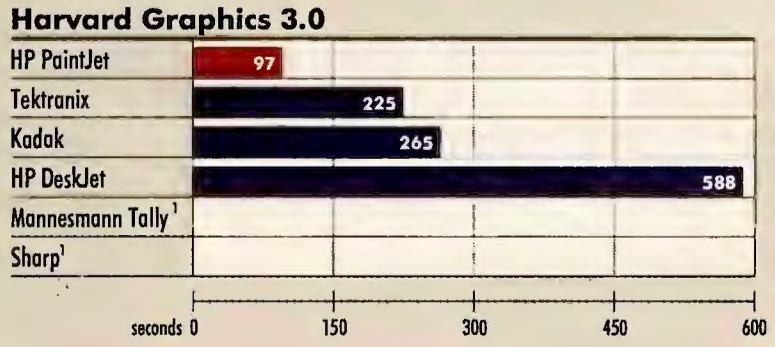
PC WORLD TEST REPORT

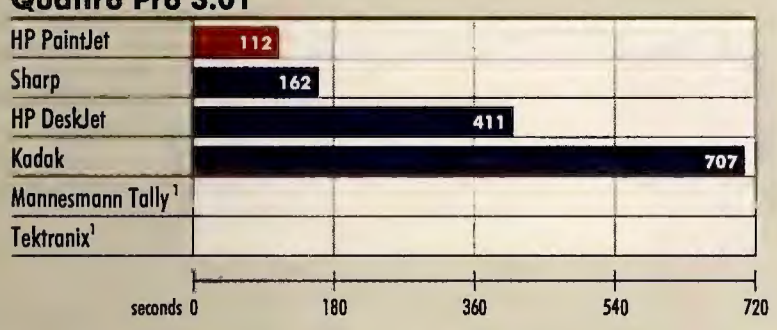
PaintJet Wins the Color Ink Jet Derby

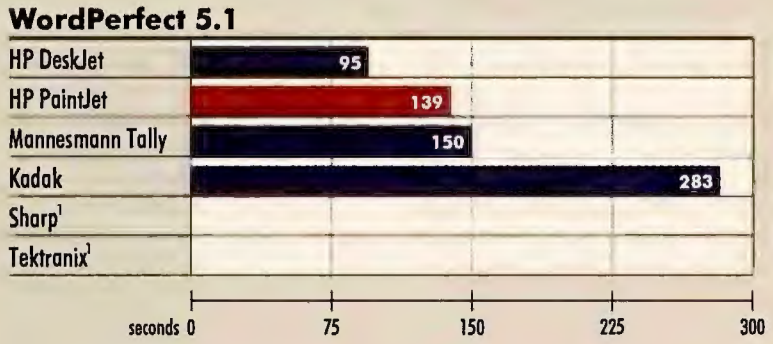
The HP PaintJet XL was fastest in a series of tests that some printers couldn't even finish.

BEST BUY









[1] Viable print driver unavailable for this application.

Methodology
All printers are connected to the parallel port of a 20-MHz Zenith Data Systems 486SX running under DOS 5.0 with 4MB RAM and a 210MB hard disk. The applications used in the benchmarks are installed on the hard disk along with their test files in discrete subdirectories. All tests are timed from the moment the print command is initiated until the last page is ejected from the printer.

Corel Draw for Windows
We print a single-page graphic containing a graduated radial fill, script text, and several irregular shapes filled with custom-blended colors.

Harvard Graphics 3.0
We print a single-page document containing two exploded pie charts and several lines of Helvetica text.

Quattro Pro 3.01
We print a single-page document consisting of a ribbon graph with a three-dimensional grid and solid color backgraund.

WordPerfect 5.1
We print a four-page dacument using 10-point Caurier text and line draw. We assign six different calors to various parts of the document.

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

WHERE TO BUY

HP DeskJet 500C, HP PaintJet XL
Hewlett-Packard Ca.
19310 Pruneridge Ave.
Cupertina, CA 95014
800/752-0900
LIST PRICE: DeskJet 500C $1095, PaintJet XL $2495
ACCESSORIES: black ink cartridge $19.95 (DeskJet), $29.95 (PaintJet); calar cartridge $34.95 (DeskJet), $29.95 (PaintJet); caated paper (200 sheets) $20.95 (bath); transparency film (50 sheets) $55.95 (DeskJet), $64.95 (PaintJet)
Reader service no. 673

Kodak Diconix Color 4
Eastman Kodak Co.
901 Elmgrove Rd.
Rochester, NY 14653
800/344-0006
LIST PRICE: $895
ACCESSORIES: black ink cartridge $13.95, calar cartridge $19.95; transparency film (50 sheets) $59.95
Reader service no. 674

Mannesmann Tally MT92 C
Mannesmann Tally
P.O. Box 97018
8301 S. 180th St.
Kent, WA 98064-9718
800/843-1347,
206/251-5524
LIST PRICE: $2995
ACCESSORIES: black ink cartridges (five-pack) $125, calar cartridges (five-pack) $150
Reader service no. 675

Sharp JX-735
Sharp Electranics Corp.
Sharp Plaza
Mahwah, NJ 07430-2135
800/237-4277,
201/529-9594
LIST PRICE: $2195
ACCESSORIES: black ink vial $11.95, calar vial $11.95; caated paper (500 sheets) $53
Reader service no. 676

Tektronix ColorQuick
Tektronix Inc.
26600 S.W. Parkway
MS63/630
Wilsanville, OR 97070-1000
800/835-6100,
503/682-2980 (fax)
LIST PRICE: $2595
ACCESSORIES: black ink vial $6; calar vial $6; caated paper (500 sheets) $45; transparency film (50 sheets) $55
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4090 ⊙SuperStor 2.0 ..... $83.
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9623 ⊙Adobe TypeAlign 1.0 for Windows .... 69.
6591 ⊙Adobe Illustrator 4.0 for Windows .... 429.
⊙Adobe TypeSets for Business..... ea. 95.
6590 ⊙Adobe Streamline 3.0 for Windows... 125.
7928 ⊙Adobe Plus Pack 1.0..... 129.
8367 ⊙ATM and Plus Pack Bundle..... 169.
(Entire Adobe Type Library, from 1 to 260 is available. Call for more information.)
Aldus ... NCP
8000 ☐Persuasion 2.0 for Windows ..... 329.
1341 ☐FreeHand 3.0 for Windows..... 395.
1332 ☐PageMaker 4.0..... 499.
4195 ☐Photostyler 1.0 ..... 529.
Alpha Software ... NCP
5104 ⊙Alpha FOUR 2.0 ..... 329.
Application Techniques ... NCP
1214 ⊙Pizazz Plus 2.0 ..... 79.
9621 ⊙Picture Eze 2.0 for Windows..... 95.
Artisoft ... NCP
2455 Lantastic AE-2 EtherNet Starter Kit *(includes software, 2 EtherNet cards, cable)* ..... 479.
2452 AE-2 EtherNet Adapter Card ..... 199.
Atech Software ... NCP
9435 ☐Publisher's Powerpak 2.1 for WP & Word 49.
4797 ⊙AllType 1.0 *(universal typeface converter)* 49.

Microsoft ... NCP
7010 ☐*Windows 3.1*–Improve Setup, faster printing and better output with TrueType font technology, improved support for MS-DOS based applications allowing you to cut and paste between Windows and DOS programs, as well as drag and drop File Manager enhancements all make this latest release of Windows better than ever ..... $95.

2856 ⊙*Excel 4.0 for Windows*–Includes more powerful tools than ever before with smart features like Drag and Drop, Autofill, Scenario Manager for viewing multiple "what-if" scenarios, improved presentation tools, and Help for Lotus 1-2-3 Users ..... 309.

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8846 ⊙WideAngle 2.0 ..... 79.
Automap ... NCP
2729 ☐Automap 1.0..... 49.
Avery Dennison ... NCP
6006 ⊙Label Pro 1.6 *(Laser)*..... 49.
7336 ⊙Label Pro 1.0 for Dot Matrix ..... 49.
Banner Blue Software ... NCP
3322 ⊙Family Tree Maker 2.0..... 39.
3324 ⊙Org Plus Advanced 6.0..... 65.
2088 ⊙Org Plus 1.0 for Windows ..... 125.
Berkeley Systems ... NCP
9885 ⊙After Dark 2.0 for Windows..... 29.
Bitstream ... NCP
7568 ⊙FaceLift 2.0 for Windows 2.x/3.0..... 59.
8040 ⊙FaceLift 1.5 for WordPerfect 5.0/5.1 ... 59.
2332 ⊙TypeEssentials 1.0 *(Headlines)* ..... 62.
⊙TypeEssentials 1.0 *(all others)* .... ea. 92.
2089 ⊙MakeUp 1.0 for Windows 3.0/3.1 ..... 95.
Borland International ... NCP
3551 ⊙Quattro Pro SE 1.0 ..... 47.
6242 ⊙Quattro Pro 4.0 ..... 319.
7030 ☐Quattro Pro 4.0 Competitive Upgrade . 95.
9695 ☐Borland's C++ 2.0..... 325.
1514 ⊙Paradox 3.5 ..... 499.
7988 ☐Paradox 3.5 Competitive Upgrade ... 165.
9635 ⊙Object Vision 2.0 ..... 99.
Broderbund ... NCP
1434 ⊙New Print Shop..... 35.
ButtonWare ... NCP
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Caere ... NCP
8933 ⊙Omnipage Professional 1.0 ..... 669.
Calera ... NCP
1769 ⊙Fax Grabber 1.0..... 99.
Campbell Services ... NCP
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Central Point ... NCP
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6179 ☐PC Tools Deluxe LAN 7.1 ..... 799.
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9751 ⊙AntiVirus 1.2..... 79.
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8849 ⊙Instant Recall 1.2 ..... 64.
Claris ... NCP
3394 ⊙Hollywood ..... 339.
CompuServe ... NCP
7546 ⊙DOS Membership Kit 1.3 ..... 29.
Concentric Data Systems ... NCP
6575 ⊙R & R Relational Report Writer 4.0.... 159.
Contact Software ... NCP
1625 ⊙Act! 2.1..... 229.
Corel Systems ... NCP
5506 ☐CorelDRAW! 2.0..... 365.
2618 CorelDRAW! 2.0 CD-ROM ..... 449.
3419 ⊙Blockbuster Bundle *(ext. CD-ROM drive & CorelDRAW!)*..... 995.

Data Storm ... NCP
4798 ⊙PROCOMM PLUS 2.01 ..... 79.
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5611 ⊙Crosstalk 1.2 for Windows..... 119.
Delrina Technology ... NCP
2446 ⊙WinFax Pro 2.0..... 75.
4085 ⊙WinFax Pro/Calera FaxGrabber Bundle 149.
4325 ☐PerFORM 2.1 ..... 95.
7351 ⊙PerFORMPRO 1.0 ..... 179.
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8288 ☐DR DOS 6.0 ..... 67.
Discovery Systems ... NCP
3215 Nautilus Subscription Kit *(CD-ROM)*..... 20.
Fifth Generation Systems ... NCP
7725 ⊙Direct Access 5.1 ..... 64.
3950 ⊙Fastback Plus 3.0 ..... 119.
Fox Software ... NCP
6188 ⓇFoxPro 2.0 ..... 489.
Geoworks ... NCP
5217 ☐Geoworks Pro..... 129.
Gibson Research ... NCP
9832 ⊙SpinRite II 2.0..... 64.
Hayes ... NCP
7983 ⊙Smartcom EXEC 2.1..... 75.
Helix Software ... NCP
9627 ⊙Netroom 2.1 *(single user)* ..... 65.
IBM ... NCP
2666 ☐DOS 5.0 Upgrade ..... 59.
ICOM Simulations ... NCP
1326 ⊙Intermission 2.0 for Windows ..... 29.
Individual Software ... NCP
6222 ⊙Resume Maker 1.3..... 29.

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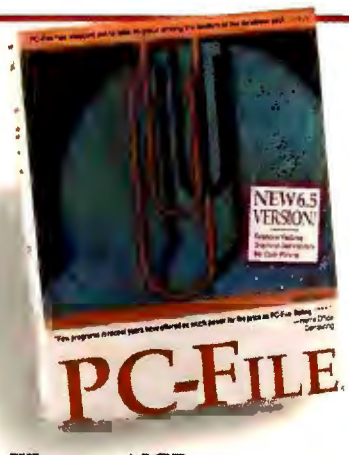

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3820	⦿HiJaak 1.0 for Windows	125.
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2040	⦿HiJaak Color Sep 1.0	339.

Intuit ... NCP

2426	⦿Quicken 5.0	45.
5596	⦿Quicken 1.0 for Windows	45.
2474	⦿Quicken with QuickPay	75.

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6882	⦿PrintCache 2.5	99.

Lotus ... NCP

5417	☐1-2-3 3.1 Plus	415.
5653	☐1-2-3 2.3	335.
1852	☐1-2-3 2.3 Upgrade	95.
2755	☐1-2-3 1.0 for Windows	399.
2747	☐1-2-3 for Windows & Ami Pro 2.0 Upgrd.	199.
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4603	⦿Tobias' Tax Cut 1040 1991	39.

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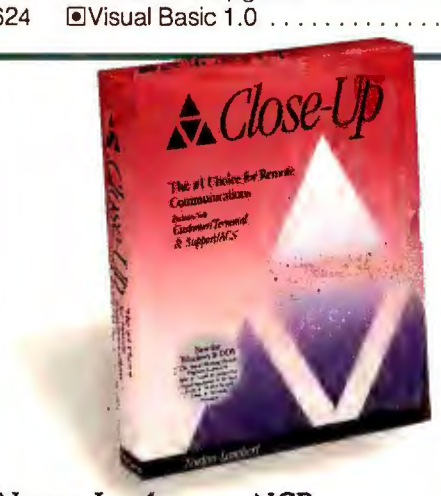

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2753 ☐ *Close-Up for Windows & DOS Dual Pack 4.0–PC Magazine*'s Editors' Choice (2/92). New remote Close-Up lets you take control of PCs miles away by modem. *PC World*'s "Best Buy" (2/92) . . . . intro. price until 6/30/92 $129.

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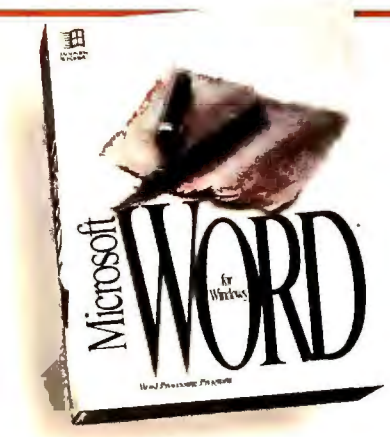

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1836 ⦿Where in America's Past is Carmen . . . 39.
5851 ⦿SimCity from Maxis. . . . . 29.
4388 ☐SimAnt from Maxis . . . . . 39.
4411 ⦿SimEarth for Windows from Maxis . . . . 45.

Davidson & Associates ... NCP

3947 ⦿Math Blaster Plus . . . . . 29.
4183 ⦿KidWorks . . . . . 29.

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4534 ⦿Mavis Beacon Teaches Typing 2.0 *(CP)* 35.
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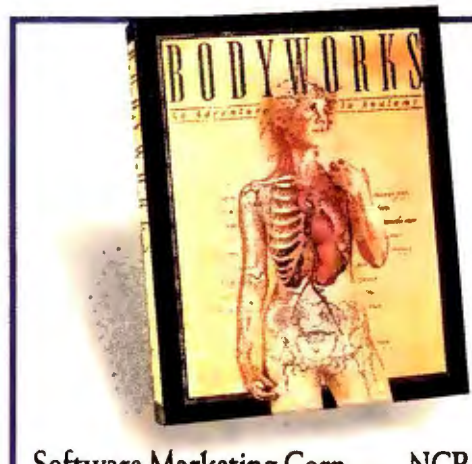
3861 ⦿Knowledge Adventure 1.0 . . . . . 55.



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4416 Sound Source . . . . . 29.

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2480 MousePen Pro PC . . . . . 62.

ATI Technologies ... 2 years

9821 VGA Basic-16 *(640 x 480, 16 colors)*. . . . . 69.
9985 VGA Integra *(1024 x 768, 16 colors)* . . . . . 95.
2706 VGA Wonder XL *(with 1 MB)*. . . . . 199.
2382 Graphics Vantage VGA *(with 1 MB)* . . . . 359.
9822 8514/Ultra *(with 1 MB) (requires VGA)* . . . 419.
2012 Graphics Ultra with VGA *(with 1 MB)*. . . . 479.
1825 2400etc/i Modem *(with 9600 SendFax)* . 139.
9620 9600etc/e Modem . . . . . 369.
3902 Stereo•F/X . . . . . 149.
3900 VGA Stereo•F/X *(w/512K, upgrd. to 1 MB)* 329.

Boca Research ... 5 years

7150 BOCARAM/AT PLUS *(2 MB)*. . . . . 199.
7139 *(4 MB)* . . . . 299. 7138 *(8 MB)* . . . . 499.
6998 I/O Board for AT . . . . . 49.
6999 I/O Board for Microchannel *(S/S/P)*. . . . . 95.
8380 BasicVGA *(256K, 640 x 480)* . . . . . 49.
8381 SuperVGA *(1 MB, 1024 x 768)* . . . . . 119.
3859 2400 Internal Modem *(V.42, MNP Level 5)* 85.
2502 2400 Baud Internal Modem . . . . . 49.
4001 2400 Baud External Modem . . . . . 59.

Bravo Communications ... 2 years

7400 2 Position Laser Compatible Switch Box. 109.

Brown-Wagh ... 1 year

8578 Creative Labs Sound Blaster . . . . . 109.
2336 Creative Labs Sound Blaster Pro . . . . . 189.

Caere ... 1 year

8158 Typist Plus Graphics. 389

Canon ... 1 year

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7894 BJ-10ex Printer *(4.6 lb.)* 329
7897 BubbleJet Ink Cartridge *(BJ-10ex)* 23
7896 BJ-10ex Sheet Feeder 75

Cardinal ... 1 year

2719 MB2296SR Internal Send/Receive Fax. . 105
1132 386-SX-16 Motherboard ØK 279
1197 386-SX-25 Motherboard ØK. 349
1480 Cardinal 9600 Internal Modem. 329
2783 Cardinal 9600 External Modem 349

CH Products ... 1 year

7935 Game Card III Auto . . 33. 7341 MCA . . 49
7340 FlightStick 45

Curtis ... lifetime

1708 Ruby-Plus SPF-2+ 65
7358 Command Center SPF-4 89

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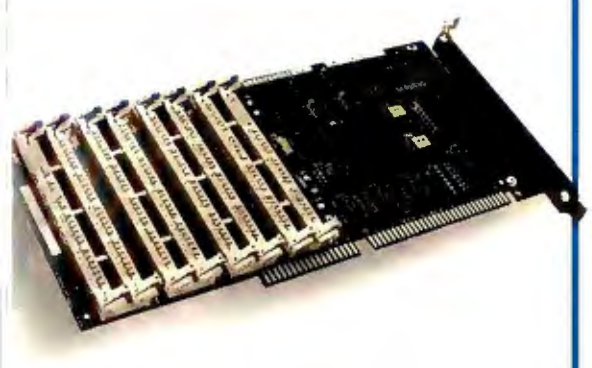

Intel ... 5 years

1086 Matched Memory Classic Memory Board ØK–Great performance with a great price to match. EMS 4.0 compatibility built in to the hardware for up to 90% faster processing. Expandable to 8 MB using 1 MB SIMMs . . . . . $139.

Cyrix Corporation ... 5 years
MATH COPROCESSORS

9875	FasMath 83D87-25	159.
9876	FasMath 83D87-33	169.
9877	FasMath 83S87-16 *(SX compatible)*	99.

Epson ... 2 years
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1906	FX-850 *(80 col., 264 cps, 9 pin)*	319.
1904	FX-1050 *(136 col., 264 cps, 9 pin)*	449.
2358	LQ-570 *(80 col., 252 cps)*	289.
2361	LQ-870 *(80 col., 330 cps)*	489.
2357	LQ-1170 *(136 col., 330 cps)*	669.
5184	LX-810 *(80 col., 180 cps, 9 pin)*	185.

Everex ... 1 year

1683	Tempo LX Notebook *(5 MB, 60 MB HD)*	call

Hauppauge Computer ... 1 year

9870	25 MHz 386N Motherboard for AT *(1 MB)*	729.
9034	33 MHz 386N Motherboard for AT *(1 MB)*	789.
3670	33 MHz 486 Motherboard for AT	1229.
4008	Win/TV	439.

Hayes ... 2 years

7391	ULTRA 96 Modem	669.
5024	ULTRA 144 Modem	799.
1345	OPTIMA 24 Modem	155.
3522	OPTIMA 96 Modem	389.
9884	Pocket Edition 2400	119.

Hewlett-Packard ... 1 year

3175	DeskJet 500C *(color) (with toner)*	749.
3957	LaserJet IIP Plus *(with toner)*	879.
9993	LaserJet IIIP *(with toner)*	1099.
6754	LaserJet III *(with toner)*	1599.

Intel ... 5 years

3864	14.4EX Modem	549.
6421	2400B MNP Internal Modem	189.
6420	2400EX MNP Modem	225.
7880	9600EX Modem	469.
5336	Above Board Plus 8 2 MB	379.
5342	Above Board Plus 8 I/O 2 MB	399.
1086	Matched Memory Classic Memory Brd. ØK	139.
7782	SatisFAXtion *(fax board)*	349.
8903	Matched Memory 4 MB *(PS/2)*	199.

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1810	1 MB . . . . . 89.	1787 2 MB . . . . . 149.
3076	Snap-In 386 *(for PS/2 50/60 & IBM AT)*	389.
3358	Power Pak *(Snap-In 386 & Above Board Microchannel 4 MB)*	799.

MATH COPROCESSORS

7385	80287XL *(16 MHz 80286 CPU's)*	89.
4750	80387SX *(16 MHz 80386SX CPU's)*	129.
6830	80387SX-20 *(20 MHz 80386SX CPU's)*	139.
5409	80387DX	219.

Kensington Microware ... 1 year
Full line available. Partial listing.

4973	PowerTree 20 *(6 outlets, EMI/RFI Filtering)*	$27.
2582	Master Piece Plus	99.
7899	Expert Mouse *serial* . . 99.	7900 *bus* . . 115.
3311	MasterStand	59.
3312	LaserStand *(for HP LaserJet)*	125.

Keytronic ... 3 years

4518	101 Plus Keyboard	99.

Kraft ... 5 years

5801	Game Card *(2 ports)*	27.
5813	Game Card with Thunderstick	49.
5800	3 button Thunder Joystick	29.

Logitech ... limited lifetime

3996	Trackman 2 *(combo)*	84.
2343	Trackman Portable	99.
7975	ScanMan 256	289.
1322	FotoMan *(camera for your PC)*	549.
4727	Kids Mouse	45.
3295	MouseMan *(combo)* 69.	9766 *(cordless)* 89.

Megahertz ... 5 years

3020	T224FM 96/24 Pocket Fax Modem	249.
1187	T324FM 96/24 Fax Modem *(Toshiba Lptps.)*	269.

Micron Technology ... 2 years

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Canon ... 1 year

7894 BJ-10ex Printer–New enhanced version of the popular 4.6 lb. printer provides laser-like print quality (up to 360 dpi) on plain bond paper, envelopes or transparencies. Available in white or gray . . . . . $329.

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2897	Mouse with Paintbrush *(bus or serial)*	99.
2898	Mouse with Windows 3.0 *(bus or serial)*	149.
1896	Ballpoint Mouse *(serial only)*	119.

MicroSpeed ... 1 year

2763	MicroTRAC *(serial & PS/2 interface)*	57.
6330	PC-TRAC Trackball *(PS/2)*	79.
6007	*serial* . . . . . 75.	6008 *bus* . . . . . 89.

Microtek ... 1 year

2736	ScanMaker 600G *(gray-scale scanner)*	759.
2739	ScanMaker 600Z *(color scanner)*	1249.
2740	ScanMaker 1850 *(slide scanner)*	1649.

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5997	Trackball *(1 yr. wrnty.) serial* . . 49.	*bus* . . 59.
3213	PC Trackball II *(serial)*	69.
7878	PC Mouse III *(serial)* . . . . 89.	*(bus)* . . . . 95.

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2425 PM14400FXSA Modem/Fax–Get ultra high speed 14,400 bps data transmission as well as Group III S/R fax capabilities in one integrated and affordable package. Includes QuickLink II for modem and fax communications . . $399.

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3651	CDR-73M CD-ROM Drive	589.
2478	CD Gallery with CDR36 for PC	579.
4252	Multisync 3FGX Monitor *(14")*	689.
4249	Multisync 4FG Monitor *(15")*	799.

Okidata ... 1 year
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5093	OL400 Page Printer *(4 ppm)*	649.
5094	OL830 Page Printer *(8 ppm)*	1329.
3025	Toner Cartridge	25.

Orchid Technology ... 4 years

7863	ProDesigner VGA IIS *(with 1 MB, includes RAMDAC chip)*	249.
4071	Fahrenheit 1280i with 1 MB	365.

Pacific Data ... lifetime/60 day MBG

5072	25 Cartridges in One! *(for DeskJet 500)*	105.
5071	25 Cartridges in One! *(for DeskJet Plus)*	105.
6779	25 Cartridges in One! *(LJ II, IID, IIP, III, IIID)*	269.

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7055	*2 MB* . . . . . 139.	7759 *4 MB* . . . . . 245.

Memory upgrade for LaserJet II/IID:

6838	*2 MB* . . . . . 245.	6836 *4 MB* . . . . . 359.
7158	Pacific Page PE *(LJ IID, IIP, III, IIID, IIIP)*	299.
9833	Pacific Page XL *(w/accelerator board)*	699.

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1222 ProModem Ultima Home Office–Integrated system of data, fax & voice. 14,400 bps data modem with V.42bis/MNP 5 data compression & error correction, plus 9600 bps send/receive fax, & full voice capability . . . . . $489.

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REPLACEMENT POWER SUPPLIES

3203	Turbo Cool 200	$149.
7915	Turbo Cool 300	159.

Practical Peripherals ... lifetime

3103	2400 Baud Internal Modem	79.
3102	2400 Baud External Modem	99.
8993	2400 Baud Internal Modem *(V.42 bis)*	115.
8994	2400 Baud External Modem *(V.42 bis)*	125.
8132	PM2400 Pocket Modem	109.
2266	PM9600 Internal Modem	275.
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2264	PM2400FX96 *(int. modem/fax)*	95.
1344	PM2400FX96SA *(ext. modem/fax)*	99.
3803	PM14400FX96 *(int. modem/fax)*	359.
2425	PM14400FXSA *(ext. modem/fax)*	399.

Prometheus ... 2 years

1222	ProModem Ultima Home Office	489.

Targus ... lifetime

1305	Universal Notebook *(computer case)*	69.

TheComplete PC ... 2 years

5828	TheComplete Communicator	299.

Tripp Lite ... 2 years

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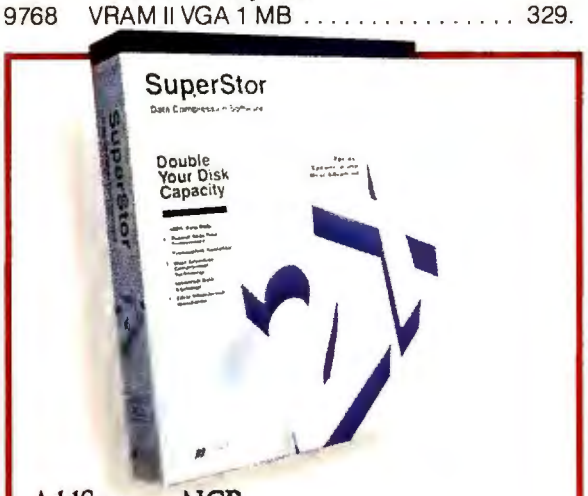
6201	Isobar 8-12 *(8 outlets, Gold Seal Warranty)*	69.

Video 7 ... 7 years

9768	VRAM II VGA 1 MB	329.



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4090 ▣ *SuperStor 2.0*–Double your disk capacity with an advanced, feature rich software only data compression product. Easy to install and use. Compatible with Windows and all applications . . . . . $83.

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1166	2400 Baud External Modem	69.
3386	FaxModem AFC *(2400 baud modem, 9600 send, 4800 receive fax)*	69.
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1494	9600 V.32 Turbo External Modem *(2 yr.)*	329.
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4098	24/96 External Fax Modem/WinFax Pro/Calera Fax Grabber Bundle	239.

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4354	Jumbo 250 Tape Backup	269.

Conner Peripherals ... 1 year

2339	CP30104 120 MB IDE HD *(19 ms)*	399.
1337	CP3204 200 MB IDE HD *(16 ms)*	599.

IOMEGA ... 1 year
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2224	Bernoulli II Transportable 90 MB.	799.
2616	Internal 90 MB Bernoulli	799.
2500	PC2B Controller	199.
2530	90 MB Cartridge	149.
2467	90 MB Cartridge Tripak	439.

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Mountain Network Solutions ... 2 years

2917	40-120 MB Internal Tape Drive	259.
3812	FS8500 IDE Tape Backup *(304M)*	569.
6153	DC2120 Tape Cartridge *(5 pack)*	149.

Pacific Rim ... 1 year

1304	1.2 MB External *(for any parallel port)*	239.
2761	1.44EX MB External *(for any parallel port)*	239.

Quantum ... 2 years

8304	Plus Hardcard II XL 50 MB *(9 ms)*	299.
8287	Plus Hardcard II XL 105 MB *(9 ms)*	449.
4060	105 MB Drive Kit for MC PS/2's *(13 ms)*	789.

TEAC ... 1 year

4670	1.44 MB Drive for PC/XT *(3½")*	59.
4326	1.44 MB Drive for AT *(3½", w/Bastech)*	79.
4951	720k Drive for PC/XT *(3½")*	55.
6951	1.2 MB Drive for AT *(5¼")*	65.
4414	3½"/5¼" Dual Floppy Drive	165.

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6556	256k DRAM *(100 ns, set of 9)*	19.
5510	1 MB x 9 SIMMs *(80 nanosecond)*	49.
2497	4 MB x 9 SIMMs *(80 nanosecond)*	179.
5746	1 MB Chips *(80 ns, set of 9)*	49.

DISKS/MEDIA

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3943	DC2000	17.	1581 DC2120	24.

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2214	3½" DS Disks *(10)* 9. 2242 *(50)*	32.
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3292	5¼" HD Disks *(Qty. 10)*	12.
3297	3½" DS Disks *(10)* 9. 6148 *(30)*	25.
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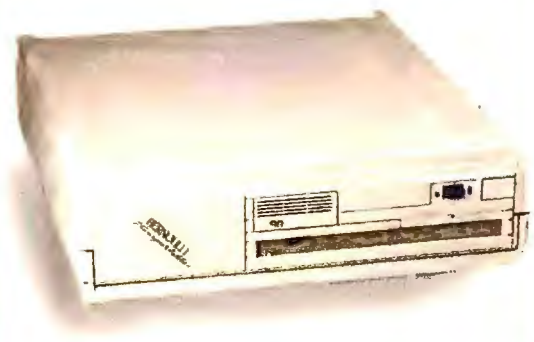
8185	QD2040 Tape Cartridge	14.
1895	QD2120	21.
6715	QD6150 23. 1602 QD6250	29.



IOMEGA ... 1 year
2224 Bernoulli II Transportable 90 MB–Rugged and built to last, this drive will absorb 1000 g's of shock and provide 90 MB of portable storage. Awards from *Byte* and *InfoWorld*. Requires adapter card . . . . . $799.

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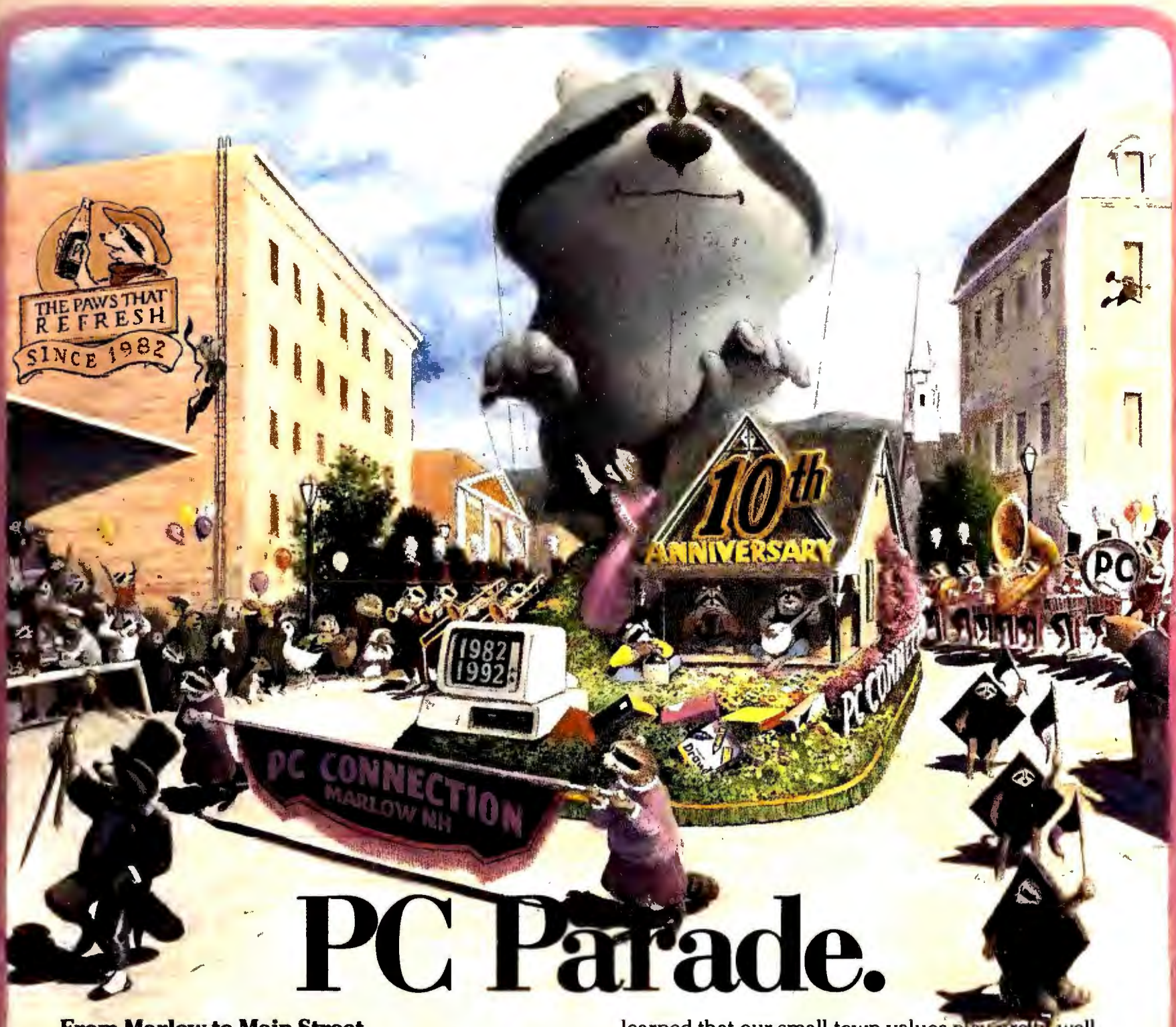

PC Parade.

From Marlow to Main Street.
(Or, a decade of service to beat the band.)

Back in July of '82, shortly after the introduction of the IBM-PC, we marched (to the beat of a different drummer, of course) smack dab into the middle of the PC marketplace. Our idea was simple—to sell add-ons and software exclusively for IBM personal computers. Our first warehouse was even simpler—a closet in a converted sawmill in the one-horse (or was that a moose?) town of Marlow, NH (pop. 542 at the time). Our goals were rather modest, too—we just wanted to be the fastest, most convenient, and most reliable source for PC products anywhere on Planet Earth.

Over the last ten years, we've learned that our small-town values play pretty well across America. And that anything humans can do, our high-stepping raccoon mascots can do better. So as our first decade draws to a close, we'd like to thank all our customers for making it so successful. May it never rain on your PC parade!

We'll give you the shirt off our backs!

The Official PC Connection 10th Anniversary Shirt, that is. A collector's item that can be worn with pride and panache at road races, corporate volleyball games, and even user-group meetings. It's free to anyone who places an order of $750 or more between now and June 30. Specify S, M, L, XL or children's.

Display your micro muscles with the all-cotton PC Connection 10th Anniverary Shirt. One per customer. Not available to net accounts.

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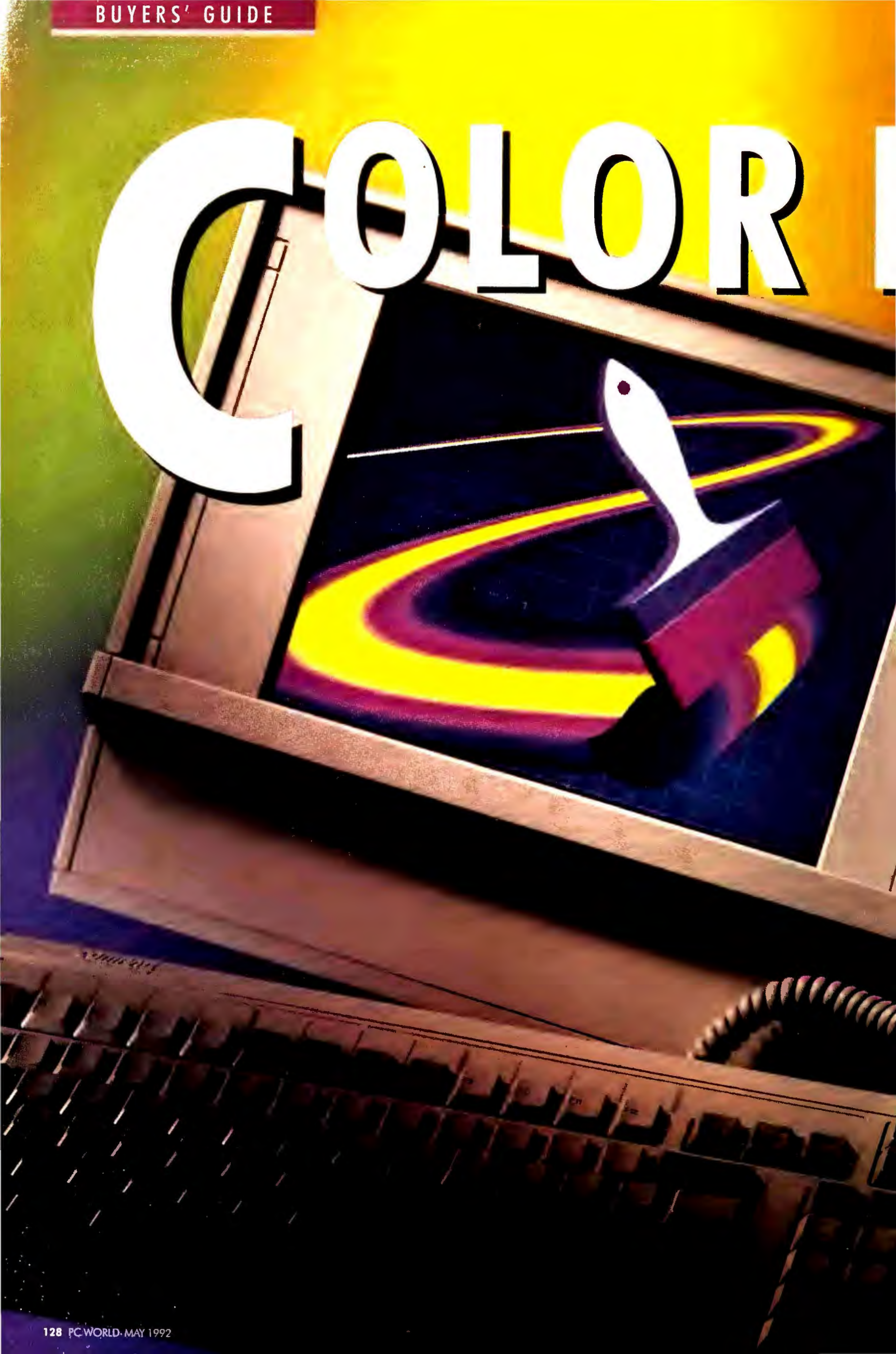
COLOR L



ORTABLES

BY ANDREW REESE

PORTABLES WITH DAZZLING, MULTIHUED DISPLAYS MAY BE THE ULTIMATE IN MOBILE PRESENTATIONS. HERE'S THE STORY ON THE LATEST KALEIDOSCOPIC CROP.

PORTABLE COLOR IS HERE! While the latest top-quality color LCD transportables are anything but cheap, if your business depends on your ability to deliver compelling presentations on the road, these hot new PCs might just pay for themselves. And even if you don't need one today, they open a window onto a near future in which a color portable with a stunning display—and low emissions—could be your desktop system of choice.

The most spectacular new color LCDs use active-matrix technology. Bright, saturated, and flicker free, the best active-matrix displays are in some ways superior to CRT monitors. They have a true flat screen without the distortion inherent in most CRT displays. They also do away with flicker and minimize electromagnetic emissions.

With hardware just starting to roll off vendors' assembly lines, we were able to get a hands-on look at eight of the first color portables—two battery-powered active-matrix notebooks, four active-matrix AC transportables, and two battery-driven passive-matrix notebooks. Passive-matrix displays are dimmer and slower, making them poor choices for presentations. Still, if a lightweight computer is your traveling companion, you've probably longed for a color display—and passive-matrix technology is

PHOTOGRAPHS BY STAN MUSELIK

AST's Premium Exec 386SX/25C boasts the lowest price of the color portables here—and a good-looking passive display.

Looking for a gorgeous color display? Compaq's Portable 486c has the best-looking screen of any machine here.

the most cost-effective way to get color on the road.

All of these machines' screens offer 640 by 480 resolution—the same sharpness provided by a standard VGA monitor. And all but one can drive the screen and an external monitor or projector simultaneously—making it easy for you to control the progress of a demo or a training session. The processors inside these portables range from a relatively slow 25-MHz 386SL to a high-velocity 33-MHz 486DX. If you're an architect who needs to run an on-site color animation or CAD application to show your customer what her new house will look like, you'll certainly want a faster (and more expensive) system. However, a 386SL is still perfectly adequate for slide-show presentation packages like *Harvard Graphics*. To help you comparison shop, we priced all eight units in a standard configuration with 4MB of RAM, an 80MB to 120MB hard drive, an internal modem, and DOS 5.0.

AST Premium Exec 386SX/25C Color

Scheduled to ship by the time you read this, AST's $4544 Premium Exec 386SX/25C Color was the least expensive color portable we could find at press time. Compared with an 18-pound transportable, this 7.3-pound notebook is a pleasure to carry. Informal battery tests indicate that even under constant use, the Premium Exec lets you work for almost 2 hours before you need an AC plug. And the 8MB RAM capacity is more than adequate for most applications.

The Premium Exec's prototype 8.5-inch screen, made by Sanyo, is the best-looking passive-matrix display we've seen. Although you can make the pointer disappear by whipping it from one side of the screen to the other—a common problem with passive-matrix LCDs—with most mouse moves, it remains in clear sight. Nonetheless, like all passive systems, the AST requires precise brightness and contrast adjustments for a good-looking image; fortunately, the slide controls are easy to use.

AST would like to sell this machine to traveling salespeople for knockout presentations, but while its display is impressive for a passive unit, low contrast and a narrow viewing angle make it a compromise choice for this market. The Premium Exec seems best suited to personal use by an individual—where it's a huge improvement over a monochrome notebook.

Dell's passive-color notebook, the 325NC, weighs a mere 7.1 pounds. In informal battery tests, it ran almost 3 hours.

Compaq Portable 486c

Looking for the best portable color display you can buy? You've just found it. Compaq's 17.6-pound Portable 486c lists for $11,697—one of the most expensive machines here. But this 33-MHz 486DX lunch box comes with the brightest, fastest, and prettiest display: a 10.4-inch Sharp screen with exceptionally bright "hot cathode" backlighting.

The 486c offers near-desktop capability. Should you want to network the unit, for instance, or connect it to a scanner, you can take advantage of two full-length 32-bit EISA slots that can accept either AT-style boards or high-throughput EISA peripherals. And the 486c comes with your choice of a 120MB or 210MB hard drive, plenty of elbowroom even if you have huge graphics files. Fast-RAM capacity is similarly uncompromised: You can load up to 32MB. In addition, the detachable 101-key keyboard is desktop quality: It boasts both excellent touch and an impeccable layout.

The 486c makes it easy to combine sound and image to produce dramatic presenta-

tions. There's a stereo input jack conveniently located near the expansion slots, where a sound board might go, a monaural audio amplifier with front-panel speaker and volume control, and a SCSI interface for plug-and-play connection to a CD ROM drive.

Thanks to its excellent expansion potential, the Compaq Portable 486c is the best portable we've seen for mobile multimedia presentations. Its high-powered processor and matchless screen also make it the portable to beat for CAD and other graphics-intensive applications. If you're willing to pay the money and carry the weight, you can't do any better.

Dell System 325NC

Does a color screen at people's prices sound good? Meet the $4897 325NC. Aside from its multihued display, this featherweight notebook is a virtual clone of Dell's familiar System 320N, which won a Best Buy in our November 1991 roundup of 386SX notebooks. This 7.1-pound unit uses a 25-MHz 386SL processor and can handle a generous 12MB of RAM. Informal battery tests show it running just a bit short of 3 hours with most power-saving features disabled—impressive for a color system.

Dell wants the 325NC to be considered a color alternative for monochrome-notebook users—which makes perfect sense. However, Dell says it's also aiming this machine at the field presentations, medical imaging, and financial modeling markets—and that makes less sense. Like the AST, the 325NC we looked at was a prerelease model, so we're reluctant to draw conclusions. Nonetheless, the 325NC lacks the ability for simultaneous external display, and its Sharp screen seemed dimmer and had lower contrast than those of the other units. The pointer has a tendency to disappear when you move the mouse, but a bundled copy of Microsoft's Mouse software 8.1, which provides an oversize flashing cursor, minimizes the problem.

The 325NC has great portability, the right battery life, and a cool price. But since it's not really suitable for presentations, you have to ask yourself if a passive-matrix color screen is worth about $1000 more than the 320N just to keep your eyes happy.

NEC ProSpeed 486SX/C

If you're willing to trade speed, expansion capacity, and a desktop-grade keyboard for a better price than Compaq's, NEC's 17.5-pound clamshell transportable is worth a close look. For starters, it costs almost $2100 less than the Compaq Portable 486c—around $9600 in our standard configuration. It handles up to 20MB of fast RAM, and its proprietary screen is fast, bright, and contrasty.

At 17.5 pounds, NEC's AC-powered ProSpeed 486SX/C is no lightweight, but it has a dazzling display for under $10,000.

The NEC's 20-MHz 486SX processor makes it less appropriate than the Compaq Portable 486c for CAD, animation, and other processing-intensive applications. In addition, when compared with the Compaq, the ProSpeed falls short of portable-desktop status. Its keyboard lacks dedicated cursor and page control keys, and there's one EISA slot instead of two.

In most ways, the design is excellent: The wide adjustment range of the swing-top display makes it easy to find a good viewing angle. The ProSpeed's dazzling display makes it a fine engine for presentations, and no one can argue with the big price break, but the Compaq Portable 486c offers greater computing power and better expansion capacity.

An active-matrix screen plus battery operation make NEC's UltraLite SL/25C a real temptation—especially at $6633.

NEC UltraLite SL/25C

It's hard to believe you can get a 9-inch color screen this good in a 7½-pound notebook. In fact, though the NEC UltraLite SL/25C's screen is similar to that of the ProSpeed 486SX/C transportable, it's slightly crisper. Combine this edge with a remarkably low price—$6633 as opposed to the ProSpeed's $9624—and the UltraLite emerges as a better buy for anyone except those who need a free slot and loads of hard disk space.

The UltraLite SL/25C offers no internal storage options other than the 80MB drive that comes with the unit (though NEC, like every other notebook vendor, plans to offer a 120MB model later this year). The machine can hold a reasonable 10MB of RAM.

We were unable to test this preproduction unit, but NEC claims that a typical UltraLite session will run 2½ to 3 hours. That may not seem like a lot, but for an active-matrix color notebook it's headline news. Moreover, like all SL systems, the UltraLite can suspend *Windows* applications safely; just hit the standby button, and your work space will stay the way it is, ready to power up again hours later. A keyboard toggle lets you switch between external, internal, and simultaneous displays.

With its light weight, stunning display, and relatively low

Desktop Color for Tomorrow

by TJ Byers, Michael Goodwin, and Karl Koessel

Even a quick look will convince you that an active-matrix liquid crystal display (LCD) screen displays a much finer image than a passive-matrix LCD—making it your best choice for resplendent on-site demos and presentations. In fact, in some ways an active display presents a better image than the familiar CRT monitor on your desktop. Passive boasts lower power consumption and a more reasonable price. While both technologies are improving, many experts feel that passive is a transitional technology and that active will eventually replace most CRTs.

How It Works

A color LCD uses backlighting as the source of the images it produces. Tiny red, green, and blue rectangular filters are arrayed on the inside surface of the screen, one three-color triplet for each pixel. The liquid crystal, which is sandwiched between the backlight and the colored filters, can vary the amount of light that shines through each colored subpixel, producing thousands of colors per triplet/pixel.

All LCD displays sandwich the liquid crystal between two sheets of glass. In a passive display, one sheet has horizontal bands of electrodes, the other, vertical. Subpixels are created wherever horizontal and vertical bands cross. A controller sends precisely timed pulses of power through the electrodes, governing how much light the liquid crystal admits through each colored filter. In an active display, a thin film of transistor-capacitor pairs is deposited onto one of the glass surfaces. Each transistor-capacitor pair controls one subpixel.

Brightness and Contrast

In a passive display, cross talk, or interference of the signals in adjacent electrode bands, lowers image quality. Active displays don't suffer from cross talk. Each transistor can exercise unperturbed control over the state of its subpixel—turning it full on or full off and keeping it that way indefinitely. This means high contrast—as high as 100 to 1. That's as good as you get from a CRT.

Pixel On/Off Speed

Thanks to those hard-working transistors, active-matrix screens can flip their subpixels on and off almost as fast as a CRT. Passive-matrix screens take three times as long to opaque or clear a subpixel, because they use lower voltages to minimize cross talk. The slowdown is noticeable during text scrolling and during rapid animation, where successive frames may be superimposed, causing blurred images.

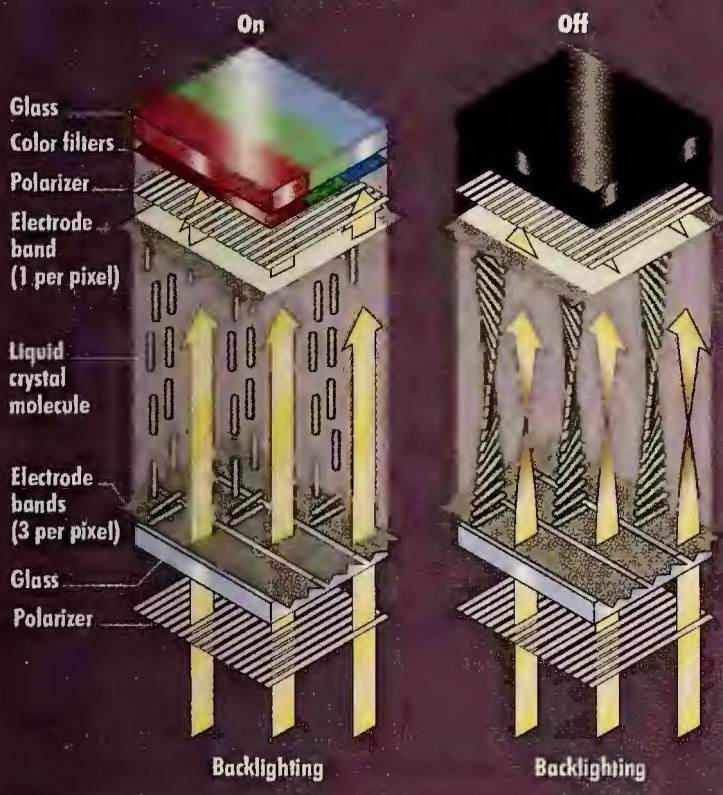
Flicker

In a CRT screen, electron guns zap the phosphors 60 or more times a second to keep them glowing. When the refresh rate is slower than the decay time of the phosphor, the screen flickers, causing eye fatigue. Since color LCD screens are continuously backlit, they produce steady, flicker-free images.

Resolution

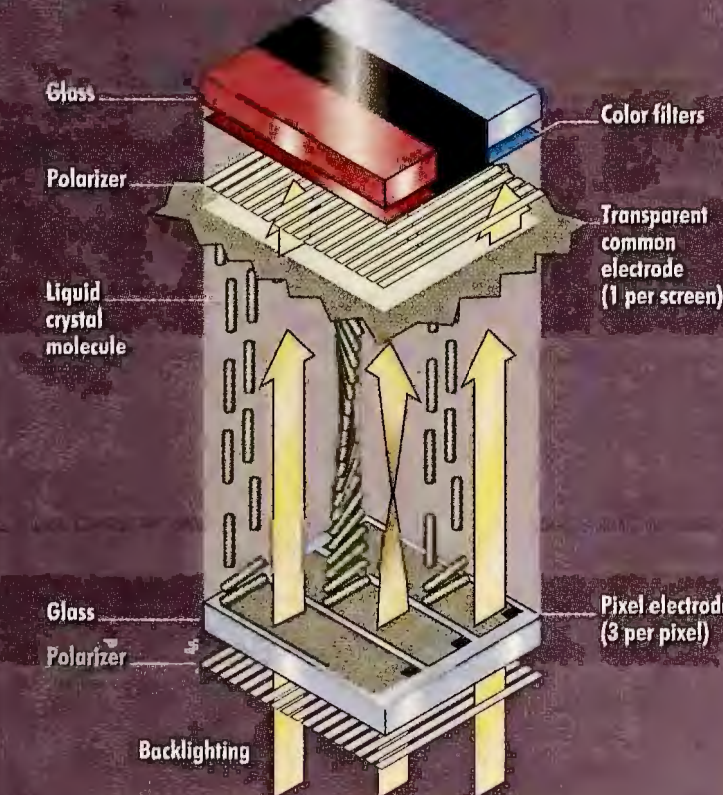
A CRT can display multiple resolutions; an LCD can't. Currently, color LCDs top out at 640 by 480. CRT monitors can go higher—commonly 1024 by 768, but as high as 4096 by 4096 for very high resolution CAD and desktop publishing displays.

Passive-Matrix LCD



Contrast	12:1 to 40:1
Pixel speed	on: 120ms to 150ms, off: 50ms
Flicker	none
Resolution	640 x 480
Emissions	none
Viewing angle	40 degrees

Active-Matrix LCD



Contrast	50:1 to 100:1
Pixel speed	on: 20ms to 50ms, off: 50ms
Flicker	none
Resolution	640 x 480
Emissions	none
Viewing angle	90 degrees

Emissions

While CRTs are known for their electromagnetic emissions—along with dust-collecting electrostatic charge—as yet there's no hard medical evidence of any health hazard. Nonetheless, if scientists discover that this "safe" radiation isn't so safe after all, it won't be the first time. So if you're worried about electromagnetic dangers, you'll be glad to hear that LCDs have virtually no emissions or static.

Viewing Angle

While both active and passive LCD screens limit you to about 40 degrees of vertical viewing range, they differ on horizontal viewing angle. You have to be looking almost dead center on a passive-matrix screen to see its images clearly. The active-matrix screen is more forgiving, with a horizontal viewing angle of around 90 degrees. Still, even that is a far cry from the 135 degrees most CRT screens offer.

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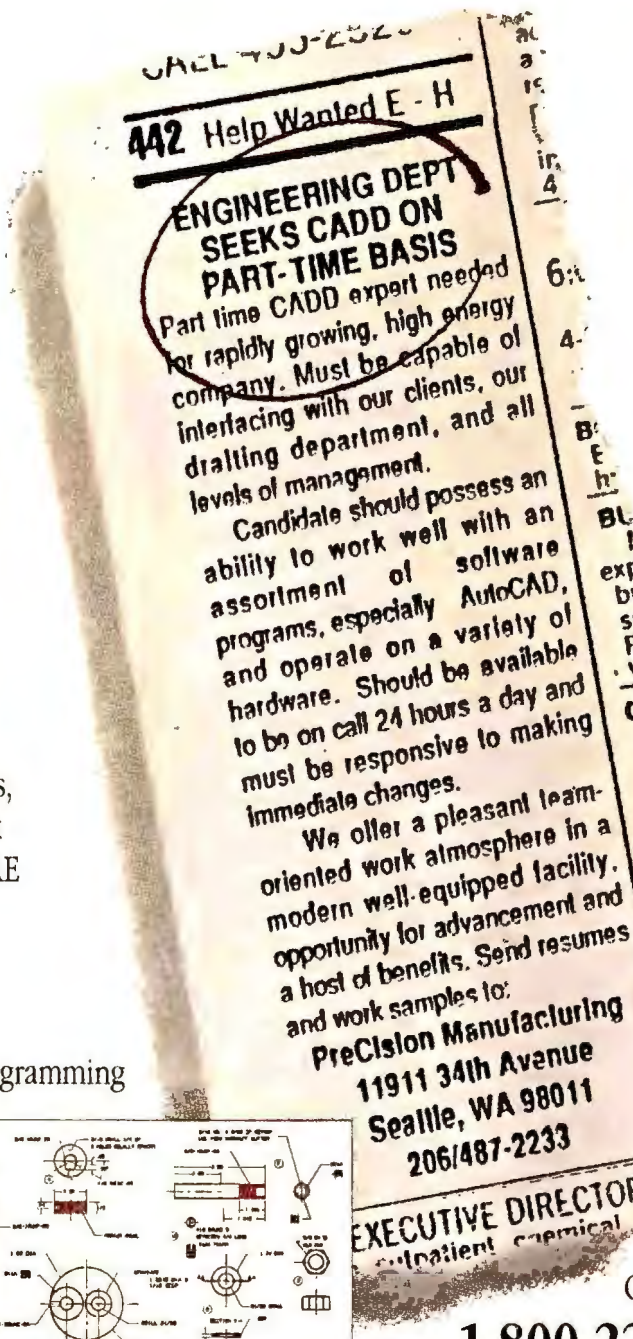

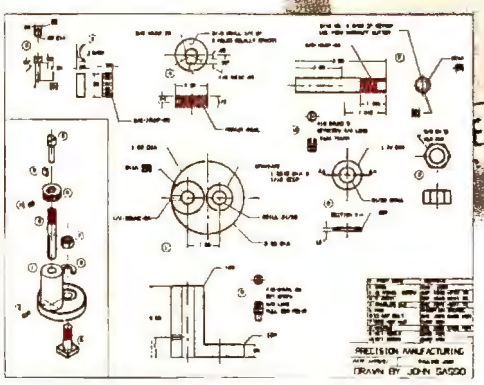

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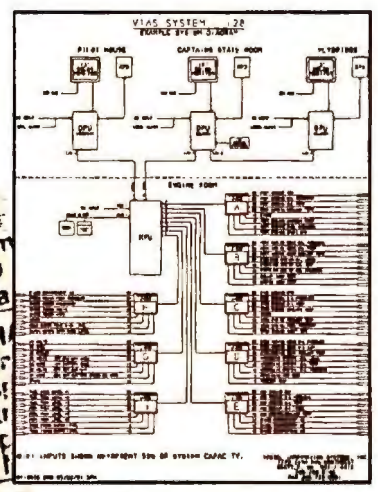

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Screen Graphics created with Photo-Finish™, courtesy of ZSoft Corporation

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The battery-powered Toshiba T4400SXC gives you active-matrix color quality—and a big, desktop-quality keyboard.

price, the UltraLite SL/25C could be the machine that brings color notebook computing into the mainstream. At the very least, this system should prove irresistible to many mobile presenters.

Toshiba T4400SXC

Toshiba's T4400SXC packs the processing punch of a transportable into an elegant, active-matrix color notebook. At $8478, this 25-MHz 486SX unit costs $1845 more than the NEC UltraLite SL/25C, but for that price you get roughly twice the CPU power—all in a neat 7¾-pound package.

At 8½ inches, the T4400SXC's display is one of the smallest of the bunch. However, the display quality stands with the best, offering color as good as that of its heavier sibling. The company has found a way to increase the efficiency of the screen, so you see the same amount of luminescence using less backlight—and therefore, less power. Combine this enhancement with a big 2.4-pound nickel-cadmium battery, and the company claims you'll get 3 full hours of battery-driven operation.

As is usually the case with Toshiba laptops, there's remarkably little compromise in the design of the T4400SXC's 82-key keyboard. The keys are full-size and fully spaced, with cursor keys arrayed in an inverted T, and dedicated <Page Up>, <Page Down>, <Home>, and <End> keys lining the right side. This arrangement may add an extra half-inch of width, but at 8.3 inches by 11.7 inches, the T4400SXC still occupies only about half of a normal-size briefcase.

Designed to be a true *Windows* portable, the T4400SXC comes with 4MB of RAM expandable to as much as 20MB. The new 120MB 2½-inch Conner drive gives you plenty of room for *Windows* apps or even a *PowerPoint* slide show.

In many ways, this high-quality color notebook surpasses Toshiba's transportable. If you can afford the very best in personal productivity and you don't need the expansion capacity of a big AC box, you've found the machine that's right for you.

Toshiba T6400DXC/T6400SXC

We looked at a preproduction model of Toshiba's T6400 clamshell color transportable. It's comparatively light (12.9 pounds), boasts a roomy 20MB fast-RAM capacity, and will be available in a high-performance, 33-MHz 486DX version for $9948 (with a 200MB drive) and a 25-MHz 486SX version for only $8648 (with a 120MB drive).

While the prototype 10.4-inch screen we looked at was quite nice, when you place it next to the Compaq and the NEC, its contrast seems somewhat lower.

You get one standard slot, but for the moment, that's as far as you can go: While the T6400 sports a 150-pin expan-

COLOR PORTABLES

Manufacturer	Product
AST RESEARCH	Premium Exec 386SX/25C Color
COMPAQ COMPUTER	Portable 486c
DAUPHIN TECHNOLOGY	1050 Lapbook
DELL COMPUTER	System 325NC
DOLCH COMPUTER SYSTEMS	P.A.C. SX-20C P.A.C. 386-33C P.A.C. 486-33C P.A.C. 486-33E P.A.C. 486-50E
EPSON AMERICA	NB/SL25C
LEADING EDGE PRODUCTS	N3/SL25 Color
NEC TECHNOLOGIES	ProSpeed 486SX/C UltraLite SL/25C
SHARP ELECTRONICS	PC-6881
TOSHIBA AMERICA INFORMATION SYSTEMS	T3200SXC T4400SXC T5200C T6400DXC T6400SXC
TWINHEAD	Slimnote 486DX33C

[1] Price based on 4MB to 5MB RAM, 80MB to 120MB hard drive, 1.44MB floppy drive, 2400-baud modem, and DOS 5.0. All prices are list, except for Dolch systems, which are discounted.
[2] Made by AMD.
[3] With 130MB hard disk.
[4] Mouse included.

Toshiba's active-color transportable, the T6400DCX is one of the lightest AC-powered machines here: only 12.9 pounds.

Price [1]	Weight (pounds)	Dimensions (inches)	Power supply	LCD type	Processor	RAM capacity (MB)	Expansion slots (EISA/ ISA/PCMCIA)	Largest hard disk ovoil- oble (MB)	Warranty (months)	Toll-free technicol support	Maximum screen colors (at 640 x 480)	Reoder service number
$4544	7.3	11.4 x 9 x 2.3	battery	passive	386SXL/25 [2]	8	0/0/0	80	12	Y	16	668
$11,697	17.6	15.6 x 11 x 5.5	AC	active	486DX/33	32	2/0/0	210	12	Y	256	669
$7995 [3]	8.5	12.3 x 11.5 x 2.3	battery	active	386SX/20	32	0/0/0	130	12	Y	16	739
$4897	7.1	11 x 8.5 x 2.3	battery	passive	386SL/25	12	0/0/0	80	12	Y	16	670
$9438	18	16 x 9.5 x 7.8	AC	active	386SX/20	16	0/5/0	420	12	Y	16	740
$9794	18	16 x 9.5 x 7.8	AC	active	386DX/33	32	0/4/0	420	12	Y	16	740
$10,600	18	16 x 9.5 x 7.8	AC	active	486DX/33	32	0/4/0	420	12	Y	16	740
$11,961	18	16 x 9.5 x 7.8	AC	active	486DX/33	32	4/0/0	420	12	Y	16	740
$13,456	18	16 x 9.5 x 7.8	AC	active	486DX/50	32	4/0/0	420	12	Y	16	740
$7903	7.3	11.7 x 9.3 x 2.4	battery	active	386SL/25	20	0/0/0	80 [6]	12	Y	16	741
[7]	6.9	11.7 x 8.2 x 1.9	battery	passive	386SL/25	10	0/0/0	80	12	N	16	742
$9624	17.5	15.6 x 14.8 x 4.2	AC	active	486SX/20	20	1/0/0	240	12	Y	256	671
[7]	7.4	11.5 x 9 x 2.4	battery	active	386SL/25	10	0/0/0	80	12	Y	16	671
TBA [7]	5.9	11 x 8.5 x 1.9	battery	active	386SL/25	8	0/0/1	80	12	Y	16	771
[7] $8337	17	15.6 x 14.6 x 4.3	AC	active	386SX/20	13	0/1/0 [8]	120	12	Y	256	672
[7] $8478	7.7	11.7 x 8.3 x 2.3	battery	active	486SX/25	20	0/0/0	120	12	Y	256	672
$8376 [9]	18.9	15.6 x 14.6 x 4.3	AC	passive	386DX/20	14	0/1/0 [8]	200	12	Y	16	672
$9948 [9]	12.9	15.4 x 10.5 x 4.1	AC	active	486DX/33	20	0/1/0	200	12	Y	256	672
$8648	12.9	15.4 x 10.5 x 4.1	AC	active	486SX/25	20	0/1/0	120	12	Y	16	672
$5248 [5]	5.9	11 x 8.5 x 1.8	battery	passive	486DX/33	20	0/0/0	130	12	Y	16	743

[5] Windows included.
[6] Removoble dota pack.
[7] Price not ovoilable ot press time.
[8] Includes full-length 16-bit slot plus half-length 8-bit slot thot doubles os proprietary 16-bit Toshiba slot.
[9] With 200MB hord disk.

For more information about all products in this table, circle reader service no. 911.

sion bus connector, Toshiba doesn't currently offer an expansion unit (unlike Compaq and NEC).

Still, were it not for the lower contrast of the display we examined, we wouldn't hesitate to recommend the SX version of the T6400 as the lightest active-matrix transportable here. As it is, we have to reserve judgment and recommend that you check out a production unit—which should be shipping by the time you read this. With color CRT technology improving daily and vendors upgrading their units almost as often, there's no substitute for a close look.

Andrew Reese is a technical writer for a major software company. TJ Byers is a contributing editor, Michael Goodwin an associate editor, and Karl Koessel the technical editor for PC World.

WHERE TO BUY

AST Premium Exec 386SX/25C Color
AST Research Inc.
16215 Alton Pkwy.
P.O. Box 19658
Irvine, CA 92713-9658
800/876-4278,
714/727-4141,
714/727-9355 (fox)
Reader service no. 668

Compaq Portable 486c
Compaq Computer Corp.
P.O. Box 692000
Houston, TX 77069-2000
800/231-0900
Reader service no. 669

Dauphin 1050 Lapbook
Douphin Technology, Inc.
1125 E. St. Chorles
Lombard, IL 60148
800/782-7922,
708/627-7618 (fax)
Reader service no. 739

Dell System 325NC
Dell Computer Corp.
9505 Arboretum Blvd.
Austin, TX 78759-7299
800/289-3355,
800/727-8320 (fax)
Reader service no. 670

Dolch P.A.C. SX-20C, P.A.C. 386-33C, P.A.C. 486-33C, P.A.C. 486-33E, P.A.C. 486-50E
Dolch Computer Systems
372 Turquoise St.
Milpitos, CA 95035
800/538-7506,
800/223-2077
California,
408/263-6305 (fax)
Reader service no. 740

Epson NB/SL25C
Epson America, Inc.
20770 Madrona Ave.
Torrance, CA 90503
800/922-8911,
310/782-5220 (fax)
Reader service no. 741

Leading Edge N3/SL25 Color
Leoding Edge Products, Inc.
117 Flanders Rd.
Westborough, MA 01581
800/874-3340,
508/836-4504 (fax)
Reader service no. 742

NEC ProSpeed 486SX/C, UltraLite SL/25C
NEC Technologies, Inc.
1414 Massachusetts Ave.
Boxborough, MA 01719
800/632-4636,
508/635-4321 (fox)
Reader service no. 671

Sharp PC-6881
Sharp Electronics Corp.
Sharp Plazo
Mahwoh, NJ 07430
800/237-4277
Reader service no. 771

Toshiba T3200SXC, T4400SXC, T5200C, T6400DXC, T6400SXC
Toshiba America Information Systems, Inc.
9740 Irvine Blvd.
Irvine, CA 92713-9724
800/334-3445,
714/583-3878 (fax)
Reader service no. 672

Twinhead Slimnote 486DX33C
Twinhead Corp.
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Milpitas, CA 95035
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408/945-1080 (fax)
Reader service no. 743

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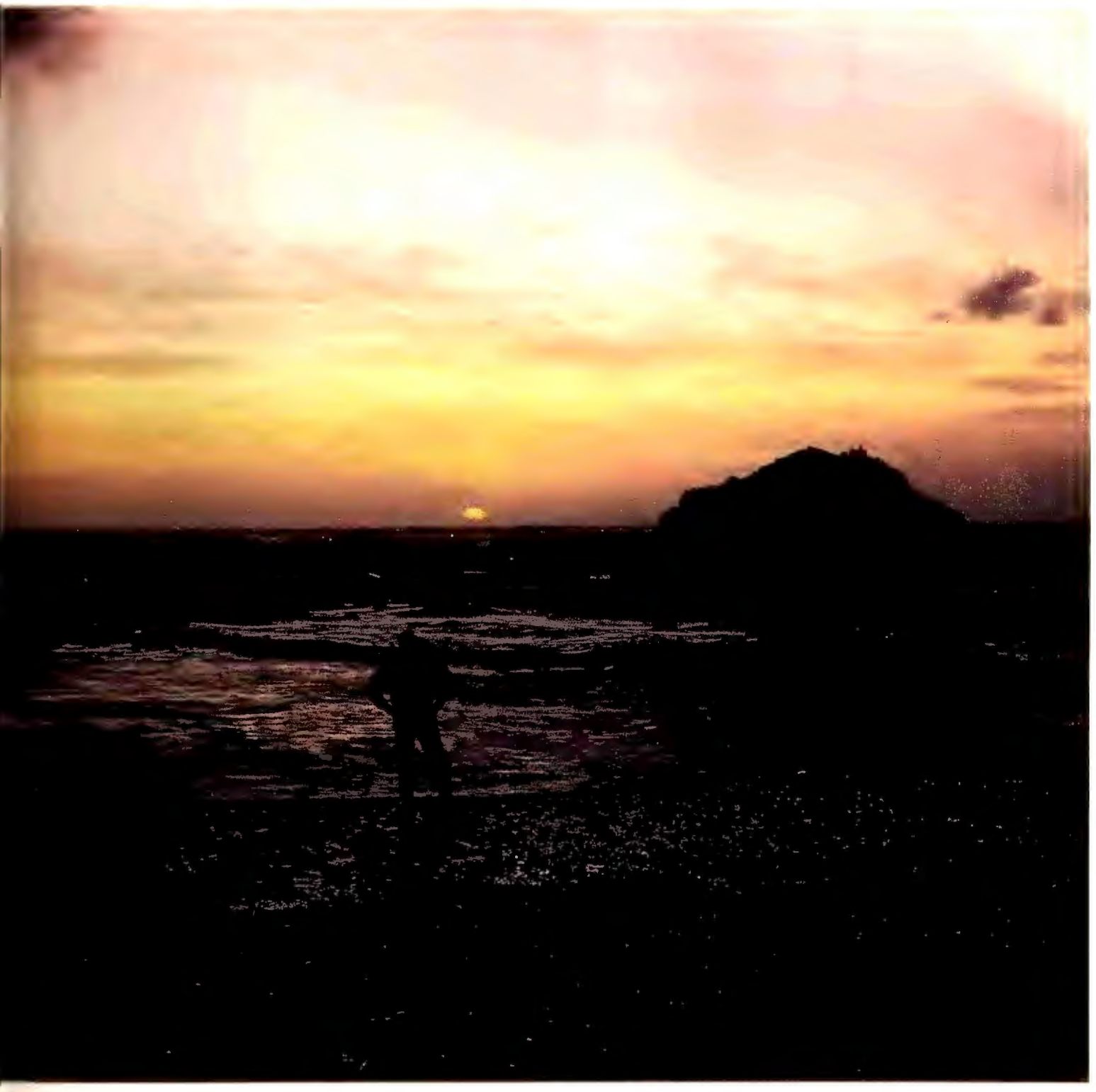

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Input Devices

BY CATHERINE SMITH

When it comes to your hands, why compromise? Find the best fit in this guide to keyboards, mice, and trackballs.

LIKE IT OR NOT, graphical user interfaces (GUIs) are here to stay. *Windows,* OS/2, and a growing number of GUI DOS packages, such as *Quattro Pro,* change not only the way you work but also the tools you work with. Yesterday's extras—mice, trackballs, and enhanced keyboards—are today's essentials.

Freedom of choice is alive and well when it comes to deciding how your hands will enter data and execute commands. This buyers' guide shows you what's available and gives you pointers on how to choose devices that will be kind to your wrists. But remember, the best judge is your own hands.

Keyboards

There are two kinds of keyboards: those that click when you type and those that don't. For the snappiest sound and feel, select a mechanical keyboard. With this kind, the key you press feels like it's spring-loaded and makes a definite clicking noise.

If noise and snap aren't for you, check out the quieter and less costly membrane keyboard. It looks the same as the mechanical type but lacks their spring and click and seems mushy to some users.

Keyboard layout determines how much time your fingers spend jumping about. The standard 101-key keyboard has 12 function keys along the top of the board, a numeric/cursor keypad, and an extra keypad devoted to cursor movement. The old AT-style 84-key keyboard has 10 function keys on the left and a numeric/cursor keypad.

Some programs, such as *WordPerfect,* assign a number of tasks to the function keys. If these tasks involve using function keys in combination with the <Ctrl>, <Alt>, and <Shift> keys, you may want a keyboard with function keys grouped along the left side for easy one-hand operation. Function keys arranged along the top of the board may require hands to hop up and down. Some keyboard manufacturers offer both schemes on one board. Also look for an L-shaped <Enter> key, which is easier to reach than a smaller, rectangular one.

The latest option is to replace the dedicated cursor keypad with a trackball. You can get one built into the board à la Datadesk's Switchboard or add a clip-on trackball to the keyboard's side. Clip-ons were designed for laptop users but work equally well with desktop keyboards (for more information, see "Traveling Companions," February 1992). Both built-ins and clip-ons eliminate the jumping back and forth that freestanding trackballs and mice involve.

Keyboards from manufacturers such as IOcomm and Datadesk are making even

PHOTOGRAPHS BY ROSEMARY WILTON

more radical changes. IOcomm's Wave ($100) has an undulating shape that follows the curve of your hands; the bottom portion of the board extends outward for extra wrist support. Datadesk's pricey Switchboard ($239) has a modular design that lets you move function, cursor control, and numeric keys to wherever they feel most comfortable.

Mice

With mice, finding the right size and shape is crucial to comfort. When you lay your hand across a mouse, you want your hand—from wrist to fingertips—to lie as flat as possible and still be supported. Expect a twinge of rebellion if your palm and wrist angle down to the desk because of insufficient support, or if your fingers must stretch to reach the buttons (see "Stress by Design").

Once you've got your hand on it, the mouse's job is to track and report movement to the driver—the software that links the mouse and applications. Movement is registered through one of three types of mechanisms: mechanical, optical, and optomechanical.

Mechanical mice have a rolling ball that tracks the movement of the mouse. Optical mice use light-beam pulses reflected off a mirrored pad to measure movement. They provide more precise screen movements than mechanical mice but are useless without the special pad.

Optomechanical mice use both technologies. The ball tracks movement like a mechanical mouse and also moves a perforated disk to create light pulses, which are transmitted as movement. Optomechanical mice are nearly as precise as optical mice, and they don't require a pad.

The amount of movement a mouse registers—its resolution—is measured in dots per inch (dpi). The higher the dpi, the farther the cursor travels for every movement of the mouse. Resolutions are listed here by the base dpi of the mouse hardware. Mouse software drivers use a complicated series of calculations to lower

KEYBOARDS

Manufacturer	Product	Price	Type	Number of keys	Number of function keys/ placement	L-shaped Enter key	Dimensions (inches)	Built-In input device	Warranty (years)	Reader service number
ALPS ELECTRIC USA	MDS101	$85	membrane	101	12/top	N	1.5 x 18.8 x 7.5	N	3	744
CHERRY ELECTRICAL	MouseBoard	$360	mechanical	102	12/top	N	1.5 x 18.5 x 7.7	Y	1	745
DATADESK	Switchboard	$239	mechanical	105	15/top	Y	1.6 x 18.8 x 7.8	Y [1]	3	746
DATALUX	Space-Saver	$98	mechanical	101	12/top	N	2.5 x 10.8 x 6	N	1	747
DELTA PHASE INT'L	714-1000	$32	membrane [2]	101	12/top	Y	1.2 x 18.6 x 7.5	N	2	748
	714-1007	$33	membrane	102	12/top	Y	1.2 x 18.6 x 7.5	N	2	748
	714-2000	$37	mechanical	101	12/top	Y	1.2 x 18.6 x 7.5	N	2	748
HONEYWELL	101WN	[3]	membrane	101	12/top	Y	1.7 x 18.5 x 7.3	N	3	749
IOCOMM INT'L TECHNOLOGY	Breeze	$90	mechanical	102	12/top	Y	1.5 x 18.5 x 7.5	N	1	750
	Breeze 84	$80	mechanical	84	10/top	Y	1.5 x 17.5 x 7.5	N	1	750
	Wave	$100	mechanical	102	12/top	Y	2 x 19.3 x 8.5	N	1	750
JAMECO ELECTRONICS	FKB4700	$80	mechanical	101	12/top	N	1.3 x 19 x 8	N	1	751
	JE2015	$50	mechanical	84	10/side	Y	2 x 20.6 x 7	N	1	751
	FK5001	$90	mechanical	130	24/top & side	Y	2 x 20 x 7	N	1	751
KEY TRONIC	KB3270 Plus	$349	mechanical	122	24/top & side	Y	2.3 x 20.9 x 8.4	N	1	752
	KB5184WP	$119	mechanical	101	12/top	Y	1.6 x 17.7 x 7.5	N	1	752
	KB101	$139	mechanical	101	12/top	N	1.8 x 19 x 8.1	N	3	752
	KB101 Plus	$149	mechanical	101	12/top	Y	1.8 x 19 x 8.1	N	3	752
	MB101	$89	membrane	101	12/top	Y	1.8 x 19 x 8.1	N	1	752
	Trak101	$199	mechanical	97	12/top	Y	1.8 x 19 x 8.1	Y	3	752
LITE-ON	SK 8801	$50	membrane	101	12/top	Y	1.6 x 18.9 x 7.7	N	2	753
	SK 8843	$50	membrane	101	12/top	Y	1.6 x 18.9 x 7.7	N	2	753
	SK 0002	$60	mechanical	101	12/top	Y	1.6 x 18.9 x 7.7	N	2	753
	SK 4100	$45	membrane	101	12/top	Y	1.6 x 18.9 x 7.7	N	2	753
	SK 9001	$50	membrane	102	12/top	Y	1.6 x 18.9 x 7.7	N	2	753
LIUSKI/MAGITRONIC	D-K160	$37	mechanical	101	12/top	Y	1.3 x 18.5 x 6.5	N	1	754
	D-K2001	$55	mechanical	108	12/top	Y	1.3 x 18.5 x 7.5	N	1	754
	D-K5001	$80	mechanical	130	30/top & side	Y	1.3 x 20.7 x 7.3	N	1	754
NMB TECHNOLOGIES	RT 101+ Sculptured	[3]	membrane	101	12/top	Y	1.4 x 19.2 x 8.2	N	1	755
NORTHGATE COMPUTER SYSTEMS	OmniKey/101NI	$89	mechanical	101	12/top	Y	2.9 x 18.6 x 7.9	N	5	756
	OmniKey/102	$89	mechanical	102	12/side	Y	2.7 x 20.4 x 8.1	N	5	756
	OmniKey/ULTRA-T	$129	mechanical	116	24/top & side	Y	2.6 x 20.7 x 8.1	N	5	756
QTRONIX	QX-201H	$49	mechanical	101	12/top	Y	1.3 x 18.5 x 7	N	1	757
	KT-30MS	$89	mechanical	101	12/top	Y	1.7 x 19.1 x 6.9	Y	1	757
	QX-301H	$59	mechanical	101	12/top	N	1.3 x 15.6 x 6.9	N	1	757
	QX-601R	$39	membrane	101	12/top	Y	1.2 x 19 x 7.3	N	1	757

[1] Extra-cost option.
[2] Mechanical version available at extra cost.
[3] No list price available; price set by distributors who sell to end users.

For more information about all products in this table, circle reader service no. 912.

and raise dpi levels, but they sometimes sacrifice smoothness to increase dpi. The higher the base dpi, the more likely the mouse is to support smooth cursor movement at higher dpi levels.

As with any add-in device, check hardware and software compatibility before you buy. The mice listed here come in serial, bus, and PS/2 versions. Unless your system has a PS/2 mouse connector, a serial mouse that plugs into one of your PC's serial ports is the easiest way to go. If the serial ports are already in use with printers, digitizers, or scanners, you'll need to buy the bus version, which includes a mouse interface board. Contrary to popular belief, there's no performance difference between the versions.

Since the Microsoft Mouse is the big cheese of input devices, all the mice here are Microsoft compatible. However, some maverick users prefer a three-button mouse to the two-button Microsoft standard. This decision is strictly a matter of taste—and whether the utilities that come with your mouse enable you to use that third button in some useful way. For example, a zoom function programmed into the third button could make picture editing much easier.

Any peripheral added to your system will also add a tangle of cords. If you want to avoid the mess, you have two choices: infrared-remote or radio-wave mice. With infrared remotes, nothing should obstruct the line of vision between the eye of the remote and the computer—block the light beam, and your device becomes useless. Radio-wave mice don't have this problem. They work by assigning one of four to eight "stations" to your mouse, which works fine if no other mice are in the immediate area using the same frequency. If they are, then each user will need to have a separate station.

Stress by Design

We all know of someone who's experienced discomfort or injury from long hours at the keyboard. What's surprising is that physicians are also reporting an alarming increase in injuries attributable to mice and trackballs.

Sharri Baker, former graphics production supervisor at Farallon Computing in Emeryville, California, came face-to-face with this reality in late 1990 on a job that involved "heavy mouse work." Baker spent up to 7 hours a day performing hand-intensive mouse functions such as designing shapes, highlighting text, and cutting and pasting.

Within two months, Baker was diagnosed with overuse syndrome involving inflammation of the tendons of the hands and put on medical disability leave. Now, Baker can work on a computer for 30 minutes, twice a day.

How do you lessen your chance of developing a cumulative trauma injury when our work environments and the devices we use seem to be a breeding ground for them? First, rest your hands often. Take short but frequent breaks. Vary your tasks; put the stress on a variety of muscles rather than using the same muscles in exactly the same way throughout the day. Last, remember to do frequent hand exercises and stretches.

Most important, get an input device that doesn't bite the hand that uses it. One of the most likely dangers is the one-size-fits-all philosophy. Product adjustability can also offset repetitive stresses to muscle groups. Look for keyboards with adjustable heights, mice that come in a variety of sizes, and trackballs with easy-to-reach buttons and a low-lying ball that lets your hand lie flat.

Trackballs

Flip a mouse on its back, and what do you get? A trackball (oversimplified, but you get the idea). Trackballs don't require the room that mice use roaming around your desk, and they offer all the same functions.

All the trackballs here have at least 150-dpi resolution and are Microsoft compatible. The balls themselves range from pearl-size to roughly the size of a tangerine. In general, the larger the trackball, the better the response to movement, although Appoint's Thumbelina trackball has found its way onto the desk of keyboard aficionados and portables users with limited space.

One potentially annoying trackball problem involves click-and-drag. To highlight text with a mouse, you move the cursor to the starting point, hold down the appropriate mouse button, and move the cursor to the end of the line. With a trackball, this operation can require two hands —one to hold the button, one to rotate the trackball.

Some trackball companies solve this problem with a drag lock feature. Click the drag lock button, and the trackball acts as if the pointer button is held down. The challenge is remembering whether drag lock is enabled; some trackballs have an LED indicator to show when this feature is in use.

THE DEVICIVE DECISION

In a graphical world, the key to survival is comfort. Wrist support, hand posture, muscular stress, and the repetitive demands of your job all factor into the ergonomic benefit of introducing a new input device into your work environment.

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Circle 185 on reader service card

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QEMM 6
February 11, 1992

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MICE

Manufacturer	Product	Price	Resolution (dpi)	Number of buttons	Serial/ bus/ PS/2 ports	Uses Microsoft drivers	Number of other drivers available	Operating mechanism
AAMAZING TECHNOLOGIES	AMX-300	$39	300	3	Y/Y/Y	Y	0	mechanical
APPOINT	MousePen	$99	150	2	Y/Y/Y	Y	1	optomechanical
DFI	DMS-400	$79	400	3	Y/N/N	Y	1	optomechanical
IMSI	IMSI Mouse	$70	240	3	Y/Y [1]/N	Y	1	optomechanical
	PET Mouse	$40	240	3 [2]	Y/Y/Y [1]	Y	1	optomechanical
KEY TRONIC	Professional Series Mouse	$109	200	2	Y/Y/Y	N	1	mechanical
KYE INT'L	Clix Mouse	$39	200	2	Y/Y/Y	N	1	optomechanical
	Clix Plus	$49	200	2	Y/Y/Y	N	1	optomechanical
LIGHTWAVE TECHNOLOGIES	Lester the Cordless Mouse	$100	200	3	Y/Y [1]/Y [1]	Y	1	infrared, opto
LITE-ON	QMouse	$35	250	2	Y/Y/Y	N	5	optomechanical
LIUSKI/MAGITRONIC	F-Pro-003	$30	200	3	Y/Y/N	Y	1	optomechanical
LOGITECH	First Mouse	$79	400	3	Y/Y/Y	N	1	optomechanical
	Kidz Mouse	$79	200	2	Y/Y/Y	N	1	optomechanical
	MouseMan Cordless	$169	400	3	Y/Y/Y	N	2	radio, optomechanical
MICROSOFT	Microsoft Mouse	$125	400	2	Y/Y/Y	Y	1	mechanical
MOUSE SYSTEMS	Little Mouse/PC	$135	300	2	Y/Y/Y	N	1	optical
	OmniMouse II	$70	200	2	Y/Y/N	N	1	optical
	PC Mouse III	$155	300	3	Y/Y/Y	N	1	optical
PROHANCE TECHNOLOGIES	ProMouse	$70	400	12	Y/Y/N	Y	0	optomechanical
	PowerMouse/50	$90	400	12	Y/Y/N	Y	0	optomechanical
	PowerMouse/70	$100	400	17	Y/Y/N	Y	0	optomechanical
	PowerMouse/100	$130	400	40	Y/Y/N	Y	0	optomechanical
QTRONIX	Mighty Cat Mouse	$35	200	2	Y/Y/Y	N	1	optomechanical
	Cordless Mouse	$119	200	3	Y/Y/Y	N	1	optomechanical
SUNCOM TECHNOLOGIES	Crystal Mouse	$50	500	3	Y/N/N	Y	2	optomechanical
ZENY COMPUTER SYSTEMS	Zen Mouse	$69	400	3	Y/N/N	N	1	infrared, opto
Z-NIX	Z-Nix SuperMouse II	$69	400	2	Y/Y [1]/Y [1]	Y	0	mechanical
	Z-Nix Cordless SuperMouse	$129	400	2	Y/Y [1]/Y [1]	Y	0	infrared, mechanical

[1] Extro-cost option.

[2] PS/2 version has two buttons.

TRACKBALLS

Manufacturer	Product	Price	Resolution (dpi)	Number of buttons	Serial/ bus/ PS/2 ports	Drag lock feature	Trackball diameter (inches)	Uses Microsoft drivers	Number of other drivers available
AAMAZING TECHNOLOGIES	AAK-300	$59	300	3	Y/Y/Y	none	3	Y	0
APPOINT	Thumbelina	$99	150	2	Y/Y/Y	button	0.38	Y	0
EVERGREEN SYSTEMS INT'L	DiamondXX	$365	400	4	Y/Y/Y	button	2	Y	7
	Omega	$195	400	3	Y/N/Y	switch on side	1.5	Y	7
ITAC SYSTEMS	Mouse-trak Industrial	$295	200	3	Y/Y/Y	button	2	Y	2
	Mouse-trak Professional	$179	200	3	Y/Y/Y	button	2	N	2
KENSINGTON MICROWARE	Expert Mouse	$150	200	2	Y/Y/Y	button	2.25	Y	1
KYE INT'L	GenieTrack GK-T320	$119	350	3	Y/Y/Y	button	1.5	N	1
LOGITECH	TrackMan Stationary Mouse	$139	300	3	Y/Y/Y	button	1.25	N	1
MICROSPEED	PC-TRAC	$119	200	3	Y/Y [1]/Y	button	2.25	Y	0
	MicroTRAC	$90	200	3	Y/N/Y	button	0.75	Y	0
MOUSE SYSTEMS	PC Trackball II	$120	350	3	Y/Y/Y	button	1.62	Y	1
PENNY + GILES	TrackerMouse II	$99	200	2	Y/Y/Y	none	1.5	Y	1
PROHANCE	PS/2 Trackball	$100	400	2	N/N/Y	button	1.75	Y	0
	PowerTrack	$130	400	40	Y/Y/N	button	1.75	N	1
QTRONIX	TB-90 Trackball	$45	200	3	Y/Y/Y	button	1.25	N	1
	TB-30 Trackball	$42	200	3	Y/Y/Y	button	1.25	N	1

[1] Extro-cost option.

Bundled software	Warranty	Reader service number
pop-up menus	1 year	695
none	lifetime	696
Bitpaint	1 year	697
MenuDirect, Image 72	lifetime	698
MenuDirect, Lymmings Demo	lifetime	698
Key Tronic Software	1 year	699
none	lifetime	700
Dr. Genius II	lifetime	700
Visualizer Color	1 year	701
none	lifetime	702
Dr. Halo	1 year	703
none	lifetime	704
Dinosaur Recovery Kit	lifetime	704
none	lifetime	704
PC Paintbrush, Windows 3.0	1 year	705
PowerPanel	lifetime	706
PowerPanel	lifetime	706
PowerPanel	lifetime	706
none	1 year	707
Macro Builder	1 year	707
Macro Builder	1 year	707
Macro Builder	1 year	707
Dr. Halo	1 year	708
Dr. Halo	1 year	708
none	1 year	709
KeyFree	lifetime	710
Telepaint	lifetime	711
Windows 3.0	lifetime	711

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

Operating mechanism	Bundled software	Warranty	Reader service number
optomechanical	none	1 year	712
optomechanical	none	lifetime	713
optical	none	1 year	714
optical	none	1 year	714
optomechanical	Amenu	1 year	715
optomechanical	Amenu	1 year	715
optomechanical	none	1 year	716
optomechanical	Dr. Genius III	lifetime	717
optomechanical	none	lifetime	718
optomechanical	KeyMAP	1 year	719
optomechanical	KeyMAP	1 year	719
optomechanical	PowerPanel	lifetime	720
optomechanical	none	1 year	721
optomechanical	none	1 year	722
optomechanical	none	1 year	722
optomechanical	Dr. Halo	1 year	723
optomechanical	Dr. Halo	1 year	723

For more information about all products in this table, circle reader service no. 909.

Nothing beats a hands-on test. If the device doesn't fit your hands, it's not worth the desk space it sits on.

Catherine Smith is a freelance writer in San Diego and a former assistant editor for PC World.

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Aamazing Technologies Corp.
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Alps Electric USA Inc.
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408/432-6000

Appoint
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503/692-9600

Datalux Corp.
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703/662-1500

Delta Phase Int'l
714/768-6842

DFI Inc.
916/568-1234

Evergreen Systems Int'l
818/991-7835

Honeywell Inc. Keyboard Division
800/445-6939,
915/543-5581

IMSI
800/833-4674,
415/454-7101

IOcomm Int'l Technology
310/644-6100

ITAC Systems, Inc.
800/533-4822,
214/494-3073

Jameco Electronics
800/831-4242,
415/592-8097

Kensington Microware Ltd.
800/535-4242,
415/572-2700

Key Tronic Corp.
800/262-6006,
800/348-6006 (Canada),
509/928-8000

KYE Int'l Corp.
800/456-7593,
714/590-3940

Lightwave Technologies Inc.
708/634-1700

Lite-On, Inc.
408/946-4873

Liuski Int'l Inc./Magitronic Corp.
516/454-8220

Logitech, Inc.
800/231-7717,
510/795-8500

Microsoft Corp.
800/426-9400,
206/882-8080

MicroSpeed Inc.
800/232-7888,
510/490-1403

Mouse Systems Corp.
510/656-1117

NMB Technologies, Inc.
800/321-3536,
818/341-3355

Northgate Computer Systems Inc.
800/548-1993,
612/943-8181

Penny + Giles Computer Products
800/554-0220,
508/226-3008

ProHance Technologies, Inc.
408/746-0950

Qtronix Corp.
408/954-8040

Suncom Technologies
708/647-4040

Zeny Computer Systems Inc.
510/659-0386

Z-Nix Co. Inc.
714/629-8050

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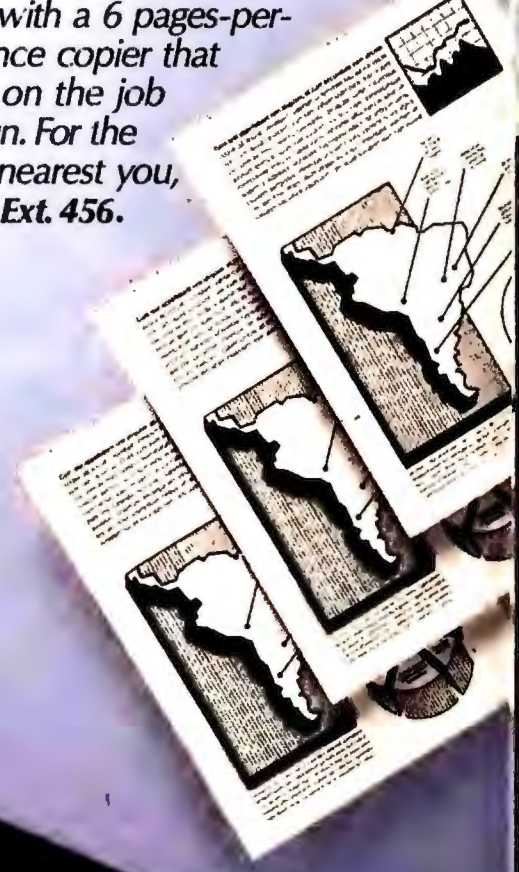

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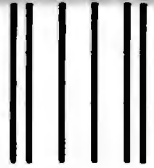
Offer valid for new members only, subject to acceptance by CBC. Foreign applicants will receive special ordering instructions. Canada *must* remit in U.S. funds. All U.S. orders are shipped 4th Class Book Post. PCW592

Exceptional Savings!



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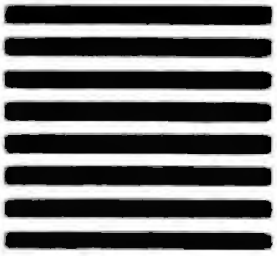

BUSINESS REPLY MAIL

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POSTAGE WILL BE PAID BY ADDRESSEE

The Computer Book ClubSM
with **BYTE Book Club**®
Blue Ridge Summit, PA 17214-9988

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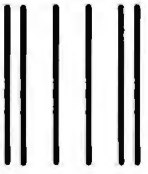

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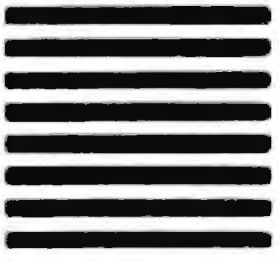

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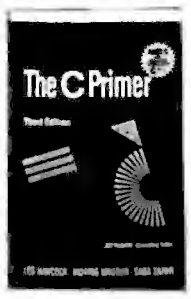

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3057 $15.95
Softcover

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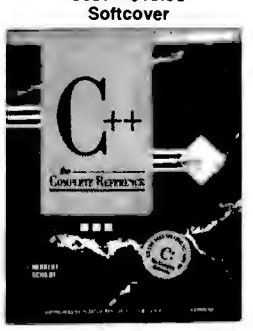
Softcover



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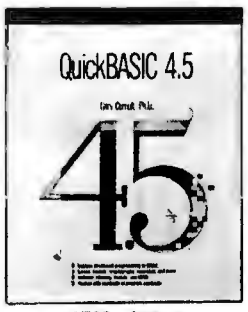

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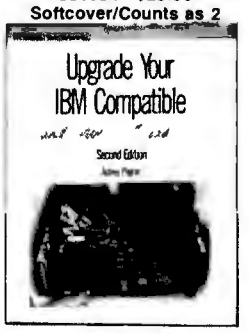

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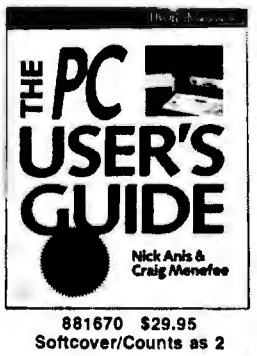

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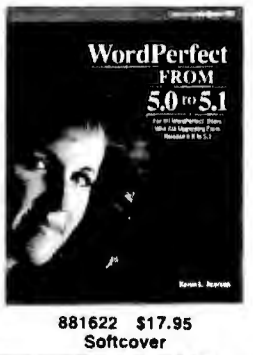

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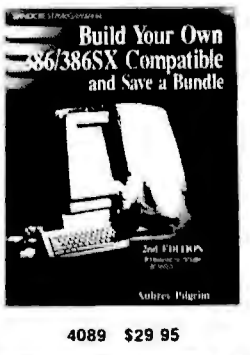

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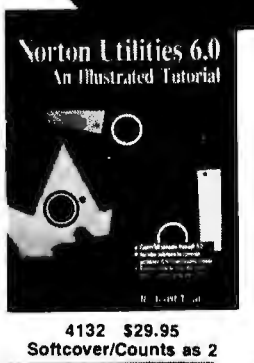

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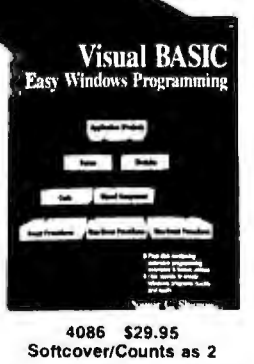

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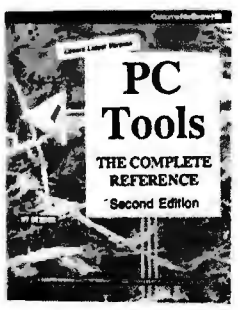

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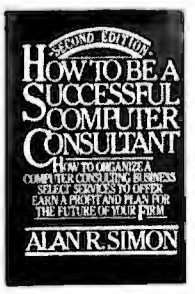

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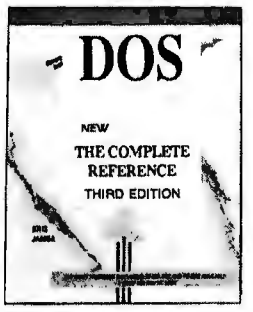

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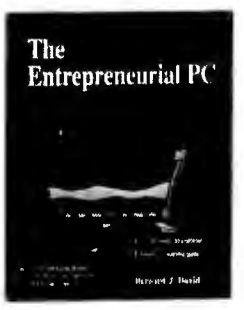

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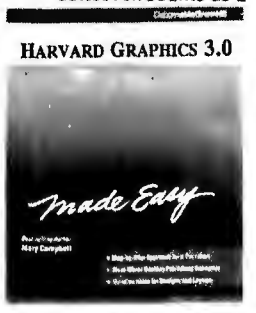

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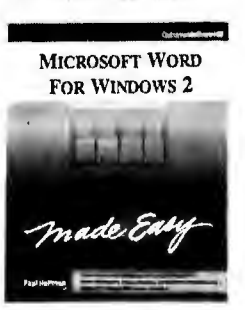

881727 $19 95
Softcover

Select any 5 books for only $4.95

Values up to $194.70

And choose a 6th book FREE when you prepay your order

when you join *The Computer Book Club*℠ *with the* BYTE Book Club®

3490 $29.95

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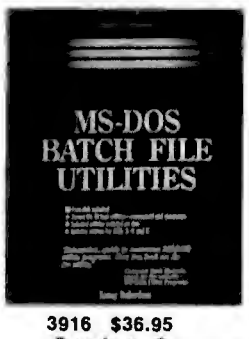
Special Book/Disk Offers



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10035 $49.95
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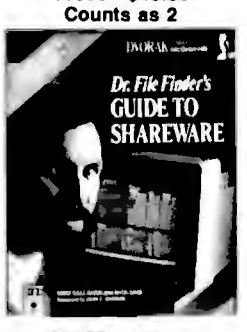
3382P $29.95
Counts as 2



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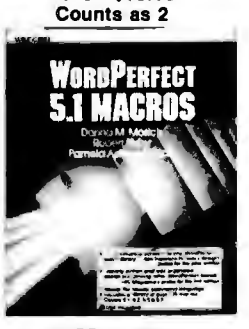


3617P $29.95
Counts as 2

As a member of The Computer Book Club . . .

. . . you'll enjoy receiving regular Club bulletins every 3-4 weeks containing exciting offers on the latest books in the field at savings of up to 50% off of regular publisher's prices. If you want the Main Selection do nothing and it will be shipped automatically. If you want another book, or no book at all, simply return the Reply Form to us by the date specified. You'll always have at least 10 days to decide, and if you ever receive a book you don't want, due to late mail delivery of the News, you can return it at our expense. Your only obligation is to purchase 3 more books during the next 2 years, after which you may cancel your membership at any time.

PCW592

All books are hardcover unless otherwise noted. (Publishers' Prices Shown)
A shipping/handling charge and sales tax will be added to all orders.

If card is missing write to.
The Computer Book Club, Blue Ridge Summit, PA 17294-0820

Circle 49 on reader service card

SCAM!

WHEN LINDA BRECHBILL WAS IN THE market for a couple of laser printers, she did what she always did: She thumbed through advertisements in computer magazines to find the best deal. Brechbill, the controller for Brechbill & Helman, a construction company in Chambersburg, Pennsylvania, thought she'd hit on a winner when she saw a two-page ad for American Computer Technology (ACT), a Garden Grove, California, mail-order firm specializing in name-brand peripherals.

Bad choice.

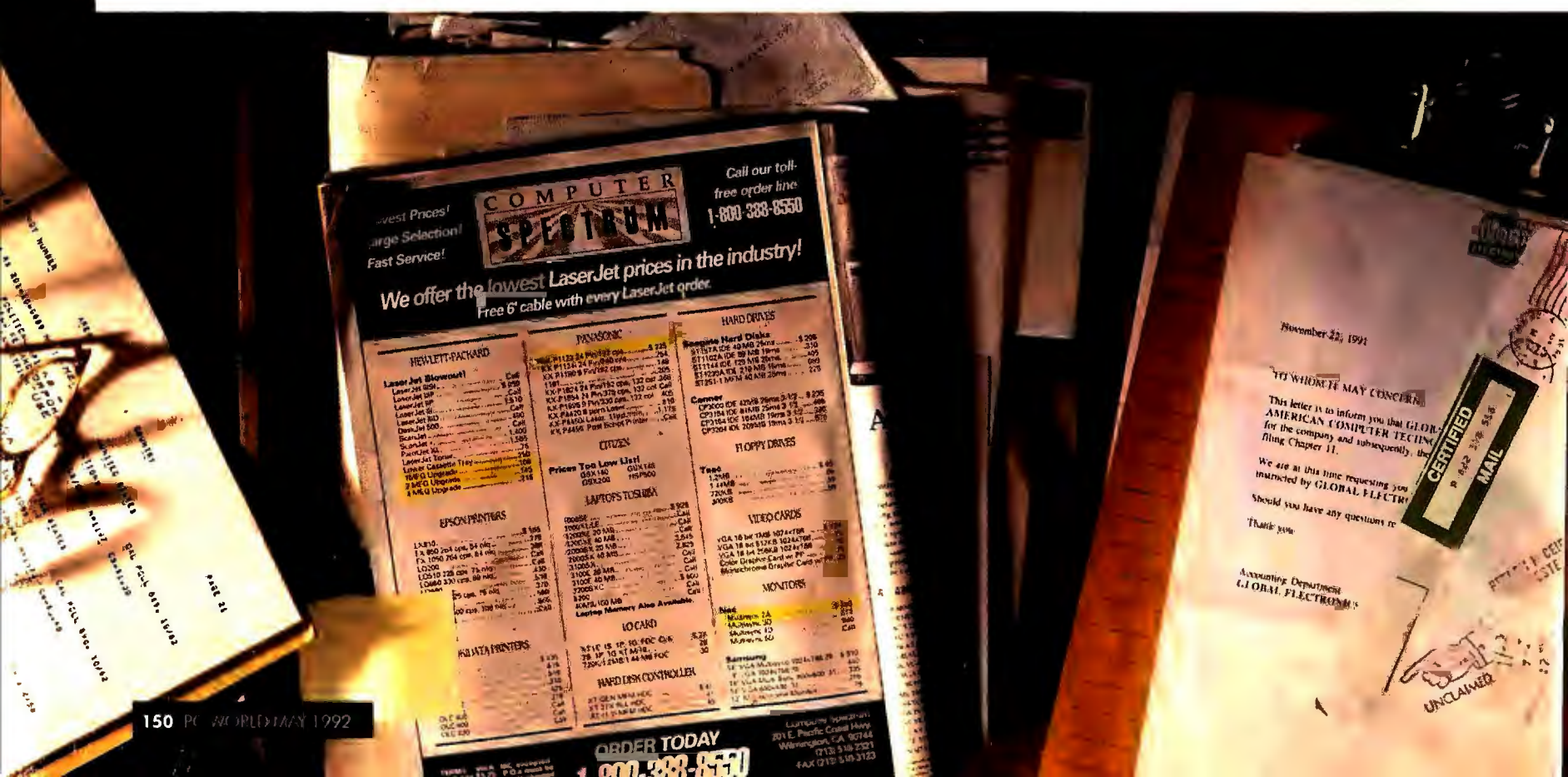
"They offered me a discount if we paid up front," recalls Brechbill. Although her usual policy is to order products COD, the chance to save $300 was too good to pass up. She wrote ACT a check for $4288.69 and sent it by overnight mail.

ACT cashed her company's check the next day but never shipped her products. When two weeks went by with no sign of the printers, Brechbill began calling ACT every day, finally threatening legal action. An infuriating two months after she placed the order, the lines were disconnected.

"I don't think they ever intended to send me anything," says Brechbill, who is far from the only one taken in by ACT's frequent ads and low prices. More than 30 other consumers reported paying ACT for products they never received, and another 50 have reported similar treatment from other California firms with links to ACT and each other: One Stop Micro (OSM) of Van Nuys, Minuteman Computers of Costa Mesa, and Computer Spectrum of Wilmington.

To date, reports from *PC World* readers indicate losses of $97,000. Our reader-service bureau forwarded 9049 inquiries to the four suspect companies in response to their ads in *PC World*. A source in the computer direct-sales

PHOTOGRAPH BY ROBERT CARDIN



HOW A GROUP OF LOS ANGELES MAIL-ORDER COMPANIES RIPPED OFF CONSUMERS, DISTRIBUTORS, BANKS, AND PUBLISHERS AND WHY THEY'RE GETTING AWAY WITH IT

BY ROBERTA FURGER AND MIKE HOGAN

industry says 2.5 percent of reader-service leads usually result in sales averaging $2000 each. By this reckoning, *PC World* readers may have ordered as much as $450,000 worth of goods from these companies. Since the firms regularly ran ads in major computer publications over the past year, the total number of victims is unknown, and actual losses may be much greater.

Moreover, evidence indicates that these companies are only the latest in a series of retail/mail-order firms that have sprung up in the greater Los Angeles area and have links to one another and distinctly similar methods of operation.

"Just one of these locations could take in $150,000 a month," estimates a Los Angeles retailer, "and if it's a rip-off, that's pure profit." The potential loss for those who have done business with these companies runs well into millions of dollars.

Those funds have gone to pay for the fast cars and fast times of eight or more Los Angeles–area men. The primary intent of these individuals seems to have been to scam the consumers, banks, and publishers with whom they were doing business, says an East Coast credit and collections officer who has been investigating them for several years.

"I've been in this business since 1970, and this is probably the worst I've seen," he says. "There is no doubt in my mind that these folks were out to defraud right from the get-go."

These companies have been able to fool customers and creditors by using a variety of schemes ranging from questionable business practices to outright fraud. They obtained credit from banks, product suppliers, and the media by using each other as credit references and, in some cases, by using phony personal identification, including aliases and multiple

Social Security and driver's license numbers.

The Southern California group began with Los Angeles native Tony Ortiz Arce (a.k.a. Anthony Palomino), according to sources who asked to remain anonymous. Following high school, Arce worked for several local computer retailers.

In 1988 Arce went to work at Los Angeles Computer of Torrance. On October 28, 1988, Arce refiled the company's Fictitious Business Name Statement (a legal document stating the name under which an individual or company is doing business) as Los Angeles Component Corporation and listed himself as a co-owner. He refiled the business as Los Angeles Components & Computers on January 10, 1989. Then on May 19, 1989, he filed two new Fictitious Business Name Statements—one for Los Angeles Computer Corporation and one for L.A.C.C. Arce used the different company names to throw off creditors, sources say, confounding them by returning with a different name after his credit had been cut off.

In late 1989 Arce's business closed down under assault by creditors. But a method of operation had been established—one he carried to fledgling retail/mail-order firms run by new people he had recruited.

One of the first, sources say, was Gregory G. Snyder, who opened Modern Business Systems of Manhattan Beach, California, on August 28, 1989. In early 1990, sources say, Arce, who was then going by the name Anthony Palomino, brought Robert Michael Hoover into the business. Hoover soon graduated to running Integrated Systems (sometimes called ISC Power Systems) of Hermosa Beach, which opened in April 1990. *PC World* has discovered 43 people who together lost more than $27,000 to ISC.

In an interview with *PC World,* Hoover stated that he "made some bad business decisions" while running ISC and filed for bankruptcy last year. "I haven't been in the computer industry since my company [ISC] collapsed," he added. After being asked about his June 1991 Fictitious Business Name Statement filing for Micro Surge, however, Hoover said that he had "been doing some consulting work under Micro Surge" but had stopped doing business under that name.

Hoover said he wasn't involved with any other firms.

THE PLOT THICKENS

By the beginning of 1991, both Modern Business Systems and ISC had faded, but they were replaced by other computer operations, the most recent of which were ACT, OSM, Computer Spectrum, and Minuteman Computers. They all appeared on the scene in the summer of 1991 and began advertising in national and regional computer publications. Offering competitive—but not outrageous—prices on name-brand merchandise, the full-page advertisements promised extended warranties and expert technical support.

Although ostensibly owned and operated by separate individuals, these companies and their predecessors have many links. At various times, their owners lived together, worked together, socialized, and/or attended school together. And according to an expert handwriting analyst, the same two people filled out portions of 12 of the 19 Fictitious Business Name Statements filed by these individuals.

"THERE IS NO DOUBT IN MY MIND THAT THESE FOLKS WERE OUT TO DEFRAUD."

"Both writers have such highly individual handwriting characteristics that there is no doubt in my mind that these two persons filled out many of the forms," says Patricia Fisher, president of Fisher Associates Questioned Document Examiners in Oakland, California.

Documents sharing the same handwriting were filed by Arce/Palomino, Hoover, Minuteman Computers owner John Paul Tremblay, Computer Spectrum owner Mark Mulvihill, One Stop Micro owner Steven Hunt, and Arthur Dean

THE WEB THAT CAUGHT CONSUMER

A roundup of the suspects, their companies, and some of the links between them

- **A** Tony Ortiz Arce recruits Robert Michael Hoover to run ISC Power Systems and Gregory G. Snyder to run Modern Business Systems.
- **B** Dynomic Micro's Fictitious Business Name Statement filed the same day as Micro Surge's; document filing number is one number higher than Micro Surge's.
- **C** One Stop Micro lists Alternative LAN Systems, Minuteman Computers, Computer Spectrum, and American Computer Technology (ACT) as credit references.
- **D** Williams Electronics and Consulting lists Computer Spectrum, Empire Group, and Minuteman Computers as credit references.
- **E** Williams Electronics and Consulting used ACT address and processed credit card vouchers for ACT.
- **F** Beach Computers' Fictitious Business Name Statement filed the same day as Alternative LAN Systems'; document filing number is one number higher.
- **G** ACT uses Empire Group's shipping account number.
- **H** Computer Spectrum lists ACT and Minuteman Computers as credit references.
- **I** ACT lists Computer Spectrum as a credit reference.

Note: "Date started" refers to filing date of Fictitious Business Name Statement.
Source: Los Angeles and Orange County records; PC World investigation

TEN TIPS FOR BUYING DIRECT

1. BUY FROM COMPANIES WITH A PROVEN TRACK RECORD. Whenever possible, go with companies from whom friends and associates have purchased goods.

2. INVESTIGATE UNFAMILIAR COMPANIES. Call the local Better Business Bureau and the regional U.S. postal inspector's office to determine whether a company has a history of complaints.

3. EVALUATE PRODUCTS AT YOUR LOCAL COMPUTER STORE before you place an order.

4. INVESTIGATE SERVICE OPTIONS AND RETURN POLICIES. Look for a 30-day money-back guarantee and after-sale support.

5. BE WARY OF INCREDIBLE DEALS. If prices seem too good to be true, they generally are.

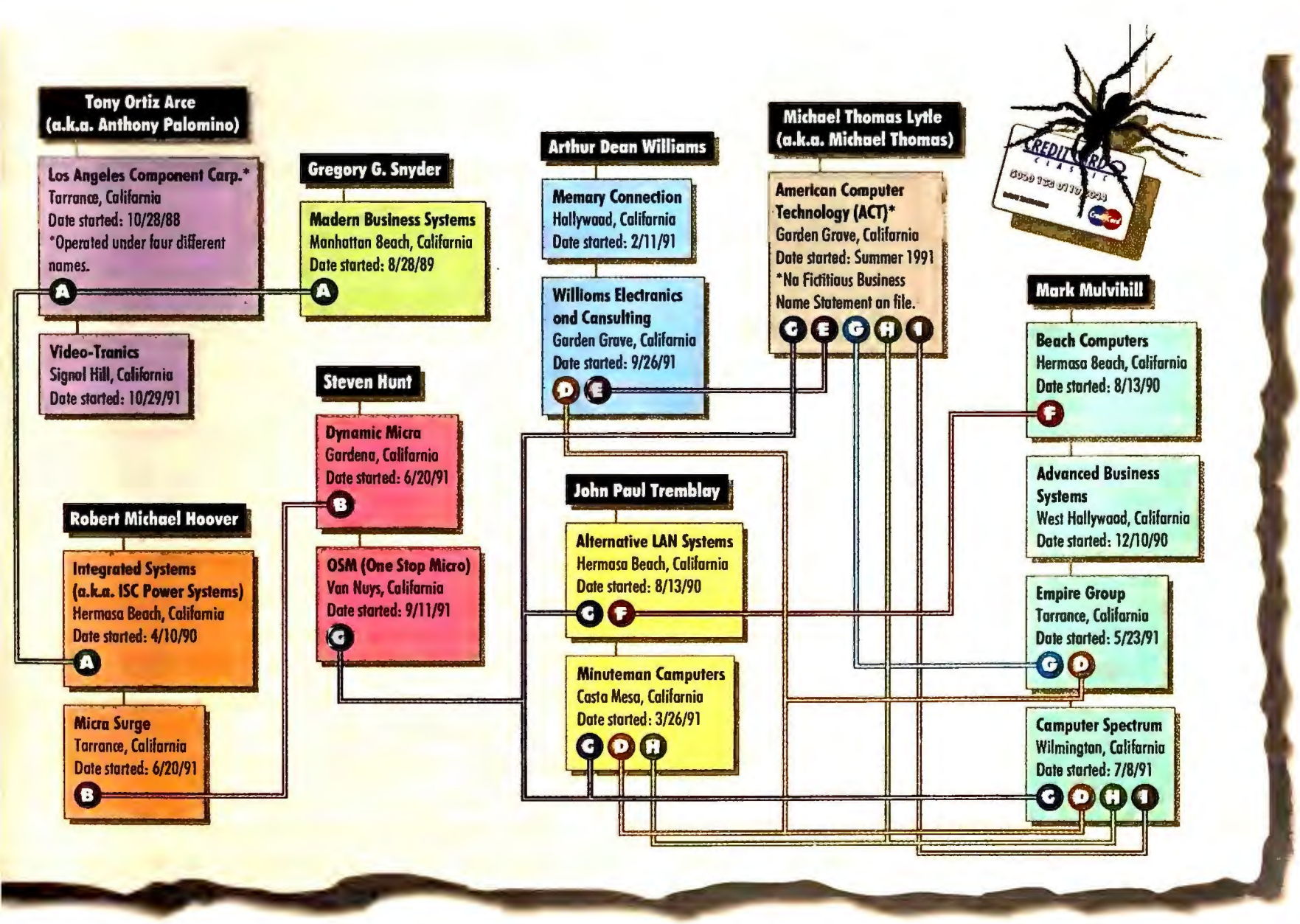
6. KEEP DETAILED RECORDS. Note whom you spoke with (first and last name), as well as promises made about price and delivery.

7. CONFIRM PHONE ORDERS with a letter or a fax to your salesperson.

8. DON'T SEND CHECKS. Credit card and COD purchases offer protection against nondelivery of goods.

9. DON'T ASSUME THE VALIDITY OF ADVERTISEMENTS. Even the most reputable of magazines, newspapers, and other periodicals do not routinely verify the claims made in advertisements.

10. KNOW YOUR RIGHTS AND EXERCISE THEM. If a company fails to ship your order on time, you can cancel the order and obtain a full refund.



WHO TO CONTACT IF YOU'VE BEEN HAD . . .

You're not without resources if you're unfortunate enough to have a problem with a mail-order company. A variety of private and government organizations are set up to assist consumers in resolving complaints.

That's the good news.

The bad news is, none of these groups can guarantee resolution of your problem, especially if a vendor never intended to send a product. And one call or letter won't necessarily prompt anyone to act. Unless you're aggressive, your complaint could end up at the bottom of a hefty pile.

With the exception of the Federal Trade Commission and local police departments, all of the following groups will contact a vendor on your behalf in an attempt to resolve problems. Some will also investigate companies suspected of illegal activities. If you're not sure who to contact, write to everyone. And always send a copy to the company causing problems. The threat of outside involvement may be enough to spur action.

Letters should include a complete description of the transaction, as well as any supporting material, such as invoices, credit card statements, or canceled checks. The more information you provide, the better your chances of resolving the matter quickly.

U.S. POSTAL INSPECTOR
Western region: 415/742-4411
Central region: 312/765-4605
Southern region: 901/722-7700
Northeast region: 201/621-5500
Eastern region: 215/668-4500

FEDERAL TRADE COMMISSION
Washington, DC 20580

DIRECT MARKETING ASSOCIATION
Moil-Order Action Line
Six E. 43rd St.
New York, NY 10017-4646

CONSUMER WATCH
PC World
501 Second St. #600
San Francisca, CA 94107
CampuServe: 74055,412
MCI Mail: PC World Editorial
Fax: 415/442-1891
PC World Online: see poge 8

- **BETTER BUSINESS BUREAU BRANCHES NATIONWIDE**
- **STATE ATTORNEY GENERAL'S OFFICE**
- **LOCAL POLICE DEPARTMENT**

PHOTO BY GARY GLADSTONE - IMAGE BANK

Bilked consumers can forget about the Secret Service . . .

Williams, owner of Williams Electronics and Consulting, which processed credit card vouchers for many of the orders that customers placed with ACT.

Once in business, these individuals vouched for each other with creditors, referred customers to one another, used the same addresses, and, in one case, had a third party process their credit card vouchers.

They typically begin by setting up shop in a low-rent storefront—or sometimes just using a mail drop—and applying for credit with banks and vendors as a retail operation. They section off part of the "store" as a showroom, which contains a few empty boxes marked "personal computer—fragile," a few well-placed add-in boards, and some other components. But the real business takes place in the back room over telephones and fax machines.

Armed with a retail facade and credit references from other outlets run by their cronies, the firms are able to obtain privileges with credit-voucher–processing banks. Each then advertises in multiple computer publications, paying a small amount of money up front or writing checks that bounce.

WHO GOT BURNED?

We interviewed numerous companies that did business with these firms—credit card banks, magazines, and product suppliers—and none have received even a fraction of what is owed them. "They only find out after the fact that the check isn't any good," says one credit investigator.

One large distributor, which was hit at least 11 times by members of this group, has lost more than $45,000 worth of merchandise that was shipped in return for checks that bounced. The distributor has turned to collection agencies and, in some cases, filed lawsuits, but it felt that no single loss was large enough to warrant police attention. "It's not surprising that this could happen in Los Angeles," says an executive with the company, "because authorities are so understaffed and there is so much [fraud] going on. If it was a small town in Kansas, it would get a lot more attention."

Besides the businesses that fell victim to these companies, dozens of unsuspecting consumers were also taken in.

. . . AND WHY LAW ENFORCEMENT WON'T HELP

SECRET SERVICE
PUTS LIVES OF PRESIDENTIAL CANDIDATES ABOVE YOUR POCKETBOOK.

CALIFORNIA ATTORNEY GENERAL
PUNTS TO OTHER AGENCIES.

U.S. POSTAL INSPECTOR'S OFFICE
PLEADS OVERWHELMING CASELOAD.

L.A. CITY ATTORNEY
REJECTS CASES FROM INDIVIDUALS.

LOCAL POLICE
CAN'T AFFORD TO FLY IN OUT-OF-STATE FRAUD VICTIMS TO TESTIFY.

FEDERAL TRADE COMMISSION
DOESN'T ACT ON INDIVIDUAL CASES.

. . . which has other priorities: Bush and Clinton.

When *PC World* realized the extent of consumer losses at the hands of these companies, we contacted several of the law enforcement agencies that have jurisdiction. While every agency welcomed our assistance, few aggressively pursued the issue, claiming conflicting priorities.

The Secret Service, with jurisdiction over crimes involving banks and credit cards, has only three fraud agents in Southern California. Their attention is split between fighting crime and protecting presidential candidates.

The California attorney general's office says it will rely on other agencies to pursue this investigation.

The U.S. postal inspector's office cites limited resources to investigate the numerous cases brought to its attention.

The Los Angeles city attorney's office cites lack of resources, saying it files only cases referred by other law enforcement agencies.

Local law enforcement reaction was mixed. Some police officials launched an investigation; others referred us to state and federal authorities. However, local law enforcement agencies are hampered because these companies did business primarily with out-of-state consumers. The cost of flying these people in to serve as witnesses at a trial is prohibitive.

Those who called the companies report that the sales staff were professional, courteous, and helpful. They also gave the impression that they were large, organized operations with separate sales, customer service, and shipping departments.

"At first they seemed to have a large staff," recalls Brechbill, "but towards the end I got the impression it was just two guys sitting behind desks answering phones." When *PC World* visited these operations, this proved to be the case.

"There was no tip-off when I ordered the product," adds Potomac, Maryland, attorney and CPA Jonathan Robbins, another ACT victim. He began to worry, though, when he received his credit card statement and found that he'd been overcharged—and by a company with which he had never done business, Global Electronics of Culver City, California.

All the ACT customers *PC World* contacted who paid by credit card had their cards debited by companies they didn't know: Global Electronics and Williams Electronics of Garden Grove. According to county and bank records, Williams Electronics is an independent firm operated by Arthur Dean Williams; but the address listed on the company's Fictitious Business Name Statement shows Williams Electronics operating from the same building as ACT.

Debiting credit cards of customers who are not your own—or "laundering" as the banks refer to it—is not illegal, but it is a violation of credit card regulations. And "it's a very handy vehicle for fraud," says Joel Brewer, an attorney with the Federal Trade Commission's law enforcement division.

STALL TACTICS

Not long after ACT's phone lines were disconnected, several customers received a letter with a Global Electronics logo, stating that Global had been in the process of buying ACT when the firm began experiencing financial difficulties. The letter then advised ACT customers to seek relief from their credit card companies.

"The letter to the customer is a standard scam for any type of merchant situation where merchants are sending [credit card] drafts," says the head of investigations for a processing bank that revoked Global's credit-clearing priv-

ileges last December for excessive chargebacks. "In order to forestall the customer, they send out a letter saying that the name change is just a technicality."

When contacted, Global owner Paul Rossi denied sending the letter, stating instead that it was sent by ACT owner Michael Thomas Lytle. Rossi said he gave ACT "a big advance" in exchange for part of the business, and that Lytle was supposed to have notified customers that orders would be processed by Global. Rossi claimed to have been victimized by ACT and would not commit to reimbursing ACT customers whose credit cards he debited. "I'm not immediately going to refund [the money]," said Rossi. "I want to resolve things correctly and I am following my attorney's advice."

Global is also listed as a credit reference by Computer Spectrum, which, like ACT, took orders without delivering products. Although he acknowledged "a few business deals" with Computer Spectrum owner Mulvihill, Rossi could not explain why he would be listed as a credit reference. He also said he had no financial interest in the company.

The letter to ACT customers was only one tactic used to string people along. Staff at all the companies were quite adept at putting off customers, creditors, and even the authorities with stories of shipments being damaged, lost, and misdirected. After weeks of giving excuses, the companies often took the phones off the hook for hours at a time to thwart inquiries. When customers did get through, they were sworn at, told their orders were canceled, and hung up on. Ultimately, all the lines were disconnected. By the time consumers understood they had been defrauded and found the right investigative agency, the offending business had closed and its principals disappeared.

Attempts to contact other principals were unsuccessful.

HARD LESSONS LEARNED

Some customers who paid by check found themselves out thousands of dollars with no hope of ever recouping their losses.

John LaMunyon, pastor of Holy Trinity Lutheran Church in Ephrata, Washington, was one of those victims. He sent a check for $1038.52 to ACT for a printer and was assured "they'd do their darnedest to fill the order quickly." But in a pattern that was to be repeated many times over, he received many promises but no printer. "They have our money and our machine," he says.

Customers who paid by credit card were more fortunate, usually receiving a full refund from their issuing bank, which charged the amount back to the individual merchant's bank. Those banks take the loss. With complaints and chargebacks pouring in, and unable to recover hundreds of thousands of dollars paid to the suspect companies, the banks canceled the companies' credit-clearing privileges and put their names on a list of "terminated merchants." Undaunted, the companies obtained similar privileges from other credit-clearing banks, and the process began again.

All the firms had their credit-clearing privileges revoked by one or more issuing banks—all for excessive chargebacks.

Many of the issuing banks are compiling information and forwarding it to federal and local law enforcement agencies,

FRAUD: THE EXCEPTION, NOT THE RULE

News of fraud involving computer mail-order firms comes at a time when the direct-sales marketplace as a whole is experiencing phenomenal growth, with an increasing number of consumers turning to this channel for both competitive prices and quality service.

"I have had far more successes than discontentments," says Donald Smith, a long-time buyer of PC products through the mail. "I bought a pretty foxy computer by mail and was delighted with the vendor, the follow-up, and the machine," he adds. "It got here within a day of when it was promised. You couldn't ask for anything else."

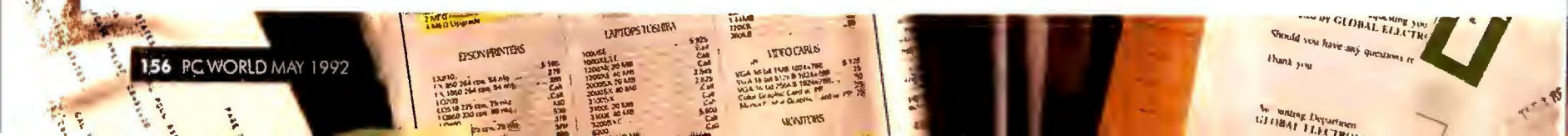
According to San Jose market researcher Dataquest, experiences such as this have fueled the growth of the direct-response channel. Sales in that arena jumped from $2.5 billion in 1990 to $3.2 billion in 1991.

But even industry leaders like Dell Computer Corporation and Zeos International can be negatively affected when other mail-order companies fail to come through.

"I don't see it as a benefit to us when other companies don't deliver," says Michael Dell, founder and CEO of Dell. "Any participant in the channel can have a negative influence on the overall market," he adds.

Clearly, though, cases of outright fraud are rare.

"Most of the time when you get questionable practices, the company's just not thinking [about what it's doing]," says Richard Barton, senior vice president of government affairs for the Direct Marketing Association (DMA), a trade group based in New York that sponsors a Mail-



as are many of the victimized consumers. But no one is likely to get satisfaction anytime soon, since this case does not seem to be a priority for most law enforcement officials.

When contacted in early March, the L.A. city attorney's office and the California attorney general's office could report no progress in the case. The U.S. postal inspector's office indicated that it had an open case but refused to discuss the matter further. Likewise, while the Secret Service acknowledged that an investigation is under way, it indicated that it has limited investigatory resources to apply to the case because of its obligation to protect presidential candidates.

"LAUNDERING IS NOT ILLEGAL, BUT IT'S A HANDY VEHICLE FOR FRAUD."

The Garden Grove Police Department is investigating ACT and "possibly some affiliated companies" for fraud, according to Investigator Rick Harrison.

The efforts of local police departments are hampered, however, by the fact that the companies are set up in different cities and no single police force has the resources to fully investigate and prosecute these types of crimes. The companies are also careful to do business almost exclusively with out-of-state customers, thereby hindering investigations.

For example, Hermosa Beach Police Department detective Lance Jaakola was unable to bring a case against ISC Power Systems last year because most of its victims were out of state. "The DA can't afford to bring people in to testify. These cases are better handled by larger agencies," he notes, adding that he turned all his files over to the postal inspector.

As Los Angeles Component Corp., Modern Business Systems, and ISC Power Systems have done, Minuteman Computers, Computer Spectrum, OSM, and ACT have closed. Many of their principals, however, run other California companies, some of which may still be operating. Using the name Palomino, Arce started Video-Tronics in Signal Hill; Mulvihill started Beach Computers of Hermosa Beach, Advanced Business Systems of West Hollywood, and Empire Group of Torrance; Williams opened Memory Connection of Hollywood; Steven Hunt, owner of One Stop Micro, started Dynamic Micro of Gardena; Minuteman owner John Tremblay opened Alternative LAN Systems of Hermosa Beach; and Hoover opened Micro Surge of Torrance.

"These guys have hooked into something they do well," says the East Coast credit investigator. "They found out how to beat the system—at least for a while."

Roberta Furger is an associate editor and Mike Hogan a senior editor for PC World. *They can be reached on PC World Online (see page 8 for more information).*

EDITOR'S NOTE: PC World *continues to investigate these companies and their activities. Customers of any of the firms are encouraged to contact us.*

Order Action Line for consumers (see "Who to Contact If You've Been Had").

In Dell's view, customers should feel very comfortable with the established players in the channel. "But," he adds, "when you look at potential savings by turning to a no-name, the risk outweighs the benefit."

But not everyone is willing to stop buying from start-ups. "I realize I expose myself to problems by going with smaller companies," concedes Smith, who refuses to stick with well-established firms. "But I've been inconvenienced far more by bigger companies than start-ups."

Given the potential for turnover and the difficulties involved when buying from a company you can't see, consumers should understand and exercise their rights, says Chester Dalzell, DMA's director of public relations.

Under the federal Mail-Order Merchandise Rule, if a company does not state a delivery date for goods, products ordered must be shipped within 30 days. If a company cannot meet the stated ship date, it must notify the consumer and offer a full refund, including all shipping and handling charges.

Because many mail-order purchases are paid for by credit card, consumers should also be aware of their rights under the Fair Credit Billing Act. Among other provisions, the law allows credit card shoppers to dispute charges for goods that are not delivered or do not meet the seller's claims. In cases of bankruptcy or fraud, this right may be a consumer's only protection.

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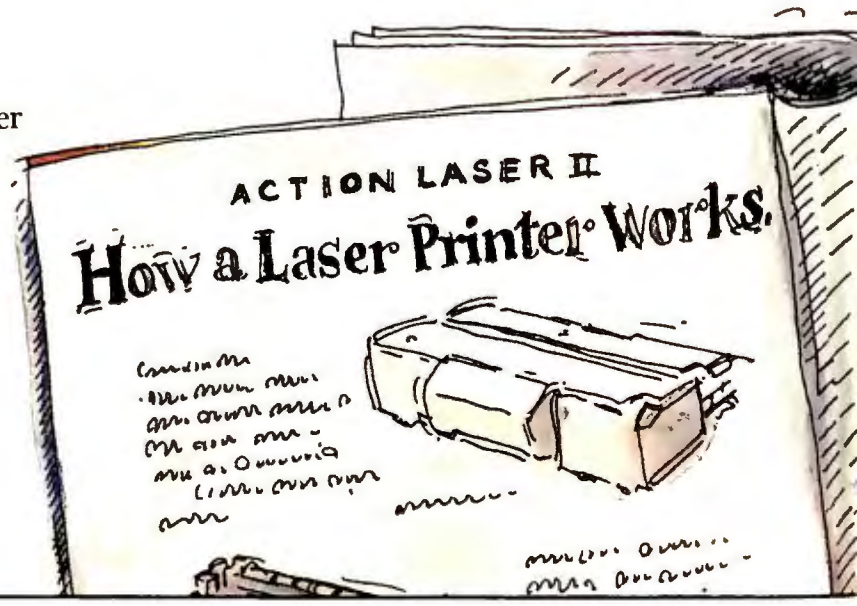

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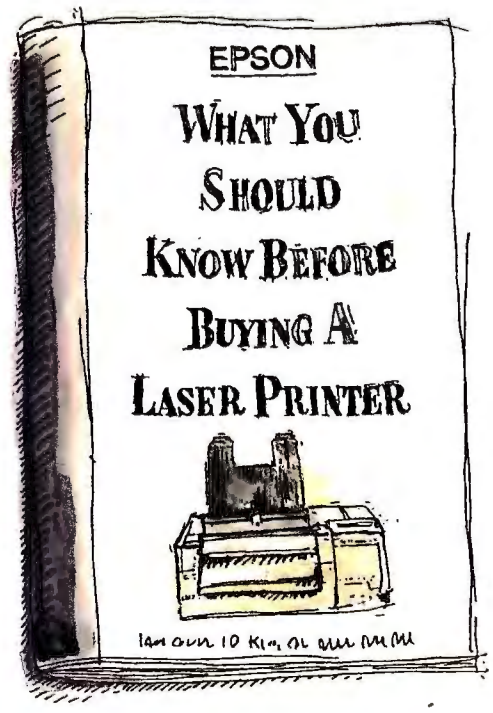

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Hang on tight! Tandy and Compaq boost computing to new heights with a revolutionary breed of low-cost, high-performance Intel 486DX2 systems.

Once you had to pay twice as much for twice the power, but no longer. Systems built around Intel's new supercharged 486DX2 chips aren't cheap, but in MIPS per dollar, they're the best deals yet in high-performance computing.

What's the trick? A common sense enhancement that took plenty of engineering pluck. Plug a 486DX2 into a 25-MHz system, and *internally* the chip will run at 50 MHz. Generally, that's all a system vendor needs to do (besides changing the BIOS) to turbocharge the processing performance of an existing 25-MHz 486DX system. No major redesign, no big price premium.

Tandy and Compaq offer two of the first systems built around the 50-MHz 486DX2. To find out exactly how much performance enhancement you can expect, we tested the Tandy 4850 EP and the Compaq Deskpro 50M using our standard suite of business application benchmarks. These tests, which include considerable disk activity, show a speed increase of 20 to 70 percent over 25-MHz 486DX systems, depending on the application.

Machines like this can force a company to reevaluate pricing of its entire product line. The Tandy 4850 EP's price is nothing short of remarkable: With 4MB of RAM and a 120MB hard disk, it costs a mere $2699. At $4999, Compaq's Deskpro 50M Model 120 costs considerably more, but it comes with 8MB of RAM, a high-throughput EISA bus, and Compaq's new QVision 1024/E Controller for accelerated high-resolution graphics; and it boasts much faster performance.

BY ERIC KNORR

Chips Are Jumping, and Performance Is High

The 50-MHz 486DX2 is one of several innovative CPUs that signal a new era of system choices, not to mention a steep plunge in the cost of computing power. In the second half of this year, you'll see speed-doubling systems outfitted with a 66-MHz version of Intel's 486DX2.

Moreover, the doubling technology in the DX2 is already available as an upgrade to 486SX systems. Remember those glossy Intel advertisements with the neon vacancy sign pointing at an empty 486SX "upgrade" socket? Well, that vacancy can now be filled with OverDrive chips that double the internal processing speed of 16-, 20-, and 25-MHz 486SX systems.

Like their 486DX predecessors, both the OverDrive and the DX2 have an on-chip math coprocessor and an 8K memory cache. In fact, the two new speed-doubling chips differ in only a couple ways. The first is a matter of a single pin: While the OverDrive is designed to plug into the 486SX upgrade socket (also known as the 487SX math coprocessor socket), the DX2 fits into a standard 486DX CPU socket. The other difference is, the OverDrive is the only end-user, speed-doubling upgrade supported by Intel. You can swap a DX2 chip into an existing DX system, but that's between you and the system vendor, which may prefer instead to sell you a whole new DX2 system.

If you go to the nearest PC retailer, buy a 25-MHz OverDrive chip and plug it into your 486SX system's upgrade socket, your 25-MHz 486SX will act just like a 50-MHz 486DX2. Voilà, your reward for buying a 486SX. (Those who've already filled that socket with a 487SX math coprocessor can always use that chip as a fishing lure.) Of course, many 486SX vendors have skipped the upgrade socket entirely: Instead, you pop out the 486SX, move a jumper, and plug in the OverDrive.

Inside, this speed demon runs at 50 MHz. Outside, it plugs into a low-cost 25-MHz memory subsystem.

Systems containing either the 50-MHz DX2 chip or the 25-MHz OverDrive processor can't match the speed of a true 50-MHz 486DX machine. The reason? In a true 50-MHz system, both the chip and the memory bus run at a full 50 MHz. In a 50-MHz speed-doubling system, the memory bus runs at 25 MHz; only data and instructions in the on-chip 8K cache are processed at full CPU speed.

Still, when the 66-MHz DX2 units ship, they should blow past 50-MHz 486DX systems and become the fastest PCs alive. Then again, who knows? There's little doubt that Intel's flurry of chip introductions has been spurred on by competition from Advanced Micro Devices, which will probably have its own souped-up 486 work-alikes by then.

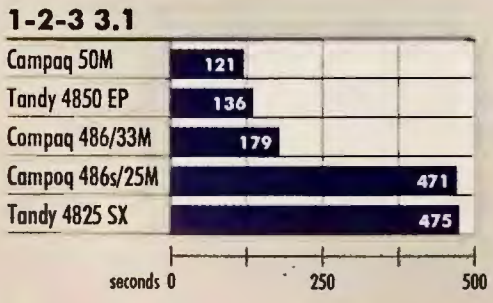
Tandy Shifts Into High Gear

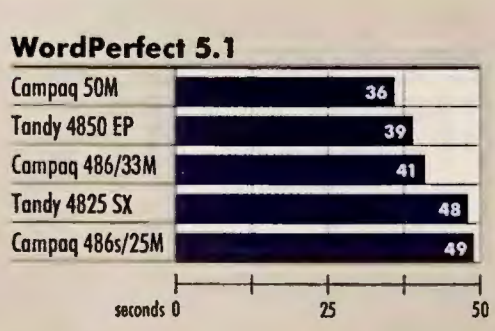
Tandy's 4850 EP reflects what most system vendors will do with the 486DX2—take an existing 486SX or DX and do little more than add the DX2. The obvious benefit here is cost. A 50-MHz 486DX2 goes for only $133 more than a 25-MHz 486DX, and the BIOS change is a trivial expense.

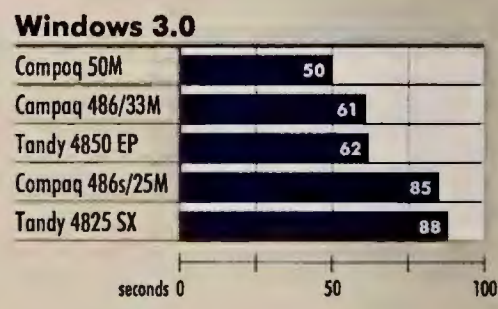
PC WORLD TEST REPORT

Compaq's DX2 Surges Ahead

Thanks to formidable enhancements to the architecture of the Deskpro/M series, Compaq's DX2 enjoys a healthy performance edge over Tandy's DX2.

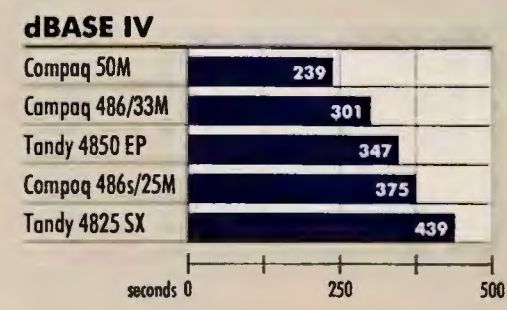


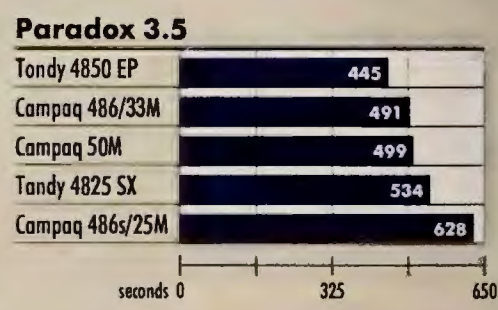




Methodology
Each computer we tested was equipped with 4MB RAM and its vendor's 120MB hard disk.

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





Nonetheless, the inexpensive 4850 EP is no slouch. It beats Tandy's only 25-MHz system, the 4825 SX, by about 30 percent in the *Windows* test, and it hovers around 20 percent faster in the more disk-intensive data base and word processing tests. And because the 486DX2 has the on-chip coprocessor, the 4850 EP ripped through the *1-2-3* benchmark in less than one-third the time of the 4825 SX. Not a bad increase in performance, considering you pay only $700 more.

Compaq's Deskpro 50M: The hottest DX2 yet?

The 4850 EP buffers the 486DX2 with a 64K external cache and includes an IDE cache controller with a 15ms hard drive to speed performance further. The compact 15-by-15-inch chassis also encloses three drive bays, three 8/16-bit ISA slots, a VGA controller with 512K of RAM (upgradable to 1MB), and sockets for up to 32MB in SIMMs. In addition, the unit comes with DOS 5.0, *Windows 3.0,* and *Microsoft Works for Windows 2.0* already installed. As usual, the company supports the machine through Radio Shack retail outlets.

Compaq Pushes the Envelope

Compaq's Deskpro 50M is more than a plug-and-play upgrade from its 25-MHz M series model, and it has the benchmark scores to prove it. In contrast with the Tandy's 30 percent *Windows* speedup, the Deskpro delivers 40 percent; the data base and word processing scores show a 27 percent increase against the Tandy's 20 percent; and in the *1-2-3* test, the Deskpro 50M offers nearly fourfold improvement over the Deskpro 486s/25M.

Predictably, comparison with Compaq's Deskpro 486/33 yields far less dramatic results. Combine the five tests using *PC World*'s typical system benchmark weightings, and the difference works out to approximately 19 percent overall—not far off the 16 percent higher list price.

Compaq is positioning the 50M as "the ultimate graphics PC," mainly due to the company's new QVision 1024/E Controller (which comes standard) and a stellar pair of competitively priced 15- and 17-inch Zenith-manufactured displays.

The QVision Controller boasts a Compaq-designed accelerator chip that offers the same performance as those from ATI, Texas Instruments, and others—which accounts for the system's fast *Windows* times. But it's the new Compaq QVision monitors that really shine. Both use Flat Tension Mask technology for a perfectly flat screen, increased brightness, and enhanced color accuracy. At $899 for the 15-inch and $1299 for the 17-inch, these monitors actually sell for significantly less than NEC's outrageously popular 4FG and 5FG, which don't offer truly flat screens.

The Deskpro *M* stands for *modular.* The processor board and a separate memory board that holds up to 64MB reside in CPU-speed slots, while an I/O board with all the usual ports slips into an interface beneath the power supply. The QVision Controller uses an EISA slot, but until you find an application that would tax an ISA bus, you're unlikely to see improvement due solely to the broader EISA bandwidth. All told, the system has four free EISA slots and room for four storage devices.

The 50M's DX2 processor board has been wholly redesigned. With large-memory multitasking and multiuser environments in mind, Compaq has added a fast 256K secondary memory cache. This cache, along with some hot new Compaq ASICs, probably explains the system's processing performance edge. In addition, Compaq's system outperforms Tandy's in the *dBASE IV* test, even though the 50M's 120MB IDE drive has a slightly slower access time than the 4850 EP's.

Although only Tandy and Compaq could meet our testing deadline for this issue, at press time over 40 companies had either announced DX2 systems or the intention to build them. And why not? Given the economies of scale, you have to wonder how long "undoubled" CPUs will last.

Plugging Into the Future

In upcoming issues, we'll cover the gamut of DX2 systems, along with 486SX PCs souped up with OverDrive upgrades—which, unless fine-tuned for the DX2, are basically the same systems anyway, because DX2 and OverDrive chips have identical innards. If this sounds a little confusing, hang on to your hat; it's only going to get worse.

Intel believes that the OverDrive upgrade concept will wrap around all its future products. The company avers that as early as this year, DX2 systems themselves may ship with an empty upgrade socket for an even more powerful processor. Or perhaps *the same* processor: If you have an operating system that can handle multiprocessing, there's no reason to put the original CPU to sleep as in the 486SX.

Whatever happens, we guarantee a wild ride, especially with new chip makers entering the fray. You can count on *PC World* to cut through the hype with application benchmarks that focus on the price/performance bottom line.

Eric Knorr is the editor for PC World. *He can be reached on PC World Online.*

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WINDOWS 3.1 DELIVERS

The latest version of Windows has the little stuff you wanted. But when all is said and done, it's the big stuff—free fonts, multimedia support, and tighter application links—that'll stick to your ribs.

EDITED BY STEVE FOX

After the biggest prerelease testing program in history, countless development hours, and endless hype, Windows 3.1 is among us. Can anything live up to that sort of buildup? Obviously not, though 3.1 certainly looks like a strong upgrade. For one thing, it offers increased stability: When an application hangs, you can restart just that program without having to bring down the whole system. And then there are all the niceties: easier installation, slicker icons, an augmented File Manager, and improved drag-and-drop.

That's all well and good. But after all the advance press, we want more; we want breakthroughs, not incremental improvements. Surprise! *Windows 3.1* delivers the goods three ways. With TrueType fonts, support for Object Linking and Embedding (OLE), and built-in multimedia extensions, Microsoft opens new worlds for many PC users. To evaluate these three hot additions, we went to the experts. DTP maven Bob Weibel gives his impressions of TrueType; Contributing Editor George Campbell, of *Word Processing Clinic* fame, conducts a walking tour of OLE; and Contributing Editor Scott Spanbauer, who also wrote our "Buyers' Guide: Multimedia Systems," evaluates the new multimedia extensions. And because we believe that even Microsoft can learn a lesson or two when it comes to building an interface, we asked Associate Editor Lincoln Spector, an avowed utilities junkie, to examine *Norton Desktop for Windows 2.0.*

TRUETYPE ENTERS THE FONT FRAY

by Bob Weibel

The best thing about TrueType? It's built into *Windows 3.1.* That means you don't have to pay extra for decent scalable type on your screen or printer.

But why the fuss over new fonts? *Windows* always came with fonts, right? Yes, but they were nonscalable, *bit-mapped* fonts—fixed patterns of dots that define each printed character at a particular resolution. If you wanted type in a size not specifically installed, *Windows* would use the closest size available or stretch the bit-mapped font on screen by enlarging the individual dots that make up the type. The result was hideously jagged on-screen type. To make matters worse, the printer needed a matching font as well.

Smart users who wanted a better solution turned to vendors such as Adobe, whose Type 1 fonts are *scalable*, meaning they're not fixed at any particular size or resolution. For these fonts, character outlines are described by mathematical formulas, and the software in your computer or printer automatically converts the outlines into the pattern of dots (the bit map) required to display or print the characters at the necessary resolution. This process is known as font rendering, and it's what a program such as *Adobe Type Manager* (*ATM*) uses to create type in virtually any size.

But now *Windows* has its own outline fonts—14 of 'em—as well as its own font-rendering software, which will pump out scalable TrueType fonts on virtually any printer. That same capability from *ATM* will run you $99.

TrueType fonts will be scarcer than Type 1 faces, though everyone was surprised when Microsoft announced it was entering the fonts business and would be selling 44 TrueType fonts for $99.95—an impressive price. Other font vendors are being more cautious before committing major resources to repackaging the bulk of their font libraries in TrueType format. Bitstream, in fact, is taking the nothing-to-lose approach with its *Type Essentials* $99 font collections. Each font will come in four flavors: TrueType, Type 1, Speedo (Bitstream's own), and an earlier format, Fontware—all in the same package.

Judging from the TrueType Times and Helvetica look-alike fonts included with *Windows 3.1* (along with Courier New and a symbol and dingbat font), I believe that a carefully made TrueType font *can* look a bit better on screen than an *ATM* font. But for the vast majority of users, there will be no discernible difference. And from my own tests, I honestly can't prove that TrueType under *Windows* is faster or even as fast as *ATM.*

Given that both look just fine on screen, the main difference is that *Windows'* TrueType is a medium-resolution (300-dpi to 600-dpi printer) solution. High-resolution (600 dpi to 3000 dpi) imagesetter service bureaus are Adobe PostScript territory, and desktop publishers, weaned on Adobe's PostScript

ILLUSTRATION BY TIM CARROLL

and Type 1 fonts, are likely to stick with what works.

For that matter, Microsoft's imperial might alone can't buy the technical and artistic expertise possessed by the folks at Adobe, who find themselves being pushed to new levels of excellence. This translates into fierce competition. In the long run, though, *Windows'* popularity will be a real oxygen rush for type vendors—even Adobe—as more people than ever will give scalable fonts a try. And ultimately that means better, more affordable type for everyone.

OLE: REASONS FOR CHEERING

by George Campbell

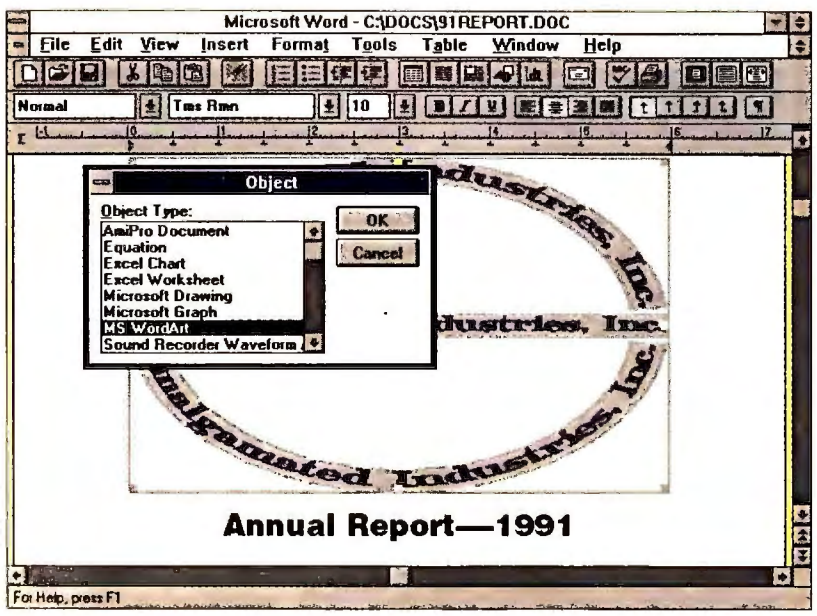
No matter how you use your PC, there will come a time when you need to move text, graphics, or other information from one program to another.

In *Windows* versions 1.*x* and 2.*x*, the only tool available to do this was the Clipboard. I could copy data from one application and paste it into another—sometimes. Occasionally data from one program was incompatible with the other. Worse, there was no way to establish a live link between applications—updates meant starting from scratch. Then along came *Windows 3.0*. Its Dynamic Data Exchange (DDE) tools let me create one- or two-way data links between programs. If I made a change, say, in an *Excel* worksheet, I could update a link to that worksheet in a *Word for Windows* document, or vice versa, with a single command. Still, these links were difficult to create and easily broken, often requiring a complex macro, and I couldn't easily send my file to another user who didn't have both programs.

But now, *Windows 3.1* offers Object Linking and Embedding (OLE). As you'll see below, OLE lets me create one-way links to other programs' data in a single step. These embedded links update themselves automatically, and if I double-click on a linked object, the application that created the data opens. When I'm done, I just exit the second program to return to my document. Best of all, I can give my file to another worker with all the linked data embedded in the file.

Not all programs offer OLE tools, just *Word for Windows 2.0, Ami Pro 2.0, Excel 3.0,* and a few others. But that situation is about to change: Nearly every software publisher will be offering OLE in upcoming upgrades.

Want to give it a try? Let's say you want to create an OLE link in *Word for Windows 2.0* to a portion of an *Excel 3.0* worksheet. Fire up *Excel,* highlight part of a worksheet to bring into *WinWord,* then select *Edit•Copy*. Switch to *Word for Windows,* position your cursor, then choose *Edit•Paste Special.* In the dialog box, double-click the *Excel Object* option, and the data pops into your document, complete with all the *Excel* formatting.



Creating a new OLE link in Word for Windows is as simple as picking from a list the application you want to link to.

That's just the start. Click once on the data and you'll find handles for sizing the linked worksheet; font sizes change automatically. You can also attach a *WinWord* frame to the object, then move it anywhere in your document. Double-click on the linked data, and *Excel* starts up with your data loaded. To return to the document, use *Excel's File•Update* command.

To create a new *Excel* worksheet while in *Word for Windows,* select *Insert•Object•Excel Worksheet; Excel* starts, showing a blank worksheet.

On a slightly smaller scale, *Word for Windows* and *Excel* ship with OLE miniapplications that work as utilities. Within *WinWord,* select *Insert•Object•MS WordArt*. Create customized text—upside down, on a curve, in a variety of fonts and styles, and so on—and it will appear in the *WinWord* document. Again, you can resize or move the new object, and a double-click restarts WordArt for editing.

Because all OLE applications work in the same way, OLE-savvy programs can interact seamlessly: For example, if you have both *Word for Windows* and *Ami Pro,* each can use the other's OLE miniapplications. As the list of OLE-capable programs grows, every application you use will gain some of the features of the others, so the definition of an "application" begins to blur. In the future, when you have a job to do, you'll be able to concentrate on the task, not on what tools you'll need.

WINDOWS DOES MULTIMEDIA

by Scott Spanbauer

Forget File Manager—the first thing *Windows 3.1* upgraders will do after installation is pull down menus, rummage through dialog boxes, and click on unfamiliar icons in search of that unknown quantity, multimedia. *Windows 3.1*'s Multimedia Extensions—a collection of dynamic link libraries (DLLs), drivers, and utilities formerly sold separately—put digital stereo sound, animation, and CD ROM storage at your disposal. But while *Windows 3.1* is ready for the zowie new world of multimedia computing, chances are you aren't.

Multimedia promises, and costs, a

New Norton Desktop: No Longer a Drag to Drop

by Lincoln Spector

No matter how good things get, I'm always left wanting more. Take *Norton Desktop for Windows 2.0,* which should be out by the time you read this. It's so much better than the *Windows 3.1* File and Program Managers, so much more robust than *Norton Desktop 1.0,* so much more powerful than the vast majority of available *Windows* shells, that I should be jumping with joy that such a program exists at all. Part of me is jumping, but another part keeps thinking about what *Norton Desktop* still can't do.

In case you don't know, *Norton Desktop* is a potpourri of useful *Windows* utilities tied together with a shell that replaces *Windows'* File and Program Managers. In case you have heard, this version loads much faster; you won't have to wait around with your arms folded for the new desktop to appear.

The original *Norton Desktop* brought limited drag-and-drop capabilities to *Windows* file management. For instance, you could print a file by dragging it to the Printer icon. Now that *Windows 3.1* lets you print this way, Symantec has gone one step better: With *2.0,* you can drop a file on *any* program icon. If you drop a file named LETTER.FRD on the *WordPerfect* icon, both the program and the file will load—even if *WordPerfect* doesn't recognize the FRD extension as one of its own.

That's impressive and handy. But it leaves me wondering why I still can't copy or move a directory, with all its files and subdirectories, by dragging it from one place on the tree to another.

Speaking of directory branches, you can now collapse them within the tree, hiding directories beneath another directory, for easier tree navigation. But if you want to get to a directory by simply typing its name, you'd better be sure it's not hidden.

Norton allows you to make screen fonts any size you like. Note the readable view of a Paradox file at the bottom of the screen.

File viewers let you examine data without loading every appropriate application first, and *Norton Desktop for Windows 2.0* lets you view files in more than 45 formats, 30 of which weren't previously supported, including *Paradox, 1-2-3* release 3, *Word for Windows 2.0,* and *Corel Draw.* Still, all you can do is *view* the data; you can't copy it to the Clipboard.

If you're using a QIC-40 or QIC-80 tape drive, you'll be able to put the new backup program (essentially a *Windows* version of *Norton Backup 2.0*) to work. If you're still backing up to floppies, however, you'll find it as flawed as previous versions. The program still can't store multiple incremental backups on the same disk: If you create or change 55K worth of files one day, you must devote an entire 1.2MB or 1.44MB disk to that data's safety. If you create or change only 23K the next day, you'll need another fresh disk.

On the other hand, the bundled version of *Norton Anti-Virus 2.0* worked just fine—although I didn't go out of my way to thoroughly test it. Like Norton's separately sold *Anti-Virus,* it should keep your system uninfected without getting in your way. The bundled version improves on its commercial cousin by adding drag-and-drop: To scan a drive, drop the drive icon on the Virus icon, and the scanning begins.

Norton Desktop has some other nice additions. If you found *1.0*'s Batch Builder intimidating, you can now record a Batch (essentially a macro) without knowing the language. Version 2.0 also lets you use TrueType to change the display font in directory and file lists. And the bundled text editor —with its multiple file windows —runs circles around Notepad.

There's still a lot missing from Norton Desktop for Windows 2.0, but it has so much to offer that only a curmudgeon like me would complain about it.

WHERE TO BUY

Norton Desktop for Windows 2.0
800/441-7234
List price: $149.95

bundle: With the addition of animated graphics, music, and narration, your presentations, computer-based training, and even memos will impress like never before. But adding a CD ROM drive (handy, if not essential, for multimedia) and a soundboard to your existing system will cost at least $1000.

And you'll also need multimedia-aware applications. Mainstream business applications will someday live and breathe multimedia—just as color gradually infiltrated television in the sixties. But for now, the only spreadsheets, data bases, and E-mail programs capable of using sound or animation are those that implement Object Linking and Embedding (OLE), such as *Excel* and *Word for Windows*. Such programs allow you to copy sounds and animation from the programs that created them, then paste them into any document within an application that incorporates OLE—only a fraction of *3.1*'s multimedia potential.

The heart of *Windows 3.1*'s multimedia consciousness is the Media Control Interface (MCI), a DLL that grants the *Windows* environment access to hardware such as CD ROM drives and sound boards. MCI doesn't care what the device is as long as its manufacturer provides a driver program that knows how to communicate properly with MCI. Although the selection of *Windows*-compatible multimedia hardware is still relatively small, MCI's device-independent design clears the way for manufacturers to create new gadgets for *Windows* users—things like videodisk players and full-motion video capture boards. The only requirement is that each device come with a driver, an area where Microsoft is offering developers significant help.

As upgraded third-party applications become aware of MCI, they too will be able to directly access your PC's multimedia hardware, and you'll have the pleasure of adding voice annotations to otherwise mute documents. Investing in multimedia for the few applications currently available is an expensive game, however, with few benefits to most businesses. But Microsoft is betting that applications that exploit multimedia the way *PageMaker* exploits a laser printer will show up soon. Until then, most *Windows 3.1* users will be like kids glued to the toy store window, wondering, When can I play? ●

Bob Weibel is the coauthor of Desktop Publishing Secrets *(Peachpit Press, Berkeley, California, 1992). George Campbell and Scott Spanbauer are contributing editors for* PC World; *Lincoln Spector is an associate editor.*

WHERE TO BUY

Windows 3.1
800/323-3577
List price: $149.95; upgrade for registered users of all *Windows* versions through June 1 $49.99; thereafter $59.99

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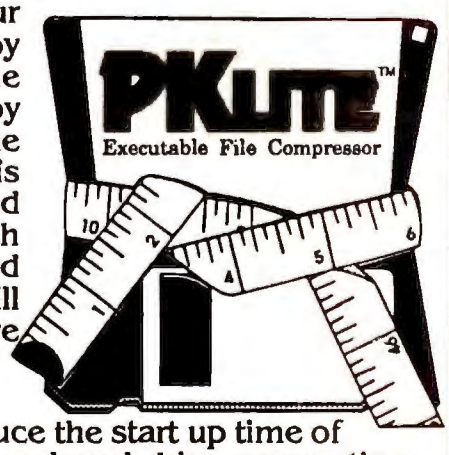

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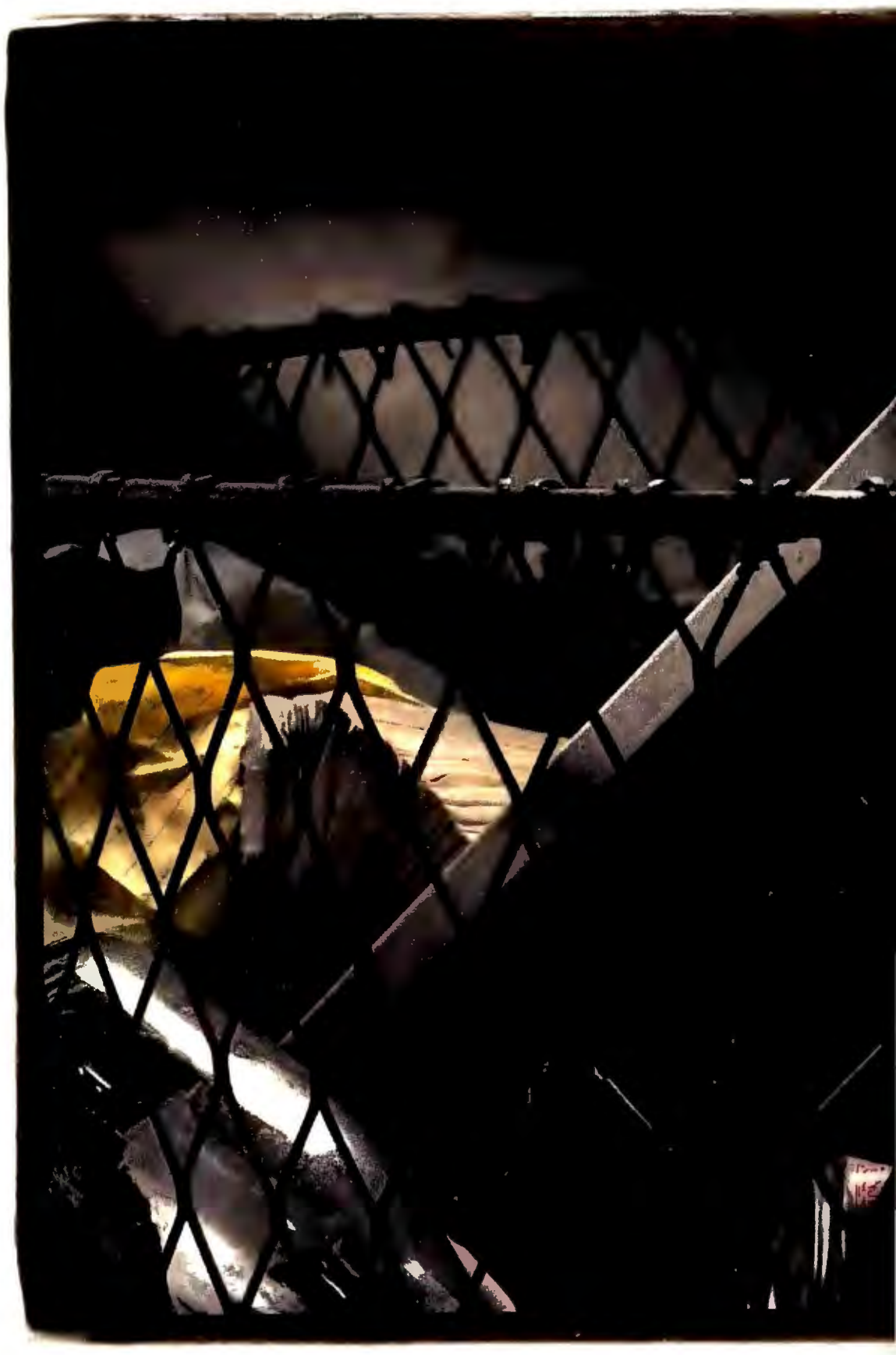

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WINDOWS DATA QUERY SHOOTOUT

What do you do when you need information that's buried in your company's data base, and none of the canned reports or queries give you exactly what you need? You could turn to the office computer jockey, but if he's not off honeymooning in far-off Outer Fluoristan, he's too backed up with his own work to help you. It would be nice to have an easy-to-use program that lets you query the data without his help, but does such a program exist? And is the *Windows* environment, with its standardized, graphic interface, the place where you're most likely to find it?

To answer these questions, *PC World* put together a team to evaluate how easy it is to query data through five different types of *Windows* programs. While data base consultant and *PC World* regular Alan Schwartz watched and occasionally helped, Naomi Wise, a writer with a dozen years of management experience, queried data for "The Sherpa Image," a catalog/retail emporium selling upscale goodies at Himalayan prices to customers scaling the financial heights. Naomi, who uses *Windows* regularly but didn't know what a relational data base was before we started, took on the role of a Sherpa Image regional manager with an urgent need for information. Our rules were strict: We'd give up on a query before we'd resort to programming. Changing from managers to schoolteachers, we'd grade each program on every query, from A if we sailed through with ease to F if we gave up.

Our goal was to answer a number of burning questions. Does *Windows* really make this innately nonvisual job easier? Could somebody familiar with *Windows* but not with the programs get useful information from a standing start? Scanning only those parts of the documentation that pertained to extracting data from two or three files, could Naomi obtain answers at all, and in a reasonable amount of time? Could she transfer the results to a spreadsheet? And finally, could Naomi actually destroy data if she slammed her coffee cup on the mouse pad, hit the wrong key, or clicked on a forbidden icon?

Since your office data base probably wasn't created with any of these programs, ours couldn't be, either. Alan stored the bulk of the data on a file server in the DBF file format used by *dBASE, FoxPro, Clipper,* and quite likely your company's data base. To make things more exciting, customer information was also stored on a separate, OS/2-based computer running *Microsoft SQL Server.*

The Answers to Our Queries

We discovered immediately that knowing *Windows* is of minimal value when you're trying to master data base terminology. What's more, carryover between data base programs was minimal; each had its own unique vocabulary and metaphors. With one exception (*PageAhead*), our "easy" first query took an hour or more as Naomi struggled with the program.

Windows data managers let you painlessly extract the data you need, no programming required. Or do they? To find out, we picked two users—one novice, one expert—and gave them a series of urgent data base tasks . . .

We also discovered that the more a program depended on metaphors that make it appear "friendly," the harder it was to learn. *Forest & Trees* presents a handsome screen with arboreal icons (leaves, trees, and so on) stemming from the title, but the woods proved an easy place to get lost. *Superbase,* drawing its screen iconography from that most intimidating of common household objects, the VCR, was no easier than a VCR to master. *Personal Access* displayed mixed metaphors,

BY ALAN SCHWARTZ AND NAOMI WISE

bedecking the screen with "office" iconography (desks, files, cards, and so forth), a hammer, and yet another VCR panel, resulting in near-total confusion. The two ornament-free programs, *Q+E* and *PageAhead,* proved the most approachable and the least likely to lure a new user into disaster.

On the other hand, *Superbase* and *Forest & Trees* were better able to handle complex queries. *Superbase*'s one-window approach to query definition let us keep all our parameters in view, while the other programs made us hop back and forth, trying to remember which entries we'd placed in which window. *Forest & Trees'* versatility made it—quite simply—the only program to successfully complete the summary-oriented fourth query.

On the bright side, we found that destroying data isn't really a serious problem. Three of these programs can read but not edit *dBASE* files, making it impossible to alter, erase, mutilate, or spindle data. The exceptions, *Superbase* and *Q+E,* wouldn't let us switch from query to edit mode without fair warning. However, crippling *Personal Access* itself was no problem: Our neophyte user's rabid mouse-work accidentally damaged a user-configurable part of the program, and the only recourse was reinstallation.

So what did we find? Most of these programs will need an upgrade or two before they're as easy as they should be. Nevertheless, you might get results without too much trouble. Or you may end up with your fist through the monitor.

Alan Schwartz is a principal in MicroMega Systems, a data base design and training firm in San Francisco. Naomi Wise is a San Francisco–based freelance writer.

Meet the Players

We examined five *Windows* programs in five disparate software categories, ranging from a full-fledged data manager to a desktop publishing utility. Only these programs' querying abilities were tested.

Forest & Trees

Sometimes called an executive information system, *Forest & Trees* can peer into multiple files of varying types to gather just the pieces you need, allowing you to build and present a coherent collection of tables, charts, and graphs.

PageAhead

Essentially a desktop publishing utility, *PageAhead*'s main job is to grab data out of your data base and turn it over to *PageMaker.* Version 1.1, which also supports *WordPerfect, WordPerfect for Windows, Microsoft Word for Windows,* and *Ami Pro,* shipped too late for our tests.

Personal Access

Personal Access is a point-and-click construction set for building applications without programming. It's based on *Plus,* a *HyperCard*-like environment (sold separately and bundled with *Personal Access*).

Q+E

If you use *Excel 3.0,* you already own a copy of this simple data-handling tool. Because it's something you're likely to own already, we looked at the version that comes with *Excel,* rather than the separately sold *Q+E.*

Superbase 4

A fully programmable relational data base, *Superbase 4* contains a robust BASIC-like language to construct complex, customized data base applications, as well as all the tools a nonprogrammer would need.

WHERE TO BUY

Forest & Trees 2.0b
Channel Computing
53 Main St.
Newmarket, NH 03857
603/659-2832
LIST PRICE: $495, client-server $1495, extra user $395
Reader service no. 766

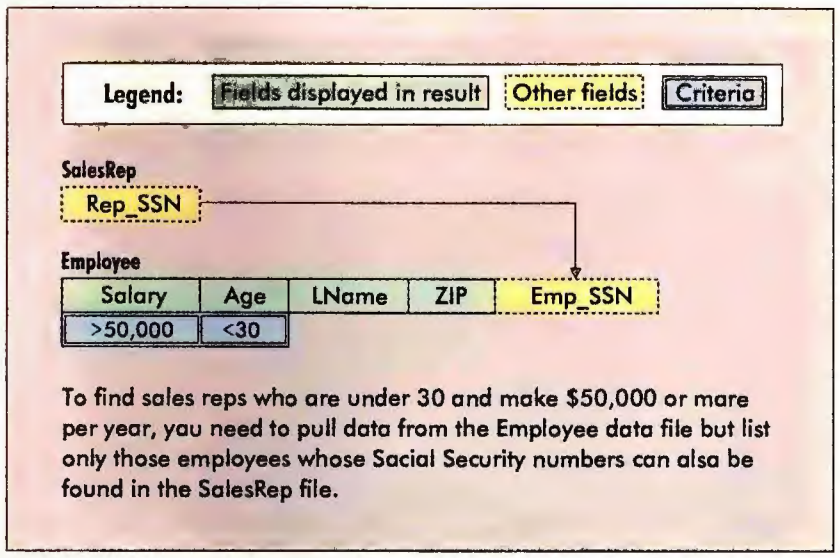
PageAhead 1.1
PageAhead Software
2125 Western Ave. #301
Seattle, WA 98121
800/967-9671, 206/441-0340
LIST PRICE: $295
Reader service no. 767

Personal Access 1.0
Spinnaker Software
201 Braadway
Cambridge, MA 02139
617/494-1200
LIST PRICE: $695
Reader service no. 768

Q+E Database Editor 2.6
Pioneer Software
5540 Centerview Dr. #324
Raleigh, NC 27606
800/876-3101
LIST PRICE: single user $199, single user an network $299, network five-pack $999
Reader service no. 769

Superbase 4 1.3
Software Publishing
3165 Kifer Rd.
Santa Clara, CA 95051
800/237-9391, 408/986-8000
LIST PRICE: $695
Reader service no. 770

MATCHMAKING BETWEEN TWO FILES



The Sherpa Image's president is setting up a "fast track" training program and has asked manager Naomi for a list of hotshot sales reps under age 30 who earn $50,000 or more a year. Since job categories aren't listed in the Employee data file, and names, ages, and pay don't appear in the SalesRep file, Naomi has to induce the computer to choose the right people from the Employee file, then compare them (by Social Security number) against the Sales Reps to exclude any non-sales hotshots.

In this first query, Naomi spent most of her time just learning to use the programs. She was initially impressed with *Forest & Trees*' sylvan screen and eye-pleasing documentation, but the books were short on plain, direct instructions, and many important tools proved well hidden. For instance, when she tried to bring the two files together, Naomi was told that there was 'no such table.' She would have been permanently stumped had Alan not disclosed an obscure technique—one too arcane for any user to guess intuitively—that he'd unearthed earlier in the deepest thickets of the documentation. Usability Grade: C

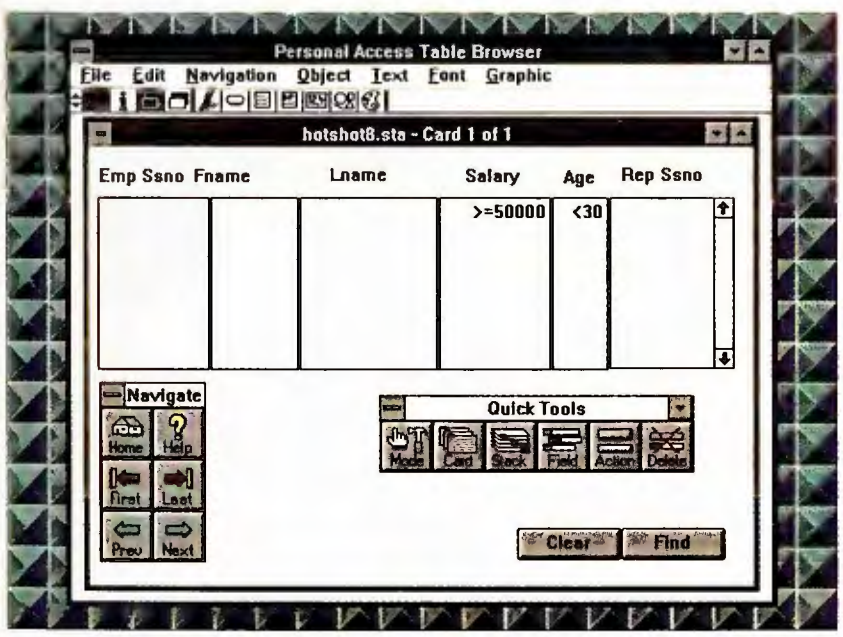
PageAhead proved much easier. With just a hint from Alan about the nature of its traditional query-by-example layout method, Naomi plunged in, despite some perplexity over the need to create a "startup file" before calling up the query tables. The coolly elegant, metaphor-free screen graphically revealed how to extrapolate data and combine files, and the documentation was written in intelligible language. Usability Grade: A

Naomi initially thought that *Personal Access*'s documentation looked clear and logical, but it didn't provide much in the way of step-by-step procedures—perhaps because the lengthy, complex ritual simply beggared description. The busy array of icons wasn't much help, and after three hours she was ready to use the Hammer icon on the monitor.

In one desperate attempt at productivity, Naomi corrupted the program, leaving *Personal Access* as frazzled as its user. Alan had to reinstall the program—and complete the query. He didn't find it easy. Usability Grade: D

Naomi lost some time trying to understand *Q+E*'s somewhat jargon-ridden—but ultimately fathomable—documentation. As "What gobbledygook!" gave way to "Oh, uh-huh, yeah," she found that the straightforward on-screen display made it easy to specify which fields and values she wanted the program to look at. Usability Grade: B

Superbase was less lucid. While actual programming wasn't required, Naomi had to define the query in a series of statements using the program's own vocabulary and syntax. The dialog boxes for creating these statements sported buttons for inserting common words and characters, but no prompts to tell her how to use those words, or warnings when she used them wrong. When she didn't think to click the *And* button, the program gave no indication of error but went ahead and produced an answer—a stupid, useless answer—and Alan had to give her the error message verbally. The documentation, written in High-Technolese, wasn't much help. Usability Grade: C-



Personal Access's buttons and icons are attractive, but coaxing straightforward results is often complicated.

Q+E presents the abstract concept of a multitable relational join in simple, clear visuals—without pretty pictures.

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For answers on-the-fly, pick *RQBE* (Relational Query By Example) and get a simple interface for creating custom queries quickly and easily. Unlike other query systems, RQBE lets you browse the information or create instant databases, reports, labels, or business graphs (with optional FoxGraph or other graphic program).

Custom systems are easy, too.

You create quick reports, forms, labels and applications by clicking on the *New* button in the dialog box instead of picking a name from the list.

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All without any programming.

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FoxPro is the state-of-the-database-art.

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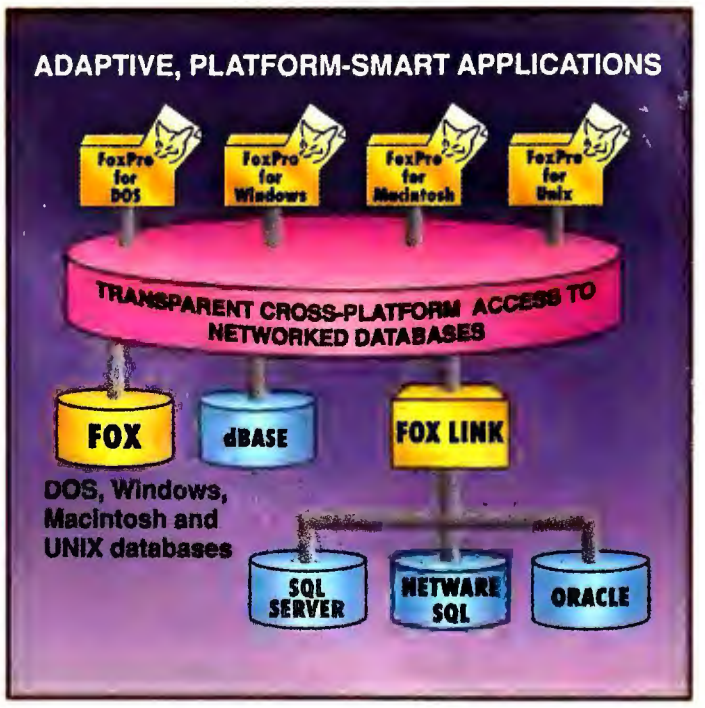

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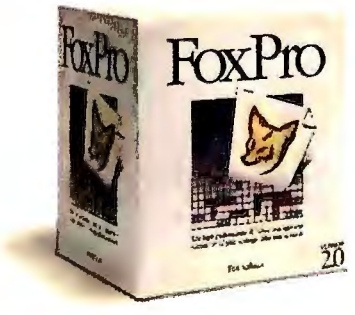


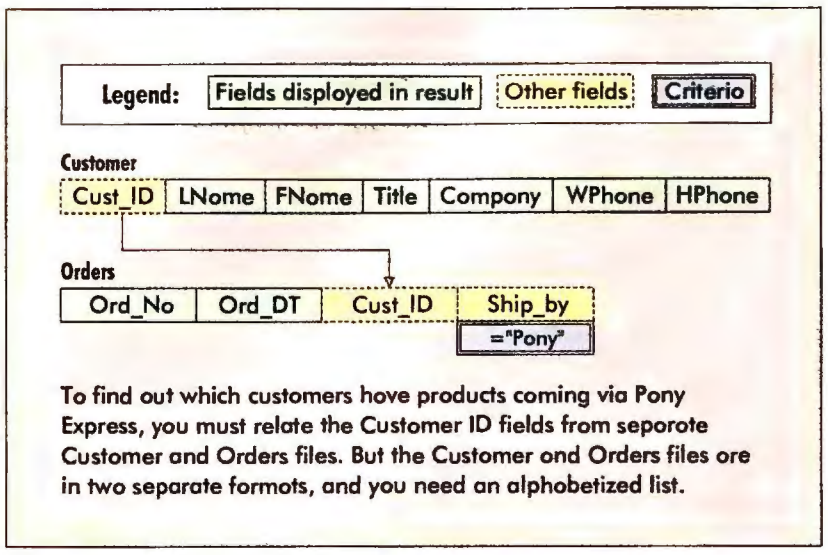
FOX SOFTWARE

†Query benchmark tests performed by Micro Endeavors, Inc. (215) 449-4680, from *Data Based Advisor* 8/91. FoxPro, FoxBASE+ and FoxBASE+/Mac are trademarks of Fox Holdings Inc.; other products are not. © Fox Holdings Inc. 1992.

Circle 76 on reader service card

—Query—

SORTING FROM DIFFERENT SOURCES



To find out which customers hove products coming via Pony Express, you must relate the Customer ID fields from seporote Customer and Orders files. But the Customer ond Orders files ore in two separate formots, and you need an alphobetized list.

Customer service is The Sherpa Image's executive mantra. When one of the company's couriers, Pony Express, goes on strike, Naomi must give Customer Service an alphabetically ordered list of afflicted customers. Naturally, the information is split between the Customer file (with most of the data) and the Orders file (which has shipping information). What's more, the most up-to-date version of the Customer data is in a separate *Microsoft SQL Server* table rather than a *dBASE* file. (There's a Customer *dBASE* file that can be used if necessary, but it's a bit out-of-date.)

Naomi's first task in *Forest & Trees* was to query the *dBASE* Orders file. She stumbled over a log right away: The program couldn't quite believe that *"PONY EXPRESS"* was a valid text string. After a few curses, we discovered that *'PONY EXPRESS'*—with single quotes—was valid, and we had the results of a one-file query in one window. Naomi encountered no such trouble with the *SQL* data, or combining and alphabetizing the results. Usability Grade: C+

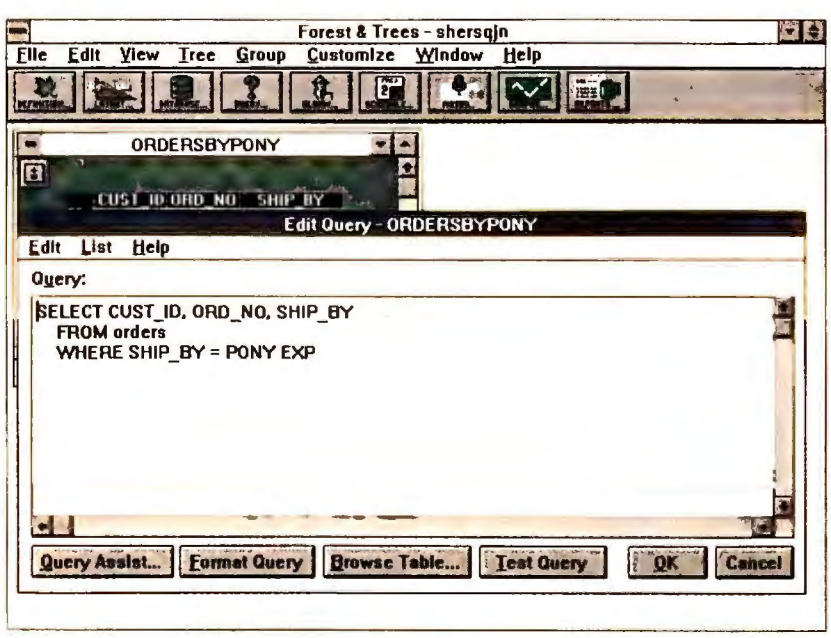
At press time, *PageAhead* didn't support *SQL Server* (it may by the time you read this), so Naomi had to make do with the less-timely *dBASE* Customer file. Getting the basic list took mere seconds, but then came the mystery of alphabetizing the names. The secret (found in another chapter of the documentation) not only told Naomi how to sort the list easily, it let her arrange columns to her heart's content. Usability Grade: B-

Since Naomi had given up on *Personal Access* in Query 1, Alan took the lead here. The first thing he discovered was that in order to link a *dBASE* file with *SQL Server* data, he had to import a humongous chunk of data from the server, a slow process that negated one of the theoretical advantages of SQL—keeping traffic on the network to a minimum. Once he had the data he wanted, alphabetizing the list was a bit awkward; since he hadn't

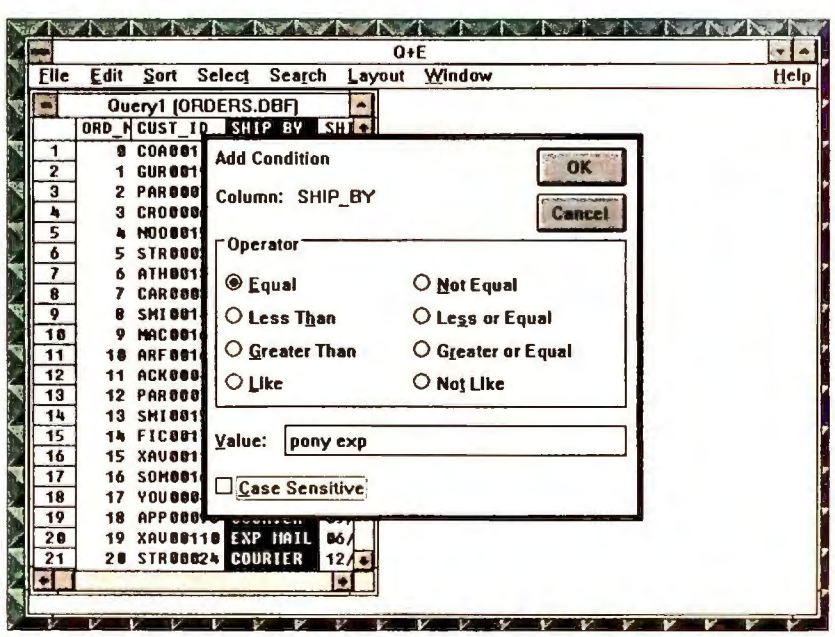
known about setting the order midway through the query, he had to create an index in a separate, bundled program. Usability Grade: D

Q+E had the same *SQL Server* problems as *Personal Access*, but once we had the data, sorting it was a single intuitive step. Another point in *Q+E*'s favor: It was the only program of the five with a readily evident way to control a query's case sensitivity, letting Naomi choose whether a request for *PONY EXPRESS* would find only *PONY EXPRESS* or also find *pony express*, *Pony Express*, and even *PoNy eXpReSs*. If any of the other programs had this option, they didn't help us find it. Usability Grade: B+

Still feeling ill at ease with *Superbase*'s eccentric vocabulary, Naomi pushed on. Once again, we couldn't get some of the *SQL Server* data without waiting for all of it. And when Naomi tried to alphabetize the list, a deceptively titled "Order" command stymied her briefly. This time, Naomi remembered the *And* button, but when she followed *Windows* protocol and *double*-clicked it she got an *AND AND* in the query, evoking the inscrutable warning 'Statement Has An Unrelated Item' and requiring her to exit and start the whole query all over again. Usability Grade: C

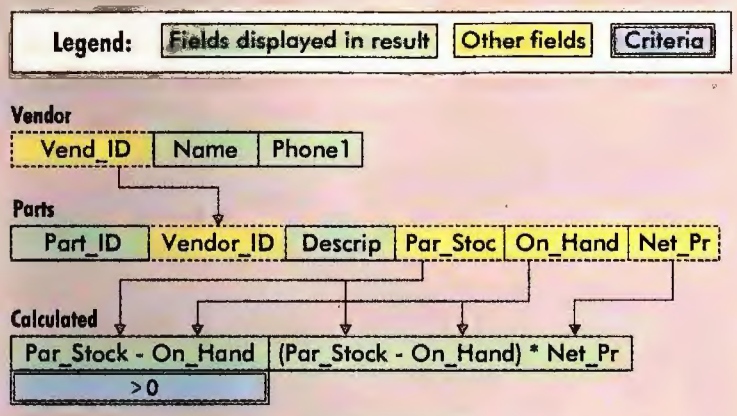


When a rookie mistake (no quotes around PONY EXP) causes Forest & Trees to object, real help wasn't forthcoming.



Q+E is the only product in the group to offer an obvious "case sensitive" option.

ALL THIS AND CALCULATION, TOO



Determining the cost of restocking parts requires more than linking Vendor to Parts via the common vendor ID field. Listing the difference between stock on hand and par-stock levels, and the cost of bringing one up to the other, require calculated fields.

The Sherpa Image's rising reputation has produced a mountain of new orders, and inventory's getting low. The vice president of Profit and Loss tells Naomi to find out what it would cost to bring all items in the inventory up to their optimum, or par-stock, level. She wants the results listed alphabetically by vendor name (with phone numbers) and exported to an *Excel* spreadsheet so that she and the company's cleverest accountant can play with the figures. The Parts file includes everything except the vendors' names and phone numbers, which Naomi will have to get from the Vendor file. She'll also have to calculate, for each product, the difference between the par-stock level and the parts on hand, and multiply that result by the net price.

Forest & Trees easily handled the query and the calculation—defining a calculated column was simply a matter of typing its name and formula into the blanks provided. But since *Forest & Trees* doesn't export to *Excel* directly, the only way that Naomi could get the data into the spreadsheet was through the *Windows* Clipboard. This proved to be a major hassle, since *Excel* required Naomi to estimate and mark out the space that she thought the incoming data would require, and made a mess if she guessed wrong. Usability Grade: B

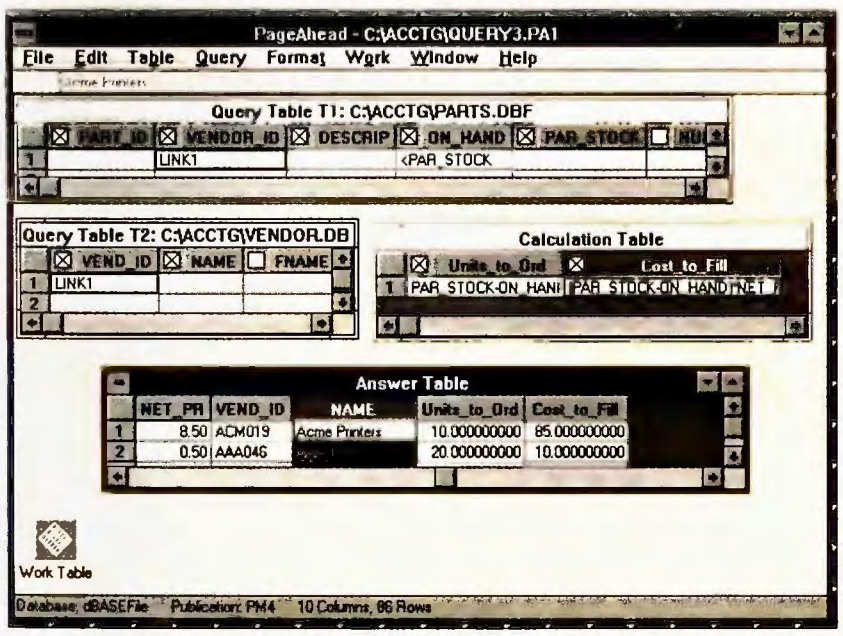
In *PageAhead,* creating a list of all parts under par-stock, ordered by vendor names, was quick and easy. It's beautiful, we said, but can it multiply? A Calculation Window provided the costs of bringing each part up to par-stock. But once again, the only way into *Excel* was via the Clipboard. Usability Grade: B

Still feeling uneasy with *Personal Access,* Alan hit the books. Although the program created a report matching

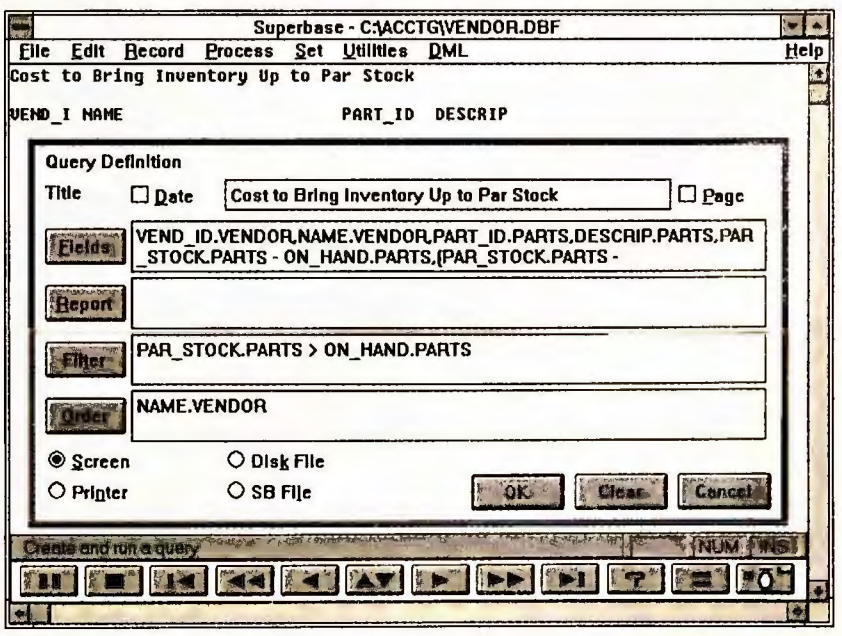
parts with vendors, there was no way to include a calculated field in the query display without actually programming it—and since The Sherpa Image's programmer was currently rappelling down Fluoristan Crest, this pass stopped us dead. Usability Grade: F

Setting up a calculated field in *Q+E* wasn't as intuitive as *Forest & Trees, PageAhead,* and *Superbase* made it—Naomi even had to resort to reading the documentation. Surprisingly, for a program bundled with *Excel, Q+E* had no better way of getting data into the spreadsheet than the other programs did. Usability Grade: C+

With the calculation complicating things, *Superbase*'s method of putting all of a query's parameters in a single window proved both helpful and dangerous. Some of the statements soon outgrew their windows, so it's no surprise that both Naomi and Alan forgot to specify the link between the two files. The result? We sat and waited as *Superbase* created hundreds of thousands of useless records (alas, this VCR doesn't have an eject button). When Naomi redid the query, she joyfully discovered that *Superbase* could save data directly as an *Excel* file, sparing her from playing "guess the boundary." Usability Grade: B



PageAhead's clean and cool use of query-by-example format lets you join and calculate fields without work-arounds.



You can't see the full calculated field in this Superbase query control panel, but the overview proves helpful.

HelpWare

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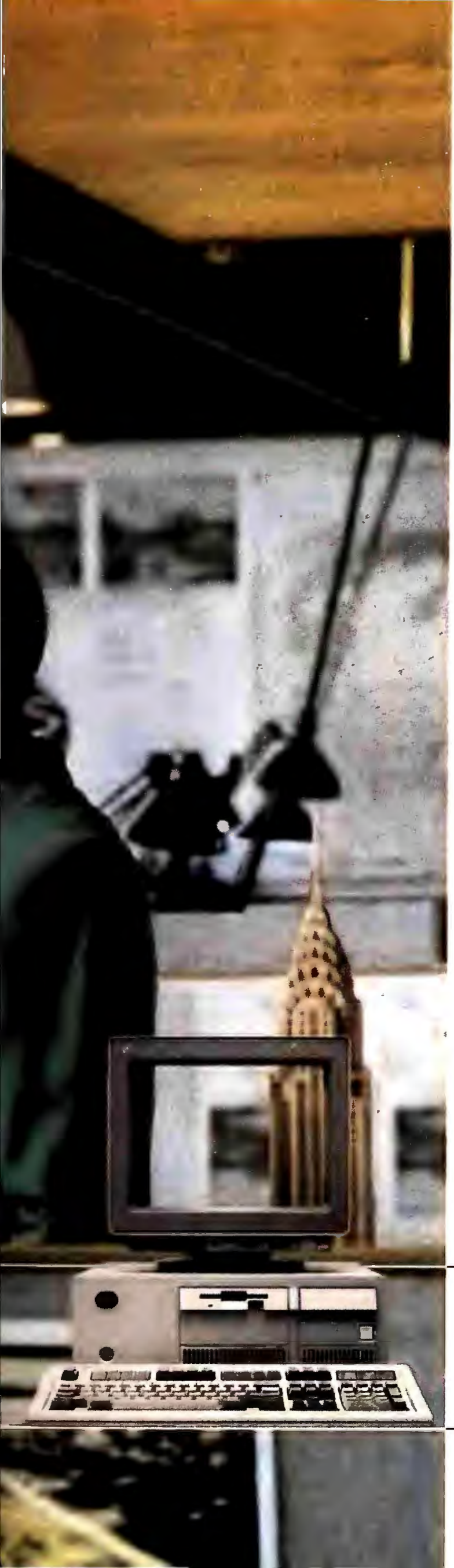

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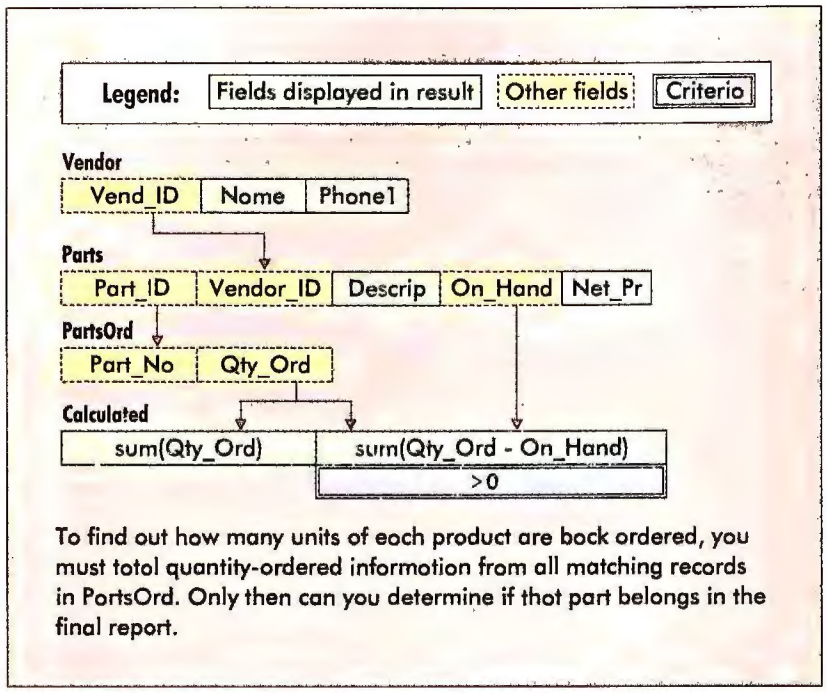
— Query —

THE ATTACK OF THE KILLER SUBTOTALS



To find out how many units of each product are back ordered, you must total quantity-ordered information from all matching records in PartsOrd. Only then can you determine if that part belongs in the final report.

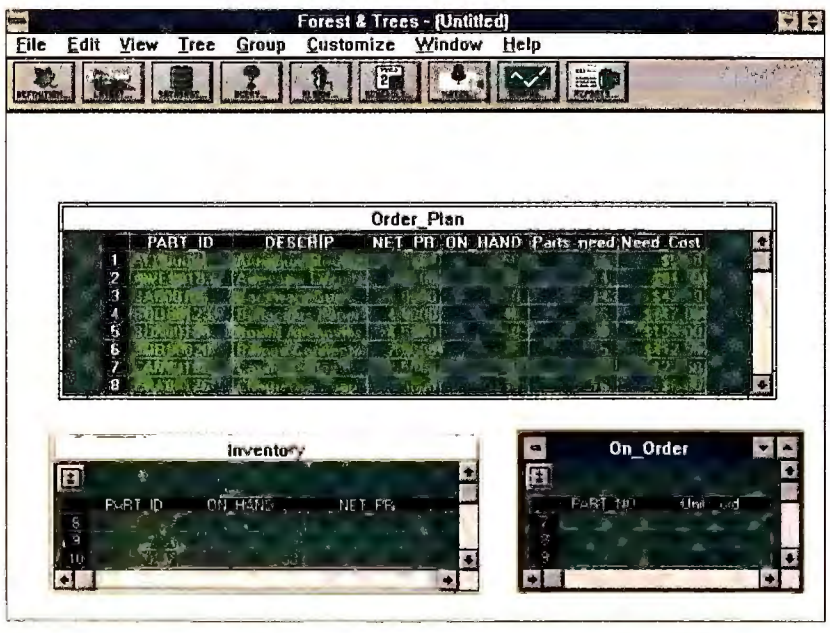
That expert accountant played too long with the Query 3 results, and now The Sherpa Image is in crisis. Products haven't been restocked, and that means large back orders and angry customers. Naomi must instantly create a "must have" parts-order list, arranged by vendor name, showing how many of each part is needed to fulfill orders and how much the company will have to pay for them. The Parts and the Vendor files can be related pretty easily, but the only way to find the number of back-ordered units for each item is to total *all* matching records in the PartsOrd file, then use that total as a calculated field in what's essentially a report on the Parts file. In other words, there can be only one line for Home Liposuction Kits in the final result, but that line must summarize information on all back-ordered Home Liposuction Kits.

Forest & Trees emerged as the only program capable of calculating the answer without unreasonable labor, and it did the job only when we broke the query into its component pieces. After a few false starts, Alan (Naomi gave up early on this one) queried the PartsOrd file for a sum of the quantity ordered of each part number. When the program managed this handily, the rest was easy: He had it compare the sum quantity ordered with the parts on hand (from the Parts file), which gave us a rundown of what parts were back ordered and the totals The Sherpa Image would have to shell out to buy them. Finally, we brought in the Vendor file to attach names and phone numbers to the Vendor Numbers and then to sort alphabetically by vendor name. This difficult but highly realistic query was finally answered. Usability Grade: B

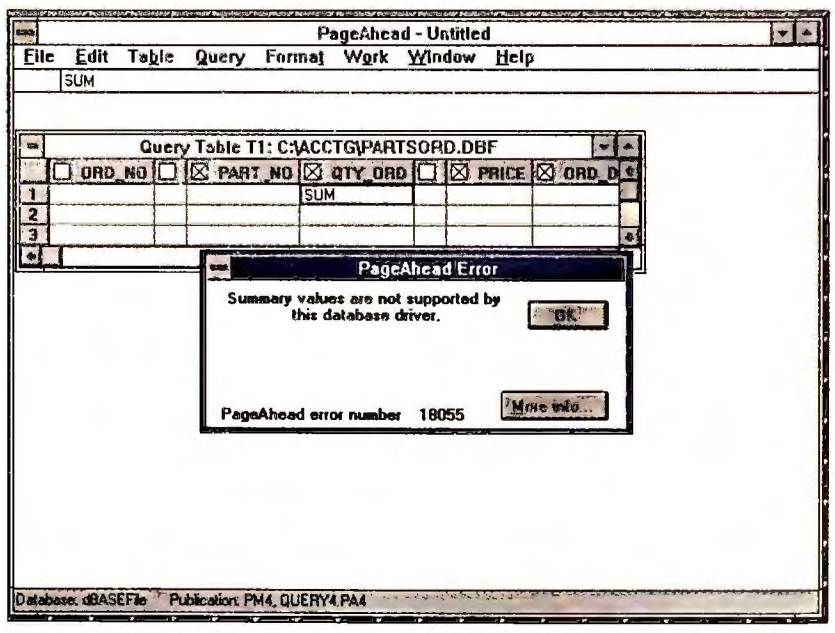
Alas, both *PageAhead* and

Q+E, the two programs we took a shine to early on, proved incapable of putting a sum from multiple items from one file in a calculated field of another. To get an answer, we would have had to send the uncalculated data to a spreadsheet and start fiddling with the numbers from there, or haul out our pocket calculators and finish the query, laboriously and manually, on scratch paper. *Personal Access* had already been eliminated at Query 3 by its need for programming before it would calculate. Usability Grade: F for all three.

We found it possible to do the query without programming in *Superbase*—but the amount of work involved was enormous. We ran into a brick wall trying to do the subtotals in the query module—it was beyond that tool's capabilities. Searching the documentation, we found that the *Superbase* report writer could do the subtotals we needed. Unfortunately, the report writer was so different from the query tool that it required a whole new, and equally difficult, learning curve. Our conclusion: You can do this query in *Superbase* without programming, but you wouldn't want to—especially when the customers are getting restless. Usability Grade: D



Forest & Trees was the only program that completed this query in a reasonable way—sort of reasonable.



Alas, even PageAhead's lovely QBE screen runs out of gas when it must sum numbers from one file to query another.

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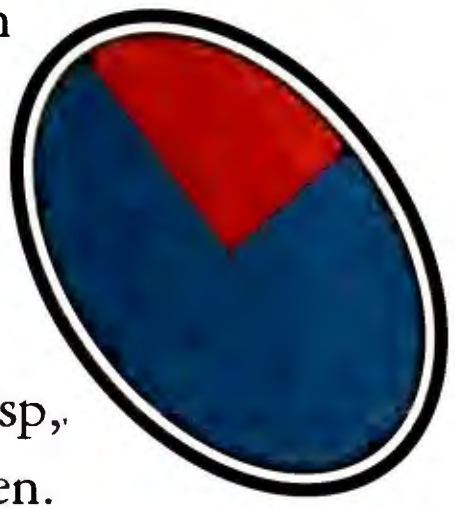

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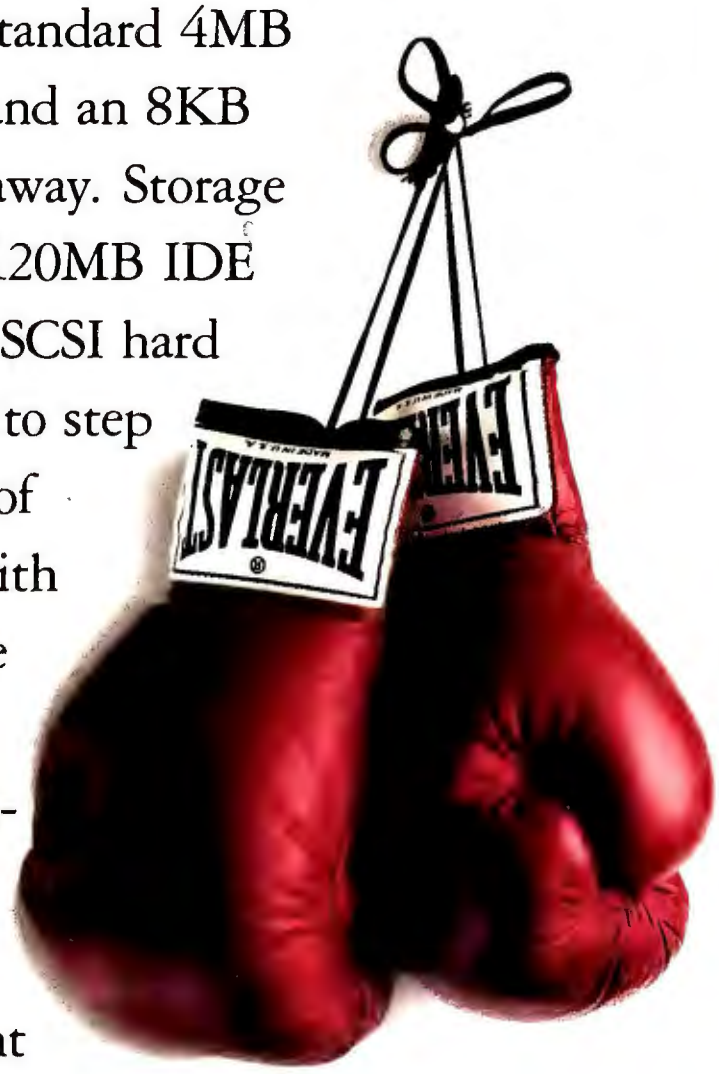

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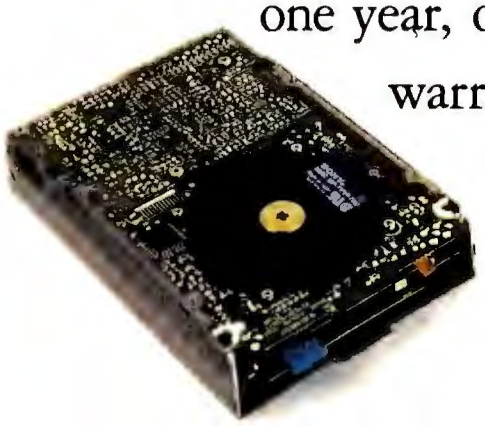

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AMX

Customization Worksheet

Your base system is a. ☐ 286 ☐ 386 ☐ 486 ☐ Other

How many applications will your PC(s) run in a typical workday? _____

What best describes the type of work the system will be used for?
(Check all that apply)

- ☐ Word Processing
- ☐ Order-entry
- ☐ Database (filing records)
- ☐ Financial Calculations
- ☐ Retail Store Management
- ☐ Desktop Publishing
- ☐ Education
- ☐ Design (CAD/CAM)
- ☐ Engineering
- ☐ Industrial Process Control
- ☐ Scientific Research
- ☐ Software Development
- ☐ E-Mail
- ☐ Other industry-specific applications (please specify)

How many people work in your group, department or small business?
☐ Less than 10 ☐ 10-20 ☐ 20-35 ☐ More

Is your operating system:
☐ DOS ☐ DOS with Windows ☐ OS/2 ☐ MAC ☐ UNIX™ ☐ Other

Which of the following graphics-oriented applications best describes your needs?
(Check all that apply)

- ☐ Desktop Publishing
- ☐ CAD/CAM
- ☐ Realtime Modeling
- ☐ Animation
- ☐ Image Processing
- ☐ AutoCad
- ☐ Business Graphics

LAN Communication

How many PCs do you have installed? _____ From how many manufacturers? _____
What kinds of connections does your PC(s) require? (Check all that apply)

- ☐ Links with other PCs in the immediate surroundings
- ☐ Connection to the local area network (LAN) throughout a building
- ☐ A line to a host system in a remote location

What kind of media (cable) is used in your LANs today? _____
What is the networking software now being used in your company? _____
What kind of host system will your PC communicate with?
☐ DECpc ☐ IBM ☐ Other _____

What Kind of Service Do You Really Need?

☐ On-site Hardware Support ☐ Software Support ☐ Telephone Support
☐ Training ☐ FAX Hotline

How many of your users take portables on the road? _____
Do you currently have a service contract(s) for your PCs? How many? _____

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SPECIAL REPORT

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MULTIMEDIA

SPECIAL REPORT

YOUR BUSINESS IS READY FOR MULTIMEDIA, BUT IS MULTIMEDIA READY FOR YOU? IF YOU ROUTINELY DO TRAINING AND PRESENTATIONS, THE ANSWER IS YES.

BY ALICE LAPLANTE

MULTIMEDIA IS A RAPIDLY VANISHING TECHNOLOGY. Not that it's unimportant or a fad that will fade away. On the contrary, multimedia technology will eventually become pervasive—a standard part of all PC hardware and software and the next logical step in the way people interact with computers.

Support for sound and video will one day be built into most off-the-shelf hardware and considered essential for all business and consumer products. If you need proof of this, ask Microsoft or IBM, which thought enough of the technology to include support for multimedia in *Windows 3.1* and OS/2 2.0.

Early adopters of multimedia technology see the biggest benefits in two key areas: training and presentations. Why? Multimedia offers economical alternatives to conventional methods, and sound and video are remarkably effective tools, offering easy user interaction and, quite simply, fun. "There is a thin line between education and entertainment; multimedia helps cross that line," says Nick Arnett, president of Multimedia Computing Corporation in Santa Clara, California.

Just as desktop publishing fueled the sale of Macs, training and presentation applications are likely to drive the purchase of multimedia systems for business. To help you with that buying decision, we've assembled a buyers' guide of 18 MPC systems, all of which guarantee compatibility with the latest *Windows* multimedia software.

OH, PIONEERS!

As our feature on multimedia training reveals, creating multimedia applications is still a specialized occupation, requiring an expert in multimedia programming. Then there is the artistic side of multimedia: Assembling a presentation or training program requires certain visual, musical, or production skills that the average person simply doesn't have.

Eventually, many off-the-shelf presentation packages will come with powerful, intuitive multimedia capabilities. Similarly, the addition of CD ROM–based sound and video tutorials to garden-variety business applications will bring multimedia training to the masses—and ensure that system manufacturers build cost-effective hardware into their PCs.

In the meantime, companies that want their multimedia now still have options. Products like Microsoft's *Multimedia Works* offer a glimpse of the software training of the future. And as you'll discover in our buyers' guide to multimedia presentation software, a wide array of products is already available, ranging from easy-to-use *Curtain Call* to more sophisticated animation packages such as Autodesk's *Animator.*

Early adopters of multimedia technology will encounter their share of problems. But as the companies highlighted in the articles that follow have discovered, these pioneering efforts can be handsomely rewarded with both cost savings and increased effectiveness—a winning combination in any business.

Alice LaPlante is a freelance writer in Palo Alto, California.

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MULTIMEDIA

SPECIAL REPORT

SUPER TUTORIALS

Here's how companies can make computer software training more effective, economical, and even fun.

BY JEFFREY BEER *and* KAREN FREIFELD

"With traditional computer-based training, you usually fall asleep. With multimedia courseware, between the music, the graphics, the color on the screen, the motion, and the interaction—this is exciting," says Joe Galvan, information center manager for El Dorado County, California.

El Dorado decided to invest in two multimedia workstations to teach the county's 1600 employees *WordPerfect*, *1-2-3*, *Windows*, and other popular applications. County officials were sold on slick, laser disk–based tutorials purchased from Comsell of Atlanta. With these one-on-one courses, users toggle between a software application and an on-screen instructor who makes sure users understand the material before moving on to the next subject.

Using the multimedia workstations, county employees learn applications at their convenience and at their own speed, eliminating two of the biggest drawbacks of traditional classroom programs: scheduling conflicts and different skill levels among students.

"It's training in somebody's office at their convenience rather than ours. And you can train people in a mode that can allow them to make mistakes without feeling foolish," says Galvan.

As technology develops and hardware costs drop, multimedia training can be a powerful, economical alternative to stand-up lectures, how-to videos, and computer-based training (tape- or disk-based tutorials, known in some circles as CBT, or "computer-based tedium").

Some multimedia courseware is available on laser disk. Other training is produced on CD ROM. The newest courseware is built into applications, as Microsoft has done with *Multimedia Works*, and uses sound, animation, and video to go beyond traditional online help.

Laser disks offer the best quality right now—but at the highest entry-level price. Tutorials such as those marketed by Comsell list for about $2000 per program, not including the application software. And the workstations to run them cost roughly $7000 apiece, which includes a 386 computer with VGA graphics, specialized audio and video boards, a laser disk player, and an optional touch screen monitor.

But evidence suggests the investment is worthwhile. A 1990 U.S. Department of Defense study concluded that interactive videodisk instruction (IVI) takes about a third less time, costs about a third less, and is more effective than conventional methods.

Indeed, people who learned *WordPerfect* and *1-2-3* through IVI scored almost a grade higher in their training courses than students who received conventional

instruction, according to a study by Sorel Reisman, professor of management information at California State University at Fullerton. And the students loved IVI, giving it a 3.42 rating on a scale of 1 to 4.

Early supporters cite specific cost benefits of multimedia training. Sending employees to off-site training courses can cost an organization between $150 and $300 per day, not including per diems and travel expenses. And hiring a consultant to train staff in-house can add up to thousands of dollars each month.

In 1990 and 1991, for instance, El Dorado contracted with a consulting firm to run two in-house classes a week with eight students in each. That cost the county about $7800 a month, but it still didn't keep up with demand. Galvan estimates that with daily use, the multimedia workstations will pay for themselves in less than a month. "And once you've recovered your costs, there's very little overhead, if any," he adds.

UP-FRONT COSTS

It's a tough sell, though, for companies that already have their own training facilities and instructors. "Investing in this new technology gives them an up-front cost they wouldn't have if they continued along the same way," says Bob Munsky, associate director of New York Telephone's Computer Technology Learning Center in Manhattan.

New York Telephone began experimenting with multimedia in September 1990. The company needed to train roughly 600 mainframe users throughout the state and bought 8 workstations to accomplish that goal. The results were impressive enough to convince the company to order 32 more workstations for other end-user locations and another 10 for its central training facility.

"We're eliminating the traditional bottleneck of [needing] eight available students and one knowledgeable instructor to give a class on a specific day," says John Connelly, a staff director of the company's Computer Technology Learning Center. The new system is "like a merry-go-round," he says. "Choose the course you want and, as long as there's a seat [at a multimedia workstation], you've got it."

Convenience isn't the only selling point, says Connelly. In a study comparing

CUSTOMIZING AN APPLICATION

Just as multimedia products are paying off when it comes to training employees in the latest PC software, a multimedia approach can work wonders in other training situations as well. With the help of multimedia authoring tools, a growing number of companies are creating their own applications to make on-the-job training more effective and consistent throughout their organizations.

Two years ago National Linen, a $500 million linen rental company based in Atlanta, distributed 15,000 pages of regulations, procedures, and hazardous-materials notifications in loose-leaf binders to its 101 plants throughout North America. Today employees sit at multimedia workstations, click on the information they need, hear the lesson in another language if necessary, and watch a video on how to perform specific jobs, such as handling toxic wastes.

Created in *Guide*, an authoring system from Owl International, the National Linen program has made the mountain of information—much of which the company is legally required to disseminate but which was nevertheless ignored by most employees—accessible and manageable. In fact, according to National Linen, the efficiencies that resulted from organizing the material onto laser disks and computers has saved the company millions.

National Linen is just one of hundreds of companies creating customized multimedia training applications with authoring software—programs that allow subject experts, video producers, graphic artists, and other nonprogrammers to build their own training applications. *Multimedia Toolbook, Authorware, IconAuthor, Quest,* and *Guide* are just a few of the authoring programs currently available, ranging in price from $495 to $8000.

Multimedia development time doesn't come cheap, however. It cost National Linen roughly $150,000 and took nearly one year to design its application using *Guide*. Add to that the cost of the high-end hardware to run the programs—$7000 IBM PS/2 Model 70 workstations with VGA, video boards, and laser disk players—and you've got a pretty hefty investment.

Not that every application has to be so expensive or intricate. In a matter of weeks, Duke University used Aimtech's *IconAuthor* to create a multimedia training application to teach medical students about acid-base disorders. According to Duke's Anthony Benson, one of the developers, animations were used to simulate the dynamic flow of ions in different kidneys. "You're putting across a concept that would take a page of description," he says.

Custom multimedia applications can be particularly powerful because of their ability to draw the viewer into the subject being covered. Union Pacific Railroad, for instance, used Allen Communication's *Quest* to create an interactive training program for conductors that evolved into a kind of multimedia documentary about the company. A touch screen brings interviews from employees in diverse jobs alive on video, emphasizing the importance of teamwork throughout the organization.

The new application turned the railroad around, helping to bolster company morale and boost package delivery rates from 48 percent to more than 80 percent. "With *Quest* we were able to simulate our system and simulate a day's work," says Union Pacific's Rich Elder, a conductor in the service reliability training design and development department in St. Louis.

JEFF SCHEID

Union Pacific's interactive multimedia training program simulates a day in the life of a conductor. It's credited with dramatically improving package delivery rates and boosting morale.

Since the program was instituted in September 1990, roughly 3000 of the railroad's 6700 conductors have completed the course on 300 workstations. And because of the success of the training program for foremen and conductors, Union Pacific is designing and developing programs for other segments of the railroad, including field operations, customer service, engineering, marketing and sales, and dispatch.

"The training's consistent, it demands full interaction, and you're guaranteed a mastery level on completion," says Elder.

three instructor-led classes in PC literacy with three multimedia courses, New York Telephone found that more information was delivered in 7 hours of multimedia course work than in a 7-hour instructor-led class.

According to Munsky, a former lecturer, most employees are happy to let multimedia computers do the training. Unlike classes, in which fast learners become bored and slow ones fall behind, multimedia is entirely self-paced. And because the program is interactive, employees aren't as likely to daydream or be otherwise distracted. Ironically, one of the biggest complaints from telephone company users: "They don't like wearing headsets," says Munsky.

TRAINING AT THE DESKTOP

None of this is to say laser-based training tools are the be-all and end-all. For one thing, multimedia courseware seems best suited to novice users. For another, employees still have to leave their desks and PCs to go to a specialized workstation for their lessons.

Many managers say the ideal training tool would be one that runs on standard equipment that employees could use right at their desk, when they need it, and that comes to them through a network or less expensive media like CD ROM.

Multimedia CD ROMs for training are on the market, but they can't yet match laser disks' television-quality video. Recently, for instance, the Defense Logistics Agency Systems Automation Center in Columbus, Ohio, tried *Windows 3.0 Skill Builder*, a CD ROM from National Education Training Group in Naperville, Illinois.

But the center's John Cosenza, a computer systems analyst in instruction, wasn't impressed: "It's not there yet. It's limited motion, not like someone coming on and speaking to you, like with IVI."

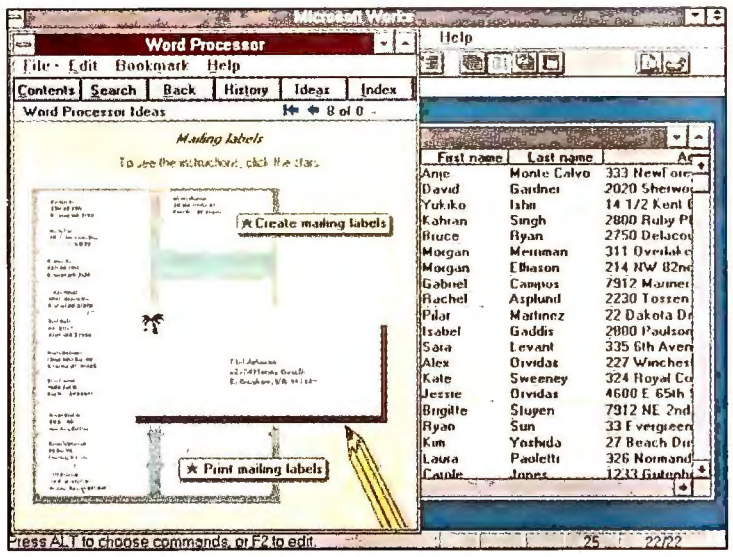
Still, experts cite CD ROM when describing the future. Leading the way, they say, is Microsoft's *Multimedia Works 2.0*, a CD ROM *Windows* version of the integrated, DOS-based package which has multimedia training built right in. Its 50 minutes of animation and audio instruction considerably expand the notion of on-line help.

"It makes a lot of sense for *Works*, because *Works* is targeted at very unsophisticated computer users," says Nick Arnett, president of Multimedia Computing Corporation. "It's more difficult to create an on-line help system for very sophisticated users. At times they want a sophisticated explanation, but at other times they want an instant answer."

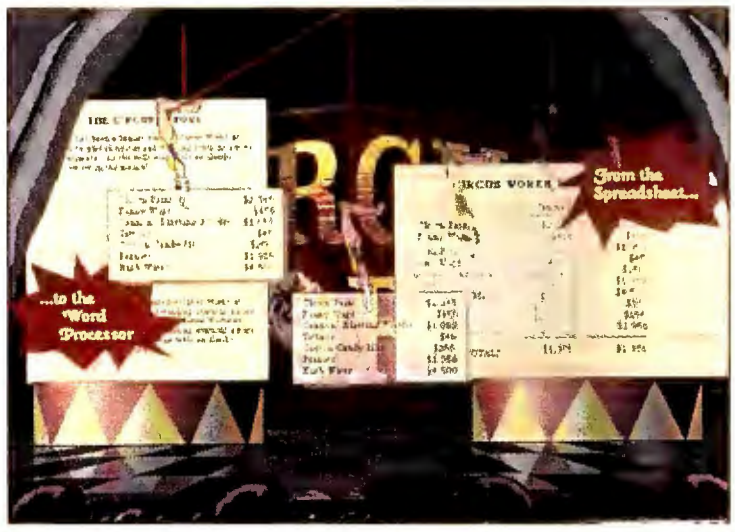
If multimedia expands at predicted rates, Microsoft surely will be followed into the CD ROM market by other software companies developing "enhanced" versions of their popular titles. Lotus Development, for example, is planning a multimedia CD ROM version of *1-2-3*. According to Rob Lippencott, director of development for the Lotus multimedia product group, the multimedia version of *1-2-3* will show users how to use aspects of the program when a they need them. If you want to create a graph, for example, you'll be able to see an animated demonstration of how to do it.

"It's the most effective way to teach people something," says Lippencott. "You call for help, and instead of just getting a help file, you also get little programs, little movies, little animated help sequences in midtask. That's why we call it 'just-in-time learning.' The idea is, you're never more ready, more motivated to learn something specific, a little chunklet of information, than when you need to."

Jeffrey Beer and Karen Freifeld are freelance writers in New York.



Multimedia Works 2.0 from Microsoft runs 50 minutes of instruction covering all aspects of program operation.



Multimedia Works 2.0 features built-in multimedia training designed to get the novice up and running.

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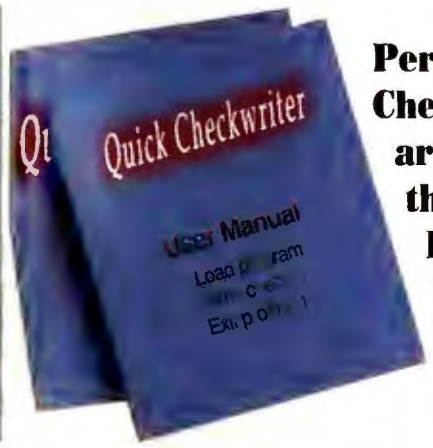

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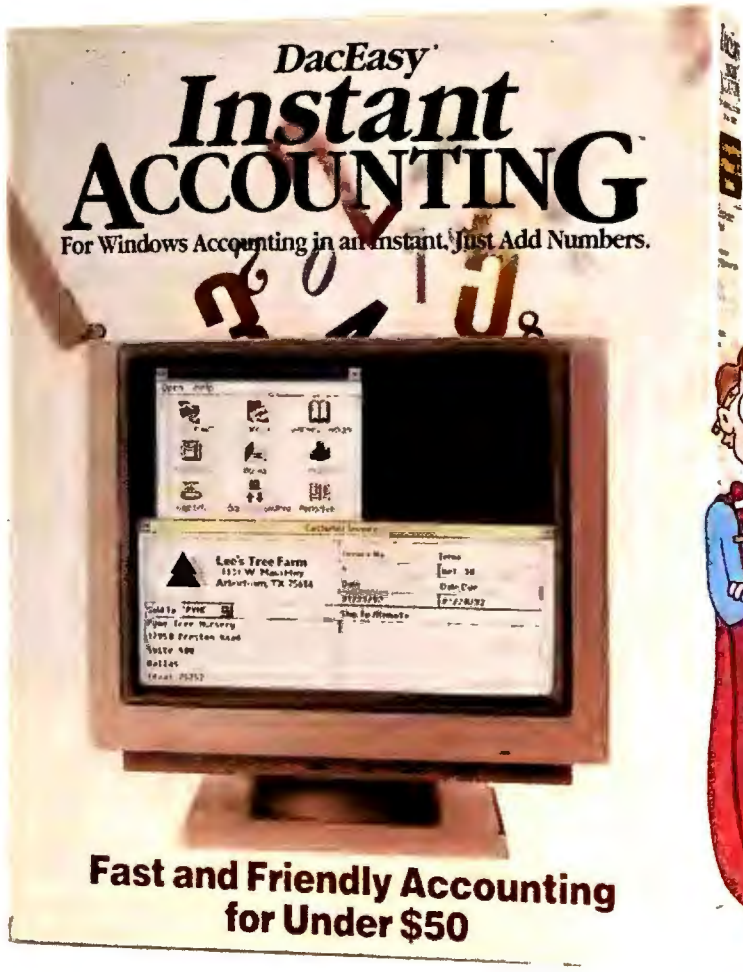

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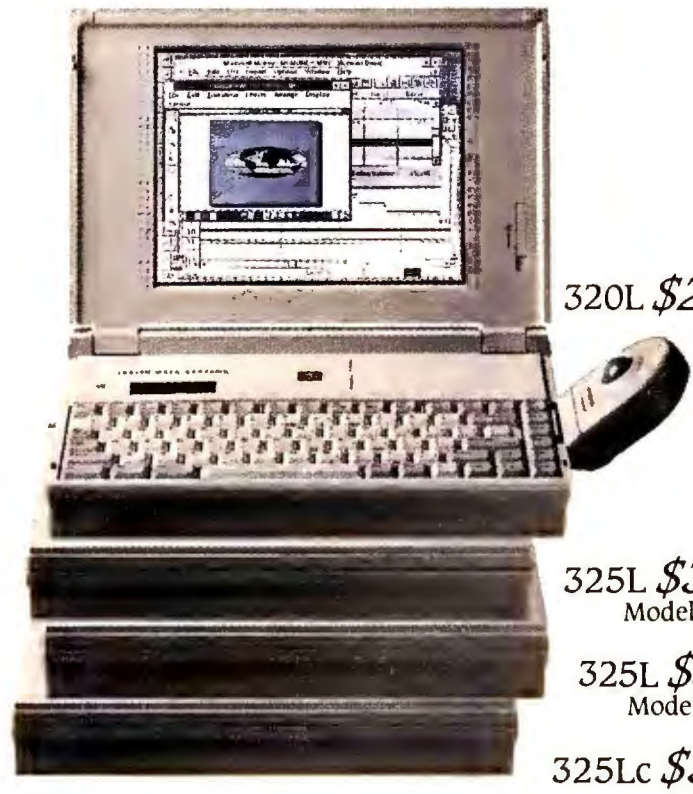

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MULTIMEDIA

SPECIAL REPORT

MULTIMEDIA PRESENTS

You thought multimedia presentations were only for programming wizards with high-end hardware? We've got good news for you.

BY PETER SCISCO

Remember the last business presentation you gave—a few bullet charts, an imported spreadsheet or two, maybe some clip art thrown in for good measure? Nothing special, right? Now imagine that same presentation, except this time, it's alive with animation, sound, and graphics. And there's another difference: Your colleagues are perched on the edge of their seats.

That's multimedia presentation, and until recently it was pretty much out of reach unless you were a sophisticated programmer with sophisticated hardware. But the latest software is easier to use and can run on even a slightly souped-up PC. Essentially, you'll be able to get by with a 20-MHz 386SX with 4MB of RAM, VGA, and a sound card. *Windows* with *Multimedia Extensions*, CD ROM, and CD audio are optional but handy. Given these modest hardware requirements, it's no surprise that business users looking to break from the pack have begun eyeing these packages.

Presenters who go this route, though, can expect to spend some time learning new techniques and metaphors. To further complicate the matter, going multimedia presents a host of compatibility problems: Audio and animation files come in a variety of formats, and CD ROM players and soundboards require drivers that may not work with every application. Fortunately, a number of presentation graphics packages—covering a range of capabilities, from enhanced slide shows to video production—are easing the transition to multimedia. *Windows Multimedia Extensions* is a big help here, since it takes care of the messy stuff for you, specifically providing drivers that any *Windows* product can use. And the news gets better with *Windows 3.1*, which has *Multimedia Extensions* built in. Even the non-*Windows* products featured here should be accessible to knowledgeable PC users since they look and feel much like standard business graphics packages. They're geared toward building presentations, not for generating full-fledged applications such as those that run in public electronic kiosks, training shows, and the like. Most important, all these packages allow the user to enhance presentations with sound and special effects—without spending weeks learning how.

At the basic end, Asymetrix's *Multimedia Make Your Point* lets you link sound files to specific bullet items and screens in your presentation. Provided you have a sound card and Microsoft's *Multimedia Extensions*, this under-$100 *Windows* product can produce quick, relatively sophisticated presentations

Madison Ave.'s specialty is capturing screens created in other applications. Eclipse Technolo-

gies' program supplies the means to link those screens to special effects and digitized voice files with the use of a compatible sound card.

Curtain Call, a *Windows* product from Brown-Wagh, takes a similar approach but uses a script to link these different elements, which it calls *events.* Scripts are represented graphically, providing visual clues to the design process.

David Warner, director of Air Traffic Control Development at Wesson International in Austin, Texas, is using *Curtain Call* to produce a demo of his company's air-traffic-control simulator systems.

Wesson's simulators mimic—right down to pilot response—the world of an airport control tower. Warner captures simulator screens, then adds voice and music to create a multimedia slide show that gives an overview of the simulation system, complete with pilot voices and animated radar screens.

Compared with the cost of a video presentation, which Warner estimates at $10,000 to $15,000, the time and money invested in *Curtain Call* is well worthwhile. "What I'll have is a 20-minute computer-based animation," he says. And unlike videotape, a disk-based demo is easily modified without huge expense.

From HSC Software, *QuickShow,* installable as either a *Windows* or a DOS application, includes sophisticated image-editing tools that let you import images from numerous graphic formats. Using the program's slide-show format, you define transition effects, timing, and delays and link visual displays—both slides and animations—to musical scores and sound effects. *QuickShow*'s biggest drawback: It requires a high-color video card (32,768 colors).

ANIMATION TAKES CENTER STAGE

The real strength of Brown-Wagh Publishing's *PC Animate Plus* is animation, though it allows incorporation of sound files as well. With conventional PC painting and drawing tools, users can create convincing 2-D animations. The application imports GIF, TIFF, and PCX files; converts and plays Autodesk *Animator* files (the de facto animation standard for the low end); and creates special effects like wipes, fades, and dissolves.

Clip Art Goes Multimedia

When you make a standard business presentation, no one expects you to draw your own pictures. That's why there's clip art. The same goes for multimedia presentations, except along with those static graphics, you need music and animated sequences, and these files come in many flavors. Among sound files, for example, *Windows Multimedia Extensions* uses the WAV format, while the Sound Blaster Pro card and others soundboards are partial to VOC files. Then there's CD Audio, the same format your home CD player uses, and the old standby MIDI. Animation is only slightly less confusing, with two main formats: MMM, from MacroMind, and FLI, created by Autodesk. When you're looking to add audio or animation to a presentation, make sure all your hardware and software support the same formats.

CLIPMEDIA—VOLUME 1: BUSINESS AND TECHNOLOGY
A collection of over 500 images, sound effects, animations, musical interludes, and digitized video images. No royalties for presentation use. MacroMind/Paracomp, 600 Townsend St., San Francisco, CA 94103; 415/442-0200, 415/442-0190 (fax). List price: $395
Reader service no. 610

COREL ARTSHOW '91
More than 850 designs as submitted by professional artists and designers to the annual Corel Draw World Design Contest. Ships on CD ROM. Royalties required for presentation use. Corel Systems Corp., 1600 Carling Ave., Ottawa, Ontario, K1Z 8R7 Canada; 613/728-8200.
List price: $125
Reader service no. 611

DIGISOUND STARTER DISC
A CD ROM sampler of 200-plus MIDI song clips and over 400 digitally produced sound effects, also available as a five-volume floppy disk version—one disk of MIDI clips and four disks with 120 sound effects each. No royalties for presentation use. Presentation Graphics Group, 270 N. Cañon Dr. #103, Beverly Hills, CA 90210; 310/277-3050. List price: CD ROM $180, each floppy $120
Reader service no. 612

HYPERCLIPS
More than 1000 animation and sound clips in MMM and WAV formats. Ships on CD ROM. No royalties for presentation use. The HyperMedia Group, Inc., 5900 Hollis St., Ste. O, Emeryville, CA 94608; 510/601-0900. Price unavailable at press time
Reader service no. 613

KILLER TRACKS MM LIBRARY
Three separate Redbook Audio CDs: *Sales Collection, Training Collection,* and *Education Collection.* Each disk contains more than 60 minutes of music in a wide range of categories. No royalties for presentation use. Killer Tracks, 6534 Sunset Blvd., Hollywood, CA 90028; 800/877-0078, 213/957-4470 (fax). List price: $300 each, all three $800.
Reader service no. 614

MEDIASOURCE LIBRARY
Fourteen volumes—historical topics, business graphics, medicine, and others—and each title includes at least 1500 images and more than 90 minutes of music and sound effects. Ships on CD ROM. No royalties for presentation use. Applied Optical Media Corp., 1450 Boot Rd., Bldg. 400, West Chester, PA 19380; 215/429-3701, 215/429-3810 (fax). List price: $395 per volume
Reader service no. 615

MUSICBYTES
These musical clips, MIDI song files, sound effects, and sampled instruments ship on CD ROM. No royalties for presentation use. Prosonus, 11126 Weddington St., North Hollywood, CA 91601; 800/999-6191, 818/766-6098 (fax). List price: $100
Reader service no. 616

MUSICLIPS, MUSICLIPS DIGITAL AUDIO
MIDI song files that ship on floppies, *MusiClips* includes the *Collectors Edition Volumes 1, 2,* and *3, Classics Edition Volumes 1* and *2, Signature Edition Volumes 1* and *2. MusiClips Digital* is a CD ROM–based set of sound effects and music in Redbook Audio, WAV, and VOC formats. No royalties for presentation use. Voyetra Technologies, 333 Fifth Ave., Pelham, NY 10803; 914/738-4500. List price: *MusiClips* $70 each, all three in *Collectors Edition* $150; *MusiClips Digital* price unavailable at press time
Reader service no. 617

For more information about all products in this sidebar, circle reader service no. 902.

MULTIMEDIA SPECIAL REPORT

Gold Disk's *Windows* product *Animation Works Interactive* integrates multimedia and animation for stunning visual effects. Roger Newhall, project manager for sales force automation at Sanofi Winthrop Pharmaceutical in New York, has been using *Animation Works Interactive* since August 1991. After he delivered a presentation to company executives last October, co-workers confided to him how embarrassed they were by their black-and-white laser-printed overheads. Newhall's presentation incorporated animation, interactivity, and music—special effects a generation or more beyond overheads.

Darrell Boyle, director of marketing for the Graphics Business Unit of Microsoft in Menlo Park, California, takes a different tack. Although a multimedia proponent, Boyle remains skeptical about the latest crop of presentation products. "Any product that requires a businessperson to be a movie director isn't going to be successful," he says.

Others echo that view. "We don't see it being a huge market for a while," says Betsy Fortin, group marketing manager for the Graphics Product Group at Lotus Development in Cambridge, Massachusetts. "Users aren't banging down our doors for this kind of thing."

User resistance may stem from timidity about learning new metaphors and new means of communicating ideas. It may also be a reflection of many companies' unwillingness to spend money upgrading existing resources.

Dialog boxes in Autodesk's Animation Player for Windows provide complete control over animation.

MULTIMEDIA GOES MAINSTREAM

Even with those obstacles, mainstream business graphics companies can't delay forever. Fortin admits that Lotus's *Freelance Graphics for Windows* will grow into a multimedia-capable product. When it does, Lotus will join companies like Software Publishing, which makes limited multimedia capabilities available in *Harvard Graphics for Windows*.

Also joining the multimedia parade is Mathematica. Already praised for its graphics editing software, the company has released *Tempra Show* for entry-level users. *Tempra Show* can combine text, graphics, and audio in one presentation. The package sells separately and comes bundled with image-editing programs.

Known for its high-end animation software, Autodesk is bundling *Animator, Animation Player for Windows,* and *Animator Clips* as *Autodesk Multimedia Explorer.* Even users who are uncomfortable creating animation can use *Animation Player,* the one *Windows* offering of the three, to modify existing animation files for presentation purposes.

At the high end of the multimedia presentation scale, MacroMind/Paracomp, which cut its teeth on Macintosh multimedia, turned to *Windows* in December 1991 with *Action*. Experienced presentation creators can link animation, special effects, sound, and voice-overs along a time line and play them on a PC or print them to videotape. Despite these sophisticated capabilities, *Action* is still basically a point-and-click affair.

In the embryonic world of multimedia presentations, none of the new generation of products is about to worry the traditional business graphics companies . . . yet. But each of these packages, in its own way, is ready for business. And as a group, they'll keep getting better—easier to learn, easier to use, and boasting more features. When that happens, the future will be theirs. If you don't have the patience to wait, check them out today.

Peter Scisco is a freelance writer in High Point, North Carolina.

For more information about all products in this article, circle reader service no. 901.

WHERE TO BUY

Action
MacroMind/Paracomp
600 Townsend St.
San Francisco, CA 94103
415/442-0200,
415/442-0190 (fax)
LIST PRICE: $495
Reader service no. 601

Animation Works Interactive
Gold Disk Inc.
5155 Spectrum Way #5
Mississauga, Ontario
L4W 5A1 Canada
416/602-4000,
310/320-5080
LIST PRICE: $495
Reader service no. 602

Autodesk Multimedia Explorer
Autodesk Inc.
11911 North Creek Pkwy. S
Bothell, WA 98011
800/228-3601,
206/483-6969 (fax)
LIST PRICE: $199
Reader service no. 603

Curtain Call
Brown-Wagh Publishing, Inc.
160 Knowles Dr.
Los Gatos, CA 95030
408/378-3838,
408/378-3577 (fax)
LIST PRICE: $199.95
Reader service no. 604

Madison Ave.
Eclipse Technologies Inc.
1221 W. Campbell Rd.
#125
Richardson, TX 75080
800/456-6434,
214/238-9944
LIST PRICE: $169.95
Reader service no. 605

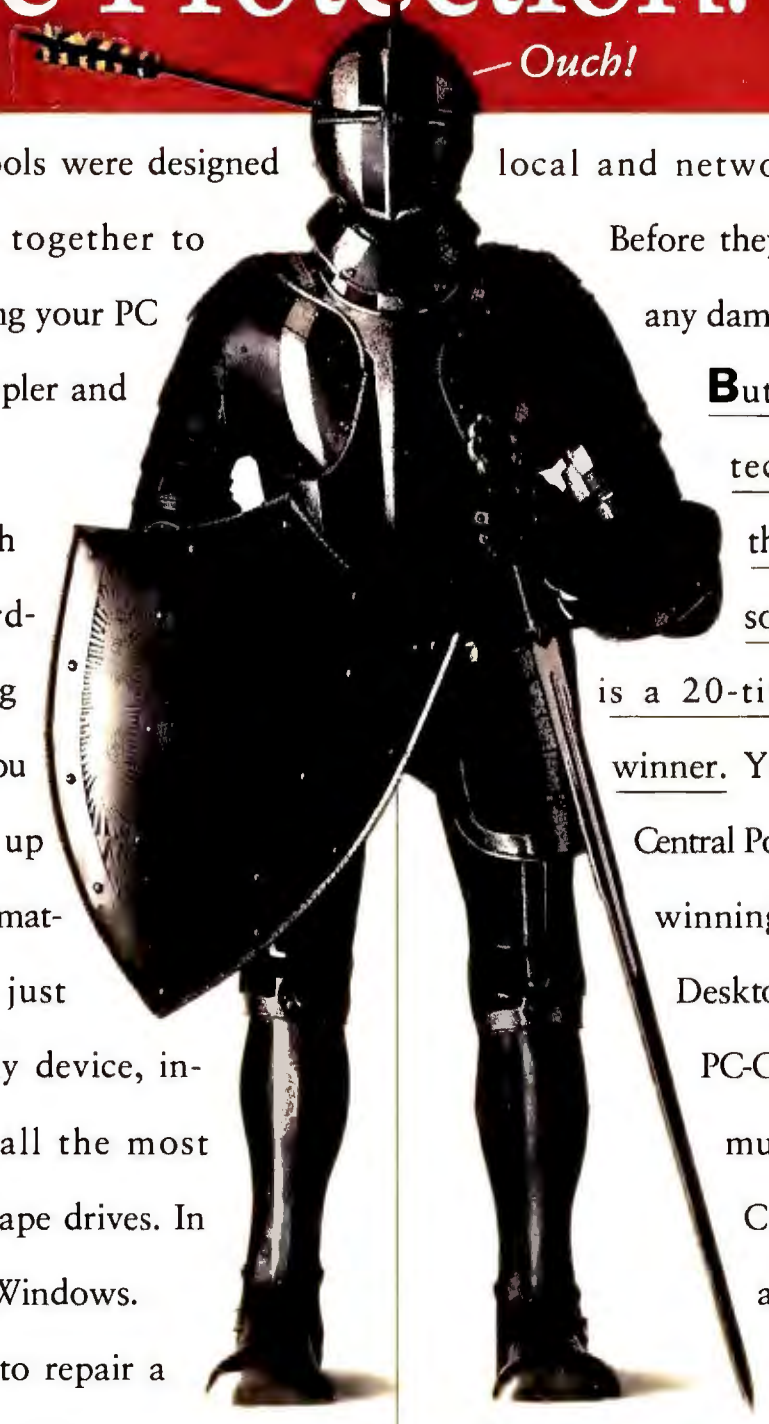
Multimedia Make Your Point
Asymetrix Corp.
110 110th Ave. NE #717
Bellevue, WA 98004
206/637-1500,
206/454-0672 (fax)
LIST PRICE: $89.95
Reader service no. 606

PC Animate Plus
Brown-Wagh Publishing, Inc.
160 Knowles Dr.
Los Gatos, CA 95030
408/378-3838,
408/378-3577 (fax)
LIST PRICE: $199.95
Reader service no. 607

QuickShow
HSC Software
1661 Lincoln Blvd. #101
Santa Monica, CA 90404
310/392-8441,
310/392-6015 (fax)
LIST PRICE: $149
Reader service no. 608

Tempra Show
Mathematica, Inc.
402 S. Kentucky Ave.
Lakeland, FL 33801
800/852-6284,
813/686-5969 (fax)
LIST PRICE: $199
Reader service no. 609

Never Underestimate The Importance of Complete Protection.



—Ouch!

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Virus Protection
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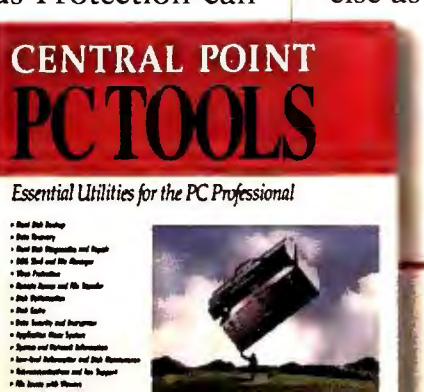
DOS Shell & File Manager
Disk Cache
Remote Computing
System & Network Info
Desktop Manager

PC MAGAZINE BEST OF 1991 — Jan. 1992
PC WORLD WORLD CLASS AWARD — Oct. 1991
PC WORLD PRODUCT OF THE YEAR 1990 — Feb. 1991



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ANNOUNCING TRUE 16-BIT STEREO SOUND

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Save $20 On Selected PC Games When You Purchase Pro AudioSpectrum 16

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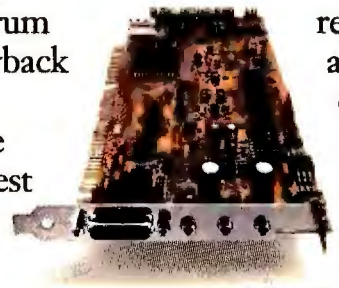
Other PC sound cards would like you to believe they offer True 16-bit Sound. The truth is, they don't.

Only Media Vision's new Pro AudioSpectrum 16™ — with its 16-bit stereo recording and playback at 44kHz — delivers the top digital quality you expect from the best CD system. Making it the ultimate multimedia sound standard, and the best studio quality sound for your games and presentations — made possible by Media Vision's proprietary audio silicon chip set.



True 16-bit Sound for the price of ordinary sound. Hallelujah.

Pro AudioSpectrum 16 supports all the PC games and is 100% compatible with first generation sound cards, including Sound Blaster™. What's more, it's fully compatible with Windows 3.1 — and exceeds MPC specifications.

It also provides the most advanced 20 voice stereo FM synthesizer — for righteous sounding music that's out-of-this-world. Plus microphone input and stereo line-in for recording, a 4 watt per channel on board amplifier and improved high speed SCSI that's absolutely divine.

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Microprose Gunship 2000

Interplay Productions Star Trek

Sierra On-Line® Conquest of the Longbow®

Electronic Arts PGA Tour

Broderbund Software Prince of Persia®

PC MAGAZINE
PC Magazine's THE BEST OF 1991 Pro AudioSpectrum

Media Vision, 47221 Fremont Boulevard, Fremont, CA 94538. 510-770-8600, FAX: 510-770-9592

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Special offer valid for limited time. One game per customer. Selected PC games include those shown above. See Pro AudioSpectrum 16 box for details.

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Big Screen for Windows

No question... this 17-inch monitor from ViewSonic is the ideal "big screen" choice for Windows. In fact, in a recent InfoWorld product comparison, the ViewSonic 7 was rated #1. Our monitor was designed for people who know what they want and won't accept second best.

The competition claims we're unfair. That's because the up-graded ViewSonic 7, with resolution up to 1280 x 1024, features microprocessor-based memory along with 26 programmable preset modes. And it has a flat square, anti-static screen to eliminate distortion and provide a sharp to-the-edge picture. Plus, for a flicker-free image, it boasts of ultra-high 76Hz refresh rate. This monitor even meets low-radiation strict Swedish MPR-2 standards!

ViewSonic 7—the ideal 17" big screen monitor for the full-scale Windows environment.

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Circle 300 on reader service card

MULTIMEDIA

SPECIAL REPORT

BUYERS' GUIDE: MULTIMEDIA SYSTEMS

Looking for great entertainment? Or are you serious about multimedia training? The first group of multimedia PCs offers a configuration to meet every need.

Like the first color televisions, the first multimedia PCs offer all the thrills and frustrations that mark the beginning of a new era. Just as those who bought the first color sets found that most TV shows were still black and white, users who buy multimedia systems today will find relatively few applications that exploit the sound and video capabilities of their new hardware.

Nonetheless, many of the first multimedia applications are compelling, from splashy CD-based games to animated business presentations. Experience enough of these apps, and you'll begin to believe the hype that eventually all software will have multimedia capability, from spreadsheets with voice annotation to CD-based tutorials that look like lavish video productions.

For those who want to get in on the ground floor of this new technology, our guide presents all the machines we could find at press time that comply with the Multimedia PC (MPC) standard, a spec announced over a year ago by Microsoft and a large contingent of PC vendors. The MPC stamp ensures that these machines are compatible with *Windows Multimedia Extensions*—software that enables any *Windows* multimedia application to talk to the soundboard and CD ROM drive. The spec also defines a minimum hardware configuration: 16-MHz 386SX CPU, VGA graphics, 30MB hard disk, 8-bit soundboard, and CD ROM drive with a 150-kilobit-per-second transfer rate. In reality, all the MPC systems here offer more—most much more.

Yet even the fastest systems here groan under the load of the most demanding applications: those that include motion video. And the quality of that video is relatively primitive—generally half the resolution of broadcast television with a mere 256 colors instead of millions. Today, you need such expensive extras as PC-compatible VCRs or laser disk players to provide video of broadcast quality.

Such limitations reveal the downside of buying a multimedia PC right away. Tomorrow's multimedia PCs will have advanced data compression for high-quality video, not to mention the advantages of faster CPUs and cheaper, bigger mass storage. If you buy an MPC today, you should first have a realistic idea of the multimedia tasks you want to perform,

BY SCOTT SPANBAUER

so you can match those goals with the variety of systems available.

MULTIMEDIA? WHICH MULTIMEDIA?

The first question is: Are you going to consume multimedia or produce it? Your answer will help frame guidelines for selecting the right system.

If you just want to run CD ROM titles, you can get away with one of the less-expensive 386SX or 386DX systems listed here (for a sampling of educational, entertainment and reference titles, see "Buyers' Guide: CD ROM Software," November 1991). The performance won't astonish you, mostly because the CD ROM drive—much slower than a hard disk—will be doing most of the work. A 486 system will be faster, of course, but much of the CPU advantage will be wasted as it spends time waiting for the drive to find data.

If you plan to use authoring software to knit text, animation, sound, and video into branching, training applications, you'll probably use your CD ROM only for libraries of clip art, sound effects, and animation clips. To create training apps, you'll need an enormous hard disk, and a 486 CPU certainly won't go to waste. With heavy-duty authoring software like *Authorware Professional* and *MacroMind for Windows*, the more horsepower you can afford, the better.

While training applications are typically large and complex, multimedia presentations generally include less information—but you still need muscular hardware to create them. Depending on the amount of sound and animation you want, a presentation put together with such *Windows* applications as *Action* or *Curtain Call* could easily run 40MB or larger. Again, you need a large hard disk, and if you can afford it, a 486 CPU.

The ideal MPC machines for *running* multimedia business presentations are portables, of course. All the portable systems in this guide have monochrome LCD screens, but they also have VGA interfaces, so you can plug in a color VGA monitor when you're ready to present. Alternatively, you might want to check out one of the new systems in the buyers' guide to color portables in this issue. They

Continues

ULTIMEDIA: IBM'S CHALLENGE TO MPC

Shortly after the Multimedia PC Marketing Council rolled out its multimedia PC standard last fall, IBM countered with its own—Ultimedia, an OS/2-based multimedia specification. Ultimedia is strong on hardware, calling for more advanced audio, CD ROM, and full-motion video components than MPC.

Ultimedia specifies high-fidelity, 16-bit audio versus MPC's 8-bit standard. It also introduces CD ROM XA, an extension to the standard CD ROM format that makes it easier for developers to synchronize image and sound. Best of all, Ultimedia offers motion video using a technology developed with Intel and based on that company's Digital Video Interactive (DVI) compression technology. Interestingly, a touch screen is also part of the spec, suggesting that IBM believes information kiosks—whether inside a company or in a retail showroom—will be a prime application for multimedia.

Currently, IBM offers the only Ultimedia system, the PS/2 Model M57 SLC, and there's been little OS/2 multimedia software development so far—probably because the multimedia version of OS/2, version 2.0, will have just begun to ship when you read this. The only Ultimedia-specific apps announced at press time (an educational CD disk about Columbus, and an authoring program called the *Audio Visual Connection*) come from IBM. Fortunately, the M57 SLC is also compatible with the MPC specification, and at this writing ships with DOS, *Windows 3.0*, and *Multimedia Extensions*. Compatibility with future *Windows* versions, however, is not assured.

A STEP TOWARD BETTER VIDEO

Motion video is where Ultimedia's advantage over MPC becomes clear. IBM has announced two new video-related boards: the Video Capture Adapter/A, a $2250 board for capturing "still" images from cameras, VCRs, and laser disks; and the $2885 IBM/Intel ActionMedia II (with capture option) that digitally records, compresses, and plays back motion video using DVI.

Using the DVI compression scheme, the ActionMedia II can produce moving images that look reasonably like television, provided you limit the size of the video window to about a quarter of the screen area. Full-screen, the images are too coarse to be considered presentable. This is still far better than the uncompressed video offered by current MPC systems.

Video captured with the ActionMedia II can be edited and included in multimedia applications—as soon as developers write software to support the board. So far, the only way to use the ActionMedia II is to write your own program using an optional $500 developer's tool kit, which is not a realistic alternative for most companies. IBM has announced its intention to write OS/2 and *Windows* drivers for the board, so that all applications that run in those environments can use it.

A LONE STANDARD?

From its DVI option to its 1024-by-768 XGA graphics accelerator, the Ultimedia M57 SLC is clearly better suited to multimedia than most MPCs. However, the M57 SLC is designed to be an OS/2 machine, and the chance of OS/2 multimedia applications becoming as plentiful as those written for *Windows* seems unlikely at this point. If you're serious about this system, either you have unshakable faith in OS/2 2.0's capability to run *Windows* multimedia software, or you're a multimedia professional willing to spend development time to avail yourself of superior hardware.

IBM's Ultimedia machine, the PS/2 Model M57 SLC, promises better stereo sound and motion video than systems based on the MPC standard. A touch screen is also part of the package.

Unfortunately, you can't count on the M57 SLC's ability to run *Windows* itself. As this was written, IBM confirmed that its soundboard driver—a key element of every Ultimedia system—is not compatible with *Windows 3.1*, and that the company doesn't intend to write one. In fact, an IBM representative told us that people who need to use *Windows 3.1* with the IBM soundboard could just write the driver themselves.

MULTIMEDIA
SPECIAL REPORT

MULTIMEDIA ON A BUDGET

If you're ready to embrace multimedia but not about to buy a new system, a number of companies offer component kits that can make your system multimedia ready with a minimum of trouble. The multimedia upgrade kits listed in the upgrade table all provide the three basic components that distinguish an MPC: a digital audio board with stereo input and output; a CD ROM drive with controller; and Microsoft's *Windows Multimedia Extensions,* which enables *Windows* multimedia software to communicate with the new peripherals.

If you already own one or more of these items, you can pick up the others separately through your favorite mail-order emporium or, in the case of *Extensions,* at any IBM dealer. But before you try to save even more money by shopping component by component, consider this: MPC kits also bundle in extras like speakers, microphones, boards that let you connect with a VCR, and best of all, multimedia software.

Those interested in creating multimedia presentations, for example, will be happy to find that NEC bundles Asymetrix's *Multimedia Toolbook,* and CompuAdd includes MacroMind's *Action.* Creative Labs offers the excellent general reference CD ROM title *Microsoft Bookshelf,* and Media Vision gives you Compton's *Multimedia Encyclopedia,* the home education title. And if sequencer software is part of the package, as it is with Samsung's MediaWizard, you can turn your MPC into a true MIDI sound synthesizer.

Software differences aside, selecting the right kit is mostly a matter of checking a few key specs. For example, soundboards that sample using 16 bits at 44.1 kHz will sound better than 8-bit boards that sample at 22 kHz, but they cost more and create larger sound files.

Most soundboards also include a SCSI interface for the bundled CD ROM drive. This can save you a slot and some money if you plan to connect a scanner or other SCSI device to your system later on. Kits from CompuAdd, Samsung, and Tandy come with a proprietary CD ROM interface, while Turtle Beach includes a separate SCSI adapter. In addition, don't forget to check the average access time of the CD ROM drive itself. Though CD ROM disks, unlike hard disks, have contiguous rather than fragmented files, CD ROM drives still have to seek those files, and drives with slow access times will take nearly a full second to get there.

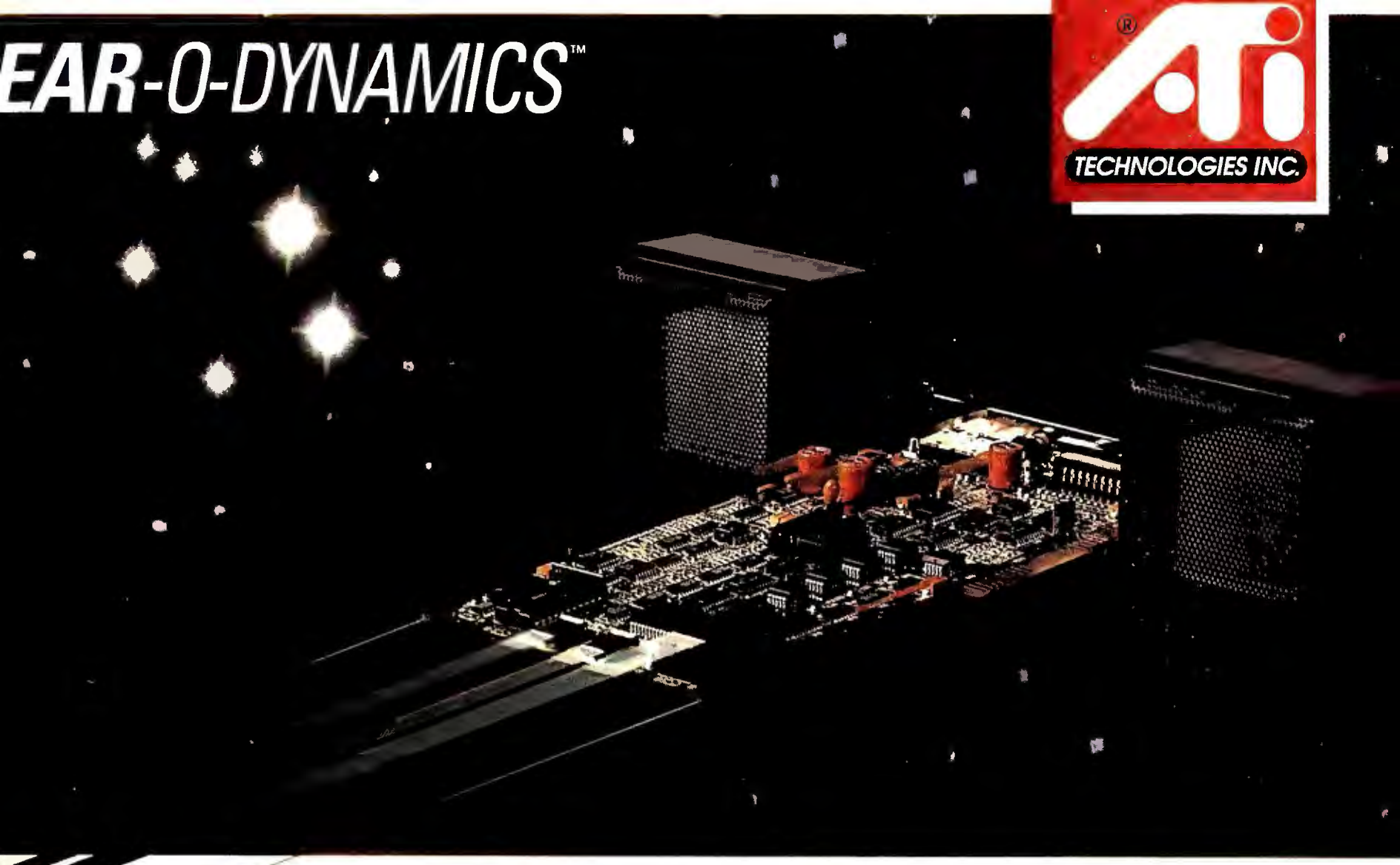
MULTIMEDIA UPGRADE KITS

				AUDIO					
Manufacturer	Product [1]	Price (internal/external CD ROM)	CD ROM access time [2]	Sound card	Bits	Number of voices (stereo)	Microphone	Speakers	Reader service number
COMPUADD	Multimedia Upgrade Kit [3]	$1069/$1295	380ms	Multimedia Option Card	8	22	Y	N	652
CREATIVE LABS	Sound Blaster Multimedia Upgrade Kit [4]	$850/$950	390ms	Sound Blaster Pro	8	22	N	N	653
MEDIA VISION	MPC Upgrade Kit [5]	$995/ [6]	380ms	Media Vision Pro AudioSpectrum	8	22	N	N	654
NEC	Multimedia Upgrade Kit [7]	$1299/$1379	280ms	NEC Sound Board	8	22	Y	Y	655
SAMSUNG	MediaWizard [8]	[9]/$799	500ms	Media Master	13	24	N	Y	656
TANDY	Multimedia Upgrade Kit	$799/$899	850ms	Tandy Audio Adapter	16	22	N	N	657
TURTLE BEACH	MultiSound Multimedia Upgrade Kit [10]	$1795/$1895	350ms	MultiSound Card	16	32	N	N	658

[1] All kits include a CD ROM drive, MIDI interface, stereo I/O, SCSI adapter, Windows 3.0 with Multimedia Extensions, and a variety of bundled software.
[2] All CD ROM transfer rates are 150 kbps, except NEC's, which is 300 kbps.
[3] Includes MacroMind Action and Adobe Type Manager.
[4] Includes six audio software packages and five CD ROM titles.
[5] Includes two CD ROM titles: Compton's Multimedia Encyclopedia, and Jones in the Fast Lane.
[6] No external version.
[7] Includes Asymetrix Multimedia Toolbook.
[8] Includes four audio software packages and five CD ROM titles.
[9] No internal version.
[10] Includes Wave Lite for Windows audio authoring software and MIDI file library.

For more information about all products in this table, circle reader service no. 903.

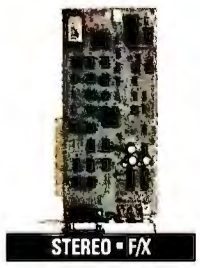
EAR-O-DYNAMICS™



What the Future Sounds Like

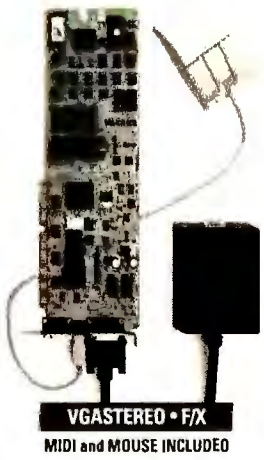
STEREO • F/X™ and VGASTEREO • F/X™

Prepare yourself to be transported into a new universe of stereo sound. ATI STEREO • F/X and VGASTEREO • F/X multimedia sound adapters offer mind-blowing stereo acoustics that add a whole new dimension to "serious" DOS* and Windows* applications – and propel PC games beyond the bounds of imagination.



Cosmic 'Coustics

Forget the tinny, raspy, mono sound of older-generation sound cards. Our advanced sound filtering and 44 kHz sampling rate produce cosmic CD-quality sound. And our stereo enhancement circuitry opens up the vastness of stereo space – even for existing mono applications.



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Circle 5 on reader service card

may not come with soundboards or CD ROM drives (you might not need the latter anyway), but several have standard expansion slots, and the color screens on some rival the CRT.

THE ESSENTIAL PERIPHERALS

The MPCs in this article are basically off-the-shelf PCs stuffed with multimedia peripherals. So the question arises: Why not buy a hot 486 clone, a Sound Blaster board, and a CD ROM drive and do it yourself? In fact, if you're not put off by the idea of resolving potential hardware incompatibilities and messing with *Windows* drivers, choosing one of the seven upgrade kits listed here—which include soundboard, CD ROM, bundled software and multimedia *Windows*—may be a more economical alternative.

Whether you buy an MPC or assemble one, the same basic buying criteria apply. Consider the following guidelines:

The Basic System Even if you only plan to run CD ROM titles, buying anything less than a 20-MHz 386SX makes little sense. Moreover, many users are gravitating to 33-MHz 486 systems just to speed up ordinary *Windows* applications; with processing-intensive authoring and presentation applications, would you want to make do with less? If you don't need a top-of-line system now but expect your needs to change, a system with an upgradable CPU can give you added flexibility.

You'll need at least 4MB of RAM for a usable *Windows* configuration, 8MB to multitask several large applications and keep things running at a decent clip. Make sure your system can expand to at least 16MB to accommodate forthcoming memory-hungry applications.

The MPC minimum of 30MB of hard disk space is unrealistic. For any *Windows* systems, at least 100MB is more like it. If you plan to author training or presentation apps, even a 330MB hard disk—the largest offered by any system in this guide—may be too small. Make sure your controller allows you to add a second drive later on. Also, look for a few free slots for scanner interfaces, video-capture options, and the like.

Audio Boards The MPC standard calls for 8-bit digital stereo sound. All the systems in the guide have an expansion board that converts analog input—from microphones, audio amplifiers, and so on—into digital information that can be stored on disk. The soundboard also turns the stored data into analog output for speakers, VCRs, and the like.

Most soundboards, such as Creative Labs' popular Sound Blaster Pro, offer 8-bit sound and a 22-kHz stereo sampling rate (that is, 22,000 data points per each second of analog input). This can't quite match the sound quality you'll get with a good CD-equipped home stereo, which offers 16-bit sound sampled at 44.1 kHz. Remember, though, that these specs apply only to sound that the board converts from analog input, such as the human

MULTIMEDIA PCS

Manufacturer	Product [1]	Price	CPU/MHz	Upgradable CPU	RAM	Maximum RAM	Free expansion slots	Hard disk	CD ROM access time [2]
COMPUADD [3]	316s MPC	$2295	386SX/16	N	2MB	4MB	4	40MB	380ms
	320sc MPC	$2695	386SX/20	N	2MB	32MB	4	80MB	380ms
	Model 333 MPC	$3995	386/33	N	4MB	16MB	7	200MB	380ms
COMPUTER & CONTROL SOLUTIONS [4]	AMPC Creator [5]	$5495	486/33	N	8MB	64MB	7	200MB	380ms
	AMPC Composer [6]	$7995	486/33	N	8MB	64MB	7	200MB	380ms
	AMPC Dominator [7]	$11,995	486/50	Y	8MB	128MB	2 EISA	330MB	380ms
DOLCH [8]	MPAC SX-20C	$5605	386SX/20	N	2MB	16MB	5	60MB	350ms
	MPAC 386-33C	$6605	386/33	N	4MB	32MB	4	60MB	350ms
	MPAC 486-33C	$7198	486/33	N	4MB	32MB	4	120MB	350ms
	MPAC 486-33E	$8488	486/33	N	8MB	32MB	4 EISA	120MB	350ms
	MPAC 486-50E	$9998	486/50	N	4MB	32MB	4 EISA	120MB	350ms
IBM	PS/2 Ultimedia M57 SLC [9, 10]	$5995	386SLC/20	Y	4MB	16MB	3 MCA	160MB	350ms
PHILIPS	386SX-20 MPC [12]	$2499	386SX/20	N	5MB	8MB	1	80MB	390ms
SAMSUNG	Sensor SP-486SX Pro [13, 14]	$3499	486SX/25	Y	4MB	32MB	3	120MB	500ms
TANDY	2500 SX/25	$1999	386SX/25	N	4MB	16MB	2	85MB	850ms
	4825 SX	$2799	486SX/25	Y	4MB	32MB	2	120MB	850ms
	4850 EP	$3499	486DX2/50	N	4MB	32MB	2	120MB	850ms
	4833 LX/T	$4499	486DX/33	Y	4MB	64MB	5	120MB	850ms

[1] Minimum configuration includes CD ROM drive; soundboard with minimum 22-kHz audio sampling rate, stereo I/O ports, MIDI I/O ports, joystick port, headphone/speaker I/O ports; 101-key keyboard; Windows 3.0 with Multimedia Extensions; and DOS 5.0.
[2] All CD ROM transfer rates 150 kbps.
[3] All systems include MacraMind Actian and Adobe Type Manager.
[4] All systems include Shadow image data base software and Ask Me 2000; AMPC Composer also includes DynaWare Ballade music sequencing and editing software.
[5] Includes video image capture board and broadcast video output interface.
[6] Includes Roland PC Computer Music System.
[7] Includes 128MB Pinnacle erasable optical drive.
[8] All systems are portable and include 10.8-inch plasma VGA monochrome screen with external SVGA support, upgradable to Sharp TFT color screen.
[9] Generous software bundle includes Authorware Professional, MacroMind Actian, Storyboard Live, two CD ROM titles, and OS/2 2.0.
[10] 386SLC CPU is 88 percent faster than 386SX.
[11] Produced by XGA graphics accelerator.
[12] Includes two CD ROM titles: Microsoft Bookshelf and Compton's Multimedia Encyclopedia.
[13] Generous software bundle includes Alien FaxIt; Norton Utilities 5.0, Desktop for Windows, and Backup for Windows; and seven CD ROM titles.
[14] Includes fax-modem.

voice; if you played a 16-bit, 44.1-kHz CD in the CD ROM drive, Sound Blaster Pro would reproduce it with its original clarity. Turtle Beach's MultiSound board can convert analog signals to 16-bit, 44.1-kHz digital sound, but be advised that these files will take up four times as much space as those created by a board that has the lower-quality spec.

CD ROM Drives All MPC CD ROM drives in the table below have a 150-kilobit-per-second transfer rate—they can all shovel a maximum of 150 kbps from the disk across the bus to the CPU. However, their *access times* (the average time it takes for them to seek and find a sector) vary from 280 to 850 milliseconds, roughly 10 to 30 times slower than the average hard disk. Access time is less crucial for CD ROM drives (where file reads are always sequential) than for ordinary hard disks (where files are often fragmented). Yet a drive with a fast seek time will perform better when reading a CD ROM containing many small files, such as a dictionary or encyclopedia application.

Video Hardware Every system here comes with a VGA capable of producing 640 by 480 VGA graphics in 16 colors. If you want to bump the colors up to 256 at this resolution or increase the resolution itself up to 800 by 600 or 1024 by 768, most of these VGAs offer the requisite super-VGA capability, and installing the super-VGA *Windows* driver for the resolution you want is easy. Most of the systems offer a choice of monitors, so make sure the monitor you choose can run at the resolution you desire. Likewise, finding a monitor and system that can do 1024 by 768 without *interlacing*—a cost-saving scanning technique that causes annoying screen flicker—is best.

In multimedia, the term *video* also means motion video. If you want to incorporate broadcast-quality video into training or presentations, you'll need a special board that plugs into your PC and hooks to a VCR or laser disk player. Some boards also "grab" individual video frames for you to import into a multimedia presentation, or let you create quality animation by exporting frames to tape one by one. The latter requires a special VCR such as NEC's PC-VCR.

GRAPHICS CARD | **AUDIO**

Maximum resolution	Maximum colors	Bits	Number of voices (stereo)	Microphone	Speakers	Reader service number
1024 x 768	256	8	22	Y	Y	661
1024 x 768	256	8	22	Y	Y	661
1024 x 768	256	8	22	Y	Y	661
1024 x 768	256	8	22	N	N	662
1024 x 768	256	8	22	N	Y	662
1024 x 768	256	8	22	N	Y	662
640 x 480	256	8	22	N	N	663
640 x 480	256	8	22	N	N	663
640 x 480	256	8	22	N	N	663
640 x 480	256	8	22	N	N	663
640 x 480	256	8	22	N	N	663
1024 x 768 [11]	256	16	8	N	N	664
800 x 600	256	8	22	N	N	665
1024 x 768	256	13	24	N	Y	666
1024 x 768	16	16	22	N	N	667
1024 x 768	256	16	22	N	N	667
1024 x 768	256	16	22	N	N	667
1024 x 768	256	16	22	N	N	667

For more information about all products in this table, circle reader service no. 904.

WELCOME TO TOMORROWLAND

Just like the first desktop publishers' braving uncharted territories of font technology and page design, buying multimedia now will make you part whiz kid, part guinea pig. Waiting a year or two for more applications—and more powerful, less expensive systems on which to run them—probably makes sense for most businesses.

But multimedia education and entertainment packages are taking off, and if you can afford it, what's the harm in paying $800 to $1500 more for multimedia capability if it offers great potential for home education and beats the heck out of Nintendo? (After all, it's an IBM-compatible PC; you can still use it for working at home.) Moreover, those businesses that can justify the cost of developing in-house multimedia applications will be rewarded with valuable know-how.

As large companies begin to phase in multimedia for training and presentations, any in-house expertise that's already accumulated will provide an edge over the competition. And in the nineties, every minute counts.

Scott Spanbauer is a contributing editor for PC World. *He can be reached on PC World Online.*

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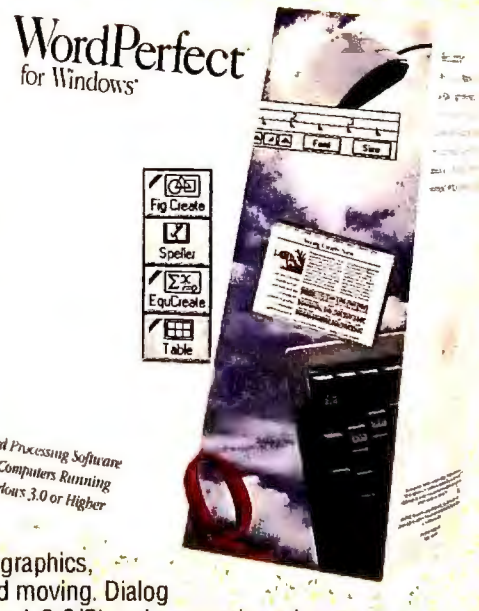

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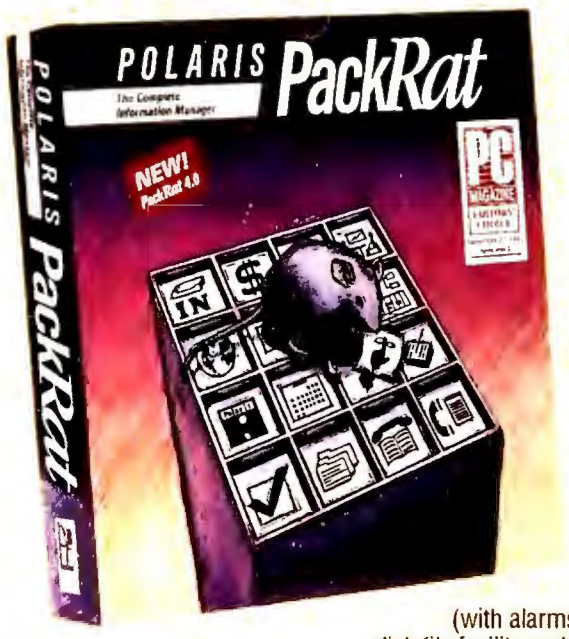

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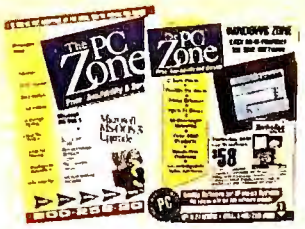

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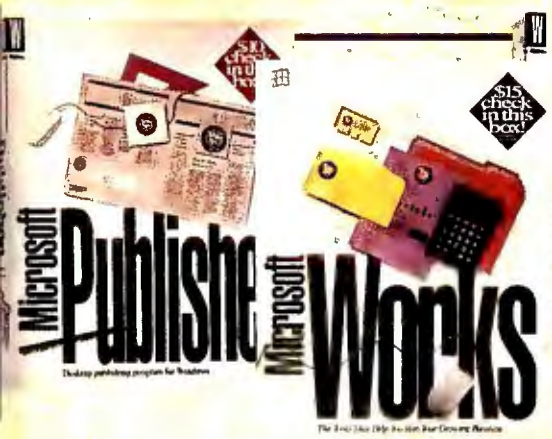

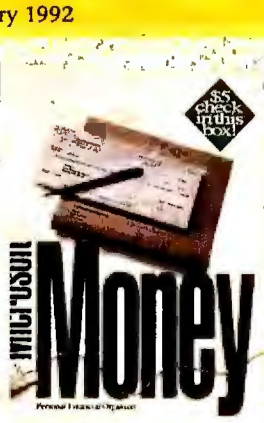

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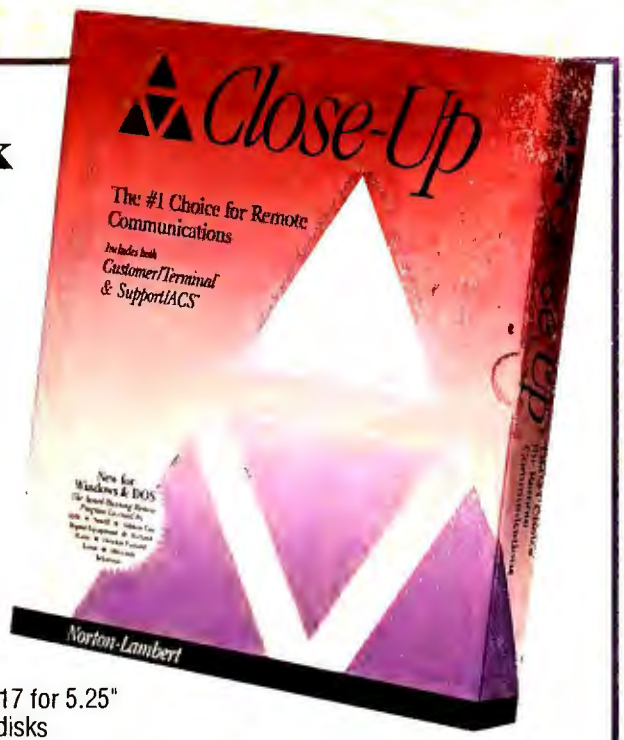

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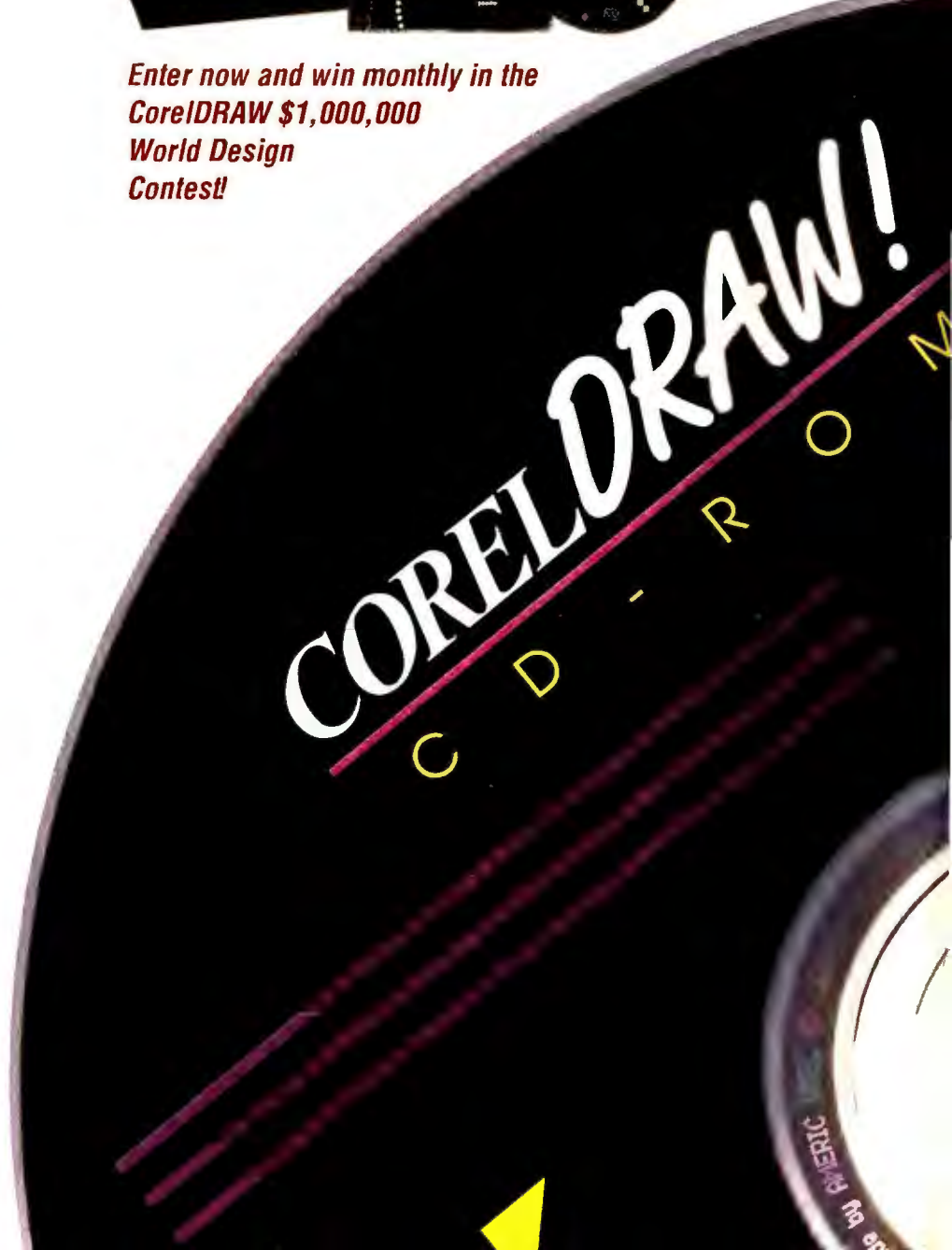

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PC World offers answers and advice at every level

Leave It On or Turn It Off?

Q *My department runs ten 386s on a Novell network. One recent Friday night, I was the last person to leave the office. It seemed to be a waste of energy to leave the workstations on, because they are not used on weekends, so I turned them off. (I left the server on, of course.) The following Monday, I was greeted by a terse note saying that the machines were to be left on at all times and that I should not tamper with things that I "obviously know nothing about." The note went on to say that leaving the computers on helps to "charge the batteries" and that most of the damage inflicted upon computer systems happens when turning them on and off.*

I am by no means a PC expert, but this struck me as a bit farfetched. What batteries need charging? Is it true that turning computers off on the weekend can damage their processors?

JOHN T. KIM
IRVINE, CALIFORNIA

A Ah, the eternal question—not a month goes by that we don't get letters asking whether to leave PCs on all the time or turn them off at night. In our quest for a conclusive answer, we've called engineers from a cross section of the computer industry, people who design and support systems, monitors, chips, boards, and drives.

Few were willing to venture an unequivocal recommendation, and the advice we did get was split right down the middle. One expert tells us, "Leave it on, and your system will probably last longer"; another says, "Shutting it off probably slows wear." Others advise: "The power surge from turning it on might hurt the system." "The power surge from the night crew's cleaning equipment's more of a threat." Turn it off and on and you'll "...wear out your drive's bearings," "...wear out your chips," "...break the power supply switch sooner." And so on.

If there were a definitive argument one way or the other, we're convinced we would have uncovered it by now. We suspect the only real danger in turning a system off comes from wide variation in temperature. If your system's in a room where the temperature drops below 55 degrees at night, it's probably a good idea to leave it on—but only if it's plugged into a good surge protector, and only if you scrupulously park the drive's heads when you go home (see "Should I Park My Hard Drive?" in this column). Otherwise, there's no reason to waste the electricity. The systems should last at least ten years in any case and will be obsolete long before any part wears out.

The batteries in question maintain the system's start-up information and keep the CMOS clock-calendar chip ticking when the system's turned off. Many newer systems do recharge their batteries when powered up, but using such a system for a couple of hours every six to nine months should give the batteries all the charging they need.

Which Is Best: IDE, ESDI, or SCSI?

Q *I am confused as to the advantages and disadvantages of various types of hard drives. We're about to set up a large* dBASE IV *application on our* Lantastic *server, which is a 33-MHz 386. Which kind of drive would be best: IDE, SCSI, or ESDI? Would the same kind also be the best choice for our workstation hard drives?*

DAVID STANLEY
GERMANTOWN, TENNESSEE

A We've had a lot of letters lately asking about the advantages of the various drive interfaces. The situation has changed a lot over the past couple of years, so here's our report on the current state of the art.

First, you can cross ESDI off your list. ESDI drives are more expensive and slower than IDE or SCSI alternatives, and most manufacturers are phasing them out. If you already own one, you can consider a caching controller if you want to boost the drive's speed.

The biggest, fastest hard drives around these days use SCSI. That makes them your first choice for a high-powered LAN server. However, among manufacturers of the 200MB-and-under drives typically installed in workstations, those we spoke with rate their latest IDE drives as fast as their SCSI counterparts. Moreover, while both interfaces' maximum throughput exceeds that of the ISA bus, newer motherboards sidestep that limitation by using a special high-speed bus to an on-board IDE connector.

A big advantage to using SCSI in a server is that you can daisy-chain six or seven drives off a single adapter for easy expansion as your storage requirements grow. Depending on the brand, you can install up to four adapters in a single system, for a maximum of 28 drives. You can also hook other devices to a SCSI

ANTHONY RUSSO

adapter, such as tape, WORM, and optical drives. In contrast, you can't use more than one IDE connector in a system, and it can handle only two hard drives.

Neither SCSI nor IDE allows you to mix and match adapters and drives freely. Due to varying interpretations of the SCSI and SCSI-2 specifications, you still can't always attach drives made by different manufacturers to the same controller. That means either restricting your choice of drives or installing additional adapters. While IDE adapters are interchangeable, IDE drives sometimes conflict with one another, which may limit your choice of a second drive to those from the same manufacturer.

Depending on your configuration, IDE can be significantly less expensive than SCSI. If your motherboard doesn't have built-in IDE, you can pick up a combination floppy-IDE adapter for under $50; SCSI equivalents cost about four times as much. While SCSI hard drives generally cost little more than their IDE equivalents, SCSI tape drives are about twice as expensive as the ones that hook to your floppy controller. (They're also a lot faster, so they may merit the extra expense.)

The bottom line is that SCSI is usually the best choice when you're setting up a network server or building a high-powered graphics or CAD workstation. For the average user's workstation, IDE is currently a better deal.

Note that in order to get top performance from your LAN server, it's not enough just to have a fast hard drive. You also need to have plenty of RAM for caching. Start off with a minimum of 8MB of RAM in the server, and watch the cache statistics to see whether you'd benefit from adding more or installing a caching controller. To attain top network data base performance, consider switching from *Lantastic* to NetWare—it has consistently proved to be the fastest LAN OS in *PC World* tests.

Delete *.BAK From Every Directory

Q *My word processor creates backup files that have the extension BAK. Is there a way that I can delete these files from all of my data directories with a single command?*

C. BEINART
NEW YORK

A You can do so easily using the DOS Shell or *Windows'* File Manager utility. Both work exactly the same way. To avoid having to confirm deletion of each file, select *Options•Confirmation,* uncheck the 'Confirm on Delete' box, and select *OK.* Then select *File•Search,* type ***.BAK,** check the 'Search entire disk' box (if it isn't already checked), and select *OK* to display a list of all files on your current drive with the BAK extension. Select *File•Select All,* press **<Delete>**, and your disk will be wiped clean of BAK files. To restore the usual warning dialog box for confirmation of deletes, select

Congratulations...
Now all your
applications
can read.

Options•Confirmation again and check the 'Confirm on Delete' box.

Cool Down an Overheating System

Q *In my never-ending quest for top* AutoCAD *performance, I've installed a lot of boards in my desktop 486 system. Currently, I've got a RAM expansion board, a video coprocessor, a caching ESDI controller, an ethernet adapter, and a scanner interface. I also have a fax-modem, which is sitting on the shelf at present. When I installed the fax-modem, my video board acted up, and my computer tech eventually traced the problem to overheating. The only solution he offered was to upgrade to a tower system for better ventilation. Are there other alternatives?*

BARBARA SWAN
SAN FRANCISCO

A A full-size tower case is a good choice for someone who needs to install that many boards. A tower has more air space inside, and the top of the case, which is the hottest part of the interior, is about a foot from the closest expansion board. It shouldn't be necessary for you to buy a whole new system—if your motherboard is a standard size, a good computer shop should be able to transplant it and your drives into a tower case.

Before you go to all that trouble and expense, however, we suggest you try installing a FanCard. This gadget is an expansion board that holds two thin fans. Plug it into a slot next to your video board, and the direct play of air over the hot chips should cool things down to an acceptable temperature.

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Should I Park My Hard Drive?

Q *I'm a student at the University of Virginia. My friend down the hall parks his hard drive every night because he's afraid someone might bump into his desk and jar the computer. I was wondering whether that's a good idea and whether I would be more likely to experience read and write errors if I were to start parking my hard drive. (I've noticed that my friend's drive now makes a whirring noise it didn't make before.)*

RICHARD B. ROGERS
CHARLOTTESVILLE, VIRGINIA

A It's extremely unlikely that your friend's head-parking utility could damage his hard drive. It could happen only if the system's CMOS setup memory contained a wrong drive type that caused the drive head to land on the formatted area of the disk, or if he used a very old or badly written park utility that was incompatible with his drive.

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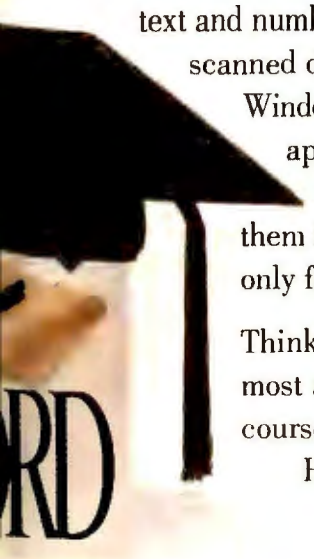

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Circle 21 on reader service card

When you leave your computer turned on and you suspect someone—like the cleaning crew in an office building—might bump into the CPU, it's smart to park the heads. The easiest way to do this is to modify your AUTOEXEC.BAT to load a memory-resident utility that parks the heads automatically after several minutes of inactivity. If you own *Mace* or *PC Tools*, use their utilities; otherwise, you can download a freeware utility like PARKTIME.COM or TIMEPARK.COM from your favorite on-line service or BBS.

If you turn your system off, you don't necessarily need to park your drive first to protect it from bumps in the night. Most hard drives manufactured in the last few years (including all IDE drives) park themselves automatically when they lose power.

As for the whirring in your friend's system, that may be the hard drive's bearings showing their age. Or it may be just the bearings in the fan. All hard drives eventually give up the ghost, so back up regularly.

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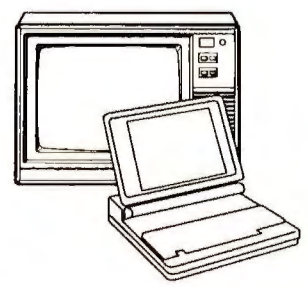

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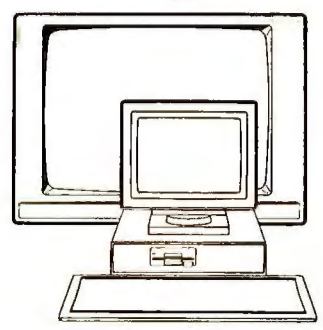

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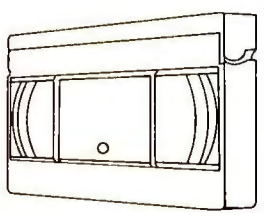

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Updating WordPerfect Printer Drivers

Q I own a Panasonic KX-P4450i laser printer. WordPerfect 5.1 *has a driver for the old Panasonic KX-P4450, but it doesn't support all my printer's features. Where can I get a driver for the newer model?*

LUIS F. ABREU ELIAS
HATO REY, PUERTO RICO

A Like most large software companies, WordPerfect constantly updates its printer drivers to add new models—including your KX-P4450i. To get information on ordering new drivers, just call the company at 800/228-1023. (If you can't dial that number from your area, use 801/226-7977.) You can also

POWER TIP NO. 245

Faster Corel Draw Printing

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Robert Luhn
Contributing Editor

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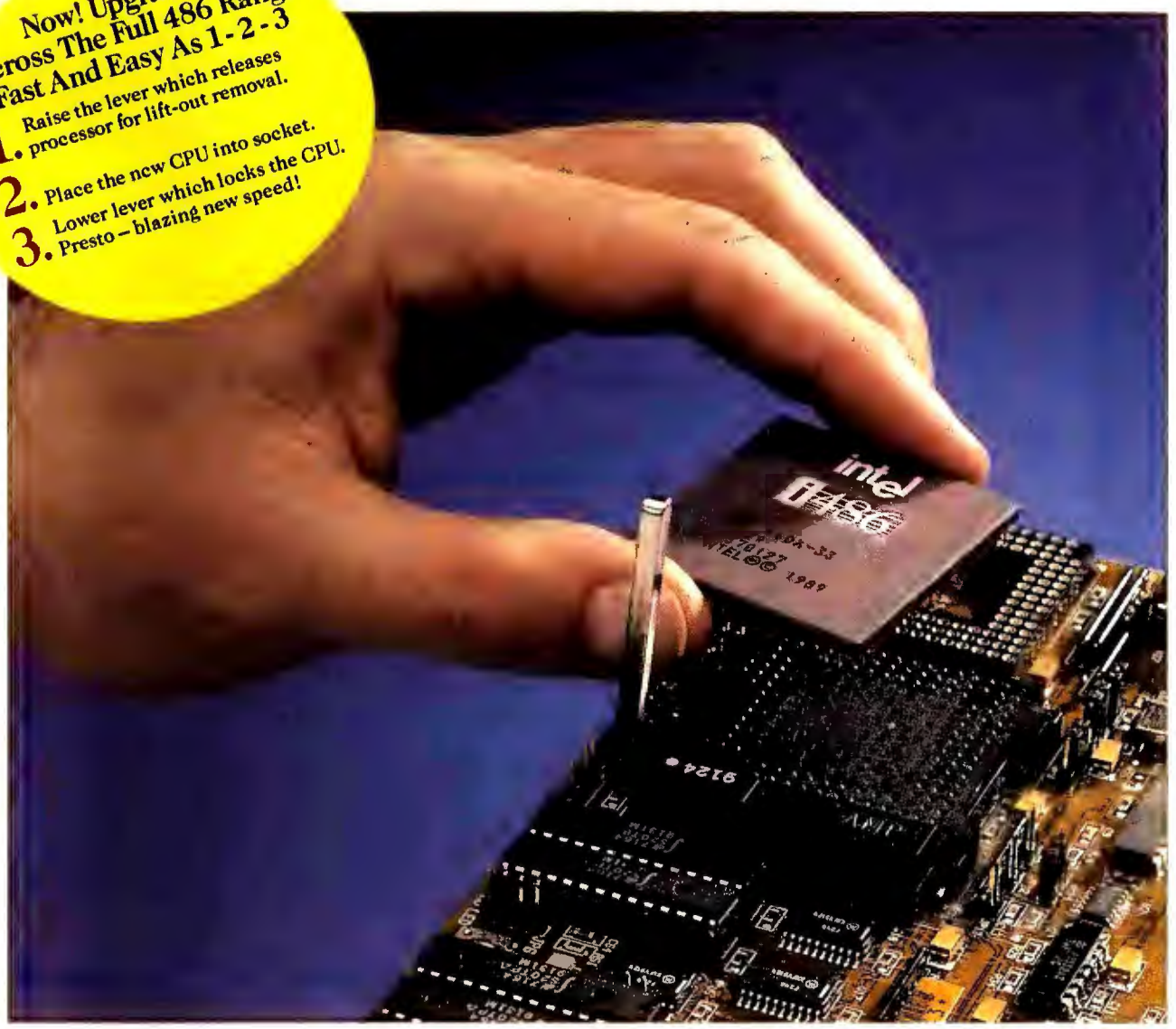

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Karl Koessel is the technical editor and Robert Lauriston a contributing editor for PC World.

POWER TIP NO. 246

Pushing the Folder Limit With cc:Mail

It's smart to use folders to store cc:*Mail* messages in manageable, organized groups. You can easily make custom folders on the fly after you read a message. Just select Move from the cc:*Mail* Action menu, and enter a name for the folder. But sooner or later when you try to create a folder, you'll get the error message 'New titles may not be entered'. What the program doesn't tell you is that you're up against its 200-folder limit. Select *Manage mailbox* from the Main menu and *manage Folders* from the Manage menu. Choose a folder you're no longer using, select *Delete folder,* and press Y to delete it along with any messages it contains. If you don't have time to look at the messages first, delete only empty folders.

Rex Farrance
Assistant Editor

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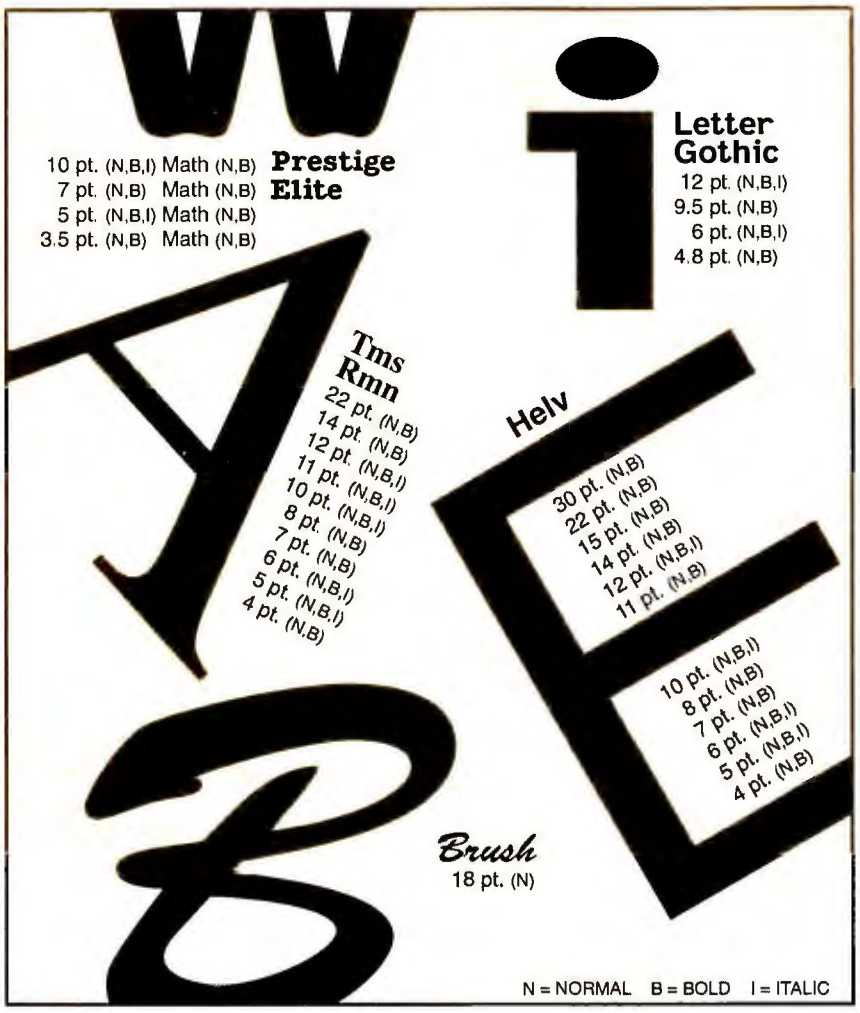

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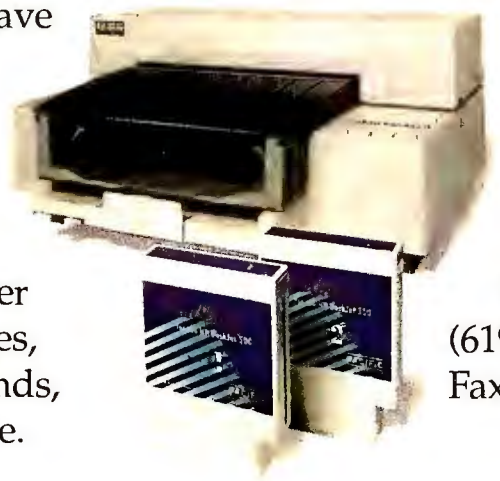

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SPREADSHEETS (A..Z)

BY RICHARD SCOVILLE

Practical tips for building better worksheets

More people store data base information in spreadsheets than in data base programs, so data base statistical functions are indispensable for many spreadsheet users. In this month's column, I'll take a look at these chronically underutilized but supremely useful spreadsheet devices. I'll explain how they work and show you how to use them in typical reports. Along the way, we'll take a peek at some nifty tricks for efficiently placing formulas in tables.

Suppose you use *1-2-3* or *Quattro Pro* to maintain a personnel data base like the one shown in range A1..D8 of **FIGURE 1**. You need to report the data in several different formats: Along with an alphabetical list of all employees, you need to show the total salary, maximum salary, and number of employees in each department. You could group the employees by department, and use @SUM(), @COUNT(), and @MAX() functions to total each department. But then you'd have to rearrange the data in order to print the alphabetical list. The solution? Data base statistical functions, of course.

Data base statistical functions such as @DSUM(), @DCOUNT, @DAVG, @DMIN, and @DMAX work much like their regular counterparts—@SUM, @COUNT, and so on—except they're more selective: They calculate the values only from a selected column of a data base, from the records selected by a criteria range. For example, if your employee data base contains columns for department and salary, like the one shown in the figure, you can create a criteria range to select the employees from the MIS department, then use an @DSUM() function to compute the total of their salaries.

The typical data base report shown in cells F14..I20 of **FIGURE 1** consists of a set of data base statistical functions for each department. Each department requires its own criteria range (they're in the range A11..D12).

Building the Model

You can build this month's model in *1-2-3 2.2* or later, or in *Quattro Pro*. Begin with a blank worksheet. With the */Worksheet•Global•Column•Width* command, set the global column width to **8**. You'll want a numeric format in which large numbers are easy to read—in other words, commas are in and anything right of the decimal point is out. Select */Worksheet•Global•Format,* choose the comma, type **0**, and press **<Enter>**. With the cell pointer in column A, use */Worksheet•Column•Set-Width* to change its width to **13**.

Now it's time to enter the labels and values. Start with the data in the range A1..D8—the alphabetized information you'll be reporting on. Each department will require its own criteria range; enter them, as shown, in cells A10..D12. Each of these ranges should be named. Use the table at F1..H6 as a guide for how to name each range. For example, to assign the name CU_DB to the range A1..D9, select */Range•Name•Create,* enter **CU_DB**, highlight the range A1..D9, and press **<Enter>**. You don't need to actually enter anything in cells F1..H6. Finally, to make your results readable, enter the labels in G14..I15 and F15..F20. Now you're ready for the data base functions, which you'll put in G16..I19.

G16: @DSUM($CU_DB,2,$CU_CR_MKT) READY

	A	B	C	D	E	F	G	H	I	J
1	NAME	DEPT	SALARY	SCORE		Range Names				
2	Crosby, David	Mkt	25,000	12		CU_DB		A1..D9		
3	Danko, Rick	MIS	41,000	41		CU_CR_MKT		A11..A12		
4	Dylan, Bob	MIS	33,000	13		CU_CR_MIS		B11..B12		
5	McGuinn, Roger	Sales	56,000	98		CU_CR_SALES		C11..C12		
6	Nash, Graham	MIS	18,500	12		CU_CR_TRAIN		D11..D12		
7	Stills, Stephen	Train	78,000	40						
8	Young, Neil	Train	122,000	31						
9										
10	Criteria Ranges									
11	DEPT	DEPT	DEPT	DEPT						
12	Mkt	MIS	Sales	Train						
13										
14							TOTAL	STAFF	MAXIMUM	
15						DEPT	SALARY	COUNT	SALARY	
16						Mkt	[illegible]	1	25,000	
17						MIS	92,500	3	41,000	
18						Sales	56,000	1	56,000	
19						Train	200,000	2	122,000	
20						TOTAL	373,500	1		
21										

DSTAT.WK1

FIGURE 1: Data functions can pull useful summary information (F14..I20) out of a range of data (A1..D8).

ANTHONY RUSSO

Spreadsheet Toolbox

EASY FORMULA EDITING

If you work with complex formulas in *1-2-3 2.x*, you've probably found yourself muttering unkind words about *1-2-3*'s formula editor. It's a bit like trying to build a house with a pair of tweezers.

Let me introduce you to the *Formula Editor* add-in from Funk Software. Press a key and you get the current formula in a full-screen display, with any syntax errors flagged in a contrasting color. Special keystrokes let you swap between range name and cell address displays; select @functions, range names, and operators from superbly organized pop-up menus; specify absolute cell addresses; and jump back to the spreadsheet to point to a cell or range, or define a new range name from any point in the formula.

And that's just for starters. *Formula Editor* can help you understand complex formulas by automatically highlighting expressions within parentheses and calculating the numeric values of each component expression of your formula.

It's a workhorse. If you live with *1-2-3*, you can't live without this utility.

Formula Editor $99.95; Funk Software Inc., 222 Third St., Cambridge, MA 02142; 800/822-3865, 617/497-6339.

Functioning With Data

In cell G16, you need the salary totals for the Marketing department. To obtain this number, enter the formula **@DSUM($CU_DB,2,$CU_CR_MKT)**. The first parameter, $CU_DB, is the data base range that @DSUM() will search. The second parameter, 2, tells @DSUM() to total the values in column 2, which is actually the third column of the data base—SALARY because @DSUM() counts the first column as 0. The last parameter, $CU_CR_MKT, is the search criteria range; since the CU_CR_MKT range—A11..A12—contains the word Mkt under the word DEPT, @DSUM() will ignore any lines in the data range that don't have the word Mkt in their DEPT column.

Use */Copy* to copy the formula into the range G17..G19. Next, edit the formulas to make each refer to the proper criteria range: Put the cell pointer on G17, press **<F2>**, position the cursor anywhere within the term 'A11..A12', and press **<F4>** to convert the range address to the range name CU_CR_MKT. Use **<Delete>** to delete MKT, type **MIS** in its place, insert a dollar sign in front of the 'CU_' and press **<Enter>**. The formula should read @DSUM($CU_DB,2,$CU_ CR_MIS). Use the same procedure to modify the remaining formulas in column G, changing the MKT to **SALES** and **TRAIN**, respectively.

Thanks to *1-2-3*'s search and replace capabilities, putting new formulas into columns H and I is easy. First, use the */Copy* command to copy the existing formulas from G16..G19 to H16..I19. To convert the H and I @DSUM() functions into @DCOUNT() and @DMAX() functions, go to H16 and select */Range•Search*. Specify H16..H19 as the range to search and **SUM** as the string to search for, then select *Formulas•Replace* and enter **COUNT** as the replacement string. Select *All* and the proper count values will appear in the range. Use this process in column I to convert SUM to **MAX**.

There you have it; your data base summary information is in place. You'll probably also want grand totals in the salary and staff columns, and you can do these with conventional spreadsheet functions: just enter the formula **@SUM(G16..G19)** in G20, and copy it into H20 for the total of all salaries and employees companywide.

Spreadsheets aren't the best tools for handling lots of data. If you have large quantities of complex information to manage, you should consider a full-fledged data management program, such as *Paradox*. But if you already own—and know—a spreadsheet program, you'll find it convenient for less-demanding data management tasks.

Questionable Spreadsheets Department

Q I'm using 1-2-3 to prepare an amortization schedule and need to truncate—not round—values for a report. I've been using the @STRING() function, editing the cell, then backspacing. Is there a simpler way?

JOHN HATTON
WOODCLIFF LAKE, NEW JERSEY

Sheet1

	A	B
1	="00"&70	0070
2	="00"&20	0020
3	="00"&50	0050
4		
5	=SUM(B1:B3)	0
6	=B1+B2+B3	140
7		
8		

FIGURE 2: As column B shows, the Excel formulas in column A can produce some surprising results.

Excel Shortcut

FAST KEYBOARD SHORTCUTS

by Ralph Soucie

Excel uses the mouse so well it's easy to overlook the program's <Ctrl>-*key* shortcuts. Nothing is faster than entering a formula or formatting a cell in a single keystroke—as long as you know the keystroke.

To enter the current date in the active cell, press **<Ctrl>-;**. For the current time, use **<Ctrl>-:**. To copy the formula on the cell above the pointer and leave the cursor on the formula bar for you to edit the formula, use **<Ctrl>-'**.

You can even format with shortcuts. The following table lists *Excel*'s formatting key combinations and what they do to selected cells, rows, and columns.

Key combination	Effect on selected cells, rows, and columns
<Ctrl>-~	Apply general number format
<Ctrl>-!	Apply #,##0.00 number format
<Ctrl>-@	Apply h:mm AM/PM number format
<Ctrl>-#	Apply d-mmm-yy number format
<Ctrl>-$	Apply ($#,##0.00_);($#,##0.00) number format
<Ctrl>-%	Apply 0% number format
<Ctrl>-^	Apply 0.00E+00 number format
<Ctrl>-1	Apply normal font format
<Ctrl>-2	Toggle bold font format
<Ctrl>-3	Toggle italic font format
<Ctrl>-4	Toggle underline font format
<Ctrl>-5	Toggle strike-through font format
<Ctrl>-9	Hide rows
<Ctrl>-(	Unhide rows
<Ctrl>-0	Hide columns
<Ctrl>-)	Unhide columns
<Ctrl>-&	Create outline border
<Ctrl>-_	Remove all borders

A As you've already discovered, you can round values by using /Range•Format and choosing a format such as Fixed, or by using the @ROUND() function. But to simply drop all decimal places past the second, try this: In a blank worksheet, enter the value **.333333** in cell A1. In A2, enter **@INT(A1*100)/100**. Multiplying .333333 by 100 yields 33.3333. The @INT() function gives you the integer value of a number, that is, 33. Then dividing by 100 gives .33.

Q *I occasionally need to enter numbers with leading zeros in* Excel. *In my search for a solution, I learned to format the cells using Format•Number and the 000# format, which works fine. But along the way, I discovered something strange about* Excel. *If you need leading zeros only in an occasional cell value, you can avoid the formatting step by entering a formula like* **="00"&70** *to display '0070.' You can see more examples in* **FIGURE 2.** *The labels in col-*

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umn A reveal the contents of the cells in column B. But here's the strange part: If you add a series of these formulas using SUM(), as in B5, you end up with zero. But if you use a formula like the one in B6, you get the correct result. Is this a bug in Excel?

SHANE DEVENSHIRE
WALNUT CREEK, CALIFORNIA

A It's not a bug. You're using a carefully designed property of *Excel*, "data type coercion," on a job for which it was never intended. When you enter a formula such as ="00"&70, you've given *Excel* an ambiguous mission: You've asked it to concatenate a text string (00) and a number (70). *Excel* responds by converting the number to a string, and the result is a string value. Your formulas then try to interpret those string formulas as numbers: The one in B6 gives the correct answer because the plus operators force *Excel* to interpret the cell contents as numeric values. But SUM() always ignores strings occurring in its arguments, hence the zero result.

Data type coercion, when used properly, actually makes *Excel* much easier to use. For instance, in *1-2-3*, you can't enter an address such as 500 Elm St. without typing a label prefix first because it begins with a numeral. But in *Excel*, as long as you haven't turned on the Alternate Navigation Keys option, you can type the address directly, and the program will see it as a label.

Mail your spreadsheet questions to Spreadsheets (A..Z), PC World, *501 Second St. #600, San Francisco, CA 94107; or send them electronically to PC World Online, Spreadsheets (A..Z); CompuServe, 72341,2727; MCI Mail, 357-4517; 415/442-1891 (fax).*
PC World *pays $50 for published questions. Sorry, we cannot acknowledge unpublished materials.*

Richard Scoville and Ralph Soucie are contributing editors for PC World.

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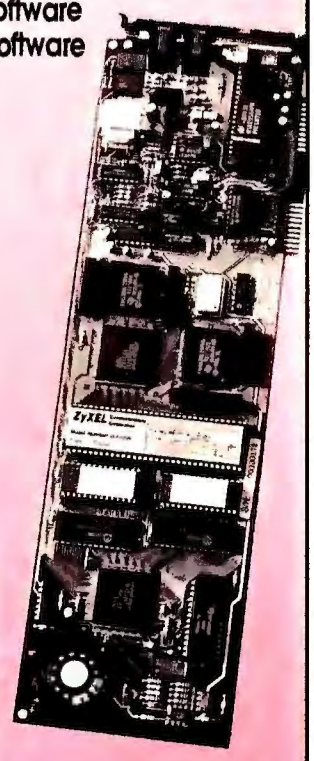

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POWER TIP NO. 247

Shortening cc:Mail Names, Period

Sometimes I want to create a folder for a *cc:Mail* message or write it to an ASCII file, but the name I've chosen is a shortened version of an existing name, say, DO instead of DONE. When I spell out DO, *cc:Mail* highlights DONE. To get around this idiosyncrasy, I just place a period after DO.

Rex Farrance
Assistant Editor

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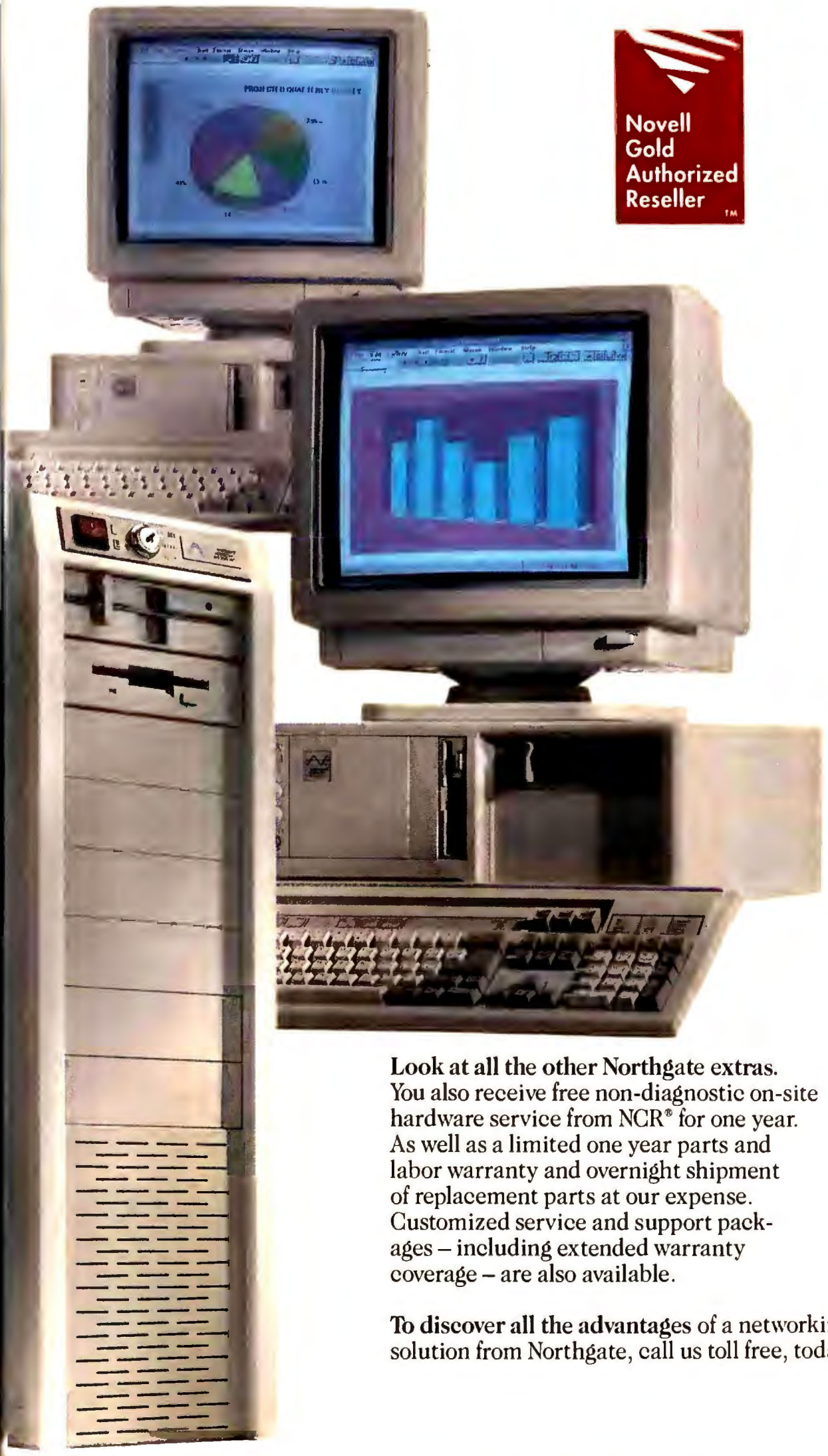

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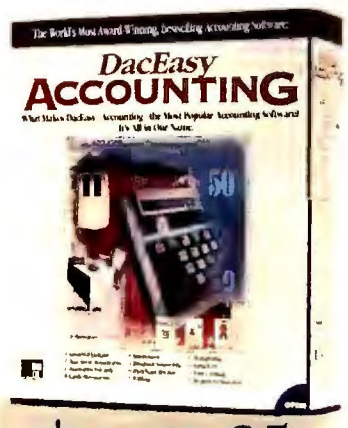

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WORD PROCESSING CLINIC

BY GEORGE CAMPBELL

Tips for getting the most out of your word processor

Q *When I change the top margin of the second page of a* WordPerfect 5.1 *document, it sometimes changes back to the margin size of the first page; I know I haven't changed the margin settings. Is there any way that I can stop this from happening?*

CAROLYN WARD
DANBURY, CONNECTICUT

A You've discovered a problem in the way *WordPerfect* handles its page margin formatting codes. When you change margins on a second page, *WordPerfect* inserts a code in your document before the text on that page. However, if you add or delete any text on a previous page, the margin code moves when *WordPerfect* repaginates. Since page margin codes must occur *before* any text on a given page, you lose your margin changes. You can see this happen if the Reveal Codes window (**<Alt>-<F3>**) is visible.

What's the cure? Wait until you've made all your text changes to format your document, or insert a new margin code for the second and succeeding pages. Just remember to move the cursor to the first character on that page before inserting the code.

Q *When I'm using* WordPerfect 5.1's *Equation Editor with my Toshiba 24-pin printer, my output shows an equal sign looking almost like a minus sign. The two lines are spaced too closely together. WordPerfect tech support has been unable to figure out what's wrong. Do you have any ideas?*

AUGUST NECHI
STONE MOUNTAIN, GEORGIA

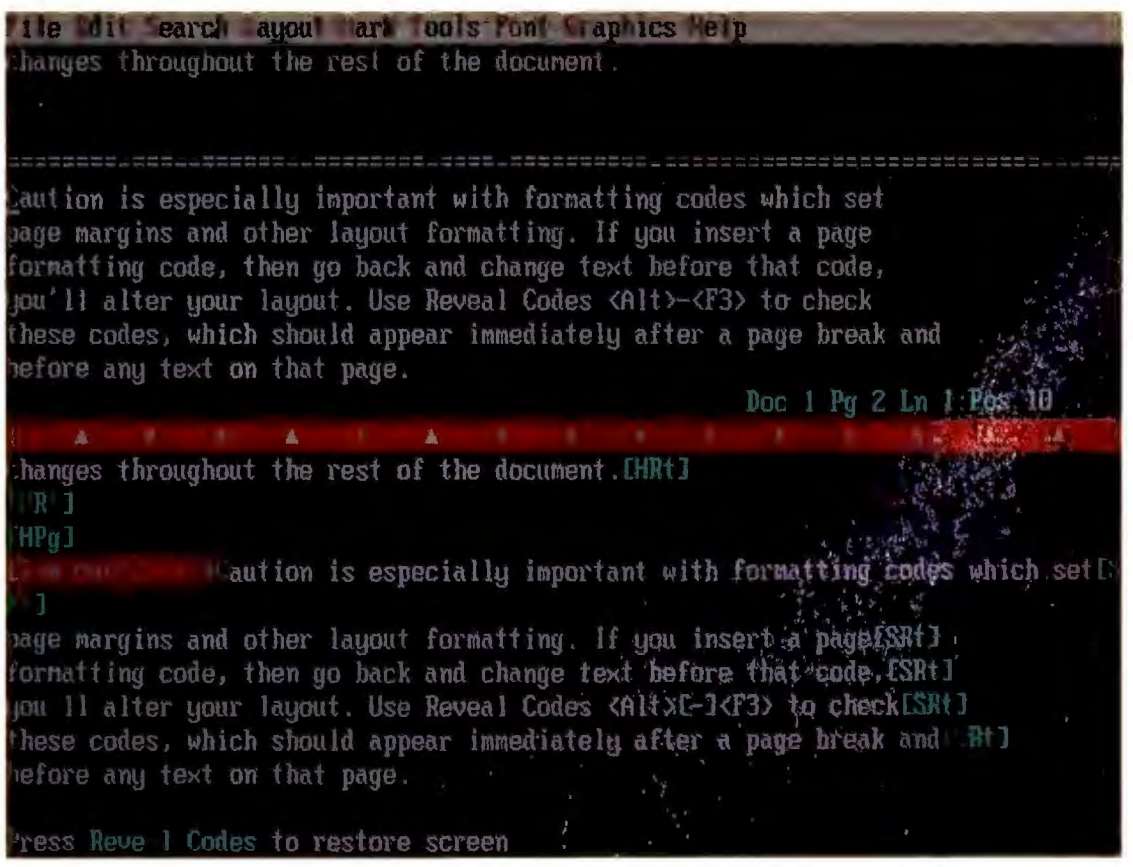
A This problem occurs with many printers, but it's fairly easy to solve. *WordPerfect* normally prints equations using graphics. Your printer is having difficulty coping with the small spacing needed between the lines of the equal sign. What's the solution? You need a larger font size. To change an existing equation's font size, press **<Alt>-<F9>EE**, type the number for your equation box, press **<Enter>**, type **E**, then press **<Shift>-<F3>**.

Now press **<Page Up>** to increase the font size for the equation, or press **<Page Down>** to decrease it. When you're finished, press **<F7>** until you return to your document, then print a sample. Repeat the process until you're satisfied with the results.

Q *I just bought a copy of* Word for Windows 2.0 *and I'm having trouble getting* PageMaker *to import its files. The import worked fine with an earlier version of* WinWord. *Is this an incompatibility problem, or is there something I'm doing wrong?*

CHUCK ELFONT
HUNTINGTON WOODS, MICHIGAN

A No, you're not doing anything wrong. When new versions of programs emerge, their file formats often change. It often takes a while for other program vendors to develop import filters that can handle the changes. Until that time, here's a work-around: After you create a document in *Word for Windows 2.0*, select *Save As*, then click on



Page formatting codes in WordPerfect, like the margin code highlighted in this Reveal Codes window, must appear before any text on that page. If you edit text on a previous page, you may lose your formatting.

ANTHONY RUSSO

the arrow for the 'Save File as Type:' list box and select the *Word for Windows 1 (*.doc)* entry. Enter a file name in the file name box, and then click *OK* to save your document as a *Word for Windows 1.*x file. *PageMaker* will be able to handle this format just fine.

Q *I use* WordStar 6.0 *to create two-column documents. I'd like to create a header for each page that contains left-aligned text above each column, plus a page number aligned at the right margin. All this information needs to be on one line. I'm having difficulty finding a way to do this in* WordStar. *Can you offer any suggestions?*

SANFORD R. SILVERBURG
SALISBURY, NORTH CAROLINA

A Aligning text within headers can be tough. While I can't give you *exactly* what you want, I can come close. The key to the solution is *WordStar*'s tab feature. *WordStar 6.0* will let you align text within headers, although it's not obvious. Assuming that you're using the default page parameters for *WordStar 6.0,* follow these steps at the very top of your document or at the top of the first page where you want the header.

1. To turn off bottom-of-the-page page numbering, type **.op** and press **<Enter>**.

2. To set tabs for the header, type **.tb 3.4"**, press **<Space>**, type **6.4"**, then press **<Enter>**.

3. To create the header, type **.h1**, press **<Space>**, type the header text for the first column, press **<Tab>**, type the header text for the second column, press **<Tab>**, type **#**, then press **<Enter>**.

4. Now press **<Ctrl>-OU** and, in the dialog box, enter **2** to specify the number of columns that you want.

You may find that *WordStar*'s default margin settings are too small to print your headers, especially if you have a two-line header. You can increase these settings in the Margins & Tabs section of the Onscreen Format menu, but first move the cursor above any of the commands for your header.

While you can create these dot commands from *WordStar*'s drop-down menus, it's easier here just to type them in. One caution: If you go back and change the tab measurements in the first line, delete and reinsert the tabs in the header text, or your changes won't take effect.

Mail your word processing questions to Word Processing Clinic, PC World, *501 Second St. #600, San Francisco, CA 94107; or send them electronically to PC World Online, Word Processing Clinic; CompuServe, 71571,222; MCI Mail, GCAMPBELL; 415/442-1891 (fax).* PC World *pays $50 for published questions. Sorry, we cannot acknowledge unpublished materials.* ●

George Campbell is a contributing editor for PC World.

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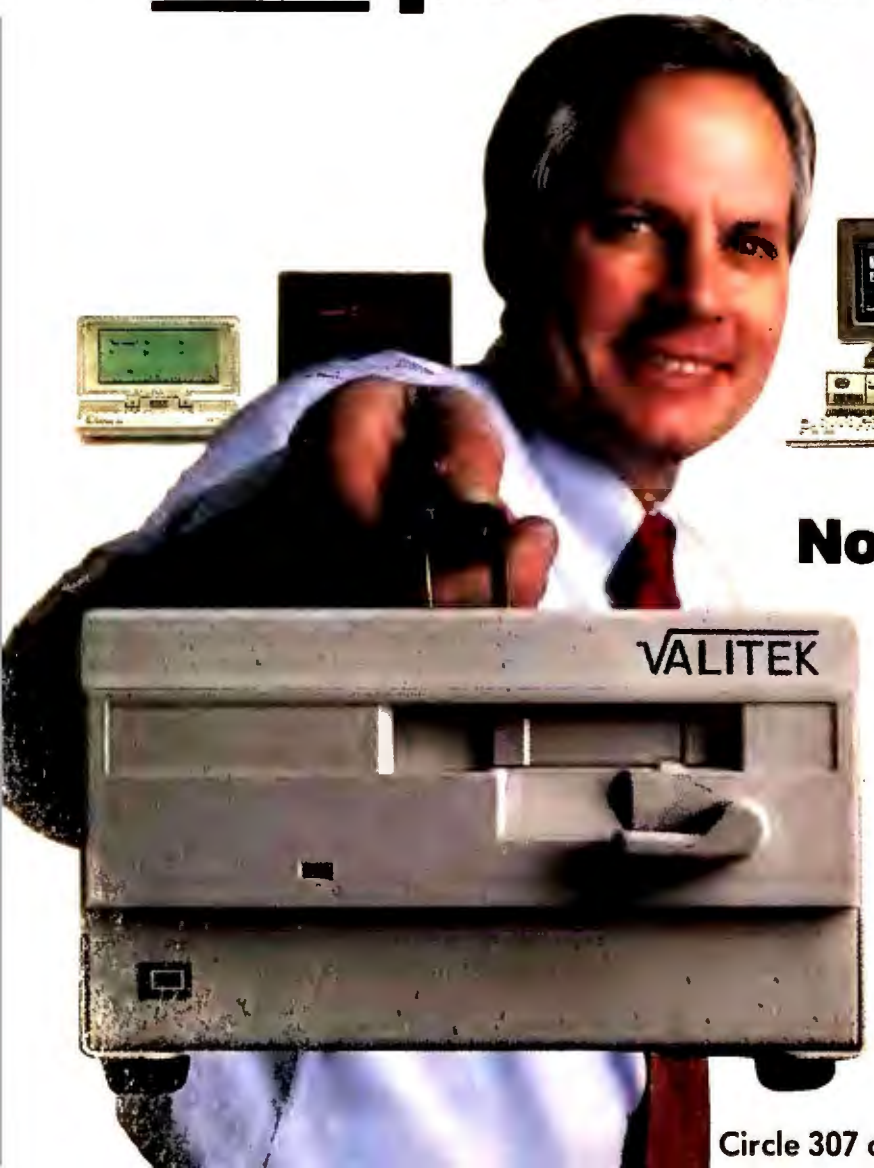

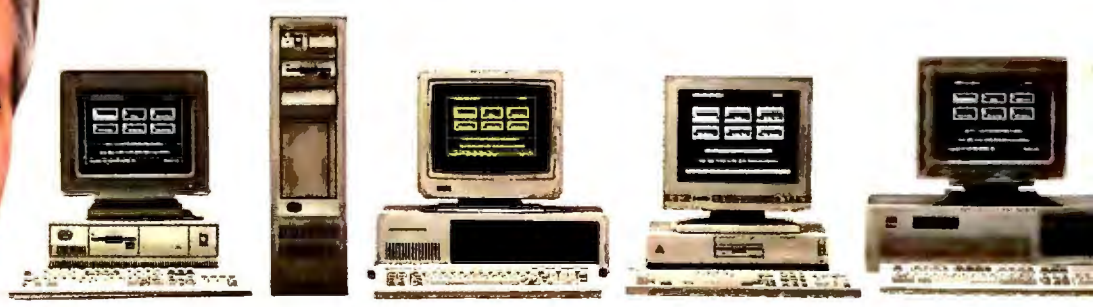

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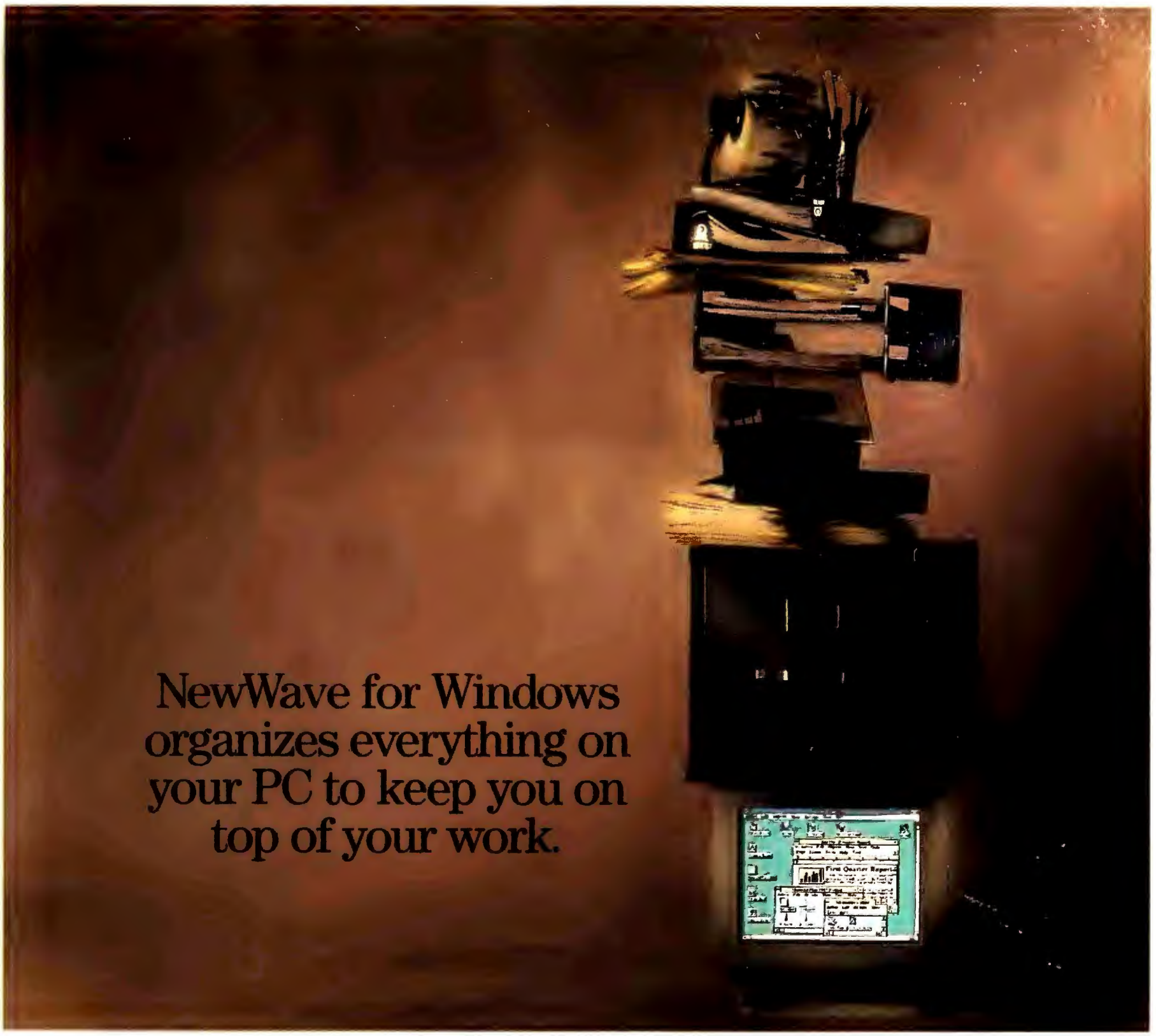

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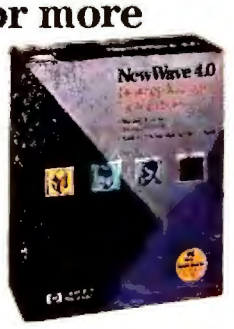

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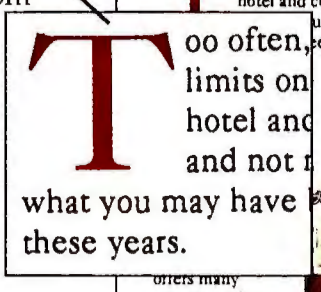
Too often, limits on hotel and and not what you may have these years.

Too often, business "travel" limits one to a view of the hotel and convention hall, uch else. Here's en missing all

offers many rewards to those who take the time to uncover its cornucopia of riches.

For an interesting lesson in American history, don your walking shoes and follow the Freedom Trail (536-4100). The trail's two loops will lead you past no fewer than 16 historical sites, including the Old North Church, the location of the Boston Massacre, the Granary Burial Ground, the Old Corner Bookstore, Paul Revere's House, and the Old South Meeting House.

Beantown contains far too many historical gems to mention here, but make an effort to visit the Boston Tea Party Ship and Museum in southern Boston (338-1773), the John F. Kennedy Presidential Library (929-4523) in Dorchester, the Bunker Hill Monument in Monument Square (Charlestown, 242-5641), and "Old Ironsides" (426-1812, also in Charlestown).

(continued on page 4)

Winter Issue — Volume 8, Number 2

A Travel Plus Publication

Gateways

INSIGHTS FOR THE BUSINESS TRAVELER

Three Great Places to Mix Business with Pleasure

If business is taking you on the road soon, why not extend your trip into a memorable vacation? Three exciting American cities, Boston, Chicago, and San Francisco, are luring increasing numbers of business travelers, and provide plenty of sights, sounds, and flavors to satisfy even the most demanding vacationer.

* * * * *

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(continued on page 4)

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Travel Productivity 3

Kerning. For truly professional typography, Express Publisher gives you automatic *and* manual kerning control. It's the difference between [HAWAII] and [HAWAII]. Microsoft Publisher doesn't give you the same kerning control.

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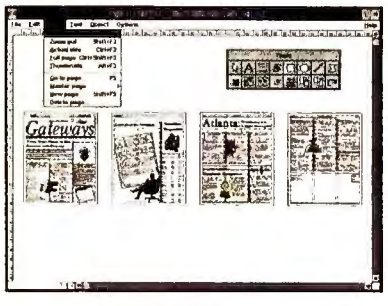

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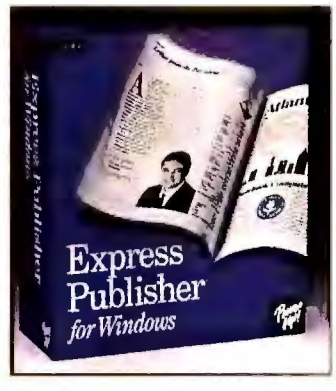

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Circle 211 on reader service card

DATA BASICS

BY STEVE CUMMINGS

Tips and techniques for managing your data

Q I wish I could find some way to automatically purge my dBASE IV *mailing list of customers who haven't ordered within the past year. Can you recommend an easy solution?*

BILL PIKE
MADISON, TENNESSEE

A Create a new query for your data file. At the Query Design screen, type **MARK** in the box directly under the data base's file name, then select *Condition • Add Condition Box* (if you're warned about changing the query type, select *Proceed*). Assuming that the Last_Order field holds the date of each customer's last order, type **DATE() - Last_Order > 365** in the condition box.

Now you can mark the old records for deletion all at once by selecting *Update • Perform the Update* and confirming the change. Finally, to purge the marked records, press **<F2>** to move to the Browse screen, and select *Organize • Erase Marked Records • Yes.*

Q I find navigating through a large Paradox *data table to be a major hassle. Is there a quick way to get to the field or record I'm looking for?*

ANDREA HARTSOCK
LITTLE ROCK, ARKANSAS

A To get where you want to go fast, use *Paradox*'s Zoom command. While viewing a table, press **<F10>** and choose *Image • Zoom*. You'll get options for moving to a specific field, record (by record number), or value—where *Paradox* will search a column for the string of numbers or characters you're seeking. This is an exact, case-sensitive search; *Paradox* will take you to only those entries on the data table that match your criteria perfectly.

By the way, there's a Zoom Value shortcut that doesn't require menus. Place the cursor in the column you want to search, press **<Ctrl>-Z**, fill in a search value, and press **<Enter>**.

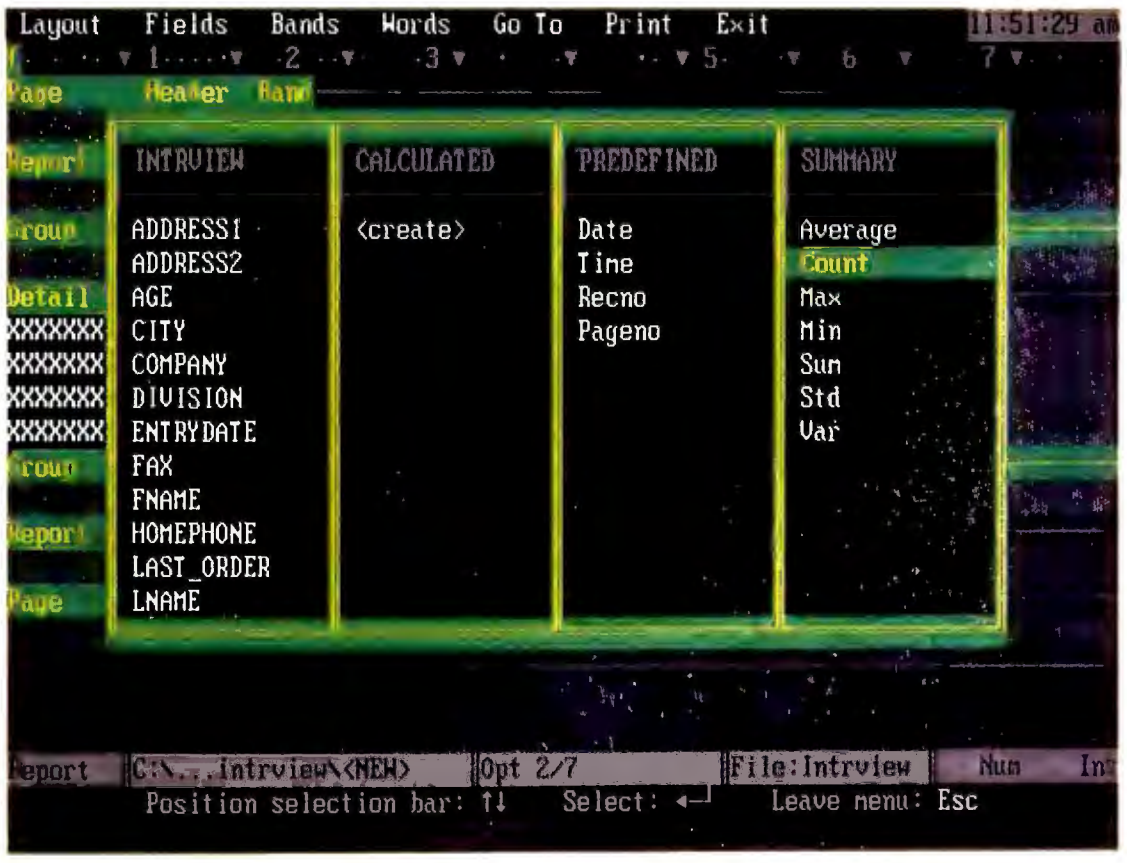
Q I'm working with a marketing survey data base that includes an age field. Is there a way to print a report using dBASE IV *that divides the data by age group?*

HAROLD R. ROBINSON
TACOMA, WASHINGTON

A Assuming that your file is indexed on the age field, one relatively uncomplicated approach uses multiple IIF() functions to group interviewee data according to age.

At the Report Design screen, place all the fields you want to print where you want them in the Detail Band, position the cursor in the Report Intro Band (the second band from the top), and select *Bands • Add a group band • Expression value.* Assuming that the age data resides in a field named Age, type in something like the following expression: **IIF(Age<=18, "Under 19", IIF(Age<=26, "19-26", IIF(Age<=42, "27-42", IIF(Age<=62, "43-62", "Over 62"))))**. Group 1 Intro and Summary Bands will appear.

That will take care of grouping your interviewees by age. To get a count for each group, go to the new Group 1 Summary Band, press **<F5>**, and select *Count* from the Summary column. Give



In the dBASE IV report writer, a Count field in a Summary Band will tell you how many records are in each subgroup.

ANTHONY RUSSO

Reader Tip

COUNTING FRIDAYS OR OTHER DAYS IN dBASE IV

Want to know how many Fridays or Tuesdays will occur in a given month or quarter? Here's how to get that information automatically in ***dBASE IV.***

Set up a data file with two date fields, Beg_Date and End_Date, and a one-digit numeric field, Weekday; then create a query for this file. At the Query Design screen, select ***Fields • Create calculated field,*** type **end_date - beg_date + 1**, press **<Down>**, and type **NUM_DAYS.** Repeat this process twice, the first time typing **weekday-DOW(beg_date) + IIF(weekday < DOW(beg_date),7,0)** on the top line and **XTRA_DAYS** below it, and the second time entering **INT(num_days/7) + IIF(xtra_days < MOD(num_days,7),1,0)** and **HOW_MANY.** Transfer this last field to the View by highlighting it and pressing **<F5>**; when you're asked to fill in a name, type **How_many.**

When you run the query, enter the appropriate dates and day-of-the-week number (Sunday is day 1) in the fields provided. ***dBASE*** will display the number of times your day of the week occurs within your time frame.

ROGER W. SANER
FAIRFIELD, CALIFORNIA

the new field a name and description if you like, and press **<Ctrl>-<End>** to insert it in your report. Save your report and exit.

From now on, when you print your new report you'll get a list of interviewee data, separated by age group, with a total at the bottom of each group. Just make sure your Age index is active before you print the report.

Mail your questions to Data Basics, *PC World, 501 Second St. #600, San Francisco, CA 94107; or send them electronically to PC World Online, Data Basics; CompuServe, 74055,412; MCI Mail, 339-3860; 415/442-1891 (fax).* PC World *pays $50 for published questions. Sorry, we cannot acknowledge unpublished materials.*

Steve Cummings is the author of Understanding Quicken *(Sybex, Alameda, California, 1990) and a contributing editor for* PC World.

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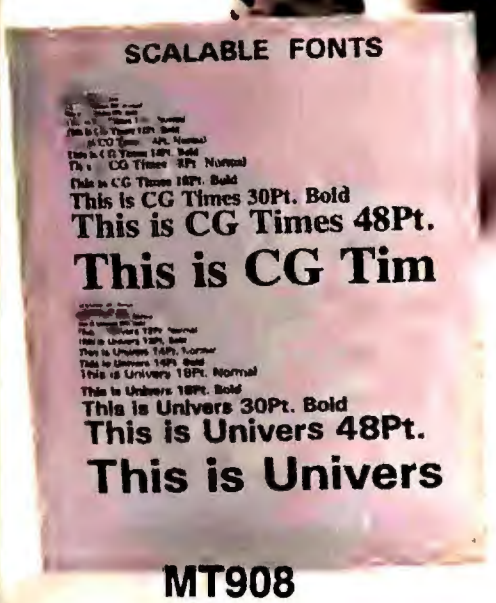

MT908

HP LaserJet III®

MT908 *Laser Printer*

Okay, here's a hint. The market leading laser printer features HP® PCL5 printer control language. The MT908 laser printer from Mannesmann Tally is PCL5 compatible, as well. Oops. The market leader provides 8 scalable fonts. The MT908 gives you the same scalable fonts. Hmm. The market leader offers a feature for smoother edges on fonts and graphics. The MT908 has Edge Enhanced Technology (EET®) for the same effect.

Alright. What about performance? The market leader prints at 8 pages per minute and includes the processing power of the Motorola 68000. The MT908 prints at 8 pages per minute but provides 2.5 times faster processing of scaled fonts and graphics with its Intel i80960 RISC processor. Now we're getting somewhere.

The market leader comes with a 250 sheet capacity letter-size cassette. If you want to load legal paper, envelopes etc., you'll have to buy additional cassettes. For more convenient paper handling, the universal paper cassette of the MT908 adjusts to hold 250 sheets of letter, legal and international sizes or up to 30 envelopes. And, there is an optional 300 sheet second paper bin that mounts under the MT908 ... you can't even buy that from the market leader.

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PUBLISHING & PRESENTATIONS

BY RICHARD JANTZ

Expert advice for creating high-impact documents and presentations

Tables in business documents can cause big problems. It can be a nightmare to squeeze all the information into the allotted space and then align it in orderly rows and columns. It can be even more difficult to make a table attractive and easy to read. But a few enhancements can often turn a lackluster or complex table into one that's graphically appealing and easier for readers to understand.

For this month's make-over, we selected a full-page table from a two-color quarterly report produced by the Center for Real Estate and Urban Economics, a Berkeley, California, research group. The original design isn't bad, but the lack of contrast in the table makes it daunting to read. It's difficult to distinguish the first column's main categories, and even harder to tell which columns are related. And while a few blue lines do enliven the black-and-white sheet a bit, they don't help organize the tabular information as well as they could.

To make the table easier to read, we changed the typefaces and type sizes, added more rules, and used a third color as a background in various areas. We also reorganized the column headings to make them uniform and added *straddle rules*—rules that extend over more than one column—to indicate lower-level heads and link related columns.

By changing the Helvetica typeface to Helvetica Condensed, we were able to use larger type in the same amount of space. To make the main categories in the first column stand out, we set them in boldface and added horizontal rules to separate them from other rows.

A third color (a light blue tint) separates sections in the table, making it easier to read across the columns. To add the third color, we simply used a tint of the original blue color—in this case, a 10 percent screen tint of 100 percent blue. This kind of spot color doesn't cost very much, and it's an excellent way to add extra color to a document while getting additional mileage out of the same-color ink.

To enliven your next table, try adding contrasting typefaces and graphic enhancements such as rules and color tints. When used properly, these tools can turn an ordinary report into an effective eye-catcher.

Correction

The "After" newsletter in February's column omitted the leading capital letter in the first paragraph.

Mail your publishing and presentations questions, as well as business document and presentation make-over candidates, to Publishing & Presentations, PC World, *501 Second St. #600, San Francisco, CA 94107; or send them electronically to PC World Online, Publishing & Presentations; CompuServe, 74055,412; 415/442-1891 (fax).* PC World *pays $200 for documents used in a make-over. Sorry, we cannot acknowledge unpublished materials.*

Contributing Editor Richard Jantz is a computer consultant in Berkeley, California. Larry Westdal, a graphic designer with Westdal Design Associates in Berkeley, also contributed to this article.

1 **In the original document, the centered title is too inconspicuous. To set off the title, we placed it on a single line and enlarged it from 12-point Helvetica Bold to 18-point Helvetica Condensed Black Bold.**

2 **We replaced the standard Helvetica typeface with space-saving Helvetica Condensed so that all the first-column categories are easier to read and fit on one line.**

3 **Contrasting typefaces and indents make it easier to distinguish different levels of information. Here, we used 10-point Helvetica Condensed Black Bold for the first category level, 10-point Helvetica Condensed Bold for the second, and 10-point Helvetica Condensed for the third level. We also indented the second level and further indented the third level.**

4 **We placed related columns under common heads and added straddle rules to bracket each set and separate lower-level heads. We also reduced the space between related columns under common heads to unify each set and make them stand out.**

5 **We changed the footnote from 8½-point Helvetica to 9-point Helvetica Condensed, used italic instead of the unwarranted boldface (for "Source:"), and eliminated the superfluous line spacing.**

6 **We used spot color to organize and enliven the tabular material. Light blue serves as a background for defining various sections of the table, and 100 percent blue is used for the ½-point rules that surround each light blue area. We used a 10 percent screen tint to produce the light blue spot color.**

ANTHONY RUSSO

AFTER

TABLE 1: Central Valley Housing Stock Growth

LOCATION	1980 Stock	1980 Occupied	1989 Stock	1989 Occupied	% Change 80-89 Stock	% Change 80-89 Occupied	Vacancy Rates 1980	Vacancy Rates 1989
Central Valley	1,531,020	1,387,171	1,913,140	1,758,185	25.0%	26.7%	9.4%	8.1%
Share of California	16.5%	16.1%	17.4%	17.1%	n/a	n/a	n/a	n/a
North Sacramento Valley	178,794	163,166	218,310	198,177	22.1	21.5	8.7	9.2
Butte	61,360	56,904	75,726	70,076	23.4	23.1	7.3	7.5
Colusa	5,334	4,690	6,123	5,411	14.8	15.4	12.1	11.6
Glenn	8,425	7,707	9,755	8,873	15.8	15.1	8.5	9.0
Shasta	47,446	43,014	60,248	53,624	27.0	24.7	9.3	11.0
Sutter	20,425	18,809	23,779	22,150	16.4	17.8	7.9	6.9
Tehama	16,556	14,538	20,592	18,065	24.4	24.3	12.2	12.3
Yuba	19,248	17,504	22,087	19,978	14.7	14.1	9.1	9.5
Sacramento Metropolitan Area	451,577	421,535	571,918	543,834	26.6	29.0	6.7	4.9
Sacramento	323,702	299,805	406,945	383,958	25.7	28.1	7.4	5.6
Solano	84,270	80,426	112,223	109,027	33.2	35.6	4.6	2.8
Yolo	43,605	41,304	52,750	50,849	21.0	23.1	5.3	3.6
Foothills	123,760	95,249	167,238	134,686	35.1	41.4	23.0	19.5
El Dorado	44,987	32,505	58,842	45,176	30.8	39.0	27.7	23.2
Placer	54,014	42,732	73,233	59,968	35.6	40.3	20.9	18.1
Nevada	24,759	20,012	35,163	29,542	42.0	47.6	19.2	16.0
North San Joaquin Valley	238,473	219,301	294,969	275,909	23.7	25.8	8.0	6.5
San Joaquin	136,001	124,626	165,014	154,087	21.3	23.6	8.4	6.6
Stanislaus	102,472	94,675	129,955	121,822	26.8	28.7	7.6	6.3
South San Joaquin Valley	538,416	487,920	660,705	605,579	22.7	24.1	9.4	8.3
Fresno	193,653	178,506	236,405	217,410	22.1	21.8	7.8	8.0
Kern	155,702	139,811	197,819	181,777	27.0	30.0	10.2	8.1
Kings	25,694	23,499	31,562	29,063	22.8	23.7	8.5	7.9
Madera	24,607	20,950	31,340	26,746	27.4	27.7	14.9	14.7
Merced	50,016	44,508	58,998	54,629	18.0	22.7	11.0	7.4
Tulare	88,744	80,646	104,581	95,954	17.8	19.0	9.1	8.2
San Francisco Bay Area*	1,977,053	1,890,113	2,216,277	2,135,149	12.1	13.0	4.4	3.7
Southern California	4,962,695	4,638,471	5,871,838	5,529,049	18.3	19.2	6.5	5.8
Total California	9,279,049	8,629,893	10,966,024	10,286,146	18.2	19.2	7.0	6.2

* Solano County appears in Sacramento Area figures rather than San Francisco Bay Area figures.
Source: California Department of Finance, Population and Housing Estimates, 1989.

BEFORE

TABLE 1
Central Valley Housing Stock Growth

Location	Stock 1980	Occupied 1980	Stock 1989	Occupied 1989	% Change Stock	% Change Occupied	Vacancy Rates 1980	Vacancy Rates 1989
Central Valley	1,531,020	1,387,171	1,913,140	1,758,185	25.0%			
Share of California	16.5%	16.1%	17.4%	17.1%				
North Sacramento Valley	178,794	163,166	218,310	198,177	22.1%			
Butte	61,360	56,904	75,726	70,076	23.4%			
Colusa	5,334	4,690	6,123	5,411	14.8%			
Glenn	8,425	7,707	9,755	8,873	15.8%			
Shasta	47,446	43,014	60,248	53,624	27.0%			
Sutter	20,425	18,809	23,779	22,150	16.4%			
Tehama	16,556	14,538	20,592	18,065	24.4%			
Yuba	19,248	17,504	22,087	19,978	14.7%			
Sacramento Metro. Area	451,577	421,535	571,918	543,834	26.6%			
Sacramento	323,702	299,805	406,945	383,958	25.7%			
Solano	84,270	80,426	112,223	109,027	33.2%			
Yolo	43,605	41,304	52,750	50,849	21.0%			
Foothills	123,760	95,249	167,238	134,686	35.1%			
El Dorado	44,987	32,505	58,842	45,176	30.8%	39.0%	27.7%	23.2%
Placer	54,014	42,732	73,233	59,968	35.6%	40.3%	20.9%	18.1%
Nevada	24,759	20,012	35,163	29,542	42.0%	47.6%	19.2%	16.0%
North San Joaquin Valley	238,473	219,301	294,969	275,909	23.7%	25.8%	8.0%	6.5%
San Joaquin	136,001	124,626	165,014	154,087	21.3%	23.6%	8.4%	6.6%
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Southern Calif.	4,962,695	4,638,471	5,871,838	5,529,049	18.3%	19.2%	6.5%	5.6%
California	9,279,049	8,629,893	10,966,024	10,286,146	18.2%	19.2%	7.0%	8.2%

* Solano County appears in Sacramento Area figures rather than San Francisco Bay Area figures

Source: California Department of Finance, Population and Housing Estimates, 1989

2

1 TABLE 1: Central Valley Housing Stock Growth

2 LOCATION | 1980 Stock | 1980 Occupied | 1989 Stock | 1989 Occupied | % Change 80-89 Stock | % Change 80-89 Occupied | Vacancy Rates 1980 | Vacancy Rates 1989

3 Central Valley; Share of California; North Sacramento Valley; Butte; Colusa; Glenn; Shasta; Sutter; Tehama; Yuba; Sacramento Metropolitan Area; Sacramento; Solano; Yolo; Foothills; El Dorado; Placer; Nevada; North San Joaquin Valley; San Joaquin; Stanislaus; South San Joaquin Valley; Fresno; Kern; Kings; Madera; Merced; Tulare; San Francisco Bay Area*; Southern California; Total California

4

5

6

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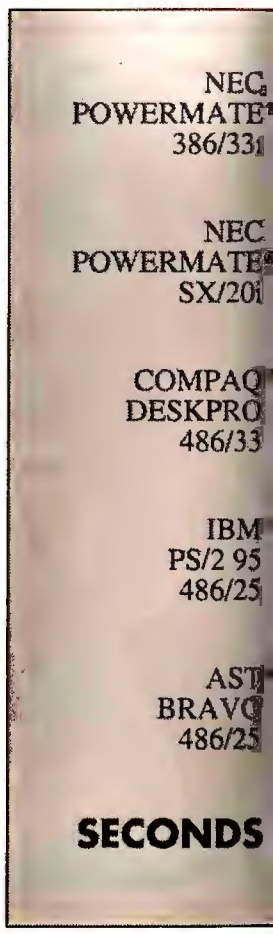

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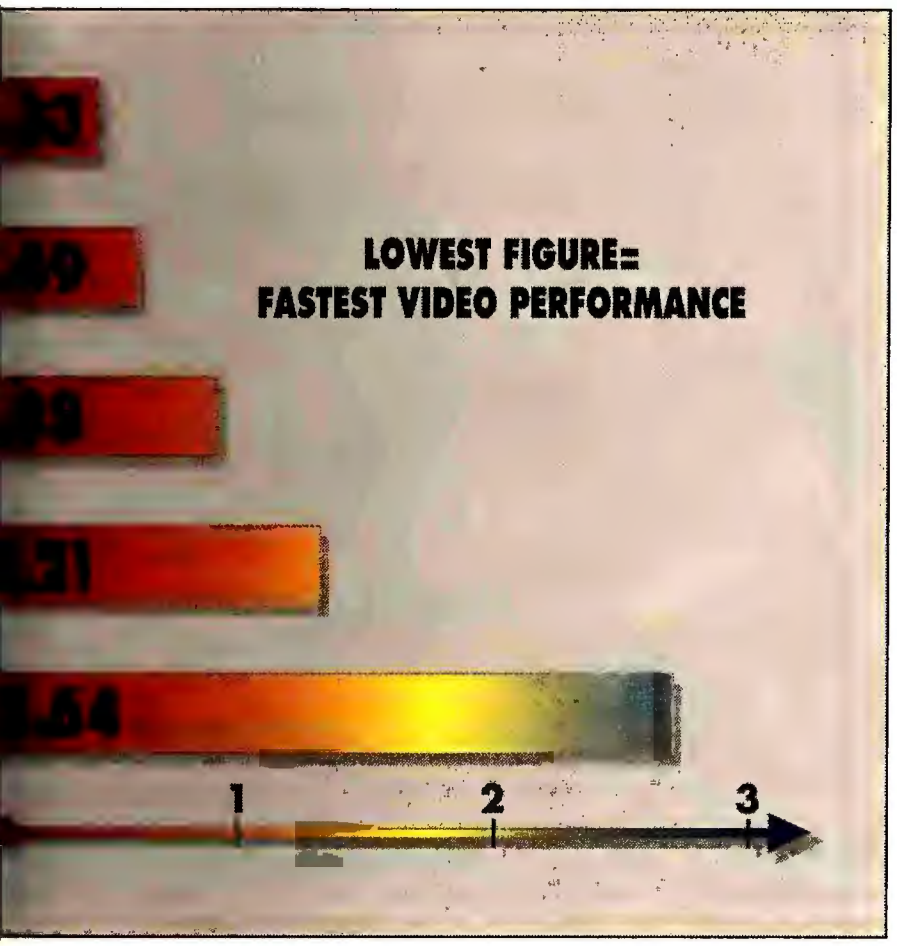

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41 on reader service card

COMMUNICATIONS Q&A

BY JUDY HEIM

On-line resources for business and professional users

Q Is there a national directory I can use to look up the E-mail addresses of people on other on-line services?

MARSHALL LABOW
LOS ANGELES, CALIFORNIA

A If you're looking for addresses for users on every on-line service, you're out of luck. But you can locate addresses of MCI Mail users, Internet users, denizens of various public and private UNIX networks, and users of many other computer systems here and in Europe through the Knowbot Information Service. The downside: Knowbot won't tell you who's on Prodigy, GEnie, or even CompuServe.

You access Knowbot through Internet. Most business users will reach Internet, in turn, through CompuServe or MCI Mail. You send Knowbot a message with the name of the person you're looking for and, if you wish, his or her country and network. Knowbot analyzes the message, then sends out "knowledge robots," intelligent search programs that march onto hundreds of computer systems and networks seeking the name you specify.

Knowbot is the product of the Corporation for National Research Initiatives in Reston, Virginia, a nonprofit organization that develops artificial intelligence–like ways to plumb data bases. The service is still being perfected, but it's quite usable, and access is free.

To conduct a search with Knowbot, you need to know its Internet mailbox address: **netaddress@nri.reston.va.us** (case is important). On CompuServe, at the To: prompt, enter **INTERNET:** followed by the mailbox address (don't put a space after the colon). On MCI Mail, address the message to NRI Directory Services, then when prompted for an E-mail system, type **Internet**. Enter the mailbox address at the next prompt. Since Knowbot will examine just the body of the message, enter only the name of the person you're seeking. Place it flush left on the first line. If you have more information about the person, add that data on succeeding lines. For instance, if you know there's a Pete Jones who lives in France, works for INRIA, and has an MCI Mail address, enter:

Pete Jones
service mcimail
country FR
org INRIA

Again, case is important: Names of services are lowercase, and countries are signified by their two-letter ISO networking country code. Knowbot will respond with a list of E-mail addresses, the names of addressees, and their organizations. For a help file of Knowbot commands, send a message with a question mark on the first line.

Q Is there a way I can get my communications software to check the amount of free disk space before I download a monster file? I hate to spend half an hour downloading only to have disk space run out and have nothing to show for my efforts.

PATRICK ARVENDUE
PORT WASHINGTON, WISCONSIN

A Some of the early file transfer protocols like XMODEM are not sophisticated enough to check file size at the start of a download and verify that there's enough room on the disk. Instead of XMODEM, try the more up-to-date ZMODEM, which comes with all the major communications programs. ZMODEM will cancel a file transfer at the start if it finds that there's not enough disk space.

Q Can I get rid of Procomm Plus's *annoying splash screen—you know, the one that requires you to press a key to continue with the program?*

MARGARET O'KEEFE
GRAND RAPIDS, MICHIGAN

A Sure. Load *Procomm* by entering **pcplus /f.** (Put the command in a batch file to make it even easier.) The /f is the command line option to load *Procomm* with a script file and is normally followed by the name of the script. If you load it without a script name, however, *Procomm* will flash the introductory screen and jump right to the terminal screen. You may get an error message with old versions of *Procomm;* ignore it.

Mail your communications questions to Communications Q&A, PC World, *501 Second St. #600, San Francisco, CA 94107; or send them electronically to PC World Online, Communications Q&A; CompuServe, 75300,713; Internet, 3127737@MCIMAIL.COM; MCI Mail, 312-7737; GEnie, JUDY.HEIM; or 415/442-1891 (fax).* PC World *pays $50 for published questions. Sorry, we cannot acknowledge unpublished materials.*

Judy Heim is a contributing editor for PC World.

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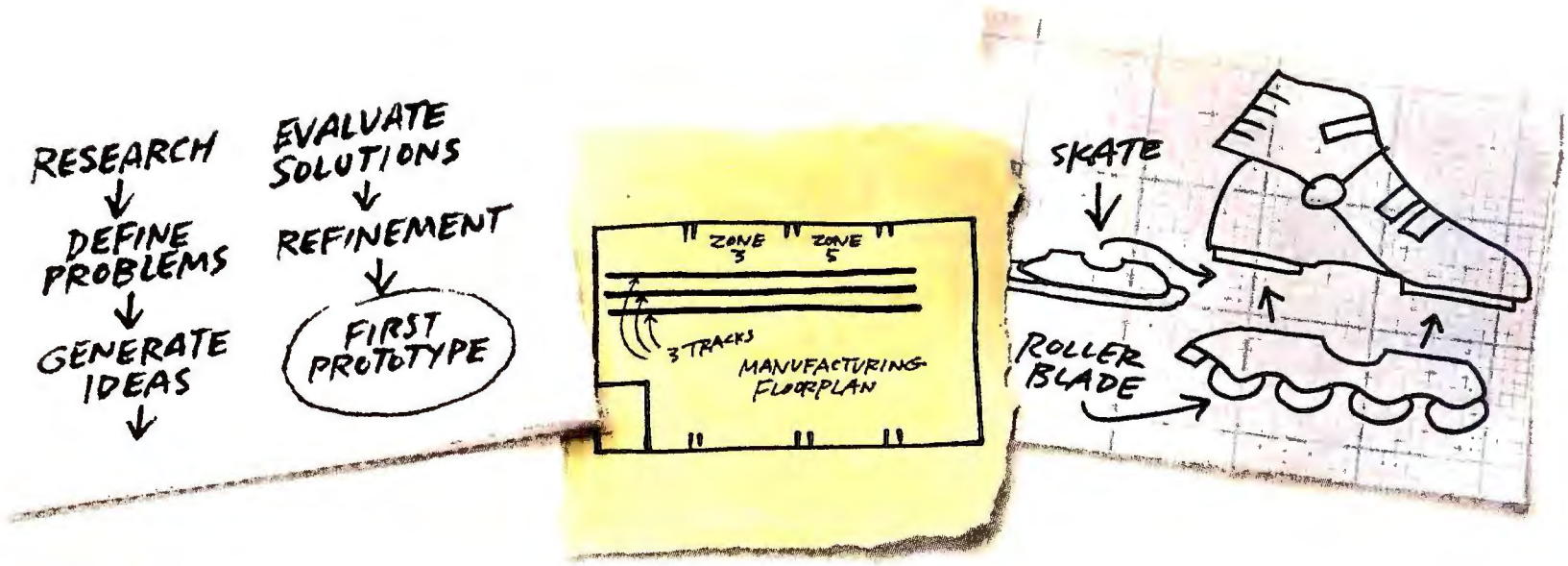

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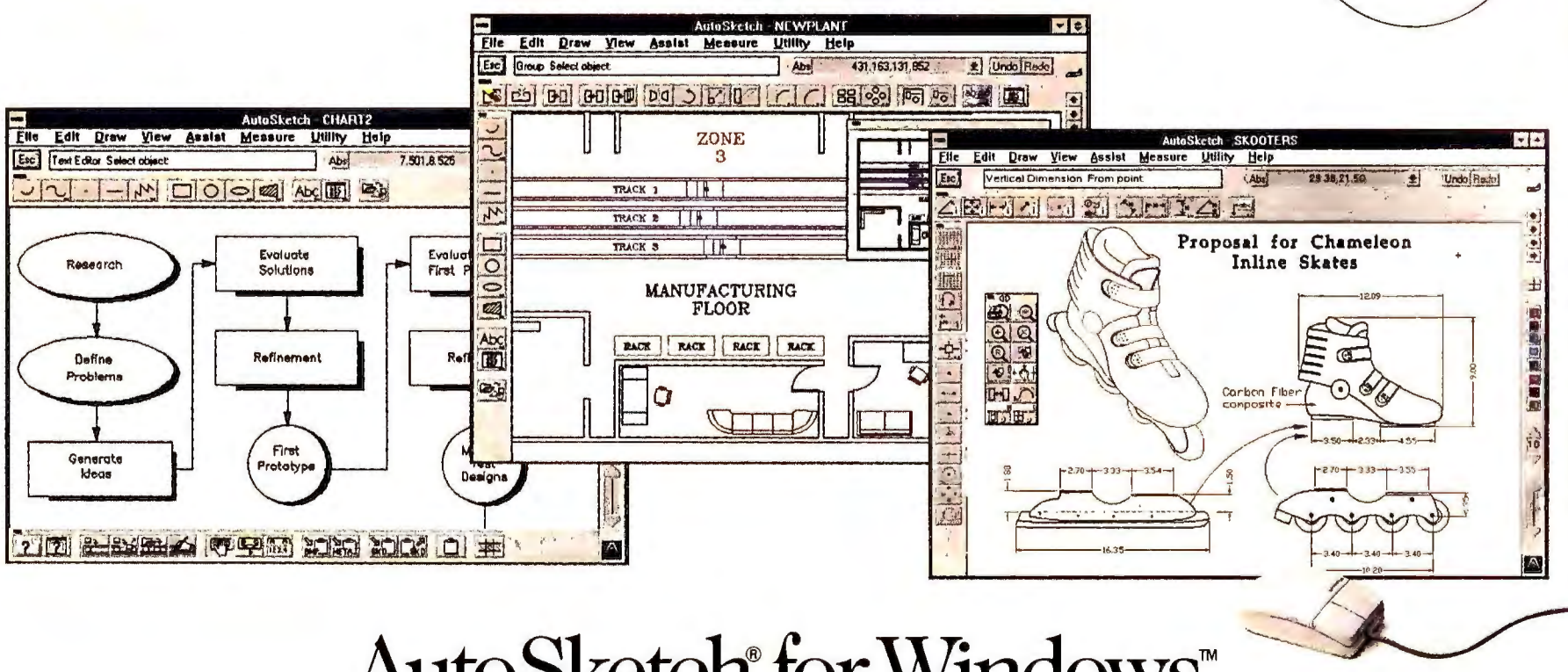

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WINDOWS WORKSHOP

BY SCOTT DUNN

Practical answers to your questions about Windows

WordPerfect for DOS Under Windows

Q I have too much invested in WordPerfect 5.1 *to give it up just because it's not a* Windows *application. However, the PIF automatically generated by* Windows *during installation proved unsatisfactory. There wasn't enough memory to handle data base merges and sorts, and I was getting 'Unrecoverable Application Error' (UAE) messages. Can you help?*

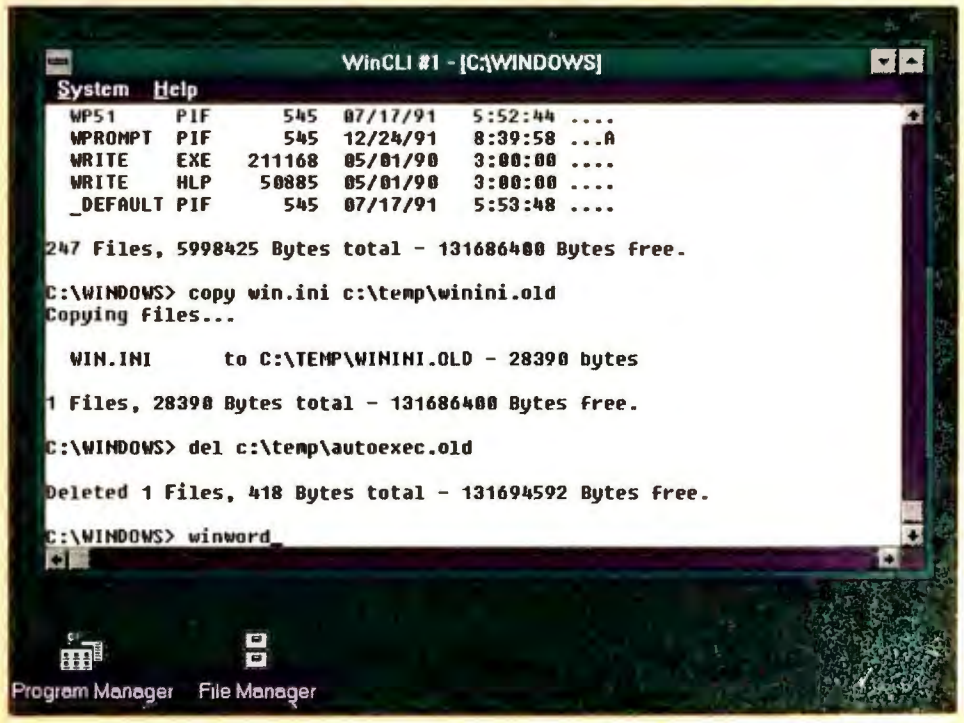
VINCENT P. AITRO
OAKLAND, CALIFORNIA

A The PIF settings *Windows* gave you are probably as good as you're going to get. Two likelier sources of your problem are insufficient disk space and lack of conventional memory. *WordPerfect* needs a lot of extra disk space to run sorts. In general, your free disk space should be 2½ times as large as the file you're sorting. If you don't have this much room, you'll get out-of-memory messages. Check to see if there are any programs that you can delete or modules within those programs—templates you don't use, tutorials you no longer need—that you can uninstall.

It's also possible (though less likely) that you're running out of conventional memory—the first 640K of RAM. When you start a DOS application in 386-enhanced mode, *Windows* gives it the same amount of conventional memory as was available before starting *Windows*. Consequently, if you have 480K free before you start *Windows*, each DOS application will get only 480K under *Windows*, minus a bit used by *Windows* itself. You can tell how much conventional memory *WordPerfect* will have under *Windows* by typing **CHKDSK** at the DOS prompt. The last line that appears will list the amount of bytes free. (Warning: Don't use CHKDSK /F while *Windows* is running—you might lose data.)

To get the extra RAM you need, you may have to reduce the number of memory-resident utilities and any extraneous device drivers you load upon start-up. To do this, first save a copy of your AUTOEXEC.BAT and CONFIG.SYS files in case something goes wrong. Then open CONFIG.SYS in a text editor, and type **REM** (for *remark*) in front of

Windows Toolbox

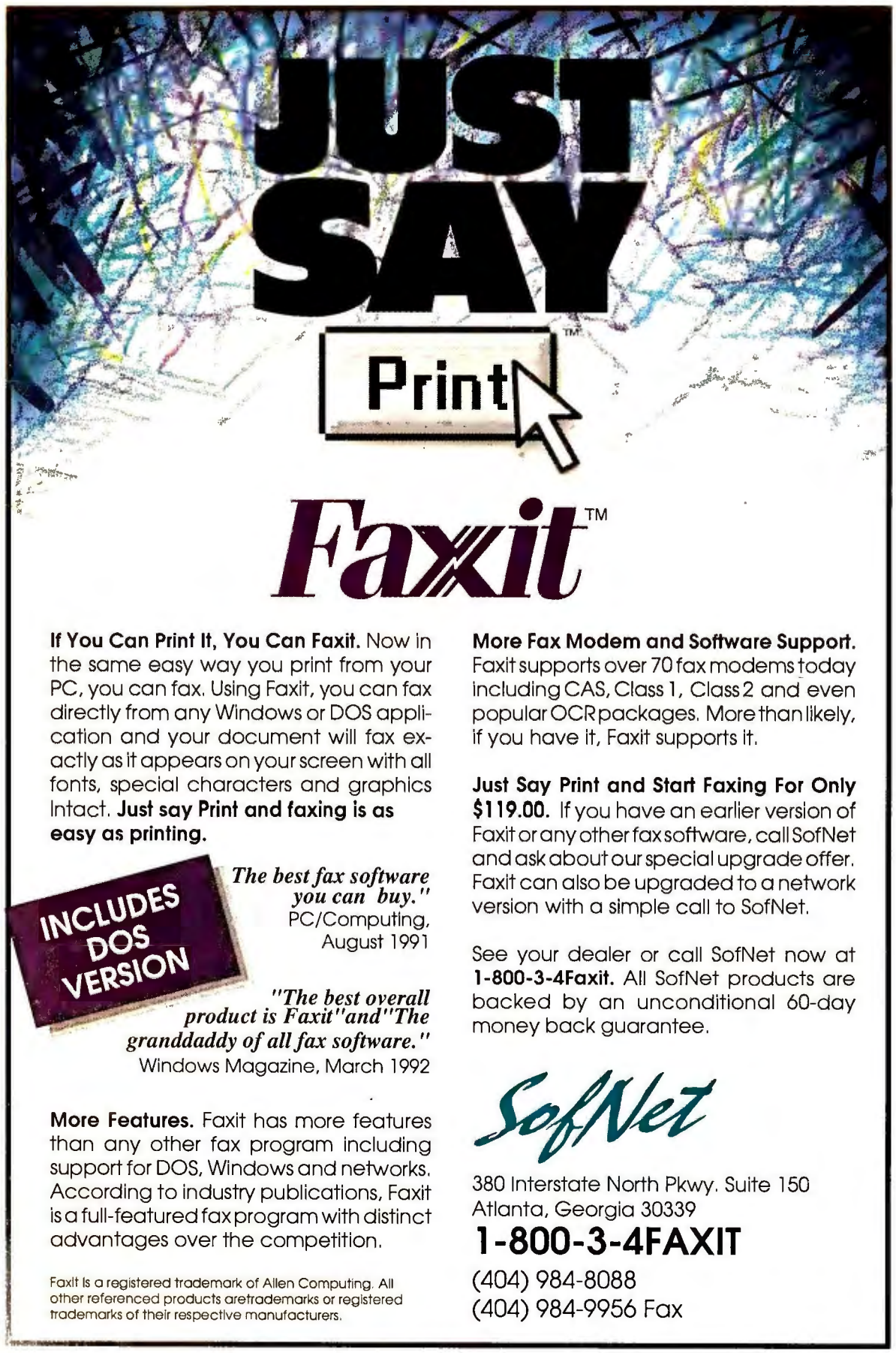


Many users find *Windows* a great multitasking shell but find File Manager and Program Manager a waste of time. If you're always running back to the DOS prompt for everyday chores, check out *WinCLI*, a *Windows*-based command line that lets you launch both DOS and *Windows* applications and access many familiar DOS commands. Unlike a windowed DOS prompt, which can take up to 640K, *WinCLI* requires only about 40K. A paltry $35 U.S. ($45 Canadian) gets you the shareware version. For an additional $80, you can get *WinCLI Pro*, with command-line editing, command-line history, aliases (like DOS 5.0's DOSKEY macros), a scroll-back buffer, selectable fonts, adjustable colors, and a number of utilities. Eschalon Development Inc., 110-2 Renaissance Sq., New Westminster, BC V3M 6K3, Canada; 604/520-1543. Reader service no. 759

ANTHONY RUSSO

each line that begins with 'DEVICE'. Don't use this disabling trick with the HIMEM.SYS line, however; *Windows* needs that to run in enhanced mode. Save the file, and use the same technique to disable memory-resident programs launched by your AUTOEXEC.BAT.

Now reboot your computer, start *Windows*, and try running *WordPerfect* again. If it performs properly, you can restore memory-resident utilities or drivers one at a time, testing *WordPerfect* after enabling each utility to make sure that you have enough memory. If this solution deprives you of a needed utility, your best bet is to upgrade to MS-DOS 5.0 or some other memory management software that lets you load memory-resident programs into upper memory blocks. In DOS 5.0, you can use the MEM command to learn how much memory is available.



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Free Memory

Q I run Windows *on my 25-MHz 386 computer with 4MB of RAM. When I open the help menu in Program Manager and select the About Program Manager option, I read 'Free Memory 14064K'. This would mean I have 14MB of free memory, which cannot be. What's happening here?*

RODRIGO DE CASTRO
URBANA, ILLINOIS

A *Windows*' 386-enhanced mode can use hard disk space as if it were extra RAM—a scheme known as *virtual memory*. The amount of memory you see reported is the total free RAM, plus the *Windows* swap file (permanent or temporary) that the program will use when you run out of the genuine article. To find out just how much RAM alone *Windows* can access, start *Windows* in standard mode (enter **WIN /S** at the DOS prompt). Then select *Help • About Program Manager* as you did before.

Edit, Don't Launch, Batch Files

Q I normally run my batch files in Windows *by launching the PIF I've assigned to each. I tried associating my BAT files with Notepad in File Manager so that I could open and edit them by double-clicking on their file names. But File Manager will have none of it. Whenever I double-click on a BAT file, it executes the file. Is there some way to get around this?*

SUSAN STAKER
SALT LAKE CITY, UTAH

A Sure. Just use Notepad to edit your WIN.INI file. (As a precaution, make a backup copy of WIN.INI.) In the first section of WIN.INI, labeled [windows], locate the line 'Programs=com exe bat pif'. Delete 'bat' from the list.

Since WIN.INI is already open, you can add the file association right now.

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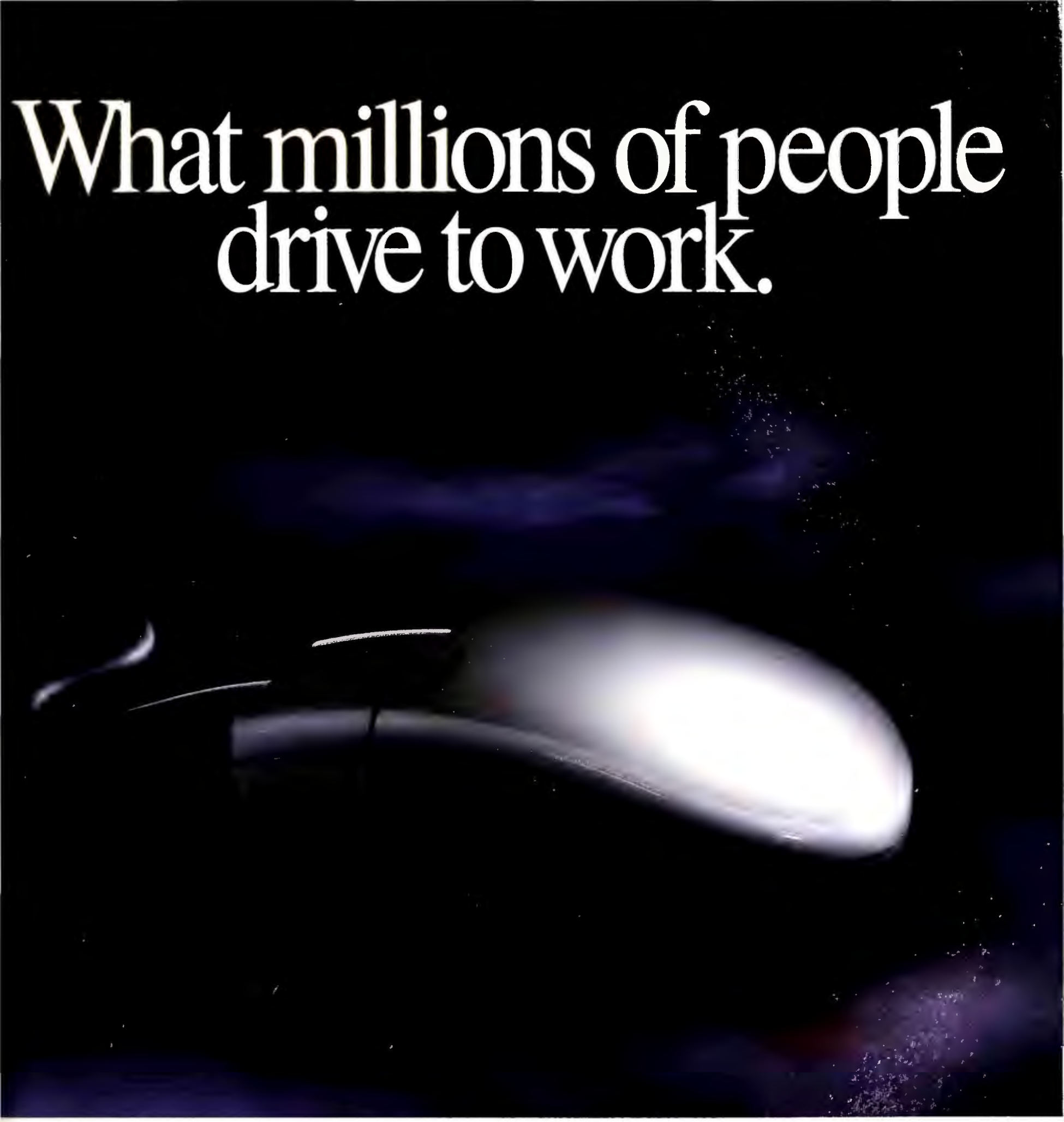

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Add a line like this, changing the path as necessary, to the [Extensions] section: **BAT=C:\WINDOWS\NOTEPAD.EXE ^.BAT.** Save WIN.INI and restart *Windows*. (Note: In *Windows 3.1,* you must make this association in File Manager. Select a BAT file name, and choose *Associate* from the File menu. Select *text file* from the list, and click *OK.*) The next time you double-click a BAT file in File Manager, it will open the file in Notepad rather than execute it. Of course, now you won't be able to run a batch file by double-clicking on it in File Manager. But that's probably a good thing, because it's smarter to run batch files by setting each one up with its own PIF and then double-clicking on the PIF's name.

Speeding Up Start-Up

Q *It takes a horribly long time for* Windows *to load on my computer. What's the problem? Can it be fixed?*

KEVIN MAXWELL
NEW YORK, NEW YORK

A *Windows'* start-up speed is affected by a number of variables. Probably the most important is your hard disk transfer time. Changing that requires a hardware upgrade.

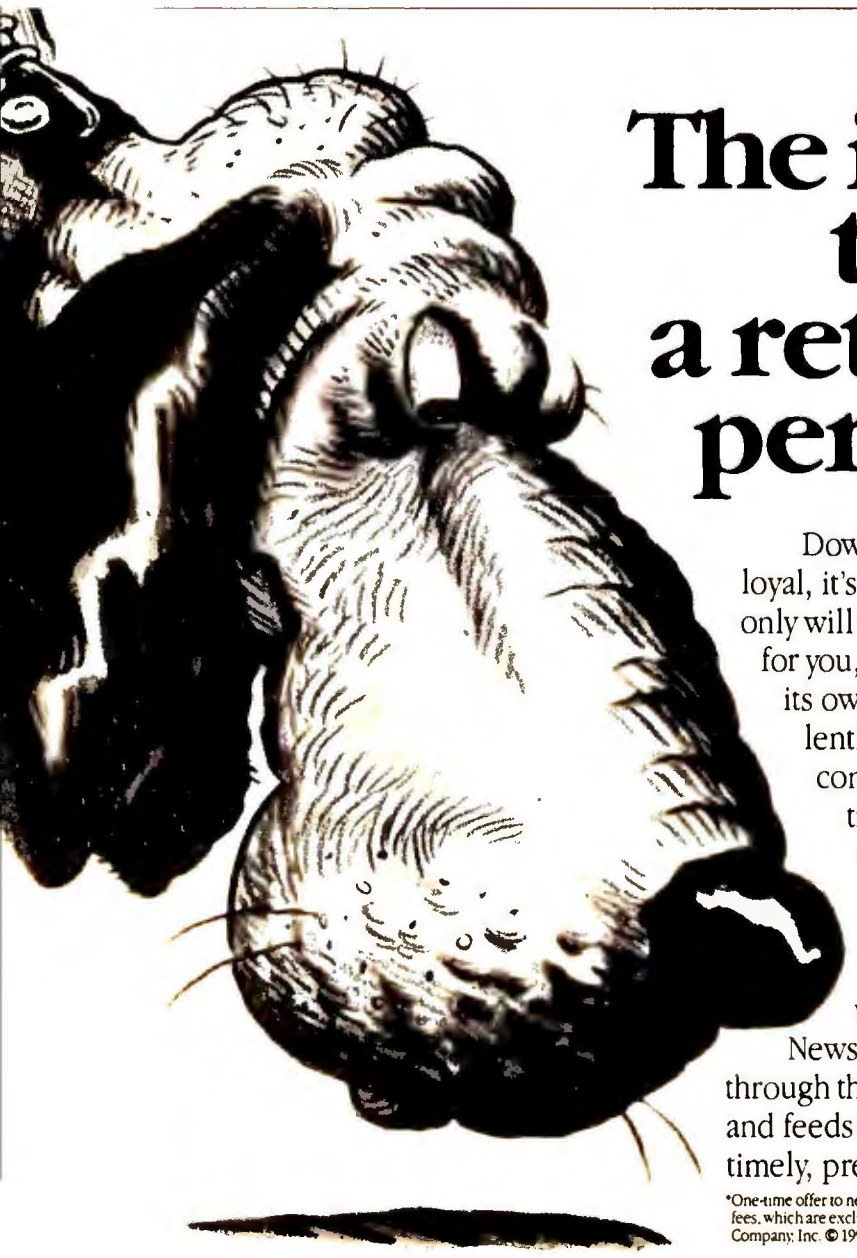
But software also can influence the time it takes to climb into *Windows.* For example, if you're not already using disk caching software, try using the SmartDrive disk cache that comes with *Windows.* The program installs SmartDrive when you load *Windows,* but things can go wrong in installation, or you might have disabled SmartDrive. See your *Windows* manual for instructions on reinstallation.

Second, reduce the number of applications you launch at start-up by removing unneeded ones from WIN.INI's load= and run= lines. If you have *Windows 3.1,* remove some less important icons from Program Manager's Startup group.

Finally, you can save about a second by making *Windows* bypass its start-up screen. One way to do this is to start *Windows* by typing **WIN:** (note the space) at the DOS prompt. If you also want to save a bit of disk space in the process, try this: At the DOS prompt, type **COPY \WINDOWS\SYSTEM\WIN.CNF \WINDOWS\WIN-.COM.** Then start *Windows* as usual. You won't have to repeat this command again unless you use the Windows Setup program to change screen drivers—doing so restores the start-up screen.

One bogus speed-start tip making the rounds says that you can accelerate *Windows'* start-up time by removing comment lines (those beginning with a semicolon) and extra carriage returns from WIN.INI and SYSTEM.INI. Although it's true that *Windows* must read these files before starting, such microsurgery has no noticeable effect.

Mail your Windows *questions to* Windows Workshop, PC World, *501 Second St. #600, San Francisco, CA 94107; or send them electronically to PC World*



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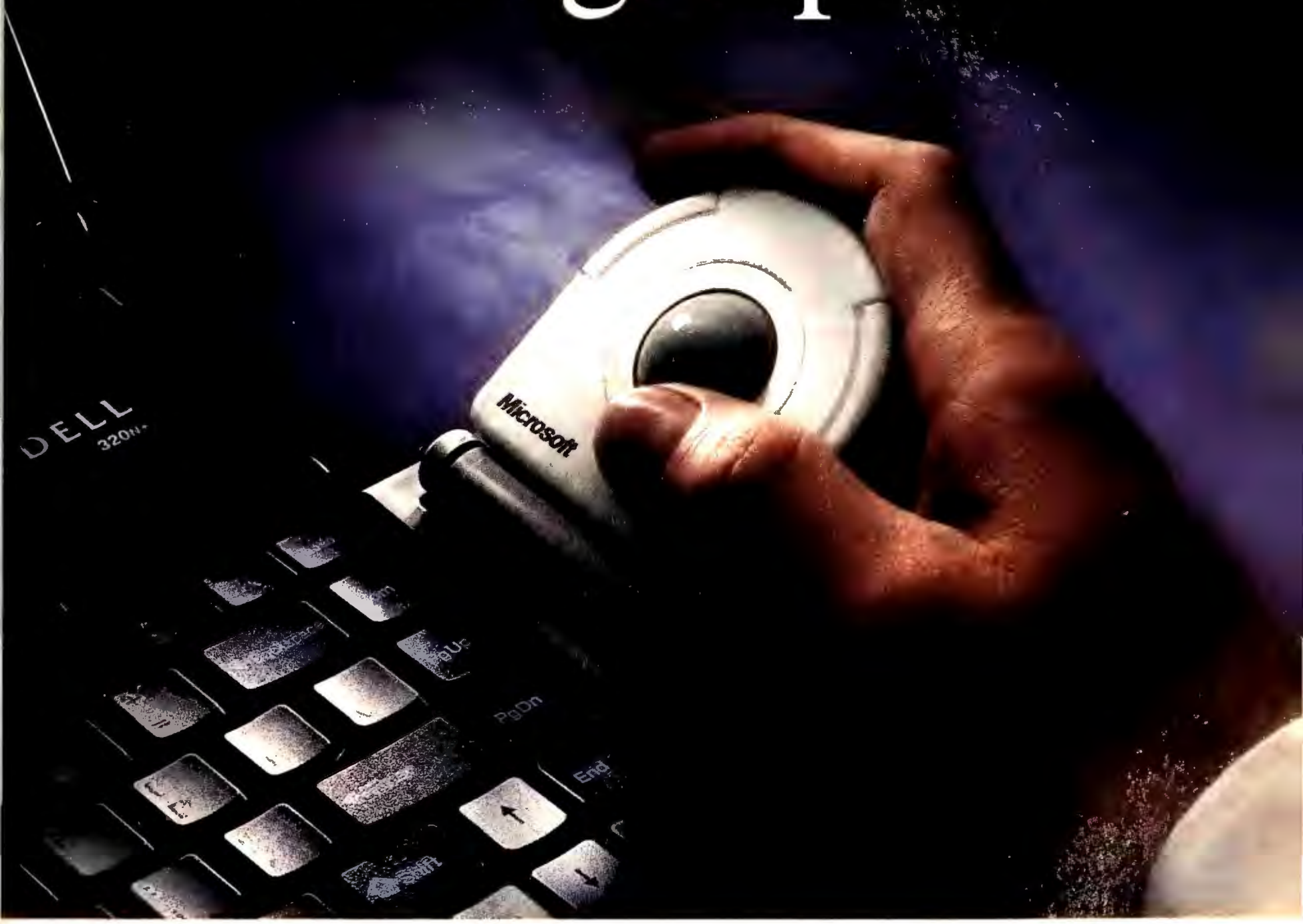

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Online, Windows Workshop; CompuServe, 74055,412; MCI Mail, PC World Editorial; or 415/442-1891 (fax). PC World *pays $50 for published questions. Sorry, we cannot acknowledge unpublished materials.* ●

Scott Dunn is the coauthor of 101 Windows Tips *(Peachpit Press, Berkeley, California, 1991).*

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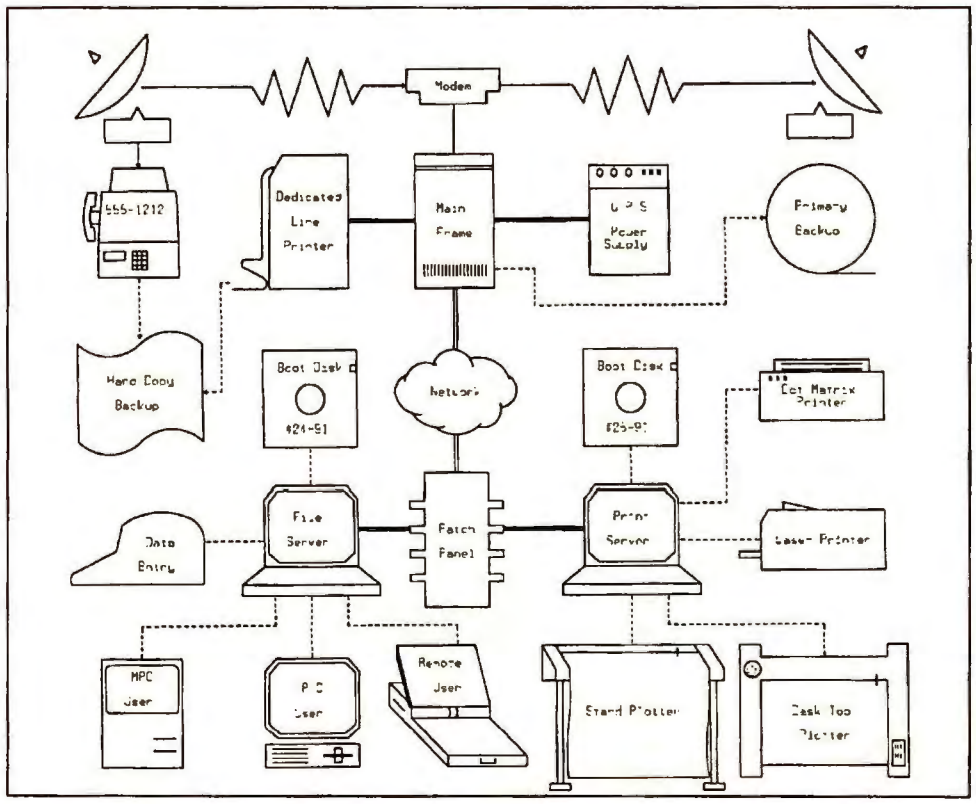

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Two Ways to Save Trees With cc:Mail

If you need to print cc:*Mail* messages, you can consolidate them and save some paper; you'll eliminate the multiple cover sheets and end sheets. Instead of pressing **P** to print, press **W**, and enter a file name, such as **MAIL**. Each message that you W(rite) will be appended to an ASCII mail file. You can print MAIL with your word processor or from the DOS prompt (with the command **COPY MAIL PRN**) at day's end. Then delete the MAIL file so you won't be reprinting today's messages tomorrow.

Karl Koessel
Technical Editor

Wait a minute, Karl! I don't need a hard copy of most messages, anyway. So after reading a message I want to save, I just press **<Enter>M** and move the message to a folder, either one I've already created or one I name and create on the spot. It's easier to refer to a message from an electronic folder than to retrieve one filed in manila. My way saves even more paper and further reduces printer traffic.

Eric Knorr
Editor

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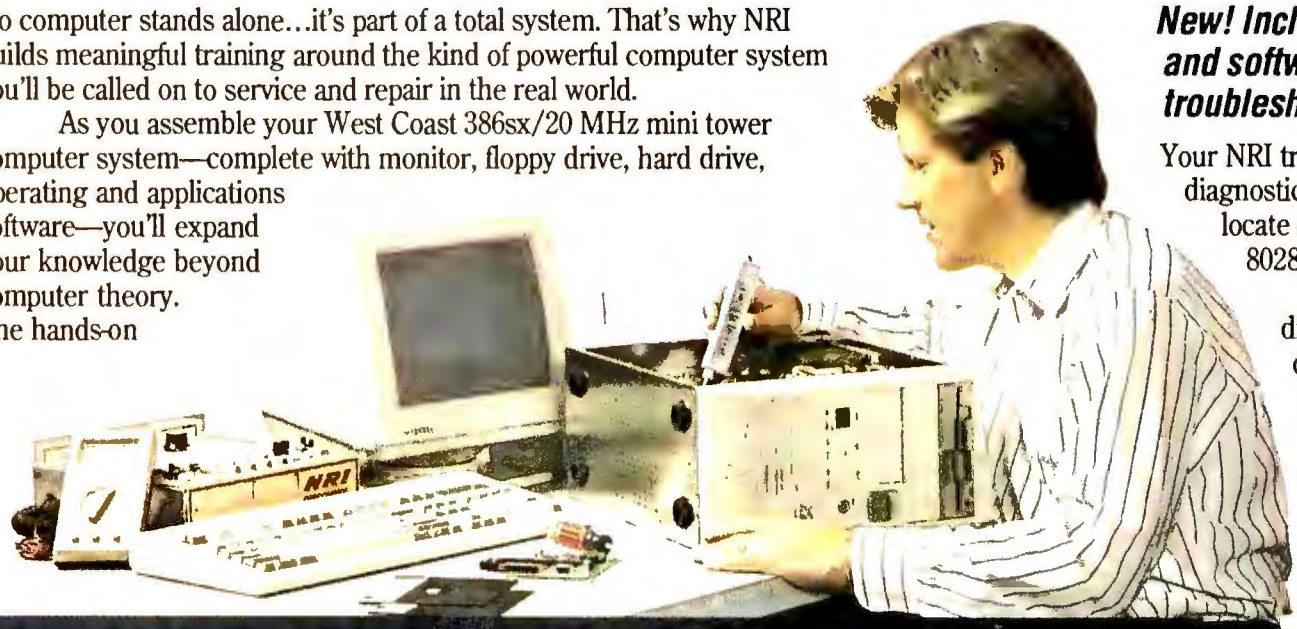

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CARD 101

USER GROUP TIPS

Helpful hints from members of the nation's user groups

Use Quick Batch Backups for Special Files

Here's a quick way to back up the project you've been working on and still get out of the office and make your train home. First, create a start-up BAK.BAT file:

```
@ECHO OFF
CLS
CALL A:BAK.BAT
```

Save it along with the rest of your batch files in a directory specified in the PATH command of your AUTOEXEC.BAT file. Next, make an individual BAK.BAT file for each essential project and store it on its own clearly labeled floppy disk. Here's an example that protects all the daily modifications you make in your May *1-2-3* financial worksheet:

```
ECHO Backing up 1-2-3
ECHO Financial Spreadsheets
REN A:\MAY92.WK1 MAY92.OLD
COPY C:\DATA\MAY\MAY92.WK1 A: /V
ECHO -- Backup completed
PAUSE
```

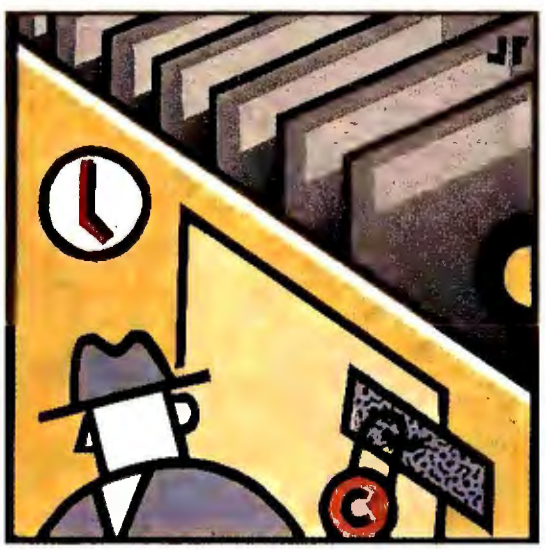
With the appropriate floppy in drive A:, enter **BAK** at the DOS prompt. The BAK.BAT on your hard disk calls the custom BAK.BAT on your floppy disk. This batch file gives your prior MAY92.WK1 backup the extension OLD in order to keep it from being overwritten. It then copies your freshly modified MAY92.WK1 file to the floppy (the /V activates VERIFY for the copy as an extra measure of protection) and pauses so you can check for errors. Use this solution, and you'll speedily back up a 240K worksheet, and be on your way.

TIM WOLF
IDAHO PC USERS GROUP

ANTHONY RUSSO

Managing and Consolidating ASCII Files

As Cary Jensen and Loy Anderson pointed out in "COPY Gets ASCII Files Together" (January 1992), copying multiple ASCII files such as E-mail notes into a single file reduces clutter and increases available disk space. If you also plan file names, you can use wildcard characters to make that job easier.



JULIA TALCOTT

Suppose you name all your May purchasing memos MAY*DDXYZ*, where MAY is the month, *DD* the day, and *XYZ* the recipient's initials. You can then easily combine, say, all of RWF's May invoices into one file with **COPY MAY??RWF MAYRWF**. Use **DEL MAY??RWF** to delete all the files you archived in one pass.

NELSON H. VAN WIE
EAST TENNESSEE PC USERS GROUP

Proper Paradox Execution

If you use *Paradox*'s PAL language, you should familiarize yourself with the Execute command, which runs text statements as other PAL commands. The script below shows how Execute can ease the job of creating simple menus.

```
table.a = "customer"
Showmenu
 "View"   : "Look at " + table.a,
 "CoEdit" : "Change " + table.a,
 "Empty"  : "Empty " + table.a,
 "Delete" : "Erase " + table.a
 to choice.a
If choice.a <> "Esc" then
 Execute choice.a + " table.a"
EndIf
```

Note this script contains no massive If . . . EndIf or Switch . . . EndSwitch commands—it doesn't need them. When you run it and select a command from the menu, the script combines the command you chose with the table name ("customer" in this example) in an Execute statement. If you select *View,* the Execute command receives the statement "View customer," and runs that as a separate command. Of course, this technique only works when all menu choices are valid PAL commands.

That's only a portion of what you can do with Execute. It's worth your time to experiment with this useful command.

STEVE FELDMAN
TWIN CITIES PC USER GROUP

If you belong to a user group, mail your tips to User Group Tips, PC World, *501 Second St. #600, San Francisco, CA 94107; or send them electronically to PC World Online, User Group Tips; CompuServe, 74055,412; MCI Mail, PC World Editorial; or 415/442-1891 (fax). Include your phone number and the name of your group. We pay $50 and throw in a* PC World *T-shirt for each tip we use. Sorry, we cannot acknowledge unpublished materials.*

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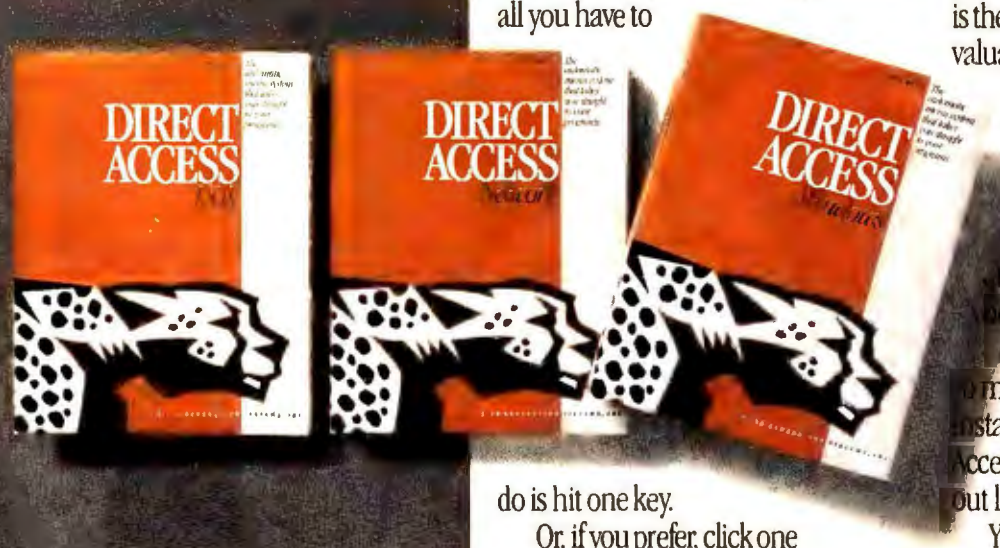

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EDITED BY BRETT GLASS

A global exchange of personal computer discoveries

Hot-Rodding DOS Under Windows

I believe I'm a fairly typical *Windows* user: I have a couple major *Windows* applications and a slew of DOS programs. Early on, I found I got very slow performance when I ran DOS applications under *Windows*. If you have the same problem, here's my solution:

Using SYSEDIT.EXE or any other ASCII text editor, open your SYSTEM.INI file, go to the [386Enh] section, and add a line with the command **PerVMFILES=20**. The '20' reflects the largest number of files that any DOS apps can use at a time; you may wish to use a larger or smaller value.

Save your file, leave your editor, and exit and reenter *Windows*. Then watch your DOS apps take off!

BOB LA PIERRE
GREAT BEND, KANSAS

Editor's note: The PerVMFILES setting reserves "private" file handles for each DOS window, giving your DOS programs faster access to files. You'll loose a few bytes of system resources, but that shouldn't cause much of a problem. Note, however, that you'll see a speedup only in programs that keep many files open at once, such as relational data managers.

Make sure of two things if you use this tip. First, make sure the value you specify is smaller than the number given in your CONFIG.SYS file's FILES= command. FILES sets the total number of files that may be open at once in the entire system (including all DOS windows), so be generous! I recommend that FILES be set to at least 60 if you're running several file-hungry applications at once; 30 is a practical minimum for Windows. *Second, make sure the PerVMFILES command is below the [386Enh] heading and above any other heading (in SYSTEM.INI, a heading is a line that's enclosed in square brackets).*

SYSEDIT.EXE is a very useful multiwindow-configuration editor that comes with every copy of Windows *but doesn't install automatically as an icon. It opens the four files you need to configure your system—AUTOEXEC.BAT, CONFIG.SYS, SYSTEM.INI—and WIN.INI—in four tiled windows on your screen. To use it, select* File • Run *from inside the Program Manager, and enter* **SYSEDIT.EXE** *as the program name. If you find yourself using SYSEDIT a lot, you may want to turn it into a Program Manager icon. In order to do this, select the group window you want SYSEDIT in, then select* File • New • Program Item. *In the resulting dialog box, type* **System Editor** *as your description and* **SYSEDIT** *as your command line. When you press* **<Enter>**, *the SYSEDIT icon will appear in your program group.*

Peek at Your Printer Ports

Here's a utility I developed to allow a quick peek at the LPT port parameters. It analyzes each LPT port (1 through 3) that has an existing base I/O address in the BIOS data area. Just run the program, and it will give you the status of the Printer Busy, Acknowledge, Paper Out, Selected, and Error signals for all your printers.

JERRY KEENAN
FREMONT, CALIFORNIA

Editor's note: This program can be very useful if you suspect that one of your printer ports is malfunctioning or incorrectly configured. It's also handy for checking whether a network print spooler is malfunctioning, since most network printing software reports an 'out of paper' or 'busy' condition if it is unable to contact the print server.

To create LPTSTAT.COM, copy the DEBUG script in **LISTING 1** *to a text file called LPTSTAT.SCR. (There are no uppercase letter O's in the listing, so anything that looks like one is actually a zero.) Once you've copied and checked the listing, type the command* **DEBUG < LPTSTAT.SCR** *at the DOS prompt. The file name LPTSTAT.COM will appear in the current directory; move the file to a directory listed in your AUTOEXEC.BAT's PATH statement.*

An Excellent ECHO

Many users have noted that DOS's ECHO utility doesn't allow you to echo certain characters, such as the redirection symbols > and <, without enclosing them in double quotes [see *PC World,* October 1991]. I have written a simple utility, which I call ECHO!, that takes a string enclosed between any two identical delimiter characters and echoes it without the delimiters. The command **ECHO! "Press <F10>"**, for instance, echoes the string between the double quotes—without echoing the quotes. Note that there must be exactly one space between the ECHO! command and the first quotation mark.

DAVID NYE
EAU CLAIRE, WISCONSIN

ANTHONY RUSSO

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E130 1B 00 26 A1 0C 00 3D 00 00 74 0D BA B3 01 B4 09
E140 CD 21 BA 02 00 E8 05 00 B8 00 4C CD 21 B4 02 CD
E150 17 50 80 E4 80 BA BA 01 74 03 BA C9 01 B4 09 CD
E160 21 58 50 80 E4 40 BA DC 01 74 03 BA E5 01 B4 09
E170 CD 21 58 50 80 E4 20 BA EB 01 74 03 BA F3 01 B4
E180 09 CD 21 58 50 80 E4 10 BA FF 01 74 03 BA 0E 02
E190 B4 09 CD 21 58 80 E4 08 BA 19 02 74 03 BA 25 02
E1A0 B4 09 CD 21 C3 4C 50 54 31 3A 20 24 4C 50 54 32
E1B0 3A 20 24 4C 50 54 33 3A 20 24 70 72 69 6E 74 65
E1C0 72 20 62 75 73 79 2C 20 24 70 72 69 6E 74 65 72
E1D0 20 6E 6F 74 20 62 75 73 79 2C 20 24 6E 6F 20 61
E1E0 63 6B 2C 20 24 61 63 6B 2C 20 24 70 61 70 65 72
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E200 6F 74 20 73 65 6C 65 63 74 65 64 2C 20 24 73 65
E210 6C 65 63 74 65 64 2C 20 24 6E 6F 20 65 72 72 6F
E220 72 2E 0D 0A 24 65 72 72 6F 72 2E 0D 0A 24
RCX
12E
W
Q
```

LISTING 1: This script creates LPTSTAT.COM, a utility that tells you how many printer ports your system has, what they're up to, and whether they're functioning properly.

Editor's note: To create ECHO!.COM, copy the DEBUG script in **LISTING 2** *to a text file called ECHO!.SCR. (Note that there are no uppercase letter O's in the listing, so anything that looks like one is actually a zero.) Once you've copied the listing, type the command* **DEBUG < ECHO!.SCR** *at the DOS prompt. The file ECHO!.COM will appear in the current directory; move it to one listed in the PATH statement of your AUTOEXEC.BAT.*

Unlike the DOS ECHO command, ECHO! doesn't append a carriage return, a linefeed, or a Control Z character at the end of its output. This makes it extremely useful in situations where these characters aren't wanted—for instance, if you want to create a file to which you can append text without starting a new line.

Printing Backward Better

January *Star-Dot-Star* included a *WordPerfect* macro for printing a document from last page to first—a handy capability if your printer stacks pages facing up. But even when I corrected the macro's errors (a correction appeared in the March issue), it still wouldn't work on one of my documents.

I discovered the problem with the very first document I tested the macro on—it had a table of contents. After

```
N echo!.com
E100 BE 82 00 AC 3C 0D 74 13 8A F0 AC 3C 0D 74 0C 3A
E110 C6 74 08 8A D0 B4 02 CD 21 EB EF C3
RCX
1C
W
Q
```

LISTING 2: Use this script to create ECHO!.COM, a handy utility that gets around some of the restrictions of the standard DOS ECHO command.

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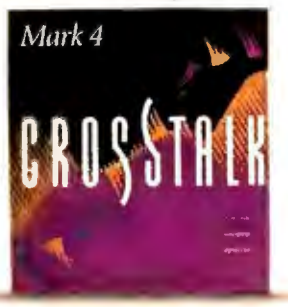

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April 1991 Crosstalk Mk. 4 | April 30, 1991 Crosstalk Mk 4 Version 2.0 | Vol 7 No. 12 1990 Crosstalk Mk.4

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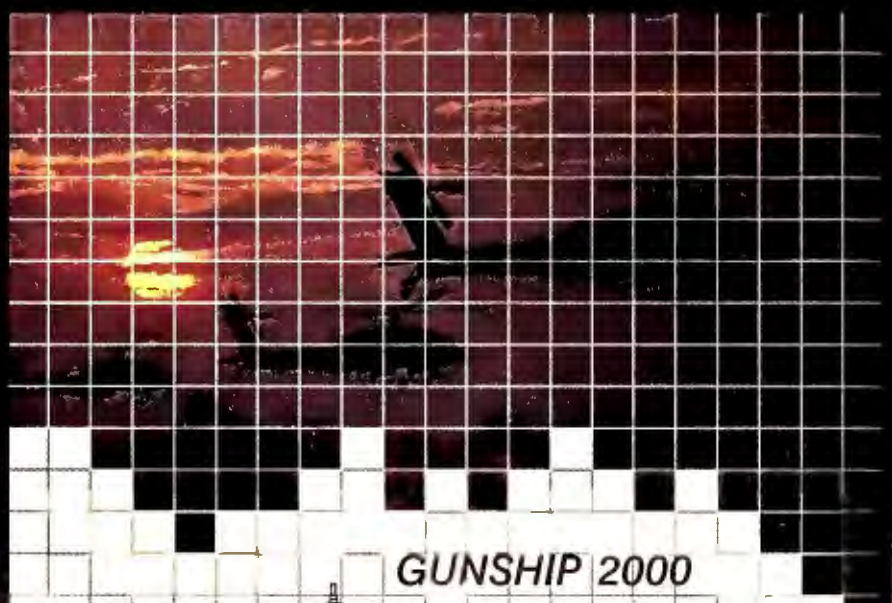

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each page, *WordPerfect* would stop and ask if I wanted to print before regenerating the table of contents. Once I discovered this, I rewrote the macro to work whether or not a table of contents was present [see **FIGURE 1**].

DONALD G. CAMPBELL
SAN DIEGO

Editor's note: In a string of errors worthy of a thirties screwball comedy, the March "correction" contained an error of its own. The >l~ at the end of the third line should have been >1~.

But as Mr. Campbell points out, even in its corrected form the original macro doesn't work when there's a table of contents in the document. It was necessary to make the macro press **Y** *as it requests a printout of each page. This revised macro shows how you can query* WordPerfect's *internal flags to determine whether or not a response is needed.*

As with the original, this version of REVPRINT uses macro specific commands, so you can't create it by simply recording keystrokes; you must use the macro editor. To get to this editor, press **<Home>**, *then* **<Ctrl>-<F10>**. *At the 'Define macro' prompt, type* **REVPRINT** *and press* **<Enter>**; *at the 'Description' prompt, type* **Prints backward** *and press* **<Enter>** *again. You're now ready to create the macro.*

The first command, {DISPLAY OFF}, is already there. Get past it by pressing **<Right>** *and* **<Enter>**. *To place editing and cursor navigation commands like {Home}, {Down}, and {Page Up} into the macro, press* **<Ctrl>-V** *followed by the appropriate command key. To enter the commands that appear in all caps, such as {WHILE}, {STATE}, and {SYSTEM}, press* **<Ctrl>-<Page Up>**, *select the command on the resulting pop-up list, and press* **<Enter>**. *Insert {Print} by pressing* **<Shift>-<F7>**. *Type the remainder of the text as it appears. When the macro is finished, press* **<F7>** *to exit the macro editor.*

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BASICS: WORDPERFECT 5.1 MACROS

RECORDING MACROS

Record named macro	**<Ctrl>-<F10>**, type file name, **<Enter>**, type description, **<Enter>**, type keystrokes for text and commands, **<Ctrl>-<F10>**
Record unnamed macro	**<Ctrl>-<F10><Enter>**, type keystrokes for text and commands, **<Ctrl>-<F10>**
Record <Alt>-*alphakey* macro	**<Ctrl>-<F10><Alt>-***alphakey*, type description, **<Enter>**, type keystrokes for text and commands, **<Ctrl>-<F10>**

INSERTING COMMANDS WHILE RECORDING

Insert Pause	**<Ctrl>-<Page Up>**•**Pause**•**<Enter>**
Insert Display on/off	**<Ctrl>-<Page Up>**•**Display**, **Y** to turn on/**N** to turn off
Insert Variable	**<Ctrl>-<Page Up>**•**Assign**, type variable name or number from **0** to **9**, **<Enter>**, type variable's text, **<Enter>**
Insert Comment	**<Ctrl>-<Page Up>**•**Comment**, type comment's text, **<Enter>**
Nest <Alt>-*alphakey* macro	**<Alt>-***alphakey* at point where you want nested macro to run

RUNNING MACROS

Run <Alt>-*alphakey* macro	**<Alt>-***alphakey*
Run named macro	**<Alt>-<F10>**, type macro name, **<Enter>**
Run unnamed macro	**<Alt>-<F10><Enter>**
Repeat <Alt>-*alphakey* macro	**<Esc>**, type number of repetitions, **<Alt>-***alphakey*
Repeat named macro	**<Esc>**, type number of repetitions, **<Alt>-<F10>**, type macro name, **<Enter>**

EDITING MACROS

Use the Macro Editor to add or change macro text; keystroke commands such as Print, Save, and Format; keys such as <Enter>, <Delete>, and <Backspace>; and programming commands such as {IF}, {END IF}, and {INPUT}.

Open macro editor	**<Ctrl>-<F10>**, enter macro name, edit description (optional), **<Enter>** (if you used **<Enter>** to name macro, type **wp{wp}.wpm** for macro name)
Insert single edit command	**<Ctrl>-<V>**, *edit key*
Insert multiple edit commands	**<Ctrl>-<F10>**, *edit keys*, **<Ctrl>-<F10>**
Insert macro commands	**<Ctrl>-<Page Up>**, start typing command name, **<Enter>** to select
Exit Macro Editor	**<F7>**

USING VARIABLES

Use temporary variables to insert text you want to repeat frequently during the current word processing session. This is done from the Document screen.

Tip: Create a macro that will restore variables when you start a session.

Create variable	**<Ctrl>-<Page Up>**, type number from **0** to **9**, type text (79 characters or less), **<Enter>**
Insert variable contents	**<Alt>-***number*

Tip: Create a macro that stores text in variables, and run the macro next time you start *WordPerfect*. The variables will be loaded in memory for use during your word processing session.

Create macro that stores text in variables	**<Ctrl>-<F10>**, name macro, type description, **<Enter><Ctrl>-<Page Up>**• **A**ssign, type number from **0** to **9** to name variable, **<Enter>**, type text for storage in variable, **<Enter>**, repeat for additional variables; **<Ctrl>-<F10>** to end
Erase variable in macro	**{ASSIGN}***variable*~~

EXAMPLES OF RECORDED MACROS

COMPANY NAME

123 1st Ave.
Seattle, WA 98111
(206) 123-4567

(date code)

MEMORANDUM

TO: {PAUSE}

FROM: {PAUSE}

SUBJECT: {PAUSE}

The sample letterhead macro creates the top half of the example page shown above. The sample memorandum macro uses the letterhead macro to create the entire example page.

Letterhead macro

```
{Font}fnhelv 14pt bold{Enter}s {;}Choose new font~
COMPANY NAME{Enter}
{Graphics}lhw.1{Enter}   {;}Horizontal line~
{Exit}{Enter}{Enter}
{Font}fnhelv 12pt italic{Enter}s
{Flush Right}123 1st Ave.{Enter}
{Flush Right}Seattle, WA 98111{Enter}
{Flush Right}(206) 123-4567{Enter}{Enter}
{Date/Outline}c{Enter}   {;}Code to print current date~
{Enter}{Enter}{Enter}{Enter}
{Font}fncourier{Enter}s
```

Memorandum macro

```
{ALT L}                  {;}call letterhead macro~
{Center}MEMORANDUM{Enter}{Enter}{Enter}
TO:{Tab}{Tab}{PAUSE}{Enter}{Enter}
FROM:{Tab}{PAUSE}{Enter}{Enter}
SUBJECT:{Tab}{PAUSE}{Enter}{Enter}
{Esc}60={Enter}          {;}Enters a line of equal signs~
{Enter}
```

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ADVANCED: WORDPERFECT 5.1 MACROS

STORING MACROS IN A KEYBOARD FILE

You can use any <Alt>- or <Ctrl>-key combination or alphakey to name a macro stored in a keyboard file. Keyboard file macros (with WPK extensions) take precedence over regular macros (with WPM extensions).

Assign existing macro to keyboard file	**<Shift>-<F1>•K**eyboard Layout• **E**dit•**R**etrieve, type keys you want to assign macro to (i.e., **<Ctrl>-***alphokey,*) type macro name, **<Enter><F7>**
Create macro for keyboard file	**<Shift>-<F1>•K**eyboard Layout• **E**dit•**C**reate, type key combination for macro name, type description, **<Enter>**, type keystrokes and commands for macro, **<F7>**
Select keyboard file	**<Shift>-<F1>•K**eyboard Layout•**<F7>**
Return to original keyboard file	**<Shift>-<F1>•K**eyboard Loyout• **O**riginal•**<F7>**
Create new keyboard file	**<Shift>-<F1>•K**eyboard Layout• **C**reote, type keyboard file name, **<Enter>**, assign existing macros to new keyboard, create any new macros

Tip: You con store several related macros in a single keyboard file.

COMMON MACRO COMMANDS

You must insert most macro commands by selecting them from the menu in the Mocro Editor. The only commands that can be inserted while recording a macro are the Pause command ond the commands to turn Display on and off, insert variables, and insert comments.

Disploy comment	**{;}***comment~*
Ring bell	**{BELL}**
Pause mocro for data entry;	**{INPUT}***messoge~*, **<Enter>** to restart display entry
Specify key to end pause	**{PAUSE KEY}***key~*
Display message in status line	**{PROMPT}***messoge~*
Wait for single-character response to message; store character in variable	**{CHAR}***vorioble~messoge~*
Wait for up to 127-character response to message; store response in variable	**{TEXT}***vorioble~messoge~*
Turn on menu display as macro runs	**{MENU ON}**
Turn off menu display as mocro runs (except pulldowns)	**{MENU OFF}**
Delay macro for one-tenth of o second	**{WAIT}10~**
Mark section in macro	**{LABEL}***lobel~*
Instruct macro to go to specific {LABEL} mark	**{GO}***lobel~*
Instruct macro to go to specific {LABEL} mark and return action to following command	**{CALL}***lobel~*
Return macro to point following {CALL} or {CASE CALL}	**{RETURN}**

COMMON MACRO COMMANDS (continued)

Wait for response that directs action to another section of macro	**{CASE}***expression~volue1~ label~...~~*
Execute command if expression is true	**{IF}***expression~*
End {IF} condition	**{END IF}**
Begin command when {IF} condition is false	**{ELSE}**
Run macro within another	**{NEST}***mocro nome~*
Indicate operating mode	**{STATE}&***code number~*

To find out if:	*Use code number:*
current document	3
normal editing screen	4
editing structure other than normal	8
macro definition active	16
macro execution active	32
merge active	64
block active	128
typeover active	256
reveal codes active	512
yes/no question active	1024
in a list	2048
cannot go to shell	32768

Access contents of variables	**{VARIABLE}***vorioble~*
Determine if variable has been assigned	**{IF EXISTS}***vorioble~*
Run macro one step at a time	**{STEP ON}**; press any key to run next step
Turn off single-step command	**{STEP OFF}**
End macro	**{QUIT}**

EXAMPLES OF WRITTEN MACROS

Macro that saves and then prints a document

```
{DISPLAY OFF}
{Save}{PAUSE}{Enter}
{IF}      {;}If document has been saved previously~
{STATE}&1024~y {;}Choose Yes at Replace message
{END IF}
{WAIT}30~ {;}Delay macro 3/10 second before printing
{Print}f
```

Macro that retrieves a specific file based on response to a message

A travel agent uses this macro to retrieve information about various packages. He or she responds to the macro message by typing the corresponding letter. Based on the letter typed, the macro jumps to a corresponding label; the label's subsequent commands retrieve the appropriate file.

```
{DISPLAY OFF}
{CHAR}package~
Which Travel package do you want?{Enter}
H=Hawaii, S=Sun Valley, L=Las Vegas ~

{CASE}{VARIABLE}package~~
h~Hawaii~H~Hawaii~
s~SValley~S~SValley~
l~LasVegas~L~LasVegas~~
{;}Use both lower- and uppercase letters for each value
so response matches regardless of case~

{LABEL}Hawaii~{Retrieve}Hawaii{Enter}{QUIT}
{LABEL}SValley~{Retrieve}SValley{Enter}{QUIT}
{LABEL}LasVegas~{Retrieve}LasVegas{Enter}{QUIT}
{;}Each label begins routine to load a particular file~
```

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Fold Here

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Circle 207 on reader service card

```
{DISPLAY OFF}
{Home}{Home}{Down}
{WHILE}{SYSTEM}page~>1~
{Print}2
{IF}{STATE}&1024~Y{END IF}
{Page Up}
{END WHILE}
{Print}2
{IF}{STATE}&1024~Y{END IF}
```

FIGURE 1: This revised macro will print the pages of a document in reverse order even if it has a table of contents.

A Good First Impression of Windows

Windows 3.0 lets you customize many things, such as window size, location, colors, wallpaper, and icons. However, there's no obvious way to modify the start-up screen—unless you know how.

First, a bit of background: *Windows'* start-up image is not a separate file; it's an integral part of the WIN.COM program that loads the environment. When you first install *Windows 3.0,* the SETUP program builds WIN.COM by concatenating three other files. The first, WIN.CNF, loads the *Windows* software. The second, *xxx*LOGO.LGO (where *xxx* stands for a graphics adapter—VGALOGO.LGO, for instance), contains the program that displays the logo. Finally, there's the start-up image itself, the file you're going to replace.

This third file, a graphic image, has the extension RLE, for run length encoded. This extension signifies a compressed graphics file format that *Windows'* Paintbrush doesn't support. Fortunately, a number of other programs do support it, including utilities that can translate Paintbrush BMP and other common formats into RLE files; at least two of them, *PaintShop* and *WinGif,* are available as shareware.

As you create a masterpiece for your start-up screen, keep two restrictions in mind. First, *Windows* can handle only 4-bit (16-color) start-up images—that driver for your 256-color super-VGA board doesn't kick in until the start-up screen is gone. Second, your RLE file can't be larger than 59K; anything bigger, when you add it to WIN.CNF and the RLE file, will give you a COM file that's larger than 64K, and DOS won't be able to load it. This second restriction will be a problem only if you want a highly detailed start-up image.

To create your custom start-up screen, use the following procedure:

1. Find WIN.CNF and your LGO file, which may not be on your hard disk. If you can't find them in your WIN directory, you'll have to expand them (they ship in compressed form) from the distribution disks. The expansion utility, EXPAND.EXE, is also on the distribution floppies. Its syntax is simple: **EXPAND** *source destination,* as in **EXPAND A:WIN.CNF C:\WIN\WIN.CNF**.

2. Find a graphics image you want to use, or create one in Paintbrush or another program, making sure the image size matches your screen resolution. If you use Paintbrush, select *Options • Image Attributes* to set the proper image size in pixels (640 by 400 for EGA, 640 by 480 for VGA).

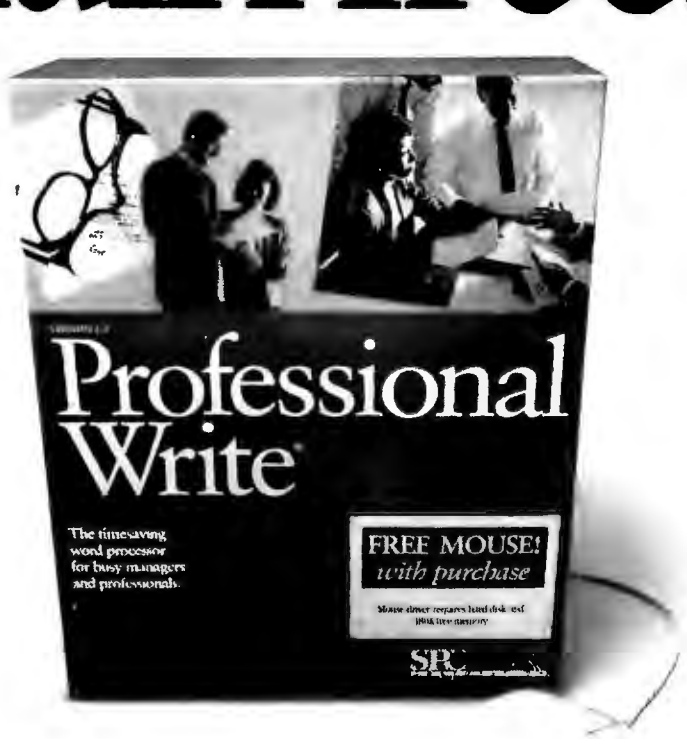
3. Convert the image from its source format (BMP, PCX, TIF, or whatever) to RLE, using any utility that can handle this translation.

4. Create your new COM file with the following DOS-line command, where *xxx* is the first three letters of your LGO file's name, such as EGA, VGA: **COPY WIN.CNF/b+***xxx***LOGO.LGO/b+***YOURLOGO***.RLE/b NEWWIN.COM/b**. The /b switch tells DOS to treat these as binary files and to ignore any end-of-file markers it finds. After you've loaded *Windows* with NEWWIN a few times and feel comfortable with it, you might want to change its name to WIN.COM.

MARK N. MARTIN
BALTIMORE

Editor's note: You can have lots of fun opening Windows *with this technique. One of my favorite screens is*

The word processor is hassle free. The mouse is just plain free.



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an image of an ordinary Windows *desktop, flipped upside down with the aid of a drawing program. If someone is watching me load* Windows, *I curse and slap the monitor on its side just before the image rights itself.*

Besides the shareware conversion utilities Martin mentions, a few commercial ones—such as Hijaak and The Graphics Link—can convert other graphic formats to Microsoft's RLE. There are also several other shareware utilities; check your favorite BBS or on-line service for information.

Have a macro, batch file, short program, or general tip you're proud of? Mail your tips to Star-Dot-Star, PC World, *501 Second St. #600, San Francisco, CA 94107; or send them electronically to PC World Online, Star-Dot-Star; CompuServe, 74055,412; MCI Mail, PC World Editorial; Internet, rogue@well.sf.ca.us; 415/442-1891 (fax).* Star-Dot-Star *pays $25 to $200 for each tip used. Sorry, we cannot acknowledge unpublished materials.*

Brett Glass is a contributing editor for PC World..

POWER TIP NO. 249

Quicker Windows Cut and Paste

Tired of constantly fussing with scroll bars after copying data into a DOS application running in a window? To quickly bring data into view, place the mouse in the window, click (as if you were going to select something), and yank the pointer in the desired direction. The data will scroll into view. Press <Esc> and you can go back to work.

Robert Luhn
Contributing Editor

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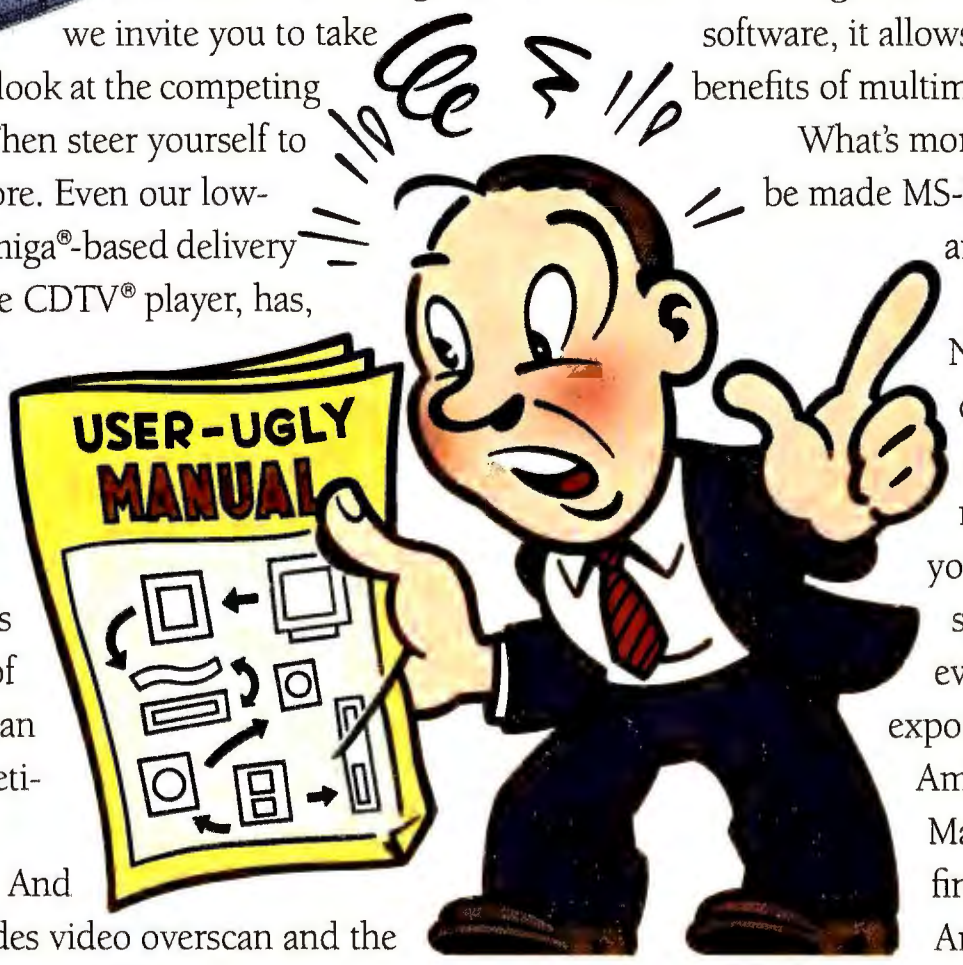

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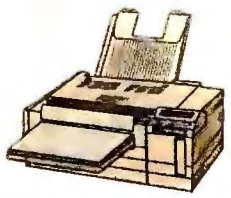

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	All	Some	Least 1	2	3	4	Most 5
Sample	◉	○	○	○	○	○	◉
In This Issue (page 13)	○	○	○	○	○	○	○
Letters (page 17)	○	○	○	○	○	○	○
What Next? (page 31)	○	○	○	○	○	○	○
Top of the News (page 34)	○	○	○	○	○	○	○
At Last, a Real Natebaak Fram IBM (page 36)	○	○	○	○	○	○	○
QuickBaaks Opens the Ledger (page 37)	○	○	○	○	○	○	○
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Industry Outlook (page 77)	○	○	○	○	○	○	○
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CD ROM Drives: 680MB ar Bustl (page 88)	○	○	○	○	○	○	○
Color Printers Came Thraugh (page 106)	○	○	○	○	○	○	○
Buyers' Guide: Calar Partables (page 128)	○	○	○	○	○	○	○
Buyers' Guide: Input Devices (page 140)	○	○	○	○	○	○	○
Scam! (page 150)	○	○	○	○	○	○	○
486 Times 2 (page 160)	○	○	○	○	○	○	○

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	All	Some	Least 1	2	3	4	Most 5
Windaws 3.1 Delivers (page 166)	○	○	○	○	○	○	○
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Multimedia Super Tutarials (page 192)	○	○	○	○	○	○	○
Multimedia Presents (page 198)	○	○	○	○	○	○	○
Buyers' Guide: Multimedia Systems (page 204)	○	○	○	○	○	○	○
The Help Screen (page 213)	○	○	○	○	○	○	○
Spreadsheets (A..Z) (page 223)	○	○	○	○	○	○	○
Word Pracessing Clinic (page 231)	○	○	○	○	○	○	○
Data Basics (page 235)	○	○	○	○	○	○	○
Publishing & Presentatians (page 242)	○	○	○	○	○	○	○
Communications Q&A (page 247)	○	○	○	○	○	○	○
Windows Warkshap (page 249)	○	○	○	○	○	○	○
User Graup Tips (page 257)	○	○	○	○	○	○	○
Star-Dat-Star (page 259)	○	○	○	○	○	○	○
WardPerfect 5.1 Macras (page 265)	○	○	○	○	○	○	○
The Hame Office (page 312)	○	○	○	○	○	○	○

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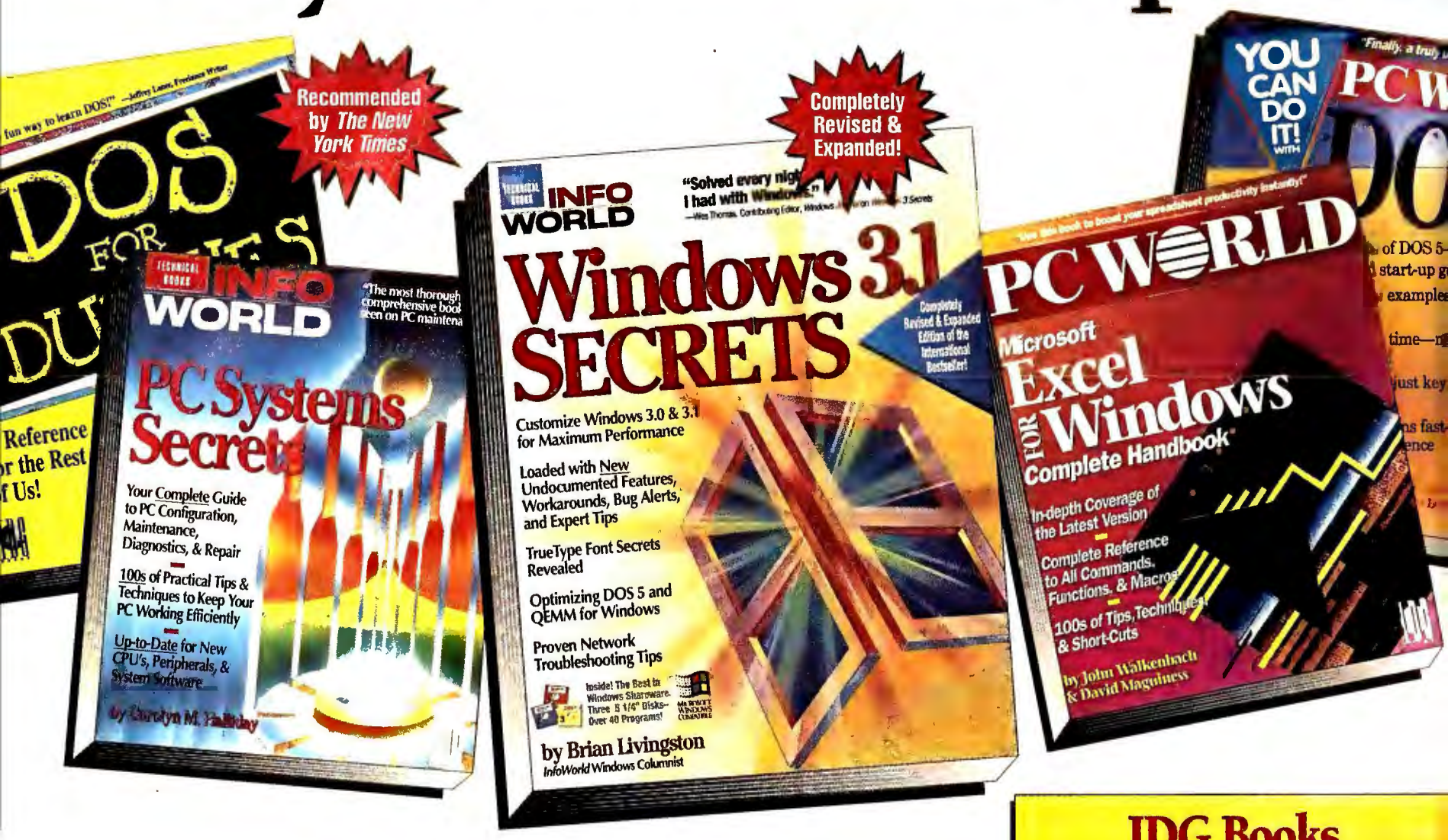

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1-800-827-6364

Extension: 5741

PC WORLD ONLINE

A service of PC World Communications, Inc.

America Online is a registered Service Mark of America Online, Inc.

Circle 207 on reader service card

You Can Afford Four Color Impact

In fact, you can't afford NOT to advertise in color. Industry studies and years of ad tracking show that color ads typically outsell black and white ads by over 40%. *PC World's* new "Business Class" section brings your four color ad to over 620,000 of North America's most influential PC buyers. Typical cost: about $4300 for a quarter page. (Call the number listed below today for full pricing information).

Improved Black and White Design

Our "Computer Showplace" section, now redesigned to better highlight your advertisements, will be an even more effective selling platform. Reader responses for the last 12 months have averaged 398 replies per ad, an increase of 43% over 1990. A 4½ inch ad in "Computer Showplace" costs about $2000 at the 12x rate. If your ad pulls an average response (398 inquiries), can you afford NOT to advertise in *PC World*?

PC WORLD

CALL TOLL-FREE NOW FOR MORE INFORMATION:
1-800-435-7766 OR 1-800-435-7760 (WITHIN CA)

CATALOG PC WORLD

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ADVERTISING SALES STAFF

Sandra Wade - *Catalog Manager*
Duane Hampson - *Eastern Account Manager*
Elizabeth Maffly - *Catalog Production Manager*

ADVERTISING RATES & INFORMATION

The *PC World Catalog* serves as a cost-effective monthly meeting place for advertisers and volume purchasers. *Our readers don't want to shop, they want to buy!* And your message can reach them in two formats—display or text. Both are arranged by product category for easy reference.

Display ads are sold by the column-inch (2-inch minimum). You must supply camera-ready type and artwork. Standard red is available as a second color.

Text ads are sold at a minimum three-time rate of $645 per issue for a total of $1,935. You supply copy. We set type.

For further information regarding the *Catalog*, space closings and material deadlines, please call Toll-Free 800/435-7766. Within California, call 800/435-7760.

PC World
501 Second Street
San Francisco, CA 94107

PCW Communications, Inc.
An IDG Communications Publication

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The PC WORLD CATALOG

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800/435-7760 (CA)

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backpack

MicroSolutions
Computer Products

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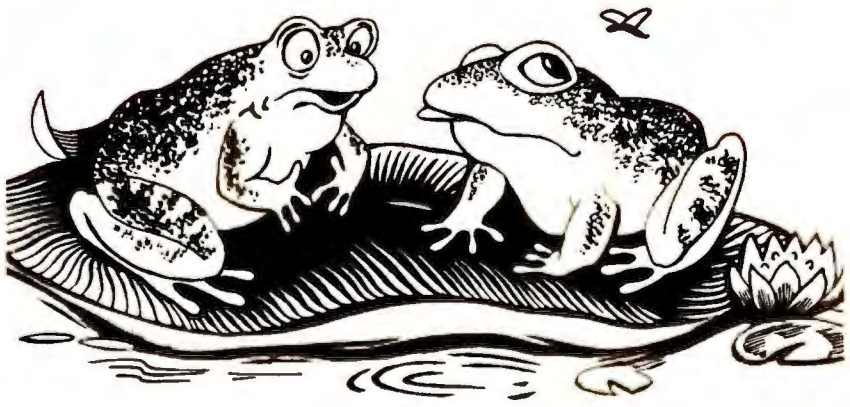
TWO COMPUTERS CAN SHARE ONE BACKPACK.



With Backpack, several computers can share a single tape drive. Backpack connects quickly and easily to the parallel printer port of any PC compatible or portable—without interface cards or tools! The Backpack tape drive is also easy to transport, making it ideal for transferring data from one computer to another. QIC 40 (40/120MB) and QIC 80 (80/250) tape, diskette and hard drive models are available. So share and share alike! Call today for more information.

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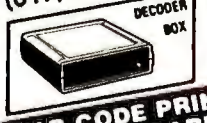

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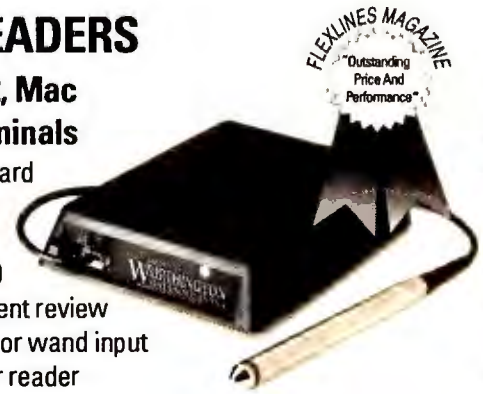

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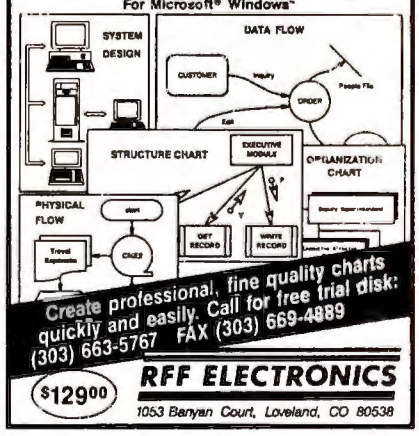

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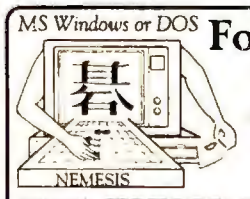

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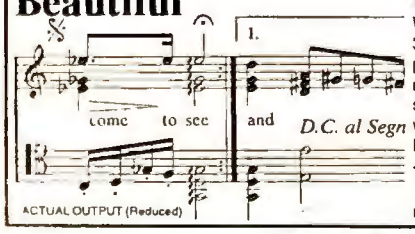

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ktop Direct from Digital regrets that an inaccurate photograph accom-
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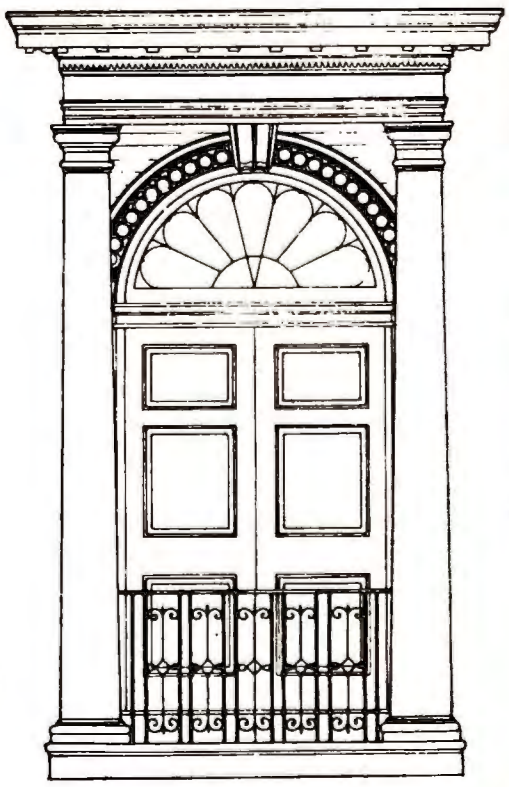

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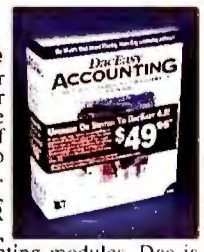

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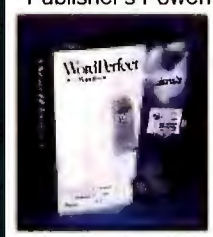

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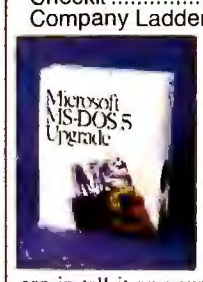

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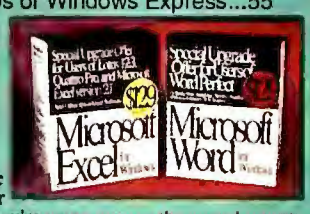

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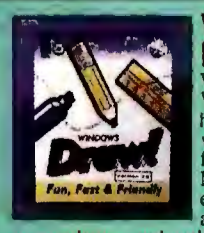

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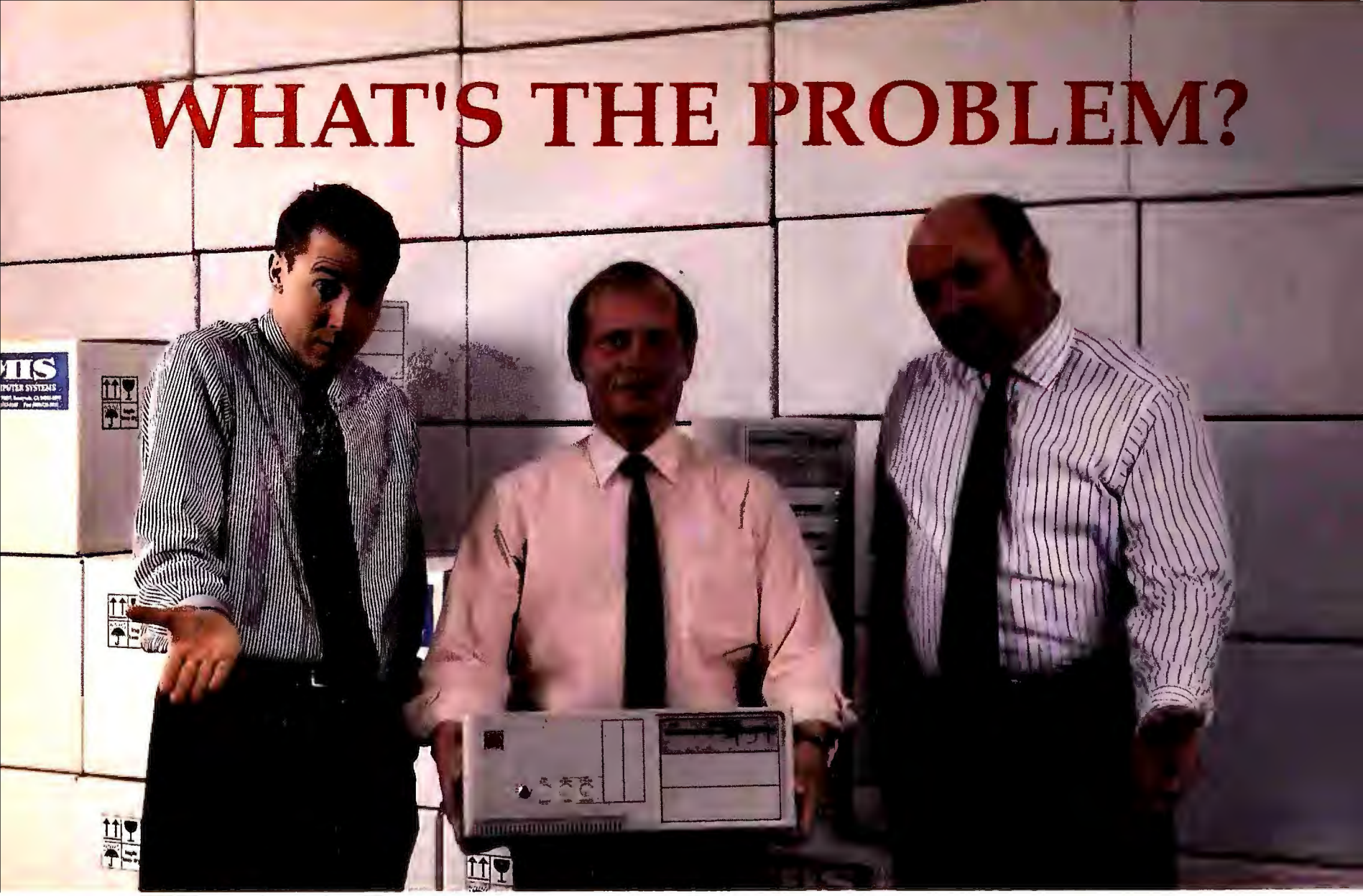

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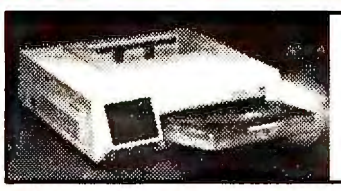

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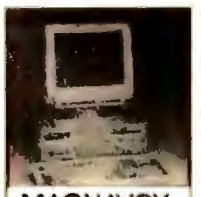

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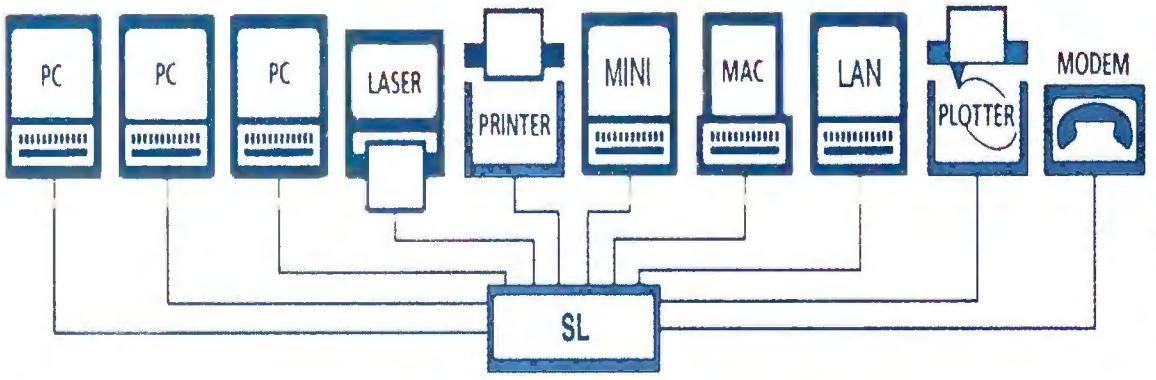

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- W **The Typist + Graphics** from Caere (comes with hand scanner, OCR s/w and interfaces— complete, effective & inexpensive OCR 385
- W **Wordscan** by Calera 219
- W **WordScan Plus** by Calera 665

IMAGE EDITORS (photo manipulation software)
- W **Aldus PhotoStyler** v1.1 (NEW & HOT!!!) 519
- W **Halo Oesktop Imager** (great & inexpensive) .. 99
- W **IMAGE-IN Color** Full Pack (new version) 695
- W **Picture Publisher v3.0** by Micrografx ..... *CALL*
- **Pixel Photo** hi-performance 24-bit color editor .. 795
- W **Photo Finish** by ZSoft 117
- W **Publisher's Paintbrush** for Windows 3.0 285
- **Tempra Pro** by Mathematica (24-bit color) 359
- W **WinRix** by Rix Software (color image ed) 295

SCANNER SYSTEMS

All scanners listed below include on interface, scanning software & scanner unit. If you purchese eny of our OCR software listed above with a Microtek ScanMaker 600Z, you can teke 5% off the bundled price of scanner + OCR.

- **Logitech Scanman 32** 400-dpi, 32 gray levels $158
- **Logitech Scanman 32** w/Catchword OCR 229
- **Logitech Scanman 256** w/Ansel software 285
- **Logitech Scanman 256** w/Catchword OCR 429
- **Niscan GS** for Windows 3.0 w/Image-In 229
- **Niscan GS** w/Perceive OCR & Image-In 335
- **Niscan Spectra** Color hand-held scanner 599

MICROTEK

ScanMaker 600Z

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Microtek ScanMaker 600Z $1335

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Adobe Streamline For Windows with a purchase of a Microtek ScanMaker 600Z or ScanMaker 1850. $195 retail value- **FREE** with purchase. One frea copy of Streamline per customer please.

ScanMaker 1850

35-mm Photo Slide Scanner

1850 x 1850-dpi, 16.7 million colors (24-bit) and 256 grayscale. Bundled with **PhotoStyler** image editing software for Windows. Scans slides and negative film media in portrait or landscape mode.

Microtek ScanMaker 1850..... $1995

LaserPix 3.0™ from XLI

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2400-dpi Printer Upgrade for HP LaserJet II & III and Canon LBP-8 mkIII Printers

LaserPix 3.0 prints high-definition imeges on HP LaserJet II and III™ laser printers. **LeserPix** is a PC-AT compatible printer controller board with both Windows 3.0 PostScript and PCL drivers. **Effective resolution of 2,400 dpi with 256 levels of gray.**. Applications include OTP, technical documentation, scientific imaging, security, end real estate. You won't believe how great photo's, text and graphics can look coming off your printer and the speed at which they print (about 3 seconds for TIFF images)!!!!

List Price: $1495 LPG Price: *CALL*

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- **EP-L Toner** Cartridge for HP, QMS, etc 75
- **EP-S Toner** Cartridge for HP, QMS, etc 85
- **Hi-Res Toner** for NewGen, LaserMaster 159
- **Hi-Density Toner** for NewGen, LaserMaster . 159

PRINTER MEMORY UPGRAOES (5-yr warranty)
- **HP LaserJet** 1-MB, 2-MB, 4-MB ..... 95 / 145 / 239
- **HP LaserJet IIIsi** 1-MB / 4-MB ..... 109 / 395
- **NEC Silentwriter 90** 2-MB 229
- **Okidata OL400** 1-MB/ 2-MB ..... 129 / 195
- **Okidata OL800** 2-MB / 4-MB ..... 199 / 299
- **Panasonic** (4420 / 4450 / 4450i / 4455) ..... *CALL*
- **QMS PS-410** 1-, 2-, 3-, 4-MB . 139 / 179 / 239 / 299
- **TI microLaser** 1-MB SIMM upgrade 95

DP-TEK TruePoint 600x600-dpi printer controller upgrade for your HP LJ II & III or Canon LBP4. Speciel SALE Price - while supplies last 1295

Color Printers

QMS
- **ColorScript 100 model 10** (8½ x 11 & 14) $5995
- **ColorScript 100 modal 30i** (11 x 17) 8695

Seiko Instruments
- **ColorPoint CH55046** MB RAM, A-size $4995
- **ColorPoint PSX 4** (ultre fast, 10-MB RAM) 6995
- **Seiko Personel ColorPoint** — prints full color on plain paper, 6-MB RAM, Pantone output, PostScript, 39 fonts, can print on 2 sidas of paper. Macintosh and PC-compatible. Prints on paper, transparency film and iron-on fabric transfer sheets. Small desktop footprint.
- **Personal ColorPoint** $6495

CAD, Plotters & Vinyl Cutters

Roland DIGITAL GROUP

- **Stika** personal vinyl cuting machine ..... $[illegible]
- **SketchMate** A-size plotter ..... [illegible]
- **SketchMate** A-size plotter & vinyl sign cutter [illegible]
- **SketchMate** B-size plotter (11" x 17") ..... [illegible]
- **SketchMate** B-size plotter & vinyl sign cuttar ..... [illegible]
- **DXY-1100** 8-pen A-B-size flatbed plotter ..... [illegible]
- **DXY-1200** 8-pen A-B-size flatbed plotter ..... [illegible]
- **DXY-1300** 8-pen A-B-size flatbed plotter 1395

KURTA

- **XLP 12" x 12"** tablet, pen, cursor ..... [illegible]
- **IS/ONE 8½" x 11"** tablet, pen, cursor 32
- **IS/ONE 12" x 12"** tablet, pen, cursor 35
- **IS/ONE 12" x 17"** tablet, pen, cursor 55

WACOM

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- **Wacom 12" x 12"** drawing tablat, pen & puck ..
- **Wacom 12" x 18"** drawing tablet, pen & puck ..

The Wacom systems listed above come with a pressure-sensitive pen and a standard 4-button cursor

CAD SOFTWARE TITLES
- **AutoSketch** version 3.0 14
- **DesignCAD 2D / DesignCAD 3D** ..... 175 / 19
- W **Orafix CAD for Windows** 43
- **Generic CAD Level 6.0** (new version) 29
- W **MacDraft** (new product for Windows) 31
- **Mennequin** by HumanCAD 44

Electronic Photography

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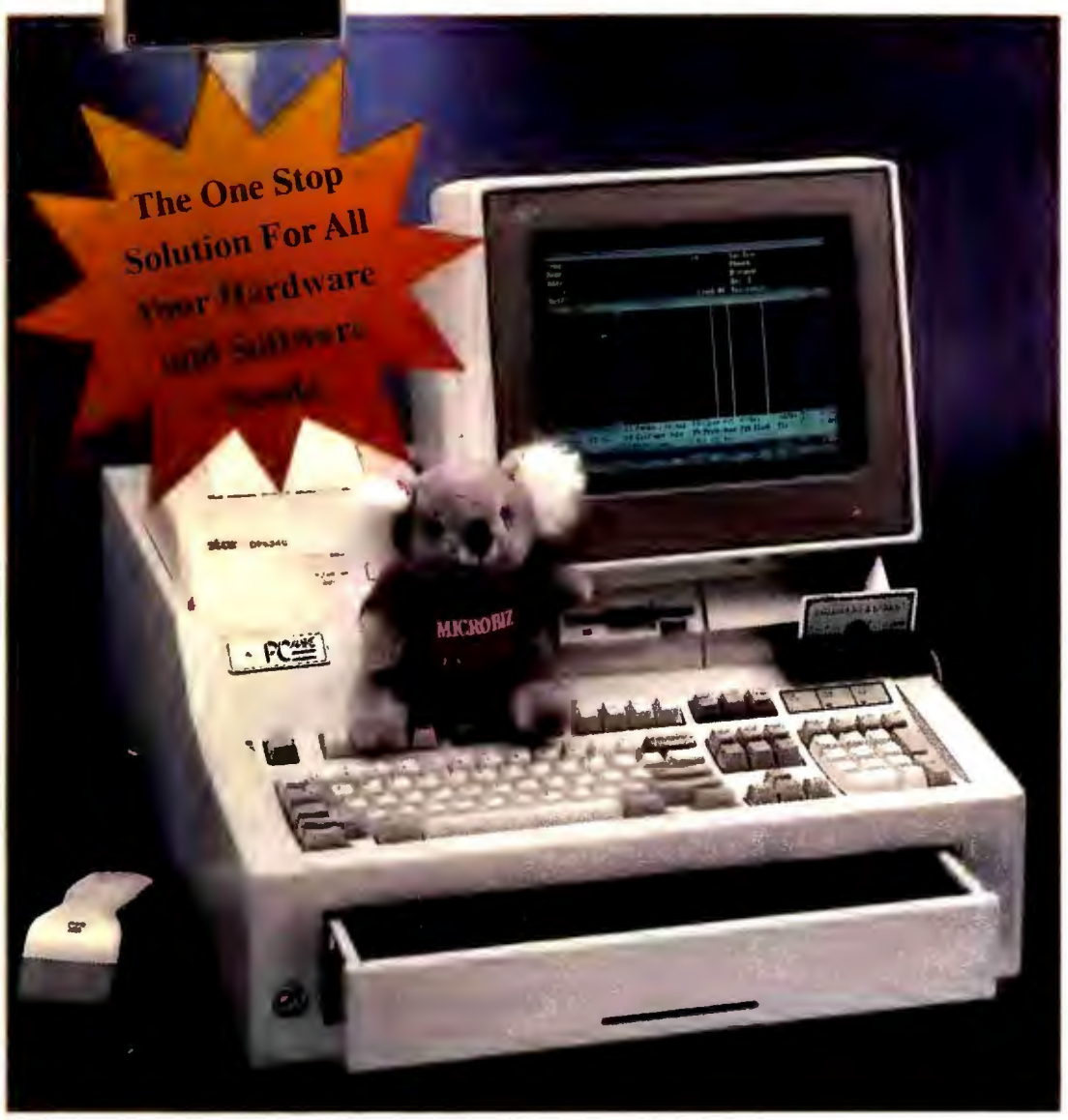

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THE HOME OFFICE

BY STEVE BASS

The practical guide to home/office computing

Here's a quiz: What program always ships on time, sends free upgrades to your home, and is a breeze to install? The Whale Virus.

If you're careful, the chance of your computer being infected is less than that of winning the Lotto. But I *wasn't*—and when the Whale took hold, my system became sluggish and programs mysteriously hung up.

To make sure I don't get hit again, I now take some simple steps to protect my home system. First, I consider any new software to be an intruder—guilty until proven innocent.

Many in my user group consider themselves immune because they avoid what they mistakenly consider to be virus hangouts: BBS's. That's a fallacy. A virus is more likely to infect your home PC via a floppy; I traced mine to a disk I used on a friend's computer.

And if you assume your office computer is exempt because it's watched over by your MIS director, think again. Repair technicians can inadvertently carry infected disks, or a disgruntled employee can intentionally sabotage a network. Don't be surprised if you bring home a virus along with the bacon.

Viruses can also lurk in commercial software; occurrences are rare but increasing. Novell had to issue software to clean the Stoned 3 virus from its network support floppies.

So step one is that *everything* gets scanned as soon as it hits my hard disk. I use Central Point's *Anti-Virus* to scan the files and immunize them. If the inoculated file is attacked, you're warned and can opt for automatic cleansing. Pretty amazing.

DAVID PETERS

Once your system is clean, do a backup. Having backup files can turn a potential disaster into a mere nuisance.

Second, I consider every anomaly in my computer a possible virus attack. Some viruses are easily found because they broadcast themselves with high-tech graffiti: "Your computer is stoned." It's harder to detect those like the Whale that mimic typical computer problems, like software conflicts, bugs, or power spikes.

Because I download lots of new software, I've installed a RAM-resident watchdog as an extra level of protection. Most antivirus programs include a TSR in order to monitor known and unknown viruses while preventing attacks on disk boot sectors and partition tables. CP's *VWatch*, for example, can be tucked into high memory using a memory manager for a meager 1K.

Because I spend so much time on BBS's, and they typically archive their files with *PKZip*, I have to decompress them before my virus program can scan. To speed the process, I created GETEM.BAT (**LISTING 1**), a handy batch file that automatically unzips and scans EXE, COM, SYS, and OVL files. I used *VWatch*'s command-line feature; you can substitute your antivirus program command on the fifth line of the listing. It then deletes all unzipped copies. I also blow away the infected ZIPped files and notify the SYSOP. Later I can unzip the archived versions at my leisure, knowing they're clean.

If you're hit and not protected, don't panic. Turn off your computer and get an uninfected, *copy-protected* system disk and reboot. Run an antivirus program from the A: drive, making sure to copy-protect its disk too.

Now if a virus knocks at your floppy door, your system will be prepared: scanned, immunized, and inoculated.

```
c:
cd \download
attrib +r *.zip
pkunzip *.zip *.exe *.com *.sys *.ovl
cpav c:\download /s
pause
del *.*
attrib -r *.zip
```

ANTHONY RUSSO

LISTING 1: GETEM.BAT unzips and scans archived files.

Contributing Editor Steve Bass is a family therapist and president of Pasadena IBM Users Group. He can be reached on PC World Online.

WHERE TO BUY

Anti-Virus 1.1 $129; Central Point; 800/445-4208
Reader service no. 758

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- RAM expansion to 64 MB
- 1 floppy drive

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System includes:

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- 120 MB Hard Drive
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Timeframe	i486	i486SX	i386	i386SX	Notebook	Other
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1. Which products are you most interested in, and how many do you plan to purchase in the next 12 months?

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intel inside

*The NX20 has to be shipped to Dell for service. **Service provided by BancTec Service Corp. On-site service may not be available in certain remote locations. †Suggested retail prices ... of 3/... 'Within the first megabyte of memory, 384KB is reserved for use by the system to enhance performance. All prices and specifications are subject to change without notice. **Payment based o... 6-m...

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It's true, that phone number really is the only thing you need to know. You don't need to know about Dell's highly acclaimed service and support, and the fact that each computer goes through tests the Marines would be proud of (all without the mark-ups and hassles of traditional retail channels). All of which has won us scads of customer satisfaction awards and helped make Dell an 890 million dollar international business in just eight years. But you don't need to know any of that, just give us a call.

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