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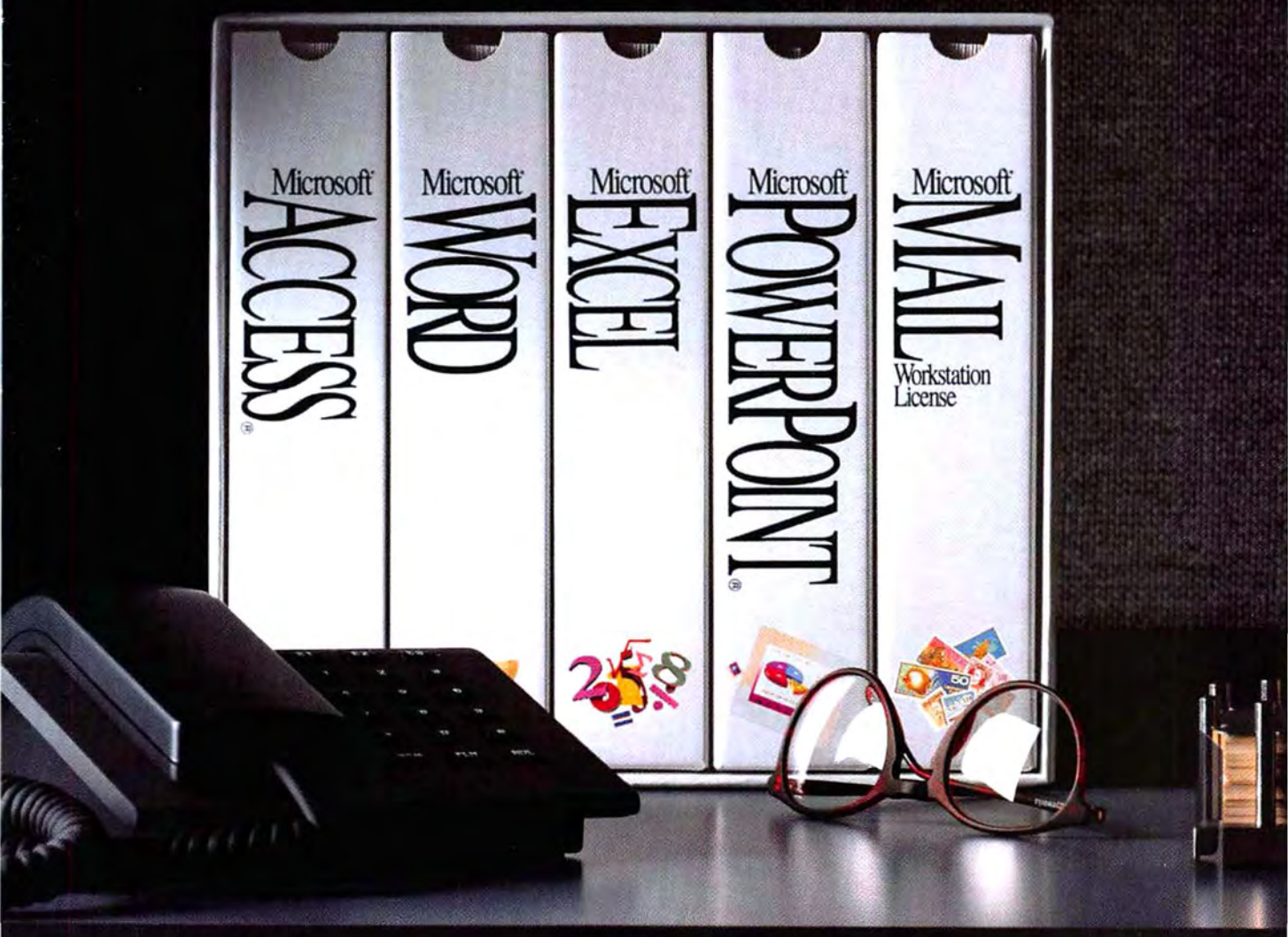

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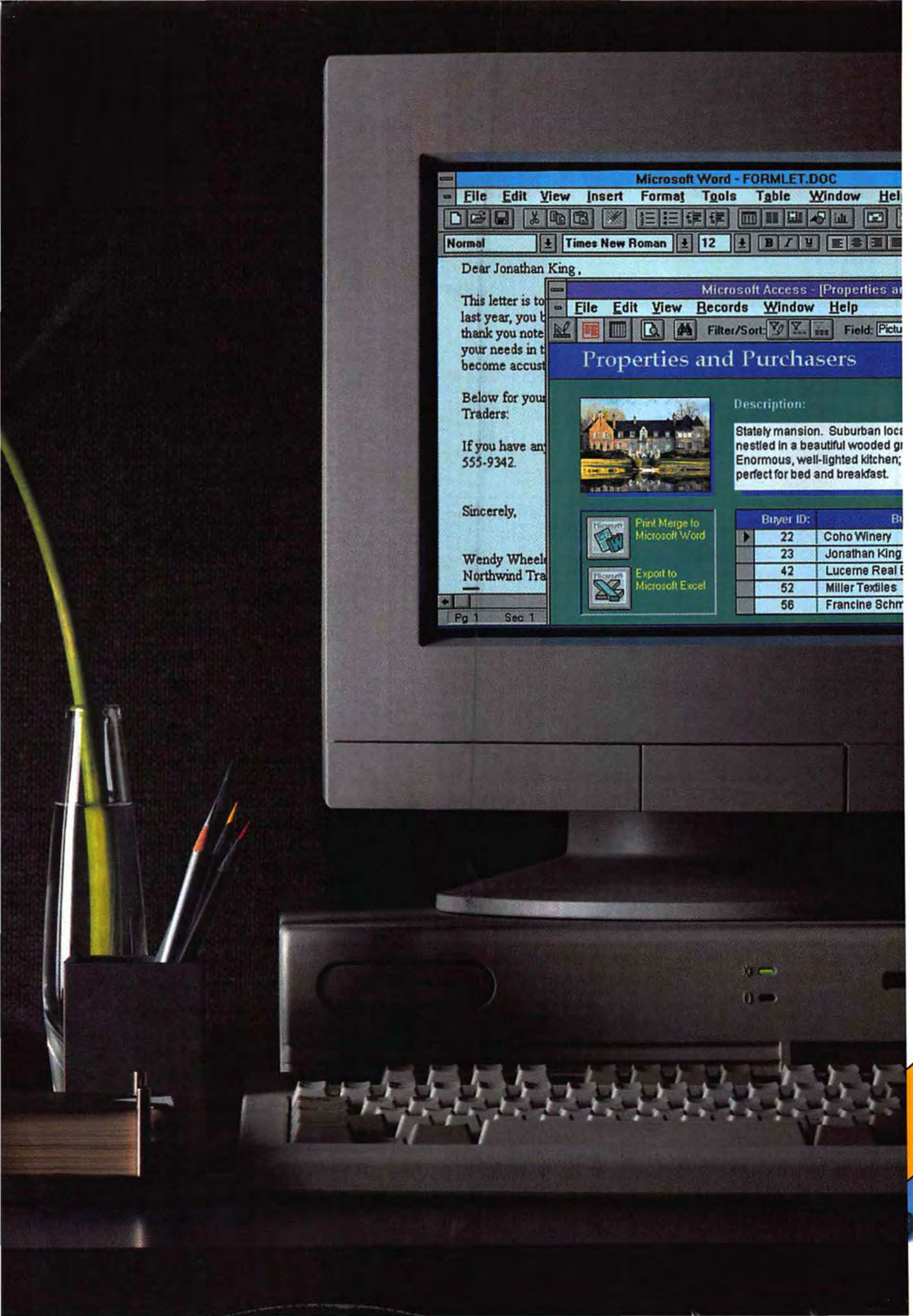
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PC WORLD

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102 With CD ROM drives and software, sound boards, fax-modems, voice mail, and more, these glitzy 486 PCs are poised to take center stage. We pick the top 5 performers from a cast of 21 systems, from 486SX-25s to DX2-66s.

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Cover photograph by Robert Cardin

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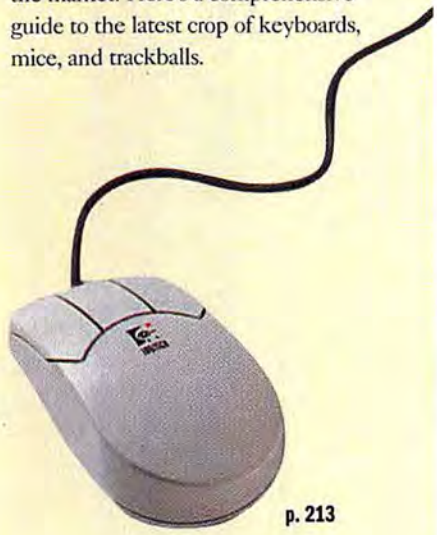

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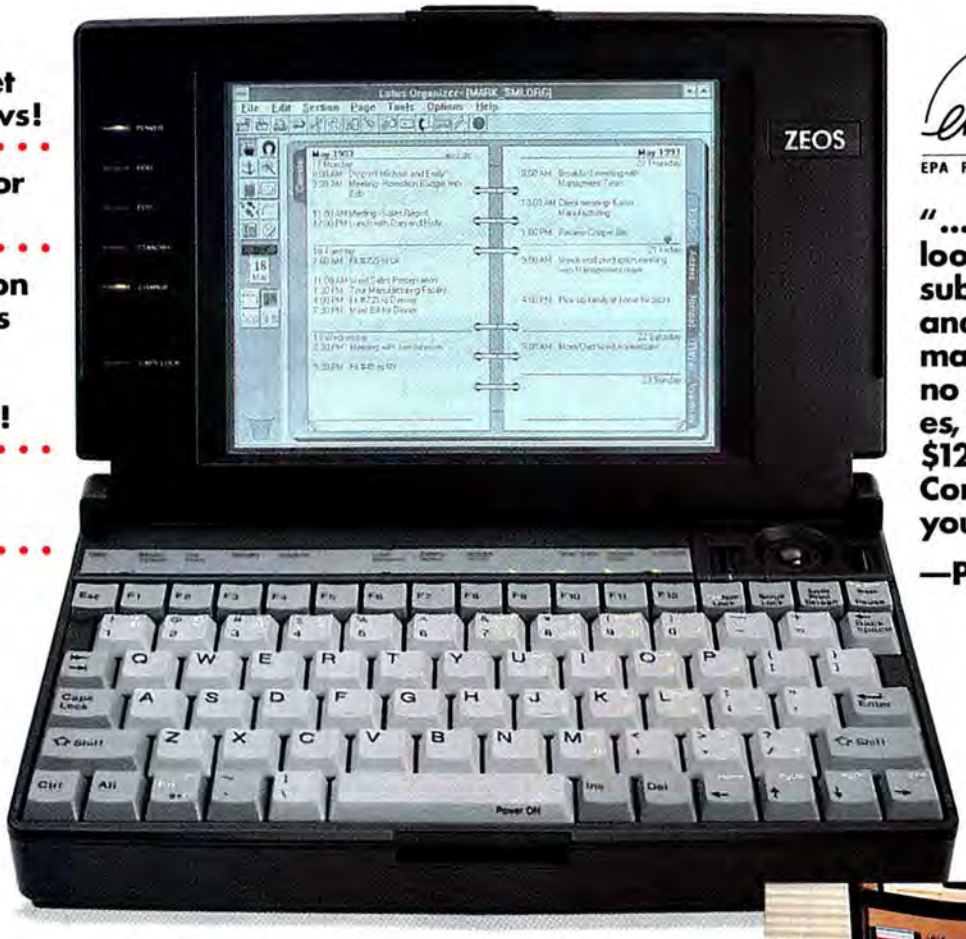

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Ripening Technologies

All things come to those who wait—if they're part of an installed base of 30 million or more. Things don't always come to the PC as fast as we'd like, but they do come. This month we look at three technologies that are beginning to deliver on the PC platform: the electronic office, optical disk drives, and desktop publishing programs for Windows.

PCs will deliver their biggest productivity gains when software lets them manage all basic office tasks in an integrated way. Microsoft At Work Architecture is a new operating system for common office equipment—fax machines, printers, copiers, answering machines, telephones—that will make integration of office tasks far better than ever before. Microsoft At Work, new telephony standards for Windows, and extensions to common fax standards will soon enable E-mail software to place faxes and voice messages in your in-box along with the rest of your electronic messages. The urge to scan in letters received on paper will soon become irresistible because of the advantage of integrated electronic storage—instant retrieval based on subject searches. Business machines exploiting Microsoft At Work will arrive before the end of the year.

Equipping the Integrated Office

How far can today's PCs take you toward the integrated office? To find out, we invited PC vendors to send their best offerings with voice-ready fax-modems, sound cards, speakers or headphones, microphones, CD ROM drives, and software. We asked each vendor to pack as much value as possible into an office-in-a-box costing $4000 or less. Ulrike Diehlmann and Susan Silvius tested the machines and Bryan Hastings and Dan Miller did the writing in "486 PCs With the Works."

The budding electronic office requires quick, unlimited, and durable storage for the variety of disk-gobbling data needed to encode images, sounds, and text. Optical storage seems made for the electronic office. If optical storage has proved disappointing as a primary storage device, it is because magnetic hard drives have provided more storage per dollar and faster access times. But optical drives are now the leaders in providing the right combination of removability, high capacity, durability of media, and fast performance. And this combination grows in importance as we increase our dependence on image data, the stock-in-trade of Microsoft Windows. Of the dozen optical drives Scott Spanbauer reviewed for this issue, 11 store 128MB per disk and the 12th stores a whopping 256MB. This gives optical media the lead over magnetic in fast-access removable storage, since SyQuest drives top out at 88MB and Bernoulli at 150MB. Magnetic tape drives offer greater capacity but are too slow for any purpose other than archiving. Magnetic hard drives that top optical in capacity and speed are fixed rather than removable. In brief, optical drives are the fastest way to archive and restore more than 150MB of data. Spanbauer concludes that improved capabilities and plunging prices have finally readied optical storage for the masses.

Of all applications, desktop publishing has the most insatiable appetite for disk space and the greatest need for removable drives. Removable drives often carry desktop publishing files to service bureaus for high-quality output, but most of those files have come from Macintoshes rather than PCs. The explanation for this is simple: The Mac has provided a better desktop publishing environment than the PC.

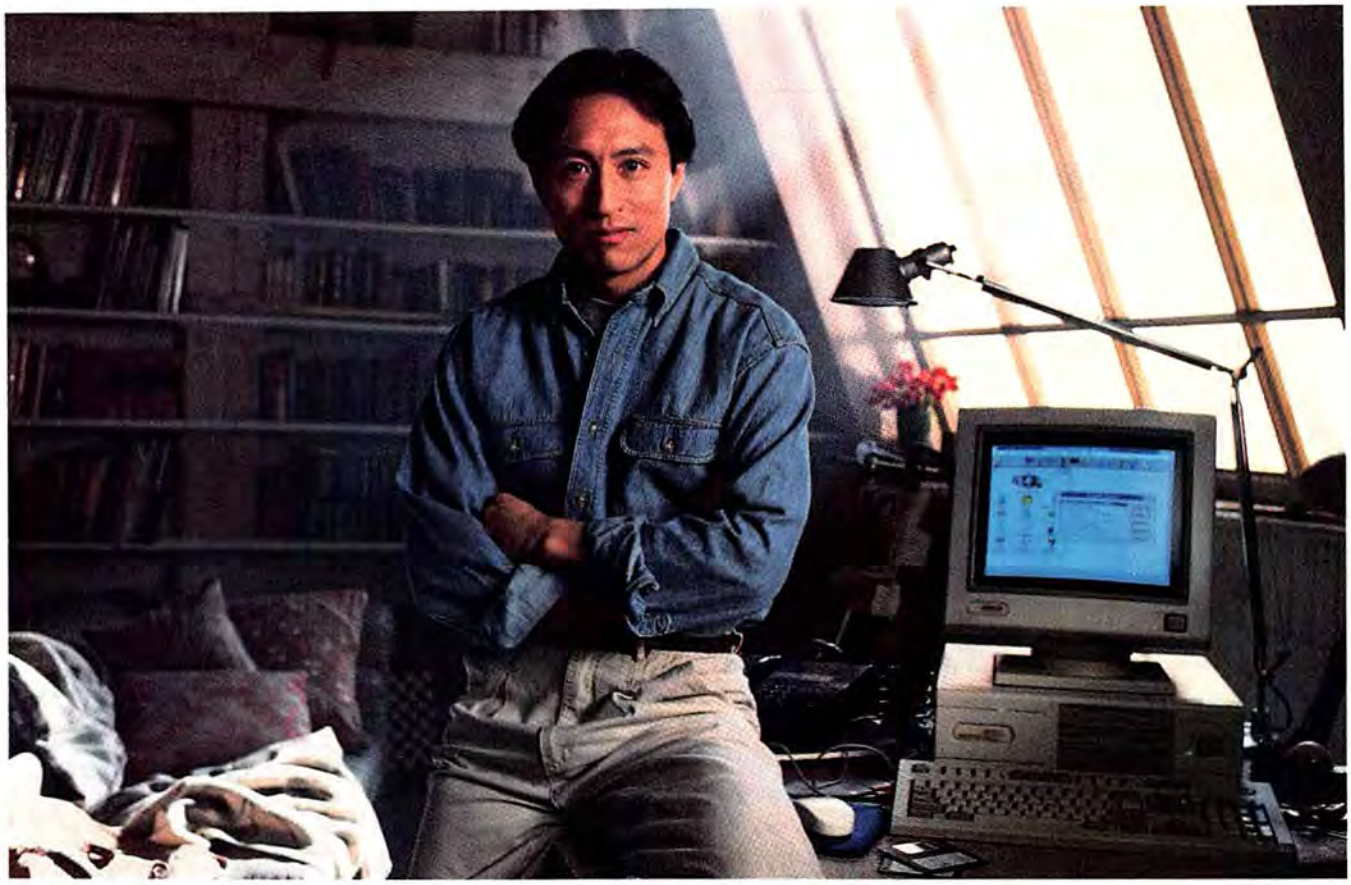
MICHELE CLEMENT

PC World Editor in Chief Phil Lemmons

But now Windows is beginning to rival the Macintosh in what has been the Macintosh's sole domain. The vast Windows market offers far more cost-effective computing power, a wide range of system vendors, and, finally, robust versions of the key desktop publishing packages, including QuarkXPress, PageMaker, and Adobe Photoshop. William Harrel, author of four books on desktop publishing, reviews four Windows desktop publishing packages—Quark, PageMaker, Ventura, and FrameMaker—in "Windows DTP Comes of Age." He also assesses the richness of the Windows environment versus the Macintosh and offers advice on moving a desktop publishing operation from the Macintosh to the PC.

Phil Lemmons

Phil Lemmons, Editor in Chief



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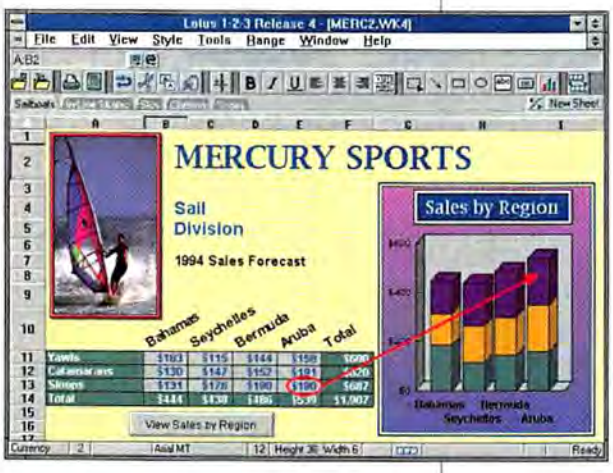
LOTUS INTRODUCES 1-2-3 RELEASE 4 FOR WINDOWS.

THIS IS CLEARLY A TIME OF CHANGE FOR AMERICAN BUSINESSES.

To keep up with these changes, business people need new and better-suited tools. Lotus® has responded by rethinking and re-creating the spreadsheet as a tool for individuals and for workgroups. 1-2-3 Release 4 incorporates over 4,000 spreadsheet user suggestions. It's dramatically easier to learn and use than any spreadsheet in history. And it's the first spreadsheet that's actually designed to help people work together in impressive new ways.

> *1-2-3 leapfrogs Excel and Quattro...*
> *–PC World 6/93*

IT'S MORE POWERFUL BUT VERY SIMPLE.



While adding dozens of major new features, hundreds of macros and hundreds of tools and @ functions, Lotus has actually simplified the way you work in a spreadsheet.

For example, Release 4 features an @ function pull-down menu to help you build spreadsheets faster. Cell copying is now a simple drag-and-drop operation, with meaningful visual feedback. And changing text and font attributes is done in one dialog box. (Excel often requires three.)

So 1-2-3® is not only a lot friendlier and easier to use than any other spreadsheet, it's a significant advance over Microsoft® Excel in usability.

THE FIRST CONTEXT-SENSITIVE USER INTERFACE.

> *The SmartIcons in 1-2-3 for Windows are smarter, and Lotus' approach to swapping different tool-bars in and out beats Excel's and Quattro Pro's.*
> *–PC Computing 6/93*

Release 4 actually anticipates what tools and functions you'll need. Depending on what you're doing, 1-2-3 presents only the menu choices and **SmartIcon**™ palettes appropriate to the operation at hand.

This means you won't spend time clicking through menus looking for the features.

IMMEDIATE ON-SCREEN MANIPULATION.

A **Live Status Bar** on screen

shows the attributes of any highlighted element.

To make a change (like font, size or decimal points) you just click on the appropriate section of the status bar. Then scroll up to your chosen attribute and click again.

And unlike Excel, 1-2-3 R 4 includes **In-Cell**™ **Editing**, so you can enter and edit any information right in the cell.

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With **One-Step Charting**, you can pick up all titles, data, legends and axis labels right from the worksheet to create a great looking chart the first time, automatically. And you can edit the chart right in your worksheet.

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Anyone who works on multiple worksheets will appreciate the new 1-2-3 **Worksheet Tabs** which can be labeled with real words. So you can go directly to any sheet simply by clicking on the appropriate tab.

And Worksheet Tab names are then incorporated into formulas. All of which helps to keep 1-2-3's unique 3D technology simple and easy to use.

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DATABASE FUNCTIONS MADE EASY.

> *1-2-3 for Windows has always had more powerful database features than Excel or Quattro Pro, and now these features are also easier to use.*
> *–BYTE 6/93*

The 1-2-3 database now has a new, completely graphical interface that makes using it easier than ever. Plus 1-2-3 provides a range of built-in tools that are powerful without being perplexing.

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Have you ever forgotten why you used a particular number? Or wanted to track more than one value in a cell or range? Suppose you've sent a spreadsheet to a co-worker who develops a whole new version and sends it back? How do you integrate it into your work?

You use the **Version Manager**, that's how. It tells you who did what when, and why they did it. It lets you save, label, track, mix, match, merge and comment on ranges, worksheets or entire files. And it does it all without overwriting existing data.

> *It (Version Manager) also makes Microsoft Corp.'s Scenario Manager in Excel 4.0 look like a toy by comparison.*
> *–PC Week 5/3*

If you have Lotus Notes® the workgroup benefits of the new 1-2-3 take on even greater proportions. Now different users can access and work on the same spreadsheet at the same time. Notes maintains file integrity and notifies you of changes made by others. So you know you're using the right numbers.

THIS IS THE BIG ONE.

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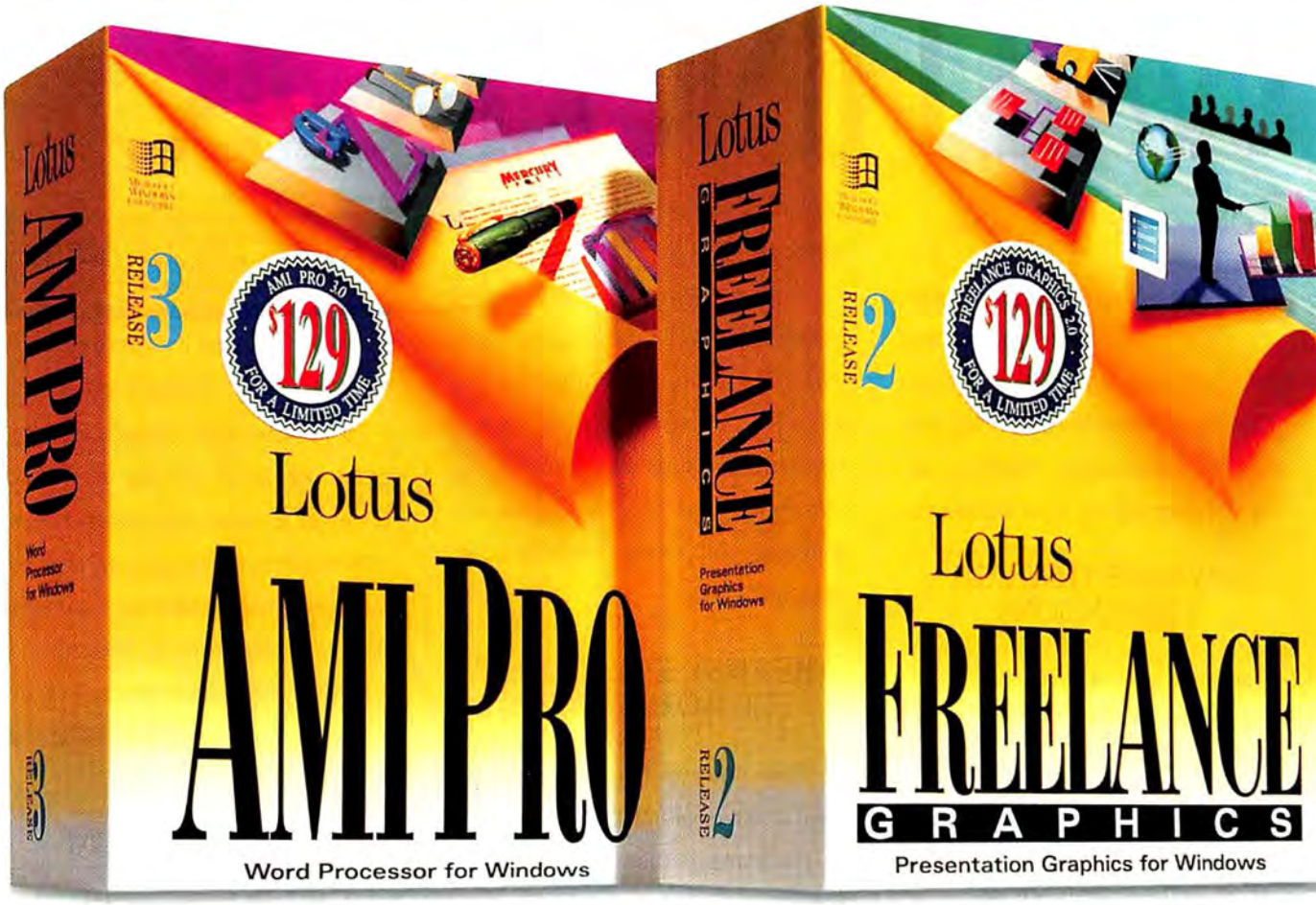

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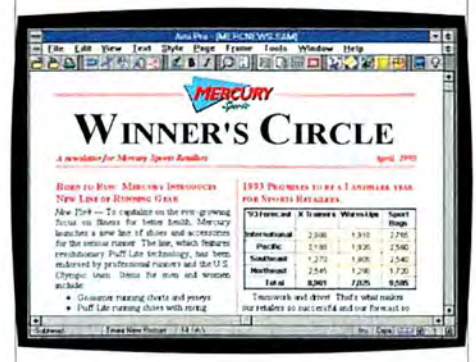

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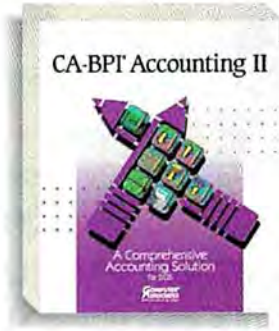

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Circle 39 on reader service card

Deceptive Tactics, DOS 6.0 Caveat, Expanding Consumer Protection

Bitter Bile

Your June cover line "486 PCs for $1000" caught my eye, and I was delighted since I'm shopping for a 486 on a tight budget. But when I sat down to read the article, I was taken aback. Right in the table of contents, it said "486s for $1250." Immediately I felt ripped off. Sure enough, the article includes one computer for $1025, one for $1099, and the rest for $1150 to $1495.

Although it was an excellent article, the deception left a bitter taste in my mouth about your publication. If I ran my advertising that way, they'd call it bait and switch.

James P. Balis, Brooklyn

Editor's response: We apologize for the error, which occurred because of late changes to the cover. At the time, we expected many of the 486 system prices, which have been falling continuously, to drop to $1000. Few prices fell to that level by press time, however, leading to the discrepancy you point out. System prices may have fallen still more by the time the June issue reached your newsstand.

Consumer Bulldog

Thank you for your excellent *Consumer Watch* column. Our business has had problems with both Business Computer Systems and Bulldog Computer Products, both of which were mentioned in *Consumer Watch* in June. It's nice to see a magazine willing to print a column that its advertisers might not like.

Consumer Watch alone makes your magazine worth subscribing to.

Kevin Krueger, Egeland, North Dakota

Editor's response: Because of the popularity of our consumer coverage, we've created a new User Issues Department that will include not only this column but also special reports and feature articles. Much of our consumer coverage is a result of reader letters to *Consumer Watch*, so drop us a note if there's an issue you think we should address.

What About WordStar?

In "Word Processor or Desktop Publisher?" in June, William Harrel claims that all the word processors mentioned lack one essential feature for creating newsletters: frame linking.

Harrel didn't look at WordStar for Windows. WordStar for Windows can link frames so that the information in one frame flows into another frame on another page. You can even link multiple frames.

Stephen C. Payer, WordStar Product Manager, Novato, California

A Tough One to Lose

May's "DOS 6: Do You Need It?" was right on. I find DOS 6.0 a big step ahead, although not the quantum leap that 5.0 was over previous versions.

I think you ought to issue a strong caveat, though: Once DoubleSpace is installed, it can't be uninstalled except after a complete backup. You have to delete everything and restore it all, which could become an all-day job. This vital information is not prominently placed at the beginning of the section on DoubleSpace, but buried deep in the back of the text.

I fear that many people will blithely use DoubleSpace and then be chagrined if they can't get rid of it.

Geoffrey Orton, Altamont, New York

A Macro With Strange Results

Readers who try to use the font-switching macros described in the *Word Processing* column in June may get strange results.

WordPerfect 5.1 macros don't recognize font names. They know only how many times you've given the {Up} command. If you start from the original base font each time you call one of these macros, you'll be fine. But if you call two macros back-to-back, you'll be somewhere out in never-never land.

One solution might be to create a companion macro for each font change that reverses the operation. A more reasonable solution would be to create a style for each font change and write a macro to call up that style.

Bob Hollis, Scottsburg, Indiana

Author's response: The answer I gave is correct for the situation posed by the questioner, who wanted to switch to different fonts at the *beginning* of documents. For font switching in the middle of a document, it is better, as Hollis points out, to create a style and use a macro to switch to it. —*George Campbell*

ROBERT NEUBECKER

The Moral of the Story

I read your article on repetitive strain injury (RSI) in the May issue ["Danger at Your Fingertips"] with great interest. I put up with a lot of pain for three years before finally consenting to surgery. Six months after surgery, I have a 7-inch scar that even the doctors admit is unsightly. I have been told that I should probably never type for more than 2 hours a day.

My employer was unable to find a job for me that required less typing, so now I find myself dealing with a workers' compensation system that hasn't a clue about how to place injured computer workers. I worked hard to acquire my computer skills, considering them my

passport to a good job in a largely rural state with a tight economy. Now I'm being told to consider a job as, say, a sales clerk. If I can't earn enough to keep my house, well, that's too bad.

If there is a moral to the RSI story, it's this: Don't get injured. If your employer refuses to make your workstation and environment safe, refuse to work. Jobs may come and jobs may go, but RSI is forever.
Name withheld by request

The Asinine QWERTY

May's "Danger at Your Fingertips" is a fine explanation of the causes and terrible effects of all-too-common repetitive strain injuries.

I would like to point out that the QWERTY keyboard is virtually unchanged since Christopher Sholes patented it in 1878. It was designed to make typing more difficult: Sholes experimented with a purely alphabetic keyboard layout, but the keyboard jammed if certain key combinations were typed too rapidly. So he took combinations of letters that are usually adjacent in the English language and arranged them so you have to use the same finger in different positions to type them, thereby slowing the typist and preventing jamming.

Other layouts have been suggested, the best of which was designed in the 1930s by August Dvorak. He used time-and-motion studies and took into account the frequency of letters. The reason this vastly superior keyboard design hasn't replaced the asinine QWERTY keyboard layout is that humans are resistant to change. Clearly, it's an idea whose time has come.
Mark Gardner, Lincoln, Nebraska

My Friends Believe Me Now

I read Steve Bass's *Home Office* column in the May issue and immediately decided to subscribe. I've been raving about the virtues of QEdit for years, but most of my friends believe that the only software worth considering is that which comes from giants like Microsoft. Now, thanks to Steve Bass, I can substantiate my enthusiasm.
Charles Obler, Farmville, Virginia

Missed Communication

The *Communications* column in June discussed services that offer access to Internet but completely ignored the biggest and best: Delphi. Delphi offers all Internet services, including FTP, Telnet, E-mail, Archie, Gopher, WAIS, Veronica, and more.
Ray Jones, New Orleans

Author's response: Much of Delphi's access to Internet is fairly new. The features you mention weren't on the service when we went to press. But the low-cost, easy-to-use access that Delphi is now providing is exciting and something readers should know about. Thanks for mentioning it.

Delphi is offering a free, 5-hour, no-obligation trial membership to new users. Access to Internet costs either $4.80 an hour or $7 an hour in the evening, depending on whether you sign up for a $20-per-month or $10-per-month subscription. For details, call Delphi at 800/695-4005. —*Judy Heim*

Save It for Key West

Referring to your headline "Weird Keyboards: Rx for Hands?" in the May *Top of the News* section, I believe that "Ergo-

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Circle 200 on reader service card

Windows at Your Fingertips

PC Magazine recommends the WinBook "...for its comfortable and efficient keyboard, trackball, and wrist rest; good battery life; and full complement of equipment at a good price."

PC MAGAZINE, June 29, 1993, First Looks

The WinBook by Micro Electronics™ gives you all the power to run Windows, and a unique, ergonomic design to make it easier to use.

It features a built-in, centered trackball which allows you to control cursor movements effortlessly with either thumb without having to lift a single finger off the keyboard. Full-size keys and the WinBook's exclusive sloping hand rest let you work in total comfort.

The WinBook comes with the power and speed needed to run Windows effectively. You get 4MB memory, the new ultrafast 486 SLC/E processor and the Motorola chipset which provides eight power-saving features, even while running Windows. Plus, we have fine-tuned the WinBook's screen. In monochrome and now in dual-scan STN color—you get sharper and clearer images with less cursor loss.

The WinBook was engineered for Micro Electronics, a division of MEI/Micro Center, Inc. MEI is America's leading direct source for computer accessories. Micro Center has been selling PCs for more than 14 years—longer than IBM or Compaq—with over 736,000 units sold. And with over 2.2 million satisfied customers nationwide, we have developed a superior support staff, including top engineers and technical specialists. So you always get the highest quality product at the lowest possible price.

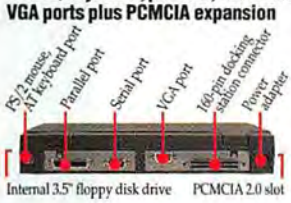
Before you choose a notebook computer, look at the WinBook—the first notebook computer designed specifically for Windows.

WinBook™

The 5.4 lb. WinBook, designed by award-winning Palo Alto Design

- Includes a 9600 baud send/4800 baud receive fax/2400 baud modem.
- Fast-acting, LCD screen for less cursor loss.
- Industry standard PCMCIA 2.0 slot for future expandability.
- 512k video RAM.

Mouse/keyboard, parallel, serial and VGA ports plus PCMCIA expansion

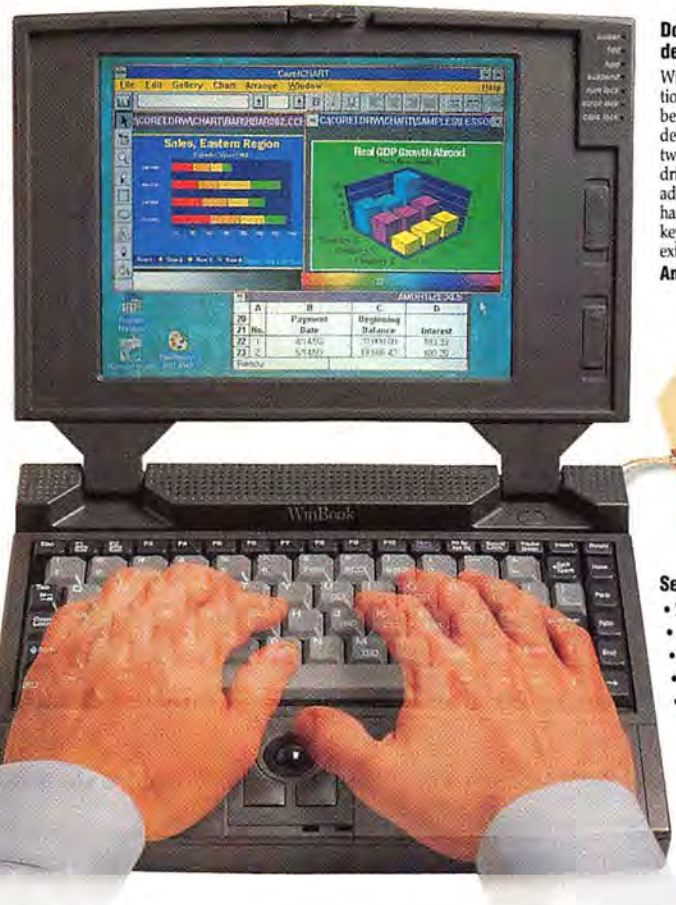


Clean, sharp color display

The superior quality of the WinBook's new dual-scan STN color display gives you near active matrix quality at a passive matrix price.

Longer battery life

The WinBook features NiMH 2200 MA batteries with gold-plated contacts. This allows it to run much longer than units with traditional NiCAD batteries—and there's no memory effect.



Docking station gives you desktop power

With the available docking station, your WinBook instantly becomes a full-function desktop computer. The two expansion slots and drive bays allow you to add peripherals such as monitors, hard drives, CD ROMs, I/O cards or an extended keyboard. It also includes parallel, serial, PS/2 mouse, external keyboard and VGA ports.

And it's just $399!

Service, warranty and support

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- 24-hour burn-in protection.
- One-year limited warranty on parts and labor.
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No-risk, 30-day unconditional money-back guarantee

Specifications

Size/Weight
- 11" X 8 3/4" X 1 3/4"
- 5.4 lbs. with battery (monochrome)
- 5.9 lbs. with battery (dual-scan color)

Pointing Device
- 16mm Alps dual-action, Microsoft-compatible trackball

Battery
- Up to 3 hours with power management (less 30 minutes for color)
- NiMH (no memory effect)
- 2200 MA with gold-plated contacts
- Worldwide auto-sensing AC adapter
- Quick 2-hour recharge

Power Management
- Eight power-saving features

Processor and Memory
- 486 SLC/E-25MHz CPU
- 4MB RAM
- 1MB ROM for AMI BIOS
- Motorola chipset
- 1k internal cache

Drives
- One built-in 1.44MB 3.5" floppy drive
- Internal 120MB (15ms) hard drive
- 250MB (12ms) hard drive optional

Software
- Comes loaded with MS-DOS 6.0 and Microsoft Windows 3.1

Display
- Super-twisted 64 grayscale, 10" LCD and 1024 x 768 for external monitor with 512k
- Optional dual-scan STN color display
- Adjustable contrast and brightness
- Visible LED indicator on cover-down

Keyboard
- Full-function keyboard with 85 keys and 4 inverted-T cursor control keys, 3.0mm keyboard spacing

Modem
- Fax-9600 baud send/4800 baud receive/2400 baud modem

I/O Ports
- PS/2 mouse interface/AT keyboard interface
- PCMCIA 2.0 slot
- Serial: 9-pin connector
- Parallel port
- Video: 15-pin connector for CRT
- 160-pin docking station

Options
- 250MB (12ms) hard drive
- 8MB RAM
- Coprocessor
- Docking station

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Circle 197 on reader service card

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design, while models with Intel Pentium™ processors move data via a 64-bit superhighway. Add AST's new LocalMotion™ video drivers for full-screen, full-motion video and you've got the kind of performance that's ideal for today's — and future — Windows, graphics, and multimedia applications. The Premmia system is just one of the reasons that businesses in over 100 countries look to us for PC-based solutions. And with results like that, we honestly don't mind missing a streaking comet or two.

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nomic Progress, Rx for Wrists!" might have been more appropriate.

The word *weird* should be reserved for certain residents inside the DC beltway, academia, and Key West, Florida.

Peter J. Apol, Gotha, Florida

There Is a Simpler Way

Tip 4 in June's "50 Spreadsheet Tips" states that you can ensure exact matches for a table lookup by using the formula @IF(@LOOKUP(PART,LIST,0)=PART,@VLOOKUP(PART,LIST,1),@NA).

This method seems unnecessarily complex to me. If you enter the part number as a label rather than a value, the formula @VLOOKUP(PART,LIST,1) alone will produce the desired result.

If there is a match, then the part description is generated. If there isn't a match, the formula returns 'ERR'.

Arlene Podos, New Hyde Park, New York

A Careful Reader

I discovered a number of errors in June's "50 Spreadsheet Tips." Tip 1: The first formula should be **@INT(@RAND()*(B1-A1+1))+A1**. Tip 3: There should be no space between the first **&** and **@STRING** function. Tip 6: There should be no space before any **(**, and the second **@ABS(A1)** function should be followed by a **<**, not a comma. Tip 8: **<Ctrl>-<Insert>** is used in Windows to *copy*. Tip 11: The formula is missing the minus sign before the first **@SUM(X)**. Tip 19: Both formulas should begin **@IF(Bottomline=0**. Tip 35: To match the figure, the formula should be **=SUM(IF(D6<=SHARES,1))**. Tip 40: A comma is missing between **"Audit"** and **"Showcirc"**.

Shane Devenshire, Walnut Creek, California

Corrections and Clarifications

The list prices in May's "CD ROM Drives: The Time Is Right" for the Relax Technology Vista I Texel DM 3024 external and parallel-connected models should both be $599. The list prices for the Vista II Toshiba XM3401 external and parallel-connected models should be $649. The Trantor T130 adapter card for external drives costs extra.

Bug Watch in May's *Consumer Watch* should have listed the correct version of PKZip's maintenance release as 2.04g.

In June's *Home Office*, we omitted the phone numbers for It's Your Money, maker of Uninstall for Windows. The numbers are 201/663-4577 and 201/663-2110 (fax).

June's evaluation of disk caching hardware and software, "Caches Pay Off," should not have warned against using Aldridge's Cache86 with AddStor's SuperStor. Cache86 is compatible with SuperStor.

The correct name, price, and CPU type of the Compudyne system in "Mobile Tips" at the bottom of page 232 in July's special report on mobile computing are Compudyne 486SL/25 Notebook, $1999, and 486SL-25 Intel processor, respectively.

The DEBUG script in July's *Help Line* ("Num Lock On") should be stored in a file named NLOCKON.SCR; the 'B' following the script's 'RCX' should be on its own line.

The correct version number for ImagePals from U-Lead Systems, mentioned in July's *Windows* column, is 1.2.

PC World regrets the errors.

PC World *welcomes your reactions and ideas.* *See page 12 for contact information.*

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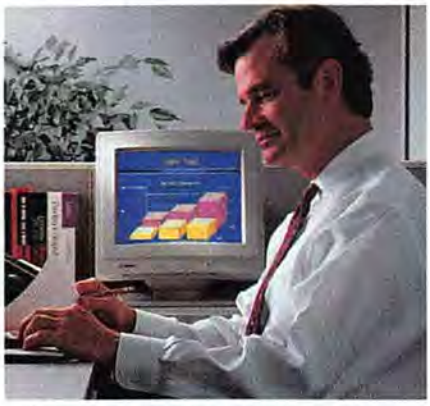

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Circle 176 on reader service card

Getting the Lowdown on Hardware-Software Bundles

I don't know about you, but I'm a sucker for one-stop shopping. I'd rather pick up the phone and order everything from a catalog—even stand in one of those interminable lines at Price Club—than spend a Saturday driving all over town with two kids fighting in the backseat of the car. That's the notion behind the trend to bundle software applications with PCs. In one purchase you get all the hardware and software you need to get up and running.

It's a pretty enticing deal, and a trend that has attracted the attention of both first-time PC buyers and experienced users looking to upgrade to a higher-class system. Browsing through the most recent issue of *PC World*, I found ads for a dozen companies selling a range of software applications with their systems. Zeos offers just about every package in Lotus's software suite, Compaq has different bundles for various ProLinea systems, Gateway throws in one Microsoft or Borland package with every system sold...the list goes on. Everyone from IBM to Packard Bell is sweetening the hardware deal with an application or two.

"I wouldn't base my buying decision on whether or not I got software bundled with the computer, but it is a nice feature as long as you're getting something you really need," says Kevin Pyle, a deputy auditor in the Hamilton County, Ohio, auditor's office. Pyle got Borland's Paradox for DOS database, the C++ programming language, DOS, and Windows with his Gateway system and says the added software "did tip the scales" in Gateway's favor.

But Pyle, like many PC buyers, discovered a few kinks that have yet to be worked out of the PC-software bundling arrangement. The thorniest issue is product support, but readers have sent letters on a host of other software bundling questions—from missing floppy disks and manuals to concerns about whether they are getting the "real" application or a trimmed-down version.

Take Pyle's case, for example. Though his system came with Paradox and C++ installed on the hard disk, the original floppy disks and documentation were missing for both packages. "I could live without the manuals, since both programs have extensive README files," says Pyle, "but what worried me was the fact that if Windows crashed I wouldn't have the original disks to reconfigure the system."

ROBERT HOLMGREN

By Roberta Furger

Get Those Disks

As it turns out, Gateway's policy is to include both documentation and disks with each package. In this case, floppies and manuals were on back order, and Gateway told Pyle it would send the completed package as soon as the new shipment arrived. Pyle ultimately got everything he'd ordered (plus a copy of Quattro Pro for Windows for his trouble), but he offers this bit of advice to fellow buyers: "Find out if you'll get the original disks and documentation. A lot of new buyers don't realize that if the software is loaded only on the hard disk, you need to back up that puppy as soon as you get it home."

Another recent PC buyer was a little more annoyed. "After spending $2500 for a new 486DX2 without a monitor, I was floored when I found out I'd have to copy 16 disks' worth of program files onto floppies so I'd have backups," says Kevin Myers, a computer repairer in Big Stone Gap, Virginia.

PC World Consumer Watch editor Roberta Furger

According to hardware and software companies we spoke with, there are two principal ways that software gets shipped with systems: either preloaded on the hard disk (the most common option) or as separate shrink-wrapped packages that may or may not be installed, depending on the wishes of the customer.

With preloaded software, the PC manufacturer generally decides whether to include the floppies and all the original documentation. (Copies of Microsoft DOS and Windows, however, must include documentation and disks, says Microsoft product manager Richard Freedman.) For applications, Lotus and Microsoft—two companies that are aggressively pursuing bundling arrangements—require PC companies to either include the disks or provide some way for the user to get them. Dell, for example, provides a utility that walks the user through the process of copying program software from the hard disk to floppies. Other companies include postcards from the software

developer that users can return to request original disks (although you may have to pay extra for them).

Gateway, one of the first PC companies to offer bundled software, has established a unique arrangement with Microsoft. Customers get all the floppies, but all Microsoft software is identified as the Gateway 2000 version. According to spokesperson Mike Schmith, although the floppies and documentation look a bit different from the Microsoft-provided products, the application is the same.

Floppy disks and documentation are just two of the issues that buyers should ask about when ordering a software-equipped PC. The other big issues are registration and support—from making sure you're a registered user of the software to knowing who'll be on the line when you call for technical assistance.

Most PC companies include registration cards for each of the applications they ship with a computer (Borland, Lotus, and Microsoft require that a card be included). Sending in the completed card ensures that you're put on the software company's mailing list, so you'll get newsletters and upgrade notifications. It doesn't, however, guarantee that you'll get support from the software developer. That duty often falls to PC makers, which buy the packages from the software developers. (Details of these arrangements vary considerably, but companies essentially pay a fee for the right to resell software applications; they get the software at a discounted rate but are often required to provide support as a condition of the deal.) For DOS 6.0, PC companies are also required to include a registration card and a certificate of authenticity with each package. As with applications, though, registration doesn't get you support for DOS or Windows—that's the responsibility of the hardware company that sold you the products, says Freedman. Recognizing that customers aren't always able to get support through the PC maker, Microsoft also has a 900 number for DOS support and a toll line for Windows support.

Although software firms say they train the technical staff at hardware companies on all aspects of their packages, not everyone is thrilled with going to a PC company for software support. "I think it's a little troublesome to be married to a hardware vendor for all your software products," says Kevin J. Mooney, a programmer in Maitland, Florida. "I find it hard to believe that a hardware company would be as knowledgeable as the developer of an actual operating system or application software."

Mooney also worries that you may not always be getting the full application when it comes bundled with a PC. Companies we spoke with say that with a few exceptions,

What to Ask About Hardware-Software Bundles

- **Are floppy disks, manuals, and a registration card included?**
- **Is it the full-blown application or a "lite" version?**
- **Who provides software support?**
- **Who handles upgrades?**

Slumping, slouching or sagging posture while seated at your computer can be related to the position

© 1993 Ergodyne

the products are identical. The most notable exception is the often-bundled WinFax software from Delrina. Most WinFax bundles include WinFax Lite, not WinFax Pro 3.0. Among the 3.0 features missing from the Lite version: 101 fax cover pages, the cover page designer, the capability to annotate faxes, optical character recognition, and document management capabilities.

The Lite version, according to Delrina spokesperson Shelly Sofer, is intended only to provide basic send and receive capabilities. Most customers want the more advanced features, and Delrina offers an upgrade to WinFax Pro for $49.95 (the full package retails for $129). WinFax Lite is supposed to be supported by the hardware companies, but Sofer says Delrina won't turn customers away (a point repeated by every software company we contacted).

Hardware-software bundles can be a great deal. You get leading applications at a discount and generally don't have to bother with installing a bunch of software before you can begin using your new PC. But buyers should remember two cardinal rules when considering hardware-software bundles, says Microsoft product manager Jon Kechejian: Don't assume you'll get support from the software company, and, unless you've received a certificate of authenticity, don't assume yours is a legitimate copy of DOS. I'd add a third: Don't assume anything. Ask a lot of questions so you know what you're getting before you ever take the computer out of the box.

Christina Wood contributed to this article.

Shop Talk

The Mystery of the Pentium Upgrade

I ordered my 33-MHz 486DX computer from Insight Distribution Network, in part because the salesperson told me that the motherboard was fully upgradable to the then-upcoming Pentium processor. (In fact, he was so convincing that I chose Insight's system over many others.)

In late March of this year, after reading about the new Pentium chip from Intel in various computer magazines, I became suspicious of the upgradability of my purchase and called Insight.

Insight admitted that it had made false claims and offered to let me return the computer (though I would have to pay the shipping charge). I thought about sending it back, but since I was otherwise happy with the system and had over 195MB of information and programs on it, I declined.

Buyers should be aware, though, that so-called Pentium upgrades aren't all they're cracked up to be.

Mark E. Sadowski,
Dearborn Heights, Michigan

Editor's note: With the advent of the new Pentium technology, many consumers are asking if the system they're buying can be upgraded to the new, faster processor. And many hardware companies, for their part, are touting "Pentium upgradability" in their ads. In fact, there is no *true* Pentium upgrade path for typical personal computers. Many systems—including, says Insight, ▶

of your feet, so help avoid undue strain on your body with our fully adjustable foot rest.

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software for your hardware 1-800-323-0052

Circle 46 on reader service card

BUG WATCH

DOS 6.0

The DoubleSpace compression utility in DOS 6.0 is incompatible with the BIOS in some Sharp, Canon, and older-model Acer computers. In these systems, the computer locks up when DoubleSpace is installed. But since no compression has occurred at this point, no data is lost. And there is an easy work-around: Reboot your computer with a DOS 5.0 or 6.0 boot disk that does not have the file DBLSPACE.BIN on it. Then delete DBLSPACE.BIN (a hidden and read-only file) from the root directory of your C: drive. In DOS 6.0, type DELTREE C:\DBLSPACE.BIN. In DOS 5.0, remove the file's hidden and read-only attributes and type DEL C:\DBLSPACE.BIN.

Microsoft Corp.

206/646-5104 (available for first 90 days after purchase), 206/454-2030 (general technical support)

SoundBlaster Pro

A bug in the Windows 3.1 Virtual DMA controller causes bus timeout errors on some MCV SoundBlaster Pro–equipped IBM PS/2s. The bug affects only machines that are based on IBM's Micro Channel bus.

The current work-around is to start Windows in standard mode by typing WIN/S, exit, and restart in enhanced mode. Creative Labs and Microsoft are working on a new driver (available from Creative Labs) that should correct the problem.

Creative Labs

405/742-6622

—Gordon Ung and Christina Wood

Have you run into a software bug or hardware incompatibility? Call us at 415/978-3253 with the details. We'll investigate problems and report on those with the broadest interest.

***Gordon Ung is an editorial intern for* PC World.**

the one Sadowski bought—may be upgradable to the forthcoming Pentium-based OverDrive chip. The performance boost you get from that OverDrive chip won't match that of a "true" Pentium system. That OverDrive chip will work in 386- or 486-class PCs with the 238-pin OverDrive socket. To get full Pentium capabilities (including a 64-bit memory bus), you would need to buy a new, expensive motherboard—or a new PC.

As for Sadowski and Insight, Rick Rickert, Insight's director of client services, described the situation as a misunderstanding rather than a deliberate attempt to mislead the customer.

The Hassle of Taxes

Over the last few years, *PC World* has given high ratings to TurboTax software from ChipSoft. I, too, have found it to be great tax software, but the customer service and technical support departments are less than satisfactory.

This year I terminated my many years of involvement with ChipSoft. This decision

Hands

That kink you feel in your wrist from typing at your computer could lead to painful tendinitis or even carpal tunnel syndrome so help reduce the strain keyboarding puts on

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was based solely on the company's inability to support the program in a timely fashion.
W. R. Johnston, North East, Maryland

Editor's note: We received several letters from ChipSoft customers who were unable to reach ChipSoft for help in filing their 1993 tax returns. According to ChipSoft spokesperson Diane MacKeeby, "There wasn't enough customer support staff to handle increased sales." She adds that ChipSoft is working to remedy this problem before the next tax season rolls around. "We've installed a new phone system, which can automatically answer commonly asked questions, and more than doubled the customer support staff," says MacKeeby. ChipSoft also offers technical support on a number of bulletin board services.

A Hollywood Ending

I recently had a very unpleasant experience with a happy ending. I placed an order with a mail-order company for a copy of Broderbund Software's Print Shop Deluxe. After cashing our check, the mail-order company went bankrupt. I called the Better Business Bureau and the attorney general's office and was told by all that nothing could be done.

I contacted Broderbund Software and explained the situation. I faxed the company a copy of my original order and a copy of the canceled check. The representatives were nice enough to send me a copy of the software free of charge, even though they had no obligation to do so.
Steven Farkas, Belle Harbor, New York

I Own It, But I Can't Touch It

I own a program I would not have bought if I'd known that the majority of its graphic images were on CD ROM. I'm referring to Micrografx Graphics Works.

In all its advertising, Micrografx ballyhoos the 10,000 photo images included with the program. However, the ads fail to state that a CD ROM drive is necessary to access most of the images. It isn't even clear on the box. I was appalled when I tried to use the images and found only a few available.
V. C. Cody, Portland, Oregon

Editor's note: Micrografx spokesperson Peter McLaughlin admits that, due to an oversight, neither the ads nor the packaging for Graphics Works made it clear that a CD ROM drive is required to access the images. When Micrografx realized the problem in April, it immediately clarified its ads and added stickers to the packages. According to McLaughlin, "Some packages—judging from Cody's experience—missed getting stickers." Micrografx is working with retail stores to correct this problem. McLaughlin offered Cody a full refund, but she opted to keep the program and is working with a friend to copy the images to disk. Micrografx will either provide technical support to people who want to get the images onto disk, or offer a full refund to those who want to return the program.

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

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Circle 13 on reader service card

In Pursuit of the Green PC

Can you preserve the environment, improve working conditions for your employees, and still save money? Surprisingly, the answer is yes. This month, Rick Barry, a consultant at the World Bank in Washington, D.C., explains how they set about purchasing PCs and related products that are friendly both to employees and to the environment—and how the bank's strategy is paying off in reduced energy costs. —*Ed.*

Most of us have concerns about our environment—the water we drink, the air we breathe, the food we eat—and many of us are accepting more responsibility for the quality of our lives and surroundings. At the World Bank we've found that creating an environmentally and ergonomically sound workplace also makes good business sense—though it's almost as big a project as trying to protect a Sumatran rain forest.

Our main complex in Washington, which we're currently replacing, is a perfect example of an outdated office. It consisted of half a dozen adjacent buildings acquired over 20 years, beginning in the 1940s. The offices were designed to accommodate a maximum of 3500 people.

In the late 1970s, our increasing use of computers, fax machines, and printers began straining the power and cooling capacity of these buildings. In 1977, only 1 in 100 employees used a PC. By 1980, that number had risen to 1 in 25. By 1983 it was 1 in 4, and by 1987 all employees had their own PCs.

Since the average PC emits more British thermal units of heat than a human being, this increasing use of computers severely taxed the building's electrical and cooling systems. In fact, installing 1000 PCs created an electrical demand equal to what 2500 additional people would cause, costing on average an additional $30,000 a month.

That was only the tip of the iceberg. Even after we spent more money on cooling systems, employees began to complain about excessive heat, static electricity shocks, eyestrain, and headaches. We also had power overloads on certain floors where computer equipment was concentrated.

A Well-Lighted Place

In 1990 we envisioned a safe, environmentally healthy, people-friendly workplace, in which energy-saving PCs would play a large part. We concluded that as a first step, we would have to replace a large part of the original main complex and turn it into a single building. The old buildings had fallen below the changing fire and safety standards and contained asbestos, and the cost to upgrade would have been prohibitive. Because the new buildings offered a potential energy savings of $400,000 per year (not including the savings for energy-efficient PCs), we decided to rebuild.

Today, we've finished the first phase of a six-year construction project designed to house about 5000 World Bank employees on the same site. With its natural lighting, ergonomic furniture, and easy-on-the-eyes matte wall and floor finishes, the new building is designed both to save energy and to provide a high-quality working environment for World Bank staff.

Environmental Purchasing Criteria

Once we decided to build new offices, persuading management to purchase energy-saving, low-emission technology was relatively simple. That's because we estimated saving as much as $250,000 per year in power and cooling costs for the computers alone.

Rick Barry, a consultant at the World Bank in Washington, D.C.

In equipping our new offices, one of our most important concerns was reducing energy use and electromagnetic field, or EMF, emissions. Although evidence is still inconclusive, EMF emissions are suspected of contributing to higher leukemia, brain cancer, and miscarriage rates among workers. So we designed the building's power and lighting systems to mitigate EMF emissions while significantly improving energy conservation. The next step is to apply the same philosophy to office equipment. When we procure desktop computers, we make sure our staff can opt for workstations—monitors in particular—that comply with the strict emissions standard of some European countries (notably Sweden).

Many U.S. companies now belong to the Environmental Protection Agency's Energy Star Computers Program. Members of the program, such as Apple, Compaq, Digital Equipment, Dell, Hewlett-Packard, IBM, and others, commit to developing systems that

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reduce power requirements to 30 watts or less. These systems reduce power consumption and EMF emissions by entering a sleep mode after a set period of inactivity, or by incorporating quiet, energy-conserving heat sinks, like those used in space vehicles, in place of noisy fans.

All other things being equal, we tend to favor companies with a demonstrated commitment to the environment. We appreciate, for instance, the efforts of one major chip manufacturer to improve its chip-soldering practices. The new methods promise to reduce the amount of chlorofluorocarbons (CFCs) released into the atmosphere from 600,000 pounds a year in 1991 to zero by the end of 1993.

Another ongoing goal is to buy products with recyclable parts, such as printers and plain-paper fax machines with recyclable toner cartridges. We strongly favor computers with replaceable components such as reusable chips and boards. And we prefer to buy from vendors who pack their products in recycled cartons or—better yet—in reusable containers.

Our environmental philosophy extends to other strategies, such as sending electronic mail whenever possible to save paper. With every staff member's help, we also recycle used paper, and we purchase recycled paper for printing and copying. We are exploring a document management system that will allow us to store electronic images of documents rather than their paper forms.

Insist on It

Many manufacturers are offering products that meet our specifications, so we can be choosy. Some of this equipment is expensive. Swedish-standard monitors, for example, cost up to $100 more than other displays. We believe that savings in energy costs will defray additional expenses. After calculating the cost of reconstructing our buildings, purchasing new equipment, and implementing energy-saving strategies, we estimate we'll receive a return on investment of 18 percent.

If your company is like most, you probably aren't planning to replace your computers or buildings. Fortunately, you can increase employees' comfort without running up huge expenses. To reduce heat, avoid overcrowding in office areas, especially if you have a lot of equipment. Place

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Looking for the ultimate in multimedia sound? Then take a look at what we have up our sleeves. Introducing MediaMagic, a family of Digital Signal Processor (DSP) audio boards and sound systems that bring superior concert-hall sound to your PC.

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ProAudio Spectrum-16	16-bit 44 Khz	No	No	No	No

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Circle 138 on reader service card

shared items such as printers and fax machines where people don't work all day.

Also, encourage people to turn off equipment, such as EMF-emitting monitors, when not in use. Turning off PCs at night and on weekends can save $40 to $100 per year for each PC, depending on the cost of power where you work.

If you need new equipment, put your environmental criteria into your RFP, and buy from vendors in programs such as the EPA's Energy Star Computers Program. If you work for a small company that's purchasing from a superstore, enlist the salespeople's help, and give them the sale if they find the products that meet your standards. Also, purchase from vendors that have demonstrated a commitment to improving the environment.

Until we all insist on higher-quality, ergonomically and environmentally sound products, many vendors will treat them as a costly option. But your dollar can make a difference. Until a few years ago, vendors treated such standard items as adjustable keyboards, displays, and nonreflecting matte finishes on PCs as extras. Now, no manufacturer would dare produce a PC without these features.

Note: For a list of manufacturers enrolled in the EPA's Energy Star Computers Program, contact Brian Johnson at 202/233-9230. To receive a copy of Rick Barry's personal checklist of purchasing criteria for ergonomically and environmentally friendly products, see PC World Online.

Edited by Bronwyn Fryer

If you use PCs to manage people and other resources in a business environment, Real Problems, Real Solutions *wants to hear from you. See page 12 for contact information.* ■

POWERTIP no.292

Retrieving Title Bars

Should you ever accidentally move a window's title bar beyond the top of the screen and find you can't retrieve it, press <Alt><Space>M, and then <Down> until the title bar reappears.

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Do You Know Where Your Signature Is?

Sign right here... You reach for your pen automatically. A signature—sealing the deal—is a vital component of nearly all business transactions.

Yet as our world of checks, contracts, and credit cards becomes increasingly computerized, affixing your signature to a nonpaper document can be a test of your computer skills. I frequently "sign" computer fax transmissions with a PCX file of my scanned-in signature and let the recipient's attorneys wrangle over how binding such an image may be. As a result, I'm using my PC not only for words and numbers but for images. And I suddenly find myself mired in the problems associated with handling and storing image files.

Business Fixtures looks at various solutions this month: The Inforite MP100 Writing Pad is a signature tablet reminiscent of the original *Star Trek* that plugs into a serial port to capture your handwritten input. The Windows-based AceFile 2.0 lets you easily add graphics files to your database reports, and start-up product Watermark Discovery is a full-featured graphics image-management system. Due to the taxing space requirements of graphics images, I also tried out a 120MB magneto-optical (MO) drive, Panasonic's LF-3000.

Inforite MP100 Writing Pad

If you've signed for a United Parcel Service (UPS) delivery recently, the Inforite Writing Pad will feel familiar. UPS has more than 60,000 AS1050 computer clipboards (also developed by Inforite) that let you write directly on the unit's surface with a stylus to affix your electronic signature.

The MP100 Writing Pad brings this technology into your office. It's a new kind of input device—complete with DOS and Windows software—that captures your handwriting digitally, storing it as an image file. No more crippling your writing hand signing the multiple pages of, say, a mortgage application. You could review the documents on screen, make a few revisions, attach your digital signature, and E-mail the whole package to your banker.

What a great idea, right? Well, I thought so, too—until I spent several hours working with the MP100. First, the Writing Pad's output doesn't *look* like my signature. My signature is loopingly distinctive, and, I think, quite legible. I've never had a problem verifying that the scrawl was mine. Not so with Inforite's output, which my wife described as "arthritic."

And do you want your signature in a file somewhere, ready to be reused? How do you retain control of that computerized image once you've given it away? I don't know, and neither do you. Fortunately, the MP100's version of my signature is sufficiently non-Foulksy that I could easily deny it was mine.

The problem is, the tablet is hard to write on: The front of the pad, where the side of your hand rests, slopes awkwardly downward. And the writing surface is sunken, slippery, and without visual feedback. Hence, you write by reflex because you can't see what you're writing (except on the PC screen).

Of course, given the inherent dangers of distributing computerized signatures, maybe the Writing Pad's inability to capture my autograph is a plus. Still, I'd prefer a flat surface design to make the MP100 more usable—not an unreasonable expectation for a $299 product.

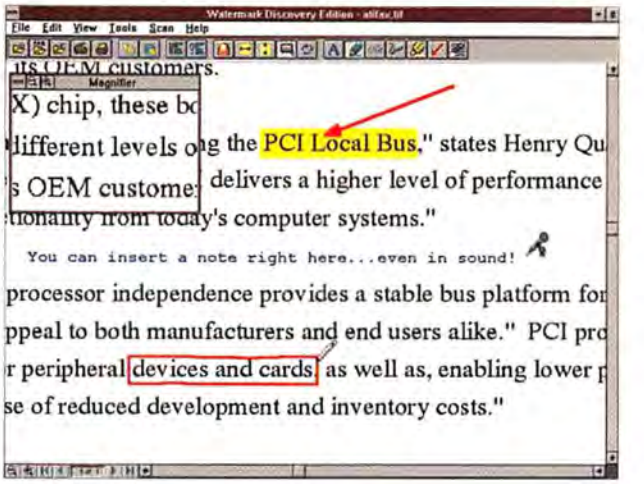
AceFile 2.0

A year ago, an overly long meeting (I was the speaker) delayed me for an appointment with a would-be client. I was to help her set up a Windows database system with AceFile 1.0. I say "would-be" client because by the time I arrived, she had already accomplished 90 percent of the setup and printed her first report. I was out of a job.

AceFile *is* that easy. Version 2.0 provides context-sensitive help; offers six ready-to-use applications; and invites image-handling (PCX, BMP, and TIFF) glamour for its report, label, and forms output. Yes, you can print your business logo on a mailing list without having to mail merge using a word processor.

AceFile 2.0 has a series of templates that make it simple to get up and running. They include an order/inventory system, an employee record system, a sales lead tracker, and a personal organizer (with auto-dial support).

The new version of AceFile has features that mimic relational capabilities. It lets you join and relate information in two or more data tables so you can



FOULKS' FAVORITE: Watermark Discovery is an image-management solution that lets you add images and even verbal comments to your document.

ALSO FEATURED THIS MONTH: Inforite MP100 Writing Pad • AceFile 2.0 • LF-3000 Magneto Optical Drive

By Thom Foulks

search for information in more ways and across tables. Since you don't have to copy tables, you also cut down on storage overhead—a plus when you're dealing with images.

Pick up AceFile this morning for about $110 on the street, and you can have it working by this afternoon.

Watermark Discovery Edition

Document managers—products that aim to replace filing cabinets and paper documents with computerized images of the paper originals—have long been in the realm of expensive hardware-software solutions. But Watermark Discovery Edition, a major new entrant into this category, is an inexpensive software solution that's simple to use.

"How do you retain control of a computerized image once you've innocently given it away? I don't know, and neither do you."

You might wonder if such paper-centric professions as law, medicine, and accounting are eagerly awaiting such products. I find it hard to visualize computer-based court filings or a doctor carrying a patient's charts on a notebook computer instead of a clipboard.

No matter. Watermark stands bravely ready to provide a panoply of document-management tools. It offers built-in support for scanners (it is TWAIN-compliant) and computerized faxing (via a module that works with Delrina's WinFax Pro) and carries the OLE (Object Linking and Embedding) powers of Windows 3.1 to heights likely not anticipated even by Microsoft. Watermark makes it possible to add images to Windows applications that previously couldn't handle them. And it translates images to text (optical character recognition) and inserts them into your Windows word processor via a separately installed Wordlinx package from Ocron.

You might ask why you would need to do all this. Well, you could plug the fax image of a sales report into your Quattro Pro for Windows spreadsheet that tracks sales activity. Or embed a scanned photo of a home for sale into the Word for Windows document that lists the features of the home. Or attach your signature image to an E-mailed contract and electronically close the deal in a matter of seconds.

When your boss reads the Quattro Pro spreadsheet on her screen (she must also have Watermark installed), a Watermark logo is displayed where you inserted the image. All she does is double-click the logo to display the image.

These general capabilities already exist within OLE-compliant Windows software. What Watermark adds is the ability to edit and manipulate the original image file more easily. You can add notes to the sales report fax or draw arrows pointing to key features of the home photo. If you have a sound card, you can even add a verbal comment to the E-mailed contract.

To help keep track of your images and documents, you can attach properties to them. For instance, if you attach keywords and subject information to a document, you can later search for these elements to find the document or round up a group of documents with similar properties.

A version expected later this year, Watermark Professional Edition, promises to add support for optical storage and jukeboxes and the ability to create folders of documents that can in turn be included in other folders.

Watermark is a well-designed product, but it's the price that makes it a Foulks Favorite. At $149 it's a bargain, even if you use it only to handle incoming faxes. I'm putting it right to work.

LF-3000 Magneto Optical Drive

Don't be spooked by the $2195 suggested retail price of this built-like-a-battleship external MO drive. When last we looked, its street price had fallen to around $1200. That puts it in the same ballpark as other solid performers rated by *PC World* (see the review "MO Drives: Storage for the Masses").

The LF-3000 requires a SCSI controller and cable. If you don't have these components, you can purchase an Adaptec-prepared kit ($529) from Panasonic. My kit was the LF-S016AT, replete with Adaptec's AHA-1540B adapter, software, manuals, and installation pamphlets for DOS, Windows, Novell NetWare—a package intended to cover all possibilities. Even the CorelSCSI utilities were included.

Despite all the reading material, I used only one small installation guide to hook up the drive. The default settings of the jumpers on the adapter card were correct for my system; it seemed impossible to attach the cable incorrectly, and the drive's power-on switch is on the front panel. Plus, I was impressed with its solid feel and durability.

Few MO drives can be considered speed demons, and the LF-3000 isn't likely to zoom past any checkered flags. In April, I wrote about transferring 13.8MB of files, 453 total, to an MSI Cachét MO drive. It took 3 minutes, 33 seconds. The Panasonic unit, attached to the same system, required 5 minutes, 45 seconds, to XCOPY 13.7MB, 440 files, from a hard drive to the MO's 128MB cartridge.

But then I removed that cartridge and inserted another $55 128MB cartridge. It was instantly ready for use. No removable mass media storage system can match the ease of use of the MO systems, and as graphics images become more common and places to store them become more necessary, MO is the best here-and-ready answer.

- **AceFile 2.0**
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  Reader service no. 765
- **Inforite MP100 Writing Pad**
  Inforite Corp.
  800/366-4635, 415/571-8766
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- **LF-3000 Magneto Optical Drive**
  Panasonic Communications & Systems Co.
  800/742-8086, 201/348-7000
  Reader service no. 767
- **Watermark Discovery Edition**
  Watermark Software, Inc.
  617/229-2600
  Reader service no. 768

Thom Foulks is a contributing editor for PC World.

The Heat Is On!
355
GATEWAY2000
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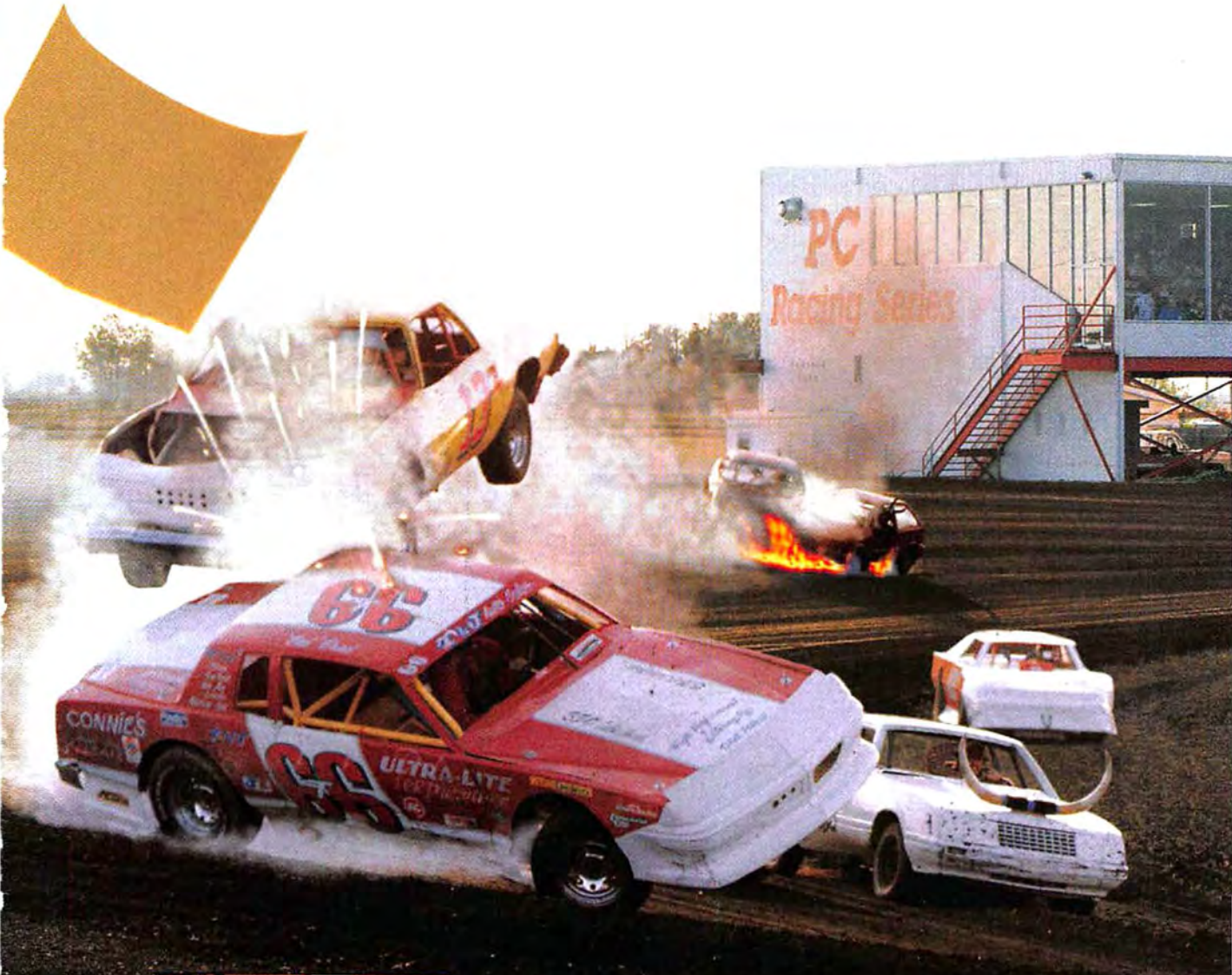

Gateway 2000's summer fun ad was inspired by our stock car racing team. As you might guess, we don't spend millions on an Indy car. Ours is an all-employee team that runs on local dirt tracks. The team races pretty much the same way Gateway operates: they're competitive and successful, but they always have fun!

But Gateway Outmaneuvers The Competition — And You Win!

In the fast-moving, hard-driving PC industry, the race for leadership is more competitive than a heat at your local stock car speedway. All classes of PC manufacturers are on the direct market track together, trading paint and slamming each other into the wall at every turn. Competitors big and small are being black-flagged and sent to the pits in record numbers this year.

All the while, season after season, the unassuming cow-spotted Gateway car consistently outmaneuvers and overpowers the competition. Repeatedly, Gateway 2000™ leads the field by providing you with the best value in the PC industry. When Gateway takes the checkered flag, you're the winner!

carefully maintained our unique, low-overhead business model with no extra parts to slow us down. The Gateway machine handles extremely well, too. We can move faster through the marketing corners without getting out of control, all of which saves you money when you buy from Gateway.

Our competitors would like to have you think they're now offering a value that meets or beats Gateway. But apples to apples, they're still hundreds, sometimes thousands of dollars more, while our systems consistently outperform theirs.

You're a smart shopper. Do the comparisons yourself and you'll confirm what Dataquest™ found in a 1993 customer satisfaction survey: Gateway ranked number one for best pricing. When you add the other buying criteria that's important to you, Gateway offers an unbeatable value.

What's The Winning Formula?

The driving strategy behind Gateway's success is simple: *understand what customers want and give it to them!*

Price

We understand you want the best possible price — and that's easy for Gateway. Like a winning stock car, we have the right combination of power, weight and handling to lead the price field.

We have the power to buy the highest quality components in huge volume at considerable savings, which we always pass on to you. Even though we're now one of the largest PC makers in the U.S. and a Fortune 500 company, we haven't let our weight get out of control (unlike some competitors). We've

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They're In Hot Pursuit Of The Value Leader...

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Gateway Gives You More Horsepower.

Performance

We understand you want the best computer performance your money can buy. That's what you get with Gateway. We hold the track record in the biggest bang-for-the-buck division.

Take our 4DX2-66V system, affectionately known as the Big Kahuna, for example. In automotive terms, this system is a top fuel dragster. It has won 11 major industry awards, and they just keep coming because the 4DX2-66V includes the best of everything at a terrific price.

Another example of outstanding price and performance is our new line of ColorBook and HandBook® 486 portables. They're colorful sprint cars sure to win the upcoming notebook races! Look for them in other Gateway ads in this magazine.

That's the Gateway price-performance ratio, and it's equally good across our entire product line.

Latest-Generation Graphics

Our price-performance ratio is even better this month thanks to improved graphics on our highest performance systems. We replaced ATI's Graphics Ultra Pro, the industry's leading graphics card, with ATI's latest-generation Graphics Ultra XLR. The new XLR is up to twice as fast as the Ultra Pro, and it's the best all-around DOS and Windows™ video performer in the industry.

The ATI™ Graphics Ultra XLR is also multimedia ready, enhancing and accelerating video for Windows through hardware. When viewing motion video, you can enlarge your window size to full screen without decreasing your frame rate, getting jaggy edges, color distortion or losing audio sync.

Compatibility & Upgradeability

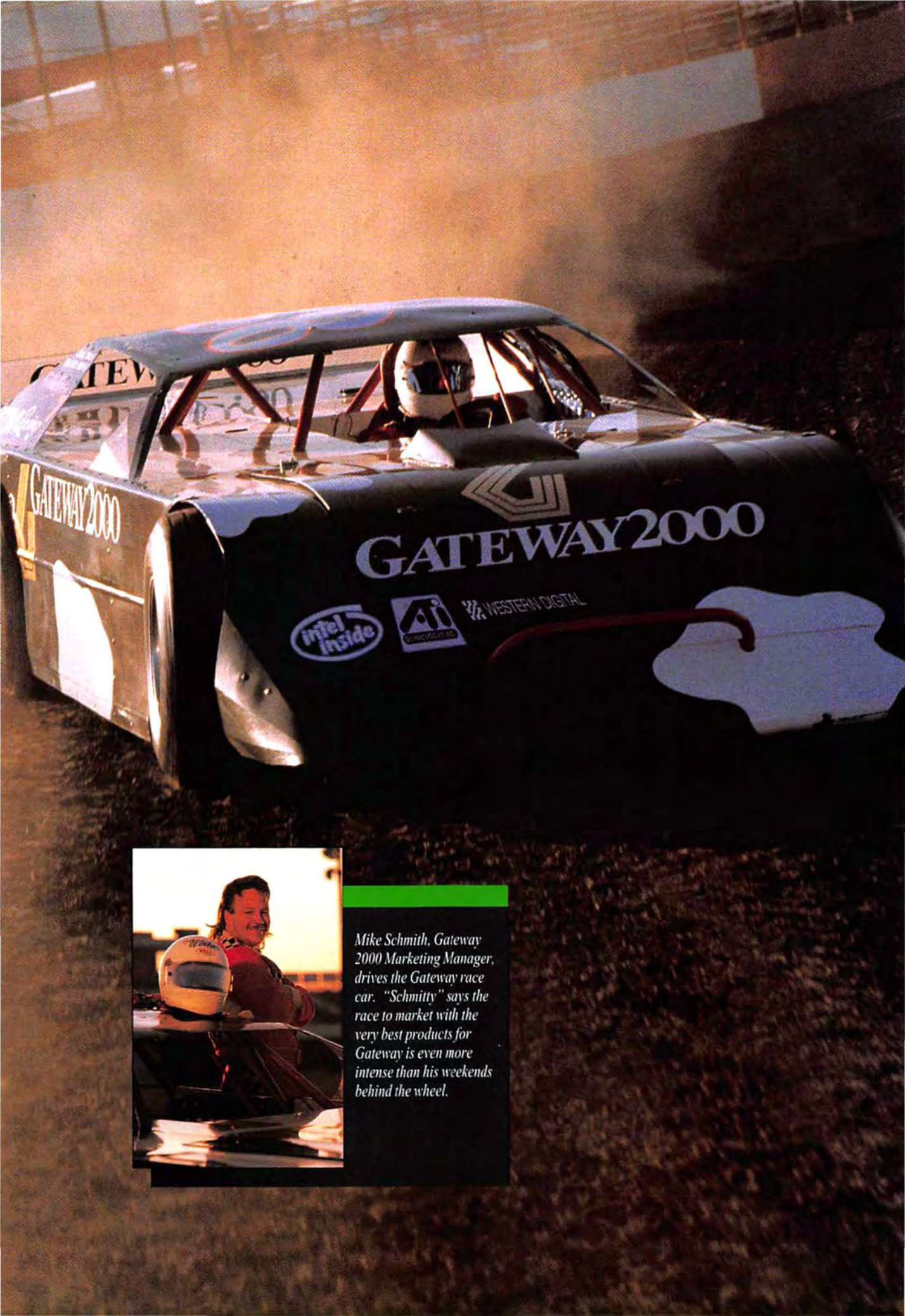
We understand compatibility and upgradeability are important to you. You can relax with Gateway. When Dataquest asked 833 PC users in Fortune 500 companies to rate personal computer companies, they ranked Gateway number one in the areas of compatibility, upgrade potential and price. All Gateway systems go through extensive compatibility testing to ensure flawless performance with all products from major software developers and peripherals manufacturers. And we give you a *written guarantee* that our 486 systems are upgradeable to Pentium technology. Ask us about it.

intel inside

GATEWAY 2000

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

800-846-2065

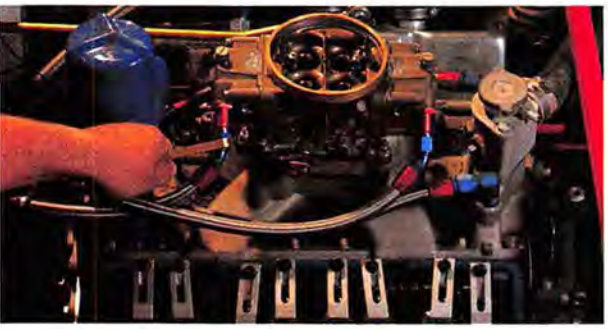


Mike Schmith, Gateway 2000 Marketing Manager, drives the Gateway race car. "Schmitty" says the race to market with the very best products for Gateway is even more intense than his weekends behind the wheel.

Gateway's Award-Winning Team Is Behind You All The Way.

Reliability & Quality

We understand you want reliability and quality, in both the products you buy and the company you buy them from. That's what you get with Gateway. In the **three** most recent reader surveys conducted by *PC Magazine*, Gateway systems received the highest ratings for reliability. We earn these awards because we use only the best quality



components in our computers, and they're manufactured with Midwest pride and painstaking quality-control procedures. Gateway 2000 is also one of the most financially stable companies in the industry, assuring you that you're buying from a reliable manufacturer that can withstand the rigors of the PC Racing Series.

Service

We understand you want the best in service, from your first phone call through the years you own your computer. You can count on Gateway to live up to your expectations. Our Midwest representatives are friendly, caring folks. You'll feel right at home with Gateway.

Every Gateway 2000 system comes with excellent after-the-sale support. You get a 30-day money-back guarantee. If you don't like your system, send it back within 30 days for a refund.

All systems come with a one-year limited warranty and telephone technical support for the life of the system. When you need help with your PC, whether it's not working or you just have a question, you want a fast, skilled crew waiting for you in the pits. That's what you get with department. We received *PC World's* World Class Award in 1992 for best service and support in the hardware category. In February and again in July of 1993, *PC Magazine* readers gave Gateway excellent ratings for service and reliability. And in June, *BYTE* readers echoed the other awards, choosing Gateway 2000 as the company that provides the best service in the industry.

intel inside

SERVICE RELIABILITY PC MAGAZINE READERS' CHOICE

PC WORLD SERVICE EXCELLENCE AWARD

1993 BYTE READERS' CHOICE AWARD Best Service

If you'd like to read our guarantee and warranty, please write to us and we'll gladly send you a free copy.

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Brent Culbertson, a Gateway 2000 Tech Support Supervisor, is Crew Chief on the race team. He spends weekends keeping the Gateway car running, weekdays keeping your systems running.

Gateway 2000's Fast PCs

4SX-25

- 25MHz 486SX Intel® Processor
- 4MB RAM
- 3.5" Diskette Drive
- 170MB 13ms IDE Hard Drive
- Intel Pentium™ Technology Ready
- Windows Accelerated Video w/512K DRAM
- 14" Color CrystalScan® 1024NI
- Mini Desktop Case with Password Protection
- 5 16-Bit ISA Slots
- 124-Key AnyKey® Keyboard & MS Mouse
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4SX-33

- 33MHz 486SX Intel Processor
- 4MB RAM
- 5.25" & 3.5" Diskette Drives
- 212MB 13ms IDE Hard Drive
- Intel Pentium Technology Ready
- Windows Accelerated Video w/ 512K DRAM
- 14" Color CrystalScan 1024NI
- Mini Desktop Case with Password Protection
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- 124-Key AnyKey Keyboard & MS Mouse
- MS-DOS 6, Diagnostics & Windows
- MS Works for Windows 2.0

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4DX-33

- 33MHz 486DX Intel Processor
- 8MB RAM, 64K Cache
- 5.25" & 3.5" Diskette Drives
- 212MB 13ms IDE Hard Drive
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- Mini Desktop Case with Password Protection
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4DX-33V

- 33MHz 486DX Intel Processor
- 8MB RAM, 128K Cache
- 5.25" & 3.5" Diskette Drives
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- Local Bus IDE Interface
- Intel Pentium Technology Ready
- Windows Accelerator w/ 1MB DRAM on VL-Bus™
- 14" Color CrystalScan 1024NI
- Desktop Case (Tower Upgrade) with Password Protection
- 7 16-Bit ISA Slots, 2 on VL-Bus
- 124-Key AnyKey Keyboard & MS Mouse
- MS-DOS 6, Diagnostics & Windows
- MS Works for Windows 2.0

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- 124-Key AnyKey Keyboard & MS Mouse
- MS-DOS 6, Diagnostics & Windows
- Choice of Application Software

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4DX2-66V

- 66MHz 486DX2 Intel Processor
- 16MB RAM, 256K Cache
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- 424MB 13ms IDE Hard Drive
- Local Bus IDE Interface
- Intel Pentium Technology Ready
- ATI Ultra XLR Video w/1MB VRAM on VL-Bus
- 15" Color CrystalScan 1572FS
- Desktop Case (Tower Upgrade) with Password Protection
- 7 16-Bit ISA Slots, 2 on VL-Bus
- 124-Key AnyKey Keyboard & MS Mouse
- MS-DOS 6, Diagnostics & Windows
- Choice of Application Software

$2995

4DX2-66E

- 66MHz 486DX2 Intel Processor
- 16MB RAM, 256K Cache
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- 500MB 11ms SCSI Hard Drive
- 32-Bit EISA SCSI Controller
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- 14" Color CrystalScan 1024NI
- Tower Case with Password Protection
- 8 32-Bit EISA Slots
- 124-Key AnyKey Keyboard & MS Mouse
- MS-DOS 6, Diagnostics & Windows
- Choice of Application Software

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4DX2-66 Best Buy

- 66MHz 486DX2 Intel Processor
- 8MB RAM, 128K Cache
- 3.5" Diskette Drive, CD-ROM & System CD
- 340MB 13ms IDE Hard Drive
- Local Bus IDE Interface
- Intel Pentium Technology Ready
- Windows Accelerator w/1MB DRAM on VL-Bus
- 15" Color CrystalScan 1572FS
- Desktop Case (Tower Upgrade) with Password Protection
- 7 16-Bit ISA Slots, 2 on VL-Bus
- 124-Key AnyKey Keyboard & MS Mouse
- MS-DOS 6, Diagnostics & Windows
- MS Multimedia Works, CD-ROM Edition

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Software

If a system comes with "choice of application software," choose one of the following packages:

- Microsoft Works for Windows™
- Microsoft Excel for Windows™
- Microsoft Word for Windows™
- Microsoft Word and Bookshelf '92,® CD-ROM Edition
- Microsoft PowerPoint for Windows™
- Microsoft Project for Windows™
- The MS Entrepreneur Pack
- Borland Paradox® and Quattro Pro® for Windows

All hard drive sizes are manufacturer's specified capacities. Microsoft MS-DOS 6 can increase hard drive capacity through software compression.

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This ad is dedicated to the memory of NASCAR-driver Davey Allison from all his fans at Gateway.

And PC Racing Accessories

SOFTWARE UPGRADES

Microsoft Office™ — You can upgrade from a choice of application software to Microsoft Office, CD-ROM version, for only **$99**! This single package has all the leading Windows applications: Word, Excel and PowerPoint. The standard edition of MS Office is also available as an upgrade from a choice of application software for **$175**, or **$499** as a second application.

Choice of Application — If the system you want comes with MS Works for Windows, you can upgrade to a choice of application software for only **$100**.

PERIPHERALS

Multimedia Upgrade Kit

Everyting you need to add multimedia to your PC is included in this specially priced kit! You get:

Sound Blaster™ 16 ASP Sound Card. Simply the best sound card available! This 16-bit PC audio card offers CD-quality sound, Yamaha® FM music synthesizer, MPU-401 MIDI interface, joystick connector, built-in CD-ROM interface, and more. The Advanced Signal Processing chip delivers 4:1 real-time hardware data compression while reducing CPU demands by up to 65%. Provides 100% compatibility with all Sound Blaster applications, plus DOS and Windows sound support. You also get two Labtec CS-180 speakers that attach to your PC monitor.

CD-ROM Drive. Kit comes with the same high-quality drive that we offer in our top-of-the-line 4DX2-66V system. You also get our free system CD with Microsoft Multimedia Pack™ and more!

Kit Price (with system purchase): **$395**

Sound Kit

Get just the Sound Blaster 16 ASP sound card and two Labtec CS-180 speakers. **$199**

TelePath™ Fax/Modem

Internal fax/modem, 14,400bps modem, V.32bis, with 9,600bps fax capability. Package includes software — WinFax Pro,® Crosstalk™ for Windows and Qmodem — plus a free CompuServe® trial membership. **$195**

Network Cards

Call for a selection of Ethernet cards and Token Ring adapters, installed and configured.

Microsoft Windows™ for Workgroups

Networking made easy! Share files and printers, send electronic mail, schedule group meetings with the click of your mouse — and get everything you need in one inexpensive package. Price includes an Ethernet adapter and software. Hardware and software are factory-installed. **$159**

Colorado Memory Systems™ TBU

250MB internal automatic tape backup unit copies up to 9.5MB per minute with high-speed data compression. Comes with easy-to-use DOS software, one tape and cable. **$175**

CrystalScan® 15-Inch & 17-Inch Monitors

Non-interlaced color monitor with flat, square screen, .28mm dot pitch. If your system comes with a 14-inch monitor, you can upgrade to the 15-inch model for **$100**, or the 17-inch for **$600**. If your system comes with a 15-inch monitor, you can upgrade to the 17-inch monitor for **$520**. (Prices good only for upgrades at the time of system purchase.)

Panasonic® KX-P2123 Color-Capable Printer

Add color to your documents with this 24-pin dot matrix printer. Includes Adobe Type Manager.® Call for price!

Texas Instruments® MicroLaser™ Plus Laser Printer

Never before has such a small, Postscript® laser printer offered so much speed and economy. The MicroLaser Plus is only 13.4" x 14.2", yet it prints 9 pages per minute at 300dpi. Call for price!

We offer many other system options and upgrades. Call today!

SERVICE

Every Gateway 2000 system is backed by:

- 30-Day Money-Back Guarantee
- One-Year Limited Warranty
- Lifetime Toll-Free Technical Support
- On-Site Service Available to Most Locations
- Lifetime BBS Membership
- FaxBack™ Automated Fax Service

The software and peripherals listed here are sold only with the purchase of a system. For details on our complete line of extras for Gateway customers, call our special add-on components division at 800-846-2080.

TOOLS ON TOP FROM CENTRAL POINT

Tools on Top is now included on all Gateway 2000 mini desktop, desktop and tower systems. Program includes file manager, desktop and emergency disk portions of Central Point's award-winning PC Tools for Windows.

Gateway 2000 is a corporate sponsor of GLOBAL RELEAF

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THE TELECOMMUTING

Federal and local legislation is forcing managers to determine how to implement telecommuting programs and which technologies to use. Here's what you need to consider and how to do it right.

Telecommuting isn't just a good idea, it may soon be the law. Two new acts of federal legislation make it necessary for employers to develop strategies to let staff work at home. As a result of these and other factors, the number of telecommuters is expected to increase from 4.5 million in 1993 to 7.1 million in 1996, about 5.5 percent of the work force, according to Raymond Boggs, an analyst at BIS Strategic Decisions of Norwell, Massachusetts. All these workers will rely on PCs, modems, and other telecommunications technologies to stay in touch with the main office.

The most wide-ranging legislation encouraging telecommuting is probably the Amendments to the Clean Air Act passed in 1990, which took effect last November. The amendments stipulate that employers in certain high-pollution metropolitan areas must develop plans to reduce the number of commuters. Several states, including California, have instituted their own laws to reduce commuter traffic. Telecommuting is one of the most cost-effective tools for meeting the guidelines, according to Ed Risse, a principal at Synergy Planning, a Fairfax, Virginia–based telecommuting consulting firm.

The Family and Medical Leave Act, one of the first laws signed by President Clinton, kicked in this summer for most employers. The act entitles employees to 12 weeks of unpaid, job-protected leave each year for specified family and medical reasons. The act leaves room for companies to develop telecommuting plans that let employees perform some work at home. It's a great option for employees because they can continue to earn some or all of their pay and keep their career on track.

Even if your company is not affected by this legislation, you may

Edited by Russell Glitman

IMPERATIVE

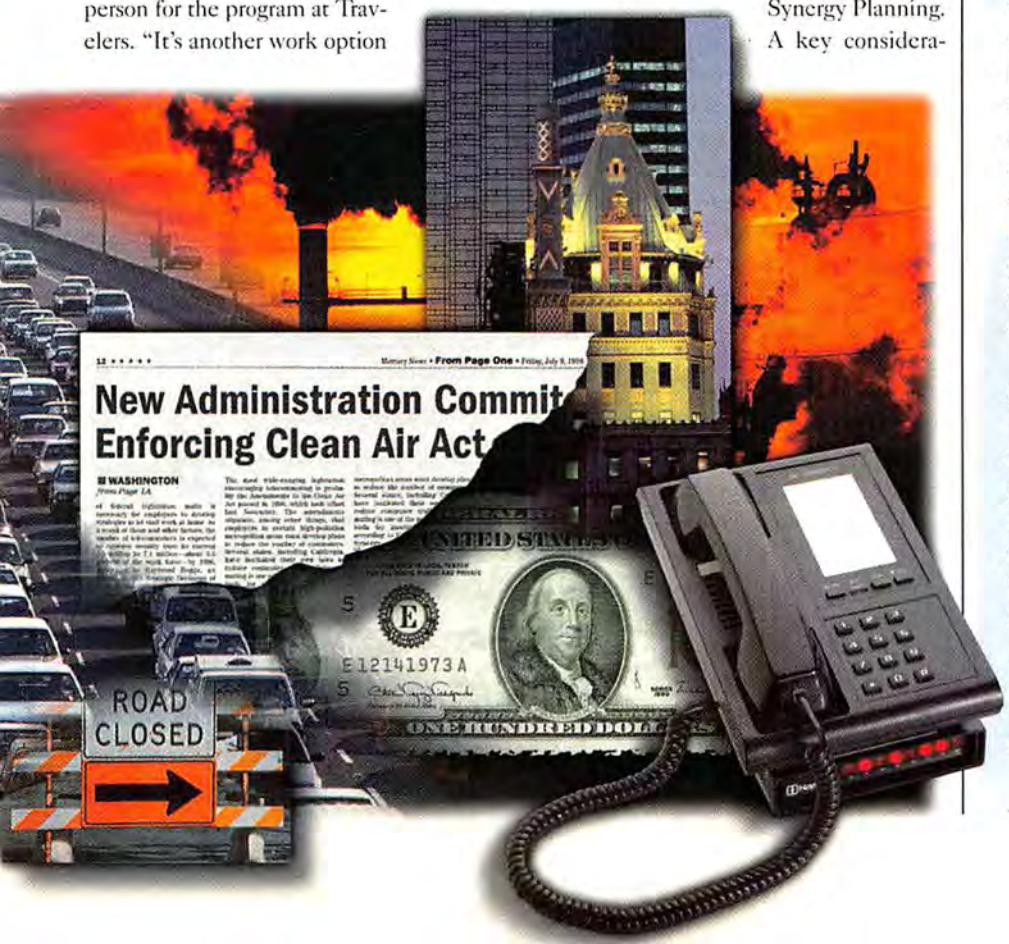
want to consider telecommuting for business reasons. These programs offer employers numerous advantages, such as increased productivity and reduced staffing and office costs. Early adopters are quick to testify to the benefits: In a two-year study involving 250 California state employees, two-thirds of the managers involved said their telecommuting employees were more effective than those who didn't telecommute, notes Jack Nilles, primary consultant on the study. Nilles just completed a similar study of 350 Los Angeles city employees that corroborated his earlier findings.

The Travelers Corporation, a Hartford, Connecticut–based financial services firm, has had a telecommuting program since 1987 and uses it to attract and retain employees. "We see telecommuting as a recruitment tool," says Jim Kalach, spokesperson for the program at Travelers. "It's another work option you can offer people." The program has also saved on retraining costs.

Choosing the Employees

Once you decide that telecommuting is right for your company, you need to select the positions and employees best suited for it. Ideal jobs include field workers who use the main office only periodically to make phone calls; creative workers, such as writers, artists, computer programmers, and managers, who need periods of undisturbed concentration; and employees whose job revolves around the phone, such as customer support staff.

After identifying the jobs, consider the individuals performing them. Choose solid workers, particularly self-starters and gregarious people who will be sure to stay in touch, says Linda Risse, another principal at Synergy Planning. A key considera-



News Monitor

ANOTHER DOS: Novell DOS 7 will provide built-in peer-to-peer networking based on the company's NetWare Lite software. (A separate peer-to-peer LAN product, Personal NetWare, will target users of other DOS flavors.) Scheduled to ship in September, Novell DOS 7 will feature a variety of improved utilities, such as an enhanced file compression utility from Stac Electronics, which makes Stacker 3.1.

Novell DOS 7 will provide other goodies, such as preemptive multitasking that allows multiple DOS programs to run simultaneously. You'll be able to load TSRs and drivers in extended RAM, removing them almost entirely from the first 1MB of memory (rather than loading them in upper RAM with a memory manager). Novell officials also promise full-featured backup and antivirus programs from Fifth Generation Systems—unlike the scaled-down utilities in Microsoft's DOS 6.0.

MEMORY PRICE MADNESS: The price of memory chips more than doubled this summer as demand, spurred by rising PC sales, exceeded supply.

For instance, prices of 1x9 SIMMs jumped from $29 in April to $75 in mid-July, according to Ron Seide, director of marketing at Kingston Technology, a Fountain Valley, California, memory enhancement firm. Kingston is adjusting prices every couple weeks. Prices took another fast jog up in early July following a fire at a Japanese plant that makes 60 percent of the world's supply of a conductive epoxy resin used in DRAMs. Fear of a shortage, rather than any immediate

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PHOTO ILLUSTRATION: JEFF BERLIN; PHOTOS: JOHN GREENLEIGH; THE IMAGE BANK (ROSS M. HOROWITZ, G & M DAVID DE LOSSY, HMS IMAGES, PATTI MCCONVILLE, ROBERT HERKO); ILLUSTRATION: DAVID FLAHERTY

Avoiding the Pitfalls: The Five Commandments of Telecommuting

1. Set clear objectives, including work hours and measures of success.
2. Select jobs with tasks performed easily at a remote site.
3. Choose top-performing employees who are familiar with company policies and procedures.
4. Use excess or "obsolete" equipment or establish employee purchase plans.
5. Create a telecommuting contract that covers objectives, work hours, and thorny issues such as corporate liability.

Continued from page 53

tion is familiarity with the company. The Travelers Corporation allows only employees who've been with the company at least a year to telecommute.

The associated costs of having a remote office vary wildly. In the California state employee study, home office costs ranged from nothing to $4000, depending on how many days the telecommuter worked at home. If an employee worked three or more days at home, the state provided a workstation there but not in the main office, says Dave Fleming, a project manager involved in the study. The state covered expenses such as phone costs and software compatible with that in the main office.

The Travelers Corporation runs its program similarly: Full-time telecommuters receive a complete home office setup. The employees generally spend half a day at the main office delivering and picking up work and meeting with their supervisors. The main office doesn't include a work space for them. Employees who telecommute only part time generally have an office at work and receive a PC and other requisite tools for work at home. They don't usually receive furniture for their home.

Outfitting a home office for telecommuting is like outfitting any other home office, except for two major areas: security and communications. For securing data, Marty Barrack, a telecommuting technology policy analyst for the federal government, recommends a removable drive device, such as a Bernoulli Box, magneto-optical drive, or portable hard drive. Tape backup is a less popular option because the devices are slower and their data must be restored to a hard drive before it can be used. The employee should perform regular backups and keep an updated backup in the main office.

Remote-control software, such as Micro-

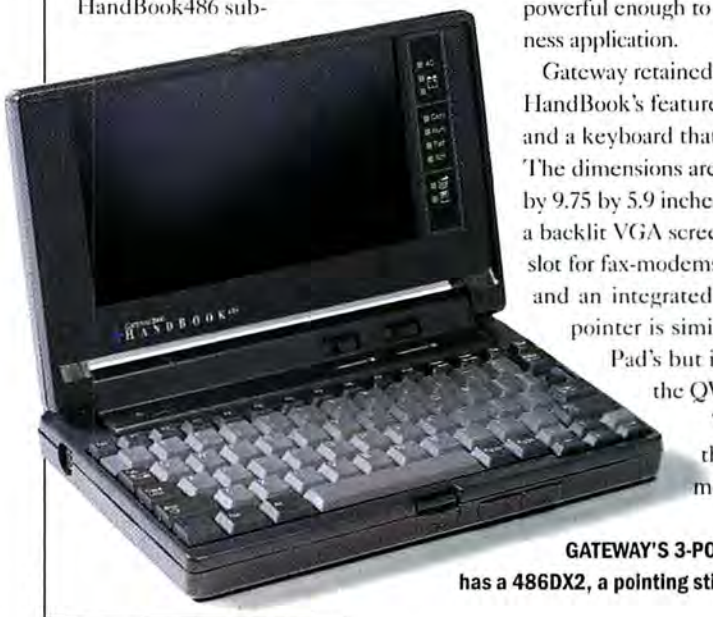
Gateway, AST Notes Add More Power

TEST DRIVE New systems from Gateway 2000 and AST pack more computer into a smaller package.

The innovation leader in the new mobile lineup is Gateway's dramatically improved HandBook486 sub-notebook, which offers more power per pound than anything on the market. The HandBook486 comes with either an Intel 40-MHz SL-enhanced 486DX2 or a 25-MHz 486SX—energy-saving CPUs that are powerful enough to run any Windows business application.

Gateway retained the best of the original HandBook's features—its 3-pound weight and a keyboard that touch-typists can use. The dimensions are nearly unchanged: 1.6 by 9.75 by 5.9 inches. New features include a backlit VGA screen, a PCMCIA Type II slot for fax-modems and other peripherals, and an integrated pointing device. The pointer is similar to the IBM ThinkPad's but is located at the end of the QWERTY key row.

The company claims the batteries should last more than 2 hours with power management features enabled. For $1495, you get the 486SX-25 HandBook486 with 4MB of RAM and an 80MB hard drive. The DX2-40 offers a 130MB hard drive and 4MB of RAM for $1995. Both come with DOS and Windows. An optional external floppy drive is $99.



GATEWAY'S 3-POUND HANDBOOK486 has a 486DX2, a pointing stick, and a PCMCIA slot.

Three Powerful New Portables

HandBook486, ColorBook

Pricing: HandBook486 486SX-25 model $1495, 486DX2-40 model $1995; ColorBook $1995
Gateway 2000, 800/846-2000
Reader service no. 793

Bravo NB 4/25s, 4/25s Color, 4/25s ColorPlus

Pricing: 4/25s $1700, 4/25s Color $2400, 4/25s ColorPlus $3300
AST Research, 800/876-4278
Reader service no. 794

PHOTOS: JOHN GREENLEIGH; ILLUSTRATION: DAVID FLAHERTY

Additional Resources

- *Flexiplace: Questions and Answers on Computer and Telephone Issues*, publication KMP-92-1-I, by General Services Administration, single copies free, 202/501-4860, 202/501-2482 (fax)
- *The One-Minute Commuter*, by Lis Fleming, distributed by Terra Nova Press, $9.95, 916/753-1519
- *Telecommuting: How to Make It Work for You and Your Company*, by Gil Gordon, $15.95, 908/329-2266
- *Telecommuting: Moving the Work to the Workers*, by Commuter Transportation Services, Inc., $6, 213/365-6812

com's Carbon Copy and Symantec's pcAnywhere, offers an inexpensive connection for single users and small businesses with minimal information services staff. The products let employees tap into a PC at the main office and operate it as if they were there. They can retrieve and send E-mail and even access files and applications that may be too large to store on their home PC. These products are ideal for temporary telecommuting situations, such as parental leave, when the employee's office PC will remain at the main office.

If you need a more permanent solution or need to connect multiple sites, consider other options, including multiuser remote-control products, such as Citrix's WinView for Networks, and remote networking products, like Shiva's LANRover/E and LANRover/T and DCA's Remote LAN Node. These let numerous users dial into one server simultaneously, which can reduce hardware costs.

Will telecommuting be the way most of us work in the next century? The benefits are clear: improved productivity, cleaner air, reduced office costs, and happier employees. The challenge is yours to meet.

—Randy Ross

Per Pound

Gateway also has a new series of three 5½-pound ColorBooks with enhanced dual-scan passive color displays that are a considerable improvement on the first generation of passive color displays. Other features include an integrated trackball, a floppy drive, and a PCMCIA Type III slot that accommodates thicker PC cards such as hard drives. A ColorBook with a 25-MHz 486SX processor, 4MB of RAM, and an 80MB hard drive costs $1995.

AST'S 5½-POUND BRAVO NB offers local bus graphics.

Bravo NB Notebooks

AST's new Bravo NB notebook comes with your choice of a monochrome, dual-scan passive color, or active-matrix color display. We were particularly impressed with the preproduction Bravo NB's dual-scan passive color display, which offered excellent contrast and vibrant colors. However, pricier active-matrix displays still offer better viewing angles and better contrast.

With 4MB of RAM and a 120MB hard drive, the dual-scan Bravo NB 4/25s Color costs about $2400 on the street. A similarly equipped monochrome model, the Bravo NB 4/25s, is approximately $1700; the active-matrix color model with a 170MB hard drive, the Bravo NB 4/25s ColorPlus, is over $3300. Each 5½-pound Bravo NB comes with a PCMCIA Type III slot, a floppy drive, and an integrated trackball.

—Jeff Bertolucci

News Monitor

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lack of supplies, sparked the price increases, according to Seide.

The price increases could spill over to PCs, making it harder for small vendors to compete. First-tier system vendors have chip supply contracts that insulate them from the increases. "We've seen insignificant increases and don't see any near-term impact forcing us to raise prices," says Dell Computer's Chris Efstathiou, semiconductor commodity manager. System prices are also stable at Zeos International because for now the company is absorbing the increase in memory costs, says Rick Apple, vice president of marketing.

PRINTER RIBBON DEALS A STEAL: NEC, Okidata, and Lexmark recently discovered counterfeit ribbons that deliver poor print quality, wear quickly, and can cause printhead failure, according to the three vendors.

NEC has found hundreds of thousands of counterfeit ribbons, says Joe Tamker, NEC's director of supplies, sales, and marketing. The investigation also resulted in the seizure of 12,000 counterfeit Okidata ribbons for its 100 series printers, says Chuck Kocher, Okidata's senior marketing manager for consumables and parts.

To avoid counterfeit products, examine packaging closely, stick with authorized dealers, and call NEC at 800/388-8888 for help authenticating a box, says Tamker. Users should also watch for fake ribbons for the Okidata 390 series printers, says Kocher. When you buy Okidata ribbons, make sure they're in a gray box: The fakes are in

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User Group Finds PIMs Pay Off

If you're like many of us, the day-to-day details of your job can sometimes threaten to overwhelm you. Conventional solutions, such as Post-it notes, to-do lists, Rolodexes, and leather-bound business card holders, only fuel the chaos. To the rescue comes a new generation of Windows personal information manager (PIM) programs that vendors claim will put you in control of your complex life.

Do these packages work? Yes. Should every businessperson have one? Yes. That's the unanimous vote from a group of six Boston Computer Society (BCS) volunteers—with jobs ranging from marketing consultant to CEO—who were hands-on PIM testers for two months for *PC World* this spring.

A good PIM generally includes four basic components: a contact database for addresses and phone numbers, a calendar for scheduling, a to-do list, and a notepad. Our testers looked at three PIMs: Lotus Organizer 1.0, Arabesque's Ecco Professional 1.0, and Polaris's PackRat 5.0. They used the packages at work and at home and without a lot of time to spend looking through manuals. (One tester had been using a PIM regularly.) The group didn't identify one PIM that works for everyone; instead, users learned each is best suited to a different work style. Here are their findings.

Organizer: A Quick and Easy Solution

Lotus Organizer looks and works like a Day-Timer planner and rated high for ease of use with all but one tester. "If you need something simple, Lotus Organizer is it," says Jerry Blumenthal, principal engineer at Fay, Spofford & Thorndike, a Lexington, Massachusetts, engineering and planning firm. Blumenthal works at the project management level with other engineers and consultants and tracks schedules and meetings. "I really like the pull-out planner to plot and track events," he adds. "I print the appointment list every day." Organizer meets his key need: ease of use.

LOOKING FOR SIMPLICITY: Lotus Organizer fit the bill for Jerry Blumenthal, principal engineer at Fay, Spofford & Thorndike.

Henk Portier also liked Organizer best for classifying customer information for his disaster recovery and consulting business, Dr. Computer, in Needham, Massachusetts. "I like Organizer for the interface and intuitiveness," says Portier. "It's easy to import files. I want a program you don't have to open the manual for." Portier prints many

Expert-System Virus Protection:

Now that virus protection comes with the latest versions of Microsoft DOS and IBM DOS, do you need a separate antivirus package? Central Point Software thinks so and has released the latest version of its antivirus crusader. Here's what you get.

Central Point Anti-Virus 2.0 features a new expert system that uses a rules-based engine to sniff out viral code. Called Virus Analyzer, this system searches for characteristics common to all viruses rather than for specific signatures (or code) of individual invaders.

Thanks to Virus Analyzer, "system administrators don't have to upgrade 100 PCs each month with antivirus upgrades," says Tori Case, Central Point Anti-Virus product marketing manager. For those who want the assurance of being protected against the latest known viruses, Central Point will continue to offer updates every four to six weeks.

Another advantage of Central Point Anti-Virus is that it's designed for use with large networks. The antivirus utility in MS-DOS 6.0—a scaled-down version of Central Point's product—is for single-user PCs only, Case says. Central Point Anti-Virus 2.0 offers such business-friendly features as password protection, an events scheduler, and network install—ease-of-use capabilities not found in the MS-DOS utility.

In addition to scanning files in DoubleSpace, Stacker, and SuperStor compressed formats, Central Point Anti-Virus 2.0 also scans files stored in PKZip, PKLite, LZEXE, and ARJ formats.

The program's list price is $129.95; upgrades are $29.95. Central Point Software, 800/964-6896, 503/690-8088. Reader service no. 784

PHOTO: RICK FRIEDMAN; ILLUSTRATION: GORDON STUDER

to-do lists and phone lists because he also heads BCS's Consultants & Entrepreneurs special interest group. "For most of my customers, Organizer would be all they'd need," he adds. (Organizer 1.1, to be released in August, retains the same interface and features but adds compatibility with cc:Mail for group scheduling. A Notes-compatible version is slated for year's end.)

Organizer has a few cons: You can't customize fields in the address book or schedule overlapping events, Blumenthal points out. Portier found it disappointing that when he imported contact names in several DBF files, Organizer couldn't find and delete duplicate entries easily.

Ecco Adds Outlines to the Mix

Arabesque's Ecco, the rookie of the group of PIMs we tested, scored well for its interface, which shows information in a flexible outline form with folders for attaching data to items in the outline. The Shooter utility, which copies information from other Windows applications and imports it to Ecco, also won high praise.

DROPPING HER DAY-TIMER: Louise Reilly Sacco opted for Ecco. "It makes life easier."

Louise Reilly Sacco, a marketing consultant in Needham, Massachusetts, liked the Ecco and Organizer interfaces. "There are days when I get on the phone and have 40 calls to complete, half of which will tell me to call back at a certain time," Sacco says. She needs a to-do list that rolls over undone tasks. Both Organizer and Ecco offer such a feature, but Ecco has a split view with both the to-do list and calendar on the same page, which Sacco says she prefers.

Tracking information in outlines makes sense, says Andrew Novick, who owns a document imaging consulting business in Cambridge, Massachusetts. "I like that the outlines are hierarchical and I can attach data to items," Novick says. He prints Ecco outlines and uses them to detail his activities in reports for customers. "Ecco has more of a learning curve than Organizer. The screen is kind of cluttered, and sometimes there were icons I didn't recognize. But the format is better for me." Novick was so impressed, he's using the software to plan his wedding.

George Beard, CEO of computer manufacturer i Corp in Boston, says Ecco offers a solution for executives who want to organize different kinds of information. "It's a good way to store information in electronic files," he says. "I'm taking information from CompuServe and filing it in many different ways. I use Ecco for jotting notes, planning, and putting the information in folders. The Shooter makes it all the better; when I type a letter, I use Shooter to file it." Beard already uses a PIM, Okna's DeskTop Set, strictly for its phone management features. His day centers around vendor and customer calls, and he wants a PIM that identifies a caller before he picks up, a feature that DeskTop Set provides. Beard decided to keep DeskTop Set for his phone calls but to use Ecco as well.

Ecco had one con for Sacco: If you write in rambling, narrative style, getting used to outlines takes time, she says. Blumenthal

News Monitor

(continued from page 55)

white boxes. They are often labeled "Oki" rather than "Okidata."

Counterfeiting isn't a widespread problem for Lexmark, but it is conducting several investigations, says Michael Yaro, supplies product planner for Lexmark. This spring Lexmark uncovered counterfeiters who were replicating packaging, then putting generic ribbons inside. Avoid ribbons that don't have a company name on them, Yaro says.

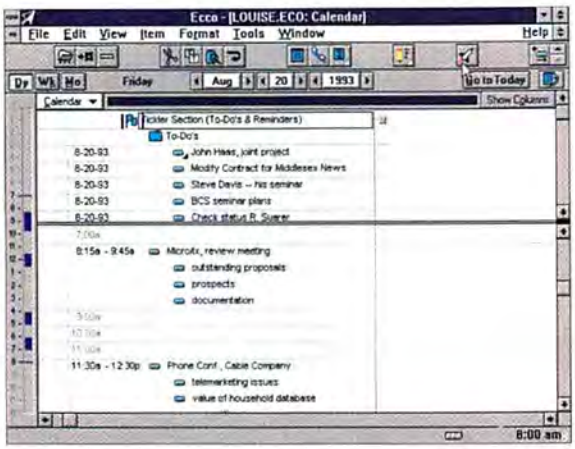
BIG BLUE DISPLAYS: IBM is entering the high-end–monitor business with four ergonomically correct, digitally controlled monitors. They include two 14-inch monitors with standard screen technology and two 15-inch flat-screen models; prices range from $499 to $599. This fall 17- and 21-inch models that work interchangeably with the Apple Macintosh will be unveiled. Pricing for those models was unavailable at press time.

The .28mm dot pitch monitors achieve reduced glare via the combination of a screen-etching process and an antiglare coating. They meet the Swedish MPR-II standard for low emissions and Sweden's tougher new TCO-91 recommendations. The monitors remember 26 settings—11 of which are user definable—for special screen configurations and have four levels of power management.

—Edited by Randy Ross

Contributors: Joe Abernathy, Jeff Bertolucci, Russell Glitman, and Laurianne McLaughlin

PHOTO: SETH RESNICK; ILLUSTRATION: DAVID FLAHERTY



ECCO SHOWS a to-do list above a daily calendar view. At top, a Rocket icon activates the Shooter feature.

Continued from page 57

says Ecco seems cluttered, but that he might grow to like it, since folders make sense for his projects.

PackRat Offers More Customization

Polaris's PackRat delivers more customization capabilities than either Lotus Organizer or Ecco. The program not only manages your information, but also organizes your desktop. You design folders that can hold your database, calendar, or even icons to launch other applications. Version 5.0's customized folder—which has setups for 12 professions, including engineer, consultant, and MIS director—seemed promising, but none of our testers found the setups significantly helpful. PackRat gives you more flexibility for adding or sorting fields and constructing unique screen views than the competing two PIMs offer.

Arnold Bilansky, a systems analyst for the Massachusetts Department of Public Health's Division of Food & Drugs, liked PackRat the best. Bilansky purchases hardware and software and trains and supports about 50 employees. He has to do a lot of scheduling and must take notes on products and requests. And as leader of BCS's Excel/Word special interest group, one of his duties is to schedule meetings and speakers.

"If someone were just looking for an easy PIM, I'd recommend Organizer," Bilansky says. "But I'd use PackRat myself because I can go to town customizing it. I can get a bigger calendar view, do different printouts, and customize my contact lists. I need to change fields in the address book entry and sort them by what I want to do." Bilansky also liked PackRat BASIC, a macro language that automates tasks and allows you to create links to other applications. He says that if you're project oriented, you should take the time to set up different folders by project and link them to the applications that you use frequently.

According to our group, PackRat's biggest con is its learning curve. Blumenthal, Sacco, and Novick lost patience with the options in PackRat, the complex manual, and some of the program's icons.

After spending almost two months with the PIMs, all six BCS testers say that personal information management software is just as important as a word processor or a spreadsheet.

"Anybody who's using a Day-Timer should be using a PIM," says consultant Sacco. "It makes life easier."

—Laurianne McLaughlin

Three Windows PIMs

WINDOWS **Our users test drove these PIMs with varying results.**

Ecco Professional 1.0

Pricing: $99 till September 22, $395 thereafter
Arabesque Software Inc., 800/457-4243, 206/869-9600
Reader service no. 791

Lotus Organizer 1.0

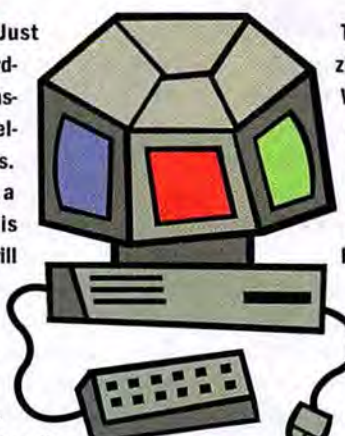
Pricing: $149
Lotus Development Corp., 800/343-5414, 617/577-8500
Reader service no. 790

PackRat 5.0

Pricing: $395
Polaris Software, 800/722-5728, 619/592-7400
Reader service no. 792

IBM's Pentium Alternative:

Just when you thought you had a handle on your hardware and operating system choices and purchasing plans for the next year or two, recent developments could force you to review your options. The new 32-bit PowerPC 601 microprocessor, a joint venture by Motorola, IBM, and Apple, is available in quantity to vendors, and systems will be available in the fourth quarter. This 66-MHz RISC chip costs about $450 (versus the $926 Pentium) in quantities of 1000 and runs about twice as fast. According to Linley Gwennap, analyst at the *Microprocessor Report* published in Sebastopol, California, "IBM is talking about shipping PowerPC systems as early as the fourth quarter." Apple has said it will ship PowerPC-based Macs by mid-1994.



The PowerPC is only part of the high-end buying puzzle confronting managers. There have been hints that Windows NT could be ported to the PowerPC, and Apple is said to be considering licensing its System 7 operating system not only for the PowerPC but also for Intel systems. Meanwhile, MIPS Technologies' R4000 and R4400 RISC chips are finding homes in new systems. High-end DEC Alpha PCs are available now and a version for less than $3000 could appear in 1994. Both the MIPS and DEC chips offer as much as four times the performance of Intel's 66-MHz 486DX2s at about the same price. However, there are few applications that have been compiled to run on these processors.

What does this augur for 486 system pricing? Look for another round of cuts by year-end.

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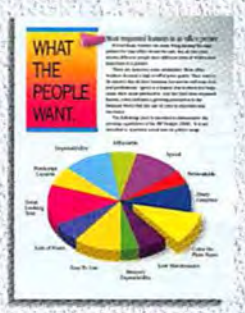

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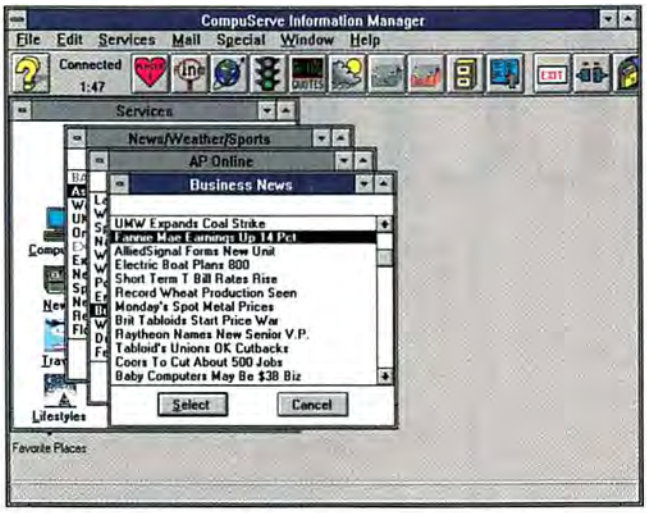

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TEST DRIVE While the newspaper industry wages war with the telephone and cable television industries over the future of information delivery, a growing number of innovators are "publishing" news online that you can tailor to your needs.

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Electronic news agencies offer a range of services. If you want quick facts, The Daily News Alert from JRA Information Services will scan 1600 periodicals for topics you've preselected and send a synopsis or clipping via mail or fax.

If you're looking for news on screen, MCI's Information Advantage program allows you to have a number of different offerings delivered to your mailbox. Among the information providers available are Individual Inc., an "information refinery" that delivers a customized daily newspaper; Dialog; Dow Jones News/Retrieval; Dun & Bradstreet Information Services; History Associates, a historical consulting service; Information Inc., which prepares custom news reports; NewsNet, which offers the full text of more than 600 newsletters and more than 20 news wires; and The Search Bulletin, a headhunter service.

Individual Inc. also will deliver its customized news products, First and HeadsUp. First delivers news via fax, E-mail, or Lotus Notes. HeadsUp provides news synopses via fax or wireless connection to pagers and hand-held PCs using Motorola's Embarc system.

CompuServe's extensive online news system includes weather information, AP, UPI, Reuters, Press Release Newswire, Washington Post, Agence France-Presse, Deutsche Presse-Agentur, Kyodo, Xinhua, and historical news databases. The CompuServe Executive News Service scans the news for any number of chosen topics and saves the results to folders that you can review for $15 per hour. America Online, meanwhile, features the Washington Post News Service. And Prodigy has its own newsroom—the only one in the online universe—but Prodigy offers little more than headlines.

Windows users can get their news with an exciting new product called Journalist—Live Page Layout for Windows. The $129.95 application interacts with CompuServe to let you build a customized daily newspaper. Most topics, including weather maps, business news, and the full AP news report, are available for the flat-rate basic subscription, but historical stock analysis charts add extra fees (5 cents per historical quote). Journalist also works with the Executive News Service.

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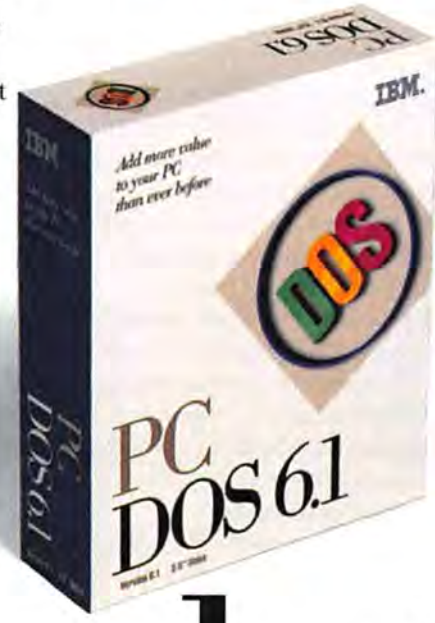

Features and Functions	PC DOS 6.1	MS-DOS 6
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High-speed floppy disk support	x	
Approximate number of viruses that can be detected	>1,400	800
Automated system configuration optimizer	x	
PCMCIA II support	x	
Enhanced editor	x	
Program scheduler	x	

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Circle 133 on reader service card

Continued from page 62

photos and four original graphics, all accessed from a Windows interface.

Newsweek Interactive is a CD ROM product published quarterly that includes recorded interviews and graphics. It costs $49.95 an issue.

Competitive Edge

Moving up the scale, the NewsEdge "intelligent" news service can put your company on the cutting edge of journalism, but it's expensive. Intended mainly for delivery on local area networks, NewsEdge aims to help people restructure the way their organization gets news, in this case selecting from among 130 services, including AP, Comtex (a sister service to UPI), Dow Jones, Federal Filings, Federal News Service, Knight-Ridder Tribune, PR Newswire, and Reuters. This real-time interactive system alerts you to events based on triggers—such as the Dow dropping 10 points—that you set. It can also create briefings of news article clips to construct a custom clippings database. Prices start at $10,000 a year for five users.

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Caveat emptor: Electronic news, like printed news, varies widely in quality. UPI is available at low cost, for instance, but AP is considered more comprehensive. Remember to ask exactly what you're getting with a subscription, and from whom.

—Joe Abernathy

Stacker 3.1 Versus DoubleSpace:

With the introduction of DoubleSpace in MS-DOS 6.0, more users are aware of the benefits—and potential pitfalls—of data compression. While many have found DoubleSpace a handy tool for boosting disk capacity, others claim the compression program has crashed systems, corrupted files, and lost data.

While the verdict is still out on DoubleSpace, Stac Electronics has begun touting its Stacker data compression product as the "safe" alternative for Microsoft DOS 6.0 users. The new Stacker 3.1 ($149) has a number of features designed specifically for use with DOS 6.0 and Windows 3.1 and will even convert DoubleSpace-compressed drives to Stacker drives (see *New Products*, page 84).

Like DoubleSpace, Stacker 3.1 integrates tightly with the DOS 6.0 kernel. Both compression utilities preload their drivers and therefore don't require commands in your CONFIG.SYS or AUTOEXEC.BAT file. Also, both let you use common DOS commands such as CHKDSK, DIR, and the new DEFRAG on compressed volumes.

So how is Stacker safer? For starters, version 3.1 keeps two copies of the File Allocation Table (FAT), whereas DoubleSpace keeps only one. If a disk error causes your compressed drive to lose its only FAT in DOS 6.0, your data could be irretrievably lost. Also, Stacker scans your disk and maps out bad sectors before installation; DoubleSpace doesn't.

Another DoubleSpace shortcoming: It lacks a simple command for decompressing drives; Stacker 3.1 has an UNSTACK command. Stackometer gauges provide Windows users with a monitor of disk capacity, compression ratio, and fragmentation levels.

Stacker 3.1 also works with IBM DOS 6.1 but doesn't integrate as tightly with that as it does with MS-DOS 6.0, says Anne Galdos, Stacker product manager. But the situation should change this fall when IBM introduces an updated DOS with hooks for third-party compression products.

Meanwhile, Stac's patent infringement suit against Microsoft is scheduled for a December hearing in U.S. District Court in Los Angeles. Stac claims that some of the compression techniques DoubleSpace uses infringe on the company's patents. Stay tuned. Stac Electronics, 800/522-7822, 619/431-7474. Reader service no. 663

How Stacker 3.1 Works With DOS 6.0

- Tight integration with the operating system—no need for Stacker commands in CONFIG.SYS or AUTOEXEC.BAT file
- Lets you use common DOS commands (CHKDSK, DIR, DEFRAG, and so on) on Stacker-compressed volumes
- Converts DoubleSpace-compressed drives to Stacker format

JEFF BERLIN

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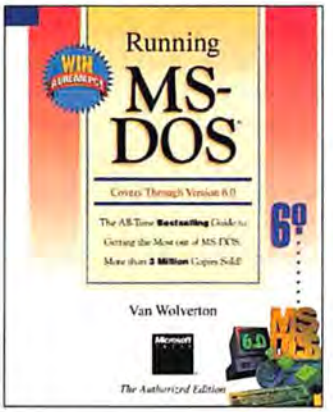

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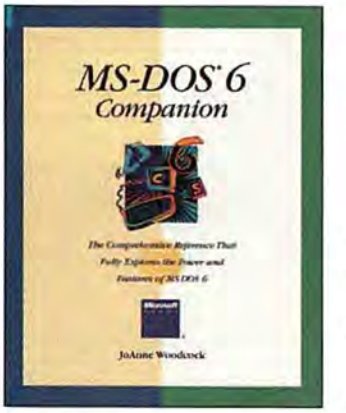

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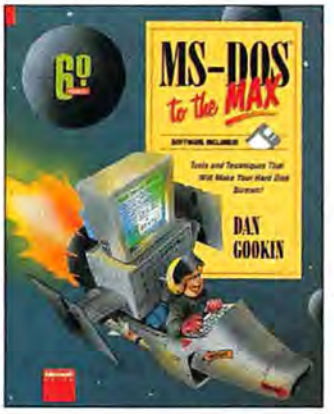

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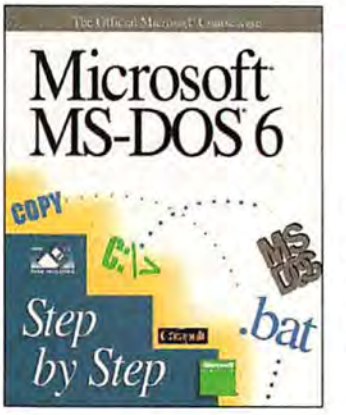

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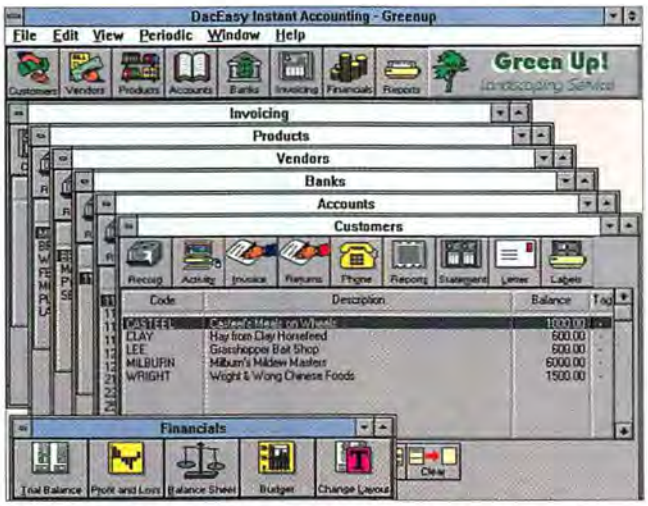
Run Your Business Without a CPA

TEST DRIVE ▶ A new breed of Windows-based accounting programs for nonaccountants takes much of the pain out of minding your business. These packages aren't meant to replace a good accountant, but they will admirably replace a pen-and-paper accounting system or one based on less sophisticated software.

Microsoft Profit 1.0a ($199) has a unique focus on delivering analytical information on the performance of your business. You enter information regarding sales, customers, and expenditures, and Profit does the accounting behind the scenes, maintaining full journals and ledgers for examination by your accountant and lawyer. When you want to gauge cash flow or the profitability of a product or salesperson, a custom graph is just a couple of clicks away.



DACEASY INSTANT ACCOUNTING 2.0 features graphical button bars, making it the easiest to navigate of the new accounting packages.

Executive Approach

An approach less concerned with the executive and more concerned with the enterprise is taken by Peachtree Accounting for Windows 2.0 ($169). Peachtree comes network ready and offers a suite of accounting modules, including payroll (which Profit lacks). No accounting experience is required on the part of the employees who will enter sales and customer information, but traditional accounting features are easily accessed. Features such as data integrity verification and a custom forms designer—with Object Linking and Embedding, so you can use your logos—reinforce Peachtree's focus on usability at every level of your company.

While Profit and Peachtree battle for the full-featured–products market, BestBooks 1.1.1 and DacEasy Instant Accounting 2.0 let you start small and then go corporate once your widget hits it big. BestBooks by Teleware ($99) has the same interface as its big brother, M.Y.O.B., and is file compatible. Its 30-plus starter setups include some targeted at creative professionals who don't deal in inventory, although these setups seemed like a poor retrofit. The BestBooks screen is based on a simple flow chart system that makes navigating the program easy—and which helped M.Y.O.B. 3.0 win a *PC World* Best Buy in October 1992.

DacEasy Instant Accounting 2.0 ($49.95) offers the happy combination of a low price and strong functionality and design. Although all the accounting products we evaluated were fairly simple to navigate, DacEasy's intuitive icon bar made it the easiest to use—we didn't spend any time wandering around flow charts, filing cabinets, or drop-down menus trying to find out how to write a check or record a sale. DacEasy Instant Accounting is file compatible with DacEasy Accounting for DOS.

Which, if any, of these products is for you? As a creative professional, I've been looking for the right accounting package—one that will track sales of software I've written; keep up with freelance article assignments, deadlines, payments, and taxes; track expenses and assignments for my staff job at *PC World;* and keep clear tax information for my home office. That package doesn't exist. But with these applications, accounting software has improved dramatically enough that I'm now willing to use it—under the direction of a CPA.

Before you select one of these packages, determine whether you need sophisticated inventory tracking. If so, you need Profit or Peachtree. Profit's graphical analysis makes it a good choice for the executive. Peachtree is the best bet for any business in which more than a couple of people do the bookkeeping, including order entry.

If you don't need sophisticated inventory tracking, both DacEasy Instant Accounting and BestBooks are fine choices, and both offer a path to more full-featured products. I prefer DacEasy to BestBooks because DacEasy has a smoother graphical interface and it's half the price of BestBooks.

—Joe Abernathy

Easy Windows Accounting

WINDOWS **A new breed of Windows accounting programs lets you mind your business better without being a CPA.**

BestBooks 1.1.1

Pricing: $99
Teleware Inc., 800/322-6962, 201/586-3200
Reader service no. 788

DacEasy Instant Accounting 2.0

Pricing: $49.95
DacEasy Inc., 800/222-8778, 214/248-0305
Reader service no. 789

Microsoft Profit 1.0a

Pricing: $199
Microsoft Corp., 800/426-9400, 206/882-8080
Reader service no. 786

Peachtree Accounting for Windows 2.0

Pricing: $169, upgrade $79
Peachtree Software Inc., 800/228-0068, 404/564-5700
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or $ 50.00/ month

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- Intel486SX/25 (upgradable to 50MHz)
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- 4MB RAM (70ns)
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- Windows TurboCharger w/1MB VRAM
- Pre-loaded Productivity Pak & 101-Keyboard
- 3-year on-site warranty
- 3 slots/3 bays

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- VESA Local Bus Video
- Windows TurboCharger w/1MB VRAM
- Pre-loaded Productivity Pak & 101-Keyboard
- 3-year on-site warranty
- 3 slots/3 bays

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- VESA Local Bus Video
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- Pre-loaded Productivity Pak & 101-Keyboard
- 3-year on-site warranty
- 3 slots/3 bays

NCR 486DX2/66

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or $ 107.00/ month

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- 3.5" Flex Drive
- 14" SVGA VESA Flicker-Free Monitor
- VESA Local Bus Video
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- Pre-loaded Productivity Pak & 101-Keyboard
- 3-year on-site warranty
- 6 slots/5 bays

Terrific for High Intensity Graphics!

Outstanding File Server.

NCR 486DX2/66

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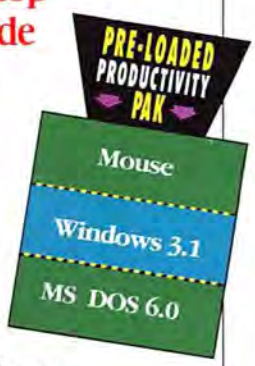
or $ 134.00/ month

- ***Intel Pentium OverDrive Ready***
- Intel486DX2/66 Tower Case
- 520MB 10ms Hard Drive (max. 2GB)
- 16MB RAM (70ns)
- 256KB Write-back Cache
- 3.5" Flex Drive
- 600MB CD ROM
- SCSI-2 Adapter
- 14" VESA SVGA Flicker-Free Econo-Monitor
- Super VGA Graphics Adapter
- Pre-loaded Productivity Pak & 101-Keyboard
- 3-year on-site warranty
- 6 slots/5 bays

All NCR Desktop Systems include a pre-loaded Productivity Pak:



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or
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- 4MB RAM/512KB Video Memory
- 1 PCMCIA slot (Type 2)
- 6.3 lb. Compact Unit/Featherweight 8 oz. AC adapter
- 3-4 Hour battery-life (NiMH)
- Snap-on cableless TrackBall
- Enhanced pre-loaded software: DOS 6.0, Windows 3.1, Bitfax, TourGuide, AT&T Mail, AccessPLUS and on-line Windows documentation
- 3-year Warranty (first year on-site)

3150 Mono Notebook

$ 2,195
or
$ 79.00/ month

- Intel486SX/25 (487 upgradable)
- 170MB Removable Hard Drive/Internal Flex Drive
- Mono Screen (9.5" diag.)
- Local Bus Video
- Simultaneous LCD/CRT display
- 4MB RAM/512KB Video Memory
- 1 PCMCIA slot (Type 2)
- 5.5 lb. Compact Unit/Featherweight 8 oz. AC adapter
- 3-4 Hour battery-life (NiCAD)
- Snap-on cableless TrackBall
- Enhanced pre-loaded software: DOS 6.0, Windows 3.1, Bitfax, TourGuide, AT&T Mail, AccessPLUS and on-line Windows documentation
- 3-year Warranty (first year on-site)

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MIPS-Based PCs for NT: Fast, Inexpensive, Available Alternatives

The hoopla surrounding Windows NT's introduction has subsided. You're meditating on your computing needs. Your breathing is slow and deep. Gradually, the mind clears and truth reveals itself: You're a power hound who must have NT and a blazingly fast PC! Read on.

The fastest PCs readily available to run Windows NT are based on MIPS Technologies' R4000 family of RISC processors. The low-end 100-MHz R4000PC chip is expected to offer Pentium-like performance at 486 prices. True speed freaks may opt for systems with the faster 150-MHz R4400PC processor. Like Intel's DX2s, the R4000PC and R4400PC are dual-speed chips.

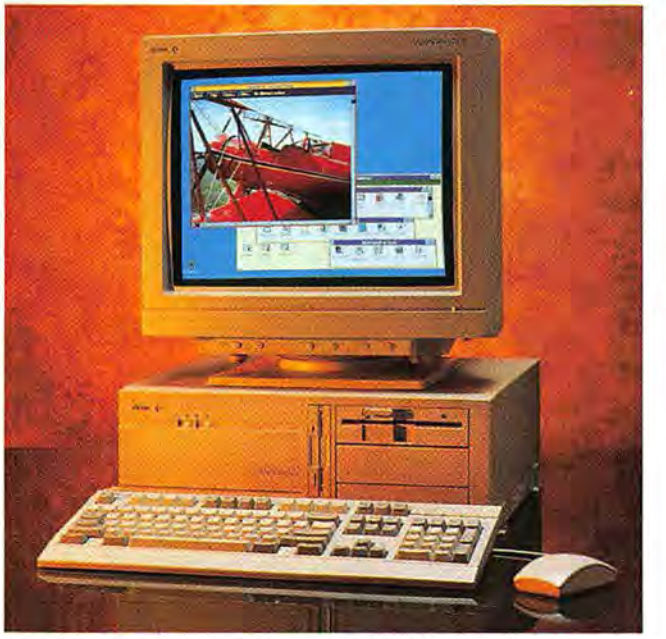
Systems based on the MIPS R4000 include the $3995 Tangent Carrera 4 Workstation, the $3695 AcerFormula 4000 ($4049 with monitor), and the $3995 DeskStation Evolution rPC401e/100. Systems based on the faster R4400PC chip will likely cost $5000 to $10,000.

Unless you're running NT applications compiled for these chips, you'll have to run them in NT's Windows emulation mode. Because it's an emulation mode, you won't notice any performance boost over your 486 system. MIPS versions of technical and high-end design applications should be available when NT ships, according to Dean McCarron, senior analyst at MicroDesign Resources. However, more mainstream applications, such as spreadsheets and desktop publishing programs, may not be available in MIPS versions until late this year or early next year.

Now the good news: To accommodate the MIPS 64-bit processors, vendors added proprietary 64-bit local buses from the CPU to key components such as RAM, secondary cache, and video. PC-type features include 32-bit bus I/O and EISA or ISA slots for PC peripherals.

Carrera 4 Workstation

Tangent's Carrera 4 is powered by a 100-MHz R4000PC processor and features a 50-MHz, 64-bit local bus for memory. The system has a separate local bus for video driven by a 32-bit S3 graphics accelerator chip that displays 256 colors at up to 1280 by 1024 resolution.



PENTIUM PERFORMANCE AT 486 PRICES IS YOURS with the AcerFormula 4000 and Windows NT applications.

The Carrera 4 features a third local bus (50 MHz, 32 bit) for the SCSI and ethernet adapters and the parallel and serial ports. The SCSI port handles both a 230MB hard drive and a CD-ROM drive. Two free 16-bit ISA slots are included. The Carrera 4 comes with a 14-inch, noninterlaced monitor and a 3½-inch floppy drive.

AcerFormula 4000

Acer's AcerFormula 4000 offers a configuration similar to the Tangent's. The key differences are that the Acer includes a 128K RAM cache, a 340MB SCSI hard drive, Windows NT preinstalled, and a lower-resolution S3 video accelerator.

Evolution rPC401e/100

Deskstation Technology took a different approach with its rPC401e/100: It added a MIPS R4000PC processor to a 486 EISA system board. The rPC401e/100 features a 50-MHz, 32-bit path to memory, which will move data as fast as the 25-MHz, 64-bit local buses on the other systems, McCarron says. However, peripherals such as video boards and hard drives will use the slower 8.33-MHz, 32-bit EISA bus. To counter this, the system includes a 50-MHz, 64-bit path for its 512K secondary cache, which allows faster access to frequently used data and instructions.

The vendor claims the rPC401e/100 will perform on par with competing systems for all but the most graphics-intensive applications, such as imaging. The system includes a 200MB hard drive, a 3½-inch floppy drive, three free EISA slots, and a 14-inch, noninterlaced color monitor. Now if only it had a more appealing name.

—Randy Ross

Tangent Carrera 4 Workstation, Acer AcerFormula 4000, Deskstation rPC401e/100

Workstation performance and PC compatibility for power users who want to run Windows NT now.

Tangent Computer
800/800-6060, 415/342-9388
List price: $3995
Reader service no. 646

Acer America
800/733-2237, 408/432-6200
List price: $3695 without monitor, $4049 with monitor
Reader service no. 647

Deskstation Technology
800/793-3375, 913/599-1900
List price: $3995
Reader service no. 648

Mitsubishi's Latest Diamonds Cut Glare, Improve Brightness

MITSUBISHI'S DIAMOND SCAN MONITORS use flat-square CRTs, which are curved side to side, to maintain image sharpness and reduce on-screen glare.

Following the leads of Nanao and NEC, who have lately discovered there's money to be made moving leading-edge monitor technology into the mainstream market, Mitsubishi has introduced its new FS line of flat-square monitors. The Diamond Scan 15FS, Diamond Scan 17FS, and Diamond Pro 21FS inherit many of the best features of the company's previous displays but cost substantially less.

The three new monitors use flat-square CRTs—flat from top to bottom, curved from side to side—which help maintain image sharpness and reduce on-screen glare because they don't reflect overhead lights. All three also use what's known as an Invar shadow-mask, which helps produce brighter images.

You can store sizing and positioning information for 20 screen resolutions, which eliminates the need to resize or reposition the screen image manually when you switch, say from Windows at 800 by 600 to DOS in standard VGA.

The 17- and 21-inch monitors employ a technology called Dynamic Beam Forming, which helps maintain focus as electron beams travel from one corner of the display to another. All the screens have high-contrast, antiglare coating. All three monitors comply with the MPR II standard for electromagnetic field emissions.

The 15FS, which displays resolutions up to 1024 by 768 at a quick 76-Hz noninterlaced refresh rate, lists for $645 (versus $635 for NEC's comparable 3FGe). The 17FS displays up to 1280 by 1024 at 74 Hz noninterlaced and lists for $1299 (NEC's 5FGe lists for $1155); it should be available for under $1000 on the street. The 21FS displays up to 1600 by 1280 at 60 Hz and 1280 by 1024 at 76 Hz; it lists for $2999.

—Dan Miller

Mitsubishi FS monitors

A new line of flat-square monitors that combine high-end features with mainstream prices.

Mitsubishi Electronics
800/843-2515,
714/220-2500
List price: Diamond Scan 15FS $645, Diamond Scan 17FS $1299, Diamond Pro 21FS $2999
Reader service no. 649

Appian's Renegades Promise Faster Graphics Action

The good news: A graphics accelerator for your PC has never been more affordable. The bad news: It's almost impossible to keep all the new models and vendors straight. In the past year, dozens of accelerator boards have appeared on the market, many of them based on graphics chips from IIT, ATI, and Weitek. Now Appian Technology is jumping into the accelerator fray with a line of Windows accelerator boards built around its own graphics chip.

Appian has introduced two lines of accelerators, the high-end Renegade 1280 and the more affordable Renegade 1024. Both the 1280 and the 1024 come in ISA and VL bus versions, while the 1280 includes an EISA version. All Renegade boards are based on Appian's 98032 graphics processor, which uses acceleration techniques to deliver speedy graphics performance for Windows and CAD applications.

The Renegade 1280 supports a maximum resolution of 1280 by 1024, displaying 256 colors at a flicker-free 75-Hz refresh rate. All versions of the Renegade 1280 display up to 16.8 million colors at VGA (640 by 480) resolution, also at 75 Hz. Standard features include 2MB of VRAM, dual-monitor output, and support for DRAM memory that serves as a performance-enhancing cache.

The lower-cost Renegade 1024 series offers 1MB of VRAM and supports a maximum resolution of 1024 by 768. It displays up to 256 colors at a 72-Hz screen refresh rate. The 1024 displays a maximum of 65,536 colors at VGA resolution, also 72 Hz.

Both Renegade series include a suite of drivers for Windows and popular DOS and CAD applications. They also provide display utilities such as pan and zoom. The ISA and VL bus versions of the Renegade 1280 list for $545; the EISA model is priced at $595. The Renegade 1024 is $425 for the ISA or VL bus version.

—Michael Desmond

Renegade 1024, 1280

Two new entrants in the Windows acceleration market promise fast performance for Windows and CAD applications.

Appian Technology Inc.
800/727-7426,
408/730-5400,
408/730-5473 (fax)
List price: Renegade 1280 $545/$595, Renegade 1024 $425
Reader service no. 650

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- New Price!

PC Magazine Editors' Choice

March 1993
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Way!

New and Improved

- MPR II
- Pincushion Control
- Tilt Control
- 16 Preset & 8 User Modes
- New Price!

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July 1992
MX 17F

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Circle 169 on reader service card

Epson's ActionNote 4000: Power in a Small Package

Epson ActionNote 4000
A Windows-ready subnotebook at a budget price.

Epson America Inc.
800/289-3776,
310/782-0770
Price: Under $2000
Reader service no. 651

Smaller doesn't always mean more expensive in a fully functional portable computer. Epson's latest offering is a case in point.

The 3.9-pound ActionNote 4000, which Epson says will sell for under $2000, trims an inch and a half off the side and front of the average notebook, measuring only 10 by 7 by 1½ inches. Into this decidedly petite parcel, Epson managed to pack nearly all the trappings of a full-size notebook, with a few trade-offs. One is the 7½-inch monochrome backlit LCD screen. Although small, it's quite readable. The other compromise is battery life: Even with the unit's built-in power management, the nickel-cadmium battery runs just 2½ hours, according to Epson—on the short side for a notebook.

The unit's 80-key keyboard is comfortable to use and has a two-button trackball mounted on the upper right side above the keys. You can plug in a full-size external keyboard and regular mouse. Especially useful is the ActionNote's removable hard drive, available in 80MB and 120MB sizes. Rounding off the feature set is a PCMCIA 2.0 slot, along with serial, parallel, mouse/keyboard, and external video connectors. Included are sockets for extra RAM (up to 4MB) to fill out the original 4MB and for a math coprocessor to complement the 33-MHz Cyrix 486SLC processor. The only familiar notebook feature that's missing is the floppy disk drive, which comes standard as an external unit. Total traveling weight with the floppy drive, AC adapter, and other goodies is 5.2 pounds.

EPSON'S ACTIONNOTE 4000 SUBNOTEBOOK features a 7½-inch monochrome backlit LCD screen and weighs only 3.9 pounds.

To keep you up and running when you travel, Epson offers Extra Care Road Service, a toll-free call. Should the ActionNote fail in the line of duty, you can easily remove the hard drive to retain your valuable data while the computer goes back to the company. (Because the drive chassis has open circuitry and helps strengthen the subnotebook's case, Epson advises against frequent removal of the hard drive.) With a credit-card deposit for the cost of the ActionNote, which will be processed only if you fail to return the defective notebook, Epson will send you a replacement computer overnight anywhere in the United States.

—Bryan Hastings

Multimedia Boom Box

At about 20 pounds, the $6995 Thunderbox II Multimedia Portable is no lightweight: This is a system designed for people who require desktop PC power for audio and video presentations on the road.

This 16-by-9.5-by-7.8-inch lunch-box–style system from Lightning Computers provides significant processing power, a good display, lots of storage capacity, and impressive expansion capability. You may need a small cart to haul it around, but you can store it on a plane as a carry-on item.

The Thunderbox features a speedy 66-MHz 486DX2 processor and will be upgradable to Intel's OverDrive for DX2 when the chip ships sometime next year. (Lightning says it will also offer a $2500 system board upgrade with a Pentium chip installed.) The system includes VESA local bus video for fast graphics performance. A super-VGA card supports the 9.4-inch active matrix color screen at up to 640 by 480 resolution, and an external monitor at up to 800 by 600 resolution. The Thunderbox comes with 4MB of RAM (expandable to 256MB) and a 240MB hard drive. Larger hard drives, including a 2-gigabyte model, are available.

With five expansion slots, you have plenty of room to add a fax-modem, a network adapter, and sound and video boards. To keep the system weight (and the price) down, Lightning isn't bundling a CD-ROM drive or a full-motion video adapter with the multimedia Thunderbox. (A Toshiba 3401 CD-ROM drive, with a 200ms access time, is an extra $660.)

The Thunderbox comes with your choice of internal or external stereo speakers, DOS 5.0 or 6.0, and Windows 3.1. Additional processor, hard drive, audio, and network adapter options are available.

—Laurianne McLaughlin

Thunderbox Multimedia Portable
This luggable 20-pound PC is built for on-the-road multimedia presentations.

Lightning Computers
800/347-4486,
415/543-3111
List price: Starts at $6995
Reader service no. 652

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Circle 225 on reader service card

Three New Packages Simplify Financial Chores

Let's face it, when it comes to managing our finances most of us could use a little help. Three new packages for consumers and small-business owners aim to give users more control over their finances—without taking a bite out of their pocketbook.

Parsons Technology's $49 MoneyCounts for Windows is the graphical version of the company's low-priced DOS personal and small-business financial management software.

With Intuit's Quicken for DOS and Windows holding the lion's share of the personal finance market, Parsons hopes that MoneyCounts' new reporting features, streamlined Windows interface, and easy links to Parsons' tax package, Personal Tax Edge, will attract home and small-business users. MoneyCounts for Windows also includes predefined charts of accounts for home users, small businesses, rental property owners, farms, and churches—the latter two being segments of the market that are not specifically targeted by any competing packages.

MoneyCounts for Windows features a checkbooklike interface to simplify data entry. The product allows users to establish multiple sets of books for managing separate home or business accounts; you can also choose to use a single-entry or double-entry accounting system.

MoneyCounts for Windows allows you to assign descriptive names to accounts. A reminder notifies users when payments are due or deposits should be made. You can also attach separate notes to customer or vendor accounts.

Another bonus is that MoneyCounts converts data from Quicken (DOS and Windows), Managing Your Money, Dollars & Sense, and Microsoft Money. For quick analysis of financial information, MoneyCounts for Windows includes a variety of financial reports, as well as 3-D bar and line graphs and pie charts for a graphical representation of financial data.

Payoff

If your financial management needs are simpler—say you need to choose among home loan options—consider two new financial calculation utilities, Phadean Engineering's $79.95 Payoff 2.0 and Electronic Arts' $39.95 Financial Workshop. Both packages are designed to provide quick, detailed analysis of financial problems.

Payoff 2.0 loan analysis software demystifies loan options by analyzing such common alternatives as fixed versus variable-rate mortgages, or choosing between a low-interest car loan and an instant rebate from the dealer. Besides analyzing all the standard loan types, the program lets you specify any sequence or combination of alternatives, such as variable interest rates, accelerated loan payments, balloon payments, or skipped payments. Once you've entered the terms of your loan, Payoff calculates all the information you'll need: individual payment amounts, including amount paid to principal versus interest, outstanding balances, and total interest paid to date.

Financial Workshop

Financial Workshop includes interactive, on-screen examples of common questions about taxes, investments, savings options, and home mortgages. You'll also get detailed information about some overwhelming issues most of us need to tackle at some point—retirement planning and saving for a child's college education, to name a couple. Online help provides users with advice on traps to avoid when making important financial decisions.

—Roberta Furger

MoneyCounts for Windows

Home and small-business financial software includes predefined charts of accounts.

Parsons Technology
800/223-6925,
319/395-9626
List price: $49
Reader service no. 660

Payoff 2.0

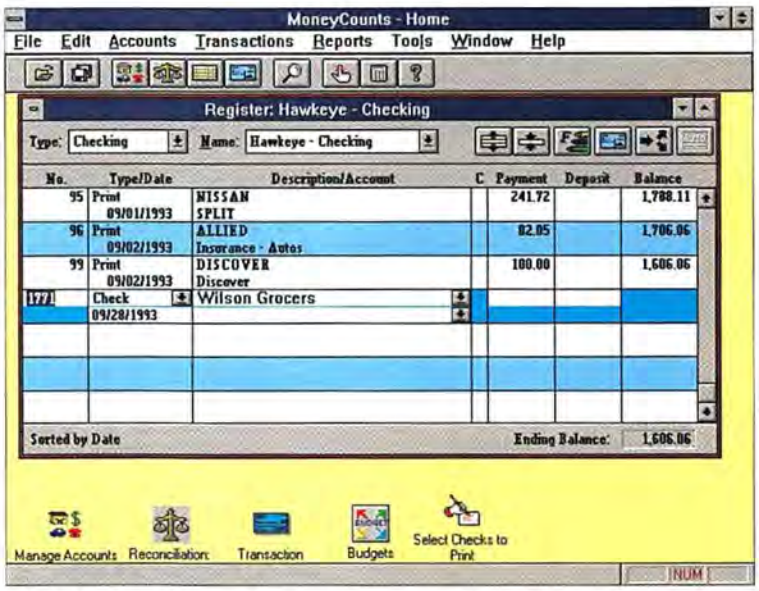
Help is just keystrokes away with this comprehensive loan analysis tool.

Phadean Engineering
508/869-6077,
508/869-2185 (voice and fax)
List price: $79.95
Reader service no. 661

Financial Workshop

Obtain quick answers to common financial questions about everything from home and auto loans to education and retirement planning.

Electronic Arts
800/245-4525,
415/571-7171
List price: $39.95
Reader service no. 662



MONEYCOUNTS FOR WINDOWS' checkbook interface simplifies data entry. You can create multiple sets of books for home or business accounts.

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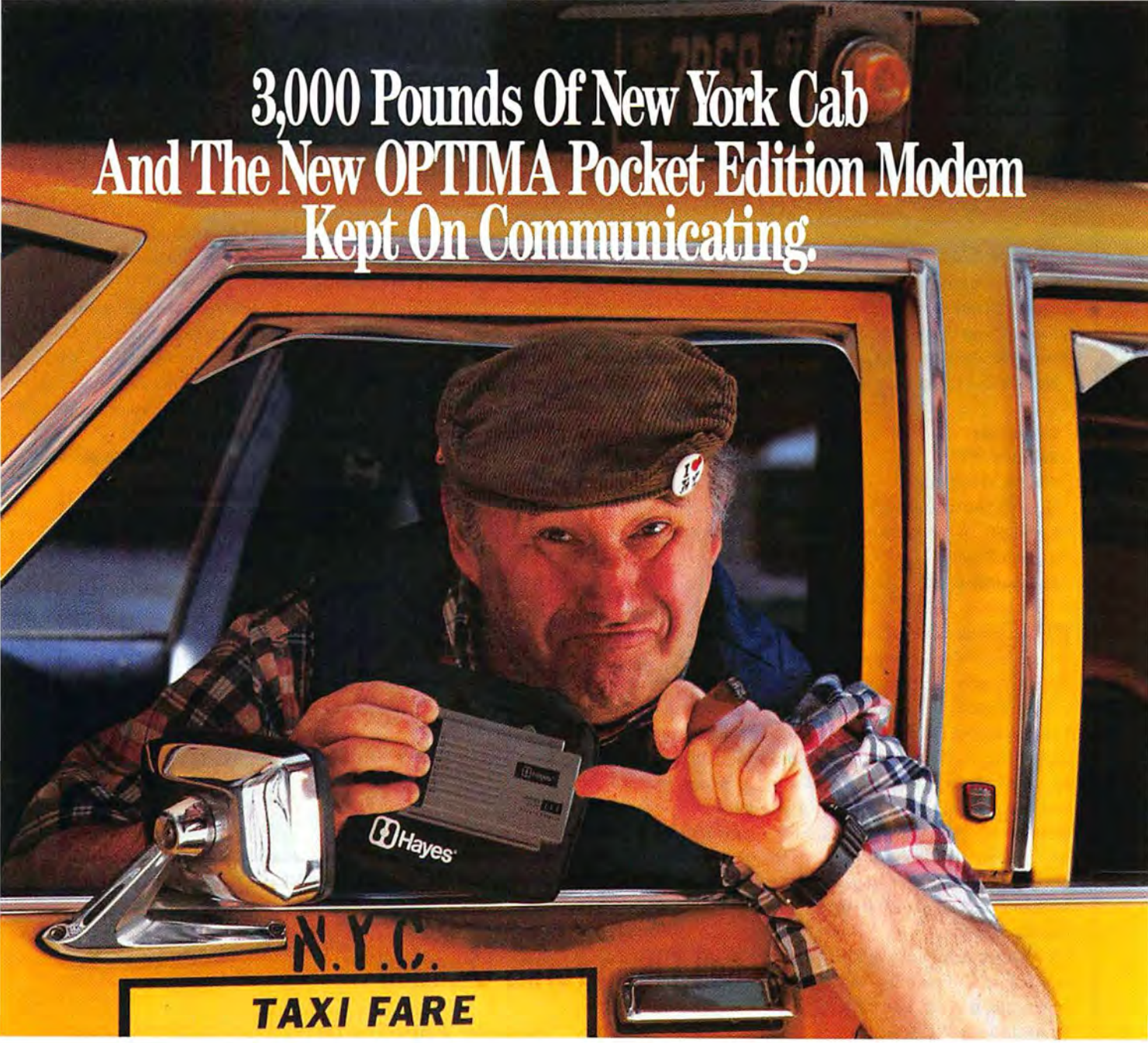

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Picture this. It's four o'clock and you've closed the deal. But, you need to check the inventory data base at the plant and FAX the order confirmation by five. You jump out of the cab. Your portable modem falls. The cabbie takes off, and *crunch*. Now what? Well we ran over our new OPTIMA™ 144+FAX144 Pocket Edition® in its soft carrying case and the OPTIMA still communicated ... flawlessly.

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IMPROVED ESCAPE SEQUENCE

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The Intelligent Form Replaces the Paper Trail

Delrina FormFlow 1.0

Take the paper out of the paper trail with a forms software package that includes intelligent E-mail routing and full database support.

Delrina Corp.
800/268-6082,
408/363-2340 (fax)
List price: Manager component $399, 10-user network package $1840
Reader service no. 653

Expense reports, contact summaries, vacation requests, and memos. The relentless tide of paper can daunt the bravest soul, but Delrina Corporation hopes to offer some relief by taking the corporate paper trail digital. FormFlow is a Windows-based forms design and management package that brings intelligence to those stubborn sheets of paper to expedite tasks.

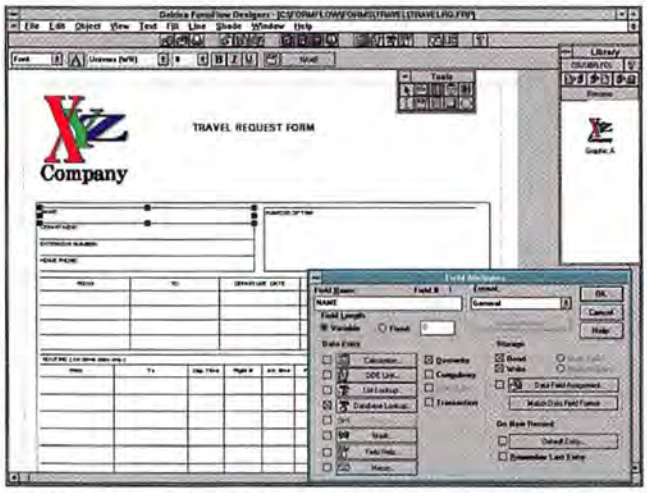
Like Delrina's PerForm Pro line before it, FormFlow lets you create, manage, and fill in forms on your PC. It features the same visual, object-driven design approach, which makes it consistent and easy to learn, and lets you plug into databases to update data captured on forms. FormFlow also acts as a front end for databases. The program can read from and write to common file formats such as dBASE, Paradox, and ASCII, which makes it highly compatible with existing systems. In addition, FormFlow lets you work with relational databases (not a given with forms products), as well as associate a single form with several databases or several forms with a single database.

Forms are created in the Designer module using tools found on convenient, if somewhat cryptic, icon bars. In this module, designers create and identify input fields; place borders, graphics, and text; and initiate links to external databases and E-mail packages. Because FormFlow is a group application, the program includes password security and executive privileges, allowing designers to control access to important data links and routing schemes.

A high-level, BASIC-like programming language called Intelligent Forms Language (IFL) gives you greater control and customization of forms. IFL lets administrators design forms with conditions and rules for moving forms around the office and storing data. FormFlow supports all major E-mail standards so it can hook into a network and send forms over the wire. This lets you route employee expense reports, for example, directly to accounting—unless a specific condition, such as an expense over $500, causes the form to be routed to a supervisor for review first. Supervisors can then "sign" forms on screen using personal codes. The result: No more lost documentation, repeated submissions, or sluggish internal mail to worry about.

FormFlow's Manager component for designing forms lists for $399, while User Packs vary by the number of network nodes. A ten-user network package, for instance, lists for $1840.

—Michael Desmond



CREATE, MANAGE, AND FILL IN FORMS with FormFlow from Delrina.

Easy and Cheap Forms Creation

In an era of hopelessly bloated software, it's nice to see programs that won't overtax your system, much less your budget. Form Creator, a DOS-based forms design and entry program from Parsons Technology, doesn't claim to be a one-stop solution for businesses looking to automate paperwork. But if you need to lay out forms, manage on-screen entry, and perhaps save data to a file, Form Creator delivers for as little as $29.

Form Creator's design mode lets users create customized forms with specific field characteristics, defined order of entry, and boxes and borders. The program lets designers use the mouse to click and drag items, making it easy to set up fields and graphic elements, while drop-down menus provide command cues. Once you create the documents, you can output them as paper forms for written entry or store them as on-screen templates for computer entry.

In addition to keyed input, Form Creator accepts comma-delimited ASCII files, letting businesses tap into information stored on databases and spreadsheets. Data entered in Form Creator can be exported in ASCII format. The program can print to a variety of printers.

Form Creator lists for $49 but is available direct from Parsons Technology for $29. The software requires a system with at least 512K of RAM (640K recommended) and 2MB of free hard disk space.

—Michael Desmond

Form Creator

A simple, low-cost forms design and entry program that won't tax your hardware or your wallet.

Parsons Technology
319/395-9626,
319/395-0102 (fax)
List price: $49, direct $29
Reader service no. 654

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From the largest server to the smallest router, the Back-UPS Series will increase your productivity by providing a cost-effective solution to power problems. **Call for your free power protection handbook.**

The **Back-UPS 250** offers even more cost-effective protection for LAN nodes (typical runtime for a 386SX system is 10 minutes).

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Guaranteed ABSOLUTE™ Protection

- ABSOLUTE™ Protection guarantees repair or replacement of equipment (up to $25,000) if damaged by a surge while protected by a properly installed Back-UPS (See warranty for details).
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- Ask about PowerChute® UPS monitoring software and Novell compatible UPS monitoring boards
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Computer Reseller News Editors' Choice

1991, 1990

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	Back-UPS 400	Desktop 386, 486 systems, 286 servers	~~$249~~	$229
	Back-UPS 450	Tower 386, 486 systems, servers	~~$329~~	$279
	Back-UPS 600	Heavily configured systems, CAD/CAM workstations	~~$449~~	$399
NEW!	**Back-UPS 900**	Multiple systems, longer runtime applications		$599
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Circle 45 on reader service card

A Convenient Way to Switch Between Video Resolutions

AnyView

WINDOWS **Change resolutions without exiting Windows.**

Binar Graphics
415/491-1164,
415/491-1565
List price: $99, introductory price $69.95
Reader service no. 655

Fantastic Recall

WINDOWS **Start Windows—and your Windows applications—where you left off.**

Binar Graphics
800/228-0666,
415/491-4182
List price: $79.95, introductory price $49.95
Reader service no. 656

For most users, Windows is full of hassles. Here are two of them: Although your video card may support several resolutions (640 by 480, 800 by 600, 1024 by 768, and so on), you can't conveniently switch between them. And when you load Windows, it doesn't bring you back to where you were when you exited. Programs by Binar Graphics, AnyView and Fantastic Recall attempt to solve these problems.

AnyView checks out your hardware at installation, then lets you change your video driver—and with it your resolution—on the fly. If you've been working at 1024 by 768, and you decide you'd prefer to work in 800 by 600, just click the appropriate icon and there you are, without exiting Windows or closing any applications.

What happens if you pick a resolution that doesn't really work with your hardware, and you're left with a blank or unreadable screen? You hot-key back to the previous resolution. Also, the program rewrites SYSTEM.INI when you change the resolution, so you can always edit it back in DOS.

You can also associate resolutions with applications. You can, for instance, assign 1024 by 768 to Quattro Pro, where you need to see a large worksheet, and 640 by 480 to Ami Pro, where you want large letters. As you move from one app to another, your resolution changes.

AnyView sports a few other useful features. You can turn the screen into a scrollable window on a giant virtual desktop. And if you ever thought that those rulers in design-oriented programs looked wrong, AnyView lets you set the number of pixels that equate an inch. You can define this setting—while holding a physical ruler up to your screen—for each resolution your system supports.

If you like to start work each morning where you left off the night before, Fantastic Recall is worth considering. When you exit Windows through Fantastic Recall, it copies memory to a disk file; when you run the command-line program in DOS, it restores from the file to memory, returning you to Windows with your apps running and your data files up, exactly as you left off. That's a lot more energy efficient than keeping your system on all night. The program also has an autosave feature to copy memory to disk.

—Lincoln Spector

WordPerfect Presents Multimedia

These days it takes more than bulleted text charts and 3-D graphs to captivate an audience. Fortunately, Presentations for Windows 2.0 lets you turn ordinary dog-and-pony shows into multimedia events.

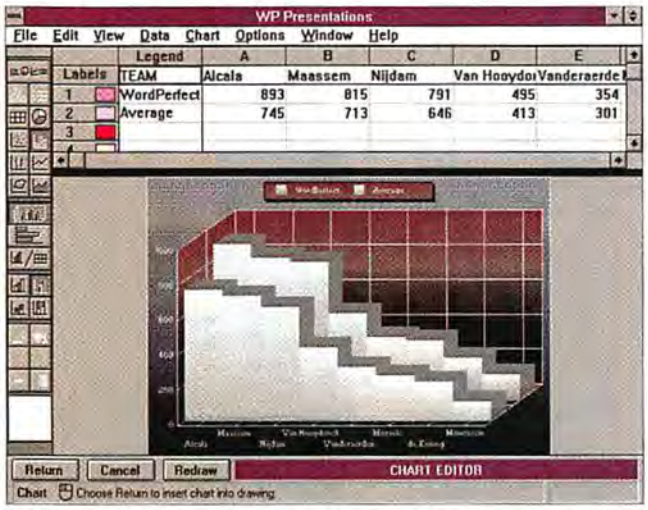
WordPerfect Presentations for Windows 2.0

WINDOWS **This sophisticated presentations package handles sound and video as well as charts and graphs.**

WordPerfect Corp.
800/451-5151,
801/225-5000,
801/222-5077 (fax)
List price: $495
Reader service no. 657

The $495 Presentations 2.0 lets you incorporate sound and video clips into on-screen presentations and has an integrated outliner, sophisticated drawing and charting, prefab slide templates, and a slide sorter.

The program comes with 100 sound files, from applause to jazz to country music. Each slide can contain one MIDI sound clip plus a digital audio track, letting you add narration or an audio selection from a CD ROM. You can create OLE links to Microsoft's Video for Windows and run full-motion animation or video clips from inside a slide show. Spark up your shows by importing clip art from Presentations' gallery of over 1000 images, or scan a picture directly into the program.



WORDPERFECT PRESENTATIONS 2.0's SPLIT-SCREEN VIEW makes it easy to edit presentation slides quickly.

Presentations 2.0 sports a button-bar style interface and a floating tool palette. A split-screen option lets you simultaneously view and update your outline or data table and slides. Upgrades from competing packages cost $129; users of the DOS version can upgrade to the Windows package for $99.

—Daniel Tynan

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Windows Magazine chose the PC Trackball II as one of the top 100 products of 1992. The Mouse Systems' PC Trackball II combines high-resolution fingertip control, compatibility, and space saving ergonomics into a small yet powerful package.

1993 ANNUAL WINDOWS 100 W MAGAZINE WIN AWARD

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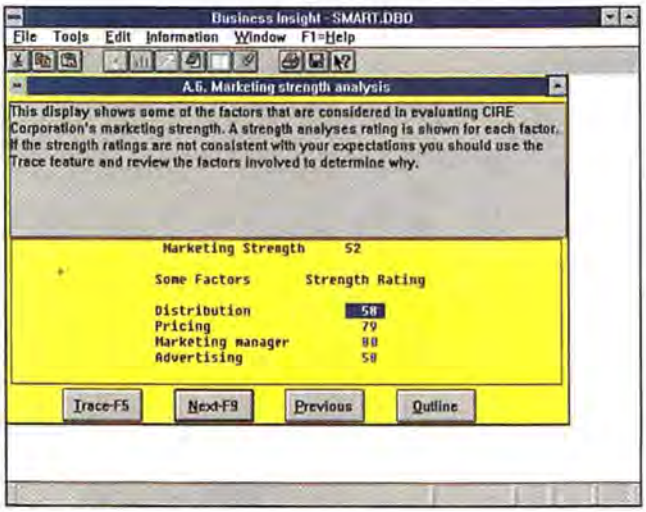
Business Insight: Like Having an MBA on a Disk



TO AVOID COSTLY MISTAKES, RATE YOUR ENTERPRISE'S CHANCES for success with Business Insight's score-card report.

Business Insight offers the counsel of business experts to help you run your business or start an enterprise. It first interviews you about your company, then searches its reservoir of business management knowledge and strategy to analyze your firm and suggest improvements.

Business Insight's designers, both with management backgrounds, constructed the program's knowledge base using the work of 35 business experts, including Harvard economics professor Michael Porter.

An outline format makes this Windows program easy to use and understand. You start by answering questions about strategic business areas such as personnel, product benefits, buyer objectives, and the competition. You don't need to have a degree to answer the questions—terms are defined, and most questions are either multiple choice or scaled. Some require financial data, such as projected startup expenses, and you can use Business Insight's integrated spreadsheet, or import data in WKS format.

Once you're done, the program generates several reports. Business Insight acts as a critical outside adviser in its "score card" report, which rates your enterprise's chances for success in key areas such as product positioning, competition, and profit potential. It gives an assertion rating from 1 to 100 for each area. The program lists the factors that contribute to each rating, so you can review its logic. Business Insight then offers recommendations for improvement and points out inconsistencies in your strategy.

A top ten list shows the ten strongest and ten weakest aspects of your business strategy. Again, each rating is explained. Another helpful feature shows the pros and cons of what-if scenarios, such as "What if I enter the market early?"

A written critique of your strategy combines this information and can frame a formal business plan.

Business Insight can not only help you start a business but develop new strategies as your product and market change.

—Laurianne McLaughlin

Business Insight

WINDOWS **This Windows program uses a knowledge base of business rules and theory to analyze ventures and offer suggestions.**

Business Resource Software Inc.
800/423-1228, 512/251-7541
List price: $495
Reader service no. 658

PlanMaker Helps You Write a Business Plan

Composing a business plan that's good enough to attract funding is never a small task—and if you don't like to write, it could mean spending long hours in front of a blank screen. DOS-based PlanMaker provides an easy-to-follow structure and three sample plans that can save nonwriters time and irritation.

PlanMaker

This DOS-based software helps nonwriters create a business plan with its Q&A section and financial module.

PowerSolutions for Business
800/955-3337, 314/421-0670
List price: $129
Reader service no. 659

This $129 software first gives general instructions, then leads you through a questionnaire that covers all the chapters of a business plan: an executive summary, a company profile, objectives, management, product/service, market analysis, marketing strategy, manufacturing, and summary and use of funding. For each chapter, the software asks a series of questions and provides space to answer them. This isn't fill-in-the-blanks—PlanMaker wants you to write full sentences, to be cut and pasted into the final document later.

Here the samples come into play. If you're stuck answering a question, you can pull up a sample business plan and read the corresponding section. The software lets you copy and paste text from the samples, then edit it. However, the writing style in the samples may not "sound like you" or reflect your age or knowledge base. We found the samples most useful for stimulating ideas.

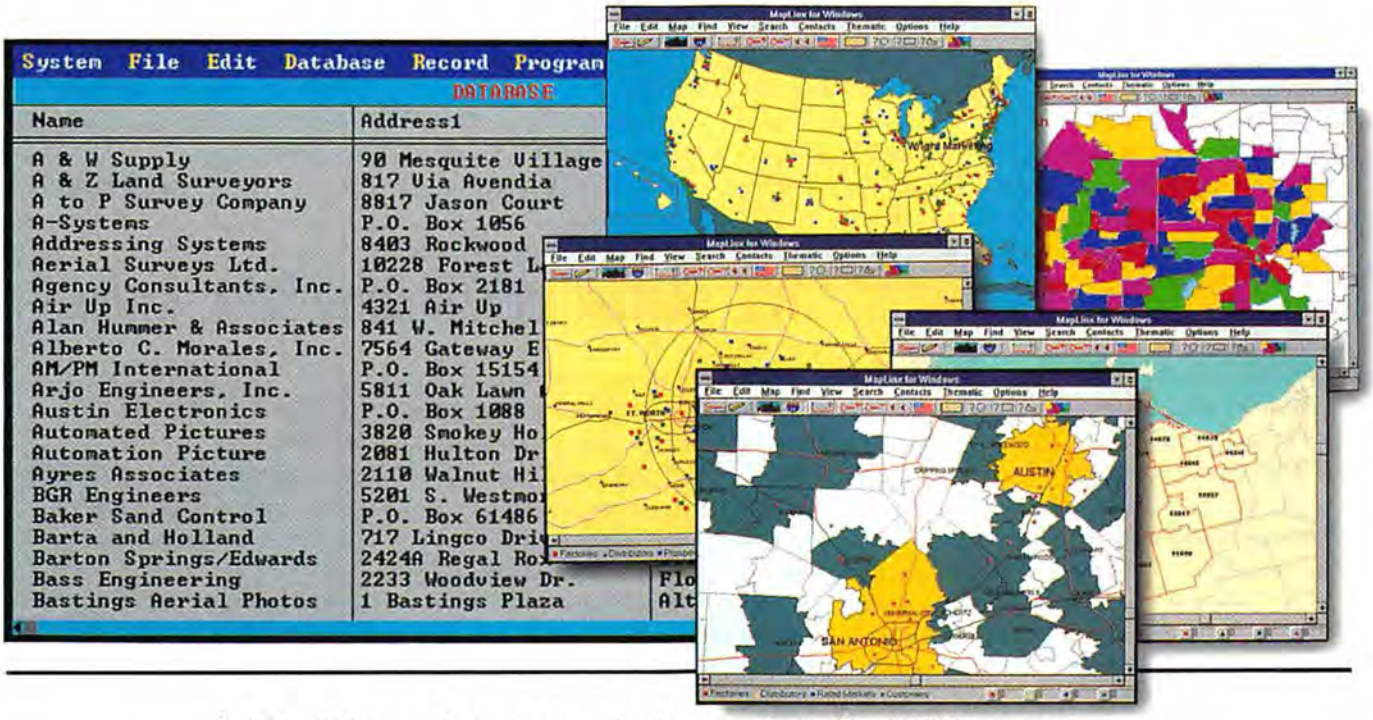
PlanMaker also generates the necessary financial statements, including a 12-month pro forma, a three-year projected income statement, cash flow projection, and balance sheet, current and projected. Enter the basic information, and PlanMaker performs the calculations (debt schedule, taxes, depreciation, and so on).

PlanMaker doesn't provide built-in charting, but if you dislike writing, you're bound to like PlanMaker's samples and on-screen workbook.

—Laurianne McLaughlin

THIS IS YOUR DATABASE.

THIS IS YOUR DATABASE ON MAPLINX.



MapLinx plots your data on detailed U.S. maps – giving you incredible planning, analysis and decision-making power!

You're sitting on a gold mine. A database full of names and addresses, sales figures or other information that *should* be your most valuable asset in making good decisions.

But are you really getting the most out of it?

You will, with MapLinx for Windows. MapLinx automatically plots your data on U.S. maps accurate all the way down to individual zip codes and highways. For the first time, you'll be able to *see* your data – for incredible planning, analysis and decision-making power!

Put your business on the map.

Across America, business professionals are using MapLinx to geographically analyze sales, service and competitive activity. To distribute leads, create balanced territories, and plan mailings and advertising with rifle-shot accuracy.

MapLinx is a *must* for planning local or out-of-state travel. It highlights prospects and customers within a given distance of a point, so you can efficiently "group" your appointments. You can even print hardcopies and plan your trips right on the map!

MapLinx is also a great tool for referring callers to their nearest dealer, service center, doctor or agent – depending on your business. It's perfect for planning service routes, analyzing store locations and much, much more. If you have a database, you *need* MapLinx!

Ideal for users of:

- Access, Approach, Paradox and other Windows databases.
- ACT!, PackRat and other Windows contact managers/PIMs.
- Excel, Quattro Pro and Lotus 1-2-3 for Windows.

"MapLinx is a classy, easy-to-use, relatively inexpensive tool."

InfoWorld, 3/15/93

Limited-Time Special Offer!

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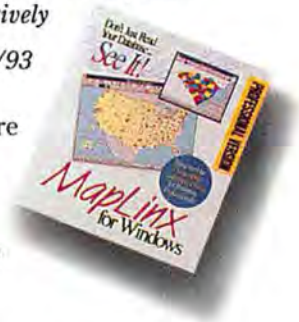

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System Requirements: IBM AT, PS/2 or 100% compatibles; Microsoft Windows® 3.0 or higher; DOS 3.3 or higher; 2 Mb RAM; EGA, VGA, XGA or SVGA video card; Microsoft® or compatible mouse.

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Circle 161 on reader service card

Fastback Is Back in Style With Significant New Features

Fastback Plus 6.0, Fastback for Windows 1.1, Fastback for OS/2, Fastback Express 2.0

New networking and notebook features help this product reassert its reputation as one of the premier PC backup programs.

Fifth Generation Systems
800/873-4384,
504/291-7221
List price: Fastback Plus for DOS, Windows, or Macintosh $149; upgrade from earlier versions $49, DOS 6.0, and competing backup utilities $69; Fastback Express $59
Reader service no. 664

Developers of utilities software are responding to MS-DOS 6.0 with aggressive feature-packed versions. One notable entrant is the latest Fastback Plus, Fifth Generation Systems' backup program. Significant additions in Fastback 6.0 include virus scanning on the fly, notebook-to-desktop-device backup, a file viewer, extensive network features, and support for SCSI and other tape backup devices—none of which you'll find in DOS 6.0.

Fifth Generation also brought out its first version of Fastback for OS/2; an updated version, 1.1, for Windows; and version 2.0 of Fastback Express, an entry-level DOS backup utility with no tape support.

The update to Fastback Plus starts with a friendly new interface. Most operations—backup, restore, compare—can be launched with <Enter>, while the highly detailed menus of past versions are available to power users. But the improvements go deeper. The new virus scanner lets you hunt for viruses at any time, although you'll need another program, such as Fifth Generation's DiskLock, to rid yourself of any you find. Also, long overdue support for QIC 40, QIC 80, and SCSI tape drives is now included. Users can back up to tape drives across the company network, and notebook users can back up to any device available to their desktop computer.

The Fastback Plus versions for OS/2 and Windows are fully optimized for those environments, with REX scripting support and true multitasking under OS/2. The Windows version supports drag-and-drop selection of files for backup, a customizable button bar, and Dynamic Data Exchange, which allows Fastback to be linked to other applications in Windows and Windows for Workgroups. A particularly useful feature of both the OS/2 and Windows products is one-disk, one-key recovery from operating system failures.

—Joe Abernathy

FASTBACK PLUS 6.0'S IMPROVED INTERFACE makes it easier to launch most backup operations.

Stacker and XtraDrive Safer, Easier

Stacker 3.1, XtraDrive 3.0, XtraDrive Lite

Three upgraded data compression products offer better performance and ease of use.

Stac Electronics
619/431-7474,
619/431-0880 (fax)
List price: Stacker 3.1, $149
Reader service no. 663

Integrated Information Technology
800/832-0770,
408/727-1885,
408/980-0432 (fax)
List price: XtraDrive 3.0, $79.95; XtraDrive Lite, $34.95
Reader service no. 665

The latest versions of Stac Electronics' and Integrated Information Technology's (IIT) data compression products promise DOS 6.0 compatibility, greater ease of use, and enhanced safety features to protect your hard drive from corrupted files and lost data.

Stac's new Stacker 3.1 for Windows and DOS integrates its compression technology with DOS 6.0. Stacker replaces DoubleSpace, the tepidly received data compression utility bundled with the newest DOS. Stacker 3.1 is compatible with earlier versions of DOS as well.

With DOS 6.0, Stacker 3.1 drivers are added to the DOS kernel, so you won't need to add Stacker commands to your CONFIG.SYS file. All DOS commands work on Stacker drives. Stacker 3.1 can create compressed drives as large as 2 gigabytes, and its Unstack command will return a Stacker drive to its uncompressed state. Stacker 3.1 lists for $149. Upgrades from Stacker 3.0 are priced at $19.95.

IIT's $79.95 XtraDrive 3.0 now supports removable media. XtraDrive also loads a limited version of itself onto compressed floppy disks automatically, so that other PCs can read and write to them. Plus, XtraDrive 3.0 is 20 percent faster than its predecessor, according to company officials.

XtraDrive 3.0 supports compressed drives as large as 2 gigabytes. Its online help utility is now faster and features an improved interface.

For 286 and 386 PCs with smaller hard drives, IIT now offers XtraDrive Lite. Priced at $34.95, XtraDrive Lite supports only hard drives as large as 100MB, and it doesn't support removable media.

—Jeff Bertolucci

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CorelDRAW is renowned for its powerful graphics capabilities. CorelDRAW 4 now leaps even further ahead by adding page layouts, animation and OCR, as well as hundreds of other feature enhancements. It's the best value in software today–and it's still the easiest to use!

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- **Over 5,000 "Drag and Drop" Symbols and Shapes for faster, easier selection and placement**
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- **On-line Help**
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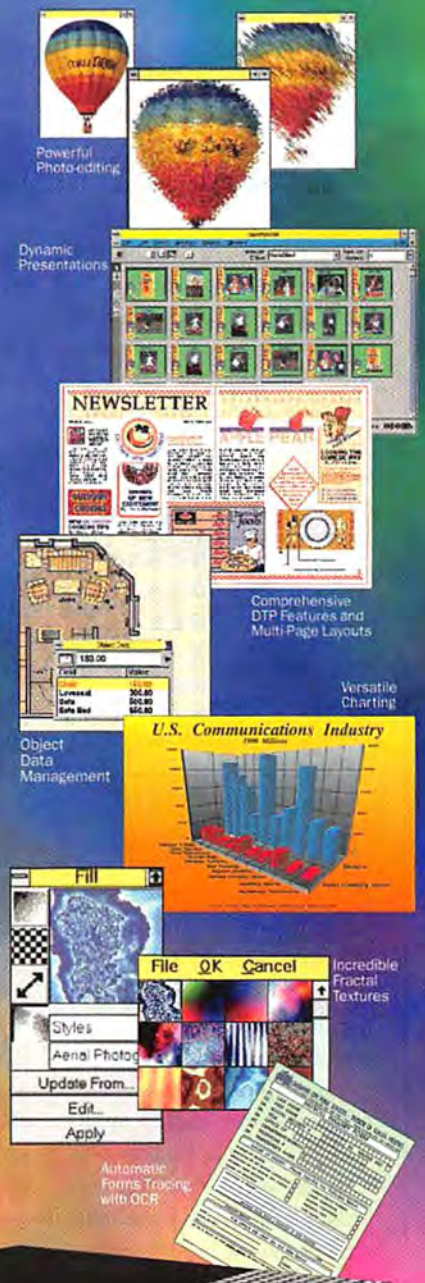

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Circle 92 on reader service card

Modest E-Mail: Notework Version 2.0 Gets the Job Done

When you're shopping for E-mail packages, it's easy to be seduced by high-end features, such as rules-based messaging that can automatically route mail to other users or into specific folders. But if your needs are more modest, a recent upgrade to a solid product warrants your consideration.

Notework Corporation beefs up its easy-to-use Notework E-mail product to better address the needs of larger organizations. Version 2.0 handles up to 50,000 users spread across 100 different servers, without having to dedicate one server as a mail server. (The previous product was limited to 3500 users on 14 servers.) Version 2.0 also supports Novell's new Global Message Handling Service protocol, which makes it easier for the product to communicate with other types of E-mail systems, particularly those used in UNIX and mainframe environments.

A host of new end-user features addresses other former shortcomings. Notework previously limited user addresses to a single eight-character name. If you had two people in the directory with similar names—a distinct possibility in a large company—it was difficult to keep their names straight. Version 2.0 now supports full addressing with first and last names.

Notework also facilitates addressing the same message to recipients with local, remote, or fax addresses. (The previous version forced you to send separate messages to local, remote, and fax addressees.)

Smaller improvements to the product include carbon copy and blind carbon copy message handling. In addition, there's an intelligent subject feature that plugs the first sentence of a note into the subject area if the sender forgets to include a subject, so recipients will know what to expect.

By striving to be consistent between Windows and DOS versions, Notework lacks some of the conveniences Windows users may have come to expect. In particular, the product's inability to resize the message window is frustrating; if you have a long message to read, you'll have some scrolling to do. You also can't add fonts or colors to message replies. Instead, Notework differentiates new additions to a "thread" (a message with multiple replies) by labeling blocks of text. This can turn a long thread into a confusing mess.

Finally, Notework 2.0 can't create different folders for filing messages, nor does it include file viewers.

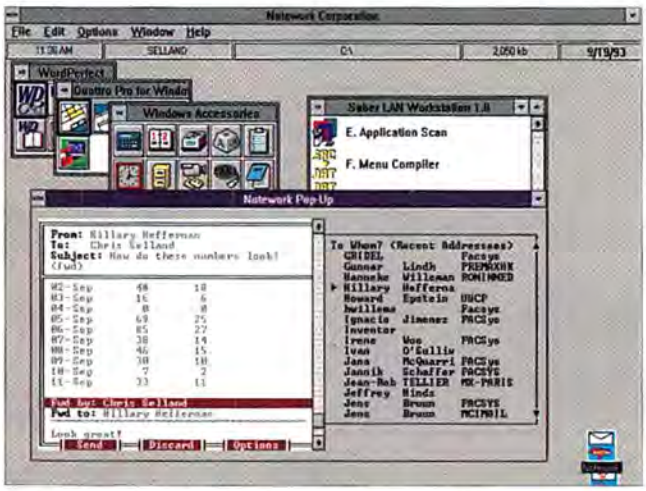
—Randy Ross

Notework 2.0

WINDOWS

This easy-to-use E-mail product for DOS and Windows is now even easier and more powerful.

Notework Corp.
800/767-6683,
617/734-4317
List price: $199 plus $45 per user (10-user minimum), $30 per user for more than 5000 users
Reader service no. 666



THE NOTEWORK 2.0 DOS and Windows E-mail program supports full addressing with first and last names.

Improve Remote Communications

RemoteWare is a suite of software tools that streamline the flow of information between your headquarters, branch offices, and mobile workers. Consisting of a set of miniapplications called AppliComms, RemoteWare now offers nearly 100 new features, including enhanced forms routing and automatic compression.

RemoteWare's AppliComms include versatile programs for creating and sending electronic forms, documents, reports, and E-mail by means of conventional or cellular modems.

RemoteWare Forms 1.3 provides a "master record" capability that automates the flow of information across an organization. You can create a training schedule, store it on your database server, and send copies to other RemoteWare users. Updates are sent automatically to all users.

RemoteWare Documents 1.2 now enables you to create detailed reports and documents that include graphics, images, and text. A built-in compression feature reduces modem transmission time.

RemoteWare Mail 1.3 now supports the X.400 protocol, so you can exchange messages with public E-mail providers such as MCI and AT&T.

RemoteWare's components are priced separately. Forms 1.3 is $7500, Documents 1.2 $2500, Reports 1.2 $1500, and Mail 1.3 $3000. Software for remote users ranges from $75 for Mail 1.3 to $225 for Forms 1.3.

—Jeff Bertolucci

RemoteWare

This family of office automation products strengthens ties between headquarters and the branch office.

XcelleNet
800/322-3366,
404/804-8100,
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List price: $1500 to $7500, $75 to $225 for remote users
Reader service no. 667

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Aaron Matas
Product Support Specialist
IBM Personal Systems
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425SX/S

433DX/D

466DX2/T

ValuePoint SpaceSaver

- Compact size: 14.2" W x 4.8" H x 16.5" D
- 3 slots (includes 1 VESA Local Bus slot!) and 3 bays
- Also available in medialess (no drives) configuration to function as an economical LAN client workstation!

ValuePoint Desktop

- Plenty of room to grow: 5 slots (includes 1 VESA Local Bus slot!), 5 bays
- A super combination of speed, power, upgradability and expandability!

ValuePoint Mini-Tower

- Convenient, compact Mini-Tower processor case measures 9.5" W x 16.8" H x 16.9" D
- Enormous room for growth: 8 slots (includes 1 VESA Local Bus slot!), 6 bays
- Perfect format for high powered computing (CAD/CAM, graphics, multimedia, etc.) or as a low-cost network server!

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- A 32-bit VESA Local Bus slot for local bus speed on SCSI drives and other peripherals!
- IBM HelpWare
- Upgradability via Intel OverDrive™ technology all the way up to Pentium™ [3]
- Zero Insertion Force (ZIF) socket for fast, easy processor upgrades.

ValuePoint SpaceSaver	425SX/S	433SX/S	433DX/S	433DX/S
Processor	i486SX/25 MHz	i486SX/33 MHz	i486DX/33 MHz	i486DX/33 MHz
Hard Drive/Memory	120MB/4MB	120MB/4MB	120MB /4MB	245MB/8MB
Diskette	3.5"	3.5"	3.5"	3.5"
Display	6312 14" SVGA NI	6312 14" SVGA NI	6312 14" SVGA NI	6314 14" SVGA NI
Operating System	IBM DOS & WINDOWS™	IBM DOS & WINDOWS	IBM DOS & WINDOWS	OS/2®
Price* / IBM Credit Lease**	**$1,579** / $57 per month	**$1,779** / $64 per month	**$2,029** / $73 per month	**$2,469** / $89 per month

ValuePoint Desktop	425SX/D	433SX/D	433DX/D	466DX2/D
Processor	i486SX/25 MHz	i486SX/33 MHz	i486DX/33 MHz	i486DX2/66 MHz
Hard Drive/Memory	120MB/4MB	120MB /4MB	120MB/4MB	245MB/4MB
Diskette	3.5"	3.5"	3.5"	3.5"
Display	6312 14" SVGA NI	6312 14" SVGA NI	6312 14" SVGA NI	6312 14" SVGA NI
Operating System	IBM DOS & WINDOWS	IBM DOS & WINDOWS	IBM DOS & WINDOWS	IBM DOS & WINDOWS
Price* / IBM Credit Lease**	**$1,659** / $60 per month	**$1,859** / $67 per month	**$2,099** / $76 per month	**$2,779** / $100 per month

ValuePoint Mini-Tower	433DX/T	466DX2/T	466DX2/T	466DX2/T
Processor	i486DX/33 MHz	i486DX2/66 MHz	i486DX2/66 MHz	i486DX2/66 MHz
Hard Drive/Memory	340MB/4MB	527MB/4MB	527MB/4MB	527MB/8MB
Diskette	3.5"	3.5" & 5.25"	3.5"	3.5"
Display	6318 14" SVGA NI	6318 14" SVGA NI	6319 15" SVGA FS NI	6319 15" SVGA FS NI
Operating System	IBM DOS & WINDOWS	IBM DOS & WINDOWS	IBM DOS & WINDOWS	OS/2
Price* / IBM Credit Lease**	**$2,579** / $93 per month	**$3,499** / $126 per month	**$3,599** / $130 per month	**$3,789** / $137 per month

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The Mwave™ WindSurfer™ Communications Adapter is a V.32 Data Modem, 9600 bps Fax/Modem and CD-quality sound system. Mwave MIDI synthesizer with instruments *and* MIDI port...all in one!

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This 3.5" Rewritable Optical Drive lets you put all your large-project files on one 127MB optical disk. You can store this disk in your desk, and free up precious hard drive space! Update data when you want, use the disk over and over.

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The easy, affordable way to go to a speedy CD-ROM.

The ISA Internal CD-ROM has a fast 300KB/SEC maximum data transfer rate – double the speed of most CD-ROM drives! You can load your operating system and applications software from a typical 600MB CD-ROM disk. You save precious hard drive space and load onto your ISA system faster. It's priced to move fast too!

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KingCOM Squashes Communications Port Conflicts

If you think having to close one program before opening another is a dull chore that disappeared with the advent of Windows, try launching several Windows communications packages at once. Begin opening Procomm Plus for Windows, for example, when Winfax Pro is open, and you're rudely confronted by a 'COM port busy' message, forcing you to close the fax program before proceeding. Want to receive a fax in the background? You have to close the comm program before relaunching the fax program.

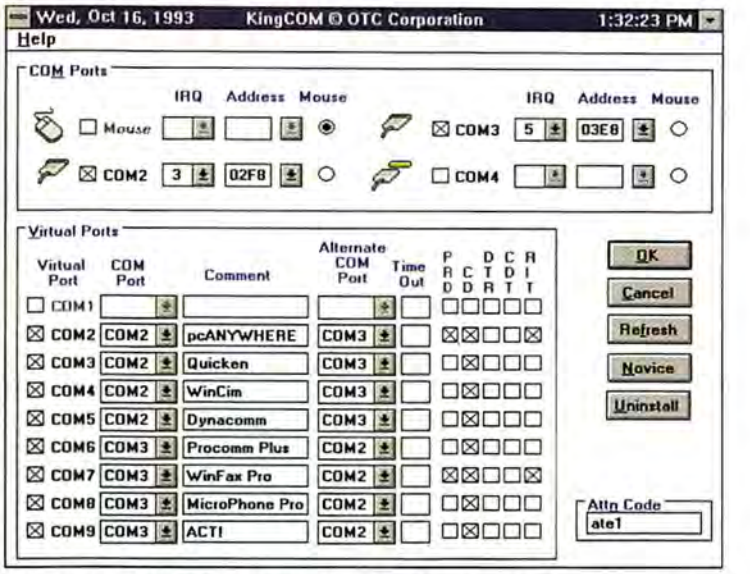
You're put through this rigmarole thanks to the fact that most applications that use the modem—such as E-mail, faxes, pager messaging, and auto-dialing programs—vie for total control of the COM port, which is the computer's gateway to your modem.

Enter KingCOM. This utility allows different communications programs to cohabit your Windows desktop by creating nine "virtual" ports. This neat software sleight of hand lets nine Windows-based comm programs stay open without conflicts. Say your external fax-modem is connected on COM1, and you want to keep both your data and fax programs open. You can "correct" the actual COM1 port to virtual ports 2 and 3, and then change the fax program setting to COM2 and the data program setting to COM3. KingCOM automatically hands over the real port to whichever communications program you switch to. (You can't send faxes and E-mail at the same time over virtual ports that are linked to the same real port.)

KingCOM lets you tailor the way your comm programs control the modem or modems. You can pick which application will answer incoming calls on the modem. If you use more than one modem, you can choose the first- and second-choice modems for each communications program.

OTC says the next version of KingCOM, which will support DOS communications programs, will be available by the time you read this.

—Bryan Hastings



KINGCOM LETS YOU RUN nine Windows-based communications programs at once without COM port conflicts.

KingCOM

WINDOWS Utility that allows multiple open communications programs in Windows.

OTC Corp.
800/769-6344,
714/832-4833
List price: $49.95
Reader service no. 668

Easy Connections: Printing Without Wires

Do you work at more than one PC? Take your notebook to meetings? Repeatedly connecting to your printer may be impractical. One solution is GoPrint, a wireless printer adapter from AeroComm.

GoPrint uses spread spectrum radio to transmit data from your PC or LAN to a printer within a 500- to 1000-foot radius, AeroComm officials say.

Featuring the company's proprietary data compression, GoPrint transmits data at up to 3 mbps, making it slower than wired Ethernet (which operates at speeds up to 10 mbps) but significantly faster than some wireless LAN products (for instance, Proxim's RangeLAN runs at only 242 kbps).

You plug the GoPrint adapter into the parallel port of your PC and another GoPrint into the printer's parallel port. Each GoPrint adapter is configured to print to a specific printer. A bundled utility enables your PC to switch from one GoPrint-equipped printer to another. Also, several GoPrint-equipped PCs can print to the same printer—useful for work groups.

An optional GoPrint print buffer with 1MB of RAM stores printer-bound data, freeing your PC for other tasks. GoPrint has a DOS and Windows utility that tests the radio signal strength between your PC and printer. GoPrint uses the high-performance 2400-MHz band, which offers greater performance than the narrower 902-MHz to 928-MHz band used by many wireless LAN adapters.

GoPrint will be priced under $249, according to AeroComm. The device is powered by an AC adapter or by a connector that draws power from your PC's keyboard port.

—Jeff Bertolucci

GoPrint

A wireless adapter that transmits data from your PC to your printer.

AeroComm Inc.
913/492-2320,
913/492-1243 (fax)
List price: Under $249
Reader service no. 669

The HP 4L isn't bad, but

THE HP 4L

There's only one option on the HP 4L. A memory upgrade from 1MB to 2MB.

The HP 4L is a good laser printer. Just limited.

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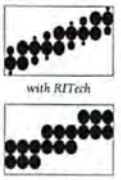
it's no ActionLaser 1500.



Epson's RITech (Resolution Improvement Technology) increases the ActionLaser's normal 300 dpi print quality to eliminate jagged edges right where you need it: in the curved lines of letters, numbers and images. And Epson's MicroArt printing technology gives you deep, dark blacks and incredibly fine lines.

27 fonts (13 scalable) are standard. Should you expand your typographical horizons, unlimited fonts are easy to install via HP-compatible plug-in cartridges, available anywhere. The HP 4L doesn't accept HP's cartridges.

The ActionLaser has 150 sheet paper capacity (letter or legal), and handles stacks of labels, envelopes and overheads with ease. And there's an optional 250 sheet auto-feed cassette, for a total of 400 sheets. The HP 4L holds 100 sheets. Envelopes, labels and overheads are manually fed, one at a time.

The ActionLaser 1500's top speed is six ppm. That's seriously fast, fifty percent faster than the HP 4L.

If you have a DOS machine, but decide to get a Macintosh, do you need a new printer? Not with an ActionLaser 1500. Just add our EpsonTalk interface and your Mac plugs right in.

The ActionLaser 1500 comes standard with parallel and serial interfaces that allow two users to share a single printer. Add another interface and a third user can share the same printer. The ActionLaser 1500 can connect to everything from PCs to IBM mini and mainframe computers. The HP 4L has one interface.

THE EPSON ACTIONLASER 1500

It's easy to add more memory. Just pop in inexpensive, industry standard DRAM chips, for a maximum of 5 MB. The HP 4L only goes up to 2 MB.

PCL 5 is standard. The extra power of Adobe PostScript is a simple plug-in option. With HP, you have to buy another printer to get PostScript.

PC Computing Best Buy. (June 1993.) The word is getting around. The Epson ActionLaser 1500 is the best choice in personal lasers.

The ActionLaser 1500 comes with Epson's limited two year warranty. HP offers one year. For help, call the Epson Connection. Quite possibly the best help line in the business. And it's free.

Don't buy a laser with a limited future. Buy one that is able to expand for the future. Compare, and you'll see why the speedy, inexpensive ActionLaser™ 1500 is the one laser worth owning. For information on the Epson ActionLaser 1500, our ink jet and dot matrix printers, or scanners, call the Epson Connection℠ at **1-800-BUY-EPSON** (800-289-3776).

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Edited by Jeff Bertolucci

FlagShip 5.0

DacEasy, long known for its feature-rich, low-end accounting software, is now tackling the high-end market with FlagShip 5.0, a customizable multimodule accounting system for large companies. FlagShip 5.0 supports multicurrency transactions, includes user-customizable menus and help screens, and keeps up to 36 months of transaction history in the general ledger, accounts payable, and accounts receivable modules. The developer's kit includes a 4GL programming language and tools for writing custom and vertical-market applications. FlagShip's single-user System Manager and all accounting modules sell for $695 each. The multiuser System Manager sells for $995. DacEasy Inc., 800/222-8778, 214/248-0305.

Reader service no. 670

Microsoft Scenes

Microsoft Scenes is a line of photographic collections intended to make your screen more visually pleasing. Each of the three collections, Sierra Club, Outer Space, and Impressionists, comes with 48 compressed high-resolution images and software to display pictures as wallpaper or screen savers. You select pictures from thumbnail displays and can choose a particular image or cycle through several images. Each image comes with explanatory text that you can pop up if you're in the mood to be educated. Scenes has its own screen-saver engine—or you can display the pictures with Berkeley Systems' After Dark. Genigraphics also provides a service for scanning pictures into the Scenes format, and three free scans come with the program. Because of the compression used, one Scenes package will take only about 3MB of hard disk space. And yes, the Sierra Club does get a cut. Each collection lists for $29.95. Microsoft, 800/426-9400, 206/882-8080.

Reader service no. 671

STB Pegasus VL Accelerator Board

STB takes the high road to faster video with its Pegasus VL line of Windows accelerator boards for ISA, VL, and PCI systems. Based on S3's top-of-the-line 928 graphics processor, the Pegasus uses fast VRAM and comes in 2MB and 4MB configurations. The 2MB version displays resolutions up to 1280 by 1024, with 256 colors, at a flicker-free 74-Hz screen refresh rate. It displays over 16 million colors at 640 by 480 resolution, with a 72-Hz refresh rate. The 4MB model shows over 16 million colors at 1024 by 768, while maintaining a high 80-Hz refresh rate. Maximum resolution is 1600 by 1200 with 256 colors, but the refresh rate dips to 60 Hz. All 2MB versions list for $799; the 4MB models are $999. STB, 214/234-8750, 214/234-1306 (fax).

Reader service no. 672

MapLand

Quattro Pro for Windows users can now display their data on maps with MapLand, an add-in module that lets you display data on a collection of U.S. and world maps. You can choose from shaded or pin maps and display any portion of a map that geographically corresponds to your data. All of Quattro Pro's editing features work with MapLand, the company says. You can use MapLand to insert country or state names into your spreadsheet, too. MapLand looks for U.S. state names or country names in your spreadsheet and matches them to the location on the map, along with the values you have assigned. MapLand lists for $99.95. Software Illustrated, 510/463-9898 or 510/463-1843 (fax).

Reader service no. 673

MICROSOFT SCENES screen collections include Sierra Club (above), Outer Space, and Impressionists. Each has 48 high-resolution images.

Great Plains Accounting Version 7

Faster record retrieval and updating as well as user-customizable help top the list of new features in version 7.0 of Great Plains Accounting. In all, more than 100 new features have been added across all modules of the program. Upgrade pricing varies, depending on which support plan you choose. Version 7 modules cost $195 to $1295. Great Plains Software, 800/ 456-0025.

Reader service no. 674

Cardex V41LBV

CardExpert Technology, a Silicon Valley startup, is now delivering low-cost graphics acceleration with its Cardex V41LBV board for VESA local bus systems. The Cardex V41LBV comes with 1MB of DRAM and displays up to 16.8 million colors at VGA (640 by 480) resolution. It offers a flicker-free 72-Hz screen refresh rate. The board also features a maximum resolution of 1024 by 768 in 256 colors, with a 72-Hz refresh rate. Based on Tseng Labs' ET4000/W32 chip, the Cardex V41LBV merits serious consideration from DOS users, because the W32 chip is expected to perform quite well with DOS applications compared to other popular accelerator chips. The Cardex V41LBV retails for $195. CardExpert Technology, 408/748-1118.

Reader service no. 675

Masterclips

Want to spruce up that business letter or presentation with some snazzy clip art? Masterclips is a 6000-piece clip art package with color images in 60 different groups, including such business-oriented categories as technology, office, and communica-

"So I'm waiting for my best friend to call and Dad's like totally freaked. No one at his office wanted to mess with one of those storage things. You know, the tape deals.

Well, Dad said these guys at Conner told him it's so simple a kid could do it. So I did. Dad got a promotion, I got my own phone, and they even gave me a fax thing. Hey Mom, what's a fax?"

Conner Backup Software
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Circle 49 on reader service card

tions. All images are in CGM format and can be imported into many major DOS and Windows programs, including Word for Windows, Harvard Graphics, and CorelDraw. The package, available on floppy disk and CD ROM, includes an image browser for easy image management. You can also convert color images to black and white. It lists for $299 from Masterclips Inc., 800/292-2547, 305/983-7440, 305/967-9452 (fax).

Reader service no. 625

WorldCom V.32bis Modem

Combining high-speed fax and data with cellular capabilities, the WorldCom V.32bis fax-modem packs a powerful set of communications tools into a lightweight, pocket-size package that keeps you in touch when you're on the go. Among the first modems to feature Motorola's 68302 processor for additional data compression, the WorldCom V.32bis offers an uncompressed data rate of 14,400 bps; with built-in V.42 compression, the product's top speed is 57,600 bps. It supports cellular transmission, useful for wirelessly transmitting files when a land line isn't available. Measuring 4¾ inches long, 2⅝ inches wide, and about 1 inch thick, the WorldCom V.32bis is truly portable. It includes an AC power adapter and will also run on a 9-volt battery. The WorldCom V.32bis costs $695. Western Digicom, 800/262-3311.

Reader service no. 639

OL830 Plus, OL850

Okidata adds two models, the OL830 Plus and the OL850, to its line of LED (light-emitting diode) page printers. Unlike most page printers on the market, these printers use an array of LEDs instead of a single laser to discharge the photosensitive drum, which applies toner to the page. Both are 8-page-per-minute, 300-dot-per-inch printers equipped with Adobe

CREATE YOUR OWN 3-D MONSTER with Playmation's animation program. The program ships with a library of characters.

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MORE COMFORTABLE OUTSIDE.
We continued the ergonomic evolution of the 25 million mice we made before this one, and shaped MouseMan Cordless to fit naturally in your palm and leave your wrist relaxed. Then we added grooves to our three keys that help your fingers find them easily.

PostScript; both come with Adobe Type Manager. The OL830Plus (which replaces Okidata's OL830) includes 17 scalable Adobe Type 1 fonts. The OL850 (which replaces the OL840) has 65 fonts (35 resident, plus 30 downloadable soft fonts). The OL830 Plus lists for $1799, the OL850 for $1999. Okidata, 800/654-3282.

Reader service no. 677

Playmation

3-D computer animation is a realm reserved for people with access to high-end systems, expensive software, and lots of time, right? Not anymore. Playmation is a 3-D animation program for the average user. You can create 3-D characters, choreograph their actions, animate them, render them, and show your completed animations on any 386 or better PC (a math coprocessor is required). The program ships with a library of dozens of characters for use in animations, so even if you can't draw a line you can create animations right away. To create a character, you build a few key frames and let the computer build the necessary in-between frames. You can apply surface textures, control lighting, direct the action of your characters, and control complex muscle and skeletal movements. Playmation sells for $559.95. Hash Enterprises, 708/234-8060, 708/234-8031 (fax).

Reader service no. 678

Printex Paper Server

It's Murphy's Law: The paper supply always runs out just before you need to print something in a hurry. To boost your printer's paper capacity, consider Printex Technology's Paper Server. This oversize paper feeder holds 1500 sheets, enough to supply workhorse printers that are connected to networks. The Paper Server for Canon SX- and RX-based printers costs $495; pricing for the Canon NX model wasn't available at press time. Printex Technology, 415/591-8007, 415/591-8928 (fax).

Reader service no. 637

City Streets: The Electronic Street Guide

City Streets is a DOS navigation application that lets you put the places you frequent on your own digital map. You can add your clients' offices, your favorite restaurants, or anyplace you repeatedly visit to City Streets maps. Use the program to search for your destination by address, street, intersection, city, or ZIP code. It quickly locates it and displays the distance you'll need to travel. City Streets information is based on maps and data from reputable digital mapmaker Etak. However, City Streets maps lack one-way street information and can't suggest a route to your destination. The product lists for $99.95 and includes one free city map. Additional maps cost $49.95 each. Road Scholar, 713/266-7623, 713/266-4525 (fax).

Reader service no. 638

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

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Circle 122 on reader service card

Marketplace

A Monthly Survey of Prices on Popular Models

Over the Counter

What you pay for popular PCs (with monitors)

n/a = not applicable

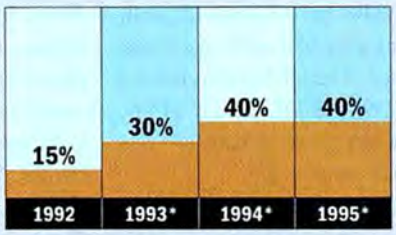
	Configuration			National	
	CPU/speed (MHz)	RAM (MB)	Hard disk (MB)	List price	Average street price
386-class desktop PCs					
ALR Flyer SC 3/33s	i386SX-33	2	170	$1268	$1142
AST Bravo 3/33s	AMD386SX-33	4	120	$1495	$1344
Dell Dimension 386DX/33	i386DX-33	4	212	$1449	$1449
DECpc 333sx LP	i386SX-33	4	52	$1399	$1399
HP Vectra 386/33N	i386SX-33	4	80	$1898	$1692
486SX-class desktop PCs					
ALR Flyer SC 4/33s	i486SX-33	2	240	$1568	$1399
AST Bravo 4/33s	i486SX-33	8	213	$2360	$2150
Compaq ProLinea 4/25s	i486SX-25	4	240	[1]	$1711
CompuAdd 433S	i486SX-33	4	200	$2285	$2285
Epson America Progression 486SX/25	i486SX-25	4	240	$2538	$2188
HP Vectra 486/25N	i486SX-25	4	170	$2338	$2045
Gateway 2000 4SX-33	i486SX-33	4	170	$1495	$1495
IBM PS/2 Model 85 XP 486[2]	i486SX-33	8	212	$4739	$4285
NEC Image 425	i486SX-25	4	170	$2319	$2126
ZDS Z-Station 433Sh	i486SX-33	4	200	$2009	$2009
486DX-class desktop PCs					
AST Bravo 4/66d	i486DX2-66	8	210	$2660	$2444
Compaq ProLinea 4/33	i486DX-33	4	340	[1]	$2264
CompuAdd 466	i486DX2-66	8	340	$2995	$2995
DECpc 466d2 LP	i486DX2-66	8	245	$2949	$2949
Dell 466/M	i486DX2-66	8	320	$3249	$3249
Gateway 2000 4DX2-66V	i486DX2-66	8	340	$2495	$2495
HP Vectra 486/66U PC	i486DX2-66	4	240	$4358	$3622
IBM PS/ValuePoint 433DX	i486DX-33	4	120	$2169	$2169
Insight 486DX2-66	i486DX2-66	4	250	$2099	$2099
NEC Image 466	i486DX2-66	4	340	$3374	$3097
Zeos 486DX-33	i486DX-33	8	245	$2095	$2095
Portable PCs					
AST PowerExec 3/25SL	i386SL-25	4	60	$2099	$1943
Compaq Contura 3/25	i386SL-25	4	120	[1]	$1540
Compudyne 486DX2/66 Slimnotebook	i386DX2-66	4	210	$2999	$2999
Dell 320SLi	i386SL-20	2	80	$1699	$1699
Epson ActionNote 4SLC/25	i486SLC-25	4	120	$1619	$1619
Gateway 2000 Nomad 450DXL	i486DX2-50	8	200	$2995	$2995
HP 95LX	NEC V20-5	1	n/a	$799	$614
HP OmniBook 300	Am386SXLV-25	2	40	$1950	$1950
IBM ThinkPad 700	IBM486SLC-25	4	80	$2750	$2598
NEC UltraLite SL/20	i386SL-20	2	80	$1499	$1258
NEC UltraLite Versa	i486SL-25	4	120	$4269	$3808
TI TravelMate 4000WinDX	i486DX-25	4	120	$2799	$2486
Toshiba T4400C	i486SX-25	4	120	$3999	$3643
ZDS Z-Note 325Lc	i386SL-25	4	120	$3335	$3335

From a national survey of more than 180 dealers by International Data Corporation. Figures are based on at least four price quotes for each machine. Prices are based on manufacturer's standard configuration with monitor.

[1] No list price available. [2] Uses MCA bus.

Software Suite Sales Rising

Microsoft, Lotus, and Borland suite sales as a percentage of their overall unit sales



The way America buys software is changing. Microsoft, Lotus, and Borland, the big three players in the software suite market, are selling more of their mainstay applications through suites, says Jeff Silverstein, publisher of the *Software Industry Bulletin*. The suites are selling particularly well to first-time buyers, who want an inexpensive way to stock their PCs, he says. By 1995, he expects suite sales to stabilize at 40 percent of overall sales.

*Projected Source: Software Industry Bulletin

Suites Offer Real Savings

Suites vs. individual applications: July street prices

$359 Borland Office

$571 Purchased individually
Quattro Pro for Windows 1.0, $141; WordPerfect for Windows 5.2, $270; Paradox for Windows 1.0, $160

$442 Lotus Smart Suite 1.2

$1270 Purchased individually
1-2-3 for Windows 1.1, $315; Ami Pro 3.0, $243; Freelance Graphics 2.0, $315; cc:Mail 1.0 (per user in a ten-user pack), $300; Lotus Organizer 1.0, $97

$470 Microsoft Office for Windows 3.0

$1146 Purchased individually
Excel for Windows 4.0, $283; Word for Windows 2.0, $292; PowerPoint 3.0, $309; MS Mail 3.0 (per user in a five-user pack), $262

The current crop of software suites offers great deals for consumers, and more good news lies ahead, says industry analyst Will Fastie. With the upcoming addition of database applications to Lotus and Microsoft suites, price competition will heat up, Fastie predicts. After that, it's unclear how many more applications will be added to a suite—vendors may combine different applications into suites targeting different users, he says.

Source: International Data Corp.

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SPSS® for Windows™ set the standard for statistical data analysis software on microcomputers, winning the *PC Magazine* Editors' Choice Award. And now, SPSS 6.0 for Windows gives you more of the analytical tools you need in a program that's even easier to use. You get:

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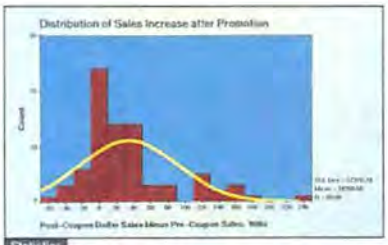

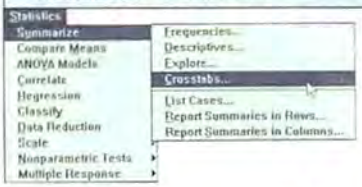

In-Depth Statistics

"For more statistical analysis tools than you'll get from a spreadsheet such as Excel, without the steep learning curve, SPSS for Windows is a great buy." – Michael Burgard, PC/Computing. Use correlations, crosstabs, regression and more. You won't outgrow this package.

Learn fast, work fast

SPSS 6.0 for Windows is the easy-to-learn, easy-to-use data analysis program that helps you do your analysis quickly and efficiently. Analytical options are clearly displayed in simple, yet complete, menus and dialog boxes. With a program this easy to use, you concentrate on the analysis, not the mechanics.

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Learn Fast, Work Fast

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Key Features In SPSS For Windows

Features in red are new to SPSS 6.0 for Windows.

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- Open several windows of different types at once

Create presentation-quality reports

- **Control page layout, use smart title and break wrapping**
- Control summary stats in output
- **Dialog boxes for summaries in columns and other enhancements**

Customize the program

- Determine the amount of virtual memory allocated to SPSS
- Type your own production mode commands
- Make macros for customized tasks
- Refer to on-screen glossary for explanations of statistical terms
- "Undo" an accidental action
- Data and graphics sharing through Dynamic Data Exchange and Object Linking and Embedding
- **Print charts in unattended production mode from command line**
- **Customize your menus to integrate programs in C or FORTRAN and macros from third-party applications with new programming interface tools**

Data Management with Direct Data Editing

- Handle large data sets with an essentially unlimited number of cases and variables
- Sample, sort, rank, count and weight cases
- Add, aggregate, merge, update, split, transpose files
- Increase analytical power through programming functions
- Define multiple missing values
- Perform SQL queries on relational databases via dialog boxes
- Transfer data between SPSS/PC+, SPSS Portable, Excel, Lotus, dBASE, SAS transport, ASCII (tab-delimited), SYLK, Oracle and SQL Server
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Data Editor provides constant data access and editing capabilities

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- Save all characteristics of a variable definition in a template
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Compare Means – testing hypotheses about group means

- Independent-, paired- sample t-test
- One-way and simple factorial analysis of variance and covariance

Correlate – measures of association among variables

- Bivariate and partial correlations

Regression – linear regression using weighted or unweighted least squares

- Several methods for variable entry and removal
- Analysis of residuals and influential points

Multiple response – summaries for data in which questions can have more than one answer

- Frequency counts and tables, crosstabulations

Non-parametric tests – analyses which require very limited assumptions about the data

- One-sample tests
- Tests for K-independent and K-related samples

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- **Autocorrelation and partial auto correlation function plots, curve fitting, case-plots and more**

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- Choose any of 10 line-interpolation methods
- Pick from five line-fit options for
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* This information covers selected features in the SPSS for Windows Base package only. For an in-depth list of features in this and other SPSS for Windows modules, contact your account representative at (800) 543-5837.

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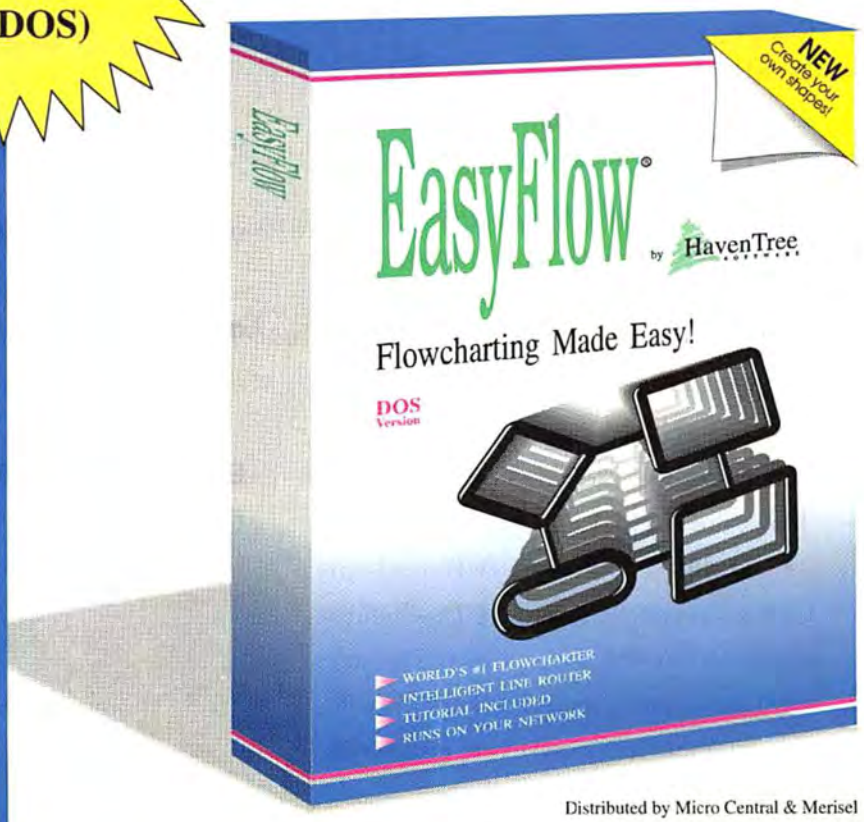

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486 PCs with the Works

With CD ROM drives and software, sound cards, fax-modems, and more, these 21 versatile PCs stand poised to star in your office. Are they ready for center stage?

BY BRYAN HASTINGS AND DAN MILLER

TESTING BY ULRIKE DIEHLMANN AND SUSAN SILVIUS

Ever since the PC made its dazzling debut, it's been expanding its repertoire. It started out as a combination electronic ledger sheet and typewriter, then moved to more demanding parts—fax machine, filing cabinet, interoffice mail service, bulletin board, Rolodex, tape recorder, and occasionally, video arcade game.

Today the PC is poised to take the stage solo, with no need for supporting cast. The time is coming when your desktop system will be the only office machine you'll need; the PC will integrate all its current functionality with the office library, the TV set, the dictating machine, and the telephone to become one integrated office-in-a-box. Think this is a bunch of hype? Consider:

• CD ROM disks—650MB read-only laser disks similar to audio CDs—hold as much data as 450 floppy disks. The days when a company needs banks of file cabinets for reference materials are numbered.

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• Voice-ready fax-modems skirt your company's voice-mail system by turning your PC into a messaging center for voice as well as fax and data. Coming technologies, both hardware and software, will make voice messages as easy to manage as E-mail.

• Sound cards let you add sound to presentations and annotate documents with spoken comments; video capture boards let you add live video as well as sound to documents and presentations. With the larger hard disks and advanced computing power of today's desktop, your PC is fast becoming a potent presentation tool, replacing both the slide projector and the VCR.

Best of all, these attractions are surprisingly inexpensive. CD ROM drives cost as little as $300, and a good sound card and fax-modem can be yours for less than $200 each.

Ready for Prime Time?

Has the office-in-a-box actually arrived? To find out, we asked a cross section of vendors to give us their best "complete" systems costing $4000 or less. Our price point may seem steep, but so were our demands.

We were after 486-based systems decked out with a CD ROM drive, a sound card, and a fax-modem. To go along with the high-powered peripherals, we wanted at least 8MB of RAM, a 200MB hard drive, and a video subsystem capable of displaying 256 colors at 1024 by 768 resolution. We also wanted headphones (or speakers), microphones, and all the necessary software (Windows and DOS plus communications software). Finally, we encouraged each company to add any hardware and software it thought appropriate, within our pricing guidelines, to bring the system as close as possible to the ideal office-replacing desktop.

Despite our stiff requirements, 21 vendors rose to the challenge. As we examined their systems to determine which best fit our definition of the complete PC, we turned up several issues you should take into account when considering one of these powerhouses.

No Ready-to-Run Systems

For one thing, although we had little trouble finding candidates for this review, we had to struggle mightily getting everything to work smoothly. We expected the systems to arrive ready to run, but fewer than half ran trouble-free straight out of the box.

One company sent us a machine with an uninstalled CD ROM drive, several companies omitted the fax-modem, and many neglected to install the fax software, which can be difficult to configure in heavily loaded systems. While these omissions wouldn't be serious in simple configurations, they're real problems when you're trying to cram this many peripherals into an ISA-based system (which almost all our candidates are).

First, each peripheral needs its own interrupt request line (or *IRQ*, the channel it uses to get the CPU's attention). Some peripherals require a specific IRQ, others need more than one, and ISA systems have a limited number of IRQs to pass around. In some cases, you also have to worry about assigning direct memory address (DMA) channels and memory address locations.

Although most of the systems arrived with their peripherals physically installed, we often had to struggle with hardware and software conflicts that knocked one or more of the peripherals out of commission. If our veteran lab technicians had trouble with a system, we shudder to think what might happen to less experienced buyers.

Best Buys

And if that's not problem enough, with the exception of ALR's Evolution IV MPC and NEC's Image 466, none of these boxes came configured with network cards, which are notorious for being incompatible with other peripherals.

For all the above reasons, we pay special attention to customer service in this review. Most companies offer toll-free support, and weekend support is a growing trend, but only four—AST, Compaq, IBM, and Insight—offer 7-day-a-week around-the-clock support. As usual, we called each company anonymously several times to ask some typical customer service questions, scoring responses for quickness and accuracy. We also looked at the details of warranties and on-site service contracts.

Where's the Software?

Another reason the office-in-a-box concept isn't quite ripe: CD ROM–based business programs aren't yet common. Fortunately,

Best Performance

The message is clear: The 66-MHz 486DX2 processor is the key to top performance. All these hot rods were outfitted with at least 128K of secondary cache and made heavy use of their local bus slots. Three machines use a caching disk controller with at least 1MB of cache.

1. **Polywell Poly 486-66VZ** (page 120)
2. **Gateway 4DX2-66V** (page 113)
3. **Axik Ace Cache BusinessPro** (page 107)
4. **ALR Evolution IV MPC 4DX2/66 Model 240** (page 106)
5. **Tri-Star Tri-Win Multimedia System** (page 125)

There's more to the complete-office PC than high performance—service and support are more important than ever in these fully loaded machines. Our five Best Buys scored consistently well in all categories—including price, design, and expandability—offering you solid all-around office achievers.

1. **Polywell Poly 486-66VZ** (page 120)
2. **Axik Ace Cache BusinessPro** (page 107)
3. **Keydata 486-Multimedia WindowStation** (page 114)
4. **AST Advantage Plus 486DX2/66** (page 106)
5. **Micron 466VL Magnum** (page 116)

BEST BUYS: clockwise from lower left, Polywell Poly 486-66VZ, Axik Ace Cache BusinessPro, AST Advantage Plus 486DX2/66, Micron 466VL Magnum, and Keydata 486-Multimedia WindowStation

both PC vendors and business software companies are beginning to embrace CD ROM. As programs grow larger and more complex, floppies become less adequate as a means of distribution, and CD ROMs make more sense. These rigid plastic-encased optical disks are much more durable than floppies and offer an alternative to people who would rather not cope with a dozen or more disks during installation. A number of major programs, including 1-2-3 for Windows and CorelDraw, are already available on CD ROM; Windows NT will be available on CD ROM.

Although we made it clear to the vendors that we wanted business applications on CD ROM, the great majority of the disks we received were games, "edutainment" packs, and encyclopedias. A few systems arrived with CD ROM–based business applications, both specific (MacroMedia's MacroMind Action and Authorware Star multimedia authoring packages) and general (such as Microsoft's Office). Most, however, came with reference works, including Microsoft's Bookshelf and The Software Toolworks's Reference Library, both of which are chock-full of writer's aids such as dictionaries, thesauruses, and indexed collections of quotations, as well as business databases (such as the disk accompanying the Axik PC that lists the addresses and phone numbers of 10 million businesses in the United States and Canada).

In judging these systems for value, we took software bundles into account. We use two methods to determine and report what you will actually pay for each PC. If a computer is sold direct, we simply list its direct price. If it is sold through dealers, we take the average street price based on calls to dealers. We then give each system some credit for its software bundle, based on a percentage of the software's list price.

Only a handful of the PCs exceeded our $4000 limit. AST's amply endowed Advantage Plus takes the biggest bite out of your budget at $4627, while Netis's candidate causes the least damage at $2420. We penalize candidates that exceed our $4000 price point, but we do not necessarily award big points to PCs whose prices fall far below the limit. Our goal was to get as much machine as possible for $4000.

Talk's Not Always Cheap

Get ready for the PC-based voice-mail system—the quintessential office-in-a-PC peripheral that unites your telephone's answering machine, fax machine, and E-mail. The voice-mail system is an integrated communications environment in which each message can be received, retrieved, routed, and stored, all in your PC.

It sounds wonderful, but only five PC vendors—AST, Axik, Compudyne, Eltech, and Polywell—included voice-mail capabilities in their systems. PC-based messaging is still a new, unstandardized technology, and the existing collective of PBX, E-mail, and fax machines already serves many people quite well. PC voice-mail systems also require you to keep your PC on all the time and can cost a lot of hard disk space—up to 250K to record each minute of voice. Using a PC as a voice-mail center should become more practical, however, with the emergence of "green" PCs, which won't cost as much to leave on, as well as larger and less expensive hard drives.

Most of the systems we looked at came with fax-modems that

Best Price

If it was under $3000, it got a Best Price award; it's a sign of the changing times that Compaq picked one up. We emphasized a rich feature set over low cost, but one of these low-cost wonders—Keydata's 486-Multimedia WindowStation—also captured a Best Buy.

1. **Netis N466 VL/MPC** (page 116)
2. **Keydata 486-Multimedia WindowStation** (page 114)
3. **Compaq ProLinea CDS** (page 110)
4. **Eltech Model 4660VB** (page 112)
5. **Blackship BLK 486/50LB** (page 108)

Best Service and Support

The better equipped your PC, the more that can go wrong, so we made service and support a priority when evaluating overall system value. All the vendors that made this list offer on-site service, toll-free tech support, and a 30-day money-back guarantee. Eltech and Polywell tie for fifth place.

1. **ALR Evolution IV MPC 4DX2/66 Model 240** (page 106)
2. **Keydata 486-Multimedia WindowStation** (page 114)
3. **AST Advantage Plus 486DX2/66** (page 106)
4. **Blackship BLK 486/50LB** (page 108)
5. **Eltech Model 4660VB, Polywell Poly 486-66VZ**

went up to 9600 bps for fax and 2400 bps for data, but several vendors included modems that tore up the phone lines with 14,400-bps fax and data. You should have no trouble using data communications programs such as Procomm or Crosstalk with these modems, but fax software can be trickier. While these modems worked fine with their bundled fax software, they may not get along with your favorite fax program at all. The only way you'll know for sure is to call the modem company and ask if its lab has tested its product with your fax program.

Full House

Because these systems already have just about every peripheral you could want, we pay less attention to expandability in this review than we usually do. The real question is, how do vendors cram all these extras into a single box? Some vendors save space by using multifunction cards, such as a multi-I/O adapter (which combines the hard disk, floppy disk, and serial and parallel port controllers on one card) and combination sound card–CD ROM drive controllers.

One expansion feature, however, still deserves your attention: processor upgradability. Even your DX2-66 has an upgrade path these days if it has the 238-pin CPU-upgrade socket. It's unclear right now what chip Intel will eventually provide for that socket: The company initially said it would be a Pentium-based OverDrive for DX2, but heat problems have made that plan uncertain. Current guesses are that it will be some variant of the DX2, a clock-tripled DX3, or a hybrid of Pentium and 486 technology. In any case, you'll be able to put *something* in that socket that will outstrip the DX2-66 in speed. Ideally, this socket should be a zero insertion force (ZIF) socket, which makes removing and installing CPUs as quick and easy as lifting a lever.

In assessing these systems, we also consider a system's overall design and construction. Does the case flex, especially near the system board? Too much warp can crack the delicate traces on the system board, a not-so-uncommon cause of PC failure. What about ventilation? Look for a processor with a heat sink strapped or glued to it, or a ventilation fan on or nearby it, especially if it's a DX2-66. If a system has both, so much the better. Also look for easy access to SIMM and secondary cache RAM sockets.

The Bottom Line

So what else can you ask of your computer if it's going to be your all-in-one business solution? You still need speed. Today's applica-

ALR Evolution IV MPC 4DX2/66 Model 240

VITAL STATISTICS

Direct price: $4027
PROS: Good performer, top-notch service and support
CONS: Pricey, few expansion slots
Contact: Advanced Logic Research, 800/444-4257, 714/581-6770
Reader service no. 612

In terms of performance and features, this ALR offering is truly evolved. The machine comes well stocked with the 486DX2-66 processor, a 256MB hard drive, and 8MB of RAM expandable to 52MB and is amply endowed with 256K of secondary cache.

There's more. The Evolution is one of only two machines in the review with three local bus slots (Tri-Star's offering is the other). Two of these slots support the VESA standard, and the remaining one is ALR's own Cache Local slot. The company populated this slot with an unusual multifunction board that combines a video controller, 256K of secondary cache, and an ethernet controller—the latter touch matched only by NEC in this review. The video controller is especially potent with its Mach32-based video accelerator and 2MB of VRAM, letting you display 65,536 colors, instead of the usual 256, at 1024 by 768 resolution. If that's not enough, you get a speedy 14,400-bps fax-modem and a CD ROM drive that supports the Kodak Photo CD format. ALR bundled five CD ROM disks, including Microsoft's Multimedia Works and Bookshelf.

Despite being dressed to the nines, the Evolution was one of a handful of machines that worked fine right out of the box. In addition to being loaded with hardware, ALR's contender placed fourth in our performance ratings, trailing the leader by only 18 percent. ALR also excelled in service and support. The company did a stellar job on our calls, which, coupled with above-average policies including Saturday hours and a five-year parts, 15-month labor warranty, earned ALR the top spot for service and support.

Despite its very strong showings in performance and in service and support, the Evolution lost its edge in overall design and expansion: only three 16-bit slots, instead of the usual four or five, and no 5¼-inch floppy drive. The Evolution also exceeded our price limit, if only by $27. If performance and service and support are your main concerns, however, this PC deserves serious consideration.

AST Advantage Plus 486DX2/66

VITAL STATISTICS

Street price: $4627
PROS: Excellent service and support, voice mail, tape drive
CONS: Most expensive system in review, not as speedy as other DX2-66s
Contact: AST Research, 800/876-4278, 714/727-4141
Reader service no. 613

This special edition of the AST Advantage Plus is an easy pick as one of our five Best Buys. It packs so many extra features under its mild-mannered exterior, and backs them up with such top-notch service, that this system comes close to our ideal of the complete PC.

tions demand more than ever from your PC, and there's no indication future revisions won't demand more. So as usual, we put these machines through our vigorous workout, consisting of the PC World Test Center's suite of application-based Windows tests and the BAPCo benchmarks, which gauge performance running both Windows and DOS applications.

Despite all that extra hardware, these machines responded like real pros. Since we were looking at a mix of CPUs, we were less concerned with comparing these systems against one another than with the history of test results for their respective CPUs. When we compared them with the other 66s we've tested this year, for example, we found that most of this month's crew were average or better for their processor class; some, including the Gateway and Polywell, were among the fastest we've ever seen.

One minor problem emerged from our testing: The DFI showed anomalous results on the BAPCo SYSmark92 suite. Results on the Harvard Graphics 3.0 section, which includes several print jobs sent to a null printer, are very slow for this PC. Control tests with a real printer installed indicate a still noticeable but less pronounced degradation of performance. When our technicians looked closely, they spotted an AMI November 92 BIOS, which we know can cause the anomaly. DFI is aware of the problem.

We sat down with the test results to pick five of these systems as Best Buys. Taking into account the quality of overall integration, customer service, and design as well as price and speed, Polywell's entry is this review's number one Best Buy. Next in line is Axik's Ace Cache BusinessPro, followed by the entries from Keydata, AST, and Micron.

Whether these machines qualify as offices-in-a-box is a matter of debate. There's no argument, however, that all provide a tremendous amount of computer for the money. Furthermore, there's every indication the desktop computer won't remain content with the lead role in your work place but will eventually play the whole cast of characters. Read on to see which one of these versatile performers could be starring on your desk someday soon.

Bryan Hastings is an associate editor and Dan Miller an assistant editor for PC World. *Research and support by Dawn Furseth, John Goddard, and Anita Hamilton.*

For more information about all products in this article, circle reader service no. 901.

At first glance, the Advantage Plus doesn't appear to be anything special. The minitower is equipped with 8MB of RAM and a 340MB Western Digital hard drive connected to a simple, non-caching IDE controller. Video is handled by a Western Digital Paradise accelerator, which doesn't even support 24-bit color (standard in most systems here). Compared with the other DX2-66s we've tested this year, the AST is only slightly faster (about 8 percent) than the average, turning in its best performance on Windows applications.

Things start to get more interesting when you take a closer look at the system's other peripherals. See that 9600/2400 fax-modem? It comes bundled with a copy of The Complete PC's Complete Communicator for Windows, a software-hardware combo that supports voice mail. The third slot contains a Media Vision Fusion CD 16 sound card connected to a Sony CD ROM drive; since the sound card and CD ROM drive are bundled together by Media Vision, the two components work together seamlessly. Look at the front of the case: The company included a 120MB tape drive, an addition that *none* of the other vendors thought to provide.

AST's smarts don't stop with the PC. The company offers a year of free on-site service and toll-free tech support 24 hours a day, 7 days a week. When we called tech support, the staff answered two of our three questions correctly, but the third answer was off target. The representatives also lost a few points for keeping us on hold once for more than 5 minutes. Media Vision provides a 12-month warranty for the CD ROM drive and sound card, and The Complete PC offers a 7-year warranty for The Complete Communicator fax-modem.

The AST is the most expensive system in this review, exceeding our $4000 limit by more than $600. However, that price buys you a raft of software, including Microsoft Office, WinFax Pro 3.0, and that copy of The Complete Communicator we mentioned earlier, along with a passel of entertainment titles.

If it had been a tad faster and a bit less expensive, the Advantage Plus would have been our number one Best Buy. As is, its integration of voice mail and a tape drive with CD ROM, sound, and fax-modem makes it an excellent choice if you want to fit as much desktop functionality as possible into a single PC.

Axik Ace Cache BusinessPro

VITAL STATISTICS

Direct price: $3998
PROS: 22 percent faster than average 66, voice mail
CONS: More expensive than some
Contact: Axik Computer, 800/234-2945, 408/735-1234
Reader service no. 614

When it comes to breeding the complete PC, some companies aim for purebreds, using nothing but their own fax-modems, their own sound cards, and their own CD ROM drives. Others choose to hybridize, picking from a variety of vendors and then combining components to create a whole machine. Axik has taken the latter course and done such a good job, its Ace Cache BusinessPro earns a Best Buy.

So how mixed are this system's bloodlines? Inside the tower case you'll find a Media Vision Pro AudioSpectrum 16 sound board connected to one of Texel's double-speed DM-3024 CD ROM drives. For communications, Axik uses Macronix's MaxFax 14,400/14,400 external fax-modem *and* Talking Technology's BigMouth voice-mail board (yes, we said *voice mail*). One of the two VESA local bus slots is filled with Diamond's Stealth 24 VLB video card; the other local bus slot is free. The 240MB Quantum

ProDrive LPS hard drive plugs into a Promise DC-99 Super IDE controller with 1MB of disk cache.

The Ace Cache BusinessPro doesn't seem to be suffering from any performance identity problems, however: It's the third-fastest system in the review overall and nearly 25 percent faster than the average DX2-66 we've reviewed thus far this year. It posted some particularly fast times in the BAPCo suite, which gauges performance running both DOS and Windows applications, especially in the database and graphics sections. If its current speed isn't enough for you, the system CPU sits in a 238-pin, ZIF P24T socket, which means you'll be able to upgrade to Intel's OverDrive for DX2 when that chip is finally released.

Axik sells this system for just under our $4000 price limit. However, that price includes a large (if sometimes impractical) collection of software, including Publish It 2.0, Symantec's Q&A 4.0, The Software Toolworks's Reference Library, and a miscellany of CD titles. Axik also supports the system well, with a year of free on-site service and convenient Saturday tech support hours. Our tech questions were answered quickly and in all but one case, correctly.

With the Axik, mixing and matching turns out to be a great way to put a blue ribbon full-featured system together. If you want a speedy PC that can handle almost any office task thrown at it, the Axik Ace Cache is one of the best deals here—which is why we recommend it as a Best Buy.

Blackship BLK 486/50LB

VITAL STATISTICS

Direct price: $2595
PROS: Low price, good service and support
CONS: Slightly underpowered
Contact: Blackship Computer Systems, 800/531-7447, 408/432-7500
Reader service no. 615

The Blackship BLK was one of a number of machines that required some extra rigging to get going. We had to reinstall DOS and Windows several times before the system would complete our tests. Once under full sail this PC showed impressive power, but not enough to move to the front of the pack.

Many of the BLK's features equal or surpass those of the best PCs here. The BLK came equipped with 8MB of RAM expandable to 32MB, 256K of secondary cache upgradable to an impressive 1MB, and two VESA local bus slots. One of these slots is populated with Orchid's Fahrenheit VA/VLB video controller, the other with a multifunction serial/parallel/floppy drive–hard disk adapter. The fax-modem sends and receives faxes at 9600 bps and data at 2400 bps.

The BLK's weakest quarter, however, is its 50-MHz 486DX processor. The most powerful PC processor available only two years ago, the 486DX-50 has since been eclipsed by the DX2-66, the chip of choice for most vendors here. For its price, the BLK is impressive, but it still falls in the lower half of the performance charts.

Blackship's tech support provided fast, knowledgeable answers to our questions. Support policies are strong, if not exceptional. However, while its features and price are very good, this system lags in the crucial area of performance.

While the Blackship's performance might seem to be a major drawback, you might be tempted to go with the low cost and live with it until the 238-pin OverDrive for DX2 chip becomes available, since the BLK comes with a CPU-upgrade socket for it. However, this CPU would add more heat to the inside of the Blackship case, and you would likely have to add extra ventilation since the only fan in the system is buried in the power supply. Our recommendation? Spend the extra money for a more powerful system.

Compaq Deskpro 4/33i

VITAL STATISTICS

Street price: $3653
PROS: Nice CD ROM drive, slim design, 3-year warranty
CONS: Low performance, poor expandability
Contact: Compaq Computer Corp., 800/345-1518, 713/378-8820
Reader service no. 616

No question about it: Compaq's gotten mighty aggressive on pricing. We were pleasantly surprised to receive a fully decked out PC for less than $4000. In fact, Compaq sent us two systems, this Deskpro 4/33i being the better-equipped model.

Compaq still has a way to go, however, to match the price/performance of its hottest competitors. Most striking is this system's 33-MHz 486DX processor, one of the least-powerful CPUs in this review. While the Deskpro came with 8MB of RAM, its 64K of secondary cache is less than most of these machines offer. We weren't surprised at the comparatively low performance figures.

In fact, feature for feature, the 4/33i could look better. While its 240MB drive may be adequate for most users, the capacity is still one of the lowest. And the system doesn't have a 5¼-inch floppy drive. Its CD ROM drive has pretty favorable specs—300K-per-second data transfer and 290 ms access time—but it doesn't come with any CD ROM software.

This is a truly slim desktop—just under 4 inches tall—but you pay a price for compactness. While the integrated video controller eases card congestion a bit, the 4/33i has only four slots—all 16-bit ISA. This PC came in dead last on expandability. At least getting inside the case is simple. The 4/33i is one of the few PCs to come with an easy-open case, and it's easy to lift out the hard drive to access the secondary cache sockets beneath.

Given Compaq's history of strong telephone support, you might expect its service and support to lift the ratings. Indeed, not only is Compaq one of the few vendors to offer around-the-clock tech support, weekends included, its 36-month warranty is matched only by NEC. This time around, however, it puts in an uneven performance on support calls. Taking it all into account, we had to rank

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1993 ANNUAL BUSINESS 100 W MAGAZINE WIN AWARD

yes It runs with NetWare

© *1993 Qualitas.* Qualitas, 7101 Wisconsin Avenue, Suite 1386, Bethesda, MD 20814. *All company and product names are trademarks or registered trademarks of their respective owners.* **System requirements: Any 386, 486, or Pentium micro-processor based PC or PS/2, min. 256KB of extended memory, DOS 3.3 or higher, high density floppy disk or hard disk drive.** **plus $6.95 shipping & handling in continental U.S.*

Compaq a few points below its norm for service and support, although it still received a decent rating. If reliability and brand name matter, then you might consider this system, but we'd recommend the Best Buy AST instead.

Compaq ProLinea CDS

VITAL STATISTICS

Street price: $2681
PROS: Low price, 3-year warranty
CONS: Slower than other systems reviewed
Contact: Compaq Computer Corp., 800/345-1518, 713/378-8820
Reader service no. 617

Perhaps we should be getting used to it, but the idea of putting the words *Compaq* and *low cost* in the same sentence still seems strange. Nevertheless, with a street price of $2681, the ProLinea CDS is one of the most inexpensive systems here, well under our $4000 limit and still loaded with all the extra peripherals we asked for.

The ProLinea's $2681 street price is the third lowest in this review. How does Compaq do it? For one thing, it uses its own components whenever possible. These include the 15-inch 15FS monitor, the CD ROM drive, the 9600/2400 fax-modem, and the 240MB hard drive.

Compaq also saves money by integrating components onto the motherboard: The hard drive is connected to an on-board IDE adapter, and the monitor is connected to an on-board Tseng ET4000/W32 video controller on a proprietary local bus. The only significant third-party component beyond the video controller is the Media Vision Pro AudioSpectrum 16 sound board.

Also, this system's software bundle is less valuable than some other vendors'. Although you do get a copy of Spinnaker's PFS:WindowWorks integrated software, most of the other titles would be more at home in your family room than your office.

The compact case has no externally accessible drive bays free, a cost-cutting move by Compaq that perhaps many users could live with. But the boldest cost-cutting move comes in an area some buyers might regret: performance. In a review crowded with DX2-66s, this system putters along with a 486SX-25 and is easily the slowest system here; the only other machine even close to the bottom rung is the Tangent, which is based on Cyrix's Cx486S-40 processor.

Despite its low price, owners of this machine still get Compaq's exemplary 24-hour toll-free tech support and 3-year warranty. Unfortunately, success may be overtaking even Compaq's vaunted tech support system: Despite its history of consistently stellar customer service, this month our callers waited on hold as long as 17 minutes. Also, Compaq is one of the few companies in this review that doesn't offer a 30-day money-back guarantee.

If an SX-25 is enough for you, and reliability counts, this system is an excellent value from a proven vendor. If you want something a little faster, you'll have to keep looking.

Compudyne 486DX2/66 Mini-Tower

VITAL STATISTICS

Street price: $3999
PROS: TyIN 2000 voice-mail/fax-modem, 17-inch monitor
CONS: Average performance
Contact: CompUSA Direct, 800/862-3095, 214/702-0055
Reader service no. 618

When we said we wanted a complete PC, the folks at Compudyne must have rubbed their hands together with glee—they managed to pack an astonishing number of features into this little minitower.

The base system is tricked out with a DX2-66 in a 238-pin CPU-upgrade socket, 8MB of RAM, a 256K secondary cache, Diamond's speedy Viper VLB video card in a local bus slot, and a roomy 420MB Western Digital hard drive. Compudyne met our demands for a sound card and CD ROM drive with a Media Vision Fusion CD 16 bundle. The 17-inch MAG monitor looks great. Compu-

Late List Prices

We were able to compare prices for 19 systems in this review. Prices for only 4 fell more than 10 percent during the 60 days between our two rounds of calls.

Price Drops Slow Down

	List price as of July 1993	Price drop from May 1993
ALR Evolution IV MPC 4DX2/66 Model 240	$4027	none
AST Advantage Plus 486DX2/66	$4092	$535
Axik Ace Cache BusinessPro	$3998	none
Blackship BLK 486/50LB	$2595	none
Compaq Deskpro 4/33i	[1]	
Compaq ProLinea CDS	[1]	
Compudyne 486DX2/66 Mini-Tower	$3999	none
DFI Model 466 MPC	$3599	$100
Duracom DeskSaver 486/66DX2	$3449	$200
Eltech Model 4660VB	$3299	$150
Gateway 4DX2-66V	$3439	$568
IBM PS/ValuePoint 466DX2/D Model 6384-WS9	$4000	none
Insight 486-33 VL Multimedia Office	$3799	$200
Keydata 486-Multimedia WindowStation	$2795	none
Micron 466VL Magnum	$3644	$355
NEC Image 466	$4475	none
Netis N466 VL/MPC	$2420	none
Polywell Poly 486-66VZ	$3555	$440
Tandy 466 DX2	$3725	$100
Tangent Black Box M440	$2999	$750
Tri-Star Tri-Win Multimedia System	$3795	$200

[1] Compaq does not have list prices.

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"THE END OF THE PAPER CHASE" Reg. T.M. Micro Dynamics, Ltd., Silver Spring, MD.

Circle 199 on reader service card

dyne seals the deal by throwing in a National Semiconductor TyIN 2000 card, which combines a 9600/2400 fax-modem with voice mail, voice recording (for memos and annotations), and audio playback.

Unfortunately, despite the nifty hardware, this box's performance proved just average for a DX2-66. It does best in the database and graphics sections of the BAPCo suite but fares less well in the Word for Windows and Excel segments of our Windows tests.

The company told us you can buy this system for $3999, a decent price for a machine with a heavy-duty feature set. While Compudyne's support policies (which include a year of free on-site service) are fine, the company lost some points for long hold times and an inaccurate answer to one question. These little service stumbles, combined with the system's unremarkable performance, make it hard to recommend this system over any other.

DFI Model 466 MPC

VITAL STATISTICS

Direct price: $3699
PROS: High-performance CD ROM
CONS: Poor performance (partially due to AMI BIOS problem), lacks 1.44MB floppy drive
Contact: DFI, 916/568-1234
Reader service no. 619

The unpretentious Model 466 MPC looked like a hot contender at first. This PC came well stocked with a 66-MHz DX2 CPU, 8MB of RAM, and an ample 128K secondary cache. DFI was also one of the few companies that, sensibly, eschewed speakers and sent headphones instead, which make more sense for an office environment. All this for an attractive $3699 price tag made us think this humble-looking PC was destined for the Best Buy chart.

But it was not to be. We were put off by the system's surprisingly congested layout—SIMMs squeezed between the last ISA slot and the hard drive, secondary cache hidden under the drive cage, and cables packed tightly together in the center of the machine. We also found it strange that DFI opted to put in the larger 5¼-inch floppy drive but omit the much more popular 3½-inch drive. The only business software included on CD ROM was Microsoft Works.

The Model 466 falls down hardest where it counts the most: performance, and service and support. The Model 466 turned in surprisingly poor Windows and BAPCo numbers, below even the 33-MHz 486DX-based Compaq Deskpro. This poor performance is due at least in part to an incompatibility between the DFI's BIOS and the Harvard Graphics section of the BAPCo test.

The system comes with a year of free on-site service, but DFI offers 9 hours of tech support on weekdays only and no 30-day money-back guarantee. Considering that we had to hold as long as 16 minutes, DFI could use a toll-free tech support line. Once we got through, though, all questions were answered perfectly. In short, DFI's machine checks in at a decent price but with disappointing performance and service and support. If low cost is your main aim, check out Keydata's PC instead.

Duracom DeskSaver 486/66DX2

VITAL STATISTICS

Street price: $3572
PROS: Fast in BAPCo tests, good software bundle
CONS: Iffy central support
Contact: Duracom Computer Systems, 800/551-9000, 214/518-1200
Reader service no. 620

The DeskSaver offers high speed at a decent price but suffers in comparison with the better-equipped machines. At $3572 on the street, the DeskSaver is well below our $4000 ceiling, and it's the seventh-fastest system in the review, 13 percent ahead of the average. The PC scored especially well in the BAPCo tests, and its Windows results were still plenty fast. This DX2-66 system comes with a 256K secondary cache, and a 340MB Western Digital hard drive with 4MB of cache RAM. Five of the six 16-bit slots in the DeskSaver's compact case are occupied by the caching controller, the I/O board, a Zoltrix 14,400/14,400 fax-modem, a Microsoft Windows Sound System sound card, and a Future Domain ISA SCSI card that connects to Toshiba's XM-3401B CD ROM drive. Its software bundle, which includes copies of Microsoft's Bookshelf and the multimedia version of Microsoft Works, is particularly well suited to business buyers.

Duracom pales in comparison with other vendors when it comes to service and support. The company won't guarantee on-site service, though Duracom says 99 percent of its dealers offer it. The company offers telephone tech support, but it hopes buyers will call dealers first. Other vendors also scored extra credit by adding 238-pin CPU-upgrade sockets, tape drives, or voice mail. Consequently, while the DeskSaver meets our requirements for the complete PC, it lacks the extras that might have elevated it above the rest.

Eltech Model 4660VB

VITAL STATISTICS

Direct price: $3449
PROS: Very good service and support, voice mail
CONS: Below-average CD ROM drive
Contact: Eltech Research, 800/358-8330, 510/438-0990
Reader service no. 621

In a letter accompanying the 4660VB, Eltech claimed it wanted to "overwhelm the user with our office-in-a-box." As we pored over the documentation—nearly 20 pounds of it for the system and its peripherals—we knew Eltech meant business.

For one of the lowest prices listed here, you get a power tower stocked with the top-of-the-line DX2-66 CPU, 8MB of RAM, 256K of secondary cache RAM, both types of floppy drives, a 17-inch monitor with a video subsystem that can display 1280 by 1024 resolution, and The Complete PC's Complete Communicator voice-mail system. Although the 4660VB came chock-a-block with features, all components are very accessible. Even its keyboard is better equipped than most, with 129 keys, two sets of 12 function keys, diagonal cursor keys, and a built-in calculator.

Eltech also applied the more-is-better principle to software. The 4660VB offers more CD ROM titles than most vendors in this review: Microsoft Works, Microsoft Bookshelf, and a presentation program and tools from MacroMedia titled MacroMind Action and Authorware Star.

Service and support impressed us, including a money-back guarantee, a tight 2-day turnaround on repairs, and a toll-free tech support line. In addition to offering solid policies, Eltech consistently gave the right responses to our tech calls. However, Eltech is less than generous with its warranty (only one year), on-site service ($69 per year), and support hours (9 hours on weekdays—relatively meager compared with others in this review).

But Eltech's PC did so well in so many other categories, why didn't it earn a Best Buy? Despite its 66-MHz DX2 processor, the Eltech faltered on the lab bench, ending up in the lower half for performance. Its CD ROM also left us flat, with a sluggish 390 ms access time and 171MB-per-second data transfer rate and a small 64K buffer. Still, the Eltech nearly made our hit parade. Even though the 4660VB placed eighth for overall value, it finished very close to our fifth-place Best Buy. If a slight performance lag doesn't concern you, give Eltech's machine a serious look.

Gateway 4DX2-66V

VITAL STATISTICS

Direct price: $4007
PROS: Fastest Windows machine reviewed
CONS: Can't get through to tech support
Contact: Gateway 2000, 800/846-2000
Reader service no. 622

After looking at this system's configuration and test scores, we would have bet a week's salary it would be one of our Best Buys. Good thing we don't make our living at the track. Despite the 4DX2-66V's excellent design and speed, the system's overall value is dramatically reduced because of Gateway's ongoing problems with customer support.

But first the good news. This Gateway is the fastest Windows system we've ever tested. Credit goes to Gateway's impressive base configuration, which includes 16MB of RAM and a 256K secondary cache. The ATI video board sits in one of two VLB slots, and the 340MB hard drive attaches to an integrated VLB IDE connector. As for our extra peripherals, Gateway includes Microsoft's Windows Sound System and its own CD ROM drive and Telepath 14,400/9600 fax-modem. One nice bonus: a 15-inch CrystalScan monitor. Gateway also throws in one of the best software bundles in this review. You get your choice of one of several business packages from Microsoft and Borland; for just $99 more, you can get the CD ROM version of Microsoft Office, which includes Excel, Word, PowerPoint, and Microsoft Mail—a remarkable deal if you want to get an office up and running in one fell swoop. Unlike most of the other vendors here, Gateway doesn't include any CD titles with the CD ROM drive.

But then there's Gateway's support. For the second month in a row, we were unable to get through on Gateway's toll-free number during regular business hours. This complication hurts the company severely. Although the tech support lines are open 18 hours a day during the week as well as on Saturday, and Gateway includes a year of free on-site service, this does little good if you can't reach a support person.

One wag blames Gateway's ongoing service problems on the company's already having hired everybody there is to hire in South Dakota. Whatever the reason, we hope Gateway finds a solution soon so we can go back to admiring its systems for what they are: fast, well configured, and reasonably priced. Until then, the smart money is on other systems.

IBM PS/ValuePoint 466DX2/D Model 6384-WS9

VITAL STATISTICS

Direct price: $4000
PROS: Fast CD ROM drive, solid support policies
CONS: Lackluster performance, few expansion slots
Contact: IBM Direct, 800/ 772-2227, 800/426-2968

IBM? We are as surprised as you to see these three letters in a review that emphasizes the most features and performance for your dollar. Yet it's true. With its new IBM Direct service, Big Blue is out to show the world it's no longer above it all, especially when it comes to price. For $4000, IBM offers a lot of system in a surprisingly clear, friendly design.

This ValuePoint is one of the few entries with an easy-open case—just press a button on the front panel to slide the lid off. It was also nice to find the 66-MHz 486DX2 processor plugged into a 238-pin ZIF socket, allowing for easy upgrading as more powerful processors become available. IBM also provided a VESA local bus slot and a generous 340MB hard drive.

This ValuePoint is small, even for a compact desktop. Despite the small case, IBM included five expansion slots. Several slots are still free, however, since both the hard disk adapter and video controller are integrated on the system board. The video system and monitor support 1280 by 1024 resolution, though you'll likely want to avoid

that resolution on the 14-inch monitor. IBM also bundled a 9600/2400 fax-modem along with Delrina's popular high-end fax program, WinFax Pro 3.0, but it didn't include a data communications program.

Despite all this horsepower, the ValuePoint checked in with middling performance, at least in comparison with this group of speedsters, running about 40 percent slower than the fastest. This PC could have benefitted greatly from secondary cache RAM; even 64K might have made a big difference. In fact, IBM offers this system with 128K of cache for the same $4000 price but failed to include cache in the system it sent us to test.

IBM's service and support policies remain excellent. Though its 1-year warranty is considered the minimum these days, the company throws in free on-site service, a 30-day money-back guarantee, and toll-free support day and night, even on the weekends. (There's no turnaround policy because all repairs are handled on site.) We were slightly less impressed by IBM's handling of our tech support calls. Hold times were acceptable, but two of the reps' three answers were only partially correct.

Even though the ValuePoint's performance and price weren't good enough to make it a Best Buy, IBM has shown that it's come a long way. Keep an eye on future developments from IBM Direct.

Insight 486-33 VL Multimedia Office

VITAL STATISTICS

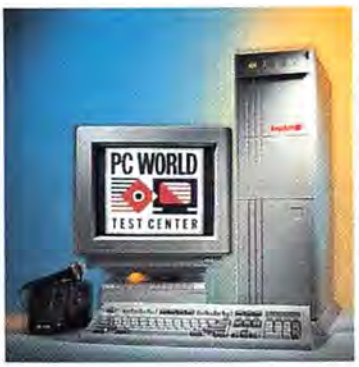
Direct price: $3999
PROS: Extremely fast for a DX-33, good software bundle, 17-inch monitor
CONS: Slower than most here
Contact: Insight Distribution Network, 800/755-9628, 602/350-1128
Reader service no. 623

Like a high-school quarterback in the Super Bowl, this Insight system may be good at what it does, but it's out of its league here. While most of the systems here use DX2-66s, this one uses a DX-33. To no one's surprise, it's one of the slower machines. However, when you compare it to others of its ilk, it's a screamer: In the BAPCo tests, it's the fastest 33 MHz we've tested lately.

Except for the CPU, everything about this machine is optimized for speed. The system connects the 250MB Western Digital hard drive to a DTK local bus adapter; the 17-inch Philips monitor hooks up to an STB PowerGraph VL-24 video card. To meet our other demands, Insight added a Media Vision Pro AudioSpectrum 16 sound board, a Texel DM-3024 CD ROM drive, and a Boca 9600/2400 fax-modem. A 238-pin ZIF socket will let you upgrade to a more powerful processor.

Insight comes with one of the best software bundles in the review, including Microsoft's Office and Bookshelf, 1-2-3 for Windows, Publish It, and a slew of CD reference works. Unfortunately, Insight still charges top dollar—$3999 direct for a comparatively slow system. Additionally, Insight's customer service could be better. Tech support kept us on hold too long, although once we got through, our questions were answered accurately. The company offers 24-hour tech support but no on-site service or repair turnaround policy. Still there's much to like about this system; with its current configuration, however, it can't keep up with this crowd.

Keydata 486-Multimedia WindowStation



VITAL STATISTICS

Direct price: $2795
PROS: Low price, business software bundle, excellent tech support
CONS: None
Contact: Keydata International, 800/486-4800, 908/755-0350
Reader service no. 624

We talk a lot about speed, but honestly, that's not all we care about. Give us a good price, top-drawer service, and all the right peripherals, and even if performance is just adequate, we can be pleased. In the case of this Keydata system, in fact, we can be so pleased we'll award a Best Buy.

Of course when we say *adequate* performance here, we still mean *screaming*—it's just that the Keydata doesn't scream quite as loudly as some of the others. It didn't make our top five for speed, but it's still plenty fast. It was the sixth-fastest Windows machine in this review, up to 16 percent faster than the average DX2-66 in our Windows suite, and its times in most BAPCo tests were average compared to other DX2-66s.

If its speed is less than top-notch, its price puts the Keydata way ahead of the pack. At $2795 direct, it's less expensive than all but one of the DX2-66s in this review (Netis is the cheapest). That price also gets you an excellent Windows software bundle, which includes copies of Norton Desktop for Windows, Quattro Pro 1.0, and PFS:WindowWorks.

Keydata doesn't skimp on service and support either. Tech support performed flawlessly, fielding our calls quickly and accurately. The toll-free lines are open 11 hours weekdays and Saturdays. The system's 18-month warranty includes a year of free on-site service and a 2-day turnaround guarantee on factory repairs (the CD ROM drive and sound card are covered separately by Aztech, their manufacturer).

As for hardware, Keydata gave us everything we asked for but no more. Along with the usual 8MB of RAM and 256K secondary cache, the system uses a 240MB Maxtor hard drive, which in turn is connected to a VLB IDE adapter (with no disk cache). An STB PowerGraph VL-24 local bus video board connects to a 15-inch CTX monitor. To meet our demands for a "complete" configuration, Keydata installed an Accex 9624 fax-modem and an Aztech multimedia kit, which connects a Sound Galaxy CD ROM drive to a Sound Galaxy NX Pro sound card.

We were looking for complete packages in this review, and Key-

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Circle 17 on reader service card

data delivered. It didn't just cram a bunch of peripherals into a case; it gave us the hardware we wanted for this particular review and backed it up with all those other things—speed, price, and service—that we *always* want. The end result is an excellent package that easily wins our recommendation as a Best Buy.

Micron 466VL Magnum

VITAL STATISTICS

Direct price: $3999
PROS: Good performance, good service and support
CONS: Sparse software bundle, skimpy hard drive
Contact: Micron Computer, 800/438-3343, 208/465-3434
Reader service no. 625

Micron is proof that there's more in Idaho than potatoes, lumber, and Sun Valley. This Boise-area company sent us a bruiser that, despite driver problems that hobbled performance at first, managed to climb onto our Best Buy charts.

The 466VL scored above average to excellent in all categories, including service and support. We were impressed by the support staff's sharp responsiveness to our tech calls; they were knocked off base only by our toughest question. Also, except for the lack of BBS and fax support, Micron's policies were better than average, with free on-site service, a 30-day money-back guarantee, very tight 2-day turnaround on repairs, toll-free support, and 11-hour support on weekdays and Saturdays.

The 466VL came with everything we've come to expect in a high-performance machine—486DX2-66 CPU, 8MB of RAM, 256K of secondary cache RAM, a pair of VESA local bus slots, and some nice extras such as a 238-pin, ZIF CPU-upgrade socket and an easy-open case. The video system also came loaded for bear. The video controller is Diamond's Viper VLB local bus adapter, which has 2MB of fast video RAM; with the accompanying 15-inch monitor, it's one of the few video systems here to offer 1280 by 1024 noninterlaced video at a reasonable rate (60 Hz). Micron's system also sports a relatively high-performance CD ROM drive—its 280 ms access time, 300K-per-second data transfer rate, and 256K buffer put this drive up there with the best of them. It's also one of the few to have a local bus SCSI adapter. The 466VL's performance checked in at ninth place, less than 30 percent behind the fastest system here.

Drawbacks? Heavy-duty multimedia users will chafe at the comparatively skimpy 213MB hard drive in this compact desktop. We also hoped to get more CD ROM–based software in the bundle. By the time you read this, however, the SoundBlaster Pro sound card/CD ROM bundles will have been replaced by the SoundBlaster Pro Deluxe, which has more CD ROM titles, including Creative Talking Scheduler, a program from Creative Labs that lets your PC remind you verbally of appointments.

Despite these minor complaints, unless a large hard drive is essential, this Best Buy Micron should be on your short list.

NEC Image 466

VITAL STATISTICS

Direct price: $4475
PROS: Fast, great integration, ethernet card
CONS: High price
Contact: NEC Technologies, 800/388-8888, 508/264-8000
Reader service no. 626

This system has *NEC* written all over it—literally. The box we received uses an NEC MultiSpin CD ROM drive and one of NEC's 17-inch 4FG monitors. Everything about this system is part of a seamlessly integrated whole.

Take a look inside the sturdy desktop case. The motherboard has integrated IDE and SCSI connectors to which a 340MB Western Digital hard drive and the CD ROM drive, respectively, connect. The system comes equipped with an ethernet adapter (ALR was the only other company to provide one). Graphics are handled by a Tseng ET4000/W32 controller integrated on NEC's proprietary Image Video local bus. The 486DX2-66 CPU sits in a 238-pin ZIF socket, connected to 16MB RAM and a 256K secondary cache.

Thanks in part to local bus graphics and plentiful memory, the NEC Image is the sixth-fastest system here, due in large part to its blazing scores in our Windows tests; its time on our Excel test is now the fastest we have on record. Its overall performance is 17 percent faster than the average DX2-66 we've tested this year.

Too bad the NEC isn't a little more average when it comes to price. It costs $4475 direct, more than all but the AST. Service and support are good, with a great 3-year warranty and free on-site service. Even with its relatively high price, the NEC Image misses a Best Buy by the narrowest of margins. If you don't mind spending the money, this Image system is an extremely attractive value.

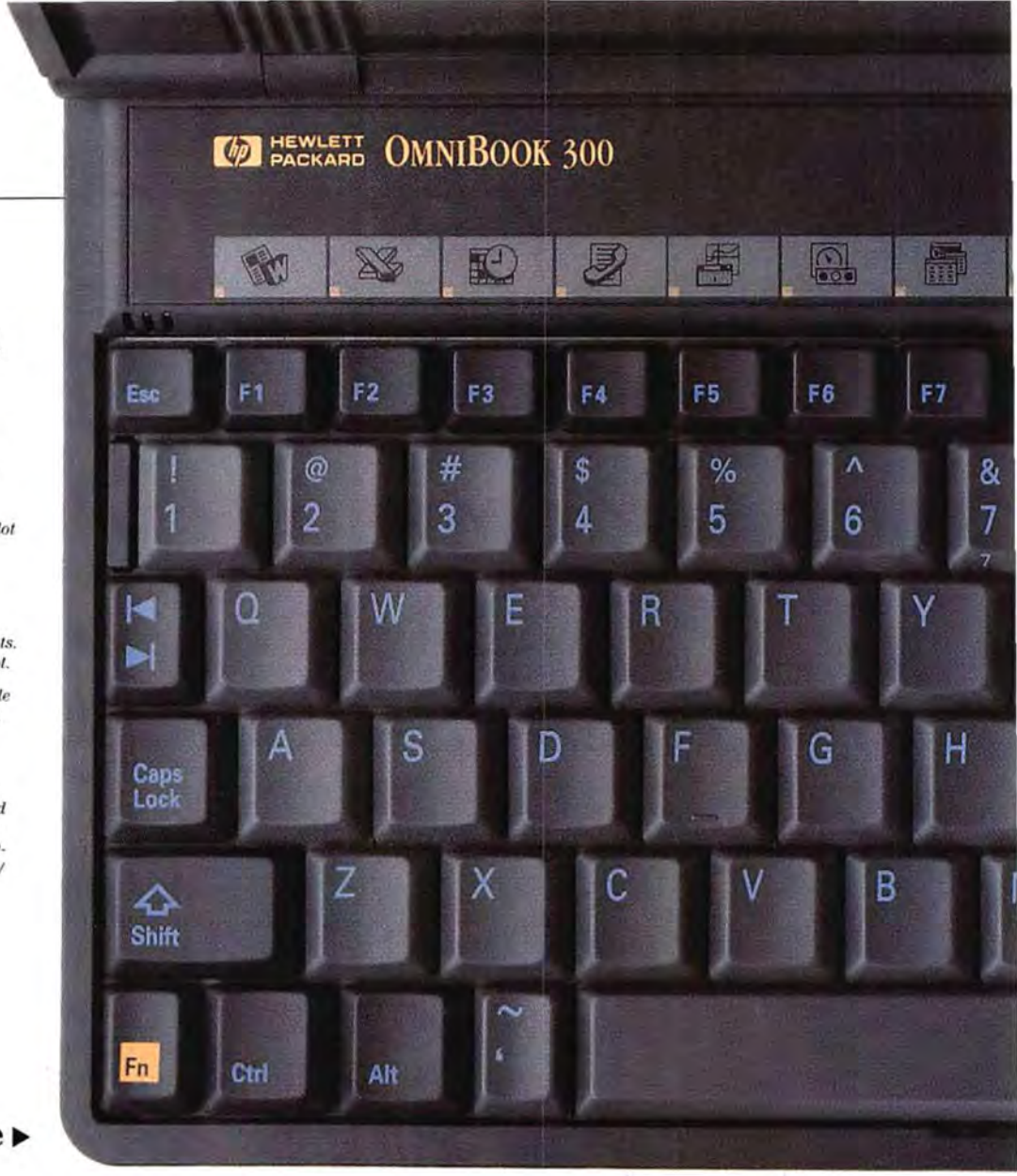
Netis N466 VL/MPC

VITAL STATISTICS

Direct price: $2420
PROS: Great price, solid performance and service and support
CONS: Slow CD ROM drive
Contact: Netis Technology, 408/263-0368
Reader service no. 627

You can almost hear Netis declaring, "We will not be undersold!" Its office-in-a-box PC is the lowest-priced system in this review. We weren't as wowed by this compact desktop's features. Netis took the high road with some components, especially silicon: DX2-66 processor, 8MB of RAM, and 128MB of

Hewlett-Packard and Microsoft are changing the way business travelers work.



***Dimensions** (closed): 1.4" high x 11.1" wide x 6.4" deep.*

***Weight:** Less than 3 pounds: flash disk model lighter.*

***Processor:** 386SXLV CPU.*

***Display:** 640- x 480-dot VGA; 9-inch LCD; 16-level gray scale.*

***Available PCMCIA Version 2.0 slots:** Flash disk model: 2 slots. Hard disk model: 1 slot.*

***RAM:** 2 MB expandable to 8 MB with optional, user-installable RAM expansion card.*

***I/O:** 115k-baud serial RS-232, serial infrared and parallel. Optional 2400-baud data; 9600-baud send/receive fax/modem.*

Actual size ▸

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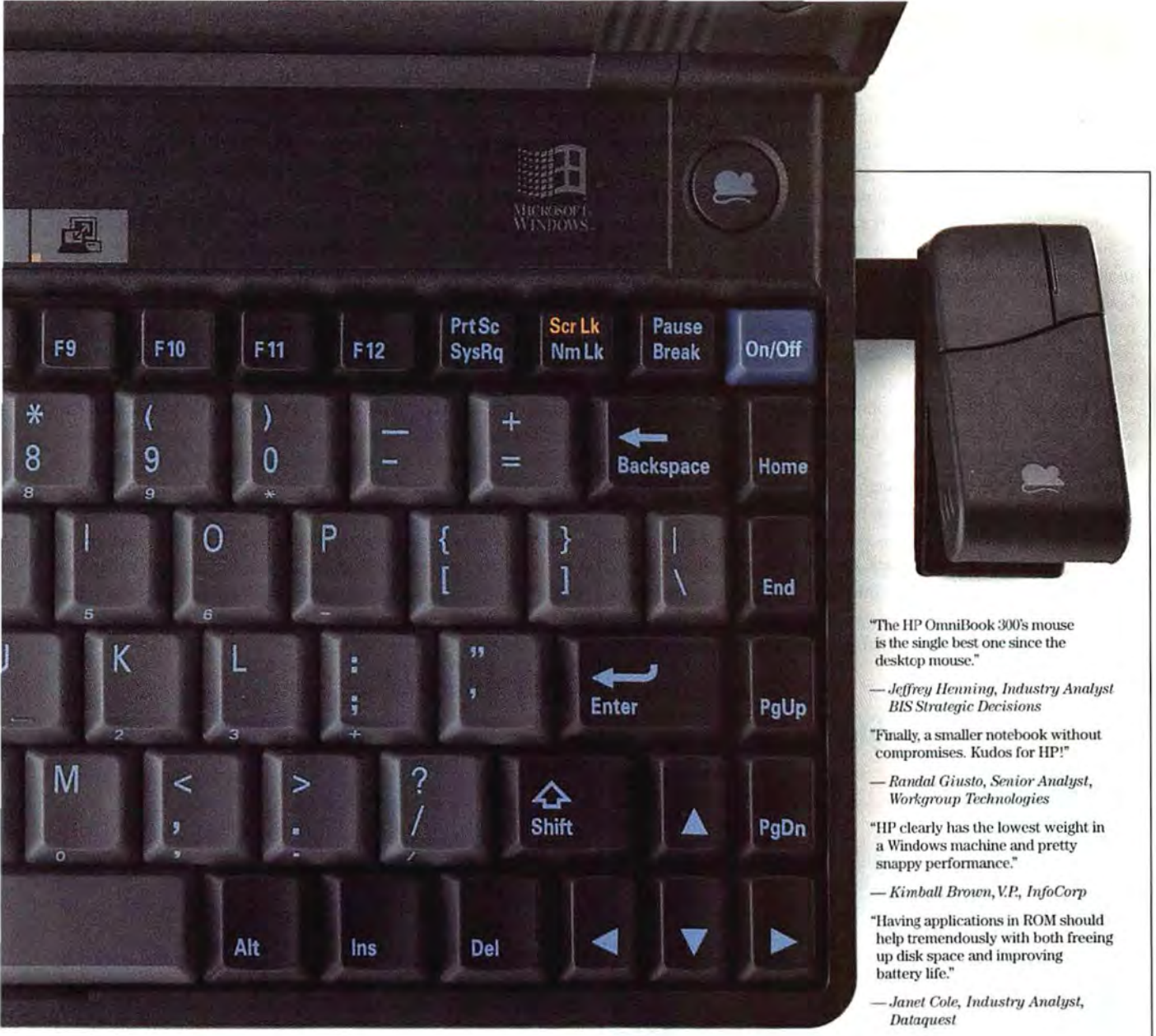

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"Finally, a smaller notebook without compromises. Kudos for HP!"

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"HP clearly has the lowest weight in a Windows machine and pretty snappy performance."

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— *Janet Cole, Industry Analyst, Dataquest*

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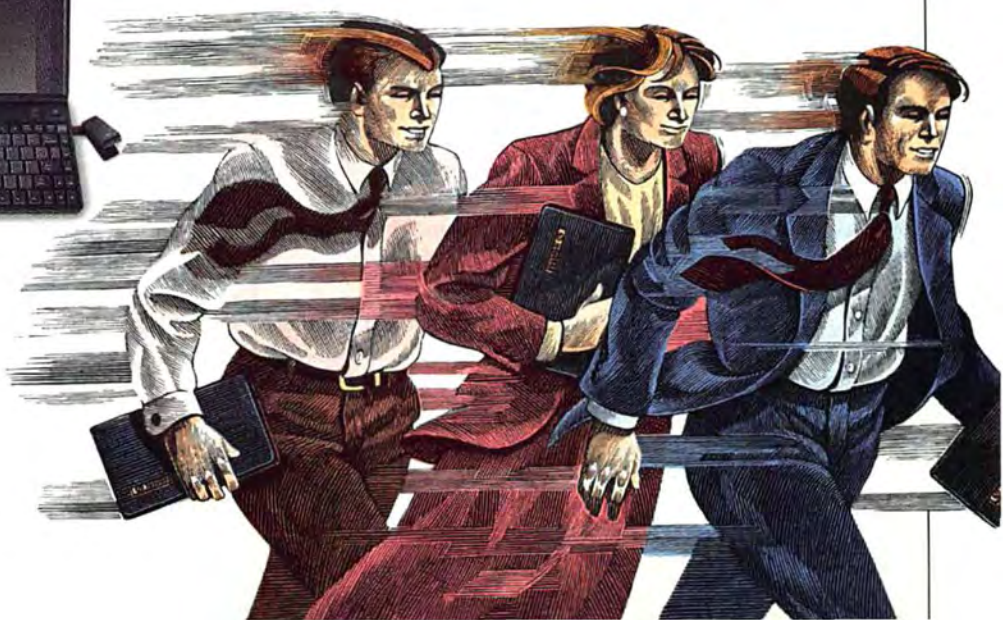
The price to lighten the workload? Just $1,950* for the hard disk model. $2,375* for the flash disk model.

For more information or the name of your nearest HP OmniBook 300 dealer, call 1-800-443-1254, Dept. 236. It's going to make a lot of workloads lighter. Including yours.



HEWLETT PACKARD

secondary cache RAM. It also comes with two VESA local bus slots, populated with an IDE hard drive adapter and a Genoa Windows video controller.

Netis leans toward the minimum on most peripherals—a 14-inch monitor, a 9600/2400 Class II internal modem from Zoltrix, and an 8-bit sound card. The 256MB hard drive might be too small for multimedia mavens, and the 1MB of DRAM on the video board is both slower and smaller than you'll find in some other systems. The quality of support and the service policies were above average. We found tech support knowledgeable and quick to pick up the phone. While the 1-year warranty is a minimum these days and on-site service costs a steep $100, Netis's toll-free support includes Saturdays, and you get a 30-day money-back guarantee and quick 2-day turnaround on repairs.

If we were looking for the cheapest complete-office PC, Netis's submission would certainly rank near the top. However, our aim was to find as much machine as possible for $4000. This system from Netis is without a doubt a solid machine with an alluring price, but its combination of features didn't give it the punch it takes to be a Best Buy. If you're looking for a high-performance do-all PC with a low price, we'd suggest that you check out the system from Keydata instead.

Polywell Poly 486-66VZ

VITAL STATISTICS

Direct price: $3995
PROS: Fastest system in review, voice mail, excellent service policies
CONS: Messy interior layout
Contact: Polywell Computers, 800/999-1278, 415/583-7222
Reader service no. 628

The PCs in this review will do pretty much anything you ask of them, but this system from Polywell is the cream of the crop. It's the most complete PC we've seen in this or any other review, such a powerful combination of performance and peripherals that it's an obvious choice as the top Best Buy.

First of all, the Polywell is the fastest system here. It's particularly well suited to DOS applications; in the BAPCo test suite, it was fastest in five out of six types of applications (word processing, spreadsheets, database managers, desktop publishing, and graphics); the only section it didn't ace was software development, in which it placed second, 13 percent slower than the Tri-Star. It wasn't slow in our Windows suite either; while the Gateway was the fastest Windows system tested, Polywell placed second.

Second, this system has all the hardware we requested and then some. The box includes a Media Vision Spectrum Multimedia Sound Card 16, a Texel CD ROM drive, and, best of all, The Complete PC's Complete Communicator, a combination voice-fax-modem. The system also comes with a 340MB Western Digital hard drive connected to a local bus caching controller, and an Orchid Fahrenheit VA/VLB local bus video board. If all of that isn't enough for you, two of the system's five 16-bit slots are still free, and there's a 238-pin ZIF socket for upgrading the CPU with Intel's forthcoming OverDrive for DX2.

Reason number three: Polywell offers some of the best service in the industry. The system is backed by a 24-month warranty. When we called to check tech support, the support staff picked up the phone quickly, and their responses were right on the money.

Finally, you get all this for $3995. That includes a mixed bag of software, ranging from The Complete Communicator (for DOS and Windows) to Chessmaster 3000 (which could perhaps help you sharpen your strategic skills). We can't fault the Polywell for being more expensive than some systems in the review; we gave companies a $4000 limit to work with, and Polywell used almost all of it.

Okay, we admit the system has a couple of flaws—it's an unholy mess of wires inside, you have to open a door on the front panel to turn the thing on, and on-site service costs $75 per year. But this is one impressive package, including just about everything we had in mind. If you want to set up an office with one easy purchase, this Polywell is your Best Buy.

Tandy 466 DX2

VITAL STATISTICS

Direct price: $3825
PROS: Speaker/amplifier unit
CONS: Bundled with Windows 3.0
Contact: Local Radio Shack dealer, or Tandy headquarters, 817/390-3011
Reader service no. 629

When it came to assembling a complete PC, we had great expectations for Tandy. After all, we figured, a company with so much expertise in different kinds of electronics should have no problems putting it all together in one box. Also, Tandy recently introduced the Sensation series, multimedia PCs designed specifically for the home market. Too bad the system it sent us wasn't a sensation; while it had all the features we asked for, somehow the whole was less than the sum of its parts.

We give Tandy credit for its fine job of integrating components. The video controller adapter and hard drive are both on the motherboard, the latter connected to a 256MB Western Digital drive. Tandy accommodated our hardware requests with its own name-brand sound board, CD ROM drive, and fax-modem; the system also comes with a speaker-amplifier unit that sits under the monitor. Strangely, the system arrived with Windows *3.0* installed. When we called to see if this was an error, the company specifically confirmed that Windows 3.0 was the version it was including with this system. We installed our own copy of Windows 3.1 for testing.

Unfortunately, although this system's performance isn't what you'd call slow, it is 3 percent slower than the average DX2-66. It ran ahead of the pack in our Windows tests but was fully 20 percent slower than the average 66 in the BAPCo suite.

Speed on the Desktop

	Excel 4.0	Freelance for Windows 1.0	Word for Windows 2.0	Paradox 3.5 in DOS window	BAPCo SYSmark92
Polywell Poly 486-66VZ*	1:20	2:19	1:44	1:53	207
Gateway 4DX2-66V	1:23	1:42	1:41	2:13	153
Axik Ace Cache BusinessPro*	1:36	2:25	1:49	2:13	177
ALR Evolution IV MPC 4DX2/66 240	1:42	1:59	1:49	2:05	150
Tri-Star Tri-Win Multimedia System	1:33	2:28	1:49	2:32	158
NEC Image 466	1:19	1:51	1:37	2:48	135
Duracom DeskSaver 486/66DX2	1:42	2:43	1:56	2:30	169
Keydata 486-Multimedia*	1:33	2:24	1:45	2:18	139
Micron 466VL Magnum*	1:27	2:07	1:39	2:44	125
Netis N466 VL/MPC	1:46	2:15	1:55	2:41	134
AST Advantage Plus 486DX2/66*	1:40	2:43	1:56	2:33	133
IBM PS/ValuePoint Model 6384-WS9	1:52	2:34	2:02	2:46	134
Compudyne 486DX2/66 Mini-Tower	2:14	2:41	2:33	2:26	133
Tandy 466 DX2	1:52	3:00	2:04	2:55	116
Eltech Model 4660VB	1:58	2:24	2:44	5:54	155
Blackship BLK 486/50LB	2:08	2:46	2:47	2:53	114
Compaq Deskpro 4/33i	2:09	3:16	2:27	2:35	111
Insight 486-33 VL Multimedia Office	2:10	3:27	2:25	3:03	113
Tangent Black Box M440	2:23	3:34	2:50	2:52	105
DFI Model 466 MPC	2:14	2:59	2:46	3:24	99
Compaq ProLinea CDS	2:42	3:30	3:30	3:59	91

***Best Buy**

Systems are arranged in order of overall speed, from fastest at top to slowest at bottom. Test results are in minutes:seconds (lower is better) except for the BAPCo results, which are given in number of scripts executed per hour (higher is better).

Methodology Systems were tested in the configurations specified in the Features Comparison table. If we had to install Windows ourselves, we performed the program's default installation. We configured Windows on each system with a Hewlett-Packard LaserJet III as the default printer, disabled Print Manager, and attached a null printer to LPT1. We loaded the test applications, test files, the scripts necessary to automate testing, and Microsoft Test (automation software).

Excel 4.0 We perform several data extracts; build and format a financial statement and print it; and open a mortgage analysis, scroll, move blocks, change the interest rate, print preview the statement, and save it.

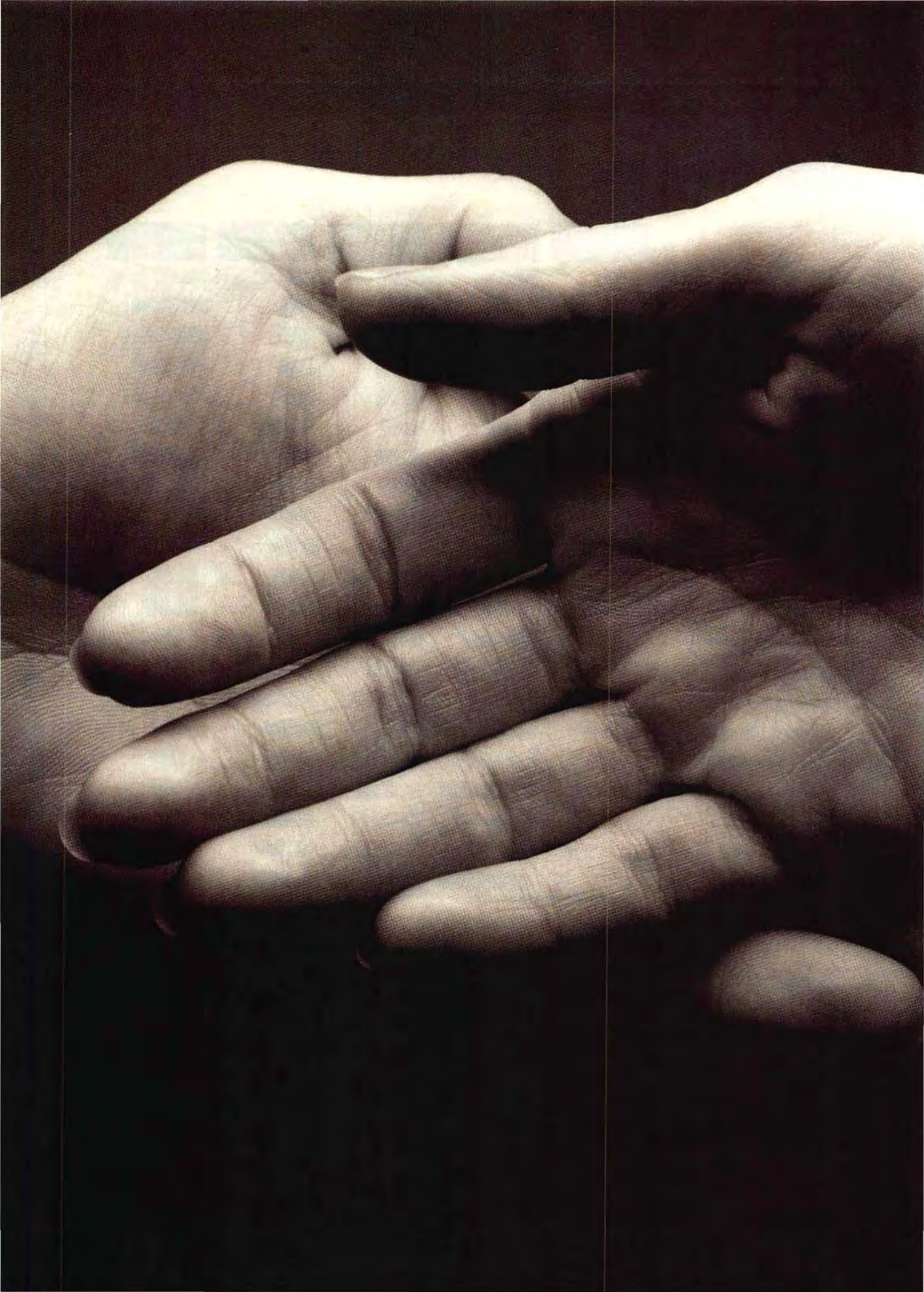
Freelance for Windows 1.0 We load a single-page starter file containing a United States map, with each state a separate object. Then we build a six-page presentation using charts and preview it five times with different effects. Finally, we save the presentation to disk.

Word for Windows 2.0 We use the spelling checker and scroll through a 27-page document; create, format, print, and save a single-page business letter; and open a business proposal, add a paragraph, then preview and print it.

Paradox 3.5 in DOS window We perform a variety of data entry, record searching, and updating tasks. Then we generate reports against a simple customer list.

BAPCo SYSmark92 We run a scripting program that loads common database, desktop publishing, presentation graphics, software development, spreadsheet, and word processing applications and executes a variety of typical tasks with each. The following software packages are used: Aldus PageMaker 4.0, dBASE IV 1.1, Harvard Graphics 3.0, 1-2-3 3.1, Microsoft C 6.0, Microsoft Excel 3.0, Microsoft Word for Windows 2.0, Paradox 3.5, Quattro Pro 3.0, and WordPerfect 5.1.

Data based on tests designed and conducted by the PC World Test Center except the BAPCo SYSmark92, which is an industry-standard test designed by the Business Application Performance Corporation. All rights reserved.



TO DESIGN OUR NEW MOUSE, WE STARTED BY READING PALMS.

In relentless detail, we studied hands of all dimensions.

We consulted professors of kinesiology, engineers, ergonomists and computer users. We used digital fiber optics to analyze the human hand. We followed it in motion.

The result is a new Microsoft® Mouse that is, well, anatomically correct. Uncommonly comfortable.

The palm is perfectly supported. Left or right handed, the grip is comfortable. Fingertips fall naturally into place. A click feels just right.

This mouse even looks good. Intriguingly asymmetrical. Yet it somehow reminds you of the gentle curves of a human form.

Did we mention that it also has some innovative new software features? They allow you to customize the mouse, so it works the way you like to work.

Try the new Microsoft Mouse. If you're not comfortable, we'll refund your money. Guaranteed. Details are on the box, which you can quickly get your hands on at a computer store near you.

Microsoft
Making it easier

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The Tandy's price isn't anything to shout about either. At $3825, it's under our $4000 limit, but so are most of the systems here, and most provide a better selection of software; Tandy includes Microsoft Works for Windows and MTEZ communications software for DOS. The company backs up the system with some ordinary service and support. You can call Tandy direct, but it was a bit sluggish to answer our calls (hold times ranged from 3 to 8 minutes), and it's a toll call to boot. The company prefers that buyers route all questions and service requirements through dealers. On the plus side, you do get a year of free on-site service. We wish we had better news for Tandy, but the competition is pretty fierce. If you're looking for a complete solution, we'd advise you to look elsewhere.

Tangent Black Box M440

VITAL STATISTICS

Direct price: $3749
PROS: Fast CD ROM drive
CONS: Low performance, long delays in tech support
Contact: Tangent Computer, 800/800-6060, 415/342-9388
Reader service no. 630

The M440 could be the Darth Vader of this roundup. Everything—system box, monitor, keyboard, speakers, even the mouse—is a striking jet black, giving this minitower the aura of the ultimate lean, mean computing machine.

Indeed, the M440's design is meant to strike fear into the hearts of its competitors. For starters, it comes with a 238-pin, ZIF CPU-upgrade socket, 8MB of RAM expandable to a hefty 128MB, and 256K of secondary cache RAM expandable to 1MB. Its sleek Sony 10-watt speakers deliver more than twice the punch of the 4-watt speakers found on most other systems. Its CD ROM drive is rated for a speedy 280 ms access time and 300K-per-second data transfer rate and a hefty 256K buffer, all girding it for motion-video action. It's also the only PC in this review to offer three types of expansion slots—EISA, ISA, and VESA local bus—and it has one of the most solid and sensible system board layouts. For all that, the M440 has a surprisingly inviting price.

With all this to recommend it, why did this machine fall in the battle for the Best Buy? Several factors contribute. Although the company offers solid support policies and answered all our tech questions correctly, it lost points on delays in responding that ranged from 45 minutes to 3 hours. Even though the 240MB hard disk is capacious by most standards, it's one of the smallest in this group. And while the video controller delivers 1280 by 1024 resolution, the 14-inch monitor is too small to display more than 1024 by 768 video comfortably.

Where the M440 really falters, however, is at its core. This PC is based on Cyrix's new 40-MHz Cx486S-40 processor—powerful, but just not able to keep up with the 66-MHz CPUs and their 8K of built-in cache (the 486S-40 has only 2K) and built-in math coprocessors. While the M440 flies high, its performance was eclipsed by this group of powerhouses, bringing this potential Best

FEATURES COMPARISON

Complete PCs: Office Replacements?

● Yes
○ No

Standard features	ALR Evolution IV MPC 4DX2/66 Model 240	BEST BUY AST Advantage Plus 486DX2/66	BEST BUY Axik Ace Cache BusinessPro	Blackship BLK 486/50LB	Compaq Deskpro 4/33i	Compaq ProLinea CDS	Compudyne 486DX2/66 Mini-Tower	DFI Model 466 MPC	Duracom DeskSaver 486/66DX2
Selling price as of 5/3/93[1]	$4027	$4627	$3998	$2595	$3653	$2681	$3999	$3699	$3572
CPU	486DX2-66	486DX2-66	486DX2-66	486DX-50	486DX-33	486SX-25	486DX2-66	486DX2-66	486DX2-66
Motherboard manufacturer	ALR	AST	Axik	unlabeled	Compaq	Compaq	Compudyne	DFI	Duracom
BIOS	Phoenix	Mylex	AMI	AMI	Compaq	Compaq	AMI	AMI	AMI
Chip set	OPTi	OPTi	SIS	SIS	Compaq	VLSI	OPTi	Contaq	UMC
238-pin CPU-upgrade socket	○	○	●	●	○	○	●	○	○
ZIF socket	●	○	●	●	○	○	○	○	○
Installed/maximum RAM (MB)	8/52	8/32	8/32	8/32	8/32	8/32	8/32	8/32	8/32
Secondary cache installed/maximum (K)	256/256	64/256	256/256	256/1024	64/64	0/0	256/256	128/256	256/256
Case style	compact	minitower	tower	compact	compact	compact	minitower	compact	compact
Externally accessible drive bays/number free									
3½ inch	1/0	1/0	2/1	1/0	1/0	1/0	0/0	1/1	1/0
5¼ inch	2/1	3/0	3/1	2/0	1/0	1/0	4/2	2/0	3/1

[1] All systems include super VGA and color monitor, a keyboard, a mouse, DOS 5.0 or 6.0, and Windows 3.1; they are otherwise configured as specified.

Selling price is either direct or the average price based on calls made to multiple dealers.

Buy down to a below-average overall rating. If you have a spare 486DX2-66 CPU you can swap in, give the M440 serious consideration; otherwise we cannot recommend it.

Tri-Star Tri/Win Multimedia System

VITAL STATISTICS

Direct price: $3995
PROS: Fifth-fastest system here, 17-inch monitor
CONS: Nothing major
Contact: Tri-Star Computer Corp., 800/800-7668, 602/961-3401
Reader service no. 631

Sometimes the difference between a Best Buy and an also-ran is decided by a few pesky details. That's the case with this system from Tri-Star. Change just a couple of its specs, and it would slip into our winner's circle. Even though it didn't make Best Buy, it's one of the most attractive systems here.

Start with its fifth-place performance finish. It did particularly well in the BAPCo suite, where it was 11 percent faster than your average 66, with especially good scores in the spreadsheet sections. It's also a fast Windows system, only 20 percent slower than the Gateway for overall Windows performance.

Tri-Star also did a good job of adding value with the system's peripherals. One prime example is the 17-inch high-quality MAG monitor, which makes the 14- and 15-inch displays supplied by most vendors look puny. This big display is hooked up to a Cardinal WarpSpeed video card. Tri-Star took further advantage of its VLB motherboard, by putting a caching controller equipped with 2MB of RAM into a second VLB slot. This controller attaches to a 256MB Western Digital hard drive. Also included are Media Vision's Pro AudioSpectrum 16 sound card connected to a Texel CD ROM drive.

The remarkable thing is, Tri-Star accomplished all this without going over our price ceiling. The company also backs the system up with some good service and support, which includes a 2-year warranty and a year of free on-site service. Tri-Star's tech support staff was extremely responsive to our anonymous calls, answering their phones quickly and our questions accurately.

So why isn't this system a Best Buy? Blame the little things. Tri-Star uses a 128K secondary cache instead of the 256K most other vendors supply. When the one year of free on-site service is up, the company guarantees only a 7-day turnaround on factory repairs. The tech support lines are closed on weekends. Finally, Tri-Star's software bundle doesn't compare with what you get from some other companies: In addition to basic communications and Publish It desktop publishing software, you get Marketing Master 1992, the Time Magazine Almanac, and a business atlas, but nothing as nice as Microsoft's Office or Bookshelf, which other vendors included.

We admit our complaints are minor, but they're enough to keep this machine out of the top five. If you like the speed and the 17-inch monitor and don't care about the software bundle, you should definitely consider this system.

	Eltech Model 466DVB	Gateway 4DX2-66V	IBM PS/ValuePoint 466DX2/D Model 6384-WS9	Insight 486-33 VL Multimedia Office	BEST BUY Keydata 486-Multimedia WindowStation	BEST BUY Micron 466VL Magnum	NEC Image 466	Netis N466 VL/MPC	BEST BUY Polywell Poly 486-66VZ	Tandy 466 DX2	Tangent Black Box M440	Tri-Star Tri-Win Multimedia System
	$3449	$4007	$4000	$3999	$2795	$3999	$4475	$2420	$3995	$3825	$3749	$3995
	486DX2-66	486DX2-66	486DX2-66	486DX-33	486DX2-66	486DX2-66	486DX2-66	486DX2-66	486DX2-66	486DX2-66	Cx486S-40	486DX2-66
	Prima	Micronics	IBM	Asus	Asus	Micronics	OEM	Netis OEM	Intercom	Tandy	NICE	Area
	AMI	Phoenix	IBM	AMI	AMI	Phoenix	Phoenix	AMI	AMI	Phoenix	AMI	AMI
	SIS	Micronics	IBM	SIS	SIS	MIC	C&T	SIS	SIS	Opti	Hint	UMC
	○	○	●	●	●	●	●	○	●	○	●	○
	optional	●	●	●	●	●	●	○	●	○	●	○
	8/32	16/64	8/64	8/32	8/32	8/64	16/64	8/32	8/32	8/40	8/128	8/32
	256/256	256/256	0/256	256/256	256/256	256/256	256/256	128/256	256/256	64/256	256/1024	128/256
	tower	tower	compact	tower	tower	compact	desktop	compact	tower	compact	minitower	tower
	2/1	2/2	1/0	0/0	2/1	0/0	0/0	1/0	2/2	1/1	0/0	0/0
	4/2	4/0	2/1	6/3	5/3	3/2	2/0	3/1	3/1	2/1	3/0	4/1

Table continues on following pages

FEATURES COMPARISON

Complete PCs continued

● Yes
○ No
n/a = not applicable

	ALR Evolution IV MPC 4DX2/66 Model 240	BEST BUY AST Advantage Plus 486DX2/66	BEST BUY Axik Ace Cache BusinessPro	Blackship BLK 486/50LB	Compaq Deskpro 4/33I	Compaq ProLinea CDS	Compudyne Mini-Tower 486DX2/66	DFI Model 466 MPC	Duracom DeskSaver 486/66DX2
Standard features cont'd									
Slots/number free									
32 bit	3/1[2]	0/0	2/1[3]	2/1[3]	0/0	0/0	1/0[3]	2/1[3]	0/0
16 bit	3/1	6/3	5/2	3/1	4/2	4/2	5/3	4/2	6/1
8 bit	0/0	1/1	0/0	2/2	0/0	0/0	0/0	2/1	1/0
Ports: parallel/serial/mouse/SCSI	1/2/1/0	1/2/0/0	1/2/1/0	1/2/0/0	1/1/1/1	1/2/1/0	1/2/0/0	1/2/0/1	1/2/0/1
Hard disk[5]	256MB Western Digital	340MB Western Digital	240MB Quantum	240MB Quantum	240MB Quantum	240MB Compaq	420MB Western Digital	340MB Western Digital	340MB Western Digital
Drive adapter	integrated IDE	integrated IDE	ISA IDE card	VLB IDE card	integrated IDE	integrated IDE	integrated IDE	ISA IDE card	ISA IDE card
Caching controller RAM (MB)	n/a	n/a	1	n/a	n/a	n/a	n/a	n/a	4
1.2MB/1.44MB floppy drives	0/1	1/1	1/1	1/1	0/1	0/1	0/0	1/0	1/1
Combination floppy drives	0	0	0	0	0	0	1	0	0
Graphics adapter	ALR Tricombo	Western Digital Paradise Accelerator	Diamond Stealth 24 VLB	Orchid Fahrenheit VA/VLB	integrated Compaq QVision	integrated Tseng ET4000/W32	Diamond Viper VLB	Genoa Windows VGA 24 8500 VL	DFI VG-8000WH
Memory	2MB VRAM	1MB DRAM	1MB DRAM	1MB DRAM	1MB DRAM	1MB DRAM	2MB VRAM	1MB DRAM	1MB DRAM
Monitor	ALR TE 1422	AST SVGA	Micro Scan 3E	KFC	Compaq 15FS	Compaq 15FS	MAG MX17H	KFC Multi-Scan VGA	Relisys RE 1422
Screen diagonal (inches)	14	14	14	15	15	15	17	15	14
Dot pitch (mm)	0.28	0.28	0.28	0.28	0.28	0.28	0.26	0.28	0.28
Sound card	Media Vision Pro Audio-Spectrum 16	Media Vision Fusion CD16	Media Vision Pro Audio-Spectrum 16	CreativeLabs Sound-Blaster 16	Media Vision Pro Audio-Spectrum 16	Media Vision Pro Audio-Spectrum 16 LMSi	Media Vision Fusion CD 16	Microsoft Windows Sound System	Microsoft Windows Sound System
Highest sampling resolution (bits)	16	16	16	16	8	16	16	16	16
Maximum sampling rate (kHz)	44	22	44	44	44	44	44.1	44	44
CD ROM drive	Sony CDU31A-02	Sony CDU31A	Texel DM-3024	unlabeled	unlabeled	Compaq	Sony CDU31A	Toshiba XM-3401B	Toshiba XM-3401B
Built-in buffer (K)	64	64	64	64	32	32	64	256	256
Average access time (ms)	490	490	265	390	290	375	490	200	310
Data transfer rate (K per second)	150	150	300	150	300	150	150	330	330
Fax-modem	unlabeled	AST Data/Fax Modem	Macronix MaxFax[6]	Ripe Hitek RipeFax02M	Compaq	Compaq	National Semi-conductor TyIN 2000	unlabeled	Zoltrix Fax 400
Speed (fax/data) (bps)	14,400/ 14,400	9600/ 2400	14,400/ 14,400	9600/ 2400	9600/ 2400	9600/ 2400	9600/ 2400	9600/ 2400	14,400/ 14,400
Service and support									
Warranty (months)	15	12	12	12	36	36	12	12	12
On-site service price for first year	$9.95	free	free	free	free	free	free	free	free[7]
30-day money-back guarantee	●	●	●	●	○	○	●	○	○
Turnaround policy (days)	2	2	2	2	3	2	2	3	2
Toll-free support number	●	●	●	●	●	●	●	○	●
Daily hours	12	24	9.5	9	24	24	13	9	11
Weekend support	●[8]	●	●[8]	○	●	●	○	○	○
BBS support	●	●	●	●	●	●	●	●	○
Fax support	●	●	●	●	●	●	●	●	○

[2] 2 VLB, 1 proprietary local bus slot total; 1 VLB slot free. [3] VLB. [4] 1 EISA, 2 VLB total; 1 EISA free. [5] Size per manufacturer. [6] External. [7] At dealer's discretion.

Eltech Model 4660VB	Gateway 4DX2-66V	IBM PS/ValuePoint 466DX2/D Model 6384-WS9	Insight 486-33 VL Multimedia Office	BEST BUY Keydata 486-Multimedia WindowStation	BEST BUY Micron 466VL Magnum	NEC Image 466	Netis N466 VL/MPC	BEST BUY Polywell Poly 486-66VZ	Tandy 466 DX2	Tangent Black Box M440	Tri-Star Tri-Win Multimedia System
2/0[3]	2/1[3]	1/1[3]	2/0[3]	2/0[3]	2/0[3]	0/0[3]	2/0[3]	2/0	0/0	3/1[4]	3/1[3]
4/2	6/3	4/3	5/3	7/6	5/3	4/3	4/3	5/2	5/2	5/3	3/2
1/1	0/0	0/0	0/0	0/0	0/0	0/0	2/1	0/0	0/0	0/0	1/0
1/1/0/0	1/2/0/0	1/2/1/0	1/2/0/0	1/2/0/0	1/2/0/1	1/2/1/1	1/2/0/1	2/2/0/0	1/2/1/0	1/2/0/0	1/2/0/0
340MB Western Digital	340MB Western Digital	340MB Western Digital	250MB Western Digital	240MB Maxtor	213MB Maxtor	340MB Western Digital	256MB Western Digital	340MB Western Digital	256MB Western Digital	240MB Seagate	256MB Western Digital
VLB IDE card	integrated VLB IDE	integrated IDE	VLB IDE card	VLB IDE card	VLB SCSI card	integrated IDE	VLB IDE card	VLB IDE card	integrated IDE	VLB IDE card	VLB IDE card
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2	n/a	n/a	2
1/1	1/1	0/1	1/1	1/1	0/0	0/1	1/1	1/1	0/1	0/1	1/1
0	0	0	0	0	1	0	0	0	0	0	0
Genoa Windows VGA 24 8500 VL	ATI Graphics Ultra Pro	integrated S3 801	STB Power-Graph VL-24	STB Power-Graph VL-24	Diamond Viper VLB	integrated Tseng ET4000/W32	Genoa Windows VGA 24 8500 VL	Orchid Fahrenheit VA/VLB	integrated Western Digital 90C31	Hercules Graphite VL	Cardinal WarpSpeed
1MB DRAM	1MB VRAM	1MB DRAM	1MB DRAM	1MB DRAM	2MB VRAM	1MB DRAM	1MB DRAM	1MB DRAM	1MB DRAM	1MB VRAM	2MB VRAM
KFC	CrystalScan 1572FS	IBM PS/ ValuePoint	Philips Fast-Refresh 17	CTX CPS-1560	MAG MX15H	NEC 4FG	View Magic CA-1460	ADI MicroScan 4A SM-5515	Tandy VGM-450	Tangent CM-1430	MAG MX17H
17	15	14	17	15	15	17	14	15	14	14	17
0.26	0.28	0.28	0.26	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.26
Creative Labs Sound-Blaster Pro	Microsoft Windows Sound System	Creative Labs Sound-Blaster 16	Media Vision Pro Audio-Spectrum 16	Aztech Sound Galaxy NX Pro	Creative Labs Sound-Blaster Pro	Media Vision Pro Audio-Spectrum 16	Creative Labs Sound-Blaster Pro	Media Vision Spectrum Multimedia Sound Card 16	Creative Tech Tandy Sound Board	Media Vision Pro Audio-Spectrum 16	Media Vision Pro Audio-Spectrum 16
8	16	16	16	16	8	16	8	16	16	16	16
44	44	44	44	44	44	44	44	44	44	44	44
unlabeled	Gateway 2000	unlabeled	Texel DM-3024	unlabeled	Chinon CDS 535	NEC MultiSpin 84	unlabeled	Texel DM 3024	Tandy CDR-1100	NEC CDR 83J	Texel DM 3024
64	32	64	64	64	256	256	64	64	n/a	256	64
390	375	320	265	350	280	280	390	265	375	280	265
171	150	300	300	175	300	300	171	300	153.6	300	300
The Complete PC Complete Communicator	Gateway 2000 Telepath Data/Fax	Cardinal MB2650SR	Boca MB9624FM	Accex 9624 Fax Modem	QuickTel 1414HV	Zoom	Zoltrix 96/24	The Complete PC Complete Communicator	Tandy	unlabeled	unlabeled
9600/ 2400	14,400/ 9600	9600/ 2400	9600/ 2400	9600/ 2400	14,400/ 14,400	9600/ 2400	9600/ 2400	9600/ 4800	9600/ 2400	9600/ 2400	9600/ 2400
12	12	12	12	18	12	36	12	24	12	12	24
$69	free	free	none	free	free	free	$100	$75	free	free	free
●	●	●	●	●	●	○	●	●	●	●	●
2	n/a	n/a	n/a	2	2	7	2	3	2	3	7
●	●	●	●	●	●	●	●	●	○	●	●
9	18	24	24	11	11	12	10	9	9	9	11
○	●[8]	●	●	●[8]	●[8]	○	●[8]	●[8]	○	○	○
○	●	●	○	○	○	●	○	○	●	●	●
●	●	●	●	●	○	●	●	●	●	●	●

[8] Saturday only.

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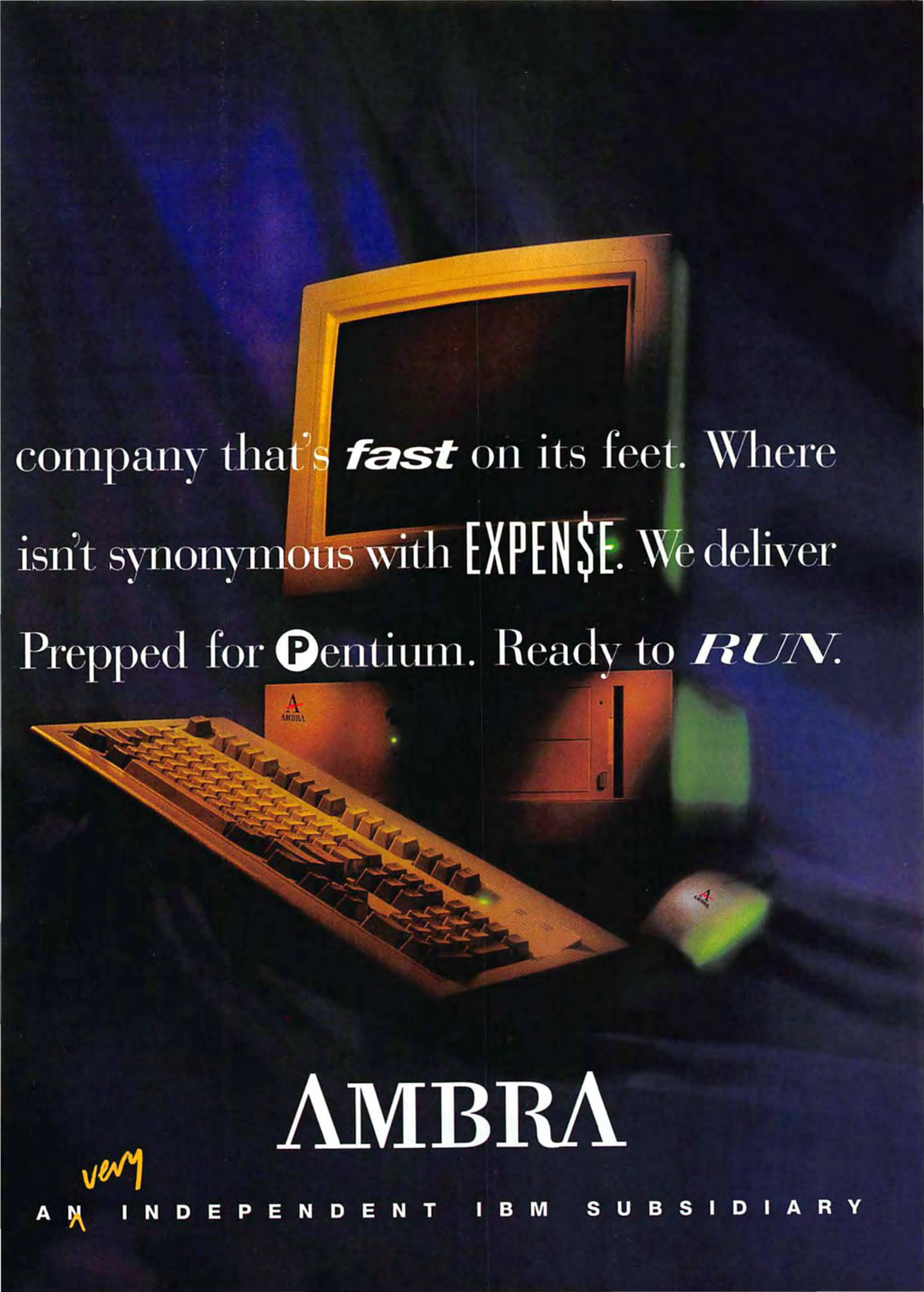
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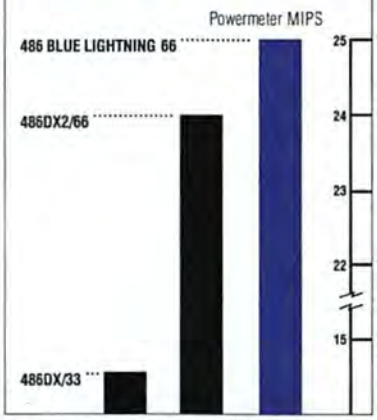
IBM's 486 Blue Lightning™ processor builds on the best features of Intel microprocessors, including performance, instruction set and upgradeability. IBM optimized the instruction set, added a 16KB internal cache, lowered power consumption and improved power management. The result: Blue Lightning doubles internal clocking to 66 MHz, while maintaining full 486 compatibility. AMBRA harnesses the power of Blue Lightning to deliver 66 MHz system performance at 33 MHz prices.

BLUE LIGHTNING PERFORMANCE COMPARISON



All processors were tested on the same IBM motherboard.
MIPS = millions of instructions per second.

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AMBRA will custom-configure any and every computer for you — and it won't cost you an extra day or an extra dime! You have your choice of chassis, processors and a full range of memory sizes. Hard and floppy disks, tape drives, CD-ROM drives, multimedia kits, and more. Plus high-quality, low-radiation AMBRA monitors, network cards, you name it. You get it all preinstalled, from a single source.

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You're backed by a one-year, onsite warranty.[1] And you can count on 10,000 IBM technicians at 190 locations nationwide to deliver service within two days of your call, Monday through Saturday. Plus, you get toll-free support from IBM technical representatives 24 hours a day, 7 days a week.

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1 - 8 0 0 -

66 MHz performance at 33 MHz prices.

With Blue Lightning AMBRA models, you reap the benefits of 66 MHz system performance — at 33 MHz prices.

	AMBRA	GATEWAY	DELL
Model	486 Blue Lightning 66	486DX-33V	433/L
Internal clock	**66 MHz**	33 MHz	33 MHz
External clock	33 MHz	33 MHz	33 MHz
System case	Desktop	Desktop	Desktop
RAM	8MB	8MB	8MB
Cache	**256KB**	128KB	—
Floppy	One	One	One
Hard disk	340MB	340MB	340MB
Onboard SCSI	✔	—	—
Local bus	✔VESA	✔VESA	✔
Video	Win accel w/1MB	Win accel w/1MB	Win accel w/512KB
Color monitor	15" FST*	15" FST	15" FST
Pentium-ready	✔	✔	✔
DOS 6.0, Windows 3.1, mouse	✔	✔MS Works for Windows	✔
Network-ready	**Ethernet (10BaseT)**	—	—
Tech support	24 hours, 7 days/week from **IBM**	Mon-Fri, 6 am to midnight Sat, 9am-4 pm	24 hours, 7 days/week
Warranty/Service	1 year **IBM onsite**	1 year onsite	1 year onsite
Price	**$2,079**	$2,025	$2,699

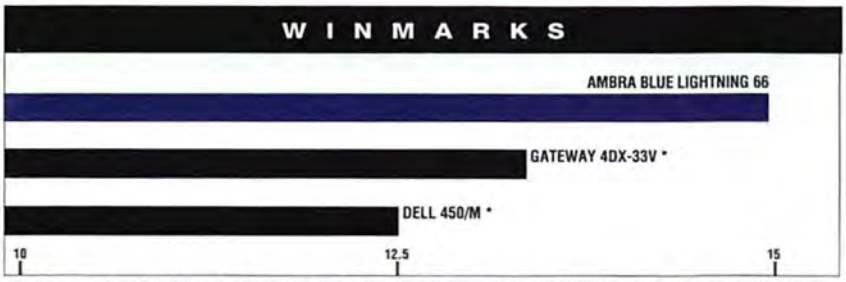
*Upgraded from 14" SVGA at no extra cost. See special offer.

Intel® Pentium, within your reach.

AMBRA is one of the few who can offer you Pentium today — and we offer it at a price you can afford.

	AMBRA	DELL
Processor	Intel Pentium 60 MHz 64-bit proc complex	Intel Pentium 60 MHz 64-bit proc complex
Bus type	EISA	EISA
System case	Desktop	Tower
RAM	8MB	8MB
Cache	256KB	256KB
Floppy	One	Two
Hard disk	**540MB SCSI**	500MB IDE
Onboard SCSI	✔**Dual 32-bit**	—
Local bus	✔VESA	✔
Video	**ATI™ Ultra Pro w/2MB DRAM**	Win accel w/512KB
Color monitor	15" FST*	15" FST
DOS 6.0, Windows 3.1, mouse	✔	✔
Tech support	24 hours, 7 days/week from **IBM**	24 hours, 7 days/week
Warranty/Service	1 year **IBM onsite**	1 year onsite
Price	**$4,259**	$7,566

*Upgraded from 14" SVGA at no extra cost. See special offer.



*Results measured in millions of Winmarks™ Reported in *Window Sources* (Ziff Davis), June 1993. Call AMBRA for specifics of this graphics Winmarks test.

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Competitive prices shouldn't mean mediocre machines. Example: AMBRA's low-cost Model S425SX. It puts you in touch with tomorrow's innovations. That's because it's Pentium-ready — and supports memory upgrades to 36MB. It features the upgradeable 486SX 25 MHz processor, cache to spare, a fast local bus, and Windows accelerator with 1MB video memory.

Extra compact design. Extra color.

At 6.4 pounds, our 486SX 25 MHz SL-enhanced notebook packs a lot of performance. You get 4MB of expandable memory; a 120MB hard disk; STN dual-scan, passive-matrix screen for vibrant color and easy mouse tracking; plus integrated fax/modem and built-in trackball. All for $2,449.

2 5 A M B R A

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Model S450SL
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- 4MB RAM max: 16MB
- 64KB processor cache
- 3.5" floppy
- 125MB (14ms) hard disk
- Windows accelerator with 1MB video memory
- 14" VGA color monitor
- Slimline case
- 3 16-bit ISA slots
- MS-DOS 6.0, Windows, mouse

$1,199

Model S425SX
- 486SX, 25 MHz
- Intel Pentium-ready
- 4MB RAM max: 36MB
- 128KB processor cache
- 3.5" floppy
- 170MB (17ms) hard disk
- 2 VESA local bus slots
- Windows accelerator with 1MB video memory
- 14" SVGA LR color monitor
- Slimline case
- 3 16-bit ISA slots
- MS-DOS 6.0, Windows, mouse

$1,339

Model S433DX
- 486DX, 33 MHz
- Intel Pentium-ready
- 4MB RAM max: 36MB
- 128KB processor cache
- 3.5" floppy
- 240MB (15ms) hard disk
- 2 VESA local bus slots
- Windows accelerator with 1MB video memory
- 14" SVGA LR color monitor
- Slimline case
- 3 16-bit ISA slots
- MS-DOS 6.0, Windows, mouse

$1,689

NC425 SL Notebook
- 486SX, 25 MHz, SL-enhanced
- Dual-scan STN color screen (640 x 480 x 256)
- Fax-modem 2400/9600 baud
- 4MB RAM max: 12MB
- 120MB hard disk
- 3.5" floppy
- 9.5" screen
- Integrated trackball
- 8.6" x 11.4" x 2.0", 6.4 lbs
- MS-DOS 6.0, Windows, MS Works for Windows

$2,449

Model D466BL/CD

An AMBRA Best Buy!

- 486 Blue Lightning 66 MHz
- Intel Pentium-ready
- 8MB RAM max: 64MB
- 256KB processor cache
- 3.5" floppy
- 440MB (12ms) hard disk
- Onboard SCSI
- 2 VESA local bus slots
- Windows accelerator with 1MB video memory
- CD-ROM drive and software
- Media Vision 16-bit sound card
- Stereo speakers
- 17" Flat Square LR color monitor, NI
- Network-ready (Ethernet 10BaseT)
- Desktop case
- 5 16-bit ISA slots
- MS-DOS 6.0, Windows, mouse

$2,869
(For minitower, add $50)

Model D466BL
- 486 Blue Lightning 66 MHz
- Intel Pentium-ready
- 8MB RAM max: 64MB
- 256KB processor cache
- 3.5" floppy
- 240MB (15ms) hard disk
- Onboard SCSI
- 2 VESA local bus slots
- Windows accelerator with 1MB video memory
- ★ 15" Flat Square LR color monitor, NI
- Network-ready (Ethernet 10BaseT)
- Desktop case
- 5 16-bit ISA slots
- MS-DOS 6.0, Windows, mouse

$1,979
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Model D466DX
- 486DX2, 66 MHz
- Intel Pentium-ready
- 8MB RAM max: 64MB
- 256KB processor cache
- 3.5" floppy
- 340MB hard disk
- Onboard SCSI
- 2 VESA local bus slots
- Windows accelerator with 1MB video memory
- CD-ROM drive
- ★ 15" Flat Square LR color monitor, NI
- Network-ready (Ethernet 10BaseT)
- Desktop case
- 5 16-bit ISA slots
- MS-DOS 6.0, Windows, mouse

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(For minitower, add $50)

Model D466E/VL
- 486DX2, 66 MHz
- Intel Pentium-ready
- 8MB RAM max: 64MB
- 256KB processor cache
- 3.5" floppy
- 540MB SCSI hard disk
- 2 VESA local bus slots
- ATI Ultra Pro Mach 32, 2MB DRAM
- ★ 15" Flat Square LR color monitor, NI
- Desktop case
- 7 32-bit available EISA slots
- MS-DOS 6.0, Windows, mouse

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Model DP60E/VL

A Pentium Powerhouse!

- Intel Pentium processor, 60 MHz
- 64-bit processor complex
- VESA local bus with 1 available slot
- 8MB RAM max: 64MB
- 256KB processor cache
- 3.5" floppy
- 540MB SCSI hard disk
- Onboard dual 32-bit Fast SCSI
- ATI Ultra Pro Mach 32, 2MB DRAM
- ★ 15" Flat Square LR color monitor, NI
- Desktop case
- 7 available 32-bit EISA slots
- MS-DOS 6.0, Windows, mouse

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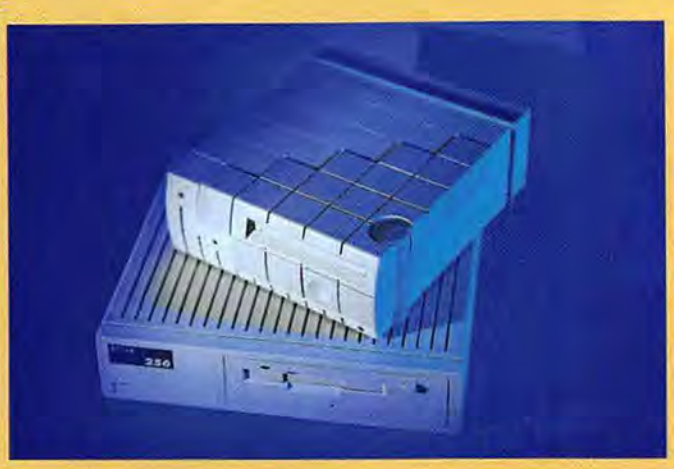
GEOFF SPEAR

MO Drives: Storage for the Masses

With cartridges as portable as a floppy, as roomy as a hard disk, and safer than either, rewritable optical drives offer more benefits than ever. The price? As low as $1000 and falling.

In this era of graphical computing, there's no such thing as a large-enough hard drive. A single CAD, graphic design, or multimedia project can chew up tens or hundreds of megabytes. Or maybe you need to save successive versions of a job in case your boss or client says, "Let's go with it the way you had it two weeks ago." If you do any of these things, a 200MB hard drive is probably not large enough to hold your data files, and a 500MB hard drive will be full before you know it. **BY SCOTT SPANBAUER**

Best Buys



We selected the Ocean Microsystems Vista 256 and the Pinnacle Micro PMO-130 as our Best Buys for very different reasons. The Pinnacle drive boasts one of the lowest prices in the review, yet still managed great performance and ease of use.

The Ocean Vista 256 is more expensive, but it's also fast and easy to use. It has the bonus of twice the capacity of most of these MO drives.

Relax, IBM, and PLI finished a little behind our two Best Buys, mostly because of performance.

BEST BUYS go to the Ocean Microsystems Vista 256 and the Pinnacle Micro PMO-130 (top).

If you've hit that 500MB ceiling, it's time to consider a magneto-optical (MO) drive. MO drives combine high capacity with the convenience of a floppy disk—you can literally pop out that 128MB or 256MB cartridge and put it in your pocket. It'll be safe there, too, because the media is extremely durable.

The average street price for MO drives is $1700 (including SCSI interface boards, cables, software, and a cartridge) and can go as low as $1000. That might seem expensive, but even after adding the price for additional MO media, it's still competitive with the cost, if not the speed, of a 500MB hard disk (see "MOs Save a Lot When You Store a Lot"). Compared with other removable media storage solutions such as an Iomega Bernoulli drive or a SyQuest drive, MO drives perform just as well and, as your storage needs grow, become more economical. The SyQuest drive has a significant installed base in the prepress and publishing industry, however, so for compatibility's sake you might have to choose that over MO.

As your storage needs grow, magneto-optical drives become more economical than other removable-media storage solutions.

Magneto-optical drives are not a universal replacement for hard disks and tape drives, however. Running the software you use every day from an MO would definitely slow you down, and you wouldn't want to place a virtual memory "swap" file on one. But with the exception of performance, MO drives behave almost exactly like regular hard disks; installing and using an application you run infrequently on an MO cartridge is not out of the question, and an MO drive could stand in for a dead hard disk in a pinch.

You can also use an MO drive as a backup device, but you shouldn't buy it for that reason alone. A tape drive is about one-fifth the price of an MO drive, and the media is about one-third the price of an MO cartridge. But tape drives are also extremely slow—switching from one job to another and back again, as you would with an MO drive, could take hours. If you need quick access to lots of large data files, a personal MO drive is the best solution—and backing up your hard disk will cost you only another cartridge or two. But if all you need is a backup device, the economy of tape overrides its slower performance.

Here Today, Here Tomorrow

The technology behind MO drives also offers a benefit that magnetic drives and tape can't: durability. While highly reliable, magnetic media—hard disks, floppies, or tape—are subject to physical wear and erasure by the magnetic fields radiated from telephones, monitors, airport metal detectors, and other equipment. MO disks, on the other hand, are relatively impervious to such environmental factors. As you can guess from the name, MO disks combine some characteristics of both magnetic and optical storage devices, but the MO drive's write head remains fairly distant from the disk, minimizing head crashes; and the data can be altered only by heating the media with a high-powered laser, oven, or building fire. Optical disk manufacturers rate the shelf life of an MO disk conservatively at 30 years.

We evaluated 12 3½-inch MO drives for this review—11 128MB units, and one 256MB drive. A new company, LaserByte Corporation, introduced its LB3128 MO drive too late for review. LaserByte claims to have a proprietary technology that greatly improves its drive's performance compared to other MOs. We were also unable to include the Liberty Systems' 256MB 115MO because the SCSI ports on two successive drives submitted for testing failed. In tests using only its parallel-to-SCSI adapter, it performed well. Although any one of the drives we reviewed could handle your needs, two are clearly best buys: Pinnacle's PMO-130 and Ocean's Vista 256.

All 12 MOs are external units, and two are intended to be portable. Most vendors sell internal units, which not only save

space on your desktop, they cost about $200 less as well. MO drives generate more heat, though, and draw more power than most hard disks. If you're already struggling to keep that 66-MHz 486 cool, you may be better off with an external unit.

The PC World Test Center put the drives through their paces, and I also installed each drive on two different systems—on one using my Adaptec 1542 SCSI adapter and EZ-SCSI software to determine general compatibility with an existing SCSI controller, and on the other using the adapter and software included with each drive. Two drives come with parallel and SCSI interfaces, and we attempted to test both.

A Drive for Every Desk

In choosing the right MO drive, first consider your valuable desktop real estate. If you're like me, you need room to spread out your work, and adding one more peripheral often means moving something else to a drawer or the floor. Drives that allow a choice of vertical or horizontal orientation are generally best at conserving space. The Relax Sierra 128 and Liberty 70MO are by far the smallest drives and could fit on top of even the most crowded desk.

And once a drive is on your desktop, you'll want controls and indicator lights that make it easy to use. Although only two drives offer it, a front-panel power switch is an obvious convenience. Maximum storage puts the Cachet System 6's switch almost out of reach below the SCSI cable connectors. Also, the SCSI ID selector—each device in a SCSI chain, including the SCSI adapter, must use a unique numeric SCSI identifier number between zero and seven—is mounted between the two connectors, making it difficult to change without unplugging one or both of the cables. Sony's RMO-S350 lacks a standard numeric SCSI ID selector, opting instead for toggle switches—a simple push-button or thumbwheel selector would be easier. All the drives have lights that indicate whether the drive is on and when it's writing to the disk. The Pinnacle PMO-130 has a third LED that lights while the drive's write buffer is still full, a nice extra that lets you know when it's safe to eject the disk. All the drives have emergency eject devices as well.

Most drives come with two standard 50-pin SCSI connectors, which give you maximum flexibility in attaching multiple SCSI devices to your adapter. The Liberty and Valitek are intended primarily as portable drives but they include only one SCSI connector. When connected to a standard SCSI adapter, each of these drives must be the last device in the daisy chain. Liberty does make a standard-configuration drive with two SCSI ports and no parallel interface, but they did not submit it for this review.

The two portables also have a parallel-port connector that allows you to attach the drive to your computer's parallel port and still use your printer on the same port via a pass-through connector. Moving either manufacturer's drive to a different computer is a simple matter of plugging the drive in and installing a driver. Liberty embeds a Trantor SCSI controller board in its drive, so when the Liberty is attached to your PC via its parallel port connector, you can attach other SCSI peripherals to the Liberty SCSI port. But because the drive is linked to the computer through a parallel port, performance is markedly slower than when connected to a computer-based SCSI adapter. Valitek's drive also embeds a Valitek SCSI controller and provides drivers that allow you to piggyback additional 3½-inch MO drives (no other SCSI devices are supported) to the printer pass-through port. Moving either manufacturer's drive to a different computer is a simple matter of plugging the drive in and installing a driver.

Getting It Together

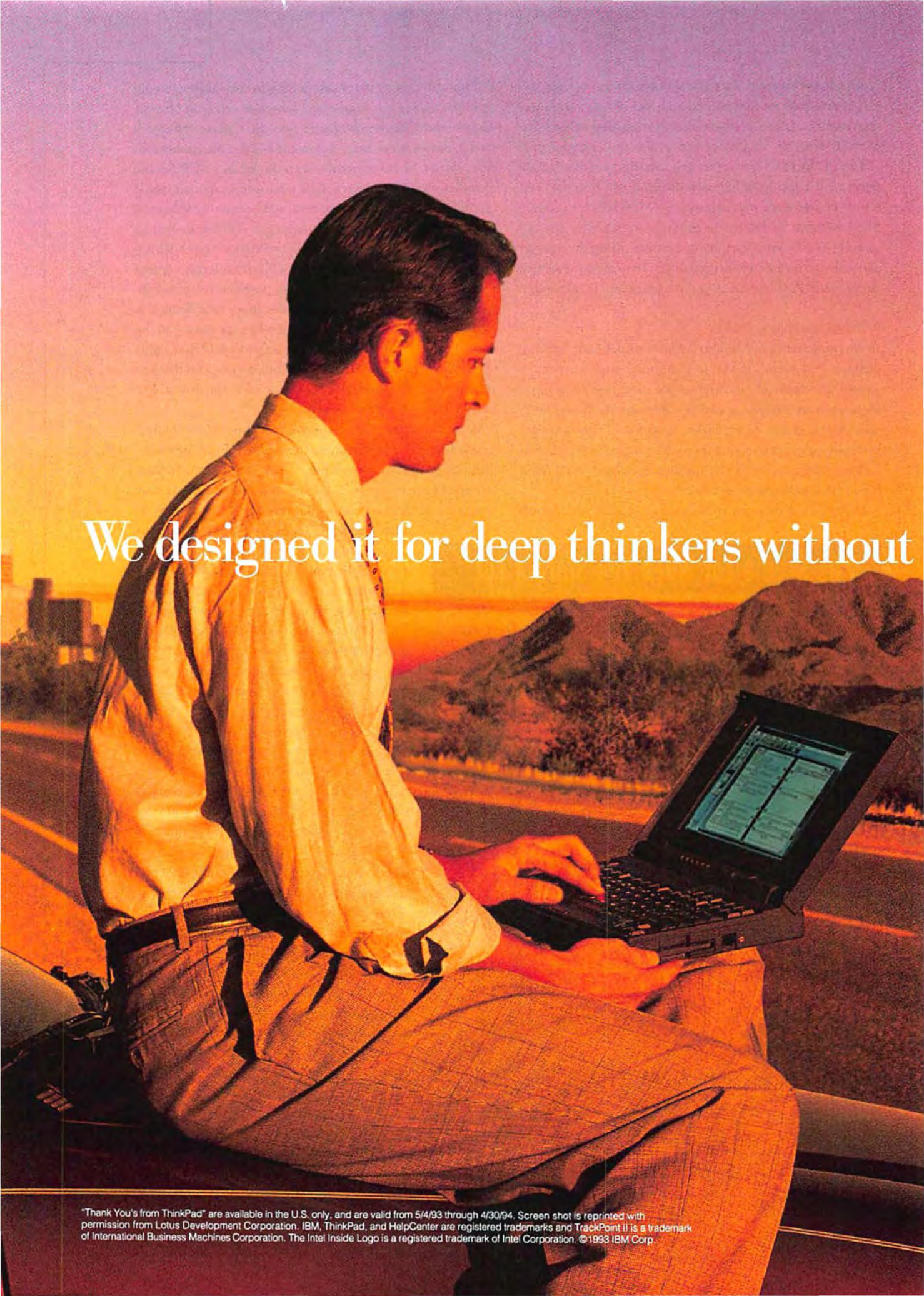
Installing an MO drive is one of the most involved upgrades you can undertake, and unless you've done it 20 or 30 times before, you'll need installation instructions that guide you through the entire process. About half the

MOs Save a Lot When You Store a Lot

With prices starting around $1000, magneto-optical drives at first seem expensive compared with their removable-media competition—the Iomega Bernoulli and the SyQuest drives, which cost $450 to $800. In the chart below, we compare the cost per megabyte, based on advertised street prices, for using these drives at different capacities. We include the cost of using IDE hard drives as a reference point. Bernoulli and SyQuest cartridges are much more expensive ($70 to $150) than MO cartridges, so in the long run you'll spend less to store data if you use an MO drive. A tape drive is the cheapest removable-media storage device, but it's very slow.

Cost per megabyte

Type of media	STORAGE AMOUNT 120MB	200MB	500MB	1GB	2GB
128MB MO drive	$8.21	$5.18	$2.27	$1.34	$0.87
256MB MO drive	$15.83	$9.50	$3.90	$2.05	$1.12
90MB Iomega Bernoulli	$7.48	$5.23	$2.99	$2.39	$2.01
150MB Iomega Bernoulli	$7.90	$5.49	$2.79	$1.84	$1.44
44MB SyQuest drive	$4.92	$3.65	$2.44	$1.99	$1.80
88MB SyQuest drive	$7.08	$4.75	$2.50	$1.85	$1.48
120MB IDE hard drive	$2.08	$2.50			
200MB IDE hard drive	$2.92	$1.75	$2.10		
500MB IDE hard drive			$1.80	$1.80	
1GB SCSI hard drive				$1.55	$1.55



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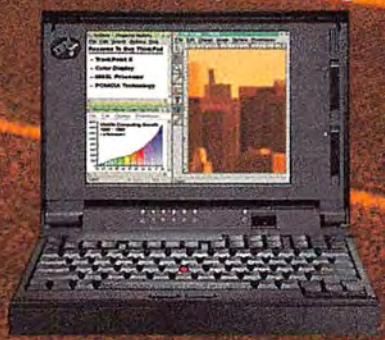
*In Canada, call 1 800 465-7999. **Available Monday–Friday, 8 a.m.–midnight, EDT. Saturday, 8 a.m.–7 p.m. EDT. †Depending on usage and configuration. ††IBM price for ThinkPad 350 (monochrome) with 125MB Hard Drive. Prices and specs differ for other models. Dealer prices may vary.

deep pockets. ThinkPad 350

What's inside

Processor: 486SL 25 MHz	Faster than a shrinking budget.
Display: 9.5″ monochrome	Big picture without big bucks.
Weight: 5.2 lbs. (with battery pack)	Light on your wallet; light on you.
Battery Life: 2.6 to 9.3 hours†	Get ready for the longest power trip of your life.
PCMCIA: Type II (2.01) slot	Adapters the size of a credit card.
Hard Drive: 125MB or 250MB	Store all of your deepest thoughts.
Price: $1,999.00 for 125MB††	Who says power has its price?

Human by design.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Circle 108 on reader service card

drives come with this kind of assistance—the rest suffer from glitches and gaps. I was able to install all the drives to my existing Adaptec controller without trouble, with the exception of the Liberty drive, which uses a 25-pin SCSI-1 connector. Liberty sells a 25-pin to 50-pin cable, but didn't include one with the review units.

In most cases, all I needed to do was partition the drive with Adaptec's AFDISK utility (much as you would use FDISK to partition your hard disk) then format with DOS's FORMAT command. In several cases the blank disks included with a drive came with a low-level format that AFDISK couldn't read, which meant I had to perform a low-level format with another Adaptec utility.

The technology behind magneto-optical drives also offers a benefit that magnetic drives and tape can't: durability. Optical disk manufacturers rate the shelf life of an MO disk conservatively at 30 years.

These glitches illustrate a big problem with MO drives—media interchangeability. All the drives reviewed conform to an industry standard for the physical format of 128MB 3½-inch optical disks, and thus, any one of them can low-level format, partition, and write to any disk. There is no standard for low-level formatting and partitioning, however, and whether a disk created on one drive can be read on another drive is a crapshoot. If you need to ensure media compatibility among a number of drives in your office or a client's, your best route is to standardize on a single controller/software combination or a universal SCSI formatting utility. Corel Corporation's CorelSCSI works with a long list of SCSI devices and controllers that conform to the Advanced SCSI Programming Interface (ASPI).

Next I installed every drive using the SCSI controller bundled by the manufacturer. The Ocean Vista 256 is a partial exception—the company includes disk partitioning and formatting software with its drive, but doesn't sell adapters. The Liberty drive includes a separate controller, which I tested along with the embedded SCSI controller/parallel interface. Finally, Valitek doesn't sell a SCSI adapter for its drive, so I installed it using the parallel interface only.

MO Installation Blues

Installing drives from FWB, IBM, Maximum, Pinnacle, PLI, and Relax was a snap. Installing the adapter and software bundled with the Liberty drive went smoothly except for one hitch: The adapter's built-in floppy controller arrived enabled, which means most users will need to disable it. Documentation didn't illuminate this important fact. Ocean's software installation program repeatedly tried to write to the A: drive, and tech support couldn't explain why.

Installing Procom's drive was more difficult. None of the included documentation explains how to install the necessary removable media drivers, a fact Procom says it will remedy. You might figure out that you need to run the INSTALL program; however, the MO driver won't work with DOS 6.0 until you use DOS's SETVER utility to fool it. Procom said it would post an updated driver on its BBS shortly.

Ricoh's bundled software and adapter were easy to set up, but after rebooting, Corel's ASPI driver issued a 'Sector size too large' error message and the system froze. Corel tech support said the install program doesn't work properly on DOS 6.0 systems where DoubleSpace disk compression is installed, then offered a fairly complicated workaround. Corel says an update is under way.

DOS 6.0 put the kibosh on Sony's disk-formatting and partitioning utility as well. Adapter and driver installation was a breeze, and the company's support staff was very helpful. But, you can't format and use a blank disk with this drive under DOS 6.0 until Sony's update is available.

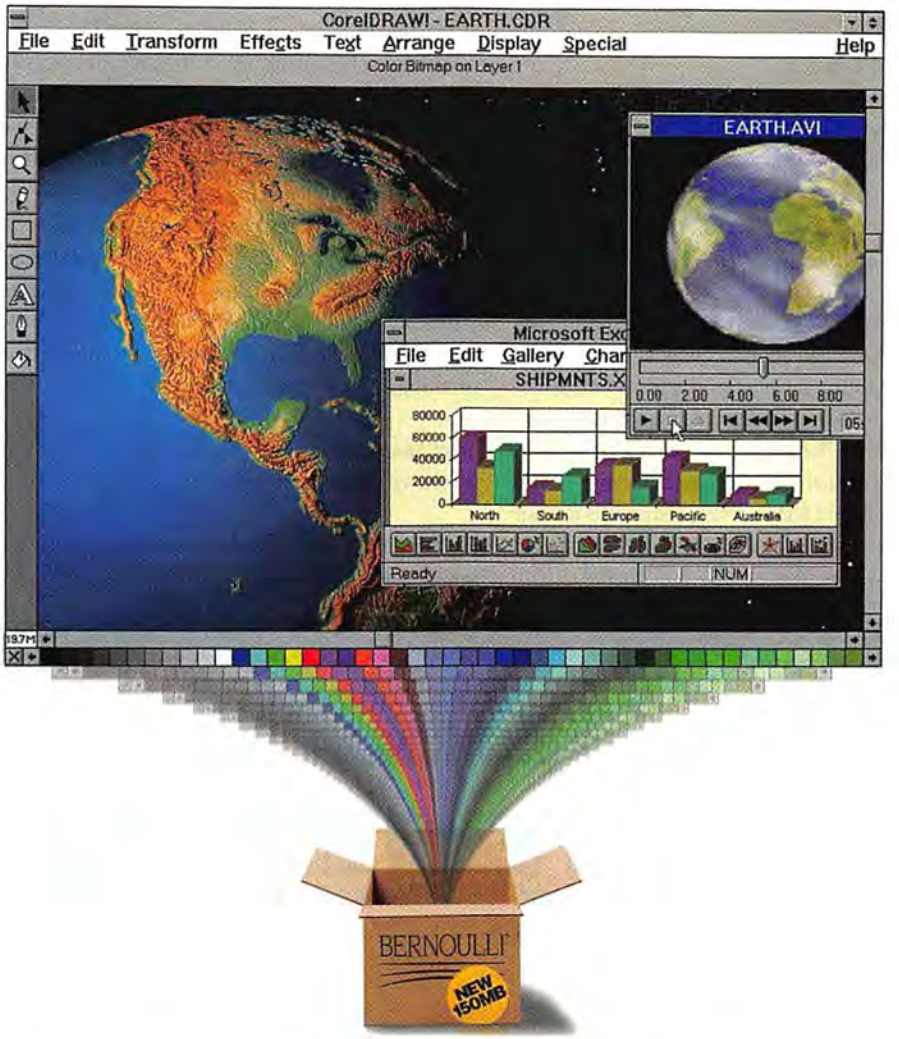
Valitek's software installation program is a study in minimalism. It pokes around your system, asks some questions, then displays the line you should add to CONFIG.SYS (you'll have to write it down carefully), and reminds you to copy the driver to your hard disk. The disk-partitioning and formatting program is not mentioned in either the Readme file or in printed documentation.

Focusing the Opticals

The PC World Test Center Report shows how each drive performed in three specific tasks: reading and writing raw contiguous data to and from the drive (using DOS COPY and XCOPY commands) and noncontiguous reading, which indicates how well a drive will perform under ordinary conditions (the test involves querying an indexed Paradox database). Formal testing showed otherwise, but in everyday tasks—running software, and opening and saving files—most drives performed about the same. The exceptions were the Liberty and Valitek units, which were perceptibly slower when installed to the computer's parallel port. The rest of the drives were just tolerable.

The Test Center found Pinnacle's drive to be the fastest overall, with blazing write performance thanks to the drive's whopping 4MB buffer. The drive came in dead last in the Paradox test, however. A Pinnacle spokesperson said that the drive is designed to perform well at tasks that MOs do best: capturing streams of multimedia data such as sound or video, or working on large bit-mapped images that are usually opened and read once at the start of an editing session, but saved many times throughout. Ocean's drive was nearly as fast as the Pinnacle, with more balanced performance, and turned in the top read speeds. Drives from FWB, PLI, Procom, Ricoh, and IBM also performed well.

It pays to shop around for good service and support. A one-year warranty is a sign that the manufacturer believes in the product—accept nothing less. A 30-day money-back guarantee is harder to come by, but can make the discovery that you really don't need an MO drive less painful. A quick turnaround policy limits costly downtime, and long support hours that extend into the weekend, a toll-free number, and the ability to get help via fax or BBS save you time and money.



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Drive 'Em Home Today

None of the MO drives here is a lemon, but two desktop drives stand out: The Pinnacle PMO-130 and Ocean Vista 256. The PMO-130 offers excellent design and ease of use, fast performance in media-intensive applications, and one of the lowest prices. The Ocean Vista 256, though considerably more expensive than the cheapest drives, is also fast, well-designed, easy to use, and offers twice the capacity of most 3½-inch MO drives. Three other drives are worthy runners-up: Relax's is a bargain, but ran about 25 percent slower than the fastest drives. IBM's is almost as slow and more expensive, but comes with hassle-free installation and great support. The PLI drive's price lies between IBM's and Relax's, and installation is painless. If portability is a must, Liberty's 70MO is about as fast as Relax's and IBM's when connected to your computer's SCSI adapter, occupies almost no desk space, and connects to any PC with a parallel port in minutes.

With their high capacity, portability, and practically unflappable data integrity, MO drives may provide the solution to your storage overload. At press time, manufacturers including Pinnacle, Maximum Storage, and Sony, had slashed list prices. According to Stan Corker, director of removable storage research at International Data Corporation, street prices may drop to $700 by year's end. If discounting continues, MO drives may increase in popularity as a mass-storage solution. Then, instead of deciding what to delete in order to install your 30MB spelling checker, you'll fish through your pockets thinking, "Now where did I put that disk?"

Scott Spanbauer is a contributing editor for PC World. *Research assistance was provided by John Goddard and Anita Hamilton.*

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

PC WORLD TEST CENTER REPORT

MO Drives: Pinnacle and Ocean Top the Charts

	COPY 15MB HD to MO	Paradox lookup	COPY 15MB MO to HD	XCOPY 100MB HD to MO	XCOPY 100MB MO to HD
Pinnacle Micro PMO-130*	2:54	15:26	2:16	14:11	14:53
Ocean Vista 256*	6:21	4:51	1:27	27:30	9:55
FWB HammerDisk 130	3:04	7:39	1:35	32:34	10:54
PLI Infinity Optical 3.5"	2:55	8:54	2:23	33:14	12:26
Procom MEOD 128	2:57	8:50	2:22	34:20	12:50
Ricoh Transporter PC/e	3:42	8:04	2:05	38:51	11:29
IBM 3.5" Enhanced Rewritable MO	3:48	7:39	1:32	41:17	10:58
Valitek PST-MO128	3:51	7:36	1:34	42:47	10:36
Liberty 70MO	3:46	8:24	2:08	42:39	11:33
Relax Sierra 128	4:02	8:18	2:07	43:11	11:43
Sony RMO-S350	4:58	10:07	3:37	41:31	17:24
Maximum Cachet System 6	3:07	9:31	2:53	24:24	39:41
Liberty 70MO[1]	6:33	12:12	5:56	53:51	27:39
Valitek PST-MO128[1]	9:54	14:55	7:35	43:30	35:25

***Best Buy**

[1]Tested with parallel adapter.

Drives are arranged in order of overall speed, from fastest to slowest. All test results in minutes:seconds.

Methodology We used each vendor's software utility to partition and prepare the MO disk provided, using the maximum available space. We chose not to make the partitions bootable because our test assumes a hard disk is booting the machine. The Windows 3.1 documentation states that if you have a SCSI hard disk, you may need to use the double-buffering feature of SmartDrive, so we activated double-buffering for all of the SCSI drives unless the manufacturer specifically said not to. Here are the steps we followed to test each MO drive: We installed the MO adapter shipped with the product, using all default settings recommended by the manufacturer. We initialized the MO cartridge, following the vendor's recommendation for setting up the cartridge. We partitioned the disk as one non-bootable DOS partition. We used Norton SpeedDisk to defragment the hard disk. We fragmented the hard disk using a fragmentation utility so the hard disk was in the same fragmented state prior to performing the first copy on each MO drive. 10MB of disk space was fragmented.

COPY 15MB, HD to MO We time how long it takes to do a DOS COPY of a 15MB Paradox database file from hard disk to MO drive and then flush SmartDrive's cache.

Paradox lookup Running Paradox for DOS on the hard disk, we perform a query that pairs sales orders with their line items according to 16-byte indexed order number. The query matches 2111 records. All data files and index files reside on the MO.

COPY 15MB, MO to HD We time how long it takes to do the previous COPY from the MO drive to the hard disk and flush SmartDrive's cache.

XCOPY 100MB, HD to MO We time how long it takes to do a DOS XCOPY of all files and subdirectories (118.5MB in 2800 user files) on the hard disk to the MO drive and then flush SmartDrive's cache.

XCOPY 100MB, MO to HD We time how long it takes to do the previous XCOPY from the MO drive to the hard disk and flush SmartDrive's cache.

Data based on tests designed and conducted by the PC World Test Center. Testing performed by Senior Performance Analyst Tom Grubb. **All rights reserved.**

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FEATURES COMPARISON

MO Drives: Capacity and Reliability in a Portable Form

● Yes
○ No

	FWB HammerDisk 130	IBM 3.5" Enhanced Rewritable Magneto Optical Drive	Liberty 70MO	Maximum Storage Cachet System 6	BEST BUY Ocean Microsystems Vista 256	BEST BUY Pinnacle Micro PMO-130	PLI Infinity Optical 3.5"	Procom MEOD 128	Relax Technology Sierra 128	Ricoh Transporter PC/e	Sony Electronics RMO-S350	Valitek PST-MO128
Standard features												
Selling price as of 4/15/93[1]	$1999	$2047[2]	$1499[2,3]	$985[2]	$1798[2]	$1164[4]	$1599	$1817	$999[2]	$1750	$1943	$1795
Interface type	SCSI	SCSI	SCSI/[5] parallel	SCSI	SCSI	SCSI	SCSI	SCSI	SCSI	SCSI	SCSI	SCSI/parallel/serial
Includes a cartridge	●	●	●	●	●	○	●	●	●	●	●	●
Unformatted capacity	128MB	128MB	128MB	128MB	256MB	128MB	128MB	128MB	128MB	128MB	128MB	128MB
Partition disk with boot sector	●	○	●	●	●	●	●	●	●	○	●	●[6]
Manufacturer's specifications												
Drive mechanism manufacturer and model name	Panasonic LF-3000	IBM Adstar MD 3125B	Ricoh Transporter	Sony SMO-P301	MOST RMD 5200-S	Pinnacle OHD-130	Sony SMO-P301	Sony SMO-P301	Ricoh Transporter	Ricoh Transporter	Sony SMO-P301	Panasonic LF-3000
Average seek	45ms	40ms	42ms	40ms	35ms	19ms[7]	40ms	40ms	33ms	<45ms	<40ms	40ms
Average latency	9.9ms	10ms	10ms	10ms	12.5ms	9ms	10ms	10.4ms	10ms	10ms	10ms	10ms
Mean time between failures (hours)	25,000	40,000	25,000	25,000	30,000	30,000	25,000	25,000	30,000	25,000	40,000	30,000
Disk rotation speed (RPM)	3600	3000	3000	3000	2400	3000	3000	3000	3000	3000	3000	3000
Buffer size	128K	256K	64K	64K	128K	4MB	64K	64K	128K	256K	64K	128K
Design and construction												
Unit tested	external	external	portable	external	external	external	external	external	external	external	external	portable
Other configuration available	internal	internal	none	internal	internal	none	internal	none	internal	internal	internal	none
Power supply	internal	internal	internal	internal	internal	internal	internal	internal	external	internal	internal	internal
Height by width by length	2.25 x 9.75 x 9.75	3.25 x 9.5 x 11	5.37 x 2 x 7.75	4.25 x 5.12 x 9.25	2.5 x 9.75 x 10.5	3 x 7 x 8.25	2.5 x 9.75 x 9.75	2.37 x 9.62 x 10.5	5.62 x 2.25 x 8.5	6.12 x 3.75 x 9.5	3.12 x 9.87 x 11.25	4.5 x 6.0 x 14.5
Mount (horizontal, vertical, or both)	horizontal	horizontal	vertical	horizontal	both	both	both	both	vertical	vertical	both	horizontal
Power-on indicator	●	●	●	●	●	●	○	○	●	●	●	●
Emergency eject	●	●	●	●	●	●	●	●	●	●	●	●
Front-panel power switch	○	●	○	○	○	○	○	○	○	●	○	○
Compatibility												
Works with Macintosh	●	○	●	●	●	●	●	●	●	○	●	●
Micro Channel bus interface	●	●	●	○	○	●	●	●	●	○	●	●[8]
Service and support												
Warranty (months)	12	12	12	3	12	12	12	12	12	12	12	12
On-site service price per year	○	free	○	○	○	○	○	○	○	○	varies[9]	○
30-day money-back guarantee	○	●	●	○	●	●	●	○	●	○	○	●
Turnaround policy (days at service center)	2	1	2	7 or more	3	2	2	2	2	10	7 to 10	1
Toll-free support number	○	●	○	●	●	●	●	●	○	○	○	●
Daily support (hours)	10	12	9	9	9	10	9	10	9	8	9	10
BBS/fax support	○/●	○/●	○/●	○/●	○/●	●/●	●/●	●/●	○/●	○/●	●/●	●/●
Telephone number	415/ 474-8055	800/ 772-2227	408/ 983-1127	800/ 843-6299 719/ 531-6888	800/ 944-6232 714/ 898-1340	800/ 553-7070 714/ 727-3300	800/ 288-8754 510/ 657-2211	800/ 800-8600 714/ 852-1000	510/ 471-6112	800/ 955-3453 408/ 432-8800	800/ 352-7669	800/ 825-4835 413/ 549-2700
Reader service no.	600		602	603	604	605	606	607	608	609	610	611

[1] Selling price is either direct or the average price found in calls made to multiple dealers. Includes external drive, adapter (if required), cables, and the cost of an optical cartridge, if not included with drive.

[2] Direct price.

[3] SCSI adapter not included.

[4] Vendor-estimated street price.

[5] 8- and 16-bit SCSI controllers extra-cost option.

[6] With SCSI controller.

[7] Vendor-estimated "effective seek" time.

[8] Via parallel-to-SCSI interface.

[9] Price ranges between $150 and $525 depending on severity of problem supported.

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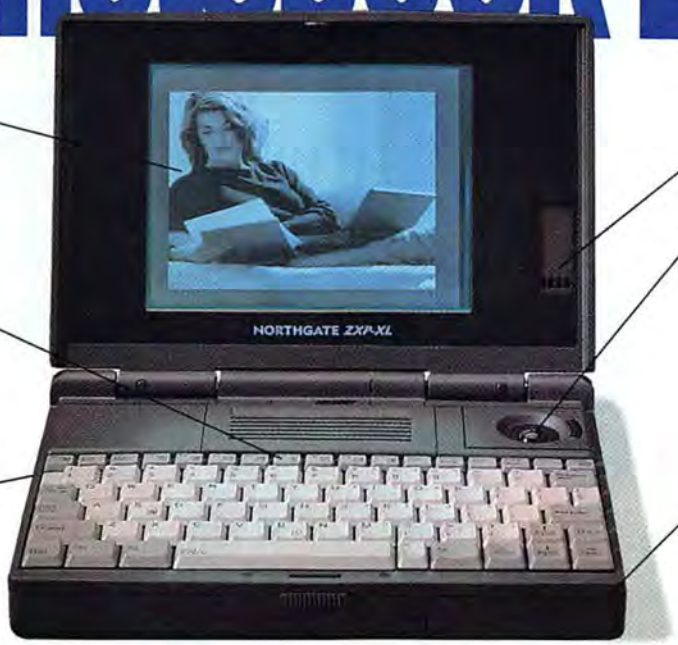

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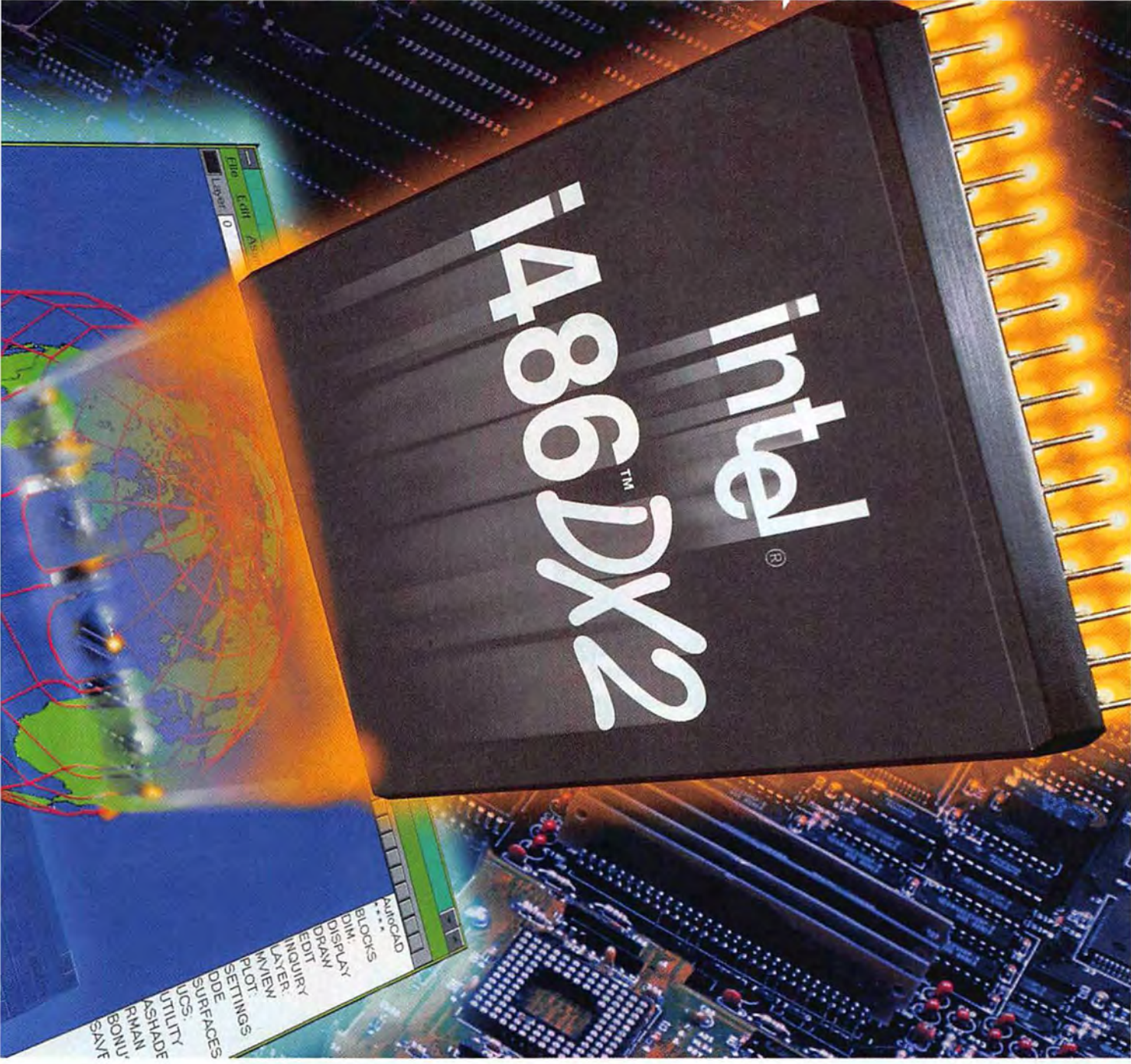

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Want to see a quick boost in your bottom line? These 22 programs–from billing to mailing to personal finance–promise to transform your PC into an instant cash machine.

You buy a new software package and open the box. At the top is a crisp $100 bill. Or a blank check with your name on it.

Impossible? Not really. Knowing that software takes a big bite out of your budget, we set out to find programs that provide *instant payback*, allowing you to recoup their cost immediately. We scoured the PC universe for these packages, talking with dozens of large and small businesses and monitoring scores of electronic bulletin boards. We haven't quite found a program that prints $1 bills, but we've come awfully close. These

By Steve Bass

MICHAEL BARTALOS

22 programs save enough cash—not just productivity or time, but actual hard cash—to quickly pay for themselves and even bring in extra dough. Many provide innovative ways to automate your business that you may not have realized were possible.

We've listed this software in eight categories of common business tasks: billing, check writing, financial decision making, graphic design, legal matters, mailing, payroll, and shipping. The products we've selected can help your business in many ways, from automating a department to improving personal productivity. Among the 22 programs are inexpensive shareware packages and even some free software. Look them over; your bottom line will be glad you did.

Billing

Timeslips 5

You discuss a problem with a client, do some related research, and make phone calls, squeezing the work in between meetings. When you're ready to generate the client's bill, it's difficult to capture every billable minute. Why not simplify the process and make it more accurate with Timeslips 5? The program efficiently tracks your hours and outputs detailed bills. A pop-up stopwatch enables you to record every minute (or even seconds for attorneys). You can track thousands of clients, have six billing rates, and use up to 15 user-definable fields to store in-depth information about clients. Timeslips' report generator produces custom reports, bills, graphs, and data analysis, to name just a few. For another $79.95, Timeslips' Accounting Link will provide a seamless link to many major accounting packages. List price: $299.95. Timeslips Corp., 800/285-0999, 508/768-6100, 508/768-7660 (fax).

Reader service no. 615

TimeTrac 93a

SHAREWARE If you don't require a program that generates bills, TimeTrac is a cheaper alternative. In addition to keeping time, the program allows LAN and remote users to integrate their time records—useful when a group is working on a single client's project. TimeTrac's multiple interruption handling allows you to switch from project to project while keeping track of them all. And because TimeTrac is small—only 355K—it's easy to bring with you on a notebook. You can also export TimeTrac's data to a word processor to create your own bills. TimeTrac is available as TT92A.ZIP on PC World Online and other online services. Registration fee: $50. Compass/New England, 603/431-8030.

Reader service no. 616

Check Writing

Disbursements Manager 1.20 (Windows), Cheqwriter 1.10 (DOS)

WINDOWS One of the best-kept secrets in the banking

Stamps

Can't remember how many stamps to put on a letter that weighs 3 ounces? Every time you slap on an extra one, you lose money. Instead, buy a letter scale, which costs between $5 and $10 at any office supplies store, and then load up Stamps, a free utility that figures out the right postage. Type STAMPS followed by the weight, and the postage amount pops up on screen. You can find Stamps as STAMPS.ZIP on PC World Online and other on-line services. Free.

Reader service no. 635

Save Money at the Post Office

Doing mailings right can save you lots of money. Putting ZIP+4 on your labels gets the envelope to its destination faster. Adding a bar code often cuts the delivery time in half. If you can correct ZIPs and addresses before you mail—and eliminate returns—you've saved postage, paper, envelopes, and labor. To dig into the *big* savings, get a $75 First Class Presort mail permit from the post office. With the yearly permit your 1-ounce, first-class unsorted mail *with* ZIP+4—you'll need at least 250 pieces—costs you 27.6 cents per letter instead of 29 cents. Sort at least 500 envelopes for the post office and the price drops to 24.2 cents per envelope. Stick on an 11-digit bar code and you pay only 23.3 cents. Mail 2000 pieces and you save $114. Do that a few times a year and, well, you get the idea (see "Cut the Cost of Mailing"). Many of the software packages we've listed take care of the tedious job of presorting and printing the special forms the post office requires. Just about the only thing these programs leave out is the rubber bands.

There's one more catch. The ZIP codes on your mailing list must adhere to the Postal Service CASS-standard—Coding Accuracy Support System. If fewer than 85 percent of your letters are correct you don't get the discount. You can submit your mailing list on disk to the post office and they'll process it for you once at no charge (National Customer Support Center, 800/238-3150). You do have to recertify your list yearly. But you can do it in your office for free with CASS-approved software. Or, for about $4 per 1000 names, you can have it certified by an outside firm. Most of the time the post office's business center will provide you with a vendor list.

The post office is eager to help. Locally, you can call your post office's business center. The folks there will walk you through the permit process. The post office's marketing department will send you a free Mail Flow Planning System program, which lets you use your computer to get an overview of the mailing process. It provides a wealth of tips to get your mailings delivered quickly. You'll find the program as USPSMF.ZIP on PC World Online

industry is that you don't have to pay for preprinted checks. Just print them yourself on a laser printer using blank safety check paper and stop paying your bank check-printing fees (see "Printing Your Own Money"). These products take care of everything—check number, bank encoding, logos, and even signatures. The only thing they won't do is make sure you have enough money in your account. They also print financial documents that need magnetic ink character recognition coding, such as deposit slips and preauthorized drafts. The programs accept data from Quicken, QuickBooks, Accpac, and other accounting programs. List price: $59 to $479 depending on the accounting program. Cheqsys, 617/621-7194.

Reader service no. 617

LaserMax

✓SHAREWARE If you want to try printing your own checks, have a look at LaserMax, a $49 shareware program. LaserMax supports Quicken for DOS and Windows, QuickBooks, QuickPay, Pacioli, Microsoft Money, and Managing Your Money and prints to any Hewlett-Packard LaserJet or compatible printer. It's available as LB121.ZIP, LQ121.ZIP, and LQW121.ZIP on PC World Online and other online services. Registration fee: $49. LaserMax Software, 800/385-2737, 518/523-2712, 518/523-8920 (fax/voice).

Reader service no. 618

Financial Decision Making

Fixed Asset Pro 1.2

✓SHAREWARE Tracking a small business's equipment and figuring out a depreciation schedule is a nasty chore. You can pay an accountant to do it or save the money by using Fixed Asset Pro. The program guides you through the process, asking questions about each item and providing comprehensive help. You can choose from five sets of "books" that use the rules from depreciation methods such as alternative minimum tax, federal tax, financial, and state. Fixed Asset allows for fiscal years that differ from the calendar year, applies tax limits, does projections and comparisons, and determines automobile depreciation limits. When the tax code changes, HammerSoft sends updates. The file is available as FAPRO12.ZIP on PC World Online and other online services. Registration fee: $79.95. HammerSoft, 419/986-6007.

Reader service no. 619

Hamlet 2.7

To lease or not to lease, that is the question. A wrong decision can be expensive. Hamlet makes the choice relatively painless and can pay for itself quickly if you're dealing with large amounts of money. Hamlet uses the net present value method, letting you compare purchase and lease alternatives to determine which option is the least expensive. You enter optional variables such as debt, lease, tax, and equipment into Hamlet and make a decision based on which of the outcomes looks most attractive. You can also perform a breakeven analysis, examine the added cost of delayed equipment payments, and factor in one of seven depreciation methods. Hamlet lets you generate summary and detailed reports, such as debt amortization schedules and tax reports, and can export them to the DIF format for use in your favorite spreadsheet. List price: $695. Decision Systems Inc., 612/338-2585, 612/337-5967 (fax).

Reader service no. 620

Per%Sense 2.0

Is it better to refinance your loan or pay it off? Pay a year's rent in advance and take the discount or put the whole amount in a CD and collect the interest? Ask Per%Sense, an inexpensive financial calculator that will help you make the best choice for your bottom line. Per%Sense talks you through the situation, requesting data as you go, or lets you plug your numbers into one of

Shareware at Your Service

Like instant gratification? Can you do without fancy packaging and shrink-wrap? Then shareware is the way to go, especially since it can save you a bundle.

For instant access to the shareware mentioned in this article, we've listed the more popular online services and BBS's across the country. You can access them with a 1200- or 2400-bps modem. All the shareware and free programs are available on PC World Online. You can also get the packages through the distributors listed at right.

ONLINE SERVICES AND BBS'S

America Online
800/827-6364 (membership), 703/448-8700

Channel 1
617/354-8873 (BBS)

CompuServe
800/848-8199

Exec-PC
414/789-4210 (BBS)

Executive Network
914/667-4567 (BBS)

HH Info-Net
203/738-0342 (BBS)

PC World Online
PC World Online is a part of America Online (800/827-6364) and CompuServe (800/848-8990)

SHAREWARE DISTRIBUTORS

EMS
301/924-3594, 301/963-2708 (fax)

Public Brand Software (PBS)
800/426-3475, 317/856-4144

Public Software Library (PsL)
800/242-4775

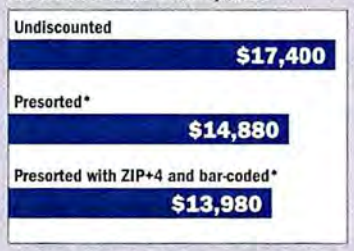
Software Excitement
800/444-5457, 317/286-3182 (fax)

and other online services or call 800/238-3150 to have a free copy mailed to you.

Remember, when you buy a mailing or UPS program, it's essential to register it with the vendor. When UPS or USPS rates increase, you'll want your software updated right away.

Cut the Cost of Mailing

The cost of mailing 5000 1-ounce letters over a 12-month period



Presorted amounts do not include the Postal Service's $75 presort mail permit fee

30 templates. List price: $49.95. Ones & Zeroes Software 800/882-2764, 415/587-1010, 415/334-8720 (fax).

Reader service no. 621

Graphic Design

Instant Artist

WINDOWS At one time or another, everyone needs business cards, even if it's just to impress an in-law. Save the cost of a designer and printer by doing it yourself with Instant Artist (see **FIGURE 1**). Choose from more than 35 professionally designed layouts. Business cards are printed ten to a page to fit perforated business card paper. Instant Artist also lets you design letterhead, banners, certificates, envelopes, and greeting cards. The program supports a range of dot matrix, ink jet, laser, PostScript, and color printers. List price: $79.95 for DOS; $89.95 for Windows. Autodesk Retail Products, 800/228-3601, 206/487-2233, 206/483-6969 (fax).

Reader service no. 622

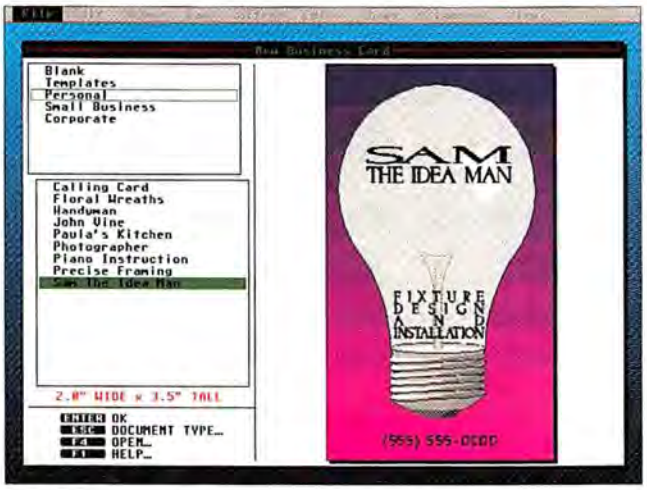


FIGURE 1: INSTANT ARTIST SAVES YOU money with templates that allow you to design your own business cards or other publications.

Rockford 3.0

WINDOWS SHAREWARE If the only thing you want to print is business cards, do it with bargain-basement–priced Rockford. Its format options include vertical and horizontal placement, four border types; line, box, and circle drawing; and PCX and BMP clip art support. Rockford can use ready-to-cut or perforated card stock, or produce camera-ready art for your print shop. It's available as ROCKFORD.ZIP on PC World Online and other online services. Registration fee: $20. OsoSoft, 805/528-3753 (BBS).

Reader service no. 623

Legal Matters

AgreeMentor 2.3

Who was it that said, "Anytime I don't have to hire an attorney, I've saved money?" Probably me. If *you* hate to pay legal fees, consider AgreeMentor, a collection of templates for agreement forms such as Business Assets Transfer, Promissory Note, Authorization to Represent, Custom Development, Warranty, Referral Fee, and the ever-important Partnership Dissolution. The sound legal documents created by AgreeMentor use understandable English, not legalese. Just load the templates into a supported word processor—Ami Pro, Microsoft Works, Word for Windows, WordPerfect, and WordStar, among others—and fill in the blanks. List price: $99. Jian, 800/346-5426, 415/941-9191, 415/941-9272 (fax).

Reader service no. 624

Nolo's Partnership Maker

If you're starting a business partnership, think for a minute. Is a handshake enough? What happens when you disagree? You can save a bundle in legal fees—and avoid having your ex-partner sue you—with Nolo's Partnership Maker. Work your way through the program's clauses, selecting those that apply to your situation. Online legal help explains each clause and clarifies what you put into the fill-in blanks. Partnership Maker comes with a built-in editor or you can export the agreement to an ASCII file and use your word processor to format and print. List price: $129.95. Nolo Press, 800/992-6656, 510/549-1976, 510/548-5902 (fax).

Reader service no. 625

Small Business Advisor 93.3

SHAREWARE If you own a small business, you need to comply with zillions of state and federal regulations to avoid paying tax penalties. The Small Business Advisor acts as an interactive expert, supplying comprehensive legal, regulatory, and tax advice for small businesses in all 50 states and Washington, D.C. The first time you avoid a hefty penalty, you'll recoup the registration fee. It offers advice on a variety of issues, including home office deductions, incorporation, OSHA regulations, the Americans With Disabilities Act, environmental laws, and others. Updates are offered every three months. The file is available as SBADV63A.ZIP and SBADV63B.ZIP on PC World Online and other online services. Registration fee: $29.95. Ronin Software, 206/391-9521.

Reader service no. 626

Mailing

AccuMail

According to the U.S. Postal Service, 15 to 30 percent of average mass mailings are undeliverable due to faulty addressing. AccuMail compares your mailing list with the Postal Service's nationwide database—a 3.8GB compressed file—and corrects street and city names, states, and ZIP codes. Then it adds ZIP+4 (the last four digits of the nine-digit ZIP code), along with the new delivery point codes (the last two digits of the street address) to your database. If you do high volume or very localized mailings, let AccuMail add carrier route cod-

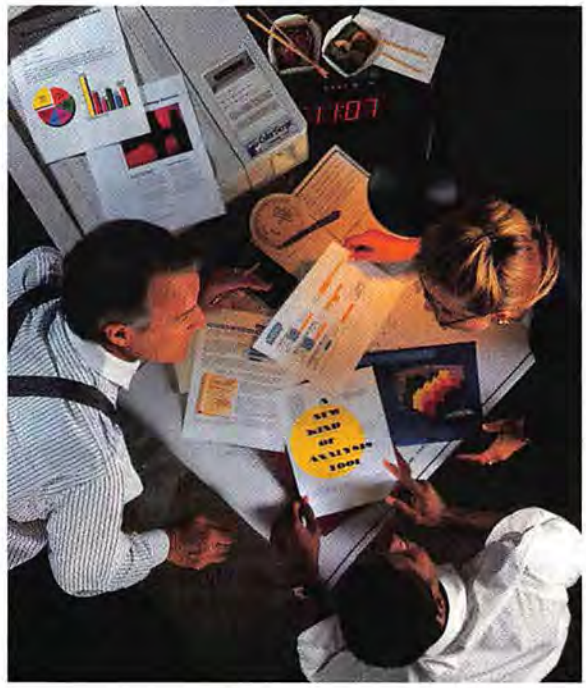
WonderBar

A bar code on each mailing label increases the likelihood your mail will get to its destination quickly—and it can also save you money. With WonderBar, applying bar codes is a snap. Insert the ZIP code preceded by a "^" where you want the bar code to appear. If the ZIP code is 91001-3539, just type ^91001-3539. WonderBar will print bar codes from 5 to 50 digits using laser, 24- and 9-pin dot matrix, and DeskJet ink jet printers. WonderBar is available as WUNBAR.ZIP on PC World Online and other online services. Registration fee: Free for private use by individuals, $35 for commercial firms and government agencies. Binary Systems, CIS: 72775,240.

Reader service no. 636

June 14, 1963.
Cindy Smith plays with color.

Thirty years later her business depends on it.



Introducing the QMS ColorScript Laser 1000. Now your business has total freedom of expression.

For Cindy, communicating decision-critical information quickly, flawlessly and in brilliant color is now her livelihood. That's why she depends on the QMS ColorScript® Laser 1000 Print System. It frees her to print entire forms and letterhead with color logos, images and high quality text without changing paper. It saves her the cost of stocking special forms, letterhead and multiple sets of supplies and uses standard paper and transparencies. It improves her message by highlighting key data with color in multipage presentations and documents. Add direct connection to a variety of networks and anyone can realize both greater productivity and a per user cost that rivals personal printers. Plus, our easy software loadable upgrades virtually eliminate obsolescence.

Save money. Save time. Free yourself from limitations. Discover the advantages of the QMS® ColorScript Laser 1000 Print System.

• Laser color and monochrome printing • Compatibility with PostScript™ Level 2 and Level 1, HP PCL®5C and HP-GL® • TrueType font scaling • Automatic collation • All four ports accept data simultaneously • Automatically interprets incoming data and selects correct language from those available • 65 resident type fonts, all with multilingual character sets • EfiColor™ and Colorimetric color dictionaries and Apple ColorSync™ device profile • Supports DOS, Windows,™ Macintosh® and Unix® applications • Software loadable system upgrades • QMS Crown™ multitasking technology.

Expression is a serious business.
Call QMS today at 800 972-6695 or 205 633-4300.

QMS

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ing to your list for even larger postage discounts. AccuMail is CASS-approved (see "Save Money at the Post Office"). The program supports mailing lists in most file formats including ASCII fixed field, Xbase, R:BASE, Q & A, and Paradox. You need a CD ROM drive to run AccuMail, but if you mail 5000 letters a month, you'll gain back the cost of both the program and the CD within six months. List price: $295 per quarter. Group 1 Software, 800/368-5806, 301/731-2300, 301/306-4373 (fax).

Reader service no. 627

DAZ-zle

WINDOWS Even if your mailing list is so small that you keep it in a Windows word processor, you can still save money on postage by making sure the address and nine-digit zip codes are correct. Just highlight the address you want on an envelope and copy it to the Clipboard. DAZ-zle grabs it from the Clipboard, dials the post office, verifies the address *and* adds the nine-digit ZIP code, pops the address onto an on-screen envelope, and sends it off to the printer. You think that's slick? DAZ-zle also computes the postage due and prints it on the envelope, so you don't waste money by adding too much postage. This version can process only one address at a time, but an address list version should be available when you read this. List price: $39.95. Envelope Manager Software, 800/576-3279, 415/321-2640, 415/321-0356 (fax).

Reader service no. 628

PostSave III

If you send mass mailings regularly but your company is too small to warrant a mail-room staff, you can save money by doing some work for the post office. Start by presorting first- and third-class mail. Earn a few more bucks by adding bar coding to your labels and sorting by carrier route. Sound tedious? PostSave can help (see "Save Money at the Post Office").

PostSave examines your mailing list, determines the lowest postage rate, and then sorts and qualifies the mail into appropriate categories. It also fills out the required postal forms. But that's just scratching the surface: PostSave tackles noxious mailing chores such as locating duplicates, the bane of every mailing list. The program also lets you split fields (to separate first and last name), change the case, replace field values, and mail-merge letters. It accepts Xbase, ASCII, comma-delimited, and fixed field files, supports numerous printers including dot matrix and lasers, and is network ready. List price: $499. Accurate Software, 800/732-3290, 415/591-5601, 415/594-8428 (fax).

Reader service no. 629

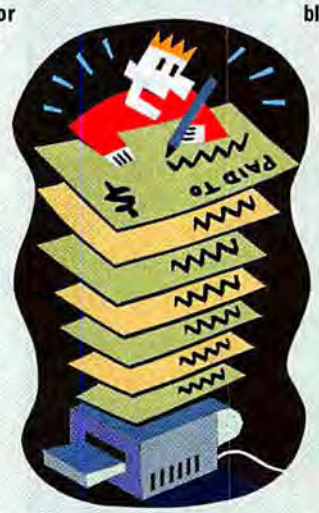
SoftSpoken Mailer for Windows 1.2

WINDOWS It used to be that DOS users banked the most lire in postage savings. But now small businesses using Windows can cash in with SoftSpoken's Mailer for Windows, a neat program designed to manage mailing lists. Mailer for Windows adds bar coding to your labels, presorts first- and third-class mailing lists automatically, and prints all the necessary mailing statement forms for the post office. It also finds and eliminates wasteful—and costly—identical and near-duplicate records. Mailer produces a disk with your list in a format approved by the post office. It imports from and exports to existing databases in Xbase, ASCII, and DIF formats. And it mail merges directly to WordPerfect and Microsoft Word for Windows. List price: $295. SoftSpoken, 800/536-1674, 919/870-5696 (fax).

Reader service no. 630

Printing Your Own Money

If your business is at all automated, you probably print checks on a laser printer using preprinted check forms. But if you write many checks, have several checking accounts, or write checks for a number of different clients, you can save money by printing them on blank paper instead. You need a special MICR (magnetic ink character recognition) toner cartridge, available from Hewlett-Packard (800/538-8787), Troy (800/332-6427), Advantage Laser Products (800/722-2804), CheckMaster (800/334-8449), CHEQsys (617/621-7194), and others. The cartridge uses magnetic ink to print checks that your bank can read with optical character recognition (OCR) devices. Most people use the cartridge for check writing only, replacing it with their regular toner unit when the job's done. The cartridge lists for about $150, but remanufactured ones list for about $70.



Using plain paper isn't a good idea—the minimum recommended weight is 24-pound stock—because it'll probably get jammed in the bank's high-speed OCR machinery. Your best bet? Buy blank laser safety check paper (with the endorsement portion on the back) from a company such as Forms Unlimited, 800/247-3676, 407/391-6900, 407/391-7344 (fax); or Duplex Products, 800/441-3571, 708/692-2260, 708/692-4423 (fax). You get about 2000 sheets for between $30 and $100. Remember, many people forgo the voucher portion of the check and print more than one check to a sheet, bringing down the cost to as low as $26 per 1000.

By comparison, a company such as NEBS (800/225-9550) sells preprinted laser check forms for $182.50 per 2000, or nine cents each. If you're not writing, say, 300 checks a month, printing your own checks, while convenient, may not be financially worthwhile. Finally, before paying for an MICR cartridge, check with your bank. If bank officials balk, stand your ground—or change banks.

Payroll

QuickPay 2.0

WINDOWS If you use Quicken and pay an outside service to do your payroll, save yourself some bucks with QuickPay. This payroll add-in to Quicken prompts you to fill in data about employees and

MOVING THIS WITH OTHER IMAGE EDITORS IS ALMOST AS PAINFUL AS TRYING IT IN REAL LIFE.

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To make keeping up with files easier, Picture Publisher's ImageBrowser™ shows thumbnails of images with search and cataloging capabilities. Plus our new Color Correction option visually adjusts images based on corrected thumbnails.

Any image editor can help you change a photo. But Picture Publisher with Object Layers actually lets you change your mind.

Feature	Micrografx Picture Publisher®	Adobe Photoshop®	Aldus PhotoStyler®
Affordability (SRP)	$595	$895	$795
FastBits	Yes	No	No
Object Layers	Yes	No	No
ImageBrowser	Yes	No	No
On-screen Text Entry	Yes	No	No

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then compute federal and state withholding, Social Security, Medicare, and unemployment, among other calculations. If you have special earning categories, such as a 401(k) plan, QuickPay can figure that too. It accepts a variety of pay schedules including salaried, hourly, and commissioned. Paychecks are transferred into Quicken for DOS, Quicken for Windows, or QuickBooks automatically, and you can easily print all the payroll reports you need to complete your company's 940s, 941s, and W-2s. List price: $59.95. Intuit, 800/624-8742.

Reader service no. 631

Faxing for Dollars

Another great way to save money is to use your fax machine instead of the mail. Local calls are free, of course, so you save the cost of postage. If you're faxing from coast to coast, you can send a two-page, double-spaced document for 14 percent less than you'd spend on a first-class stamp. Wait until evenings or weekends, and you can save another 50 percent. Be sure to purchase fax software that lets you schedule unattended mailings during less-expensive evening hours (see "Windows Fax Software" in the February issue of *PC World*).

The cost of sending 15 two-page letters, comparing postage and phone charges only

Daytime, local	
Fax	$0
Mail	$4.35
Daytime, coast to coast	
Fax	$3.75
Mail	$4.35
Nighttime, coast to coast	
Fax	$1.95
Mail	$4.35

***Source: Richard B. McKenzie, professor in the Graduate School of Management, University of California, Irvine, and author of* The Economy of Faxing: A Technological Threat to the Mail Monopoly.**

Zipper Payroll 1.6

✓SHAREWARE If you own a small company, sending your payroll to an outside firm can cost a bundle. A company with ten employees typically pays at least $780 per year to have its payroll done. Using Zipper Payroll and paying a clerk about $12 an hour, your company should be able to cut payroll costs in half and possibly save even more. Zipper Payroll is a stand-alone program that automates weekly, biweekly, semimonthly, and monthly payrolls. Zipper Payroll lets you have three hourly rates for employees and easily compute vacation, sick pay, tips, and commissions. What will it really cost to give an employee a raise? What impact does overtime have in a given pay period? Use Zipper Payroll's handy "what if" payroll analysis for quick answers. The program also calculates all necessary state and federal taxes, and the registration fee includes the following year's tax table update. Zipper Payroll can export data to Quicken and supports a range of printers. Look for it as ZPACK1.ZIP and ZPACK2.ZIP on PC World Online and other online services. Registration fee: $62. SoftCraft, 206/728-8427, 206/337-1842 (fax).

Reader service no. 632

FIGURE 2: SHIPPIT LETS YOU DETERMINE the cost of sending a package via UPS—and avoid overpaying.

Shipping

CPSLite

Are you writing the correct weight and zone in the United Parcel Service pickup record book? If you're not, you may be overpaying. Even if you're shipping only a few parcels, you can automate the process—and yield some yen—with CPSLite. CPSLite eliminates UPS's time-consuming manual pickup record book—and virtually eliminates errors at the same time—by generating a UPS-accepted manifest and processing parcels for UPS services. You can calculate shipping charges, print labels and COD tags, and maintain a shipping history. The program's data files use dBASE III, although you can import data in ASCII, DIF, and WKS formats. List price: $199.95. Harvey Software Inc., 800/231-0296, 813/482-8600, 813/482-3257 (fax).

Reader service no. 633

Shippit 1.0

✓SHAREWARE Figuring out the shipping price for UPS is a hassle. You can waste money if you don't calculate the ZIP, weight, and zone correctly. But Shippit, a TSR, calculates UPS costs for you. Just enter the ZIP and the weight; Shippit tells you the cost for Ground, Groundtrac, Blue-label and Red-label packages (see **FIGURE 2**). Once you provide a local UPS rate chart, the service customizes the program for your area and notifies you of rate changes. Shippit's available as SHIPPIT.ZIP on PC World Online and other online services. Registration fee: $39.95. Computer Consulting Group Inc., 503/488-3237.

Reader service no. 634

Steve Bass is a contributing editor for PC World *and president of the Pasadena IBM Users Group. He can be reached on PC World Online (see page 12 for contact information).*

The Choice Is
No Longer
Black And White.

inches. Its footprint measures only 11.7 x 8.5 inches, and it weighs just 5.4 pounds.

486 Power

You don't have to sacrifice performance to have color, either. ColorBook models are based on Intel® 486 processors. Both ColorBook models include a floppy drive, 4MB or 8MB of RAM (upgradeable to 20MB), and a large, fast hard drive. These notebooks are powerful enough to become your only computer!

Integrated Track Ball And PCMCIA Slots

The ColorBook includes a built-in track ball, which is much easier to use than a mouse in most portable situations. You also get two PCMCIA Type II card slots so you can plug in dozens of available PCMCIA peripherals.

Greener Pastures

The grass *is* greener on the ColorBook side of the fence! It's an extraordinary value even by Gateway's standards — and we wrote the book on value! We have a reputation for offering the best prices on high-quality products with exceptional service from friendly folks in the Midwest. That's why the choice of a computer supplier is black-and-white, even when you're buying a color notebook! Give us a call.

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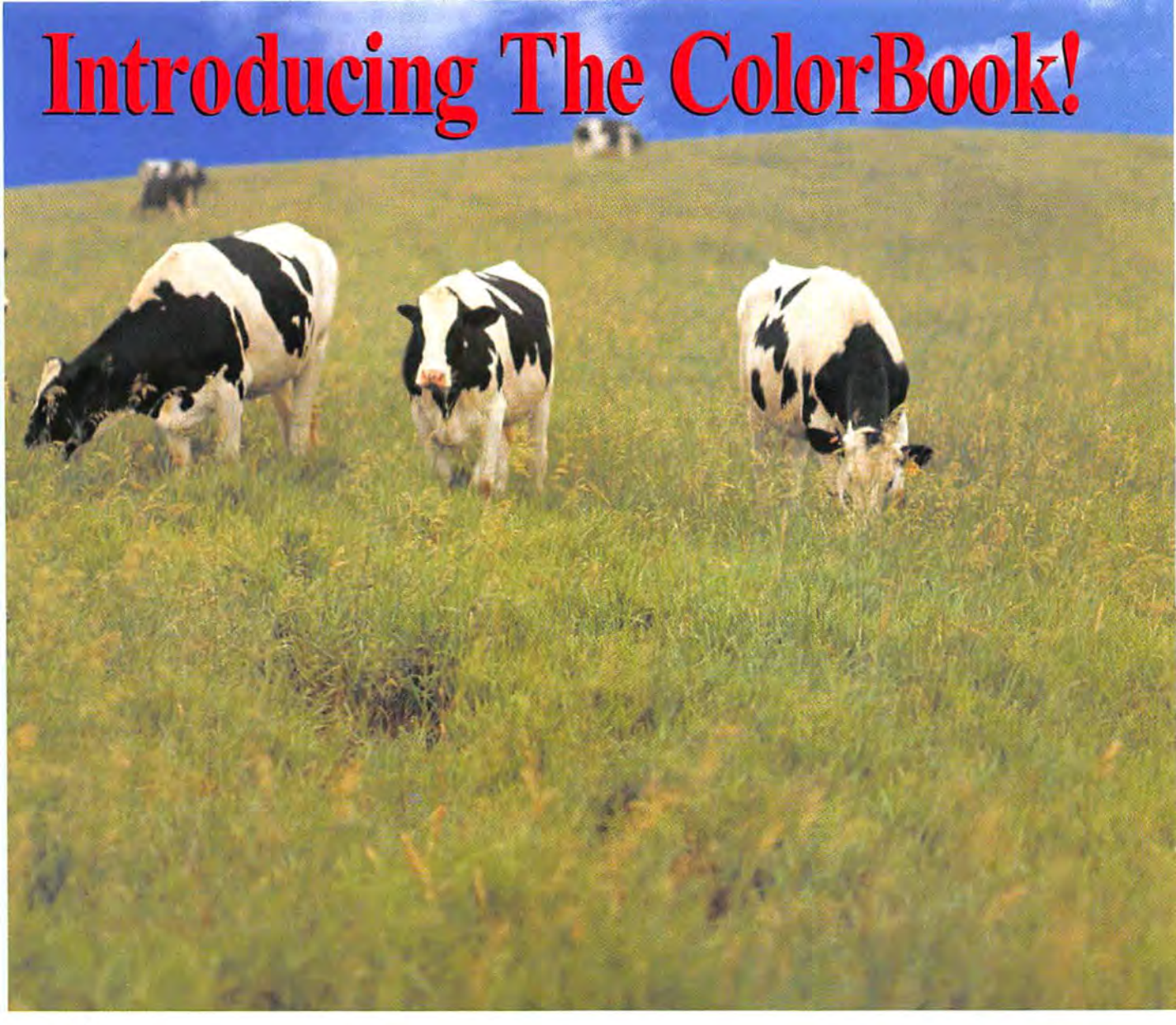
Introducing The ColorBook!



For the same money, you can have a black-and-white 486 notebook. Or you can have a color 486 notebook. Which is it going to be? Hay, it's not too hard to spot the best deal: the ColorBook from Gateway 2000! The new ColorBook has everything you're looking for in a portable at a price you'd expect to pay for a monochrome system. That's a special breed!

Exploding The Myth

Why do you expect to pay so much more for a color portable? Because other manufacturers always charge a plump premium for color. They've been milking the market, brainwashing you into thinking high-quality color costs a lot more to manufacture. It doesn't! We're selling the ColorBook for our usual cost-plus-small-margin. Now other companies will have a hard time perpetuating the color portable price myth. (Competitors absolutely *hate* us! Isn't it great?)

Experts' Reaction

We gave several PC trade publication editors a sneak preview of the ColorBook. Here's what they said about it: "Way cool!" "Dead on." "You won't be able to make enough of these."

Dazzling Color Display

The editors were impressed by the bright, crisp color graphics from the latest-technology, dual-scan STN display. It's a 9.4-inch VGA LCD, backlit for use in any lighting conditions. The editors said the ColorBook has the best STN color display they had ever seen! When they learned one model was priced *less than $2,000*, they were convinced the ColorBook will cause a stampede in the industry.

No Compromise On Size

Adding color to a portable usually means adding weight and bulk. Not so with the Gateway 2000 ColorBook. The ColorBook is the thinnest color notebook on the market — 1.77

Introducing The ColorBook!

The ColorBook is the thinnest color notebook on the market — 1.77 inches. Its footprint measures only 11.7 x 8.5 inches, and it weighs just 5.4 pounds.

You'll appreciate the convenience of using PCMCIA cards. They're as easy to carry as credit cards, and they plug right into your ColorBook.

The integrated track ball slides out from a compartment by the space bar on the keyboard. You simply pull it out and go to work. Finished? Just slide the track ball back into the ColorBook.

FEATURES

Size

With the ColorBook, you get great color at a great price while maintaining excellent portability.

Intel® 486 Processor

ColorBook notebooks are based on Intel 486 microprocessors, which makes them powerful enough to serve as your desktop PC with an external mouse, keyboard and monitor. Supports simultaneous video, up to 1024 x 768 resolution.

Dual-Scan STN Color Display

Dual-scan STN color is the latest technology in portable color displays, and it looks fabulous! You get 256 colors with the ColorBook running in VGA mode (640 x 480 resolution).

PCMCIA Type II Slots

Add a modem, network card or any of dozens of available PCMCIA-compatible peripherals. The ColorBook's two Type II slots can also be used for one Type III PCMCIA card.

COLORBOOK 486SX-25

- Weight: 5.4 Lbs.
- Dimensions: 11.7" x 8.5" x 1.77"
- Intel 25MHz 486SX Processor
- 4MB RAM (expandable to 20MB)
- 3.5" 1.44MB Diskette Drive
- 80MB IDE Hard Drive
- 9.4" Backlit VGA Dual-Scan STN Color Display
- NiMH Battery & AC Pack
- Suspend/Resume Feature
- 2 PCMCIA Type II Slots
- Integrated Track Ball (2 Buttons)
- 85-Key Keyboard
- Parallel, Serial & PS/2 Mouse Ports
- External CRT Port
- MS-DOS® and Windows™

$1995

COLORBOOK 486SX-33

- Weight: 5.4 Lbs.
- Dimensions: 11.7" x 8.5" x 1.77"
- Intel 33MHz 486SX Processor
- 4MB RAM (expandable to 20MB)
- 3.5" 1.44MB Diskette Drive
- 170MB IDE Hard Drive
- 9.4" Backlit VGA Dual-Scan STN Color Display
- NiMH Battery & AC Pack
- Suspend/Resume Feature
- 2 PCMCIA Type II Slots
- Integrated Track Ball (2 Buttons)
- 85-Key Keyboard
- Parallel, Serial & PS/2 Mouse Ports
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- MS-DOS and Windows

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- 15" Color CrystalScan 1572FS

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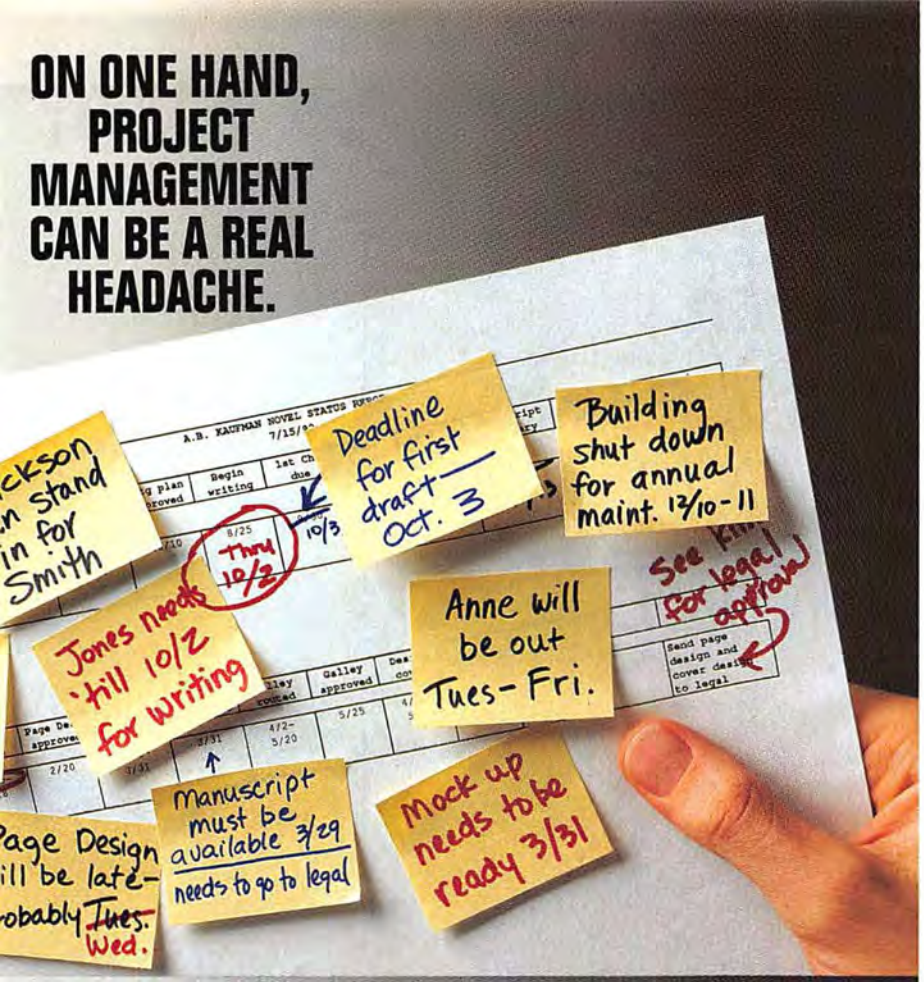
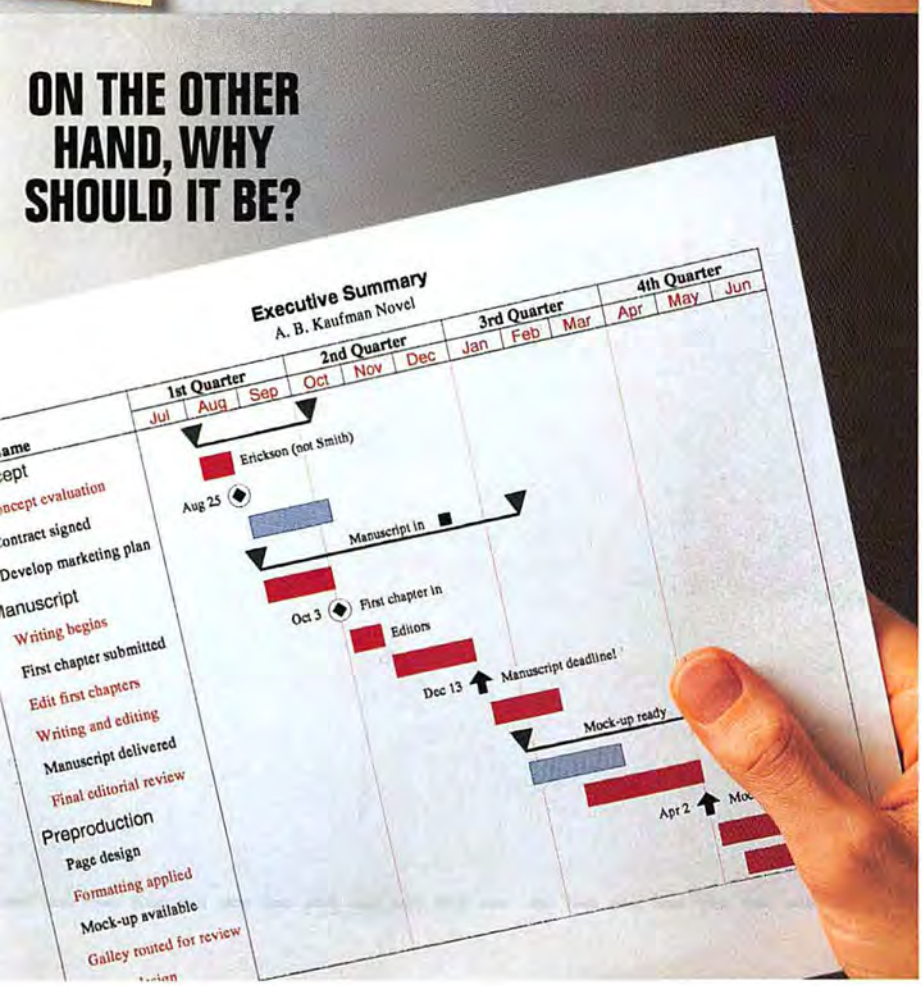


ON THE OTHER HAND, WHY SHOULD IT BE?



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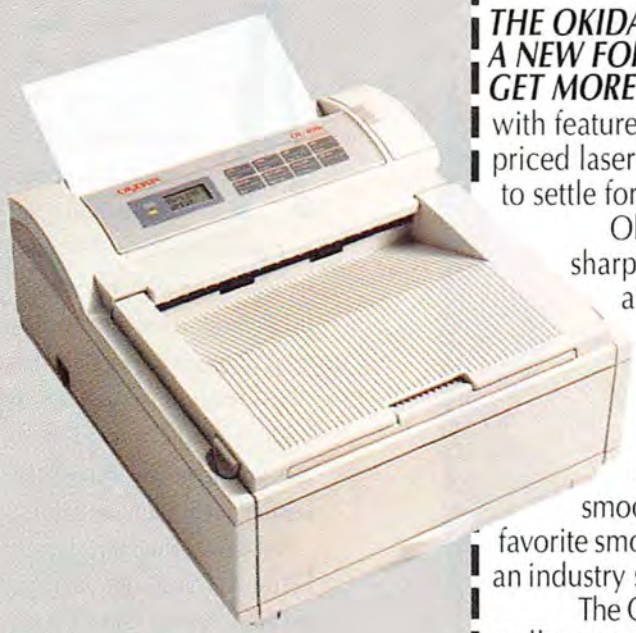

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Backup

Flexible options and easy automation highlight the Best Buys among nine top floppy and tape backup programs.

BRIAN CRONIN

A backup system is as indispensable for your PC as insurance is for your home or car. But you shouldn't have to spend precious work time making sure your data's safe. With auto or home insurance, you specify the protection and file the policy, confident you're protected. A good backup system has to work the same way, ready to pick you up in case of a fall, but out of the way until you need it.

A sound backup strategy requires regular sessions to keep backups current and to minimize potential losses. We recommend at least one full hard disk backup a week and one daily backup of modified files. But a system shouldn't force you to choose between backing

Software

Cheap Insurance for Priceless Data

up and meeting a deadline.

Fortunately, data security is high for all the backup programs here. But usability is the key to regular backups—and full protection. To help you make your backup buying decision, we looked at nine top programs that handle both DC2000 minicartridge tape units and floppy disk drives. Seven were shipping products. Two, Fifth Generation Systems' Fastback Plus 6.0 and Fastback Plus for Windows 1.1, were in prerelease (see "Fastback Upgrades: Ripe With Promise").

Cost isn't a huge factor: The most expensive program here, Sytron's Sytos Plus 1.4, lists for $225. The other prices dip as low as $79 for the price-leading Gazelle products.

In addition to data security, usability was our main concern. We believe you should be able to set up a program easily to fit your working style and never have to think about it again. That's the kind of usability you can expect from our four Best Buys: Central Point's PC Tools 8.0 and PC Tools for Windows 1.0 and Symantec's Norton Backup for DOS 2.2 and Norton Backup for Windows 2.2.

Don't be confused by the backup utility in Microsoft's DOS 6.0. While it was derived from Symantec's Norton Backup and has better functionality than prior DOS versions, it doesn't support tape drives, data compression, or fast direct memory access (DMA) transfers, so its usefulness is limited.

The Tape Backup Connection

If you want the security and convenience of full backups and you have one of the 80MB or larger hard disks typical of today's business PCs, your most practical backup hardware solution is a tape drive: Affordable QIC-80 format DC200 drives start at around $200 on the street. They can back up approximately 250MB of files using data compression—a comfortable fit for full backups on drives from 100MB to 200MB, leaving room to append several modified-files backups.

Because tape drives are now such an essential component in an efficient backup strategy, we included a guide to DC2000 tape drives with information on 31 products from 13 vendors (see the table "Minicartridge Tape Drives: Big Backups Come in Small Packages").

Every product here provides sound data security. All except Sytron's Sytos Plus can check the hard disk to make sure you aren't backing up disk errors. And all the products except the Gazelle DOS package, the Symantec products, and Sytos let you integrate a virus check.

They even guard against operator error by popping up a warning before restoring over existing files.

Automated Safety

Would you want to have to remember to recharge your car's air bag every day? Of course not. So why should you have to remember a daily backup? If you're forced to depend on your memory, chances are that other squeaky wheels will absorb the grease and you'll forget to back up. Fortunately, none of these

By TJ Byers and Rex Farrance

backup packages makes you tie a string around your finger. You can set up a schedule just once, and from then on backups will take care of themselves. Unlike many of the packages that come bundled with tape drives, all these programs back up multiple drives and partitions, which makes for true set-it-and-forget-it backups.

DOS programs always prompt you to shut down your other applications. Windows products, however, take the inside track by running backups while you're working on other applications. Although you can run full backups in the background, it makes sense to reserve this option for backups of modified files, which take less time. But full backups of 100MB of data took these Windows packages anywhere from 40 minutes to over 2 hours. (For more details, see the Test Center Report.) Generally, if you run a backup, restore, or verify in the background, it will take at least twice as long to complete, meanwhile degrading application performance.

Starting, Scheduling, and Easy Selections

Usability begins with installation, and Sytos's is automated ease. Gazelle's Back-It 4 1.4, on the other hand, makes you tweak the CONFIG.SYS and demands a separate tape drive installation step.

As for backup scheduling, all the programs here make it easy: You either click on a date and time or fill in your selection on a scheduling form. Creating setup files containing all the information you need to perform an unattended backup is also a snap.

Flexible and intuitive file selection is a must. All the programs let you include and exclude files by wild card masks (such as *.WK? for all your 1-2-3 worksheets) and dates, and each package lets you select directories from a tree display. But unlike the Best Buy Central Point and Symantec products, which let you select files and directories with a mouse click or two, the Gazelle and Sytron products make you negotiate several screens.

Backing Up Fast

If you're backing up to floppies, you'll really appreciate quick backup speed. Tape drives make speed much less important, as you generally won't need to change your media. Still, it's good to know you can get your disk backed up on your lunch hour.

To test performance, the PC World Test Center created benchmarks that simulate typical business tape backup tasks, including a full backup, both incremental and differential modified-files backups, and a selective restore. The Best Buy Norton Backup products were the fastest programs overall.

So which programs let you set your own backup agenda most easily? Our Best Buys. PC Tools 8.0 and PC Tools for Windows come with a bevy of disk care and data recovery utilities, and Symantec's programs are the fastest packages available. To put the Best Buy seal on four packages is unusual for us. But there's no way to misread the tale of the tape. These Best Buys measure up so well that we'd entrust our most important work to any of them.

TJ Byers is a contributing editor and Rex Farrance an associate editor for PC World. *They can be reached on PC World Online (see page 12 for contact information). Research and support services provided by John Goddard.*

For more information about all products in this article, circle reader service no. 902.

Best Buys

This month's backup software winners have representatives in both the DOS and Windows camps, so whichever is your favorite working environment, you can find the easy street to solid security.

OUR BEST BUYS, Central Point's PC Tools 8.0 and PC Tools for Windows 1.0 and Symantec's Norton Backup for DOS 2.2 and Norton Backup for Windows 2.2 make it a snap for DOS and Windows users to keep their hard disks backed up.

Central Point PC Tools 8.0

PROS: Super setup and scheduling, disk protection, and productivity utilities
CONS: File scrolling somewhat slow

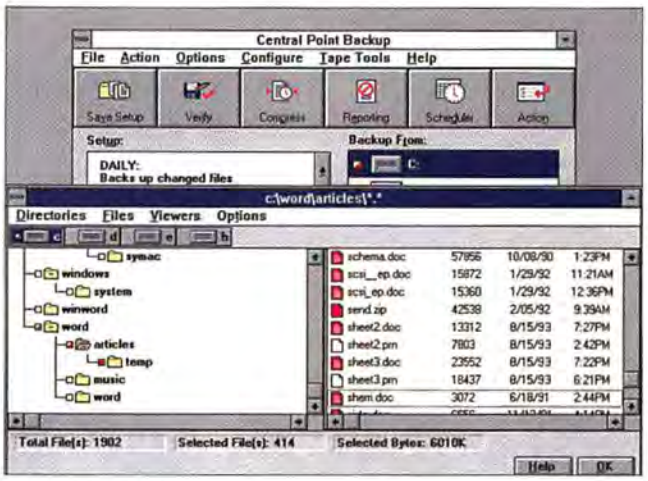
PC Tools 8.0 earned a Best Buy in our July review of disk care programs, but this utility collection's talents don't end there. PC Tools provides terrific backup protection and supports the most popular types of DC2000 minicartridge tape drives, including QIC-40/80 and Conner AccuTrak (Irwin Servo) drives, as well as many high-capacity SCSI tape drives.

While the backup component of this $179.95 utilities collection is also available as a stand-alone, we chose PC Tools 8.0 because it comes with the most current version of Central Point's DOS backup utility. If backing up is all you want to do, you should be able to find the updated $129.95 Central Point Backup for DOS 8.0 on sale by the time you read this. But we'd gladly pay the extra $50 to get the data recovery tools, antivirus utility, disk optimizer, and more.

Creating setup files is a snap, and you never have to travel more than one level to find the tools or files you need. The program also lets you name your backup sets—handy when you have to find a specific set of files to restore. Scheduling is a breeze with the monthly calendar, which indicates the days earmarked for unattended backup or restore. Click on a date, and you can schedule as many different events as you wish and repeat the pattern daily, on weekdays, weekly, biweekly, or monthly.

This version includes tape tools for retensioning, formatting, and the like, which are just a click away from the Backup, Restore, or Compare menus. And PC Tools 8.0 was the third fastest program overall. The only place you'll notice a slowdown is in the scrolling and display of file selections in file-laden directories. If that sounds

CHOOSING DAYS, TIMES, AND TYPES of backups is a snap with PC Tools 8.0's scheduling calendar.



BENEATH ITS EASY-ACCESS TOOL BAR, PC Tools for Windows' selection screen shows its coded icons.

like nit-picking, it is. This is a fantastic program, and using Best Buy PC Tools 8.0 to back up and protect your data is like putting money in the bank.

Central Point Software, 503/690-8090 **Reader service no. 632**

Central Point PC Tools for Windows 1.0

PROS: Super setup and scheduling, disk protection, and productivity utilities
CONS: None

WINDOWS Like its DOS counterpart, PC Tools for Windows 1.0 won a Best Buy in our July disk care review. And why not? With its superb Windows desktop metaphor and disk optimizer, its accessible data recovery tools, and more, this collection stands out in the Windows crowd, and its backup program is also top drawer. Central Point even throws in a fistful of backup sets configured to handle the most likely backup strategies: If you have more than one drive, you can edit sets to include other drives with a couple mouse clicks.

Need to restore a file? Simply select its backup set and click its name, or select the Search History button, type in the name, and let the program find the file for you. Scheduling? Like PC Tools 8.0, it's as easy as it comes. Wide-ranging tape drive support? Virus protection? PC Tools for Windows 1.0 has it all.

PC Tools for Windows' backup capabilities match that of its DOS counterpart, with the Windows advantage of background backups. This backup program is a Best Buy all by itself. But when you plug into the full PC Tools for Windows collection, you'll see the light—this package is a must-have for Windows users.

Central Point Software, 503/690-8090 **Reader service no. 633**

Gazelle Back-It 4 1.4

PROS: Bargain price, excellent tape drive support
CONS: Can't click on individual files for backup, limited scheduling

If you want to back up on a budget and can live without some of the flexibility of the Best Buy programs, $79 Back-It 4 1.4 from Gazelle is worth considering. Gazelle's tape drive support is among the best, and Back-It 4 can handle the most popular QIC-40/80 DC2000 drives. While there's no support for Conner AccuTrak drives, Gazelle works with many SCSI DC6000 ¼-inch cartridge drives as well as some digital audio tape (DAT) drives.

Aside from a quirky installation, the program is simply structured and reasonably easy to use. You select functions from layered menus, but there are no shortcuts. To choose a single file, you have to select its directory and type the file name.

Restore provides its own brand of tedium. You have to rummage through the tape's backup sets, one at a time, manually requesting file lists until you find the set or sets containing your files. Fortunately, there's a history search that can find all occurrences of a specified file or wild card combination.

The scheduler lets you schedule only one backup per day, and all must occur at the same hour. Back-It 4 is a reasonable choice for users who need low-cost tape support. But if you can afford the extra dollars, you'll be happier with one of our two DOS Best Buys.

Gazelle Systems, 800/786-3278 **Reader service no. 634**

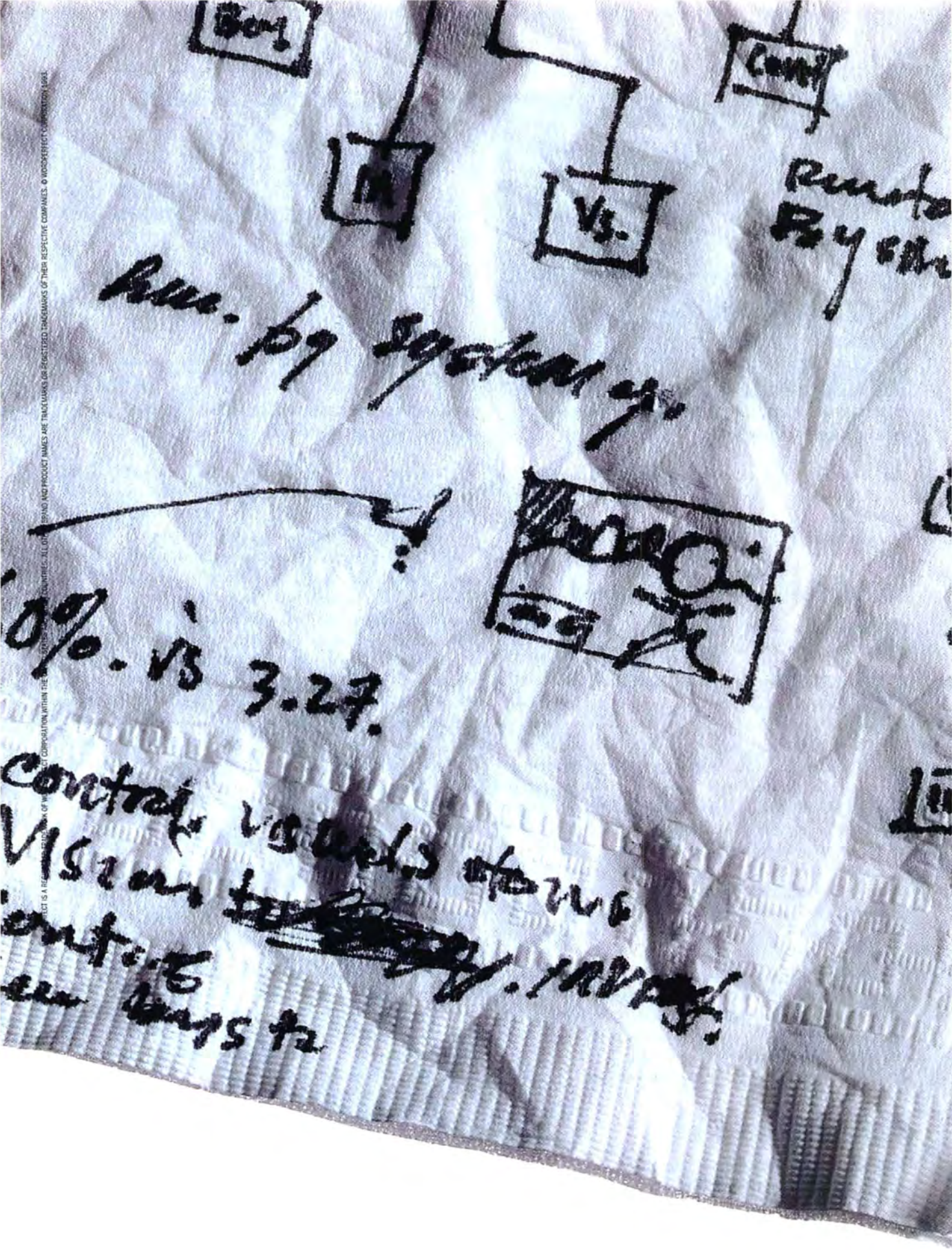
Gazelle Back-It for Windows 1.2

PROS: Bargain price, virus checker, excellent tape drive support
CONS: Limited scheduling, DOS and Windows backups not interchangeable

WINDOWS Although Back-It for Windows 1.2 sells for the same low $79 as its DOS counterpart, the two are not twins in features or capabilities. The Windows version has improved on some features and dropped others—such as LAN support. The biggest improvement is the backup directory tree, which now lists files by name, size, and date. But as with Gazelle's DOS version, there are no incremental or differential strategy choices.

The restore function as a whole is unimproved, and you can't even use the DOS program's history search. That means your file searches must proceed manually—one backup set at a time—from oldest to newest. And unlike the Best Buy Central Point and Symantec DOS/Windows siblings, backup files aren't interchangeable between the two programs.

The scheduler also missed the upgrade bus. You're still limited to the inflexible one-a-day, same-hour scheduling. This program does



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FOR WINDOWS

Fastback Upgrades: Ripe With Promise

Fifth Generation Systems created the PC backup genre with its first release of Fastback, and it still has a hefty market share. While Fastback Plus 6.0 and Fastback Plus for Windows 1.1 upgrades weren't available for this review, we looked at the new features in prerelease copies. Both versions will be priced at $149 list.

The interface is much improved. Users can now select files on a single screen by typing in file or wild card selections or by clicking on a directory tree. The 3-D Express menu also has simplified selections. Fifth Generation is adding antivirus protection, and both Fastback versions can still restore backups made with Fastback's Mac version.

The new scheduler backs up from the DOS prompt or by shelling to DOS from an application. Setup is divided into two steps. The first lists the drives and files to be backed up; the second uses a macro recorder that remembers the moves you made to create a particular backup strategy. You can link the two processes through the macro—or run them individually from a batch file.

Fastback Plus for Windows continues the look and feel of the DOS version. It wasn't as fully developed, and the macro scheduler, network support, and virus checking weren't fully implemented. But we saw enough to get a sense of what's coming. An impressive new feature that *was* working is a micro programming language that can turn backup sessions into icons.

Fifth Generation bundles in drivers for a profusion of QIC-40/80 and SCSI tape drives. And the network support is impressive, including saves of NetWare bindery and system files and peer-to-peer LAN backups.

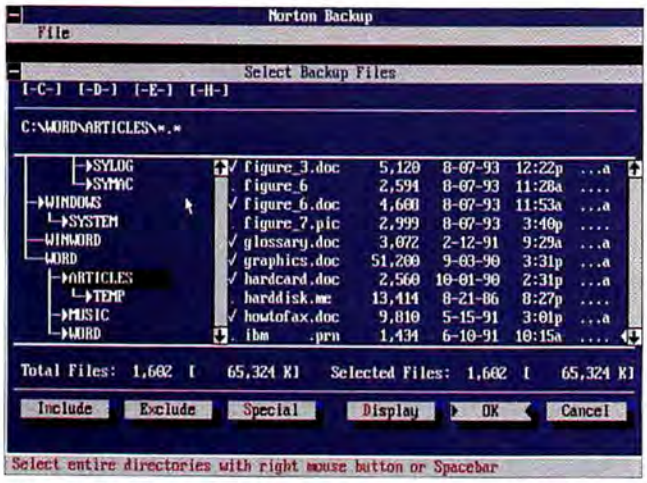
Without a full evaluation, we can't give buying recommendations. But if the shipping versions deliver the potential we saw in their betas, they should be hard to resist.
Fifth Generation Systems, 504/291-7221
Reader service no. 779

offer the advantage of Windows background backups, but it's also the slowest in our review. Unfortunately, Back-It for Windows 1.2 forces you to back up the Windows disk swap file, which eats up time as well as tape space. Gazelle informs us that Back-It for Windows 1.3—due later this year—will correct this deficiency. This is the least-expensive Windows tape handler we know of, and it even includes virus checking. But only a severe budget crunch should turn you away from our Best Buys.
Gazelle Systems, 800/786-3278 **Reader service no. 635**

Symantec Norton Backup for DOS 2.2

PROS: Fast, easy to use
CONS: None

If you want feature-rich backup from a program that's a cinch to install and use, Symantec's Norton Backup for DOS 2.2 delivers the goods. Creating setup files is fast and easy, with most setup parameters just a click away. Point-and-click file selection is as easy as plucking cherries off a tree, or you can just let the program find changed or missing files for you.



FILE SELECTION IS POINT-AND-CLICK in Norton Backup for DOS, with shortcut directions on screen.

Like the Best Buy PC Tools packages, Norton Backup uses a monthly calendar to show the days earmarked for unattended backup or restore. Clicking on a date lets you schedule as many events as you wish—with no limitation on type—and you can repeat the pattern daily, on weekdays, weekly, or monthly.

If speed is high on your wish list, Symantec's DOS program specializes in prompt delivery. It was fastest overall, with a noticeable edge on the next quickest program. Along the way, it posted top times on every tape benchmark. (Symantec's tape support is limited to the popular QIC-40/80 tape drives.) If you're looking for super speed and falling-off-a-log usability, Norton Backup for DOS 2.2 is a clear Best Buy.
Symantec Corp., 800/441-7234 **Reader service no. 636**

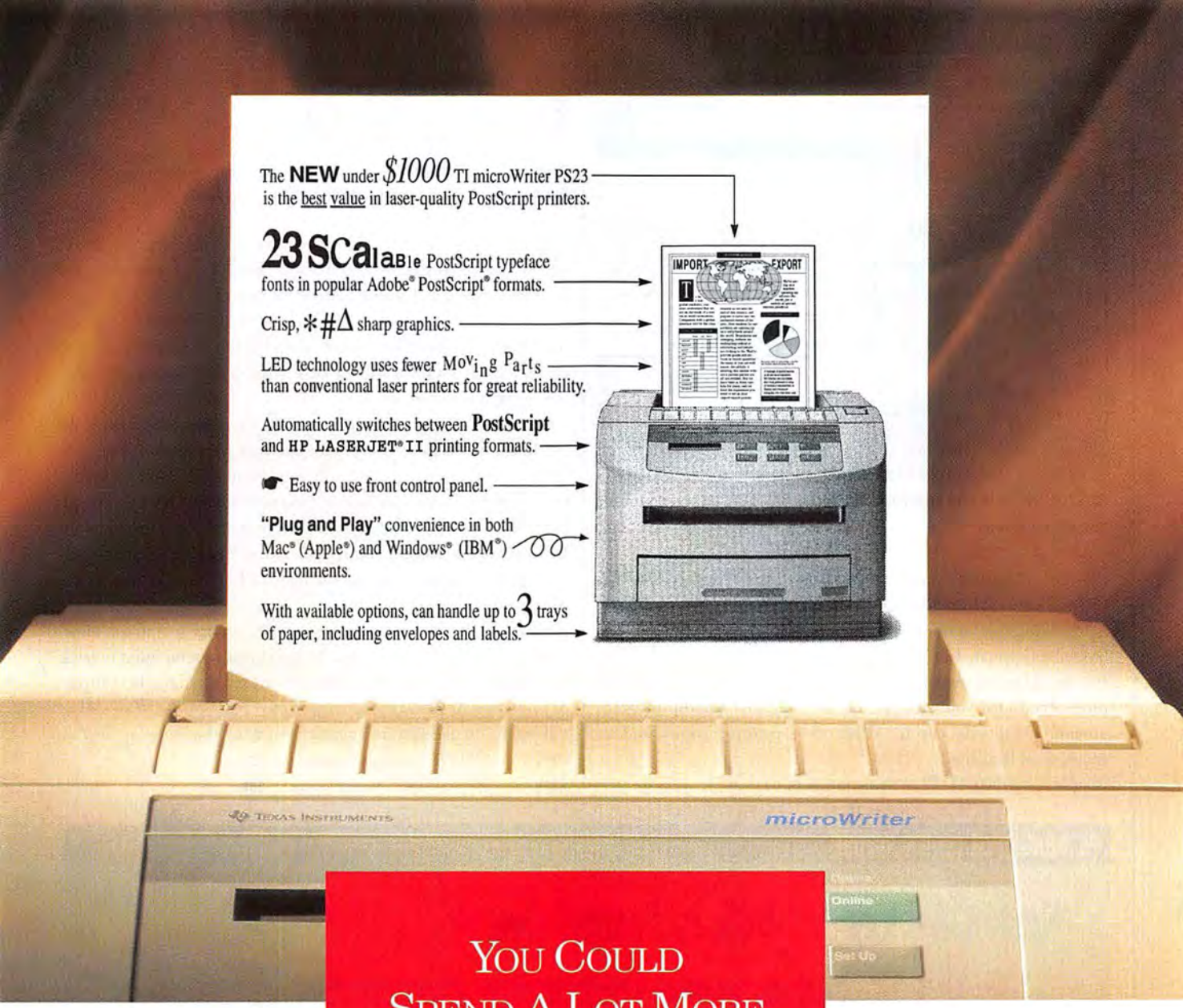
Symantec Norton Backup for Windows 2.2

PROS: Fast, easy to use
CONS: None

WINDOWS If you're a Windows user but you yearn for the performance of Norton Backup for DOS, don't despair. Symantec has another Best Buy program that demands little compromise in backup speed. Norton Backup for Windows 2.2 runs faster than most DOS utilities.

The one place where you'll notice a bit of slippage between the DOS and Windows versions is in the interface, where it takes more mouse clicks to get to the file-selection screen. But that's a small price to pay for the convenience of running backups without having to close shop on your other applications. And once you've set everything up, you'll rarely have to deal with manual selections.

The scheduler is identical to its DOS sibling's, as is the tape support. Symantec charges an extra $20 for its Windows version, pricing it at $149. That's still pretty reasonable for top-notch backup func-



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For years, capability and affordability were mutually exclusive features of laser-quality printers. But the new microWriter™ PS23 from Texas Instruments has changed all that. Now you can get sharp, crisp laser-quality images, rapid 5 page-per-minute operation and the reliability of LED technology. All in one very affordable printer. Thus enabling you to print more. Produce more. Do more. In other words, to extend your reach. The new TI microWriter PS23. It can make a small business look a lot bigger. And a big business look a lot smarter. For more information and your nearest dealer, please call *1-800-527-3500.*

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TEXAS INSTRUMENTS

PC WORLD BEST BUY

POSTSCRIPT™ Software From Adobe

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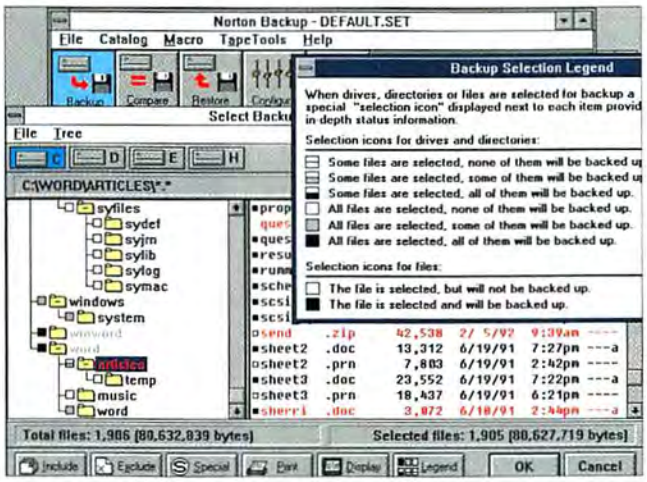
Circle 242 on reader service card



NORTON BACKUP FOR WINDOWS OFFERS COMPLETE on-screen tools and explanations.

tionality. A lot of savvy users will pick up the $179 Norton Desktop for Windows 2.2 instead, thereby getting the full backup program; many of Norton Utilities 7.0's most useful data recovery tools; and Symantec's outstanding Norton Anti-Virus, which earned a Best Buy in May. You can't go wrong with any of the four top backup programs, but if you want the fastest Windows backup program around, Norton Backup for Windows is your top choice and an undisputed Best Buy.

Symantec Corp., 800/441-7234 **Reader service no. 637**

Sytron Sytos Plus 1.4

PROS: Versions available for most tape drives, excellent installation program
CONS: Highest price in review, hard to select files and create backup sets

Sytron has been a player in the tape arena longer than any other vendor here, and when you buy Sytos Plus 1.4, you're assured of a fit. Sytron provides specific versions of Sytos Plus to fit almost any tape drive. And this program has its charms, such as the nifty move function that copies files to the backup media, compares them, and erases the originals. It's also the easiest package to install, as it automates the whole procedure.

But its usability falls short of what you get with the Best Buys. To create or edit backup sets, you have to negotiate several screens to reach the directory tree and file listings. Restoration requires a similar procedure, except you have to step through backup sets instead. Sytos Plus will do a changed-file restore search—examining each backup set until all are found. Unfortunately, that means partial restores can take longer than a full backup, but the scheduler is simple yet powerful.

Sytos Plus won't run if there's any CPU activity, so you can't load your modem TSR before going home if you've scheduled to back up. On balance, this DOS veteran can't match up to the Best Buys. *At press time, Sytron lopped $75 off Sytos's $225 price and showed us a Windows version with an updated features set that looked so good we wished we'd had it in time for review. —Ed.*

Sytron Corp., 800/877-0016 **Reader service no. 638**

PC WORLD TEST CENTER REPORT

Norton Backup for DOS Is Fastest Overall

	Full backup	Incremental backup	Differential backup	Restore
Norton Backup for DOS 2.2*	35:24	2:26	5:33	4:38
Norton Backup for Windows 2.2*	39:39	3:10	7:28	6:27
PC Tools 8.0*	39:36	4:27	8:07	5:13
PC Tools for Windows 1.0*	41:53	7:12	10:22	5:22
Sytos Plus 1.4	36:20	2:32	6:30	42:28
Back-It 4 1.4	126:40	3:27	14:50	9:29
Back-It for Windows 1.2	140:41	7:14	24:20	10:06

***Best Buy**

Products arranged in order of fastest overall performance. Times in minutes:seconds.

Methodology We tested all programs on an ALR Flyer 486SX-25 with 8MB of RAM, a Colorado Jumbo 250 tape drive, and a Quantum 240AT (240MB) hard disk running DOS 6.0 and Windows 3.1. The files were backed up using the highest level of data compression, and each backup session was appended to the sessions already on the tape. We didn't enable verification or compare, and we measured all times from when we launched a process until we regained control. The Windows applications were loaded and run in the foreground.

Full backup We did two full backups of the hard disk, which contained 138MB of data in 7873 user files spread among 58 subdirectories in the three logical drive partitions. Each full backup was done using a freshly formatted tape; they weren't appended.

Incremental backup Incremental backups select files that have been changed since the last full or incremental backup and then reset the archive bit to indicate they have been backed up. We selected the files for backup from seven to ten subdirectories spread among three logical drive partitions. We backed up an average of 1MB per day for 25 days and averaged the numbers.

Differential backup Differential backups select the files that have been changed since the last full backup. We did four differential backups with sizes of 5.6MB, 9.4MB, 15.8MB, and 22.2MB. The differential backups were added to the incremental backup tape at the end of 5-day, 10-day, 15-day, and 20-day intervals, respectively. The four differential times were averaged separately from the incremental times.

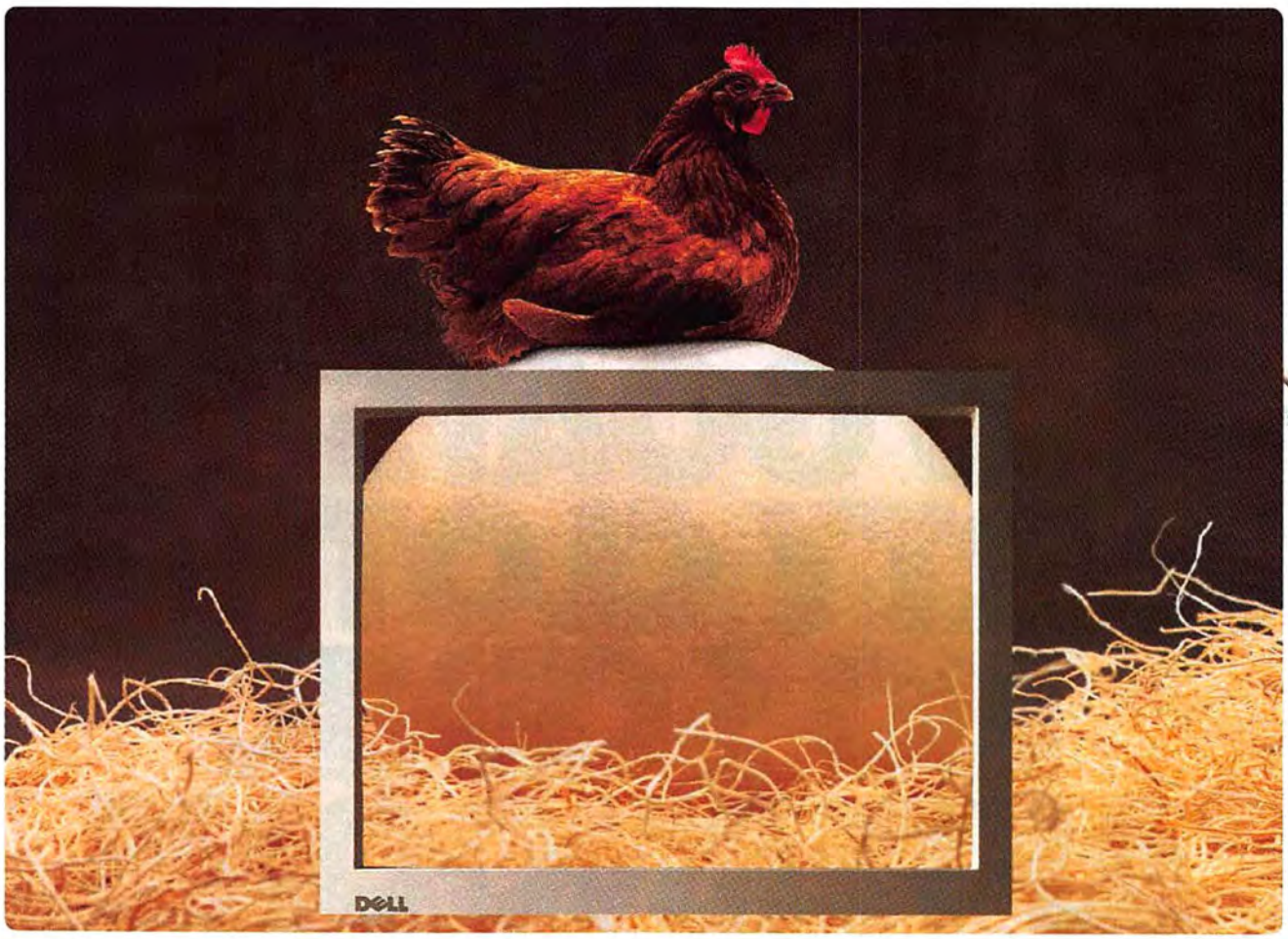
Restore We erased 2MB of files located in one subdirectory, then restored them using the fastest method the backup software provided.

Data based on tests designed and conducted by the PC World Test Center. Testing performed by TJ Byers. **All rights reserved.**

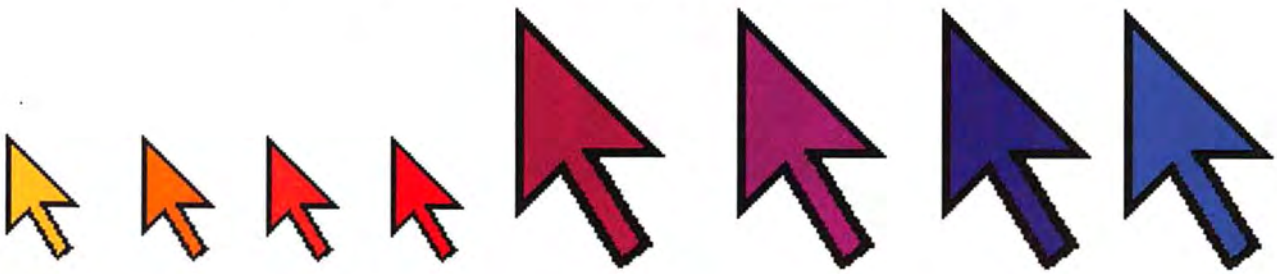
NO ROBIN HOOD, NO MERRY MEN, NO JAZZ CLUBS, NO GOATS IN PARTY CLOTHES, NO SCENIC AFTERNOONS IN THE COW PASTURE.

DELL DIMENSION XPS.
PCs DESIGNED FOR THE HIGH PERFORMANCE USER.

GET A VIRTUAL
VIRTUALLY E



Virtual screen technology is like having two monitors in one. Create the mother of all spreadsheets. Run PageMaker and Excel side-by-side. Use your monitor as a viewfinder and pan across to the place you want to be. All it takes to upgrade to a 2048 x 1024 virtual screen is just 2MB of optional RAM (1MB VRAM, 1MB DRAM).

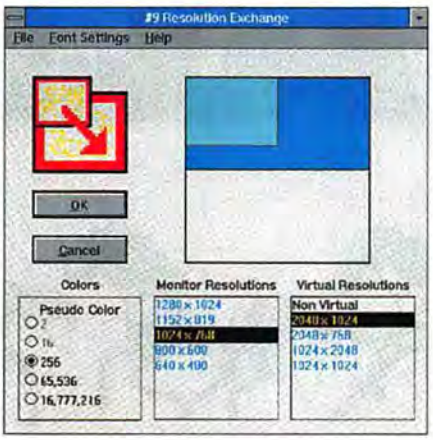


Our chameleon cursor can double in size and change color so it never gets lost. This is another feature you won't get from Gateway. They would rather have you engage in a game of hide-and-seek.

[1]Performance measured by running WinBench 3.11 at 1024 x 768, 256 colors. Both cards configured with 1MB Video RAM. Dell and Gateway 2000 systems configured with 66MHz 486DX2 processor, 16MB RAM and 256KB

SCREEN WITH VERYTHING.

Our Resolution Exchange Panel gives you complete control over your desktop environment. And since the VL-Bus links video directly to your powerful 486DX2, your commands are executed instantly.



**Resolution Exchange Panel and Hawkeye Zoom examples given for #9GXE configured with 3MB RAM (2MB VRAM, 1MB DRAM) and 1280 x 1024 monitor.*

Our Hawkeye Zoom Feature gives you up to four levels of magnification. Gateway will magnify your work too. But just once.*

ORIGINAL SIZE

If you want to plug in a mouse, Dell gives you a dedicated mouse port. Gateway turns you into a serial killer.

Inside your Dell Dimension™ XPS PC is a #9GXE video card that will give you the ride of your life.

This fast and versatile video card uses the VL-Bus™ and ultra high-speed video RAM to deliver 26 million WINMARKS. That's ten million more than you'll get from the ATI UltraPro VLB card that's found in comparably equipped Gateway machines.[1]

[1]WINMARKS are just one way Dell leaves Gateway behind. We're as much as 62% faster.

But raw speed is just part of the Dell Dimension XPS story.

The Dell Dimension XPS's #9GXE video engine can be accessed on-screen via a control panel that allows you to configure a host of powerful utilities – from time-saving "hot keys" to a chameleon cursor – for total control of your desktop video environment.

Add our optional 2MB RAM upgrade (1MB VRAM, 1MB DRAM) and you have the power to switch the #9GXE into a virtual screen with a resolution of 2048 x 1024 pixels.

This versatile add-in effectively gives you the desktop equivalent of two monitors. So you can have two full-size applications like Excel and PageMaker displayed side-by-side.

The virtual screen allows you to seamlessly pan across your monitor from application to application.

When you need a closer view of your work, just press a "hot key" and you can zoom in and out of your screen with up to four levels of magnification.*

When it comes to video and video-related utilities, Dell Dimension XPS PCs are your ticket to ride.

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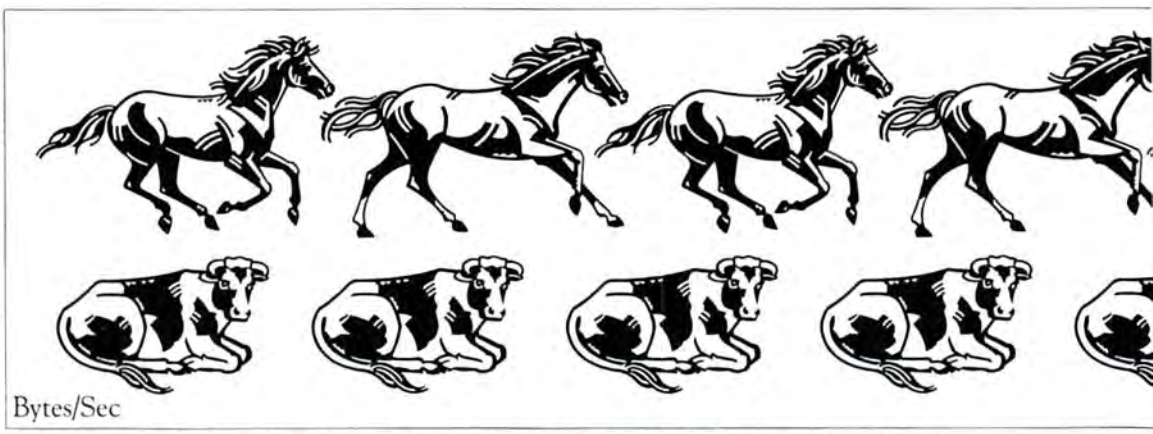
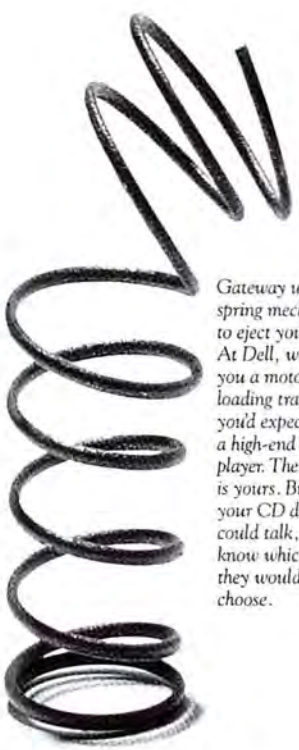
cache. VL-Bus is a trademark of Video Electronics Standards Association. Dell disclaims proprietary interest in the marks and names of others. *©1993 Dell Computer Corporation. All rights reserved.*

FAST VS HALF-



With faster access and nearly double the data transfer rate our double-spin CD ROM makes Gateway seem positively sluggish.

Thanks to our multi-session CD technology, you can print to disk on as many as four different occasions, storing up to 100 color photographs in all.

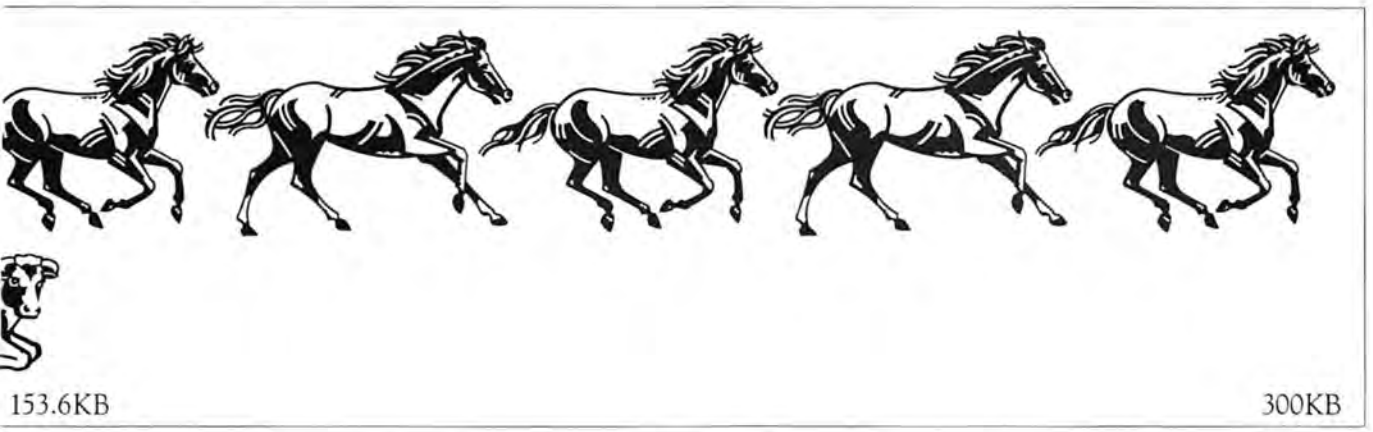


Gateway uses a spring mechanism to eject your disks. At Dell, we give you a motorized loading tray like you'd expect from a high-end CD player. The choice is yours. But if your CD disks could talk, we know which one they would choose.

Whistle while you work. Or tap your foot. Or sing along. Our audio center CD ROM software lets you play disc jockey while you carry on with the important work of the day.

*All comparisons based on manufacturers' specifications. The Dell CD ROM is the Panasonic 563. Gateway's CD ROM is either a LMSI CM205 or a Sony CDU-31A. Dell disclaims proprietary interest in the marks and names of

CDs FAST CDs.



When you buy a Dell Dimension™ XPS 450V or 466V equipped with a CD ROM, you get a CD ROM drive that runs circles around Gateway's*.

Our CD ROM drive gives you nearly twice the performance of Gateway's thanks to advanced double-spin technology that doubles the transfer rate and helps to speed up access time. In short, it's faster.

And that's just the start.

Our drive has the automatic, push-button motorized tray you'd expect to find on a high-end CD player. So your CD disks glide in and out effortlessly.

Gateway's has a manual spring-load reject, uh, eject button. It's still push-button, but your CDs don't glide effortlessly. In fact, they don't glide at all.

Ours is obviously a lot easier and more pleasant to use. And our CD ROM drive is built to last.

Our CD ROM is Kodak Photo-CD compatible. Which means you can take advantage of the latest in CD technology and view photographs on your PC screen.

What's more, our CD drive is multi-session. Which means you can print to the same CD on as many as four different occasions. Storing up to 100 pictures in all.

Our CD ROM also comes with software that lets you play your favorite tracks from any audio CD disk.

So you can listen to Mozart as you crunch numbers or bop along to the Beatles as you cruise your local BBS.

So if you want the best CD ROM technology for your money, make a fast decision and call Dell today.

After all, there's absolutely no reason why you should settle for a CD ROM that's behind the times.

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PERFORMANCE MACHINES THAT BLOW THE GATES OFF GATEWAY.

DELL DIMENSION™ 486/33S
i486™ SX 33MHz SYSTEM

$1,499

- BUSINESS LEASE[◊]: $55/MO.
- 4MB RAM
- 64MB MAX RAM
- 170MB (17ms) HARD DRIVE
- UPGRADEABLE PROCESSOR
- 6 16-BIT ISA EXPANSION SLOTS AVAILABLE
- ACCELERATED LOCAL BUS VIDEO
- ULTRASCAN™ 14C MONITOR (14", 1024 x 768, .28mm, NI)
- DUAL DISKETTE DRIVES (3.5" AND 5.25")
- 101-KEY KEYBOARD
- MS-DOS® 6.0/MICROSOFT® WINDOWS™ 3.1/MOUSE

ALSO AVAILABLE IN 33MHz i486 DX FOR $1,999, BUSINESS LEASE: $74/MO. SYSTEM INCLUDES ABOVE, PLUS: 8MB RAM, 230MB (17ms) HARD DRIVE AND ULTRASCAN 15FS MONITOR (15", 1024 x 768, .28mm, NI).

DELL DIMENSION XPS 450V
i486 DX2 50MHz SYSTEM

$2,199

- BUSINESS LEASE: $81/MO.
- 8MB RAM
- 64MB MAX RAM
- 230MB (17ms) HARD DRIVE
- 128KB EXTERNAL CACHE
- UPGRADEABLE TO PENTIUM™ OVERDRIVE™
- 6 16-BIT ISA EXPANSION SLOTS AVAILABLE, 1 ON VL-BUS
- VL #9GXE VIDEO CARD
- 1MB VIDEO RAM
- ULTRASCAN 15FS MONITOR (15", 1024 x 768, .28mm, NI)
- ONE DISKETTE DRIVE
- 101-KEY KEYBOARD
- MS-DOS 6.0/MICROSOFT WINDOWS 3.1/MOUSE

ALSO AVAILABLE IN 66MHz i486 DX2 FOR $2,599, BUSINESS LEASE: $96/MO. SYSTEM INCLUDES ABOVE, PLUS: 340MB (17ms) HARD DRIVE AND MULTI-SESSION, DOUBLE-SPIN CD ROM DRIVE.

DELL DIMENSION XPS 466V
MULTIMEDIA
i486 DX2 66MHz SYSTEM

$2,798

- BUSINESS LEASE: $103/MO.
- 8MB RAM
- 64MB MAX RAM
- 340MB (17ms) HARD DRIVE
- 128KB EXTERNAL CACHE
- UPGRADEABLE TO PENTIUM OVERDRIVE
- 5 16-BIT ISA EXPANSION SLOTS AVAILABLE, 1 ON VL-BUS
- VL DIAMOND VIPER VIDEO CARD
- 2MB VIDEO RAM
- ULTRASCAN 15FS MONITOR (15", 1024 x 768, .28mm, NI)
- ONE DISKETTE DRIVE
- 101-KEY KEYBOARD
- MULTI-SESSION, DOUBLE-SPIN CD ROM DRIVE
- MS-DOS 6.0/MICROSOFT WINDOWS 3.1/MOUSE

ALSO AVAILABLE IN 66MHz i486 DX2 FOR $2,998, BUSINESS LEASE: $110/MO. SYSTEM INCLUDES ABOVE, PLUS: 450MB (12ms) IDE HARD DRIVE AND 256KB EXTERNAL CACHE.

DELL DIMENSION XPS. PCs DESIGNED FOR THE HIGH PERFORMANCE USER.

Now that you have been a witness to the impressive technological superiority the Dell XPS PCs wield over Gateway's machines, there are only two small decisions you have left to make. And they're both easy ones:

Which Dell Dimension XPS PC is the right computer for you?

And what kind of software would you like to go with it?

That's right. You can order your software at the same time you order your Dell Dimension XPS. That way, you'll be up and running the minute you open the box and unpack your Dell XPS.

Purchase any combination from 100 of the most popular and competitively priced MS-DOS and Windows applications and have them pre-loaded onto your machine for one low $15 installation fee. Now that's a really good deal.

And should you ever feel the need to add a peripheral, upgrade a software package or order a new application, we're ready and able to help you there too. With DellWare.℠ A great selection of more than 2,400 software and peripheral items that you can order direct from us at discount prices. And if you want your DellWare selections in a real hurry, we'll ship your order to you overnight for only $5 extra. For no charge at all, we'll send you a free DellWare catalog.

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FEATURES COMPARISON

Easy Backup Software Does It All for You

● Yes
○ No

	BEST BUY Central Point PC Tools 8.0	BEST BUY Central Point PC Tools for Windows 1.0	Gazelle Back-It 4 1.4	Gazelle Back-It for Windows 1.2	BEST BUY Symantec Norton Backup for DOS 2.2	BEST BUY Symantec Norton Backup for Windows 2.2	Sytron Sytos Plus 1.4
Standard features							
List price	$179.95	$179.95	$79	$79	$129	$149	$225
RAM required	640K	2MB	384K	2MB	512K	2MB	640K
Conventional RAM used	470K	60K	2K	1K	9K	0K	2K
Windows application	○	●	○	●	○	●	○
Network support	●	●	●	○	●	●	●
Multiple user levels	●	●	○	○	●	●	○
Mouse support	●	●	●	●	●	●	●
Data security							
Checks hard disk integrity	●	●	●	●	●	●	○
Checks for viruses	●	●	○	●	○	○	○
Restores from damaged disk	●	●	●[1]	●[1]	●	●	○
Compares backup with original	●	●	●	●	●	●	●
Warns before overwriting floppy disk or backup sets	●	●	●	●	●	●	●
Warns before overwriting newer file	●	●	●	●	●	●	●
Prevents other access to floppies during backup	●	●	○	○	●	●	○
Includes and excludes hidden files	●	●	○	○	●	●	●
Password protection	●	●	○	○	●	●	●
Encrypted backup	●	●	○	○	○	○	●
Backup features							
Select directories and files from tree display	●	●	○[2]	●	●	●	●
Select files by date range	●	●	●	●	●	●	●
File list shows size, date, time	●	●	○	●	●	●	●
View files before backup	●	●	○	●	●	●	○
Estimates backup time and size	●	●	○[3]	○[3]	●	●	○[3]
Selectable verify	●	●	●	●	●	●	○[4]
Restore features							
Restores files to different drive or directory	●	●	●	●	●	●	●
Restores to subdirectories under new file name	○	○	○	○	○	○	●
Select directories and files from tree display	●	●	●	○	●	●	●
Select files by date range	●	●	○	○	●	●	●
Compares backup to hard disk	●	●	●	●	●	●	●
Estimates restore time	○	○	○	○	●	●	○
Selectable verify	●	●	●	●	●	●	○
Tape drives supported							
QIC-40/80	●	●	●	●	●	●	●
Conner AccuTrak (Irwin Servo)	●	●	○	○	○	○	●
SCSI DC6000	●	●	●	●	○	○	●
SCSI DAT	●	●	●	●	○	○	●
Utilities							
Delete individual backup sets	○	○	○	○	●	●	●
Format	●	●	●	●	●	●	●
Format during backup	●	●	●	●	●	●	●
Quick erase	●	●	●	●	●	●	●
File exchange program	●	●	○	○	●	●	○

[1] Can't complete restore if a disk is missing. [2] Directories only. [3] Size only. [4] Compare only; requires separate step.

Tape: Safe, Easy, Cheap

Notice that list prices on these drives dip as low as $249. Depending on where you buy them, you can expect a further discount on most. All handle QIC-80 format, although the Mountain and Summit drives offer an alternative proprietary format that gives an even larger capacity. If you don't need portability and you have a free drive bay, buy an internal model. The external drives and portable models connecting to the parallel port cost a lot more.

Parallel-connected models are great if you have to back up more than one PC or a notebook. Many parallel-connected models won't work with the programs in our backup software review, but at least one publisher is planning future support. It always pays to query tape vendors to see if your favorite software is compatible with the drives you're interested in.

Minicartridge Tape Drives: Big Backups Come in Small Packages

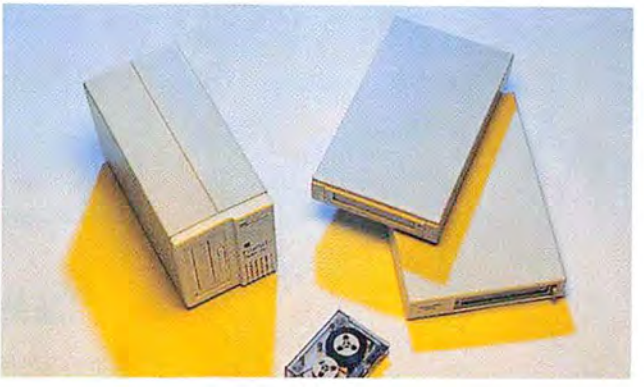
● = Yes ○ = No
n/a = not applicable

Company	Product	List price	KEY FEATURES: Format	KEY FEATURES: Type of unit	KEY FEATURES: Warranty (months)	CAPACITY AND FORMATTING: Formatted capacity (MB)	CAPACITY AND FORMATTING: Estimated maximum capacity with compression (MB)[1]	CAPACITY AND FORMATTING: Tape (media) included	CAPACITY AND FORMATTING: Preformatted tape available
Alloy 800/800-2556	Retriever 250 Plus	$279[2]	QIC-80	internal	24	120	250	○	○
Colorado Memory Systems 800/451-4523	Jumbo 250	$279	QIC-80	internal	12	125	250	○	$32
	Jumbo 250 with KE-10 External Kit	$439	QIC-80	external	12	125	250	○	$32
	Jumbo Trakker 250	$548	QIC-80	parallel	12	125	250	○	$32
Conner Peripherals 407/263-3500	TapeStor-250MQ	$249	QIC-80	internal	12	124	250	○	$25[6]
	TapeStor-250MQP	$429	QIC-80	external	12	124	250	○	$25[6]
	TapeStor-250MQT	$259	QIC-80	internal	12	124	250	●	$25[6]
	TapeStor-250MQPT	$449	QIC-80	external	12	124	250	●	$25[6]
Core Int'l 407/997-6055	CoreTape Light	$350	QIC-80	internal	18	120	300	●	$45[8]
	CoreTape Light-E	$610	QIC-80	external	18	120	300	●	$45[8]
Iomega 800/777-6179	Tape250 Insider	$269	QIC-80[9]	internal	24	120	250	○	$30
	Tape250 Half Height	$279[11]	QIC-80[9]	internal	24	120	250	○	$30
	Tape250 PC Powered	$429	QIC-80[9]	external	24	120	250	○	$30
	Tape250 Parallel Port	$548	QIC-80[9]	parallel	24	120	250	○	$30
Memorex Computer Supplies 408/957-1000	Memorex Tape Drive Backup System	$319	QIC-80[9]	internal	24	120	250	●	$30
Micro Solutions Computer Products 815/756-3411	Backpack Tape Drive	$489	QIC-80	parallel	24	120	250	○	$28
Mountain Network Solutions 800/458-0300	FileSafe TD-250	$315	QIC-80	internal	12	125	250	○	$30[13]
	FileSafe 8000Plus	$649	QIC-80[15]	internal	24	125[15]	250[15]	●	○
	FileSafe 8000Plus	$799	QIC-80[15]	external	24	125[15]	250[15]	●	○
	FileSafe 8500 IDE	$599	QIC-80[15]	internal	24	125[15]	250[15]	●	○
	FileSafe SideCar	$695	QIC-80[15]	parallel	12	125[15]	250[15]	○	○
SDI 800/872-7341	SDI 250P	$539	QIC-80	parallel	12	120	250	○	$25
Summit Memory Systems 408/438-2660	Summit SE250	$279	QIC-80	internal	24	125	250	○	$29
	Summit SE250 External	$378	QIC-80	external	24	125	250	○	$29
	Summit SE305 (IDE)	$359	QIC-80[15]	internal	24	125[15]	250[15]	○	$35
Tallgrass Technologies 800/825-4727	FileSecure FS250i	$345	QIC-80	internal	24	120	250	○	○
	FileSecure FS250e	$545	QIC-80	external	24	120	250	○	○
Tecmar 800/422-2587	MiniVault 250	$519	QIC-80	internal	24	120	250	●	$45[17]
	MiniVault 250E	$639	QIC-80	external	24	120	250	●	$45[17]
Wangtek 800/992-9916	3080PK	$325	QIC-80	internal	12	120	250	○	○
	E3080PK	$495	QIC-80	external	12	120	250	○	○

[1] Actual capacity varies with file compressibility.
[2] $259 without backup software.
[3] Included.
[4] 1-mbps high-speed controller with hardware compression.
[5] At 6 percent duty cycle.
[6] $50 for a package of two.
[7] At 5 percent duty cycle.
[8] $225 for a package of five.
[9] Can read QIC-40/80 and write QIC-80.
[10] DOS and Windows versions included.
[11] Application and pricing available at the end of 1993.
[12] Includes adapter rails to fit a 1/2-height 5 1/4-inch bay.

While the software that's bundled with tape drives has no great reputation for usability, some vendors are working on new programs with improved features. And Conner should have its own stand-alone package on the market by the time you read this. As you scan the software that comes with the drives, you'll notice Best Buy packages bundled with some of the most affordable. That's a tough combination to beat.

–Rex Farrance



RON MILLER

EXTERNAL TAPE DRIVES COME IN TWO FLAVORS: Standard models and the more easily portable parallel-port units.

CONTROLLERS, CONNECTIONS, AND LONGEVITY								BUNDLED SOFTWARE		
Works with floppy controller	Standard floppy controller or adapter available from manufacturer	1-mbps high-speed controller	Other high-speed controller	Micro Channel adapter	3½-inch drive	Fits 1-inch-high drive bays	Mean time between failures (thousands of powered-on hours)	Software provided	Windows applications	Reader service number
●	○	○	○	○	○	○	25	Gazelle Back-It for DOS and Windows	●[3]	684
●	●[3]	$129	$229[4]	$299	●	○	40[5]	Colorado Backup for DOS	$59	685
●	●[3]	$129	$229[4]	$299	n/a	n/a	40[5]	Colorado Backup for DOS	$59	685
n/a	n/a	n/a	n/a	n/a	n/a	n/a	40[5]	Colorado Backup for DOS	$59	685
●	$99	$129	○	○	●	●	60[7]	Backup Basics: Simply Safe Backup	●[3]	686
n/a	n/a	n/a	n/a	n/a	n/a	n/a	60[7]	Backup Basics: Simply Safe Backup	○	686
●	$99	$129	○	○	●	●	60[7]	Backup Basics: Simply Safe Backup	●[3]	686
n/a	n/a	n/a	n/a	n/a	n/a	n/a	60[7]	Backup Basics: Simply Safe Backup	○	686
●	●[3]	○	○	$109	●	○	25	CoreTape	○	687
●	●[3]	○	○	$109	n/a	n/a	25	CoreTape	○	687
●	●[3]	$150	○	○	●	●	30	Central Point Backup[10]	●[3]	688
●	●[3]	$150	○	○	●[12]	●[12]	30	Central Point Backup[10]	●[3]	688
●	●[3]	$150	○	○	n/a	n/a	30	Central Point Backup[10]	●[3]	688
n/a	n/a	n/a	n/a	n/a	n/a	n/a	30	Central Point Backup[10]	●[3]	688
●	○	$159	○	○	●[12]	●[12]	30	Norton Backup 2.2[10]	●[3]	689
n/a	n/a	●[3]	n/a	n/a	●	●	60[7]	BPBackup	○	690
●	○	○	○	○	○	○	30[14]	FileSafe	○	691
○	○	○	$154[4]	$239	○	○	30[14]	FileSafe	○	691
○	○	○	$164[4]	$239	n/a	n/a	30[14]	FileSafe	○	691
○	n/a	n/a[16]	●[3]	○	○	○	30[14]	FileSafe	○	691
n/a	n/a	n/a	n/a	n/a	n/a	n/a	30[14]	FileSafe	○	691
n/a	n/a	n/a	n/a	n/a	n/a	n/a	30	Gazelle Back-It or Central Point Backup[10]	●[3]	692
●	●[3]	$130	○	$250	●	○	30[14]	Central Point Backup[10]	●[3]	693
●	●[3]	$130	○	$250	●	○	30[14]	Central Point Backup[10]	●[3]	693
○	○	n/a[16]	n/a	○	●	○	30[14]	SummitSafe	●[3]	693
●	○	○	○	○	●	○	40	FileSecure	$140	694
●	○	○	○	○	n/a	n/a	40	FileSecure	$140	694
●	○	$195	○	$249	●	○	24[18]	MiniVault Software	○	695
●	○	$195	○	$249	n/a	n/a	24[18]	MiniVault Software	○	695
●	○	$195	○	○	●	○	40	Central Point Backup[10]	●[3]	696
●	○	$195	○	○	n/a	n/a	40	Central Point Backup[10]	●[3]	696

[13] $60 for a package of two.

[14] At 25 percent duty cycle.

[15] Has alternative format with 152MB native compressed capacity. Special format not QIC-80 compatible.

[16] IDE adapter. IDE controller supports 1-mbps transfers.

[17] Sold in packages of five for $225 or two for $99.

[18] At 15 percent duty cycle.

For more information about all products in this table, circle reader service no. 903.

Even a *free* memory manager may not be a bargain—especially if it can't give you all the memory you need.

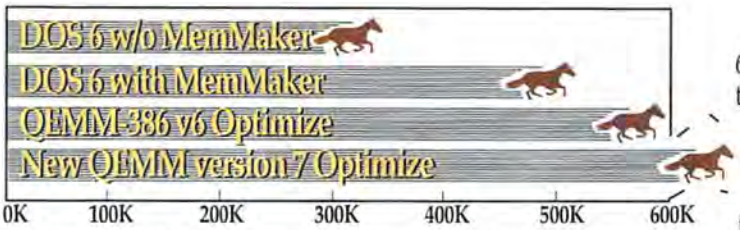
Introducing QEMM 7
The Memory Manager Worth Paying For

The newest version of the Quarterdeck Expanded Memory Manager (QEMM), version 7, once again is extremely innovative in using the critical area between 640K and 1024K. It finds space for more TSRs and drivers in this area than anyone thought possible. It optimizes this area, taking into account the many drivers that need more memory at start-up than when running; instantly calculating millions of possible memory configurations to find still more memory for your programs to use. And it treats the rest of memory as a giant pool to instantly fulfill the needs of all of your programs—whether they use extended or expanded memory. Whether your PC has 1 megabyte or 16, you can benefit from new QEMM 7.

Instant Riches

What does more memory mean in a practical sense? It means that your DOS and MS Windows programs run faster, smoother and more reliably. It means you can continue to add valuable utilities, drivers, TSRs and new capabilities to your PC. Whether it's workhorse drivers like LAN utilities and fax drivers; productivity-enhancers like disk caches and disk compressors; or fun and exciting capabilities like sound boards, CD ROM drivers, graphics tablets, etc. The better your memory is managed, the more versatility and flexibility your PC has. QEMM 7 lets you have it all without fear of 'out of memory' messages or crashes.

How to Look a Gift Horse in the Mouth



We tested DOS 6 with and without MemMaker and with QEMM 6 and our new QEMM 7 runs away from all of them. See details of test conditions listed below.

DOS 6 Giveth; DOS 6 Taketh Away

The best feature of new DOS 6 is the stable of utilities it includes. Trouble is, they all eat up memory. DoubleSpace file compression needs 43K, Vsafe anti-virus needs 7-45K, Smartdrv disk cache needs 28K and even Undelete takes 10-14K as a resident program. Using Microsoft's free memory utility, MemMaker, you could easily end up with a net loss of available 'conventional' memory in DOS 6.

New QEMM 7 takes the best of the new DOS 6 features into account, finding ways to give you more free memory for your program while taking full advantage of DOS 6. One new QEMM 7 feature, DOS-Up, moves the DOS 6 kernel, its data and resources to memory above 640K (this feature also works with DOS 3-5), freeing 7-70K. Another new QEMM 7 feature, Stealth DoubleSpace, frees 40K of the memory addresses used by DoubleSpace and makes them available for other drivers and TSRs. Both features ensure that the all-important memory below 640K is free for your programs. And QEMM 7's seemingly small feature of supporting multiple configurations gives you the flexibility and ease of setup that you expect. (MemMaker doesn't work well with this important DOS 6 feature.) That's why it makes more sense than ever to put your money on the best memory manager.

Prior versions of QEMM won just about every competition in sight, as well as remaining the #1 best-selling memory manager 5 years straight.

Page Frame: the Key to Your Future

There's been a lot of talk about our patent-pending Stealth technology. Jealous talk, mostly. Because nobody else can touch its performance. Our Stealth ROM feature, pioneered in QEMM 6, frees 48-115K of ROM addresses for use by TSRs and drivers. Our Stealth DoubleSpace feature, described above, frees another 40K. And as you might imagine, there's more to come.

The key to Stealth is its use of a 64K reserved area above 640K called the page frame. Besides being used by Stealth, the page frame is used by Lotus 1-2-3 r2.x for larger spreadsheets and WordPerfect 5.x for larger documents, DESQview for multitasking, Novell Netware, IBM LAN Server and DECnet for reducing the network driver memory footprint, plus games like Wing Commander, Car and Driver, Ultima Underworld II, Wolfenstein and others for fast action. You sacrifice all this when you turn off the page frame (which other memory managers do to maximize available memory above 640K). It's this use of the page frame by Stealth that lets you set up your PC with a mouse, CD ROM, sound board, a network such as Novell NetWare, reserve 8-24K of extra memory for optimal MS Windows performance, use all of DOS 6's memory-hungry utilities and still have more than 630K available for your programs. (Compared to DOS 6's 527K available in the same configuration, after using MemMaker).

There's lots more to QEMM 7:

- Tuned for MS Windows
- New ability to use Vidram inside MS Windows
- DPMI Host
- Pentium Support
- Laptop suspend/resume support
- PS/2 micro channel adapters
- Compaq support
- Fine tuning tools for power users
- 32-bit architecture for speed
- Enhanced compatibility in response to hardware needs of our millions of users:
  - Detects adapter RAM and ROM and bus-mastering hard drive controllers
  - Monitors DMA access into memory
  - Supports Shadow RAM

Easier to use for Novices, More Power for Experts; More Memory for All

Our seventh-generation thoroughbred QEMM has improved ease-of-use, with Express Install and Help features. And for power users, Advanced Install and editable parameters and troubleshooting hints.

And QEMM 7 comes with Manifest, the award-winning memory analyzer—enhanced for more flexibility with Pentium testing, laptop battery reporting, network analysis and editable configuration files.

The new and ever more exciting capabilities coming to your PC will all compete for memory with your favorite applications, TSRs and drivers. And that makes QEMM 7 the front runner in your efforts to get get the best performance out of your PC today—and tomorrow.

Quarterdeck

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QEMM Users: upgrades are available from dealers.

You can also buy direct from Quarterdeck. Call (800) 354-3222 ext. 1D7 and ask about our special Game Pack offer with your upgrade!

How we got the chart numbers CPU—486/33 ALR Power/business VESA machine equipped with 16 megs of RAM and running MS-DOS 6. Comparisons were done using the following memory managers. QEMM 7, QEMM 6.02, MS-DOS 6 MemMaker. In addition to the driver (or drivers) required by each memory manager, the following drivers, DOS resources and programs were loaded for all comparisons: in the CONFIG.SYS file SETVER.EXE, DOS=HIGH, FILES=20, BUFFERS=10, STACKS=0,0, MVSOUND.SYS, SNDBK12.SYS, SLCD.SYS, DOS SHELL=statement, in the AUTOEXEC.BAT file VSAFE, MSCDEX, UNDELETE, LSL.COM, NE2000.COM, IPXODI.COM, NETX OR EMSNETX, MOUSE.COM, SMARTDRV.COM, PRTSCCAP.COM.

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Windows DTP Comes of Age

Coupling ease of use with new type and color capabilities, Windows desktop publishing programs pick up where word processors leave off. We choose the best of the four front-runners. BY WILLIAM HARREL

To most people, desktop publishing (DTP) means Macintoshes running QuarkXPress or PageMaker. Desktop publishing is so entrenched on the Macintosh platform, in fact, that we desktop publishers who have hung in there with Windows are looked down upon by our Macintosh counterparts (whom we lovingly refer to as Mac snobs).

Let's face it. Until this year Macintosh users had good reason to be smug. Historically, desktop publishing has been more advanced on the Mac. This year two significant events—the releases of QuarkXPress for Windows and PageMaker 5.0—should level the playing field. Both programs support process-color separations and have excellent typography controls. The sheer size of the PC market is inspiring the move to Windows of graphics, font, video, display, and printer technology from companies like Adobe Systems, Super-Mac Technology, Radius, and Aldus.

A final touch is the release of Adobe Photoshop for Windows. While Windows image editing software abounds, most DTP professionals use Photoshop, which confined desktop photo touch-up, an important capability, to the Mac.

Windows users who held out have finally been rewarded. The desktop publishing field is now wide open. PC hardware is cheaper, and since PCs account for a huge majority of the world's computers, PC users also have the compatibility edge.

Until last year you had two main choices for full-featured Windows desktop publishing packages: Aldus's PageMaker or Ventura Software's Ventura Publisher. Computer pundits and desktop publishers argued over which program was better. Invariably, the consensus has been that PageMaker works best for short documents, such as fliers, brochures, and newsletters, while Ven-

JEFF KOEGEL

tura excels at long documents, such as books, catalogs, and directories.

Choosing a full-featured desktop publishing package is no longer an either-or proposition. Frame Technology's FrameMaker, a UNIX native, entered the DTP race last year. Its long-document prowess is giving Ventura a strong run for the money. And finally, this year's long-awaited release of QuarkXPress promises to threaten PageMaker's lengthy reign on the PC as the favored, design-intensive page layout package for short documents. Superb color capabilities and typography controls have made QuarkXPress for the Mac the pick among publishers of high-quality four-color documents. With plenty of notice, Aldus has fired back with PageMaker 5.0. PageMaker's new four-color support and improved font handling should keep it in the running and contribute greatly to Windows finally becoming a viable full-color publishing alternative to the Mac.

The Long and Short of It

So, what separates a long-document page layout program from one that works well for short documents? At first glimpse, the line seems fuzzy. But it's not, really. Most writers and publishers create longer works—books, manuals, and so on—in sections, made from separate computer files. Shorter works—brochures, newsletters, fliers—are usually contained in one file. Software proficient at laying out long documents should help you manage all the files that comprise your book or manual, and short-document software should provide flexible tools for placing and manipulating text and graphics on individual pages.

There are long documents, and then there are long documents. The distinction is in how they're laid out. Newsletters can be long, but most publishers don't lay them out in sections (or chapters) with each section a separate file. Books, some proposals, catalogs, and product documentation, on the other hand, are generally laid out a section at a time and then compiled into one large work.

To compile a long document, the page layout software must first combine several chapters and treat them as one continuous book, repaginating them in sequential sections. Long-document layout software should also provide a convenient way to generate tables of contents, indexes, and other lists that include data from all the sections in the work. Ventura, FrameMaker, and PageMaker all let you perform these tasks; QuarkXPress does not.

Again, not all long documents are created equal. Some, for example, have numbered figures and tables throughout each chapter. During layout the placement and numbering of these elements can change drastically. A truly proficient long-document DTP package should let you update figure and table numbering automatically, rather than force you to open each chapter and renumber them manually. Ventura and FrameMaker leave PageMaker in the dust

Framing the Future

Like almost every other software category, desktop publishing is ever-changing. The upgrade path for our four contenders is clear for only one product, FrameMaker.

The big news on the horizon is FrameMaker 4.0. The current version didn't fare too well in our tests. It fell short on the full-color document because it can't separate process color. In our newsletter it could not create irregular text wraps or automatic drop caps. And the program strays enough from Windows conventions that it's hard to use.

Version 4.0 of FrameMaker addresses most of these shortcomings and brings a wealth of new features to the Windows desktop publishing arena. The best news is that the confusing dialog boxes and other conventions have been revamped to make the program much easier to learn and use.

At press time Frame Technology wasn't sure whether FrameMaker 4.0 would support CMYK TIFFs, but it will separate color EPS files and colors created within FrameMaker itself. The program will also separate EPS files containing PMS colors and will have a built-in PMS color palette.

FrameMaker 4.0 will also contain several hypertext functions, such as links that take you from an index or table of contents entry to its reference—even if the document file containing the reference is closed. One of the exciting new features in FrameMaker 4.0 is Compare, which looks at two similar documents and marks them to show you how they differ. Not only that, a summary document lists the changes and lets you jump to every change directly in both documents using hypertext. This capability is nearly perfect for handling simultaneous editing.

Where FrameMaker stands head and shoulders above other desktop publishing packages is online publishing.

Where FrameMaker stands head and shoulders above other desktop publishing packages is online publishing. Used in conjunction with FrameReader, virtually any document you create in FrameMaker can be used as an interactive reference. You can, for example, create hot links between graphics and text that jump readers to other parts of documents. The benefit of using FrameMaker to generate interactive documents is that you can also publish them on paper.

A couple of features that would have helped FrameMaker fare better on our tests will still be missing, however. FrameMaker 4.0 will not support irregular text wraps and drop caps. Also, the process-color separation portion of the program we saw in the prerelease evaluation copy was perfunctory. It doesn't let you set halftone screen frequencies and angles, for example. Nor can you perform other often-necessary tasks, such as under-color removal on separations.

According to Frame Technology, FrameMaker 4.0 is not really intended for high-end process-color publishing. Frame threw in the color support in case you need it now and then. Professional desktop publishers don't often agree on the best way to lay out documents, but they would probably all want a fully developed process-color separation engine rather than part of one.

Still, FrameMaker 4.0 is a vast improvement over version 3.0 and a strong, viable alternative to Ventura Publisher.

here. You have to make these updates by hand in PageMaker—and these are the kinds of edits that are easy to miss or forget.

Variables are yet another necessity for long documents, such as catalogs, proposals, and directories, in which data changes often and requires updating. *Variables* allow you to place markers in text and change data globally with a few mouse clicks, sparing you from doing search-and-replace routines in each section. Again, only FrameMaker and Ventura have this power.

Short documents—fliers, posters, brochures, and newsletters—are usually more design-intensive than books. The emphasis is on placing, moving, arranging, and resizing objects. In a package strong in short-document layout, it should be easy, for example, to rotate text and graphics, to crop photographs, and even to move elements off the page (onto a "pasteboard") to get them out of the way while you experiment with your layout. QuarkXPress and PageMaker both handle these tasks with ease. Ventura and FrameMaker can do most of these tasks in one way or another, but not nearly as well. Since short documents, particularly brochures and circulars, are often colorful, a program good at creating them should also provide much more flexibility in preparing color documents for reproduction at the print shop. QuarkXPress and PageMaker excel here, with QuarkXPress having a very slight edge.

Sizing Up the Competition

To please the picky publishing professional, any DTP program will have to master the widest range of basic documents. We created three real-world business marketing documents to test each program—a newsletter; a short, four-color brochure; and a multisection technical proposal—for a fictitious communications company named IntelliFone. Each document emphasizes different aspects of page layout: design, full color, or long-document handling.

The bottom line: If you work at it, you can cajole any of the four programs here to produce all three test documents. However, none of the programs worked ideally for all three layouts. For example, we could have forced irregular text wraps in the newsletter a line at a time in the two programs that don't support them (Ventura and FrameMaker), but we'd have spent all day doing it.

Read on for the results of our experiences laying out the three test documents. In many ways, the desktop publishing programs performed as we predicted they would, with PageMaker and QuarkXPress excelling on the newsletter and brochure and Ventura and FrameMaker acing the proposal. But there were also some surprises.

The newsletter is design-intensive. It consists of several tricky elements, such as irregular text wraps around odd-shaped graphics, stories that jump to nonsequential pages, halftone art, rotated text and graphics, and spot-color separations.

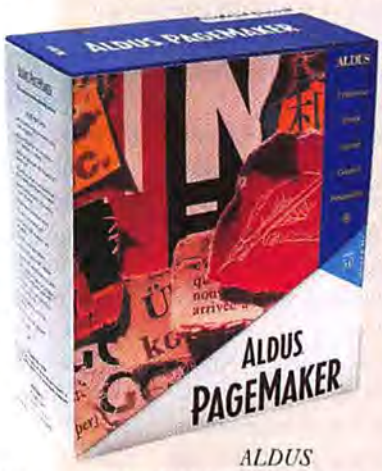
The brochure is a simple trifold mailer. What's not simple is that it's four-color. To print your full-color, or *process-color*, documents, most print shops require you to "separate" the pages into four plates, one for each color ink used by the offset press—cyan, magenta, yellow, and black (CMYK). The printing press layers the four colors over one another in percentages, or halftone screens, to reproduce photographs and other color elements.

The proposal is designed to test each program's long-document features. It contains several figures (charts and graphs) and tables that require renumbering after the document is compiled, and we generated a table of contents and an index with each new proposal.

Best Buy

Publishing a document like the Spiegel Catalog is very different from turning out the company newsletter every month. And while a desktop publishing program makes either task much easier, the features needed are dramatically different. While the best single program for laying out a variety of long and short documents is PageMaker, its color handling options aren't quite as thorough as those in QuarkXPress, and its long-document features don't match Ventura Publisher's or FrameMaker's. Nevertheless, both its book and color features for long documents are respectable. It also manages the trek to the Macintosh platform with grace and ease.

Since no program can do everything you need it to, consider whether you are prepared to learn and use more than one program to meet all your needs. To get a beautiful and rich set of color features and do careful design work with high-end process-color separations, you may want to turn to QuarkXPress instead of PageMaker if you don't often work with long documents.



ALDUS PAGEMAKER 5.0: We found it to be the best all-around buy in desktop publishing.

Long on Labor

Long documents are a slightly different story. You should seriously consider Ventura Publisher over PageMaker for these labor-intensive projects. You should also turn to FrameMaker if you want to add cross-platform features to long-document strength or if you plan to generate electronic, online documents as often as you produce paper ones.

If you're looking for the best deal, check out Ventura Software's Publisher's PowerPack. For $995 ($200 more than Ventura Publisher), you get Ventura Publisher; AdPro, a dedicated display-ad layout program; PicturePro, a full-fledged image editing package; and Ventura Database Publisher, a tool to ease the creation of documents generated from databases of information, such as catalogs.

A new program we weren't able to include in our review, PagePlus for Windows from Serif Incorporated, has most of the features of QuarkXPress and PageMaker, but without long-document handling. It includes real color separations for an incredible $59.95 (that is not a misprint). PagePlus might provide a valuable alternative for the desktop publisher who either doesn't need the robustness of the major packages or wants to add color capabilities cheaply to FrameMaker or even Ventura.

Task 1: The TeleFocus Newsletter

Newsletter publishing may seem straightforward, but it can be as complicated as you choose to make it. Our newsletter, *TeleFocus*, put these packages to the test. To perform well the programs had to let us create and use a number of fairly sophisticated paragraph styles, jump and link text on nonsequential pages, create drop caps, wrap text around several odd-shaped graphics, and print spot-color separations.

All programs set up the three-column page, created style sheets, and formatted text quite nimbly. The only problems came from FrameMaker, which does not support multiple columns in frames. On the front page, for example, we had to create six separate frames to accommodate our two stories. In general, we found FrameMaker difficult to master. Its procedures and terminology stray far enough from standard Windows conventions that we spent much too much time with our heads buried in the manual—sometimes to no avail.

PageMaker, Ventura, and QuarkXPress all have drop cap features, which made starting each new story with an enlarged first character a snap. In FrameMaker we had to create a new frame for the character and wrap body text around it. All but QuarkXPress have a column balance feature, which lines up text at the top and bottom of contiguous columns. To align our columns in QuarkXPress we had to experiment with increasing and decreasing the space between subheads and body text—a time-consuming, trial-and-error process.

Some of the stories in *TeleFocus* include headlines that span several columns. To achieve this effect, usually you must cut the headline away from the story and place it as a separate object. Ventura gets around this by letting you set a single paragraph's width to the width of the frame in the Alignment dialog box, which saves a lot of fuss and keeps the headline attached to the story it introduces.

One of the trickier layout requirements in *TeleFocus* is flowing, or *jumping*, stories to nonsequential pages. While all four programs were able to jump the stories easily enough, PageMaker and FrameMaker do not provide a way to generate jumpline references ("Continued on page 3") automatically. Whenever you insert or delete a page or move a story, you must remember to go back and manually update your jumplines.

Graphics Placement and Formatting

The *TeleFocus* layout has several graphics—gray-scale scanned photographs, a couple of monotone TIFFs, and a few EPS graphics. One of the EPS graphics, the IntelliFone logo, contains a spot color, Pantone Reflex Blue. Pantone Matching System (PMS) is the spot-color ink matching system used by most print shops. We also used Reflex Blue throughout the newsletter on rules (lines) in the headers and footers and for background shading in the table of contents and a few sidebars.

All four products support spot-color separations, but FrameMaker cannot separate imported graphics. Ventura, on the other hand, not only separates imported spot-color EPS files, but also assigns the spot colors in them to a document's color palette automatically. After importing the IntelliFone logo into our newsletter, assigning Reflex Blue to the other colored elements of our layout was a snap. The real benefit of this feature, though, comes when you don't know the name or PMS number of the spot color in the EPS file. Ventura makes the match for you.

All four of the products support spot-color separations, but FrameMaker can't separate imported graphics.

Ventura and PageMaker excelled at placing our scanned images. Both programs support scanning directly into a layout. PageMaker uses the industry-standard TWAIN interface, and Ventura ships with an extension, Ventura Scan. To bring scanned images into the other two programs, you must scan them into your image editing program and import them.

After importing our images, we wanted to contour text around a few of them. When it came to this task, QuarkXPress and PageMaker handily bested the other two. Neither FrameMaker nor Ventura supports irregular text wrap (a plug-in is available for Ventura, but it isn't part of the basic package). QuarkXPress and PageMaker wrap text quite adroitly (and almost identically), and they provide extensive control over the wrap, allowing you to adjust its contour and distance from the graphic as desired.

The newsletter we designed for this layout was complex. All four of the packages could produce a simple newsletter easily, so you should match your needs to the capabilities of different packages.

COLUMN BALANCE ADJUSTS THE LINE SPACING IN TEXT to force text at the tops and bottoms of columns to line up. Ventura, PageMaker, and FrameMaker have similar features.

No wonder everyone is moving to

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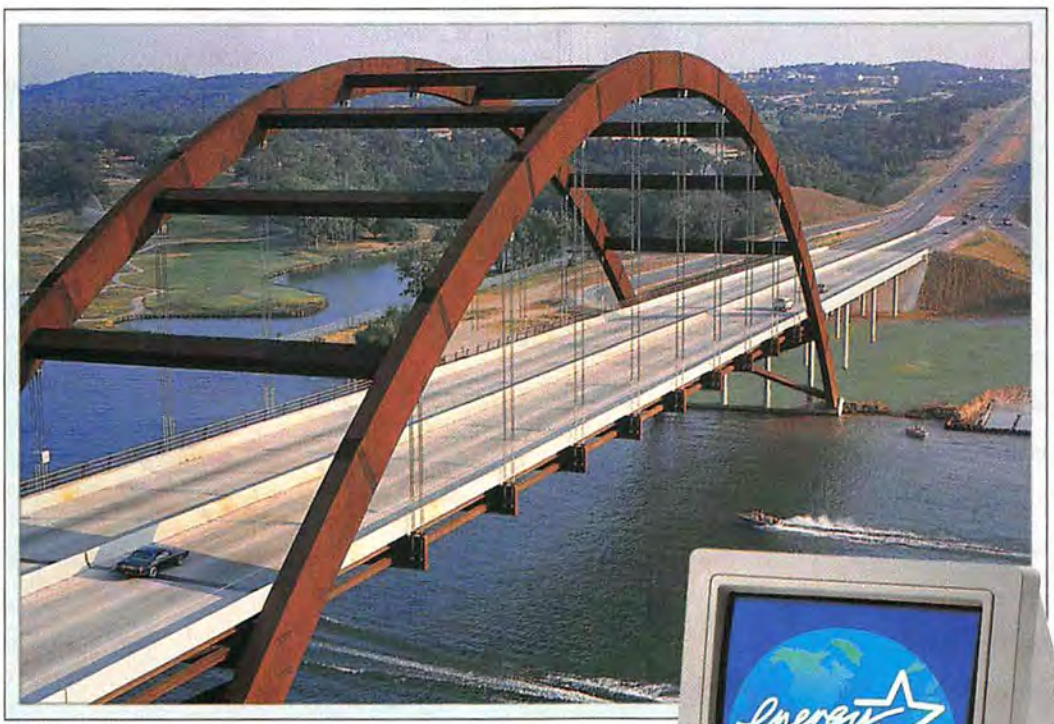

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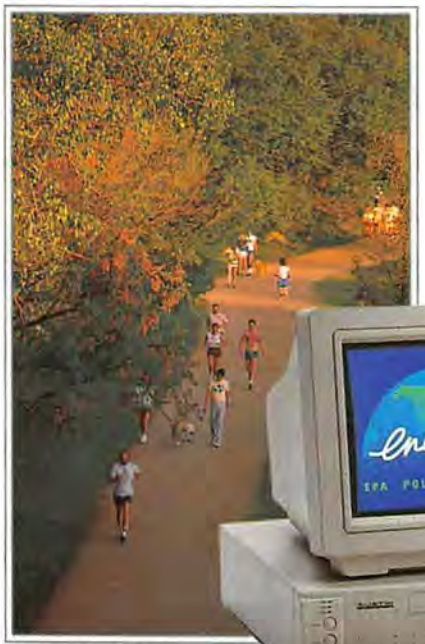

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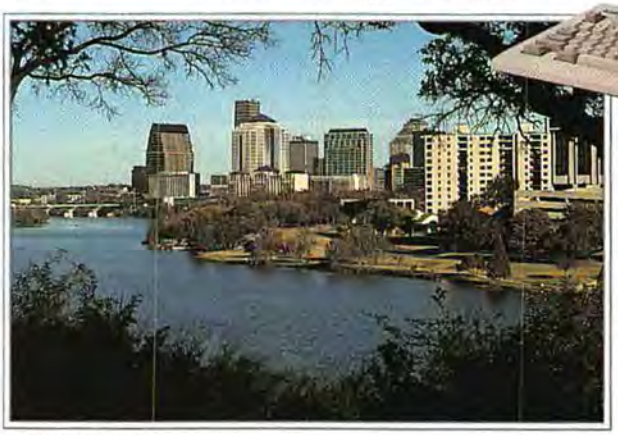

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200 Watt Power Supply
Five 16-Bit ISA Slots
Wrist Rest Pad

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STB Horizon VL-Bus Windows Accelerator with 1 MB DRAM
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STB Horizon Windows Accelerator with 1 MB VRAM
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486DX2-66 EISA	**$9,999**

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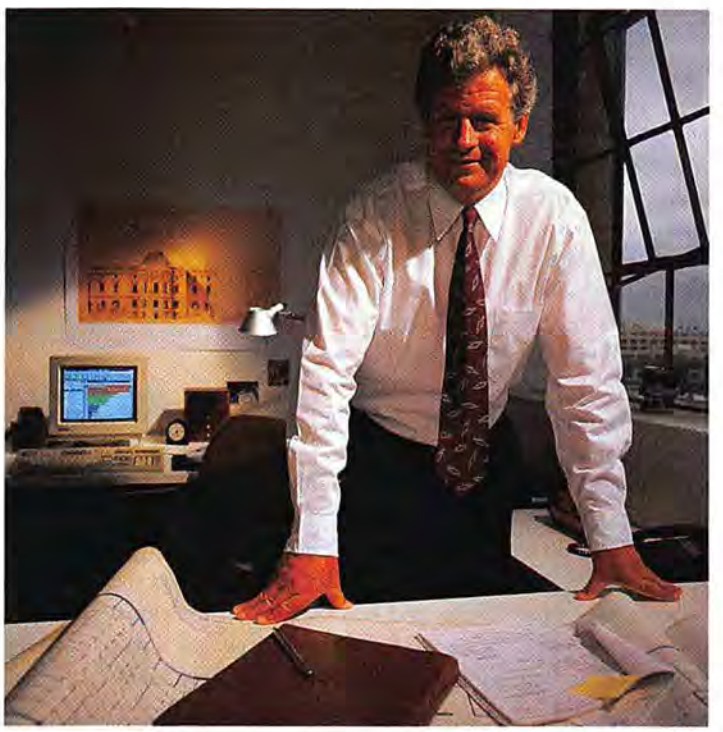

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Task 2: The IntelliFone Story Brochure

Otherwise a straightforward design, our brochure tested two key design capabilities, process-color support and bleeds. *Process color* is the technology used to reproduce photographs and other full-color images at the print shop. *Bleeds* are graphics elements that run off (or end at) the very edge of the page.

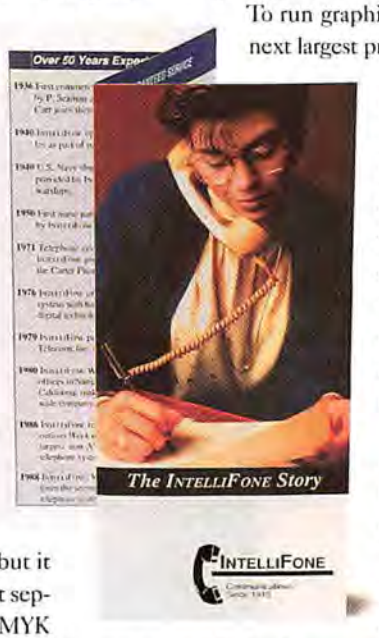
Getting what comes off the press to match what you see on your computer screen is a delicate process, especially the final step, printing the separations to negatives on a high-resolution imagesetter. This procedure is not for the faint of heart. It can require a lot of trial and error at the neighborhood service bureau, which—at $25 to $80 per proof—can get expensive. Once you get your proofs right, you can count on another $15 or so per separation for the negatives. Each four-color page must have four pieces of film. A one-page, two-sided brochure, for instance, requires eight negatives. To generate your film, you need a page layout program that provides extensive control over process-color separations.

At the starting block, FrameMaker fell out of the race. Version 3.0 does not support process-color separations, so it could not import our CMYK TIFF photographs, let alone separate them. Version 4.0 will have some limited color separation support, however (see "Framing the Future").

Ventura doesn't support CMYK TIFFs either, but it does ship with an extension, Ventura Separator, that separates RGB TIFFs (the more common type) and CMYK and spot-color EPS files. Separator is a versatile utility. It allows you to set separation screen angles and other values for individual images or for the entire document. A substantial drawback is that Separator kicks in only while you're printing color separations. When printing proofs on a color printer, Ventura uses RGB TIFF data so proofs containing TIFF images are unreliable.

QuarkXPress and PageMaker are much more adept at process-color separations. Since they import and separate CMYK TIFFs, you get much more reliable proofs from dye-sublimation printers and other proofing devices.

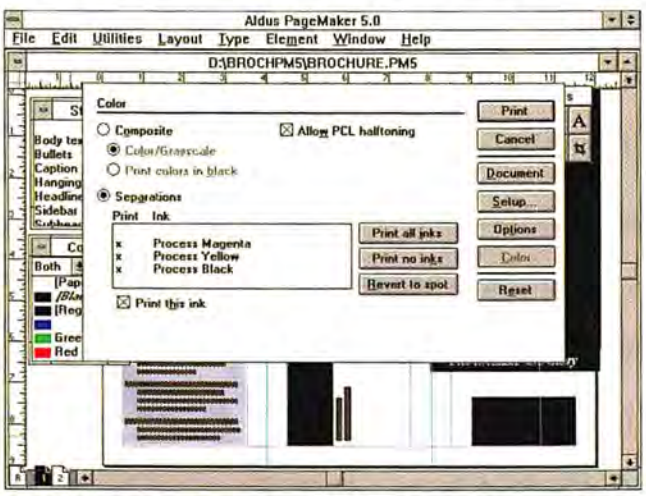
Another big difference is the way Ventura handles bleeds. (Though we weren't able to finish our brochure in FrameMaker, we did discover that bleeds must be handled the same way as Ventura.) To run photographs and other graphics to the edge of a page, print shops require that the image run over the margin by about ⅛ inch. To run graphics off the page in Ventura we had to use the next largest predefined page size.



We used the 17-by-11-inch paper size, so we had no 12-by-9-inch page guides or border to work with. Instead Ventura forced us to eyeball our bleeds on the ruler. Having to use dimensions different from the finished size was doubly difficult because it changed the column placement, which made figuring out where our brochure folded much too complicated. Had Ventura let us define a 12-by-9-inch page, we could have simply folded it at the 4-inch and 8-inch marks, or in thirds.

Finally, the page size also increases the cost of producing the document. Many service bureaus charge more for a 17-by-11-inch page than a 12-by-9-inch page.

QuarkXPress and PageMaker, on the other hand, eliminate the fuss by letting you place elements over the edges of the page. And, while both programs have nonprinting guidelines, QuarkXPress allows you to set them anywhere in the editing area, even on the pasteboard. To place our bleed elements, we set guidelines ⅛ inch off the edges of the brochure and snapped our images to them.



TO REPRODUCE FULL-COLOR DOCUMENTS at a print shop, you need a program that can produce process-color separations. Here, PageMaker is about to output CMYK separations for four-color printing.

BY USING LINKS TO IMAGE FILES, instead of importing them directly into the document file, DTP programs keep document files from getting too large to manage conveniently.

The Tandy Sensation Can Recite The Speeches Of JFK.

It can let you hear the words "ask not what your country can do for you," as only JFK could speak them. And tell you just how those words travel through your ears to your brain with a vivid animation sequence. It can read back to you over the phone the time and place of your business meetings for the week. And pronounce for your child a word she couldn't say herself. It can play an aria from *Madame Butterfly* in full digital stereo sound. And give you the final word on how the stock exchange did for the day. It can even answer your phone and take a message when your mother-in-law calls from Miami. But perhaps what says the most about the Tandy Sensation isn't what it can say, but what it can make others say. Reviewers at such respected computer journals as *BYTE* Magazine, *Compute* and *PCM*, for example. Because in the past few months, the Sensation, with its CD-ROM drive and 486SX microprocessor, has received glowing reviews from each one of these magazines for its power, versatility and usefulness. And the good word keeps spreading. Which speaks volumes, of course, for why you should stop by your neighborhood Radio Shack to see and hear a Tandy Sensation for yourself.

Overall kudos go to Tandy's Sensation; it's a well thought out execution of what every MPC (multimedia personal computer) system manufacturer should strive to emulate.

-Greg Loveria
-BYTE Magazine
May 1993

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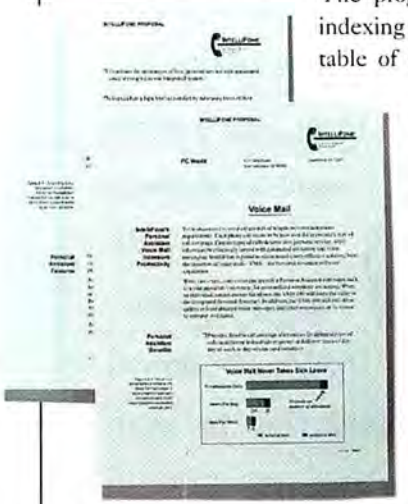
Task 3: The Telecommunications Sales Proposal

Companies like our fictitious IntelliFone generate hundreds of sales proposals each year. Since our proposal changes with each client, product sections come in and out as needed, then we repaginate the document and generate a new table of contents and index.

QuarkXPress can't handle long documents of this nature. It provides no way to compile multiple files into one work, or to generate tables of contents and indexes. In the Macintosh version, third-party extensions, or add-ons, take care of these tasks. So far, about 30 of the extensions out of 150 or so have been translated to the Windows version.

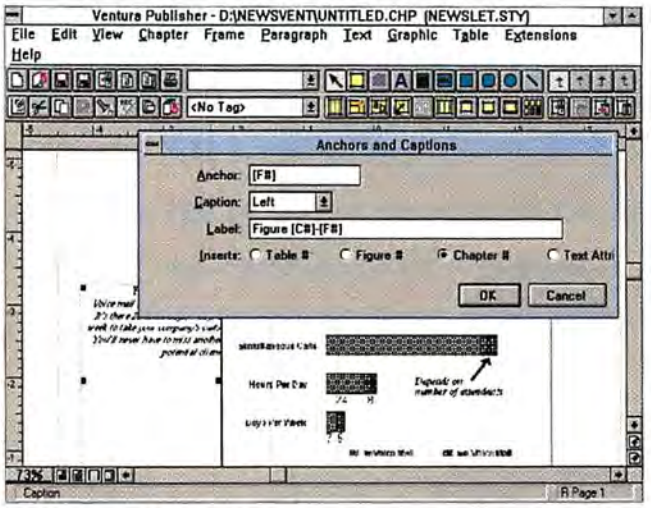
PageMaker did fairly well with the proposal. Its Book feature allowed us to swap our sections in and out and repaginate them. The program's table of contents and indexing features are robust. You define table of contents entries in paragraph styles, which means you don't have to mark each one separately. Indexing in PageMaker is also highly versatile. While defining index entries in one chapter, for example, you can cross-reference index data in other files without opening them.



A serious limitation of PageMaker's Book option, however, is the inability to copy all the chapters and supporting files in your long document to a new drive or directory. If your book sections contain linked files you must open each file and resave each one under a new name to copy them. This is extremely awkward, especially when compared with Ventura's Manage Publications feature, which copies all the files in a long document, as well as all supporting files. FrameMaker has a similar long-document file management feature.

FrameMaker and Ventura eventually pulled way out in front of PageMaker in long-document handling, primarily because of their variables features. For example, our proposal contains several tables and figures (charts and graphs, in this case) referenced according to section numbers, such as "Figure 2-2," "Table 3-2," and so on. As we moved sections in and out of our proposal, these numbers changed automatically.

Ventura allows you to generate captions with figure and table variables built in. Every time that you make a change that affects caption numbering, you can renumber the captions automatically. You can achieve the same results with FrameMaker, but not as easily. In PageMaker (no matter how well you understand the program) you must make these changes manually in each section.



USING VARIABLES TO NUMBER FIGURE CAPTIONS, as Ventura Publisher allows, lets you move or delete figures at will—captions are renumbered automatically.

The variables options in both FrameMaker and Ventura allowed us to change customer names, addresses, and proposal dates automatically—across all files and in headers and footers. Again, PageMaker forced us to open each file separately and search and replace each item individually. In documents consisting of many

Crossing Platforms

High-end desktop publishing has historically been a step or two ahead on the Macintosh. With the addition of process-color separations to PageMaker for Windows and the recent migration of QuarkXPress to the PC, this round of Windows layout packages finally closes the gap. However, most desktop publishing service bureaus, where desktop publishers get their high-resolution imagesetter and color proofing output, still cater primarily to Macintosh users. It helps considerably if your page layout program is compatible with its Mac counterpart.

All four of the programs reviewed here have Macintosh versions, but they are not all 100 percent compatible. Ventura Publisher Macintosh Edition, for example, does not support System 7, the current Macintosh operating system.

QuarkXPress for Windows can open Mac files (with some font tracking limitations); however, as of this writing, you can't open your PC files in the Mac version. According to Quark, version 3.2 on the Mac, due out by the time you read this, will open your QuarkXPress for Windows documents.

The trip across platforms is relatively reliable for PageMaker and FrameMaker users. PageMaker 5.0's Panose font substitution feature notifies you of missing fonts and lets you choose substitutions.

If you plan to print your files at the neighborhood service bureau, make sure the Macs there can open and print your page layout program's files. There are ways around this, such as using PostScript print files, but there's no substitute for good cross-platform compatibility.

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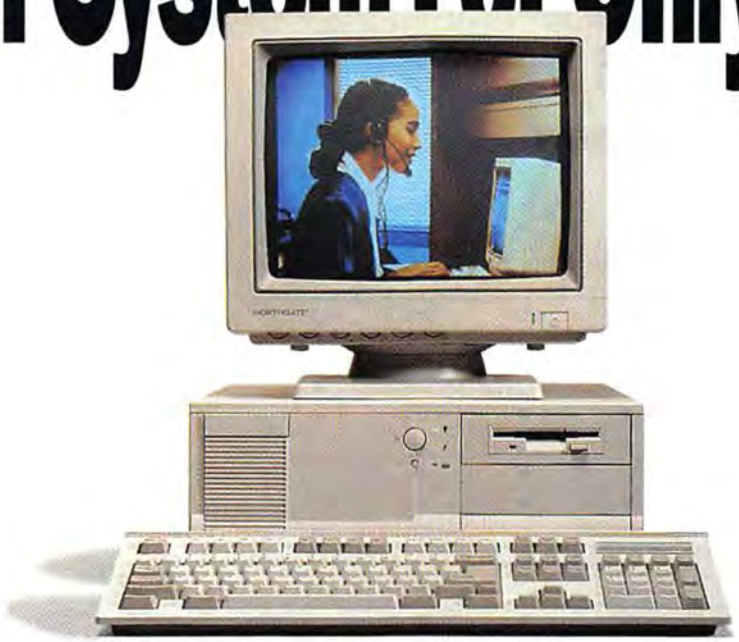

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Floppy	One	One
MS-DOS, Windows 3.1 and mouse	Yes	Yes
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sections, this is a tedious and time-consuming process. It is also the kind of detail that's easy to forget, which can be embarrassing—even disastrous.

PageMaker also fell short by not providing a built-in table editor. FrameMaker and Ventura both have strong table functions. Importing data into tables and keeping it current is simple in both programs. In FrameMaker, for example, tabular data from a WordPerfect file imported perfectly into the cells of our tables.

Our proposal is not particularly long on design. The layout did, however, raise some issues worth noting. The first three or four words in the paragraphs that start chapters contain *small caps,* or capitals set the same size as lowercase letters. Neither Ventura nor FrameMaker supports this feature.

PageMaker imported WordPerfect's small caps cleanly, as well as registered trademark symbols (®) in superscript and other special characters. Ventura, FrameMaker, and Quark imported the characters but not the superscript formatting. We had to search them out and reapply the formatting—a real nuisance.

A recurring complaint about PageMaker is that it does not support frame anchoring. Anchoring allows you to attach elements to other elements or to coordinates on a page. In our proposal, headings and captions are set in the margins next to the body text they pertain to. Without anchoring, each time we made a change in PageMaker that caused body text to move, we had to realign the heads, captions, and graphics manually.

Ventura provided the best approach to this problem. Not only does it allow you to anchor frames to paragraphs, but you can also place two paragraphs on the same line with the Break After option. This allowed us to align heads and body text without creating separate frames for the headings, which proved the only foolproof method to assure that headings stayed adjacent to the appropriate text, no matter what revisions we made to our proposal.

William Harrel is a desktop publisher based in Weaverville, California. He has written books on desktop publishing, including one on Aldus's PageMaker and two on Ventura Publisher.

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

FEATURES COMPARISON

Windows DTP Features Blossom

● Yes ○ No n/a = not applicable

	FrameMaker for Windows 3.0	BEST BUY PageMaker for Windows 5.0	QuarkXPress 3.1	Ventura Publisher Windows Edition 4.1.1
List price	$795	$895	$895	$795
Layout features				
Anchor frames	●	○	○	●
Column balance	●	●[1]	○	●
Conditional text and graphics	●	○	○	○
Element libraries	○	●	●	○
Font and picture usage lists	●	●	●	○
Generates captions	○	○	○	●
Interruptible display	○	●	○	○
Lock objects in place	●	○	●	○
Missing font notification	●	●	●	○
Missing font substitution	○	●	○	○
Multiple master pages	●	○	●	n/a
Multiple paste	●	●	○	○
Rotate text and graphics	90 degrees	any angle	any angle	90 degrees
Ruler guides	○	●	●	○
Set ruler guides off of pages	○	●	○	○
Set ruler guides off of codes	○	●	○	●
Supports scanning	○	●	○	●
Printing features				
Prints thumbnails	●	●	●	○
Process-color separations	○	●	●	●
Long-document features				
Renumbers figures and tables automatically	●	○	○	●
Compiles books	●	●	○	●
Numbers paragraphs	●	●[1]	○	●
Generates TOC, indexes	●	●	○	●
Work on TOC across multiple documents	●	●	○	●
Variables	●	○	○	●
Miscellaneous features				
Free support	30 days	90 days	90 days	90 days
Online reader	●	○	○	○
Scripting language	○	●	○	○

[1] With addition.

WHERE TO BUY

FrameMaker for Windows 3.0
Frame Technology Inc.
800/843-7263, 408/433-3311
Reader service no. 780

PageMaker for Windows 5.0
Aldus Corp.
800/333-2538, 206/628-2320
Reader service no. 781

QuarkXPress 3.1
Quark Inc.
800/788-7835, 303/894-8888
Reader service no. 782

Ventura Publisher Windows Edition 4.1.1
Ventura Software
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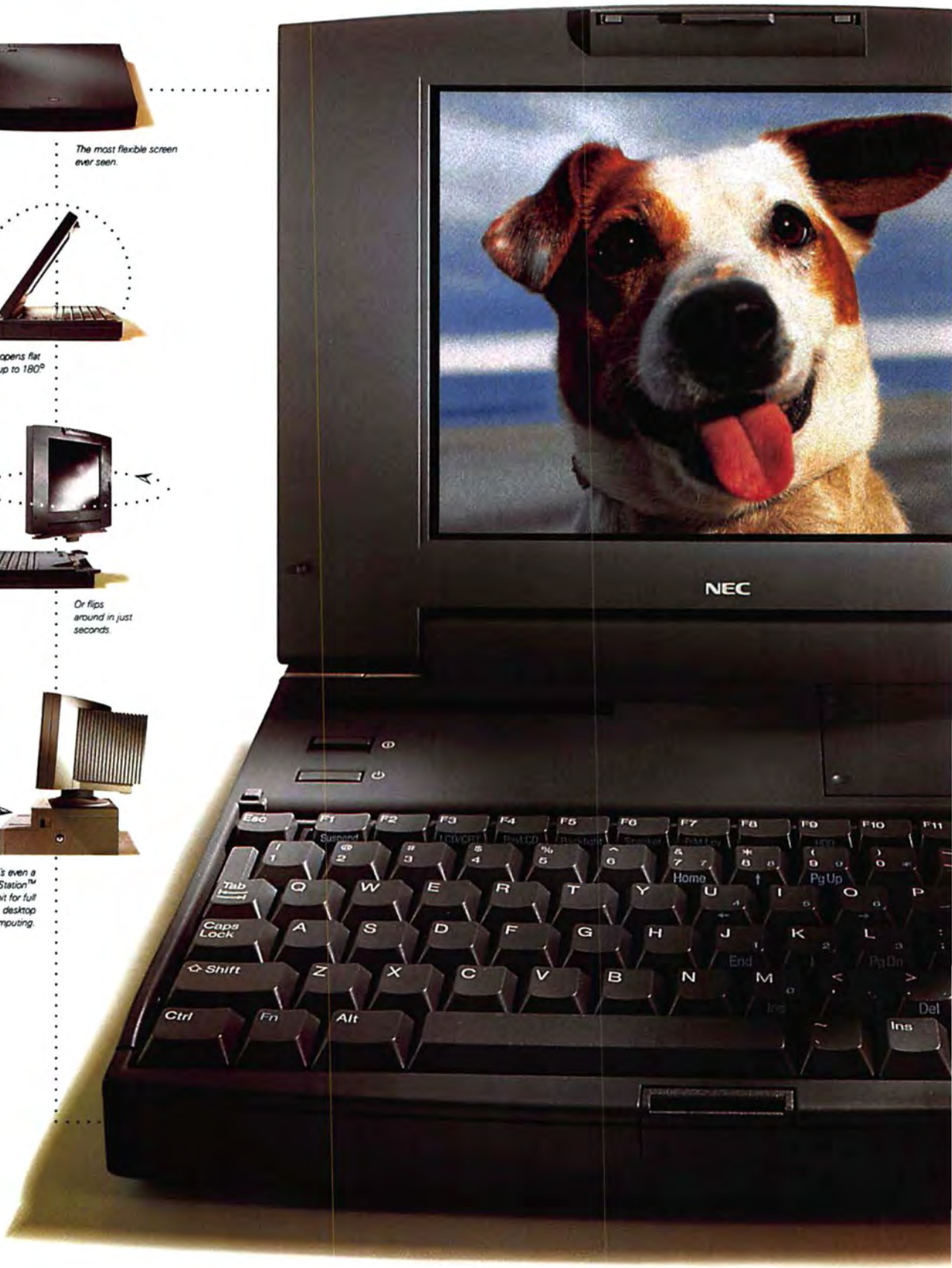

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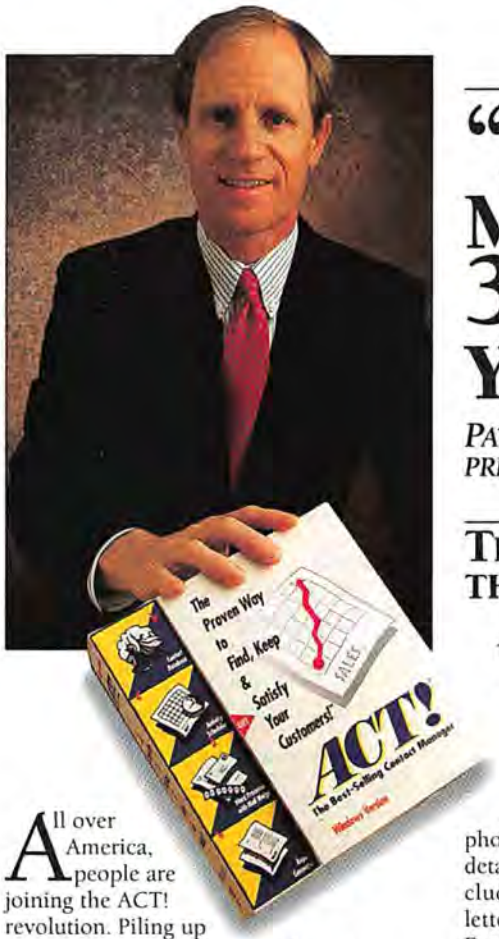

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1501 Presentations for Windows Comp. Upgrade.... 105.
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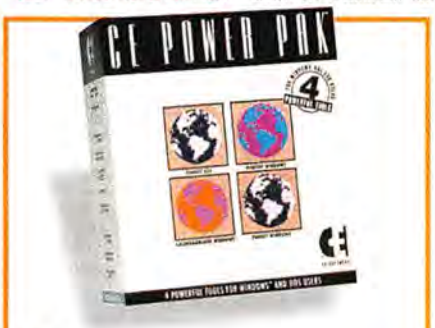

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11646	DESKPRO 4/66M Model 510/w: 66-MHz 486DX2, 510 MB Hard Drive, DOS, Windows 3.1, Mouse, QVision Video, Business Audio	3619

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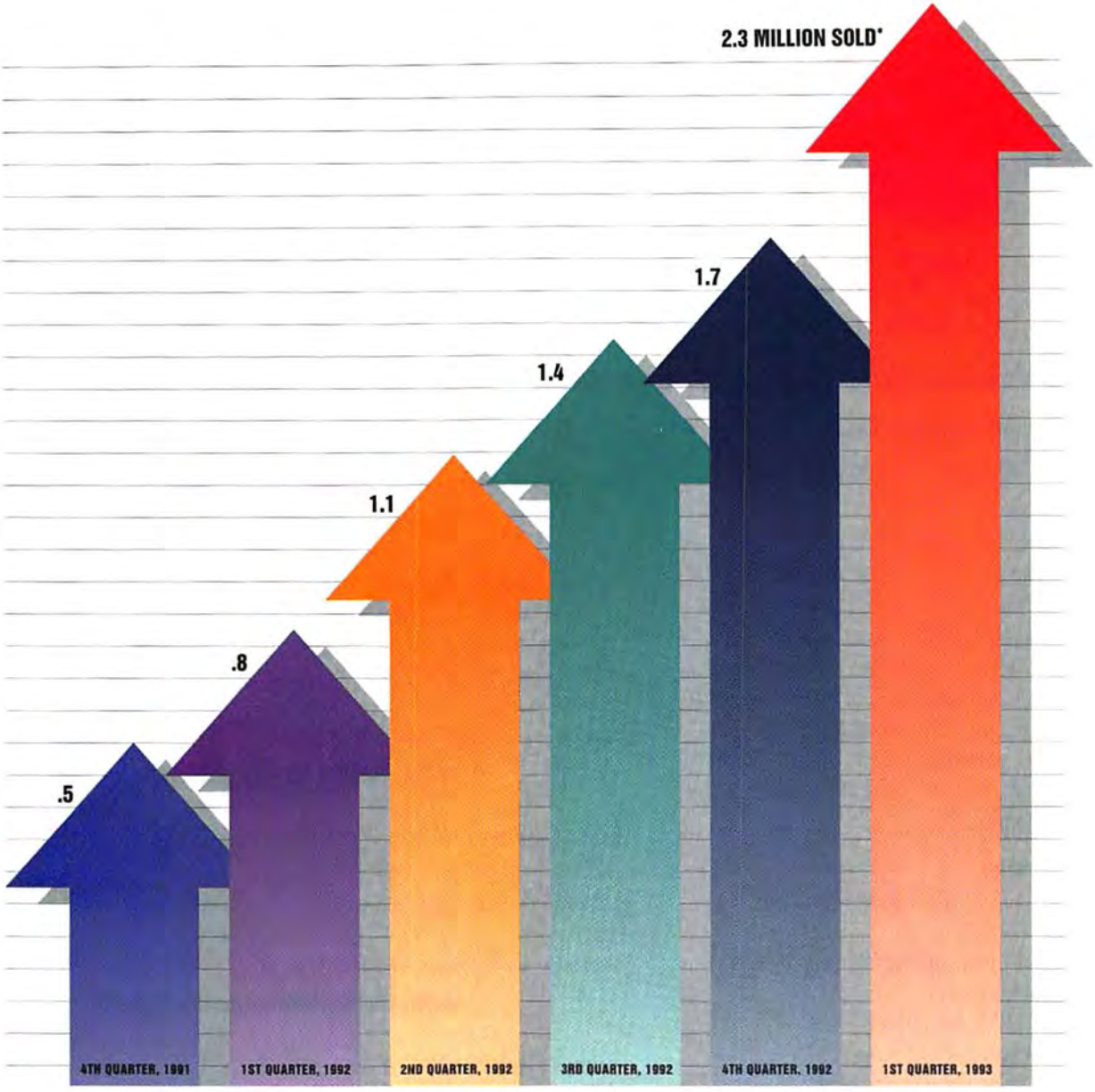

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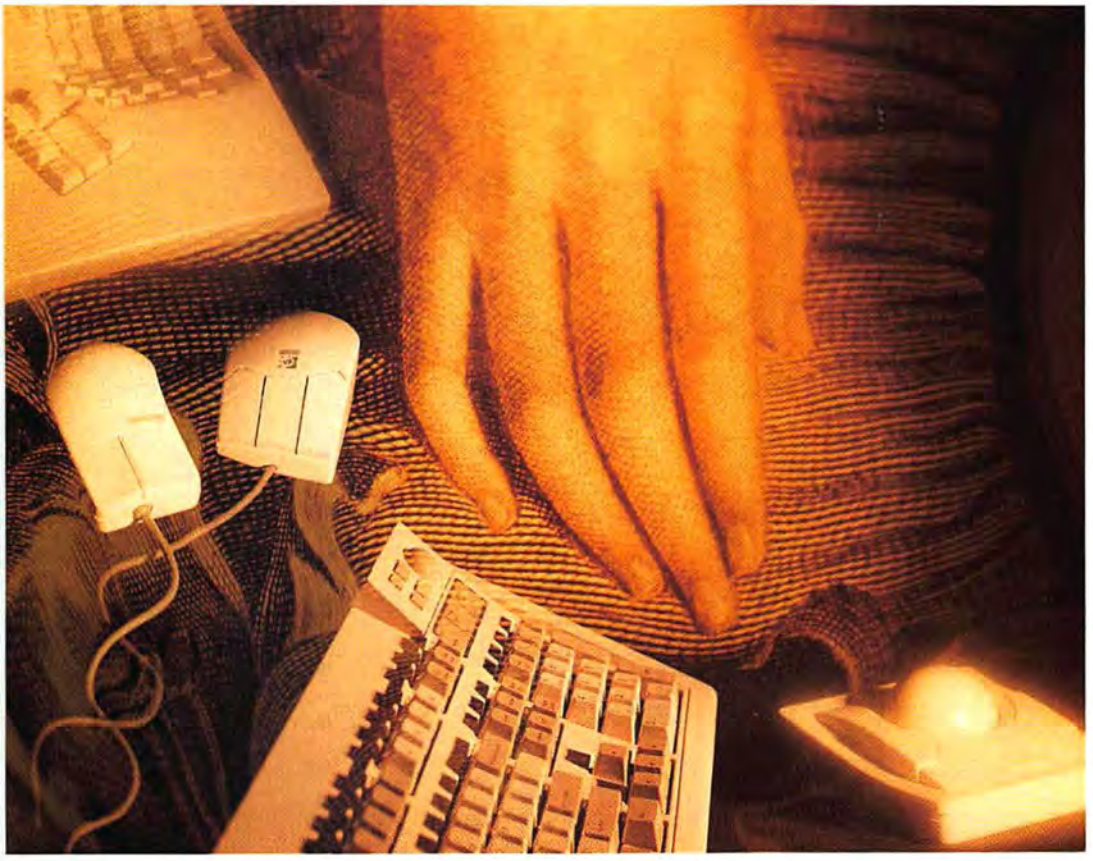
FINDING THE PERFECT TOUCH

Increased reliance on PCs–and a rash of computer-related repetitive strain injuries–inspire a new generation of input devices. Here's a guide to the latest keyboards, mice, and trackballs.



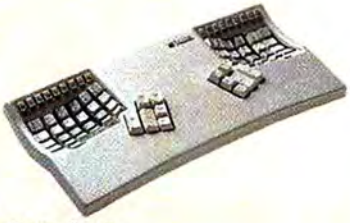
MICHAL VENERA

By Michael Desmond

Imagine a computer upgrade that can increase productivity, improve morale, and possibly save thousands of dollars in medical bills and lost time. It's not a new CPU or second hard disk. In fact, the upgrade involves some of the most basic—and long overlooked—PC components: keyboards, mice, and trackballs.

Input devices for the PC have long been regarded as secondary equipment. Users have been too busy keeping up with the latest processor or must-have application to give serious thought to keyboards and mice. But as office workers rely increasingly on computers, the performance and comfort of these devices assume new importance.

Why? Put simply, the design and suitability of the input device will affect productivity. An uncomfortable keyboard, mouse, or trackball can make even the



Keyboards

●= Yes ○= No
n/a = not applicable

Manufacturer	Product	Price	STANDARD FEATURES: Number of keys	Programmable	Special keys	PS/2 adapter	LED indicators	FUNCTION KEYS: Number	Position
Advance Computer Ergonomics 619/525-1555	The Natural	$250	101	●	○	●	○	12	top
Alps Electric 408/432-6000	FDMC-101 Mechanical	$39	101	○	○	●	○	12	top
	FDMM-101 Membrane	$29	101	○	○	●	○	12	top
	GGMC-101 Mechanical	$65	101	○	○	●	○	12	top
	MDS-101 Membrane	$38	101	○	○	●	○	12	top
Cherry Electrical Products 708/662-9200	G81-1800 Compact Keyboard	$124	101	○	○	○	○	12	top
Electrone 303/757-0335	4000	$99.99	101	○	○	optional	●	12	top
	6142	$99	142	●	●[3]	optional	●	36	dual
	6200	$68.99	84	○	○	optional	●	12	top
Ergonomic-Interface Keyboard Systems 619/454-0000	The Vertical	$299	101	●	●	●	●	12	dual
Focus Electronic 909/468-5533	KeyPro FK-9000	$79	129	●	●[3]	○	●	24	dual
Fujitsu Microelectronics 408/922-9000	FKB4700 Series	$57	101	○	○	optional	●	12	top
	FKB4870 Series	$36	101	○	○	optional	○	12	top
Health Care Keyboard 414/253-6333	Comfort Keyboard System	$795	103	●	●[3]	●	●	12	top
Honeywell Keyboard Division 915/544-5511	101WN	$79	101	○	●	○	○	12	top
Keyboard Advances 515/472-0353	Erase-Eaze	$72	101	○	●[6]	●	●	12	top
Key Innovations 612/724-7745	TE2P Touch Edit Keyboard	$120	109	○	●[6]	○	●	12	top
	TTE Touch Edit Keyboard	$99	109	○	●[6]	○	●	12	top
Key Tronic 509/928-8000	Trak101 Keyboard	$224	101	○	●[7]	○	●	12	top
	Flash101 Keyboard	$98	101	●	●[8]	○	●	12	top
Kinesis 206/455-9220	Kinesis Ergonomic Keyboard	$690	86	●	●[3]	●	●	17	top
Lexmark Int'l 800/438-2468	Lexmark Classic Touch[10]	$149	101	○	○	●	●	12	top
Marquardt Switches 315/655-8050	MiniErgo	$179	84	●	○[6]	●	●	12	top
Maxi Switch 602/294-5450	ProKey 124 Keyboard	$99	124	●	●[3]	optional	○	22	dual
MicroSpeed 510/490-1403	Keyboard Deluxe–Membrane	$64.95	101	○	○	●	●	12	top
	Keyboard Deluxe–Tactile	$84.95	101	○	○	●	●	12	top
Northgate 612/943-8181	OmniKey/Ultra-T Keyboard	$129	116	●	○	optional	●	24	dual
People & Profits 612/452-8018	VersaKey	$395	175	●	●[12]	optional	●	12	dual
Sal Systems and Laboratories 203/929-0790	Focus 2001	$49	101	○	○	○	●	12	top
Sejin America 408/980-7550	J.M. Keyboard	$99.95	101	○	○	○	○	12	top
SIIG 800/927-8688	Suntouch 101 Enhanced Keyboard	$79	101	○	○	○	●	12	top
	Suntouch Jr.	$69	81	○	●[3]	○	●	12	top
Tony[14] 808/599-8669	The Tony Ergonomic KeySystem	$625	101	●	●[15]	●	○	12	optional

[1] Adjustable or split keyboard.
[2] Integrated trackball on keyboard.
[3] User-definable macro/function keys.
[4] Adjustable frame; dimension differs by settings.
[5] Vertical typing surface with adjustable sections.
[6] Centrally positioned edit key(s).
[7] Mouse control keys.
[8] Function viewing keys.
[9] Separate, concave keywells.
[10] Two models, with built-in 16mm or 25mm trackball.
[11] Three-position tilt, low-profile design.
[12] 60 user-definable macro buttons at top of keyboard.

DESIGN ELEMENTS

Height (inches)	Width (inches)	Depth (inches)	Integrated input device	Ergonomic features	L-shaped <Enter> key	Warranty (years)	Reader service number
0.8	20	9	○	●[1]	●	2	697
1.6	18.1	6.7	○	○	●	1	698
1.6	18.1	6.7	○	○	●	1	698
1.6	18.6	8.4	○	○	○	3	698
1.7	18.9	7.5	○	○	○	3	698
1.4	15.9	7.1	○	○	○	1	699
2.8	18.5	7.5	●[2]	○	●	1	700
2	20.5	8.5	○	○	●	1	700
1.5	12.8	6.3	○	○	●	1	700
7	17[4]	7	●	●[5]	●	2	701
1.8	21	7	○	○	●	1	702
1.1	19.1	8.7	○	○	○	1	703
1	18.4	6.9	○	○	○	1	703
2.5	22	6.3	○	●[1]	○	2.5	704
1.7	18.5	7.3	○	○	●	3	705
1.6	18.2	6.8	○	○	●	2	706
2	19	9	○	●	○	1	707
2	19	9	○	●	○	1	707
1.8	19	8.1	●[2]	●	●	3	708
1.9	18.4	8.3	○	●	●	2	708
3	16.5	8	○	●[9]	○	3	709
1.7	19.4	8.3	●[2]	○	○	1	710
2	17.8	9.8	○	●[1]	●	90 days	711
1.6	20.2	8.1	○	○	●	3	712
1.7	15.8	6.7	○	●[11]	●	1	713
1.7	15.8	6.7	○	●[11]	●	1	713
2.6	20.6	8.1	○	○	●	5	714
1.5	20.4	8.3	○	○	●	1	715
1	19	7.5	○	○	●	1	716
1.6	18.2	6.6	●[13]	○	●	3	717
1.5	19	7.8	○	○	●	1	718
1.5	12	6	○	○	●	1	718
[4]	[4]	[4]	●	●[1]	●	3	719

[13] Sensors under J key let it double as pressure-sensitive input device.

[14] Available this month, according to manufacturer.

[15] All keys adjustable in three dimensions.

For more information about all products in this table, circle reader service no. 904.

simplest task a chore. Whether you're struggling with a cramped or unresponsive keyboard or fumbling with a hard-to-reach mouse button, the extra effort slows you down significantly.

But the argument for taking a new look at these devices goes beyond day-to-day productivity. Increased reliance on computers has contributed to a stunning rise in repetitive strain injuries among U.S. workers (see "Danger at Your Fingertips," May). While a minor annoyance—such as having to twist your wrists to get your fingers across a keyboard—may not seem threatening, repetition of that action can take a real toll on joints, tendons, and muscles.

So it's hardly surprising that a new crop of input devices is springing up. After years of research, ergonomic designs offering adjustable fit, contoured surfaces, and a variety of hand positions are reaching the market.

For all the variety and innovation, one rule stands firm: There is no substitute for testing. For corporate users that means setting up trial programs and running in-house usability tests. Individuals should try as many products as possible before buying. Also, look for a 30-day return policy so you can return a product if it doesn't work out.

Needless to say, the plethora of options and issues can get confusing. To give you a place to start, we've laid out important buying guidelines and rounded up keyboards, mice, and trackballs from a number of vendors to help you pick the right product.

Keyboards Stray Into New Territory

Nowhere is the new ergonomic thinking more dramatic than among keyboards. From designs that merely divide the keyboard into two parts to wildly adjustable multisection keyboards, new products are transforming the model established by IBM. But for all their variety, most new designs share two goals: Reduce finger travel and eliminate wrist strain.

Standard keyboards force users to lay their hands flat and twist their wrists inward when typing, an unnatural position called wrist pronation. Many designs seek to reduce this strain by splitting the keyboard and angling the sides outward, letting the hands rest in a natural handshake position that takes the strain off local muscles and tendons. Other designs, such as Keyboard Advances' Erase-Eaze and the Key Innovations TTE Touch Edit Keyboard, seek to

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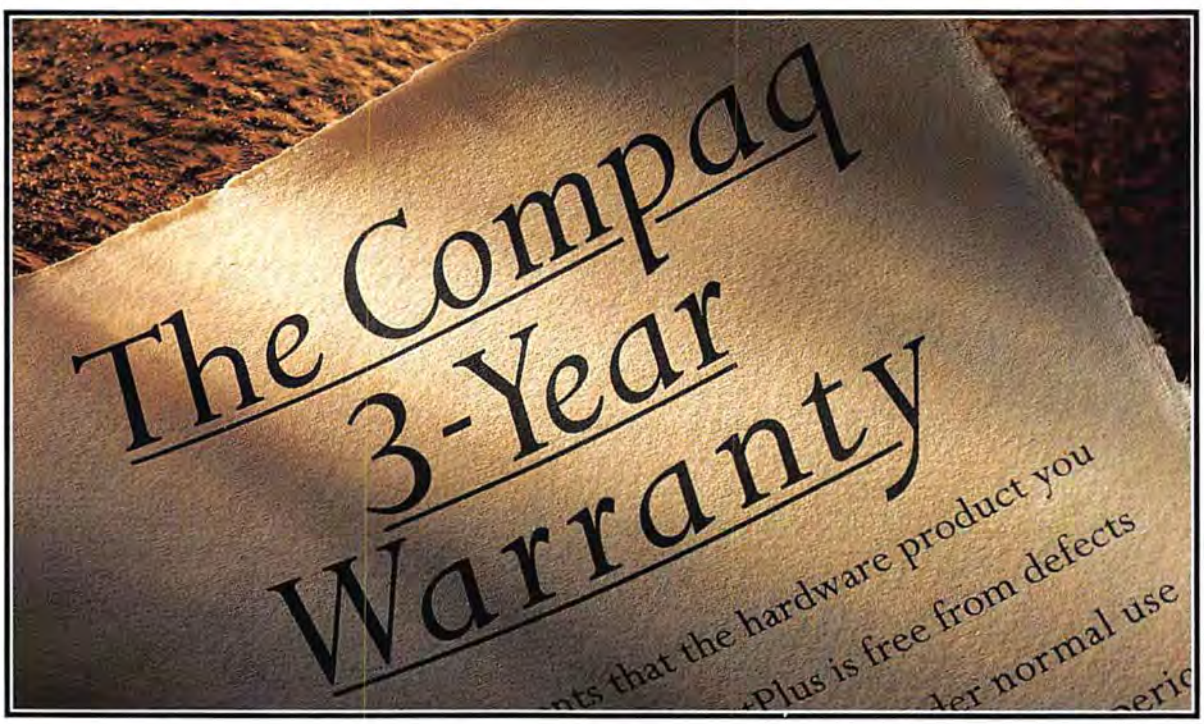
COMPAQ ProLinea 3/25s
25-MHz 386SX, 2-MB RAM, 120-MB hard drive, VGA Color Monitor. An affordable entry-level desktop PC.



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COMPAQ ProLinea 4/25s
25-MHz 486SX, 4-MB RAM, 120-MB hard drive, SVGA Color Monitor. Great for everyday business applications.

COMPAQ ProLinea 4/33
33-MHz 486DX, 4-MB RAM, 120-MB hard drive, SVGA Color Monitor. Designed for more advanced applications.

COMPAQ ProLinea 4/66
66-MHz 486DX2, 4-MB RAM, 120-MB hard drive, SVGA Color Monitor. For high performance at an affordable price.

ProLinea Features

3½" 1.44-MB diskette drive • 1024 x 768 local bus video graphics with 1-MB VRAM in up to 256 colors (on 486 models) • 3 expansion slots • 3 internal storage device positions • Security features • COMPAQ Color Monitor, preinstalled MS-DOS 6.0 and Microsoft Windows 3.1 and a COMPAQ Mouse.

DESKPRO/i Features

*3½" 1.44-MB diskette drive • Integrated QVision Graphics displays up to 256 colors at 1024 x 768 with 512-KB VRAM option** • 3 expansion slots • 3 internal storage device positions • Security features • Business Audio • COMPAQ Color Monitor, preinstalled MS-DOS 6.0, Microsoft Windows 3.1 & Sound System Software, COMPAQ Mouse & Microphone.*

COMPAQ DESKPRO 4/25is
25-MHz 486SX, 4-MB RAM, 120-MB hard drive, SVGA Color Monitor. Delivers fast, high-resolution graphics in Windows.

COMPAQ DESKPRO 4/33i
33-MHz 486DX, 4-MB RAM, 120-MB hard drive, SVGA Color Monitor. For even faster performance in a Windows environment.

Contura Features

3½" 1.44-MB diskette drive • Power conservation and security features • Battery Pack • AC Adapter • Preinstalled MS-DOS 6.0, Microsoft Windows 3.1 and EZ Help On-Line Library and a COMPAQ Trackball.

COMPAQ Contura 3/25
25-MHz 386SL, 4-MB RAM, 120-MB hard drive, monochrome VGA display, 6.2 lbs. An affordable notebook loaded with features.

COMPAQ Contura 4/25
25-MHz 486SL, 4-MB RAM, 120-MB hard drive, monochrome VGA display, 6.2 lbs. Upgradeable to Active Matrix Color Display.

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The Front Office.

COMPAQ ProLinea 4/33
33-MHz 486DX, 4-MB RAM, 120-MB hard drive, SVGA Color Monitor.

Quattro Pro for Windows

WordPerfect for Windows

This general business solution, which is offered to you at a very competitive price, teams up two popular word processing and spreadsheet applications.

$1,899
*Or $68 per month**
Save over $274†

The Windows Office.

COMPAQ DESKPRO 4/33i
33-MHz 486DX, 4-MB RAM, 240-MB hard drive, 1024 Color Monitor.

Extra 2-MB of RAM

The Microsoft Office for Windows

This solution can utilize COMPAQ business audio with the most popular Microsoft applications. The Microsoft Office includes Microsoft Excel, Word, PowerPoint and Mail.

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*Or $97 per month**
Save over $239†

The Office Pro.

COMPAQ ProLinea 4/50
50-MHz 486DX2, 4-MB RAM, 240-MB hard drive, SVGA Color Monitor.

Extra 4-MB of RAM

14.4-Kbps Data+Fax Modem

WinFax PRO for Windows

Lotus SmartSuite for Windows

This solution offers data and fax communications with popular Lotus applications. Lotus SmartSuite includes Lotus 1-2-3, AmiPro, Freelance Graphics, Organizer and cc:Mail.

$2,899
*Or $104 per month**
Save over $279†

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Mice

● = Yes ○ = No
n/a = not applicable

Manufacturer	Product	Price	KEY FEATURES: Number of buttons	Base resolution (dpi)[1]	Dynamic acceleration	Adjustable speed/sensitivity	DESIGN ELEMENTS: Ergonomic features	Operating mechanism
A4Tech 909/468-0071	3-Button Serial Mouse	$35	3	300	○	○	n/a	optomechanical
Altra 307/328-1342	Felix	$118	2	330	○	●	pen-shaped	mechanical
Appoint 510/463-3003	MousePen Pro	$99	2	150	●	●	pen-shaped[2]	optomechanical
	Gulliver	$119	2	150	●	●	very small	optomechanical
Commax 908/671-0775	City Mouse	$17	4	360	●	●	n/a	optomechanical
DFI 916/568-1234	DMS-400x	$29	3	400	○	○	contoured	optomechanical
DynaPoint 818/854-6440	DynaMouse	$99	2	400	●	●	n/a	mechanical
Focus Electronic 909/468-5533	Alum Mouse	$25	3	400	●	●	n/a	optomechanical
Honeywell Keyboard Division 915/544-5511	Honeywell Mouse	$79	2[3]	320	●	●	n/a	optomechanical
IMSI 800/833-4674	IMSI Mouse	$69.95	3	290	●	●	contoured	optomechanical
	Pet Mouse	$39.95	3	290	●	●	contoured	optomechanical
	System Mouse	$29.95	3	290	●	●	contoured	optomechanical
KYE Int'l 909/923-3510	Genius Clixes	$29.95	3	350	●	●	n/a	optomechanical
	Genius MouseOne	$19.95	3	350	●	●	n/a	optomechanical
	Genius MouseToo	$44.95	3	350	●	●	n/a	optomechanical
Logitech 510/795-8500	MouseMan Cordless[4]	$149	3	400	●	●	contoured[5]	optomechanical
	MouseMan [6, 7]	$119	3	400	●	●	contoured[5]	optomechanical
Microsoft 206/882-8080	Microsoft Mouse 2.0	$109[8]	2	400	●	●	contoured	optomechanical
MicroSpeed 510/490-1403	Mouse Deluxe	$34.95	3	500	●	●	low profile	optomechanical
Mouse Systems 510/656-1117	Mouse	$24.95	2	350	●	●	n/a	optomechanical
	New Mouse	$89.95	3	400	●	●	n/a	optomechanical
	OmniMouse II	$49.95	2	350	●	●	contoured	optomechanical
	PC Mouse III	$129	3	300	●	●	n/a	optical
ProHance 415/967-5774	PowerMouse/100	$175	40[9]	200	●	●	all buttons programmable	optomechanical
	PowerMouse/50	$99	12[9]	200	●	●	all buttons programmable	optomechanical
	PowerMouse/70	$125	17[9]	200	●	●	all buttons programmable	optomechanical
	ProHance Serial Mouse	$39.95	3	50	●	●		optomechanical
Radio Shack 817/390-3011	25-2001 Combi-Mouse	$39.95	2	400	○	●	contoured	optomechanical
Sai Systems and Laboratories 203/929-0790	Aero Plus	$39	3	300	○	●	n/a	optomechanical
Sejin America 408/980-7550	SMC 24	$28.50	2	400	●	○	contoured[5]	optomechanical
	SMC 34	$29.95	3	400	●	○	contoured[5]	optomechanical
SIIG 510/657-8688	MouseTrax	$69	3	200	●	●	dual mouse/trackball	optomechanical
Winner Products (USA) 909/595-2490	RM-2[11]	$69.95	2	400	○	●	n/a	mechanical
Zeny Computer Systems 510/659-0386	Zen Infra-red Cordless Mouse[11]	$89	3	200	●	●	contoured	optomechanical
Moustrak 702/884-1925	Colani Mouse[6]	$79	3	400	●	●	contoured	mechanical
	Win Mouse	$16.99	2	300	●	●	n/a	mechanical

[1] 600 dpi along z-axis.
[2] Dual mouse/trackball.
[3] Also available in 3-button model.
[4] Radio-transmitting mouse.
[5] Finger grooves on buttons.
[6] Left- and right-handed versions.
[7] Large size available.
[8] Prices vary for different bus types.
[9] Two true mouse buttons, rest for macros.

PORTS					
Serial	PS/2	AT	Bundled software	Warranty (years)	Reader service no.
●	○	●	none	3	720
●	○	○	mouse utility	1	721
●	●	●	desktop utility	1	722
●	●	●	desktop utility	1	722
●	○	○	graphics program	lifetime	723
●	○	○	graphics program, mouse utility	1	724
●	●	○	none	2	725
●	●	●	graphics program, mouse utility	1	726
●	●	●	none	5	727
●	○	●	graphics program, desktop utility	lifetime	728
●	○	○	desktop utility	lifetime	728
●	○	○	none	2	728
●	○	○	none	lifetime	729
●	●	○	none	lifetime	729
●	●	○	graphics program	lifetime	729
●	●	●	mouse utility	3	730
●	●	●	mouse utility	3	730
●	●	●	mouse utility	2	731
●	○	○	mouse utility, keyboard utility	1	732
●	○	●	game	limited lifetime	733
●	●	●	game, graphics program	limited lifetime	733
●	●	●	game	limited lifetime	733
●	●	●	game	limited lifetime	733
●	○	○	mouse utility, macro program	1	734
●	○	○	mouse utility, macro program	1	734
●	○	○	mouse utility, macro program	1	734
●	○	○	mouse/menu utility, graphics program	1	734
●	●	●	none	1	735
●	○	○	mouse/menu utility, graphics program	1	736
●	●	●	mouse utility	3	737
●	●	●	mouse utility	3	737
●	optional	●	graphics program	2[10]	738
●	●	●	mouse/menu utility	1	739
●	○	●	mouse utility	1[10]	740
●	●	●	none	1	741
●	●	●	none	1	741

[10] Limited coverage thereafter.

[11] Infrared transmitting mouse.

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

reduce finger travel by moving edit keys to a central position near the <Space> bar or within a split home row.

But not all users need a nonstandard keyboard, nor do they want to face the learning curve some of these products require. To add power and functionality to a plain-vanilla keyboard, consider an integrated pointing device or programmable macro keys to streamline many tasks. Lexmark's two Classic Touch keyboard models include an integrated trackball. The VersaKey keyboard from People & Profits adds value through programmability, with 60 keys that can be set to perform tasks such as launching programs and saving files.

All this innovation can get pricey, though, with some of the newer ergonomic options costing $600 or more. Systems that include integrated pointing devices and dedicated macro keys can make typing easier without demanding a high premium.

Training time is an important consideration for buyers evaluating new keyboard designs. While even the most radical split-key models listed here maintain the traditional QWERTY layout, a nonstandard orientation can confound experienced typists for hours if not days.

Pointing the Way to Personalized Computing

Keyboards are only part of the equation. As Windows has gained popularity, the mouse has become a fixture on most PCs, with trackballs and other pointing devices enjoying a lesser following.

When shopping for a mouse or trackball, pay attention to the base resolution. Resolution, usually measured in dots per inch (dpi), indicates how closely the device responds to movement. The higher the resolution, the greater your control. Most mice and trackballs offer standard resolutions between 200 and 400 dpi, with higher values achieved through software enhancements. Even so, 400 dpi is more than adequate for most graphical applications.

All these products include driver software that controls the device and lets it talk to your computer. Make sure yours comes with drivers for DOS and Windows, at a minimum. Many products also include a suite of utilities to change resolution, customize button functions, and program macros. Finally, bundled software packages, such as draw programs, menu enhancers, and other applications, are often included.

We Can Understand Why Other Companies Don't Include A 3 Year Warranty.

(If We Sold Their Compu

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ters We Wouldn't Either.)

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Circle 35 on reader service card

Trackballs

● = Yes ○ = No
n/a = not applicable

Manufacturer	Product	Price	KEY FEATURES: Number of buttons	Resolution (dpi)	Drag-lock	DESIGN ELEMENTS: Ball diameter (inches)	Ergonomic features	Operating mechanism
A4Tech 909/468-0071	First Finger Trackball	$60	3	350	○	1.5	n/a	optomechanical
Appoint 800/448-1184	Thumbelina[1]	$99	2	150	●	0.4	small, hand-held	optomechanical
CH Products 619/598-2518	RollerMouse	$129.95	4	400	●	2.25	contoured	optomechanical
DynaPoint 818/854-6440	DynaTrak[1]	$99	2	250	○	1.15	left/right-handed positioning	mechanical
Electrone 800/821-9362	1601/2	$189	3	200	●	2	palm rest	optomechanical
IMSI 800/833-4674	PC Stylus Combo	$89.95	3	100	●	0.5	pen-shaped stylus	optomechanical
GPS Marconi Circuit Technology 516/293-8686	RB2-300	$155	3	200	●	2.25	n/a	optomechanical
Itac Systems 800/533-4822	Mouse-trak	$179	3	2000	●	2	palm rest	optomechanical
Kensington Microware 415/572-2700	Expert Mouse 4.0 Trackball	$149.95	2	200	●	2.25	n/a	optical
Key Tronic 800/262-6006	TrakMate Wristpad	$149	4[2]	200	●	1.35	wrist-rest/trackball combination[3]	optomechanical
KYE Int'l 800/456-7593	Genius HiTrak	$74.95	3	350	●	1.5	n/a	optomechanical
	Genius HiPoint	$79	2	350	○	1	n/a	optomechanical
Logitech 510/795-8500	TrackMan	$139	3	300	●	1.35	contoured	optomechanical
	TrackMan Portable[1]	$169	3	200	●	1	contoured	optomechanical
Microsoft 206/882-8080	BallPoint Mouse[4]	$165	2	400	●	1.25	adjustable tilt	mechanical encoders
	BallPoint Mouse[1]	$169	4	400	●	1.25	adjustable angle	mechanical encoders
MicroSpeed 510/490-1403	PC-Trac	$119	3	50–1600	●	2.25	low profile	optomechanical
	WinTrac	$129	3	50–1600	●	2.25	low profile	optomechanical
	MicroTrac Model #PD600	$89.95	3	50–1600	●	0.75	index-finger use	optomechanical
Mouse Systems 510/656-1117	PC Trackball II	$99.95	3	680	○	1.5	n/a	optomechanical
	NewPoint	$99.95	2	200	○	1	n/a	optomechanical
ProHance 415/967-5774	ProHance PowerTrack/100	$175	40[6]	200	●	1.75	n/a	optomechanical
	ProHance PS/2 Trackball	$99.95	2	200	○	1.75	n/a	optomechanical
	ProHance Serial Trackball	$79.95	3	200	○	1.75	n/a	optomechanical
Radio Shack 817/390-3011	25-2003 Trackball	$39.99	2	200	●	1	contoured	optomechanical
Winner Products (USA) 909/595-2490	EasyTrak	$69.95	4	200	●	1	left/right-handed versions	optomechanical
	T2+	$49.95	3	400	●	1.75	n/a	optomechanical

[1] Portable.
[2] LED indicators for drag-lock and speed control.
[3] Attaches to base of keyboard.
[4] Comes with desktop stand.
[5] Limited warranty thereafter.
[6] Two true mouse buttons, rest for macros.

Mice

As with keyboards, standard mouse design has evolved in recent years. While most mouse surfaces are curved for comfort and ease of use, many new models offer special contouring, specific sizes, and even separate versions for left- and right-handed use. Again, the key issue is comfort.

The two market leaders, Microsoft and Logitech, take different approaches to comfort. Microsoft Mouse 2.0 features a long, tapered design and a contoured ridge for hand and wrist support, while Logitech's MouseMan comes in right- or left-hand versions. While both companies have spent millions of dollars trying to determine the best shape, aspect, and material for optimal use, no single design works for everybody, so try before you buy.

Beyond comfort lies the Great Button Debate: Most mice come in two- and three-button designs, yet today's software is just beginning to recognize even the second button. The third button remains un-

PORTS: Serial	PS/2	AT	Bundled software	Warranty (years)	Reader service number
●	○	○	none	3	742
●	●	●	animation program, mouse utility	1	743
●	●	●	mouse utility, menu utility	1	744
●	●	○	none	2	745
●	○	●	none	1	746
●	●	●	cursor utility	3	747
●	●	●	mouse utility	1	748
●	●	●	none	1	749
●	●	●	mouse utility, application detection switching utility	5	750
●	●	●	install utility, game	1	751
●	●	○	graphics program	lifetime	752
●	●	○	none	lifetime	752
●	●	●	mouse utilities	3	753
●	●	●	mouse utilities	3	753
●	●	○	mouse utilities	1	754
●	●	○	mouse utilities	1	754
●	●	●	keyboard utility	1	755
●	○	●	application detection utility, 3-D utility	1	755
●	●	●	keyboard utility	1	755
●	●	●	none	2[5]	756
●	●	●	none	2[5]	756
●	○	○	mouse programming utility, macro program	1	757
○	●	○	graphics program, menu utility	1	757
●	○	○	graphics program, menu utility	1	757
●	●	●	none	1	758
●	●	●	menu utility	1	759
●	○	○	menu utility	1	759

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

supported in nearly all applications. To fill the gap, some mice include utilities that let you assign cut-and-paste and double-click functions to the second and third buttons.

If your desk is a candidate for disaster relief, a cordless mouse can grant new freedom by untethering you from the PC. Inexpensive infrared models, such as Winner Products' $69.95 RM-2, eliminate the bothersome cord but demand line-of-sight transmission. A radio-based cordless mouse such as Logitech's $149 MouseMan Cordless, on the other hand, can transmit right through a stack of papers and operate a PC from 6 feet away. A word of advice, though: Make sure a radio-controlled mouse has a choice of channels so you can avoid conflict with other cordless mice in the vicinity.

In general, expect to pay between $20 and $120 for a standard mouse and up to $150 for a cordless, radio-operated mouse.

Trackballs

A trackball is essentially a mouse flipped on its back. For this reason, users face many of the same comfort, performance, and quality issues they do with mice. Generally, trackballs are considered a space-saving alternative to mice, providing full cursor mobility even on a crowded desk. For the same reason, they're ideal for portable computing.

When looking for trackballs, pay attention to the size of the ball used to control the screen cursor. A larger ball is likely to give you better control and greater comfort. Equally important is the placement of buttons; a trackball with hard-to-reach buttons can wreak havoc with your hand. Some products, such as DynaPoint's DynaTrak, have adjustable left- and right-handed positioning, and additional ergonomic and user-specific designs abound. As with other input devices, personal preference is key.

While desktop trackballs feature large rollers, stable bases, and well-spaced buttons, the portable versions used with notebooks must function in a confined space. Some products, such as Logitech's TrackMan Portable and Microsoft's BallPoint Mouse, provide control and comfort via a larger chassis that clips onto the side of a notebook. Others, such as Appoint's handheld Thumbelina, concentrate on portability by using a much smaller layout. Personal preference aside, the suitability of a portable trackball often depends on how and where you'll be using your notebook.

While the range of trackball prices—from $40 to $189—closely resembles that of our mouse products, you should generally expect to pay a little more for a trackball.

One Size Doesn't Fit All

In product categories where personal preference reigns supreme, you can never have too many choices. Fortunately, there's no shortage of options when choosing a keyboard, mouse, or trackball. A host of ergonomic designs and integrated products offer features to suit just about every taste.

Michael Desmond is an assistant editor for PC World.

Kowabunga! It's as if the Gulf Stream combined with the Jet Stream and suddenly, the waves were breaking like the monsters on the Kona Coast. Just for you. And you never even had to leave your office.
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MT SYSTEMS	Compact desktop servers with built-in Windows acceleration and plenty of room for expansion and storage.	
	• 33MHz i486DX $2,249 • 50MHz i486DX2 $2,399 • 66MHz i486DX2 $2,699 • Lease for as low as $79/Month	• Local bus SVGA video • GUI accelerator • 4MB RAM • 128 KB cache • 512 KB video RAM • 127 MB hard drive • 6 ISA slots • 5 drive bays • OverDrive Processor Upgrade • 3.5" floppy drive • 14" VGA color monitor • Pre-installed MS-DOS/ Windows • Mouse • 101-key keyboard
MTE SYSTEMS	The only desktop PC you can get with both EISA and VESA-VL buses.	
	• 33MHz i486DX $2,949 • 66MHz i486DX2 $3,399 • Lease for as low as $103/Month	• 6 EISA slots with 1 VESA-VL • Local bus SVGA video • GUI accelerator • 8MB RAM • 128 KB cache • 1MB video RAM • 245 MB hard drive • 5 drive bays • Pentium™ OverDrive Processor Upgrade • 3.5" floppy drive • 14" VGA color monitor • Video adapter • Pre-installed MS-DOS/ Windows • Mouse • 101-key keyboard
SL NOTEBOOKS	Modular notebooks that let you upgrade processors, disk drives, screens and more.	
	• 25MHz i386SL (mono) $2,299 • 25MHz i386SL (color) $2,899 • 25MHz i486SL (mono) $2,499 • 25MHz i486SL (active matrix color) $3,999 • Lease for as low as $81/Month	• 4MB RAM • 64 KB cache • 120MB removable hard drive • 2 PCMCIA slots • 2 drive bays • 4MB RAM • 120MB removable hard drive • 2 PCMCIA slots • 2 drive bays • 3.5" floppy drive • Pre-installed MS-DOS/ Windows • BitFAX/BitCOM software • 6.5-hour NiMH battery • AC adapter • Snap-on trackball

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Here's How

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HELP LINE Q & A

Tip of the Month

CUSTOMIZING DOS HELP: When you enter DOS 6.0's FASTHELP command or DOS 5.0's or 6.0's HELP command without any arguments, DOS displays a summary of commands drawn from the text file DOSHELP.HLP. You can customize the help information DOS gives you by editing or replacing DOSHELP.HLP.

To insert important but elusive facts about commands you look up frequently, find DOSHELP.HLP in your DOS directory, and open the file in any ASCII text editor such as DOS's EDIT or Windows' Notepad.

To extend any command description, type the new information at the end of the description. If you need to add a new line, hit <Enter> to force a carriage return and move over a few spaces before typing so that the command names remain alone in the first column.

You can create edited copies of DOSHELP.HLP in several directories to get help information specific to each directory. If you enter FASTHELP or HELP in a directory that doesn't contain a help file of its own, DOS will display the DOSHELP.HLP that resides in the first directory along the search path set by the PATH command.

James Langdell, Sunnyvale, California

Keyboard Heaven

Q In the January *Dialog Box*, I ran across a program called CLRBUFR-.COM, which clears the keyboard's type-ahead buffer within a batch file. I use a program that moves very slowly, and I sometimes get into trouble by typing too far ahead. Is there a way to create a hot key that clears the keyboard buffer?

I'd also like a program that tells the computer, "Forget whatever it is that caused you to crash and return to what you were doing before the last keystroke I pressed." Am I dreaming.

Nick Jones, Atlanta

A Unbeknownst to most users, every PC already *has* a hot key that clears the keyboard buffer. Pressing <Ctrl>-<Break> at any time causes the PC's BIOS to empty the keyboard buffer. The BIOS then passes <Ctrl>-<Break> to the application. Sometimes <Ctrl>-<Break> terminates an app, but most apps ignore it. If your program doesn't abort when you hit <Ctrl>-<Break>, you can use this key combination to clear the type-ahead buffer.

As for your second request: You may think you're dreaming, but there really *is* a program that does what you have in mind. Working Software's $49.95 Last Resort, a little-known memory-resident utility, remembers every keystroke you type and allows you to play them back later if the system crashes. Thus, it can do more than just recover work you didn't get a chance to save—it can also retype text you saved but then deleted. The keystrokes are saved in a text file that can be examined or changed by any word processor or text editor.

When I first heard about Last Resort, it was available only for DOS. But since then, so many users have complained about crashes in Windows that the company has developed a Last Resort for Windows as well.

- **Working Software** 800/229-9675, 408/423-5696, 408/423-5699 (fax)
  Reader service no. 680

Wavy Windows

Q The picture on my PC's Magitronic brand monitor suffers from waves of horizontal motion that move slowly from the top of the screen to the bottom. The dealer who sold me the system is out of business, and the warranty has expired. Can you help me?

Kelly L. Spicer, Colorado Springs

A The wavy motion you're experiencing is usually due to electromagnetic interference rather than a defect in the monitor. It can happen when the monitor is too close to another monitor, a fluorescent lamp, an audio speaker, an electric motor in a clock, or anything else that generates a strong magnetic field. Wavy displays also can be caused by improper grounding (make sure both your PC and your monitor are plugged into a grounded outlet) or by a faulty monitor cable.

If these tactics don't solve your problem, contact the distributor, Liuski Int'l of Melville, New York (516/454-8220).

Gigantic Graphics

Q I often carry files between my home and office on floppy disks. Recently, I created a graphics file that's too big for one floppy. How can I transport the file on floppy disks?

Hai Tang, San Francisco

ILLUSTRATIONS: JAMES YANG

A One of the best ways to solve this problem is to use PKZip 2.04G, the latest version of PKWare's acclaimed archiving program. Unlike version 1 of PKZip, the newer product allows an archive to span more than one floppy disk. You can download PKZip as the file PKZ204G.EXE from virtually any BBS or online service, including PC World Online. If you register PKZip, you get a handy reference card listing all the commands that are useful for spanning multiple disks.

A less effective way to solve the problem is to compress the floppy disk using DOS 6.0's DoubleSpace utility. This solution lets you write more data to the disk, but once you exhaust its new capacity, you're back where you started. Also, you need DOS 6.0 on both machines—an upgrade that costs much more than PKZip.

To Reach the Unreachable File

Q Not long ago, I created a file named BILL 1.DBF. Trouble is, because of the space in the middle of the name, DEL BILL 1.DBF doesn't delete the file. Unless I reformat my hard disk, am I destined to live with this file for the rest of my life?

Audrey Troyka, Wantaugh, New York

A While DOS commands can't directly handle file names with spaces in the middle, they can refer to them using wild-card characters. The command **DEL BILL?1.DBF** will delete the file. (Naturally, if you want to keep other files that match that wild-card specification, you should copy them to another directory and restore them after the delete operation.) This technique can also be used to handle other characters which are hard (or even impossible) to specify on the DOS command line—such as lowercase letters.

Another way to fix file names with odd characters is to use a disk editor such as Norton's DISKEDIT. Be careful not to change anything but the file names, though, or you may cause serious damage to your data.

The Cache That Matches

Q I use SmartDrive, the disk caching program that came with MS-DOS 5.0. But PC Tools' disk fixer and disk optimizer insist that the cache be turned off when I'm using either of them. Is there any way to accomplish this without editing AUTOEXEC.BAT and rebooting?

Fred Hohn, Andover, Massachusetts

A No, not readily. However, since you already have Central Point's PC Tools, you already have an excellent solution. Use that package's cache program instead of SmartDrive. The other tools are intimately familiar with that program and can turn it off at will, saving you the trouble of reconfiguring. (The same holds true if you're using Norton Utilities; its defragger and disk fixer know how to turn off Norton's NCACHE.) You're likely to see better performance as well.

Mo' Slow

Q I recently upgraded from a 286 computer to a 486. Simulations and games that were playable on the old machine now run too quickly. Is there some way, in software or hardware, to slow these programs down?

David Cowell, Webster, New York

A Many shareware and free programs can slow a machine down. Two that we've added to our library on PC World Online are Mo' Slow (MO_SLOW12-.ZIP) and Varislow (VARISLOW.ZIP); they're also available in the IBMSYS and IBMHW forums, respectively, on CompuServe. Each works by literally wasting the machine's time so it doesn't have as much power to run your program quickly.

CD Roam

Q How can I run an external CD ROM drive from my Toshiba T4400C portable, which has no slots for controller boards?

Justin L. Bauman, Beverly Hills, California

USER GROUP OF THE MONTH

Capital PC User Group

The September user group tips come from the Washington, D.C., Capital PC User Group. The CPCUG holds two monthly meetings, one in Bethesda, Maryland and another in Springfield, Virginia, and publishes a 50-page monthly magazine with a 4-page listing of volunteers willing to give technical support. The group maintains an 11-line bulletin board system with more than 100 conferences, and a 50MB shareware library, which members can access at meetings or at the group's offices. CPCUG has special interest groups in Windows, OS/2, Visual Basic, FoxPro, desktop publishing, accounting software, communications, AutoCAD, and other areas.

For more information, contact Rich Schinnell at 51 Monroe St., Ste. PE-2, Rockville, MD 20850. Call 301/762-6775 for recorded information, or log on to CPCUG's BBS at 301/738-9060. Family memberships cost $35 for one year, $65 for two years.

Reader service no. 681

VIDEO DRIVER RESCUE: Ever install a new Windows video driver, exit and reenter Windows, and find yourself looking at a blank or unreadable screen? When that happens, changing back to your old, reliable driver from inside Windows just isn't possible. Luckily, you don't have to. In DOS, change to your WINDOWS directory and type SETUP /I. This will launch Windows' DOS-based setup program and keep the program from trying to guess your hardware. It's then an easy matter of following the prompts to reinstall your old driver.

Charles Kelly
Capital PC User Group

The notebook industry's first 4mm, full-travel keyboard with the look and feel of a desktop system.

Built-in Windows plus 50MHz 486DX2 processor (with coprocessor) for blazing performance.

TEXAS INSTRUMENTS TravelMate 4000E Color 486 WinDX2/50MHz Active Matrix

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And yet the TravelMate 4000E weighs a mere 6.2 pounds, including battery. This convenient size and weight gives you more performance* than the leading 486 notebooks.

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Active Color Notebook	*Weight (lbs.)*	*486 Processor*	*Speed*	*Coprocessor*
TravelMate 4000E	**6.2**	**DX2**	**50MHz**	**Yes**
Toshiba T4600C	6.9	SL	33MHz	Yes
Compaq LTE Lite 4/33c	6.5	SL	33MHz	Yes
IBM ThinkPad 720C	7.6	SLC2	50MHz	No

Texas Instruments offers over 10 models of 486 notebooks for you to choose from.

TI TravelMate 486DX2 Notebooks

For more information about the world's widest range of 486 notebooks, as well as the location of the dealer nearest you, don't wait another nanosecond. Call ***1-800-527-3500***.

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TEXAS INSTRUMENTS

Circle 220 on reader service card

A Laptop owners have several choices if they want to hook CD ROMs to their machines. If your laptop has ISA-compatible slots, you can use just about any external SCSI drive. However, this isn't an option for those of us who don't like hefting very large, heavy computers; most laptops with ISA slots weigh at least 18 pounds. If you have a slimmer portable without standard slots, chances are you'll need to go with a parallel-port SCSI adapter, such as the MiniSCSI Plus from Trantor Systems ($229) or the AL-1000 from Always Technology ($199). Each of these adapters comes in the form of a cable that connects to your parallel port at one end and the SCSI connector of a CD ROM drive at the other. A pass-through printer port is provided, so you don't have to give up printing when you run the CD ROM. Trantor and AST have also announced that they will soon be shipping SCSI adapters that fit into PCMCIA card slots.

Your T4400C doesn't have a PCMCIA slot, but it does have a parallel port that can be used with either Trantor Systems' or Always Technology's parallel-port-to-SCSI adapters. Toshiba also offers a proprietary (though relatively expensive) SCSI interface that fits right into the T4400C.

- **Trantor Systems Ltd.** 800/872-6867, 510/770-1400
  Reader service no. 682
- **Always Technology** 818/597-1400, 818/597-1496 (fax)
  Reader service no. 683

Don't Punch Out Your Disks

Q I've seen many ads for double disk converters—metal punches that add a hole to a 3½-inch double-density disk so the drive thinks it's high density. The ads claim no loss of reliability. Are they correct?
Michael Farris, Oswego, Kansas

A In many cases, the media inside double-density and high-density disks are identical. However, high-density disks are more thoroughly tested, which means they're more likely to be free of surface defects. And punches can create small chips of plastic, which may migrate inside the disk case or the drive and scratch the disk's surface.

Since there's only a small price difference between double- and high-density disks, even a small risk of lost data isn't worth the paltry sum you'll save. Buy disks certified for high-density operation, or use a data compression program to pack more data onto the disk. You'll sleep better knowing your data isn't entrusted to potentially faulty media.

Balky Backup

Q Since I installed a memory manager on my machine, Norton Backup 1.2 occasionally refuses to back up my hard disk. It claims that my system configuration has changed and that I must repeat all of Norton Backup's reliability tests. Can you help?
Bob Loon, San Francisco

A Norton Backup 1.2 checks certain parts of your computer's BIOS ROM to make sure you haven't copied the program to another machine and tried to use it without reconfiguring for the new machine. Unfortunately, some memory management programs map RAM into the area formerly occupied by the system BIOS, and the contents of that RAM can change.

The best solution is to upgrade to the latest version of Norton Backup, which doesn't have this problem. But as a stopgap, you can tell your memory manager not to use the BIOS area. This usually means using an "exclude" parameter on the memory manager's command line; consult your memory manager's manual for the exact command.

Looping the Loop

Q I use a utility program to test the serial and parallel ports on PCs. One of the tests requires something called a loopback plug. What does a loopback plug do? Can it be purchased, or must it be made? How do you find out how to make one?
Gilbert F. Vela, Santa Maria, California

A The purpose of a *loopback plug* (also known as a wrap plug) is to connect a port's outputs back to its inputs. This tactic lets the port test itself by sending data to itself (just as you might test a telephone by speaking into the mouthpiece and listening for your voice in the earpiece). Unfortunately, each testing program can require the wires to be connected in a different way, so there's no such thing as a 100 percent "generic" loopback plug. Your best course of action is to call the company that provided the testing software. It should be able to tell you how to make an appropriate loopback plug or where you can buy one.

Who Was That Masked Man?

Q I'm trying to learn more about how the PC works. Can you tell me what an NMI is and what it does?
Greg Taffet, Bridgeport, Connecticut

A The acronym *NMI* stands for *nonmaskable interrupt*. As you may already know, an interrupt is a signal that serves as an alarm for your computer's central processing unit, notifying it of events requiring immediate attention. If an interrupt is *maskable*, the CPU can choose to ignore the alarm when it knows it has something more important to do. This is called *masking* the interrupt—sort of the equivalent of burying the alarm clock under a pillow. But if the interrupt is *nonmaskable*, it can't be ignored; the CPU must stop what it's doing and take immediate action. On the IBM PC and compatibles, a catastrophic event such as a parity error (which indicates faulty memory) triggers a nonmaskable interrupt. Most users become painfully aware that there's such a thing as an NMI when the PC abruptly announces that one has occurred and comes to a dead halt.

Actually, there really is no true NMI on the IBM PC, at least in the strictest sense of the term. The PC's central processing unit can (and does) disable the NMI under certain conditions, but it remains enabled most of the time and has priority over other interrupts.

By Brett Glass

Brett Glass is a contributing editor for PC World. Help Line *welcomes your questions.* *See page 12 for contact information.*

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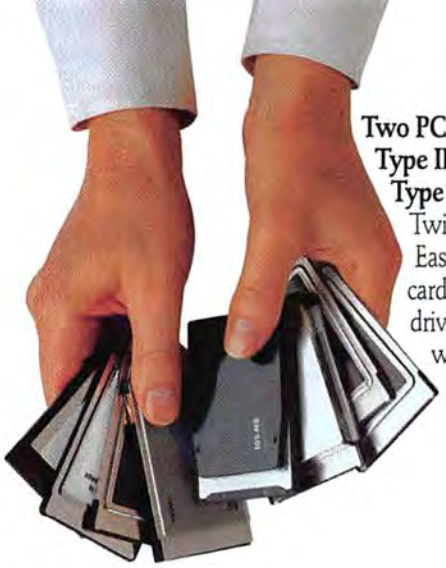

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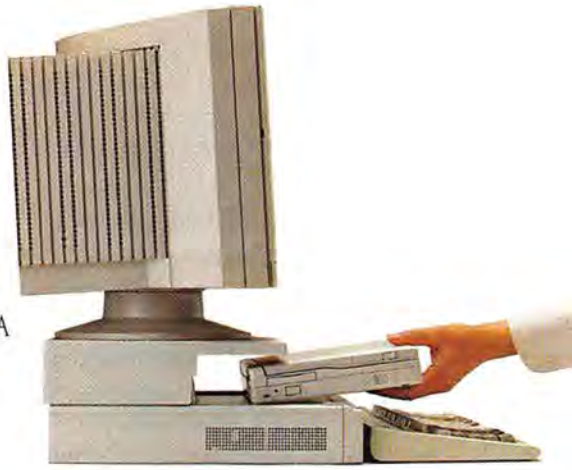

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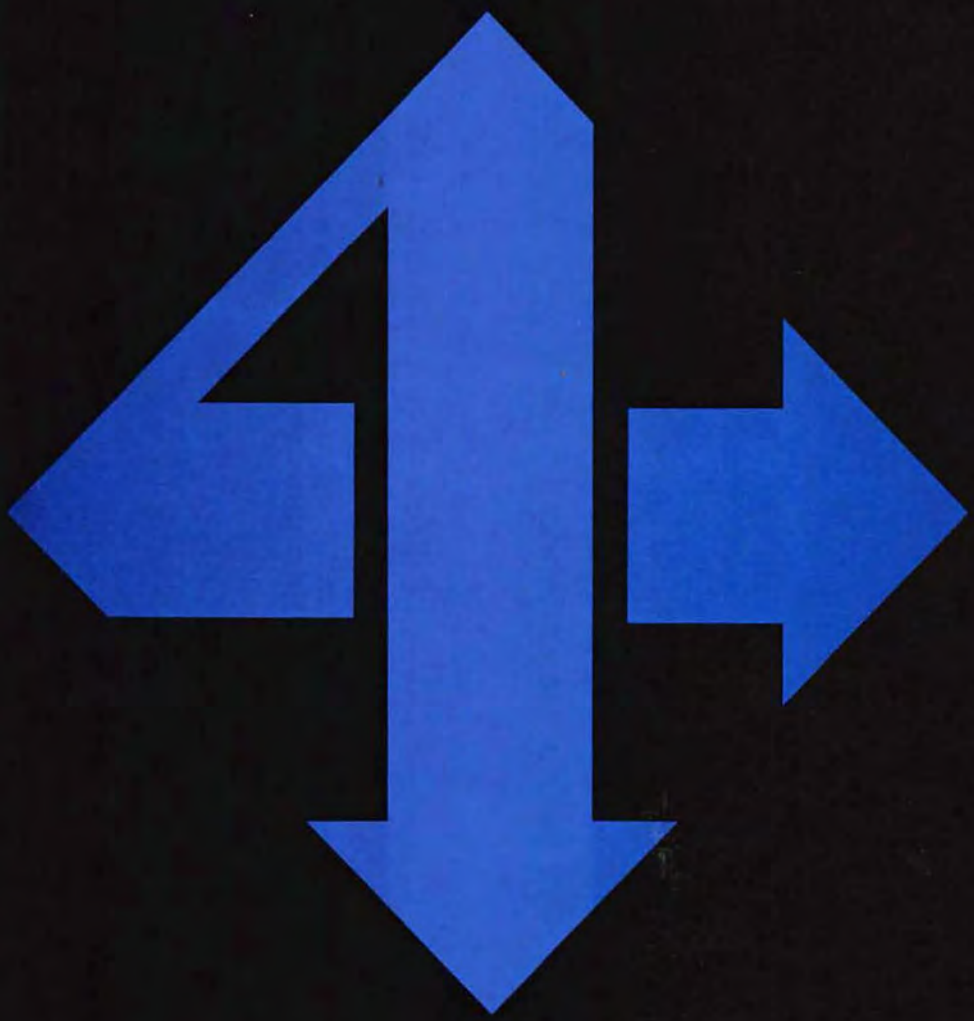

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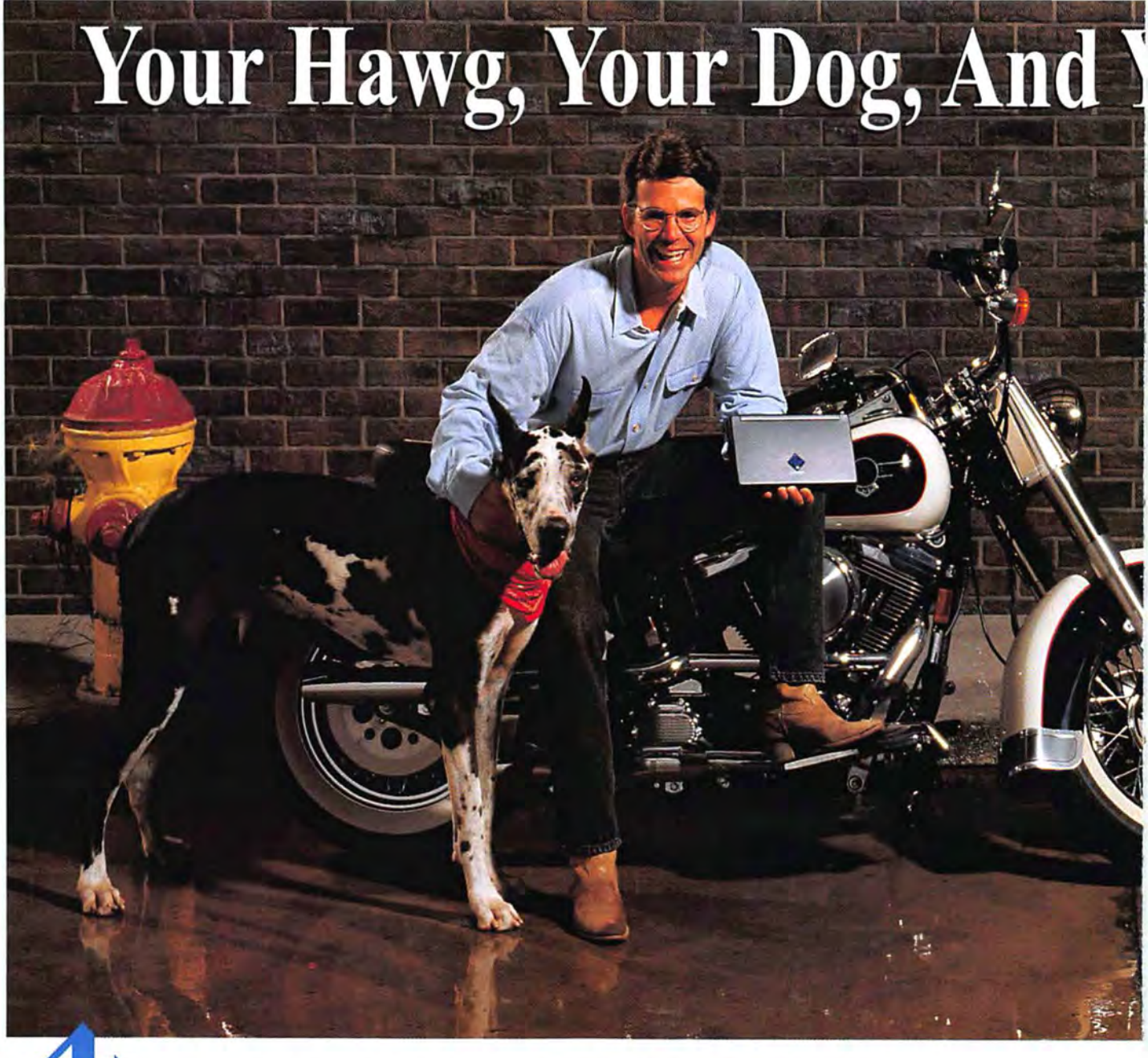

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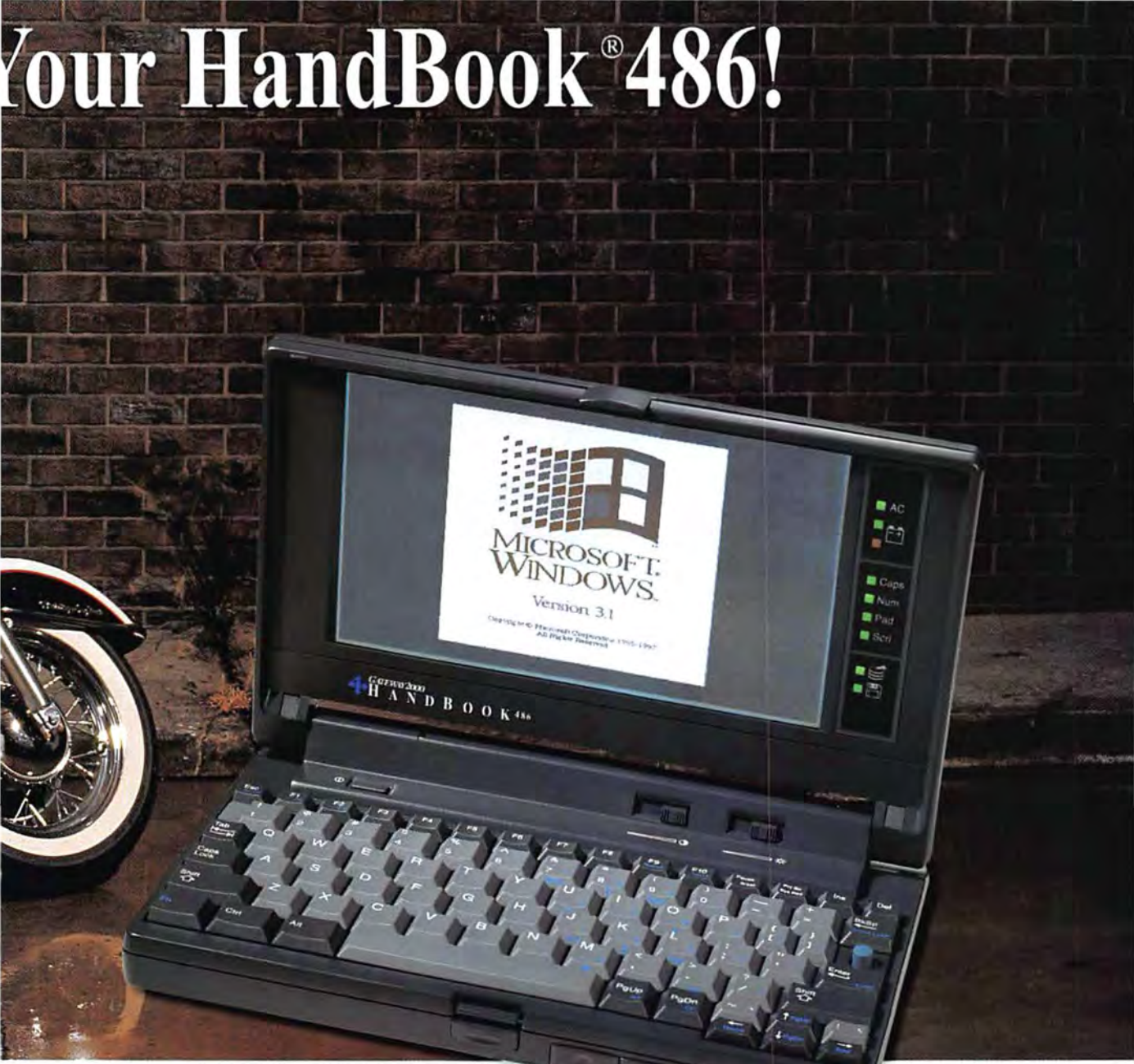

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SPREADSHEETS Q & A

Recording Rank Order

Q Your macro solution on how to assign ranks to a list of items without changing their order ("1-2-3 Rank Order," April 1993) certainly works, but I've got a simpler approach. Just insert a column of numbers to record the order of the items, then sort the data column and the column that keeps track of the order. Add a column of numbers to record the ranks, then sort the data again—using the column that recorded the original order as the sort key—to restore the original order.

Ron Saritsky, Van Nuys, California

A Thanks, Ron. A number of readers, responding to my plea for a better idea, wrote in with this solution. Blinded by macro wizardry, I overlooked it. Here are the details (illustrated in 1-2-3 for Windows release 1.1, but the technique works in any spreadsheet). Let's assume the original list of items is in A2..A15. To record their order, select the range B2..B15, choose *Data•Fill*, enter a Start value of **1**, and click *OK*. To put the first column in numerical order while remembering the items' current order, select A2..B15, choose *Data•Sort*, enter **A2** in the Primary key text box, and be sure the Ascending radio button is checked. Click *OK*. Now select C2..C15, choose *Data•Fill*, enter **1** in the Start text box, and click *OK*. Next, select A2..C15, choose *Data•Sort*, enter **B2** in the Primary key text box, and click *OK*. The first and second columns revert to their original order, and column C assigns a rank to the items in column A.

Searching for Nothing in Excel

Q I use Excel 4.0 as a database. The data that arrives on my desk is often incomplete, so I leave some cells blank. Later, when the missing information appears, I go back to the database and fill in the missing values. What's the best way to accomplish this job?

Judith Daley, San Francisco

A I've got two solutions: One that's quick and another that's flexible but time-consuming. Look at **FIGURE 1**. There are missing values in column D. To locate them quickly, click the *D* in the worksheet's frame to select the entire column. Now select *Formula•Find*. Don't enter anything in the Find What text box, just click *OK*. The active cell indicator moves to the first blank cell in the selection (column D). Type an entry, if you have one, then press **F7**, and the next missing value in the selection becomes the active cell.

If you've used *Data•Set Database* to create a database (as we have in cells A4:D12 of Figure 1), you can use the Data•Find command to locate blank rows, and it also lets you make entries in other cells in that record (row). A1:D2 is a criteria range (set it with *Data•Set Criteria*). Put an equal sign (=) in D2 to select records with no value or empty cells. Select *Data•Find*, and Excel highlights Bilbo's record, on row 6, which is missing a value. When you press **<Left>** or **<Right>**, the active cell indicator moves to the other fields in that record, where you can enter or edit the values. **<Up>** and **<Down>** move the selection to the other records with missing codes.

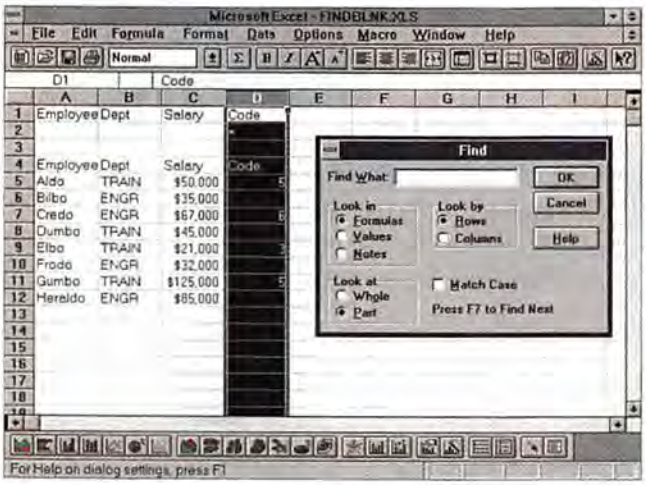


FIGURE 1: FIND MISSING VALUES QUICKLY IN EXCEL by selecting a column and using the Formula Find or Data Find command.

Selection Without the Mouse in Excel

Q I love using the <Ctrl> key with the mouse in Excel to select multiple ranges. How can I perform the same trick with just the keyboard?

Belinda Wagstaff, Birmingham, Alabama

A No sweat. Move the active cell indicator to one corner of the first range you want to select, then hold down the **<Shift>** key and move the active cell indicator to the range's opposite corner. Then press **<Shift>-<F8>**, move the active cell indicator to the beginning of the next range, hold down **<Shift>** again, and select the next range. Repeat the process until you're finished.

Don't forget that you're not limited to just the cursor keys for extending the selection. You can also use <Page Up>, <Page Down>, <End> followed by a cursor key, and other keys that move the active cell indicator while you're holding down the <Shift> key.

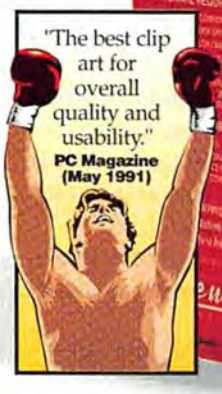
Printing Graphs in 1-2-3 Release 3.1

Q How can I print two graphs on my HP LaserJet III in portrait orientation, on a single page using 1-2-3 release 3.1? I'll bet I've gone through about two trees worth of paper trying to solve this problem.

Byron Flurie, Charlotte, North Carolina

A Spare that tree! Try the following steps instead. Set up the first graph you want to print and name it by selecting */Graph•Name•Create* and entering a name—**Graph 1**, for example. Now select */Graph•Reset* to clear away the first graph, then set up and name the second graph.

Next configure the page by selecting */Print•Printer•Options•Margins•Top* and entering **0**. Select *Margins•Bottom*



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Master Class: Sorting 1-2-3 Sheets

Paul Caron, a budget wrangler from Arlington, Virginia, asked if I could suggest a macro to sort the sheets in his 1-2-3 release 3.1 application, because 1-2-3's *Data • Sort* command can sort only rows, not columns or sheets. He has a 110-sheet file, each sheet containing data for a different country. Each sheet is assigned a geographical region. Paul keeps the sheets in alphabetical order by country but frequently wants to see them ordered by region.

The solution I came up with is the macro shown in FIGURE 1. The general layout of the file is shown in FIGURE 2. The macro is located on sheet A:. The macro makes two assumptions about the layout of the individual country worksheets. First, each sheet must include a range name that covers the entire active area of that sheet, as illustrated for China on sheet B: in Figure 2. Second, each sheet contains a pair of labels. The one in cell A1 duplicates the range name (so on sheet B:, cell A1 contains the label 'China'); another in B1 identifies the region. The other range names in the worksheet are given in E11..F24 in Figure 1.

The macro begins by creating a 3-D range ('NAMES' in Figure 2), which covers the sheet names and region labels in all sheets. Then it transfers the list of sheet names and regions from NAMES into the range \S_LIST beginning at cell E1 in sheet A: and sorts the resulting table in descending order by region. A subroutine processes each sheet name in the table, inserts a new sheet just after the macro sheet, moves the next sheet indicated in \S_LIST into it, and then deletes the now blank sheet. The details follow.

In cell B3, {goto}B:A1~ positions the cell pointer on the first sheet, at the beginning of the NAMES range. The /rncNAMES~{bs}.{end}{ns}{r}~ in B4 redefines the range name NAMES to include all the consecutive country sheets. The {bs} keystroke shrinks the range selection to the current cell, B:A1; {end}{ns} extends the selection through the stack of worksheets; and {r} widens the selection to include the region labels.

The statement {blank \S_LIST}/rtNAMES~\S_LIST~w in B5 clears the previous table of sheets, then executes the command */Range • Transpose*, which copies the sheet and region names from NAMES into \S_LIST. The w selects */Worksheets • Rows* to ensure that the data is copied into the proper place.

In cell B6, {if @count(\S_LIST)<3}{quit} aborts the macro if less than two sheet names emerged. In B7, /rnc\S_LIST~{esc}.{end}{d}{r}~ redefines \S_LIST to cover the current list of sheets and regions. In cell B8, /dsrd\S_LIST~p\S_KEY~d~g sorts the table of sheets and regions, using region (\S_KEY) as the primary key.

The statement {for \S_CT,0,@rows(\S_LIST)-1,1,\S_MOVEIT in B9 executes the subroutine at \S_MOVEIT (cell B11) once for each sheet

	A	B	C	D	E	F
1	@MACROS					
2						
3	\S		{goto}B:A1~	\S_LIST	ISRAEL	MIDEAST
4			/rncNAMES~{bs}.{end}{ns}{r}~		ITALY	EUROPE
5			{blank \S_LIST}/rtNAMES~\S_LIST~w		FRANCE	EUROPE
6			{if @count(\S_LIST)<3}{quit}		THAILAND	ASIA
7			/rnc\S_LIST~{esc}.{end}{d}{r}~		CHINA	ASIA
8			/dsrd\S_LIST~p\S_KEY~d~g			
9			{for \S_CT,0,@rows(\S_LIST)-1,1,\S_MOVEIT}			
10				Range Names		
11	\S_MOVEIT		{let \S_SHEET,@INDEX(\S_LIST,0,\S_CT)}		@MACROS	A:A1..A:A1
12			{goto}{\S_SHEET}~{let \S_DELETE,@cellpointer("coord")}		CHINA	B:A1..B:C10
13			{goto}@MACROS~		FRANCE	E:A1..E:C10
14			/wisa~		ISRAEL	C:A1..C:C10
15			/m{\S_SHEET}~~		ITALY	F:A1..F:C10
16			{goto}{\S_DELETE}~{ns}/wds~		NAMES	C:A1..E:B1
17			{return}		THAILAND	D:A1..D:C10
18					\S	A:B3..A:B3
19					\S_CT	A:B20..A:B20
20	\S_CT				\S_DELETE	A:B23..A:B23
21	\S_SHEET				\S_KEY	A:F4..A:F4
22			{return}		\S_LIST	A:E4..A:F8
23	\S_DELETE				\S_MOVEIT	A:B11..A:B11
24			{return}		\S_SHEET	A:B21..A:B21
25						

FIGURE 1: THIS MACRO SORTS THE SHEETS of a 1-2-3 release 3.1 file. Prepare them as shown in Figure 2.

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(continued from page 244)

named in \S_LIST. Cell \S_CT is the counter cell—it starts at zero in order to supply the proper offset number to the @INDEX function in B11.

In B11, {let\S_SHEET,@index (\S_LIST,0,\S_CT)} is the first statement in the subroutine \S_MOVEIT. It copies the name of the current sheet, denoted by the @INDEX function, into the variable cell \S_SHEET (B21).

The statement {goto}{\S_SHEET}~{let \S_DELETE,@cellpointer("coord")} in cell B12 records the address of the sheet to be moved in the variable cell \S_DELETE. The statements {goto} @MACROS~ in B13 and /wisa~ in B14 insert a new, blank sheet B: just after the macros sheet.

B15's /m{\S_SHEET}~~ moves the current country sheet, whose name appears in \S_SHEET, into the new blank sheet. In B16, {goto}{\S_DELETE}~{ns}/wds~ returns to the empty sheet left by the previous Move command and deletes it. The {ns} (next sheet) command is necessary because the sheet address was moved back one layer by the insertion operation in B14.

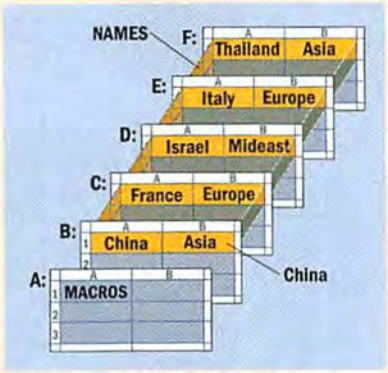

FIGURE 2: TO SET UP SHEETS FOR SORTING, name the active area of each sheet after the label in cell A1 and put the sort key in cell B2.

The macro is pretty basic. As a macro challenge, you might add a menu that lets you select the sort key to permit sorting by country or region.

and enter **0**. Select *Pg-Length* and enter **60**. Use the Header and Footer options to specify your header and footer text, if any. To specify the size of your printed graph images, select *Print•Printer•Options•Advanced•Image•Image-Sz•Length-Fill* from the Print Options menu and enter **26**. Then press **<Esc>** three times to return to the Print menu.

To print the graphs, select *Image•Named-Graph* and select the graph you want at the top of the page. Select *Align* to start a new report, then *Go* to send the first graph to the printer. Select *Line* twice to put some space between the graphs. Then select *Image•Named-Graph* again and specify your second graph. Select *Go*, then *Page*, and you now have two graphs on one page and a thankful tree.

By Richard Scoville

PC World *contributing editor Richard Scoville is a software training consultant in Chapel Hill, North Carolina.* Spreadsheets *welcomes your questions. See page 12 for contact information.* ■

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WORD PROCESSING Q & A

Stepping Back in WordPerfect for DOS

Q I recently found myself in an embarrassing situation when I tried to show a WordPerfect 5.1 file to a client. I had saved the file to a floppy disk and taken the disk to my client's office. At the remote site, the only version of WordPerfect they had was 5.0, and I received an error message when I tried to load the file. How can I avoid this situation in the future?

Vukani Ntombela, New York

A What happened to you isn't uncommon. When applications add new features, older versions of the same program often are unable to read files created by the latest versions. So if you take a file on the road, you have to be careful to store it in a format that can be read by whatever version of the application you may encounter. Fortunately, that's easy to do.

First, use the Text In/Out feature in WordPerfect 5.1 to save the file in a format version 5.0 can read. To do this, load the document into WordPerfect 5.1, then press **<Ctrl>-<F5>AW**, type in the file name for your new file, and press **<Enter>**. This file will load properly in WordPerfect 5.0. All ordinary formatting, such as fonts, pagination, columns, and margins, will remain in place.

You can hedge your bets even further by saving an additional, generic ASCII copy of the document, which can be read by any word processor you might encounter. To create the ASCII file, load the WordPerfect 5.1 document, press **<Ctrl>-<F5>AG**, enter a new file name, and press **<Enter>**. Be careful to use different file names for the two versions of the document. While the ASCII file won't preserve your formatting, at least you'll be able to read the text in any word processor.

Font Madness in WordPerfect 5.2 for Windows

Q I recently switched from WordPerfect 5.0 for DOS to WordPerfect 5.2 for Windows. I like the new tools I have available, especially the TrueType fonts in the Windows printer drivers. But when I open WordPerfect for DOS documents in the Windows version, strange things happen to my fonts.

When I open an old document that uses Bitstream Dutch fonts in the Windows version, the font changes to something called Broadway Engraved, which is not what I want. The TrueType Times New Roman font is more like the original Dutch font, so I'd like my old documents to use New Roman in the Windows version. Is there a way to tell WordPerfect for Windows to make the switch automatically?

Michael Richards, Kaneohe, Hawaii

A Strange as it may seem, WordPerfect 5.2 has no built-in font conversion table. The problem is compounded by WordPerfect's two types of printer drivers. You could use the old DOS printer drivers, but most users opt for the Windows drivers to get access to all the low-priced TrueType fonts. However, since WordPerfect doesn't offer a way to convert fonts intelligently when you load an older file, you'll have to live with a workaround solution:

Start by loading the document in question into WordPerfect 5.2 for Windows, but don't move the cursor, since you want your font change to affect the document from the very beginning. The fastest way to change the font for the entire document is to press **<Ctrl>-<Shift>-<End>** to highlight the whole document, and then click the *Font* button or select *Font•Font*, choose the font you want from the Font list, and click *OK*. Press **<Ctrl>-<Home>** to return the cursor to the top of the document. Only the font will change; italics and boldfacing will remain as they are.

To change fonts in discrete sections of the document rather than set one font for the entire document, you'll have to select individual areas of text and repeat the process. If you know that you'll need to perform this operation often, consider recording your keystrokes in a macro for faster operation.

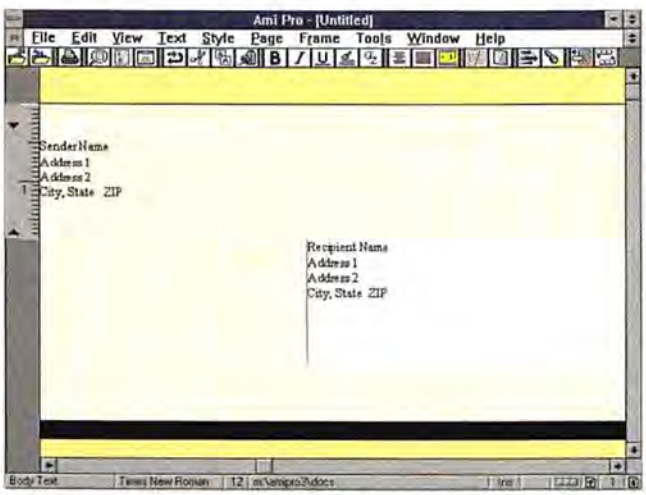
Realigning Envelope Addresses in Ami Pro 3.0

Q I use Ami Professional 3.0 with a Panasonic KX-P2180 printer. When I print envelopes with Ami Professional's envelope option, half of the first line of the return address is cut off. Do you have any solutions?

Daniel Lord, Frederic, Michigan

A The answer is simple, and it really applies to anyone who wants to alter Ami Pro 3.0's envelope layout. What's happening is that the stock envelope layout has the first line of the return address outside the printable area for your particular printer. All you have to do to remedy this is move the return address down a bit.

To accomplish this, fire up Ami Pro, and then select *File•New*. In the 'Style sheet for new document' list box, choose *Envelope-with return address area;* _envelop.sty will appear in the



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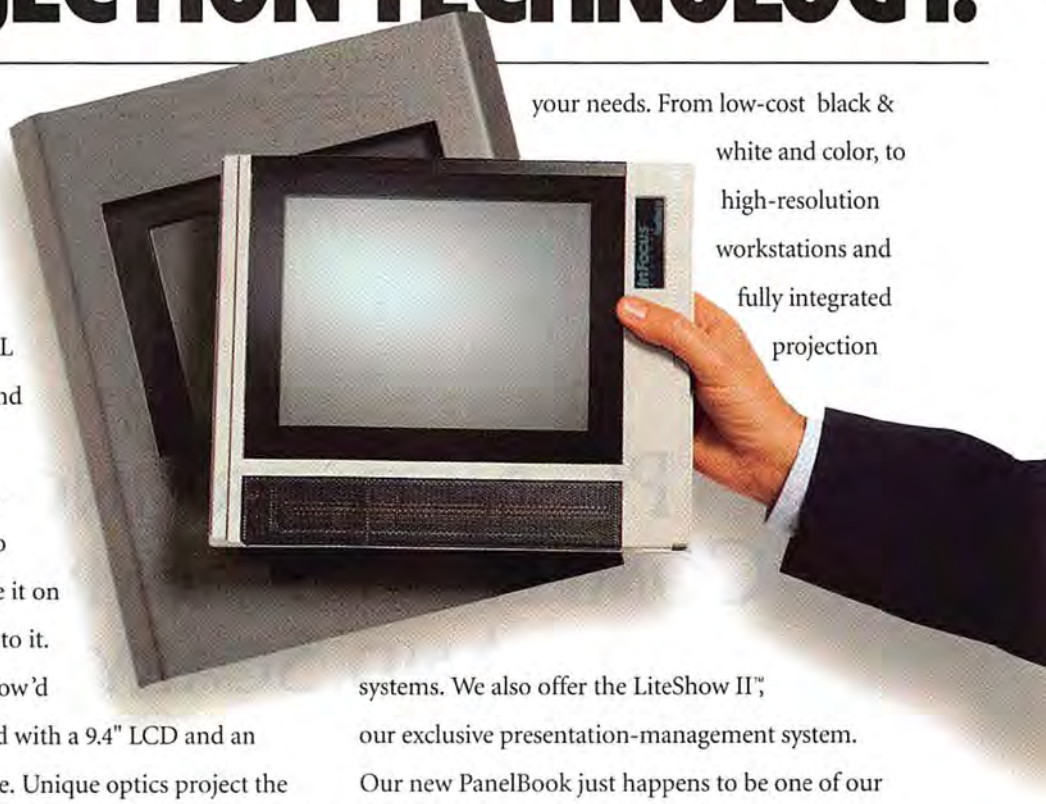

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File Name field at the bottom of the dialog box. Click on the Run Macro check box to turn it off, but leave the With Contents box checked. Click *OK* to load the style sheet for editing. You'll see your cursor in a box on the envelope layout. Scroll horizontally until you can see the return address block. Click to the left of the first line of the return address block, the line that reads 'Sender Name'. Now, press **<Enter>** to move the line one line lower on the envelope.

To save your changes, select *Style•Save as a Style Sheet*. In the dialog box that appears, leave all the fields as they are and then click *OK*. When you're prompted, confirm that you want to overwrite the existing style sheet, and you're finished. From now on, Ami Pro's envelope feature will print your return address without cutting off the first line.

You can employ the same technique to modify any other aspects of the envelope style sheet. While you have the _envelop.sty file open, you can use Ami Pro's *Style•Modify Style* dialog box to alter fonts, line spacing, and any other attributes of the basic envelope to produce a customized layout. Just make sure that you don't change any of the text on the envelope. Ami Pro uses this exact text as variables in its envelope printing feature.

Printing the File Name in WinWord

Q I would like to include the file name for each Word for Windows 2.0 document I print somewhere on the printout itself, without having to type the information. That way, when I need to reload the document in the future, I can find the file name right on the printout instead of having to search through scores of cryptic file names on the computer. Can Word for Windows do this?

Tracy McKeel, Kingston, North Carolina

A While not every word processor has this capability, WinWord does. It's common practice in many offices to print the file name below the signature block, to make finding the files easier later on. Here's what you should do:

First, place your cursor where you want the file name to print in your document. Then select *Insert•Field*. In the dialog box that appears, choose *File name* from the Insert Field Type list, then click *OK*. Your document's current file name will appear at the cursor location.

That's just part of the solution. For documents with multiple versions, the file name in the text will remain unchanged unless you update it, even if you save the file with a different name. To update the file name field in a document you've renamed or opened and saved with a different file name, highlight the file name text in the document and press **<F9>**.

To ensure that you always have the correct file name on your printouts—even if you forget to update the field manually in the file—select *Tools•Options*. In the resulting dialog box, click the *Print* icon in the Category list, then select the Update Fields check box in the Printing Options category. Click *OK* to make this the default. Now, whenever you print any document in WinWord, all its fields, including your file name field, get updated first.

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Two Word for Windows Questions With the Same Answer

Q I really like the tool bars in Word for Windows 2.0, but they're limited in size. Is there any way I can have more than one tool bar so I can use different sets in different situations?
Richard Mabry, Pasadena, California

Q Can Word for Windows format a document for printing as a folded and stapled booklet? Since the page order in such a booklet doesn't follow a normal order, it's difficult to lay the booklet out.
Victor Raybaud, Eastpointe, Michigan

A I usually answer questions one at a time, but both of these have the same answer. WinWord can't satisfy either request; what both of you need is an add-on program, Word for Windows Office Power Pack 2.0, available from Pincliffe International.

WOPR allows you to set up customized tool bars, which you simply load as if they were normal WinWord documents. It also includes a system for reformatting any document for printing as a booklet. But that's not all. WOPR, which sells for $49.95, also offers improved envelope printing plus a raft of handy macros for WinWord. Contact Advanced Support Group, 800/659-4696, 314/966-1833 (fax). Since WOPR is a shareware program, you also can download a trial copy on PC World Online. Look for WOPRA.ZIP and WOPRB.ZIP.

Informed Editing in Word

Q My job requires me to edit other people's work in Word 5.0. Some writers use multiple spaces rather than tabs, or press **<Enter>** to get a new line in a paragraph instead of just letting Word wrap the words. It would help if I could see the actual codes, as you can in WordPerfect.
Everett Wilson,
Palm Springs, California

A While I can't give you WordPerfect's Reveal Codes window in Word 5.0, I can show you how to see most of your co-workers' keystrokes. With Word running, press **<Esc>0**, tab over to the 'show non-printing symbols' field, select *All*, and press **<Enter>**. You'll see the difference immediately. Spaces show up as little dots, tabs as arrows, and paragraph endings as standard typographers' paragraph symbols.

Other special codes, such as new line codes (**<Shift>-<Enter>**), nonbreaking spaces, hidden text markers, and optional hyphens, display their own screen characters in Reveal Codes mode, which makes it easy to find and edit them. As with other Word options, this display option becomes the default when you start Word.

Note: Word 5.5 users can do the same thing by selecting *View • Preferences*, then checking the boxes in the Non-Printing Characters section of the dialog box. Word for Windows users can select *Tools • Options* and check the All box in the Non-Printing Characters section of the dialog box.

By George Campbell

George Campbell is a contributing editor for PC World. Word Processing *welcomes your questions. See page 12 for contact information.* ■

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WINDOWS Q & A

Do-It-Yourself Program Manager

Q I use Program Manager to launch documents. But Windows won't let you attach long (i.e. descriptive) labels to icons. Is there a work-around?
Kaye Justice, Memphis

A Afraid not. The Description text box in the Properties dialog box is limited to 40 characters. If that's not enough, you can go Windows one better and create a custom Program Manager that allows icon labels of any length.

The secret to this involves creating a file and inserting icons that can run programs or load your documents—icons that you can label to your heart's content. You can create this file in any OLE-capable application—such as Write or Excel—with the Windows Object Packager utility.

Let's walk through the process with Write. Launch Write and select *Edit•Insert Object*. Select *Package* from the Object Type list and click *OK*. This launches Object Packager, which will function as your Program Item Properties dialog box. From Object Packager select *Edit•Command Line* and type in the drive, path, and name of the document or executable (EXE) file you want to run, then click *OK*.

To give the file an icon, click Object Packager's *Insert Icon* button. By default, you're offered icons embedded in PROGMAN.EXE, but you can type in the name of another file that contains an icon, such as WRITE.EXE, MORICONS.DLL, or any ICO file. For now, select an icon from the list and click *OK*.

Don't label the icon in Object Packager. Instead, select *File•Exit*. When you are asked to update your untitled Write document, click *Yes*. Object Packager closes, and the icon appears in your Write window. To add a label, place the cursor either above or below the icon and type away.

To add other document or program icons to this Write file, repeat the steps listed above, starting with *Edit•Insert Object*. When you're finished, save the Write document using *File•Save As* with a name like **MAIN-GRP.WRI** and add it to Windows' StartUp group so this custom "Program Manager" opens every time you start Windows. To add MAIN-GRP. WRI to the StartUp group, drag the file from the File Manager into StartUp, or select *StartUp*, select *File•New* from the Program Manager, click *Program Item* and *OK*, and fill in the Properties dialog box, remembering to note MAIN-GRP.WRI's drive and path.

The next time Windows loads, MAIN-GRP.WRI will automatically open and display its cache of icons. To start a program or load a document, double-click the icon. To change an icon in the MAIN-GRP.WRI window, select it and choose *Edit•Package Object•Edit Package*.

Although your new launcher has limitations—you can't specify a start-up directory, for example—it can do some things Program Manager can't. You can not only create huge icon labels, but format them with any font or style and search for icons based on a label's contents. You can also resize and move icons. (In Write, use *Edit•Size Picture*, and *Edit•Move Picture* respectively; you are, however, stuck with a one-icon-per-line format.) You can even create icons that launch other files holding icons, in effect, nesting program groups within program groups.

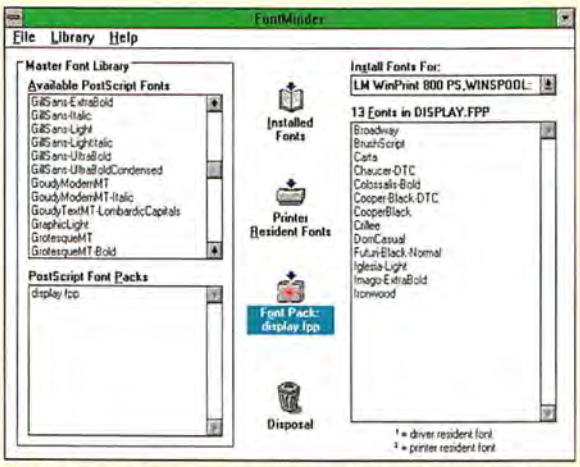
USER GROUP TIP

Quickly Add an Icon

You may know that to change an item's properties quickly in Program Manager, you hold down the <Alt> key while double-clicking on the icon (from the keyboard, highlight the icon and press <Alt>-<Enter>). Less well known is how to create a new item quickly: Hold down the <Alt> key and double-click on an empty space in your Program Manager group, then fill in the resulting dialog box.

Rob Weimer
Capital PC User Group

Windows Toolbox



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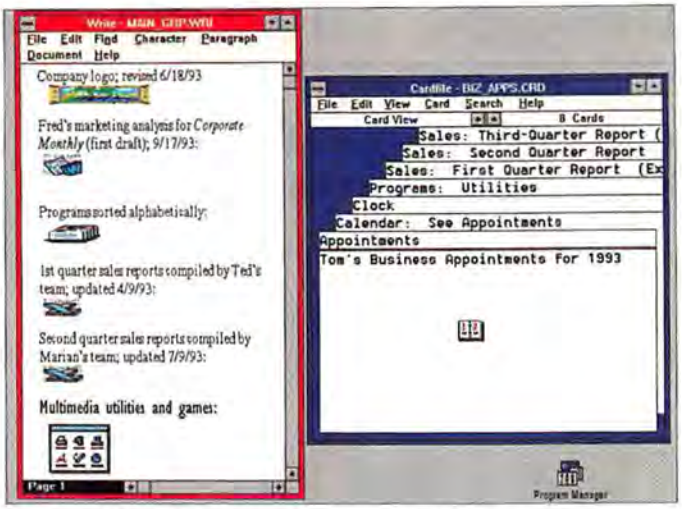

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One final caveat: Although you can drag and drop documents and programs into MAIN-GRP.WRI, don't do it. This would *copy* the document or program to your launcher file, making MAIN-GRP.WRI huge. Always use the Object Packager technique described above to create MAIN-GRP.INI's icons.

Easy Access to New Tips

Q I use Notepad to store useful tips I read in the *Here's How* section of *PC World*. Can you recommend a better way for me to save these tips?
Roger L. Ward Sr.,
Montgomery, Alabama

A We sure can. Notepad has some severe file size limitations, which means you will soon be storing tips in multiple files. Even Cardfile would be a better choice than Notepad, because you could quickly scan the index lines of each card for whichever tip you want to read.

But there is a better way: Add tips to existing Windows help files. It's easy. First, pick a file that is closely related to the tip. For example, you might add the "DOS Screens to the Max" tip that appears at right to the Help file that comes with Windows' PIF Editor.

Launch PIF Editor, press **<F1>**, and pick out a help topic related to the tip by clicking on the *Contents* button. In this example, select *Display Usage* under the 'Options for 386 Enhanced Mode' heading.

To add your tip, just choose *Edit•Annotate* and type the tip in the Annotate dialog box—there's room for several tips. When you're finished, click *Save* and a paper clip icon appears next to 'Display Usage'. If you want to view the tip or modify it, just click the paper clip.

Worried about losing the tip? Simply add it to the Bookmark menu while the Display Usage screen is present. Select *Bookmark•Define* and enter a title for your tip, such as **Run all DOS apps full screen**, and then click *OK*.

Repeat the process if you want to reference other tips that are attached to the Display Usage topic. The next time you want to find this tip while in PIF Editor, simply press **<F1>** and select it from the Bookmark menu. You will then be rocketed to the Display Usage topic. Click on the paper clip icon and voilà—the tip will appear in the Annotate dialog box.

DOS Screens to the Max

Q I inherited my 486 workstation from a previous employee who ran all his DOS applications in a window. I want to run them full screen, but I'd rather not use the PIF Editor to change the settings for all these programs. Is there a quicker way to make them run full screen in one fell swoop?
Herb Reagan, San Antonio

A There is. First, make a backup copy of SYSTEM.INI to be safe. Then choose *File•Run* in Program Manager or File Manager, type **SYSTEM.INI**, and click *OK*. Locate the [386enh] section and add the line **AllVMsExclusive=on**. Save SYSTEM.INI, and exit and restart Windows. The new setting forces all your DOS programs to run full screen. But note: You won't be able to put any DOS app in a window, so you can't cut or copy text from it to another app.

Color Schemes to Order

Q I have added a lot of custom color schemes to Windows, and I switch among them frequently. When I open the Color section of Control Panel, however, they aren't listed in alphabetical order. Why not?
Richard Shankly,
Dartmouth, New Hampshire

A Custom color schemes are listed chronologically, not alphabetically, which is why each new scheme you add appears at the bottom of the list. If this bothers you, edit CONTROL.INI in the \WINDOWS subdirectory. First, make a backup copy of CONTROL.INI. Then, in either Program Manager or File Manager, choose *File•Run*, type **CONTROL.INI**, and then click *OK*.

Locate the [color schemes] section. You'll see all the schemes listed underneath, with each name followed by an equal sign and a bunch of codes that designate your chosen colors. Rearranging these lines will affect their order in your Control Panel list box, so cut (using <Shift>-<Delete>) and paste (using <Shift>-<Insert>) the schemes until you come up with a sequence that's to your liking. Make sure that each scheme starts on a line by itself. If you accidentally delete a carriage return while cutting and pasting, and one scheme runs into the end of another, Windows will generate General Protection Fault the next time you click the Color icon in the Control Panel.

Save CONTROL.INI, double-click the Color icon in the Control Panel, and you will find that your color schemes are in order from A to Z. Naturally, you will have to repeat these steps if you decide to add more schemes later. Happy decorating.

By Scott Dunn

Scott Dunn is a contributing editor for PC World *and coauthor of* 101 Windows Tips *(Peachpit Press, Berkeley, California, 1992).* Windows Q&A *welcomes your questions.* *See page 12 for contact information.*

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DATA MANAGEMENT Q & A

Sorting by Fiscal Year in Paradox

Q I keep my invoice records in a Paradox table. I designed a report to total my invoice table by calendar year, but I want to see sales totals by fiscal year, along with the start and end dates for each of these periods. I have thought about putting a fiscal year field in the table, but I don't want to bother with keeping it up-to-date.

I'd like to find a way to automate the process. Can I use a PAL script or queries to update a fiscal year field for me? I'd like to enter the start and end dates for each fiscal year on a special form just once and then have Paradox handle the rest. I'd also like to get a report that lists all the invoices before or after the fiscal years I've entered.

Harvey J. Huberts, Jenison, Michigan

A You're right—a fiscal year field is the best solution to your problem, and yes, you can use a PAL script to handle all the drudgery of keeping it up-to-date. With an updated field, it's easy to use reports and queries to get the information you want.

You'll have to do some preparation before the script will run successfully. First, add a field called **Fiscal Year** to your invoice table (which I'm assuming is called INVOICES). This field can be an **S** type (short number) field. Then create a new table called **FISCALYR** containing the fields **Fiscal Year**, **Start Date**, and **End Date**. Fiscal Year should again be an **S** field, but you should type an asterisk (*) after the *S* to make it a key field as well. If you don't make FISCALYR's Fiscal Year field a key, you won't be able to link this table to your invoice table and show fiscal year dates in your report. Start Date and End Date should both be **D** type (date) fields. Now, enter each fiscal year, along with its start and end dates, into this table.

Next, create the script that will fill in the Fiscal Year field for you. Enter the text shown in **FIGURE 1** into an ASCII text file called **FISCRPTS.SC**. Any text editor will do the job; to use the one that comes with Paradox, select *Scripts • Editor • New* if you have Paradox 4.0 and *Scripts • Editor • Write* if you have an older version. Figure 1 assumes your original table is called INVOICES and your date field is called Date; change these labels to match your own table and field names. To run the script and update your table, select *Scripts • Play • Fiscrpts*. FISCRPTS.SC is available on PC World Online.

Once you've run FISCRPTS, you can easily query on fiscal year. To find any exception—invoices that the script was not able to assign a fiscal year to—type the keyword **blank** under the Fiscal Year field in your query.

```
VIEW "Fiscalyr"
COEDIT "Invoices"
SCAN
IF ISBLANK([Fiscal Year])
 THEN dt=[Date]
      fy=BLANKNUM()
      x=MATCH([Date],"../../..",a,b,c)
      MOVETO [Fiscalyr->Start Date]
      LOCATE PATTERN ".."+STRVAL(c)
      IF retval
       THEN IF dt<[Start Date]
               AND RECNO()<>1
             THEN UP
            ENDIF
            IF dt>[End Date]
               AND NOT ATLAST()
             THEN DOWN
            ENDIF
            fy=[Fiscal Year]
       ELSE MOVETO [Fiscalyr->End Date]
            LOCATE PATTERN ".."+STRVAL(c)
            IF retval AND dt<=[End Date]
             THEN fy=[Fiscal Year]
            ENDIF
      ENDIF
      MOVETO "Invoices"
      [Fiscal Year]=fy
ENDIF
ENDSCAN
DO_IT!
```

FIGURE 1: ASSIGN FISCAL YEARS to your invoices with this Paradox script.

You can also design a report for INVOICES with totals by fiscal year: First, select *Group • Insert • Field • Fiscal Year* to create a group band on the Fiscal Year field. Then attach the FISCALYR table to the report using *Field • Lookup • Link*, linking the tables via the Fiscal Year field. Add your summary fields in the Fiscal Year group footer using *Field • Place • Summary*. You can show the beginning and ending dates for each fiscal year by placing the relevant fields from FISCALYR into your report design.

Guarantee Unique Record IDs in dBASE

Q In "Keeping dBASE III Unique" in the April 1993 *Data Management* column, you showed how to set up a hot key to add a new record with a unique ID to a file. Wouldn't it be easier to replace your ten-line program with the following two lines of code?

```
APPEND BLANK
REPLACE ID WITH RECNO()
```

Using the new record number as the ID should eliminate the chance of duplicating an ID.

E. E. Staton, Dunwoody, Georgia

A Your approach will work well as long as you never delete records and then PACK your data file. When you use the PACK command to permanently remove records that are flagged for deletion, dBASE lowers the record number for every record after the first one removed. Therefore if your ID numbers are based on record numbers, and you PACK your file, some of your records will end up with record numbers that are smaller than their ID numbers. Because of this, an ID number assigned by taking the value from the RECNO() function might already belong to another record.

The program I printed in the April column was designed to avoid this potential problem. I suggested indexing the data file on the ID field and then using commands that tell dBASE to get the ID number of the last record in the

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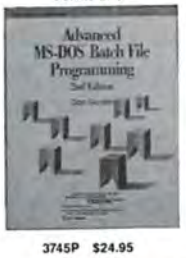

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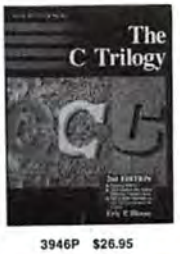

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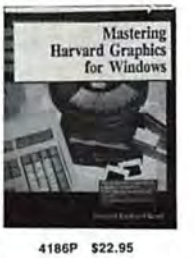

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file, rather than the record number, and increment it to come up with a unique ID for a new record. This way you're sure to get an ID that hasn't been used before, even if you've gotten rid of old records.

Mail Merging With Access and Word for Windows

Q I need to merge Microsoft Access data into Word for Windows documents, and I can't find an easy way to do this, even though both programs are Windows applications available from Microsoft. The documentation suggests copying and pasting, which is hardly what mail merge is all about. Is there a solution?

Eric Rigby,
Fernie, British Columbia, Canada

A The Microsoft Access documentation merely says that you can copy and paste from an Access table into another Windows application, which seems to imply tediously moving your data one record at a time. But if you search Access's on-line help for the keyword *mail merge*, you'll find instructions on creating an entire file of table records that you can use for a mail merge with Word for Windows.

On the Access side, the work is easy. Open the database that includes the table you want to merge. At the Database window (which is not a table view), highlight the name of the desired table and choose *Edit•Copy* or press **<Ctrl>-C** or **<Ctrl>-<Insert>**. This puts a copy of the entire table in the Windows Clipboard.

If you don't want to merge the entire table, you can use a query. Simply design a query with the information you want, name and save it, then select it from the Database window and copy it to the Clipboard as described above.

The next step is to go into Word for Windows and create a data file from the contents of the Clipboard. (Be careful not to exit Access first, or you'll clean out the Clipboard.) In WinWord, choose *File•New* from the menus, select *DATAFILE* as the template for the new document, and make sure that *Document* is selected in the New box. When the new file is up, use *Edit•Paste* or **<Shift>-<Insert>** to paste your data into it. Each record of your database will appear as a line, with the records separated by tabs and the first line showing the field names. You may need to edit this line a little bit because field names with spaces tend to confuse WinWord; simply remove any blank spaces inside field names. Now close the file and save it.

To merge the data, open or create your main document and choose *File•Print Merge•Attach Data File* and the name of your new data file. As you edit the document, you'll be able to insert field names from the data file by clicking the *Insert Merge Field* button. Once you've created this document, you can use *File•Print Merge•Merge* to view or print the results.

By Celeste Robinson

Celeste Robinson is a contributing editor for PC World *and the author of* The Paradox 4.0 Handbook *(Bantam Computer Books, New York, 1992).* Data Management *welcomes your questions. See page 12 for contact information.* ■

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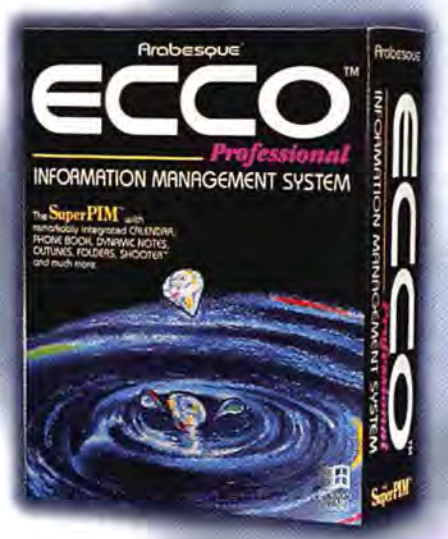

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—Andrew Seybold, Outlook on Mobile Computing, 5/93

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PUBLISHING & PRESENTATIONS MAKEOVER

Those Slippery Slides

Quick: Which has more traps—a golf course or a slide presentation?

Answer: a slide presentation.

Poorly designed slides can put your audience to sleep. A few simple design tricks, however, can help you keep your audience alert and interested. For example, don't include the full text of your presentation on your slides. Use short bulleted items to illustrate and support your points. And don't put too much information on single slides: You'll lose your audience's attention.

The slides shown below come from a half-hour presentation given by James H. Johnson, president of Johnson Direct Advertising, a Redwood City, California–based direct-mail advertising agency to the software industry. Johnson's presentation, nearly 60 slides long, was created in Microsoft PowerPoint. It covers the use of direct mail to launch software products, and he gave it at a meeting of the Software Entrepreneurs Forum, a professional organization.

While Johnson's slides demonstrate his expertise, they work against his presentation. The black-on-white type is stark and uninteresting, there are few graphics to reinforce his statements, and some of his slides have no heading—a critical oversight. In addition, several of the slides crowd too much information or make points that would be more effective if spoken.

We performed our redesign in CorelDraw, a draw package that has recently beefed up its presentation skills greatly, but we could easily have produced it in just about any presentation software package. In revising this presentation, we sought to unify and clarify the message by using the same fonts, colors, and graphics throughout.

The first step was to eliminate the opening slide's map of the United States, since it has little relevance to the subject. We replaced it with an icon of a floppy disk, which ties more closely to the presentation's theme and can be used in other slides as a graphic or as a bullet in text.

We added a graded fill—a standard template in presentation packages—that changes from black to blue to provide a more inviting background. To add even greater consistency, we replaced the original presentation's confusing variety of typefaces with the single sans serif Futura family, using Extra Bold for headlines and a condensed style for body text.

Keep It Simple

Johnson had fallen prey to the common mistake of inserting extraneous information in his slides. We eliminated slide 4 ("So pay attention because") since it conveys no critical information. Slide 6 ("You'll get all the basics"), on the other hand, is crammed with too much text. We broke it into two separate slides that are easier to read.

Easy-to-grasp graphics and commanding headlines help the audience take in a slide's meaning quickly, so we moved important information from the body text into the headings wherever possible. Where appropriate, we added graphics to underscore the speaker's point—the stack of floppy disks in slide 3 and the Microsoft Windows logo in slide 4, for example.

By using headlines, bulleted text, and data charts and giving your slides a clean, consistent look, you'll make your presentations easier to follow and as a result, more persuasive.

By David Brickley and Bronwyn Fryer

The redesign was performed by David Brickley, a designer based in Moss Beach, California. Bronwyn Fryer is a contributing editor for PC World. Publishing & Presentations *welcomes your business document and presentation make-over candidates and your publishing and presentations questions. See page 12 for contact information.*

After

JDA

JIM JOHNSON'S 1992

Software Direct Mail Marketing Seminar

1 We replaced the map in the original with a graphic created in CorelDraw. The first line is set in 60-point Futura Extra Bold; the remaining text is set in 76-point Futura.

According to Direct Marketing News 1992:

- Software has become the most profitable product in the direct mail market.
- It has replaced traditional publishing as the hottest thing going today.
- It is predicted to be the biggest money generator going into the next century.

2 We broke the long text of the original into three short bulleted items. We used the floppy disk icon as a bullet, sizing it at 125 percent of the adjacent font size.

Anticipated '93 Mail Order Software Sales

More than 2.5 million packages of software worth $500 million will be purchased through mail order in 1993.

3 To create the floppy disk graphic, we enlarged the icon by 180 percent, then copied and pasted it 50 times in a vertical stack to give the impression of volume.

Microsoft owns the retail channel, but...

Direct mail dominance is still up for grabs. It could just as well be yours as anyone's.

4 Adding an easily understood graphic element, such as the Microsoft Windows logo, averts slide-to-slide monotony while underscoring the speaker's point.

You'll get all the basics you need today...

- The consumer direct mail channel.
- The direct mail channel for vertical software.
- Why direct mail works well for software.

5 To make the slides easier to read, we placed white type on the dark background and replaced the various fonts of the original with a consistent Futura family throughout.

You'll get all the basics you need today...

- The economics of direct mail.
- How to win with a direct mail campaign.
- Direct mail production
- Processing your own direct mail windfall

6 Give your information to the audience in manageable chunks: We split the seven bulleted items on the original slide onto two separate slides—5 and 6.

Intel's video brings the same easy

Introducing Indeo™ technology and the Smart Video Recorder from Intel.

When it comes to putting video technology on your PC, Intel knows exactly which buttons to push.

Intel's new Indeo™ technology is the first video compression technology that lets you capture and compress video in one single step. (Now that's easy.) And the Smart Video Recorder is the first video capture board that takes advantage of Indeo technology. Which means adding the impact of motion video to your business presentations is faster and simpler than you ever imagined.

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technology concept to your PC.

Video for Windows lets you capture, edit and incorporate video into Windows applications.*

up to five times the disk space.

A key component of Indeo technology, scalable performance adjusts playback quality based on your system's processing power. And you don't need special hardware for playback. Scalable performance gives you the best playback possible from the computer you have now, and whatever computer you may use in the future.

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To learn more about Indeo technology and the Smart Video Recorder, call 1-800-538-3373, ext. 1153. Or to receive information immediately, call Intel's automated FaxBACK® service at 1-800-525-3019 and ask for document 9874. Because with Intel, PC video is all fast forward.

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COMMUNICATIONS Q & A

Tips for New CompuServe Users

Q I am new to CompuServe and have found the interface confusing and difficult to use. Also, I'm not sure which forums I should look at first when I explore it, and which services provide the best value. Do you have any suggestions for me?

Aleksei Znamensky,
St. Petersburg, Russia

A Try CompuServe Information Manager for Windows. This program is the most delightful communications software I've seen in a decade of reviewing. Although dedicated to CompuServe only, Information Manager makes roaming the online service as easy as tic-tac-toe, transforming the entire service with festive icons and drop-down menus.

If you're not running Windows, try CompuServe Information Manager for DOS. The two programs are virtually free: You can download a copy of CompuServe Information Manager for Windows by entering **GO WINCIM**. In the United States, downloading the program costs about $10, and you get a $10 CompuServe credit. Better yet, you can order the Windows or the DOS version online by entering **GO ORDER**. The cost is $25, and the program comes with printed documentation and a $25 CompuServe credit.

Unfortunately, both these programs are poky online, especially in the forums. So for reading and replying to forum messages, get a copy of AutoSIG, which is free. You can download AutoSIG from the IBM Communications Library on CompuServe (**GO IBMCOM**). Look in the AutoSIG Library for ATOSIG.EXE, ATODOC.EXE, and ATOADV.EXE.

This simple-to-set-up software will automatically dial CompuServe, download message headers in the public forums that you specify, then log off quickly. Offline, you can specify which messages you'd like to read; then the program will log back on to capture those messages for you.

If you plan to spend more than one hour a month on CompuServe, your best pricing strategy is to sign up for the Standard Pricing Plan at $8.95 per month with the Executive Service Option. Standard Service lets you access a variety of features, including news, daily stock quotes, games, and an online encyclopedia, without incurring hourly CompuServe connect charges. This option requires that you spend $1.05 a month online but gives you access to lots of business databases and news features you wouldn't get otherwise, plus discounts on some business-oriented services.

Spending hours online can get expensive, however. To avoid racking up needless hourly charges, always head to the Basic Services menu as soon as you log on, by either choosing it off the main menu or entering **GO BASIC**. Access any Standard Service features through this menu rather than via alternative routes, which may require toll charges.

To save money while online, print out the free guides to CompuServe navigation and GO commands, which you can access by entering **GO INDEX** and **GO FRE-14**.

Don't forget to check out the IBM Europe forum (enter **GO EURFOR**) to "chat" with friends and receive tips for computing overseas.

For a dazzling library of news, background, and financial data on any publicly held company, head to the Citibank Global Reports menu by entering **GO GLOREP**. At the prompt, enter a period followed by the company's ticker symbol. This service costs $35 per hour in addition to the hourly CompuServe toll fee, which is generally $8.

Japanese Investing

Q I'm interested in finding out about investment opportunities overseas, particularly in Japan. Can you tell me how I can conduct an online search for financial information about Japanese companies?

Dell Warken, Tampa

A Try the Teikoku Databank, the largest business database in Japan. A subset chronicling the finances of 200,000 Japanese businesses is now available in English through Dialog. It's file 502, and access runs $1.80 a minute plus $5 per record accessed. Contact Dialog at 800/334-2564.

You also can obtain faxed information from the database for just $30 per report. Or, buy the entire database on CD ROM for $3200. Contact Teikoku Databank America, 750 Lexington Ave., 28th fl., New York, NY 10022; 212/486-2637, 212/486-2638 (fax).

By Judy Heim

Judy Heim is a contributing editor for PC World *and the editor of* Online Investor, *a newsletter about using online services to track and manage investments.* Communications *welcomes your questions. See page 12 for contact information.*

USER GROUP TIP

Cleaning Out Procomm Listings

My Procomm 2.0 dialing directory is pretty full, so every once in a while I go through it to see which BBS's are worth keeping. Naturally, bringing all my old or rarely used BBS's together makes it easier to weed them out, and Procomm's sort feature lets me do just that. Here's how:

At the directory screen, press ST to sort BBS listings by the total number of times you've called them, SL to sort by the date you last called each one, or SB to sort by baud rate (to find and possibly eliminate any old 1200-bps or, worse, 300-bps boards). In all three cases, the boards you'll want to consider deleting will be at the bottom of the list. Pressing T toggles the display, allowing you to see each listing's total number of calls and last call date.

Alan Blandamer
Capital PC User Group

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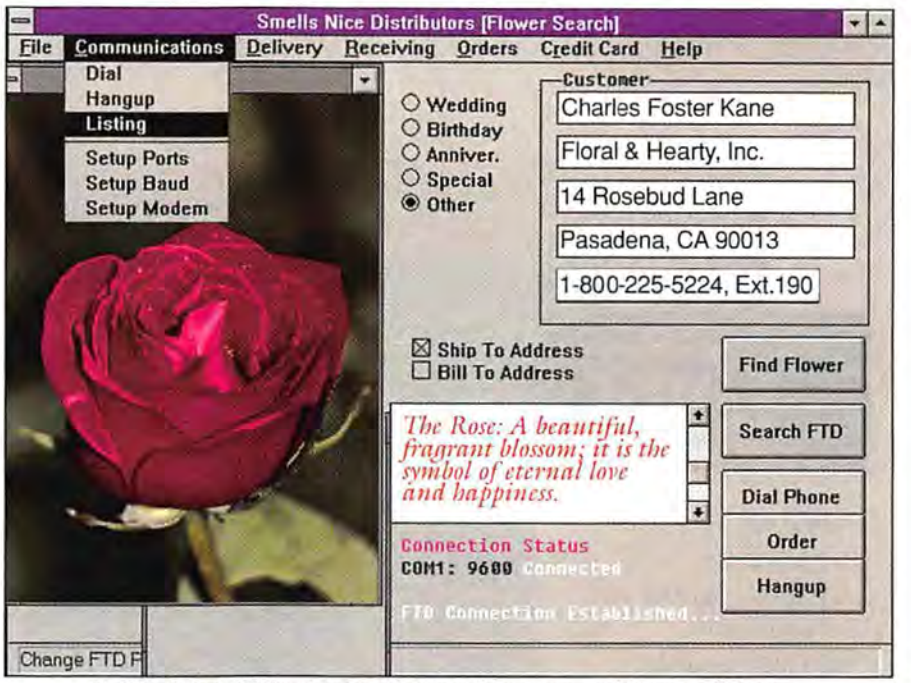
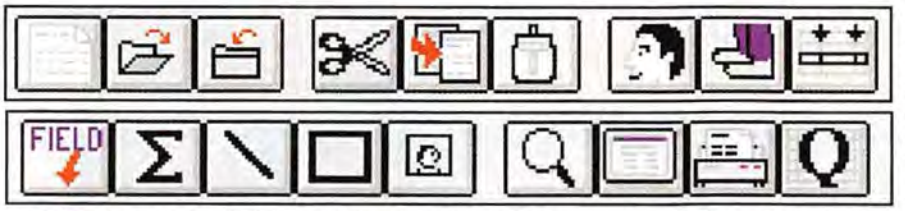


CA-dBFast includes Windows interface objects for pull-down menus, push buttons, radio buttons, check boxes, scrolling list boxes, bit-mapped graphics and more.



CA-dBFast's report writer, CA-RET, lets you mix text, graphics and data to produce great-looking reports in minutes.

The Visual Application Designer (VAD) makes creating pull-down menus, push buttons, radio buttons, check boxes, scrolling list boxes and other Windows objects as easy as "point and click" or "drag and drop." The VAD generates the required source code, saving you hours of complex programming. You also get a debugger that's so advanced it lets you watch your source code execute at run time – even Single Step through execution.

COMPUTERWORLD — 1992 W 100 WINDOWS MAGAZINE ANNUAL WIN AWARD

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For Power Users Power Lifters.

PC/Computing, July 1993.

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HARDWARE Q & A

Conflict Resolution

Q I tried installing a Microsoft bus mouse (which uses its own interface board) in my Dell Dimension system, but it didn't work. It worked perfectly in someone else's ISA machine. Why doesn't it work in mine?
Kurt Lofgren, Raleigh Hills, Virginia

A I assume you've carefully followed the steps in the mouse's software setup routine, or you've specified that you have a Microsoft-compatible mouse in the setup routine of some other application or environment. Also, make sure you've inserted the mouse's interface board all the way into the slot.

Still not working? Most of the time it's because the bus mouse's interface and some other board in the system are trying to use the same interrupt request (IRQ) line. Nearly every expansion board needs its own IRQ line to function properly. The usual way to find out which board has been assigned which IRQ is to check the switch settings, jumper positions, and documentation for every board in your system.

But there's an easier way. Before you plug in the mouse interface again, try entering **MSD** at the DOS prompt. If you have either Windows 3.1 or DOS 5.0 or 6.0 (and your DOS and Windows directories are in your PATH statement, as they should be), a handy little utility called Microsoft Diagnostics will load. Type **Q** at the opening menu. A list will appear describing the most common use for each IRQ, along with the current status of all 15 IRQ lines. If you see a 'No' or a blank in the Status Detected column, that IRQ line is available for use by any expansion board. Note the numbers of all available IRQs.

Now have a good look at the mouse interface card. Near the connector that plugs into the slot, you'll find the J4 *jumper block*—several pairs of pins with a tiny plastic-encased jumper covering one pair. The jumper determines which interrupt the interface card uses. Unlike most interrupt jumper blocks, J4 actually has an IRQ number printed next to each pair of pins; if the jumper sits on the pair labeled "2", for example, then the board is all set to grab IRQ2.

You can figure it out from there. Microsoft's bus mouse interface gives you a choice of IRQs numbered 2 through 5. If Microsoft Diagnostics indicates that, say, IRQ5 is available, move the jumper to the 5 position, plug in the board, and you're in business. Incidentally, if you don't have Microsoft Diagnostics, a number of other diagnostic utilities show you interrupt assignments and more (my favorite is CheckIt Pro from TouchStone Software; 800/531-0450, 714/969-7746 in California).

So what happens if you're sure there's no interrupt problem and the thing still won't work? Then it's time to troubleshoot the second-most common conflict, in which two boards try to use the same I/O address—that is, they both pass their data through the same place in memory. I/O address conflicts occur most frequently between similar devices, such as two video boards or two hard disk controllers. Some boards let you change the I/O address using switches or jumpers, but many don't. If two boards have the same fixed I/O address, you can't install them in the same machine.

Bus mouse I/O address conflicts occur only when another bus mouse interface is present—say, built into a video card or a multifunction board. The only reason to install a second mouse interface is if the first interface is incompatible with your Microsoft mouse. If so, you can change the I/O address to a secondary location by moving the jumper on jumper block J3.

Microsoft's mouse interface is about as simple as expansion boards get, so the risk of conflict looms larger as the number and complexity of boards increase. Remember to keep the documentation on every board in your system, particularly since few are as straightforward—or as clearly labeled—as the Microsoft Mouse interface board.

So That's Why They Call It SCSI

Q I've read in *PC World* about systems with SCSI interfaces that "allow you to chain up to seven SCSI devices." Have you really tried this? I had enough trouble getting one to work, and two seems to be out of the question.
Ralph Poledgey, Hutchinson, Minnesota

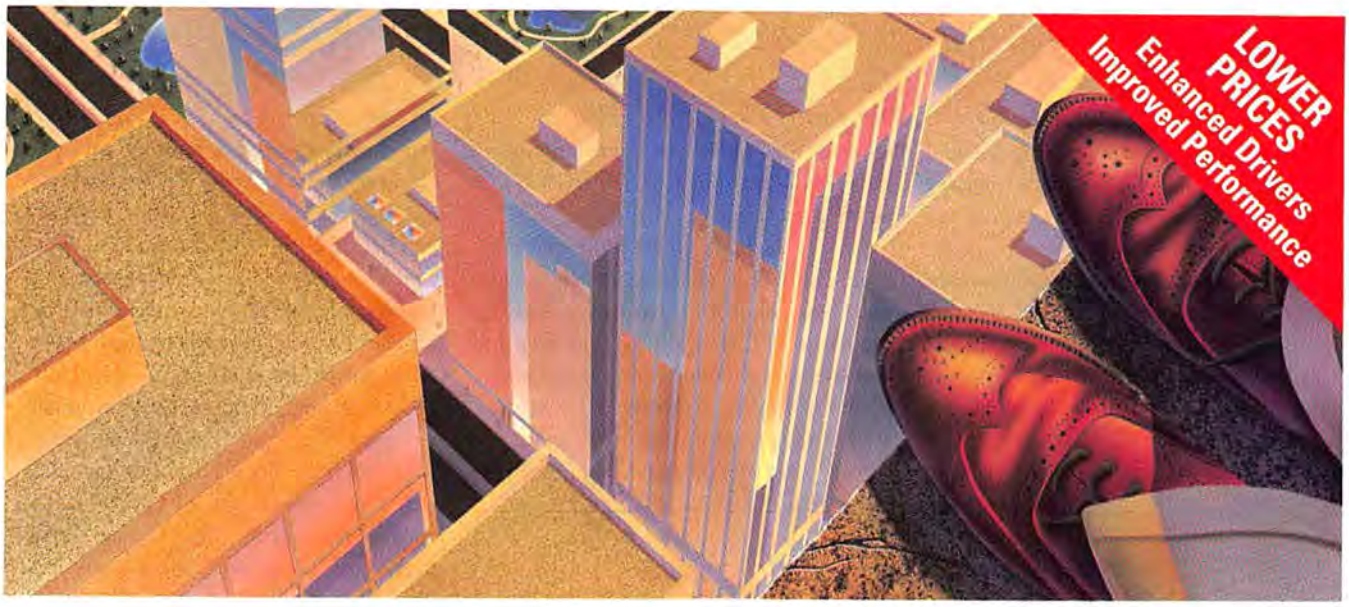
A SCSI (standing for Small Computer Systems Interface and pronounced "scuzzy") is one of those standards that's great in theory but sometimes hellish in practice. The *idea* is that you can plug up to seven SCSI devices—hard drives, CD ROM drives, WORM drives, SCSI scanners, whatever—into a SCSI interface board; "chaining" means hooking a device to the back of an already installed device. You can do this, but getting there is seldom fun.

SCSI is one of those standards that's great in theory but sometimes hellish in practice.

Each SCSI device manufacturer seems to do things a little differently. In fact, unless you install special software, certain SCSI devices only work with an interface board from their own manufacturer. Some standard!

Here are a few useful pointers that can help you run multiple devices off the same interface. The first thing you need to know is that you should *not* tell your system that you're installing a new peripheral, even if you plan to add a SCSI hard disk. In other words, there's no need to run your PC's configuration routine and change anything (in contrast to the procedure for installing IDE drives described in June's column).

Now for the SCSI nitty-gritty. The SCSI interface and all SCSI devices that you install must be assigned a unique ID number from 0 to 7. By default, SCSI interface boards come configured as number 7. SCSI devices,



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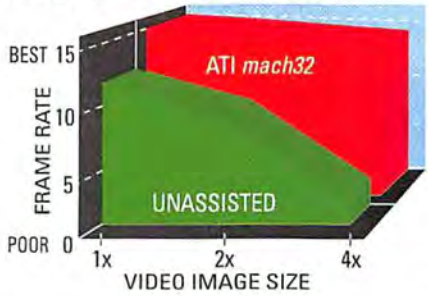

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Circle 5 on reader service card

on the other hand, usually come configured as 0 or 1—assignments you can change using jumpers or switches to ensure every SCSI device has a unique ID.

Say your needs are modest and you simply want to hang two SCSI hard disks off the same interface. SCSI interfaces usually let you boot only from drive 0, so begin by setting the drive you want to boot from to 0 and the second one to 1. Next, since a SCSI interface is an expansion board like any other, go through the procedure outlined in the previous question to avoid IRQ and I/O address conflicts.

Seat the board in an open slot and plug the SCSI ribbon cable into it (a cable with two drive connectors usually comes with the interface). If the SCSI interface includes a floppy controller on board and a floppy controller is already active in your system, disable the one on the interface.

Now make sure the last drive in the SCSI chain has its *terminating resistors* installed. These generally look like three tiny combs lined up next to the ribbon cable connector, but check the drive's documentation to be sure. Then remove the terminating resistors from the other drive. Physically mount the drives in your system and hook them to the ribbon and power cables.

Run any diagnostic routines included with the interface and verify that everything's configured correctly. Next, partition each drive using DOS's FDISK, which enables you to create either several logical drives or one big one for each physical drive. Then format the drives with DOS.

The above scenario assumes that the SCSI drives will be the only two hard disks in your system. If you plan to install more than two, or if you want to chain other types of devices from various manufacturers, you're best advised to load an Advanced SCSI Programming Interface (ASPI) driver, a small piece of software that comes with your interface and enables all manner of SCSI interfaces and devices to talk to each other. If you go the ASPI route, I suggest you also run out and buy a handy a utility called CorelSCSI ($99 suggested retail, available at most software chains). The program can make mixing and matching exotic SCSI devices easier than the hard disk installation procedure we've described.

You still need to give each device a unique ID number, avoid the usual board conflicts, disable any redundant floppy controllers, and remove all but the last device's terminating resistor. To load the ASPI driver, copy it to the root directory of your boot disk and create the following first line for your CONFIG.SYS: **DEVICE=***ASPI driver file name*. Now pop the CorelSCSI disk into drive A:, type **INSTALL**, and follow the instructions. Choose *Express Configuration*, and CorelSCSI will assign drive letters to all the devices on the chain. I tried this with an Always IN-2000 interface and a bunch of different devices and it worked like a charm. If there's a hard disk in the chain, don't try to use DOS's FDISK to partition it—use Corel's Cformat, which partitions it *and* DOS formats it in one swoop.

By Eric Knorr

Eric Knorr is a contributing editor for PC World. Hardware *welcomes your questions.* *See page 12 for contact information.*

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STAR-DOT-STAR TIPS

Weekly Cleaner

After experiencing problems with a DAT tape backup unit, I decided to make sure I cleaned its heads at least once a week. To jog my memory, I wanted my computer to display a reminder when I booted it on Monday mornings. I therefore wrote WEEKDAY.COM [see **FIGURE 1**], which makes a batch file execute certain commands—including weekly reminders—on particular days of the week. WEEKDAY.COM returns a DOS ERRORLEVEL corresponding to the current day of the week based on the system clock (where 0=Sunday, 1=Monday, and so on until 6=Saturday).

```
A 100
MOV AX,2A00
INT 21
MOV AH,4C
INT 21
RET

N WEEKDAY.COM
RCX
A
W
Q
```

FIGURE 1: BATCH FILES DETERMINE THE DAY OF THE WEEK with WEEKDAY.COM, created from this DEBUG script.

```
@ECHO OFF
WEEKDAY
IF ERRORLEVEL = 6 GOTO EVERYDAY
IF ERRORLEVEL = 5 GOTO FRI
IF ERRORLEVEL = 2 GOTO EVERYDAY
IF ERRORLEVEL = 1 GOTO MON
IF ERRORLEVEL = 0 GOTO EVERYDAY
GOTO ERROR
:MON
REM  INSERT COMMANDS FOR MONDAY HERE
ECHO REMEMBER TO CLEAN THE DAT DRIVE
GOTO EVERYDAY
:FRI
REM  INSERT COMMANDS FOR FRIDAY HERE
ECHO TGIF!
GOTO EVERYDAY
:EVERYDAY
REM  INSERT COMMANDS FOR EVERY DAY HERE
ECHO GOOD MORNING!
GOTO END
:ERROR
ECHO ERROR READING DAY OF WEEK!
:END
```

FIGURE 2: THIS BATCH FILE, WHATDAY.BAT, shows how WEEKDAY.COM executes commands based on the day of the week.

The batch file WHATDAY.BAT [**FIGURE 2**] demonstrates how this works. As written, it performs certain commands on Monday, certain ones on Friday, and others every day. When you modify this batch file, remember that the IF ERRORLEVEL statement returns 'true' if the error level is *greater than or equal to* a specific number. Therefore, your IF ERRORLEVEL commands should work from high numbers down to lower ones *[you can also work from low to high if you use IF NOT ERRORLEVEL —Ed.]*. If you reboot more than once a day, you may want to use WHATDAY.BAT in conjunction with one of the "once-a-day" batch files that have appeared in this column [such as "A Better One-a-Day Solution," April 1992] to display the message only the first time the PC is booted.

Bob Whiteman, Northvale, New Jersey

Editor's note: If you're on PC World Online, you can download WEEKDAY.COM and WHATDAY.BAT directly from the Featured in September folder. But if you're not, copy the listing in Figure 1 to an ASCII text file called **WEEKDAY.SCR**, then type **DEBUG < WEEKDAY.SCR** at the DOS prompt. WEEKDAY.COM will appear in the current directory.

Copy Codes

If a batch file must, in the course of its duties, copy files to a floppy disk, you'll want it to detect when the floppy is full. Fortunately, DOS's XCOPY command gives you a way to do that. When XCOPY fails due to an error condition, it sets an exit code that describes the nature of the problem. Exit code 4 is returned when the disk is full or if the system runs out of memory (the latter being a rare event). By checking this condition with an IF ERRORLEVEL command, you can make your batch file behave appropriately.

Bob McDearmid, Lithonia, Georgia

Editor's note: This trick is a useful way of determining if you've overflowed a disk. **FIGURE 3** shows all the exit codes that XCOPY returns as well as what conditions produce each code.

When you write your batch files, remember that IF ERRORLEVEL is satisfied if the exit code is *greater than or equal to* the number specified after ERRORLEVEL. Thus, the command

USER GROUP TIP

Freeing Up Space With DOS 6.0

The DOS 6.0 installation program automatically copies about 400K of DoubleSpace files into your DOS directory, even if you don't plan to use this disk compression system. To reclaim that valuable hard disk real estate but keep DoubleSpace handy if you decide to install it later, use the DOS 6.0 MOVE command to transfer C:\DOS\DBL*.* to a floppy.

If you choose not to remove these files, you'll also waste space on bootable floppies. That's because when you format a floppy using the /S switch (to make it bootable), DOS 6.0 puts DBLSPACE.BIN—a 51K hidden, system, and read-only file—on it. To free up that 51K, first log on to the floppy drive (A: or B:), change DBLSPACE.BIN's attributes by typing ATTRIB -H -S -R DBLSPACE.BIN, then delete the file with DEL DBLSPACE.BIN.

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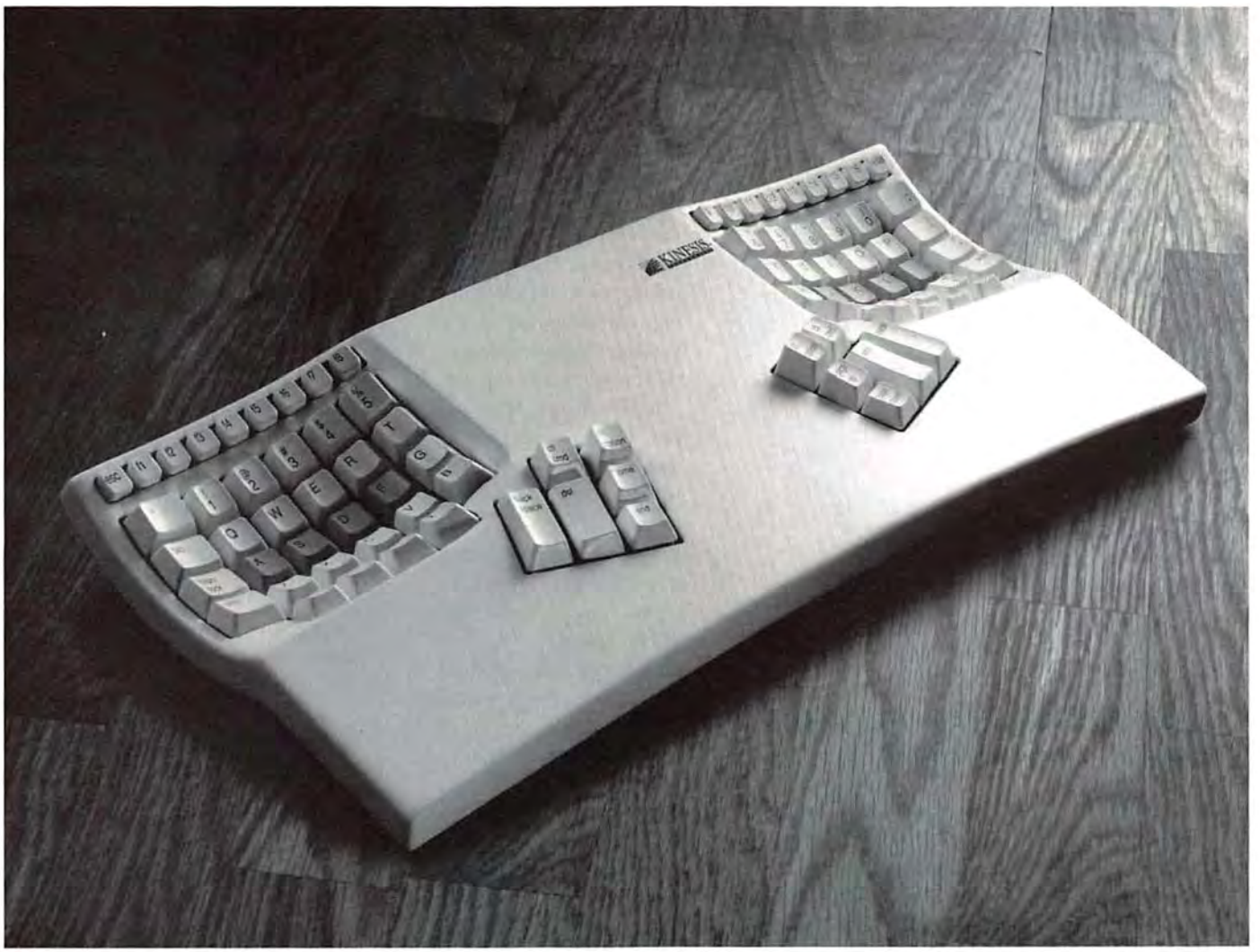

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Exit code	Error condition
0	No error
1	No files found to copy
2	XCOPY was interrupted by <Ctrl>-C
4	Disk full, invalid parameters, or insufficient memory
5	Disk write error

FIGURE 3: XCOPY RETURNS THESE EXIT CODES, which you can use to control your batch files.

```
YCOPY.BAT:
@FOR %%F in (%1) DO CALL CHKCOPY %%F %2

CHKCOPY.BAT:
@ECHO OFF
:START
XCOPY %1 %2
REM If no error, exit
IF NOT ERRORLEVEL 1 GOTO DONE
REM If other than disk full, warn user
IF ERRORLEVEL 2 GOTO GT1
ECHO Error: File %1 doesn't exist!
GOTO DONE
:GT1
REM If exit code is 2, Ctrl-C
IF ERRORLEVEL 4 GOTO GT2
ECHO Copy of %1 halted by Ctrl-C
GOTO DONE
:GT2
REM If exit code is 4, disk may be full
IF ERRORLEVEL 5 GOTO ERROR
ECHO Please change disk, then
PAUSE
:ERROR
ECHO Copy of %1 failed
:DONE
```

FIGURE 4: THESE TWO BATCH FILES, which work together, demonstrate how to use XCOPY's exit codes.

IF ERRORLEVEL 1 GOTO DONE will take the batch file to the :DONE label if XCOPY's exit code is 1 or anything above 1, while IF ERRORLEVEL 5 GOTO ERROR will send you to :ERROR only if XCOPY has returned an exit code of 5.

I wrote two sample batch files, both shown in **FIGURE 4**, to illustrate how this works. YCOPY.BAT and CHKCOPY.BAT work together to copy files from one source to another, pausing if you need to swap disks. You run them by launching YCOPY, passing the copy's source and destination to it as parameters. When you copy files using this batch combination, don't worry about the 'File Not Found' messages—your files are being found. The two batch files can be found in the Featured in September folder on PC World Online.

Counting Pages in WordPerfect, Concluded

In "Getting to the Bottom of WordPerfect" in the November 1992 *Dialog Box*, Neville G. Weekes described how to use a macro to put the number of pages in a footer or header. This macro has a problem, however: You must run it every time you make a change to the document that increases or decreases the total number of pages. If you forget to run the macro before printing your revised document, you'll get incorrect information in your header or footer.

A more foolproof way to put the last page number into a header or footer is with *WordPerfect*'s automatic cross-referencing feature. Press **<Home><Home><Down>** to get to the end of the document, then press **<Alt>-<F5>RT**, type **LAST PAGE**, and press **<Enter>**. This will insert a reference target called LAST PAGE at the end of your document.

Next, create your header or footer. For a right-aligned header that will appear on every page, go to the header screen by pressing **<Home><Home><Up>** and then **<Shift>-<F8>PHAP**. To right-align your text, press **<Alt>-<F6>**. Enter the header text, pressing **<Ctrl>-B** where you want the current page number to appear. Where you want the *last* page number to appear, press **<Alt>-<F5>RRP**. *WordPerfect* will prompt you for a target name and may give you 'LAST PAGE' as the default; if 'LAST PAGE' isn't the default, type it in. Press **<Enter>**, then **<F7><F7>** to exit the header screen.

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Note: Keys to press are shown here in **boldface**. Keys to press simultaneously are joined by a hyphen. A bullet (•) links menu, option, button, check box and drop-down list box names in a series.

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	Open existing file	**<Ctrl>-O** or **File** • **Open**
	Save current file	**<Ctrl>-S** or **File** • **Save**
	Print worksheet(s) or selected range	**<Ctrl>-P** or **File** • **Print** • OK
	Preview printout of worksheet(s) or selected range	**File** • Print Preview • OK
	Undo last command or action	**<Alt>-<Backspace>** or **<Ctrl>-Z** or **Edit** • **Undo**
	Cut selected range to Clipboard	**<Shift>-<Delete>** or **<Ctrl>-X** or **Edit** • **Cut**
	Copy selected range to Clipboard	**<Ctrl>-<Insert>** or **<Ctrl>-C** or **Edit** • **Copy**
	Paste range from Clipboard	**<Shift>-<Insert>** or **<Ctrl>-V** or **Edit** • **Paste**
	@SUM contiguous entries left of/above empty one-column/one-row selection or all entries of selection that has empty last column/row	Enter @SUM formula, cut and copy where appropriate
	Boldface entries in selected range	**<Ctrl>-B**; or right-click range, Font & Attributes • **Bold**
	Italicize entries in selected range	**<Ctrl>-I**; or right-click range, Font & Attributes • **Italics**
	Underline entries in selected range	**<Ctrl>-U**; or right-click range, Font & Attributes • **Underline**
	Left-align entries in selected range	**<Ctrl>-L**; or right-click range, Alignment • **Left**
	Center entries in selected range	**<Ctrl>-E**; or right-click range, Alignment • **Center**
	Right-align entries in selected range	**<Ctrl>-R**; or right-click range, Alignment • **Right**
	Fill selected range with series based on values in first cell(s)	Right-click range, Fill by Example
	Select all drawn objects that a rectangle can enclose	Hold **<Ctrl>** or **<Shift>**, click each object
	Draw arrow	**Tools** • **Draw** • **Arrow**
	Draw rectangle	**Tools** • **Draw** • **Rectangle**
	Draw ellipse	**Tools** • **Draw** • **Ellipse**

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SMARTICONS (continued)

Button	Task	Keyboard or mouse
	Create text block	**Tools** • **Draw** • **Text**
	Create macro button	**Tools** • **Draw** • **Button**
	Create chart using values in selected range	**Tools** • **Chart**
	Display next set of SmartIcons	**Tools** • SmartIcons, select from top drop-down list box, OK

ENTERING AND EDITING CELL DATA

A cell entry is a *label* (text) or a *value* (a number or formula). Values must begin with a number, +, –, $, @, (, #, or decimal point. To begin a label with one of these characters, type an alignment character first. To begin a formula with a cell address, range name, or worksheet file reference, type + first. As you type an entry, it appears in the cell and in the edit line's *contents box* (the edit line's larger gray box). To put the entry into the active cell, press **<Enter>**, click the edit line's Check button, or select another cell.

Align label left/center/right	Begin with '/^/"
Fill cell with repeating label	Begin with \
Enter relative cell address	Type it or select cell to reference
Make cell address absolute	**<F4>** until variation is reached
Select @function	**@<F3>**; or @Function button , List All. Optionally select **C**ategory. Double-click function; or select function, OK
Edit active cell (activate Edit mode)	**<F2>** or double-click cell or click inactive contents box
In Edit mode, erase selected characters	**<Delete>** or **<Backspace>**, **<Esc>** for entire line. **<Ctrl>-<Backspace>** for word left
In Edit mode, convert cell's formula to its current result	**<F9>**
Use existing range name in formula	Type name; or Navigator button , select name; or **<F3>**, select name, OK
Exit Edit mode (lose changes)	**<Esc><Esc>** or **<Ctrl>-<Break>** or X button

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WORKING WITH RANGES

Select range smaller than entire row or column	Select corner. Hold **<Shift>**, select opposite corner; or drag to opposite corner
Select row/column	Click frame's row number/column letter
Select contiguous rows/columns	Select first row/column. Hold **<Shift>**, select last row/column; or drag to last row/column
Select collection of ranges	Select range, hold **<Ctrl>**, select next ranges
Select all cells in worksheet	Click intersection of row and column frame
Select same range in consecutive worksheets (3-D range)	Select range in first/last worksheet, hold **<Shift>**, click tab of last/first worksheet
Deselect range	**<Esc>** or click worksheet
Cut selected range to Clipboard	Cut SmartIcon or **<Shift>-<Delete>** or **<Ctrl>-X** or **Edit** • **Cut**
Copy selected range to Clipboard	Copy SmartIcon or **<Ctrl>-<Insert>** or **<Ctrl>-C** or **Edit** • **Copy**
Paste from Clipboard	Paste SmartIcon or **<Shift>-<Insert>** or **<Ctrl>-V** or **Edit** • **Paste**
Copy selected range to new location in same worksheet	Hold **<Ctrl>**, drag edge of range; or copy and paste

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1-2-3 RELEASE 4.0 FOR WINDOWS

WORKING WITH RANGES (continued)

Move selected range	Drag edge of range or cut and paste
Erase selected range(s)	**<Delete>** or **Edit • Clear**
Insert/delete range shorter than entire column (cells selected/ below move down/up)	Select range, **<Ctrl>-<Gray Plus>**/**<Ctrl>-<Gray Minus>** or **Edit • Insert/Delete, Insert** selection/**Delete** selection • OK
Insert/delete range narrower than entire row (cells selected/ to right move right/left)	Select range, **<Ctrl>-<Gray Plus>**/**<Ctrl>-<Gray Minus>** or **Edit • Insert/Delete, Column • Insert** selection/**Delete** selection • OK
Insert/delete selected row(s)/ column(s)	**<Ctrl>-<Gray Plus>**/**<Ctrl>-<Gray Minus>** or **Edit • Insert/Delete**
Name range	**Range • Name**, type name, OK
Name range(s) using label(s)	Select label(s), **Range • Name • Use Labels**, select from **For** cells list, OK or Close
Delete range name	**Range • Name**, select name, **Delete** • OK
Wrap text in selected cell(s)	**Style • Alignment • Wrap text** • OK
Set height of row or selected rows	**Style • Row Height** or drag bottom row border in frame
Set width of column or selected columns	**Style • Column Width** or drag right column border in frame
Set width of column or selected columns to widest entry	Double-click right column border in frame
Hide column(s)/worksheet(s)	Select cell in column(s)/worksheet(s), **Style • Hide • Column/Sheet** • OK
Format selected values	**Style • Number Format**, select format, OK
Change selected range's font/font size	**Style • Font & Attributes**, select from **Face/Size** list, OK
Show/don't show selected range's negative values in red	**Style • Lines & Color • Show negative values in red** • OK
Put/remove border around selected range/all range's cells	**Style • Lines & Color • Outline/All** • OK
Set horizontal (left/center/right) alignment of selected entries	**Style • Alignment • Left/Center/Right** • OK or Left/Center/Right alignment SmartIcon
Set vertical (top/center/bottom) alignment of selected entries	**Style • Alignment • Top/Center/Bottom** • OK
Copy selected range's format to another range	**Edit • Copy**, select new range, **Edit • Paste Special • Styles only**
Protect/unprotect selected range's format	**Style • Protection • Keep data unprotected** after file is sealed • OK, protect file

WORKING WITH WORKSHEETS

Turn undo on/off	**Tools • User Setup • Undo** • OK
Undo last change if undo is on	Undo SmartIcon or **<Alt>-<Backspace>** or **<Ctrl>-Z** or **Edit • Undo**
Rename worksheet	Double-click tab, type name, **<Enter>**
Go to intersection of last row and last column with entries	**<End>-<Home>**
Go to first nonempty cell before or after empty cell	**<End>, <Up>**/**<Down>**/**<Left>**/**<Right>**
Go to cell, named range, chart, drawn object, or query table	**<F5>**, select from **Type** of item list, OK
Insert worksheet after current worksheet	New Sheet button New Sheet

WORKING WITH WORKSHEETS (continued)

Insert worksheet(s) before/after current worksheet	**Edit • Insert** or **<Ctrl>-<Gray Plus>**, **Sheet**, **Before/After**, set **Quantity**, OK
Go to worksheet	Click worksheet tab; or **<F5>**, type name and colon, OK
Go to next/previous worksheet	**<Ctrl>-<Page Up>**/**<Ctrl>-<Page Down>**
Move right/left one screen width	**<Ctrl>-<Right>**/**<Ctrl>-<Left>**
Go to cell A1/A:A1	**<Home>**/**<Ctrl>-<Home>**
Magnify/shrink worksheet 10%	**View • Zoom In/Zoom Out**
Return to default display size	**View • Custom**
Split worksheet beneath/to right of active cell	Drag Split bar or **View • Split • Horizontal/Vertical** • OK
Unsplit worksheet	**View • Clear Split**
Print worksheet sideways	**File • Page Setup • Orientation • Landscape**
Cascade three worksheets	**View • Split • Perspective** • OK
Move between panes or views	**<F6>**
Group/ungroup worksheets	**Style • Worksheet Defaults • Group Mode**
Set default label alignment, column width, font, font size, text color, number of decimals	**Style • Worksheet Defaults**, set defaults, OK

WORKING WITH FILES

Create new file	**File • New**
Open existing file	Open File SmartIcon or **<Ctrl>-O** or **File • Open**
Save open file	File Save SmartIcon or **<Ctrl>-S** or **File • Save**
Change default file directory	**Tools • User Setup • Worksheet directory**
Close file	**<Ctrl>-<F4>** or **File • Close** or double-click file window's Control box
Freeze title rows/columns/both above/left of selected range	**View • Freeze Titles • Rows/Columns/Both**
Unfreeze titles	**View • Clear Titles**
Print file or range	Print SmartIcon or **<Ctrl>-P** or **File • Print** • OK
Preview printout of selected range	**File • Print Preview** • OK
Fit print range to single page	**File • Page Setup • Size • Fit all to page**
Move to next/previous open file window	Hold **<Ctrl>**, **<End>**, **<Page Up>**/**<Page Down>**; or **<Ctrl>-<F6>**/**<Ctrl>-<Shift>-<F6>**
Protect/unprotect file	**File • Protect • Seal file** • OK
Merge file into current file	**File • Open**, select file, **Combine**

WORKING WITH MACROS

Record macro	**Tools • Macro • Record**
Display transcript window	**Tools • Macro • Show Transcript**
Play back transcript macro	**Transcript • Playback**
Name macro	Select macro range, **Range • Name**
Create macro button	Macro SmartIcon or **Tools • Draw • Button**
Run macro	**<Alt>-<F3>**, select name or range
Activate macro single-step mode	**Tools • Macro • Single Step**

Note: You can run a macro whose name begins with \ (backslash) followed by a single letter by holding **<Ctrl>** and pressing the letter key.

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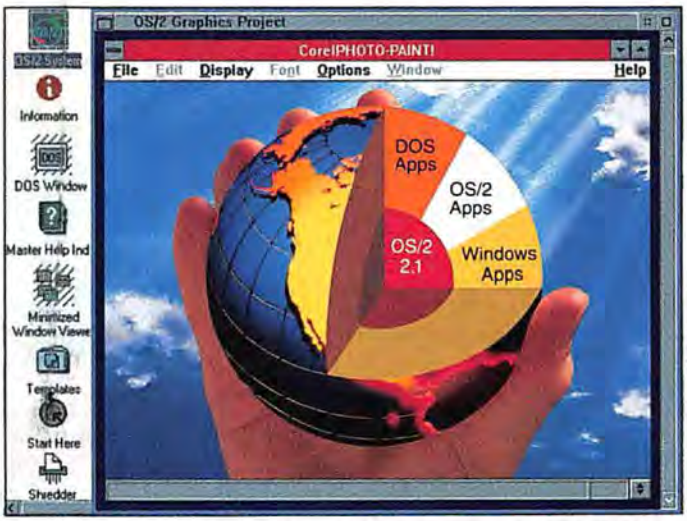

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There's still something you have to do before you can print the document—generate the references. And yes, you must do this every time you make a change to the document that increases or decreases the total number of pages.

So why is this method better than running a macro? You don't have to *remember* to generate the references; WordPerfect will remind you if you forget and try to print after editing. To generate the references, press **<Alt>-<F5>GGY**.

Ralph D. Jones, Hagerstown, Maryland

How to Get a Date in 1-2-3

When you import a text file into 1-2-3 with the /File•Import•Text command, you may have trouble using any dates from the file. Why? Because 1-2-3 imports them as labels. Luckily, you can use a formula to convert them. For instance, if the date is in the YYMMDD format, and it appears on a line by itself in the text file (and therefore in a cell by itself in the worksheet), you can use the formula **@DATE(@VALUE(@MID(*cell*,0,2)), @VALUE(@MID(*cell*,2,2)), @VALUE(@MID(*cell*,4,2)))**, replacing *cell* with the address of your date text. To convert a column of dates, enter the formula in a cell to the left or the right of the topmost date, then copy the formula down to the other cells in the column.

Note that you may need to set the range's format to make the date appear as a date rather than just a number. For example, if you use the Format•Date•Long Intn'l command to format the cell, the date will appear as something like '09/20/93'.

Mindy Moy, Brooklyn, New York

Editor's note: Moy's tip works great if the date is expressed in a 6-digit format—and if it isn't, the formula can be converted easily. However, you might want to consider importing your text with the /File•Import•Numbers command, which imports numbers and quoted text. Instead of importing each line of the input file into a single cell, this alternative breaks the line up into several columns. The only catch: You must add quotation marks to each item that's not a number, or it will be ignored.

When you use the Numbers option to import a date written with slashes (e.g., 9/20/93) and without quotation marks around it, 1-2-3 will split the date into three numbers in adjacent columns. For instance, you might end up with the month in cell

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```
Sub Pause (sec%)
If sec%<1 Then Exit Sub
If sec%>59 Then sec%=59
start%=Second(Now)
finish%=start%+sec%
If finish%>59 Then finish%=finish%-60
Do Until Second(Now)=finish%
Loop
End Sub
```

FIGURE 5: PAUSE A VISUAL BASIC PROGRAM for a set number of seconds with this routine.

A1, the day in B1, and the year in C1. Then a very simple formula, **@DATE(C1,A1,B1)**, will give you the date you need.

A Visible Pause in Visual Basic

While writing a program in Visual Basic for Windows, I discovered a serious omission: There's no built-in routine to let you pause the program for a predetermined amount of time. I therefore wrote a subroutine to pause the program for up to 59 seconds.

To create PAUSE, make sure the code window is open, select *View • New Procedure*, make sure 'Sub' is selected, enter the name **PAUSE**, press **<Enter>**, and enter the routine [see **FIGURE 5**]. To use it, simply place the command **PAUSE (*n*)** in your code, replacing *n* with the length of the desired pause in seconds.

Igor Fokine, Glassboro, New Jersey

Editor's note: It's a pity that Microsoft couldn't add something as simple and useful as a Pause routine to Visual Basic. The program's closest equivalent, a control called a *timer*, is too awkward for simple delays. Fokine's technique is a much easier solution to the problem.

I've modified the subroutine slightly to make it run more smoothly if you pass it a number that's outside the 1-to-59-second range. If the number you pass it is 0 or less, the pause will end immediately; if it's over 59, the pause will last 59 seconds. You'll find the subroutine, an ASCII text file called PAUSE.TXT, in the Featured in September folder on PC World Online.

By Brett Glass

Brett Glass is a contributing editor for PC World. Star-Dot-Star *welcomes your tips, macros, batch files, and short programs. See page 12 for contact information.*

FAX SURVEY

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Which articles in *PC World* are valuable to you? Which aren't? Help us improve the magazine by filling out the questionnaire below. Fax in your response and you'll have a chance to win an Ocean Microsystems Vista 256, a Best Buy in this month's review of rewritable optical drives.

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HOW TO FILL OUT THE FORM: FOR BEST RESULTS, PHOTOCOPY THIS PAGE; DO NOT TEAR IT OUT. Using black pen, clearly print your name (use block capital letters) and phone number at right; fill the appropriate circle under each digit of your phone number. Below, fill the circles under the answers that apply to each article you read. First tell us whether you read the entire article or just some of it. If you didn't read it at all, leave the line blank. If you read the article, please rate its value to you on a scale from 1 (least valuable) to 5 (most valuable). WHEN FILLING THE CIRCLES, AVOID GOING OUTSIDE THE LINES! One entry per person.

First name

Last name

Daytime phone number

1	○	○	○		○	○	○		○	○	○	○
2	○	○	○		○	○	○		○	○	○	○
3	○	○	○		○	○	○		○	○	○	○
4	○	○	○		○	○	○		○	○	○	○
5	○	○	○		○	○	○		○	○	○	○
6	○	○	○		○	○	○		○	○	○	○
7	○	○	○		○	○	○		○	○	○	○
8	○	○	○		○	○	○		○	○	○	○
9	○	○	○		○	○	○		○	○	○	○
0	○	○	○		○	○	○		○	○	○	○

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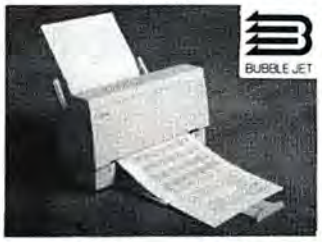

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BACK UPS 1250	490.68	**Smart 2000**	**1242.50**
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Surge Arrest Plus 7	37.97	Line-R 1250	175.58

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LOGITECH Fotoman Plus 539.30
LOGITECH Mouseman Cordless 79.33
LOGITECH ScanMan 32/Scanman 256 ..... 99.55 / 169.25
LOGITECH SerialTrackmanII/Portable ..... 74.99 / 95.50
MEMOREX 3 Button Mouse Plus 29.50
MICROSOFT Mouse V2.0 Bus 5 Pack 329.32
MICROSOFT Mouse V2.0 Bus No Software 86.80
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COMPAQ CONTURA 3/20 8MB 349.30
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COMPAQ PROLINEA 486/33 8MB 359.56
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HP DESKJET 500 & 500C 256KB 57.43
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HP LASERJET 4 4MB/ 8MB 169.60/ 339.17
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Bravo 486/25, 33	2Meg Kit	500780-005	120.00
	8Meg Kit	500780-001	298.00
Bravo 486	4Meg	500987-002	165.00
	8Meg Kit	500987-003	330.00
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Premium 386/25, 16 SX	1Meg	500718-001	55.00
Premium 386/33	1Meg	500718-002	56.00
Premium II 386SX20, 486-25, 25E, 33	1Meg	500780-003	WPB 60.00
	4Meg	500780-004	WPB 160.00
Premium Tower, 386/33TE, 486/25TE, 486/33TE	8Meg	500780-001	WPB 320.00
Cupid Memory Board	0-32Meg	500818-001	149.00

ZENITH MEMORY MODULES

MODEL	AMT. UPGRADED	AST PART #	PRICE
Z386/33, 25, 20, 33E	1Meg	ZA3800ME	50.00
Z386/33, 25, 20, 33E, 486/25E	4Meg	ZA3800MK	160.00
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33G9288 (2Meg)	Thinkpad 300	109.00
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6450375 (1Meg)	80-041	79.00
6450379 (2Meg)	80-111, 311-121, 321, 081, 161	94.00
6451060 (4Meg)	80-A21, A-61, 80-A31, 80-111, 80-311	189.00
6450603 (1Meg)	35SX, 40SX, 55SX, Model-70's, P-70	45.00
6450604 (2Meg)	70-061, E61, 121, 50Z, 55SX, 65SX, P-70, 55LS, 65LS, X-Station 120 & 130, 35SX, 35LS, 40SX	82.00
6450608 (2Meg)	70-A21, A-61, B-21, B-61, 35SX, 35LS, 40SX Value Point 325T	86.00
72X8955 (128K)	25	35.00
34F2933 (4Meg)	35SX, 40SX, 55SX, 65SX, 55LS, 65LS	159.00
87F9977 (4Meg)	55SX, 55LS, 65SX, 40SX, 35SX, 35LS	159.00
1057035 (512K)	P/S1-286	40.00
92F9935 (2Meg)	P/S1 & P/S1/386SX-2121	92.00
92F9694 (4Meg)	P/S1 & P/S1/386SX, Model-2121	144.00
6450902 (2Meg)	56, 57, 57SX,90, 95, P-75, 57SLC Value Point 77 486DX2, 486SX, SVR 85	89.00
6450128 (4Meg)	57SX, 90, 95, P-75, 57SLC, 56, 56SLC, P/S1, 386SX, Models-2123, 2133, 2155, Value Point 77 486DX2, 486SX, SVR 85	165.00
6450129 (8Meg)	35SX, 40SX	319.00
6450130 (8Meg)	56, 57, 57SX, 90, 95, P-75, 57SLC Value Point 77 486DX2, 486SX, SVR 85	319.00
79F0999 (2Meg)	LX40, N33SX, PS Note	89.00
79F1000 (4Meg)	LX40, N33SX, PS Note	169.00
79F1001 (8Meg)	LX40, N33SX, PS Note	319.00
07G1826 (2Meg)	N51 (all)	99.00
07G1827 (4Meg)	N51 (all)	179.00
07G1828 (8Meg)	N51 (all)	319.00
07G1420 (4Meg)	CL57LSX LpTp, Thinkpad 700, 700C, 720, 720C	189.00
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92F8604 (2Meg)	N45SL	99.00

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DeskPro 386/33, 386/33L, 486/25, 486/33L, 486/50L, System Pro	2Meg Module	115144-001	89.00
	8Meg Module	116561-001	339.00
	32Meg Module	116568-001	1500.00
DeskPro 386/33L, 486/33L	(Exp Bd)	116569-001	289.00
DeskPro 386/25, 386/20	1Meg Module	113131-001	79.00
	4Meg Module	113132-001	174.00
DeskPro 386S-16MHz	1Meg Exp Bd	113633-001	110.00
	4Meg Exp Bd	113634-001	239.00
	1Meg Module	113646-001	75.00
	4Meg Module	112534-001	174.00
DeskPro 386/20E	1Meg Exp Bd	113644-001	119.00
DeskPro 386/25E	4Meg Exp Bd	113645-001	239.00
	1Meg Module	113131-001	75.00
	4Meg Module	113132-001	174.00
DeskPro 286N, 386N, 386SX/20, 386/25M, 486/33M, 486S/25M, 486S/16M	1Meg Module	118688-001	50.00
	2Meg Module	118689-001	85.00
	4Meg Module	118690-001	149.00
Port. 486C	8Meg Module	128877-001	309.00
M Series Exp Bd	0-64Meg	129160-001	279.00
DeskPro 386/16	1Meg Kit	108071-001	99.00
	4Meg Kit	108072-001	269.00
	1-2Meg Exp Bd	108069-001	239.00
	4-8Meg Exp Bd	108070-001	399.00
DeskPro 286	512K Kit	113012-001	59.00
Prolinea 386 3/25S, 3/25ZS	2Meg	141738-001	99.00
	8Meg	141742-001	299.00
Prolinea 486 4/25S, 4/33, 4/50, 4/66, CDS	1Meg	141682-001	55.00
	2Meg	141683-001	98.00
	4Meg	141684-001	159.00
	8Meg	141685-001	319.00
Prosignia PC Server, 486/33, 486 DSX/66	8Meg	141685-001	349.00
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LTE/286	4Meg Bd	117081-003	179.00
LTE/386S/20	4Meg Module	121125-002	199.00
LTE LITE/20, 25, 25C	4Meg Module	129769-002	199.00
LTE LITE/20, 25, 25C	8Meg Module	129769-003	319.00
LTE LITE/20, 25, 25C	16Meg Module	129769-004	699.00
LTE LITE 4/25C	4Meg Module	142337-002	199.00
LTE LITE 4/25C	8Meg Module	142337-003	299.00
LTE LITE 4/25C	16Meg Module	142337-004	749.00
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SLT/386	1Meg Module	118303-001	79.00
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	8Meg	139499-001	299.00
Contura 4/25, 4/25C, 4/25CX	4Meg	146520-001	189.00
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T2000/T2000SX	2Meg	PC18-PA8317U	84.00
T2000SX/T1000LE	4Meg	PC-PA8314U	159.00
T2000SX/T1000LE	8Meg	PC14-PA8315U	279.00
T2000SXE/2200SX/T1800, 1850, C	2Meg	PC-PA2000U	84.00
T2000SXE/2200SX/T1800, 1850, C	4Meg	PC-PA2001U	159.00
T2000SXE/2200SX/T1800, 1850, C	8Meg	PC-PA2002U	279.00
T4400SX, SXC T6400	4Meg	PC-PA2004U	164.00
T4400SX, SXC T6400	8Meg	PC-PA2005U	299.00
T4400SX, SXC T6400	16Meg	PC-PA2010U	599.00
T4400SX, SXC T6400	32Meg	N/A	2599.00
T4500, T4500C, T4600, T1900, T1900C (3.3 v)	4Meg	PC-PA2012U	239.00
T4500, T4500C, T4600, T1900, T1900C (3.3 v)	8Meg	PC-PA2013U	419.00
T4500, T4500C, T4600, T1900, T1900C (3.3 v)	16Meg	PC-PA2014U	1299.00
T4500, T4500C, T4600, T1900, T1900C (3.3 v)	32Meg		3299.00
T3300SL	4Meg	PC-PA2007U	169.00
T3300SL	6Meg	PC-PA2008U	229.00
T3300SL	8Meg	N/A	369.00
T3300SL	16Meg	PC-PA2009U	749.00
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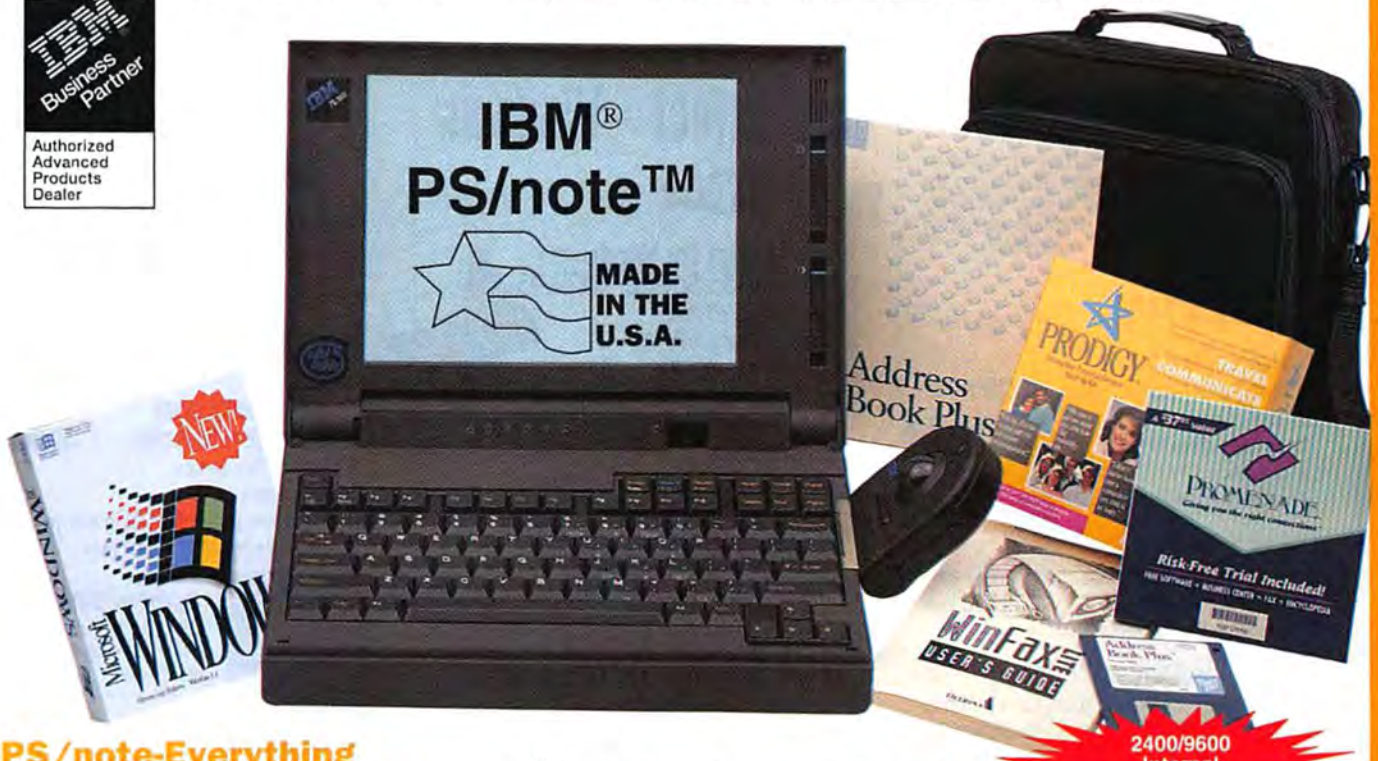

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520MB	12ms	3.5" HH	FUJITSU	SCSI	FJ2624S	699	849
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Circle 121 on reader service card

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Product Category	Business Class	Computer Showplace
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Communications	302	306
Computer Systems	302	306
Memory Cards	303	
Peripherals	304	306
Security	304	
SOFTWARE		
Business Applications	305	308
CD Rom	305	
Church Applications		308
Data Entry		308-309
Educational		309
Financial		309
Flow Charting		309
Foreign Language		309
Mailing Programs		309
Mail Order		309
Maintenance Management		309
Manufacturing		309
Medical		309
Music		309
On-Line Service		310
Public Domain/Shareware		310
Real Estate		310
Restaurant Point of Sales		310
School Applications		310
Statistics		310
Surveys		310
Utilities		310
MISCELLANEOUS		
Accessories	304	306
Bar Coding		306-307
Battery		310
Computer Insurance		307
Data/Disk Conversion		307
Disk Copy Service		308
Disks		307
On-line Services	305	
Supplies		308
Toner Recharge		308

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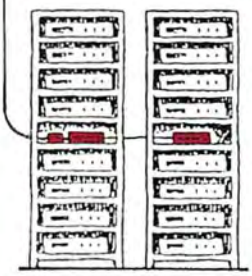

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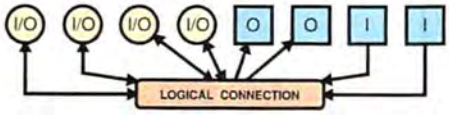

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Polaroid

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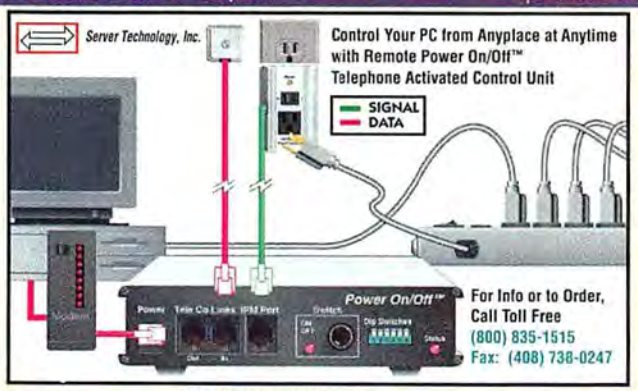

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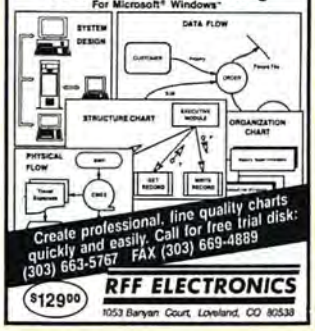

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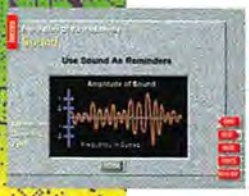

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Oil Slicks, Joy Sticks, and Mystics

From the screaming whine of the gearbox to the slight dip you take when you hit the brakes, World Circuit from MicroProse does an amazing job of putting you behind the wheel of a Formula I racer on the Grand Prix circuit. This lifelike simulation is incredibly detailed. In the pits, you practically feel your car going up on jacks, and you count the seconds while listening to your wheels being changed. Back on the track you swear you can smell burning Castrol.

The game includes precise re-creations of 16 Grand Prix courses, from Phoenix to Monaco to Barcelona, and you'll challenge the top cars and racing teams from 1991. Best of all, World Circuit goes a lot deeper into the racing scene than mere sound effects and visuals. To win, you must make complex decisions on everything from tire compounds to gear ratios and brake balance. In fact, you'll need to become an engineer as well as a racing driver.

Learning to pilot one of these highly tuned machines through a grueling series of practices, qualifying laps, and sudden-death races is no trivial task. That's why you'll love World Circuit's quick-start racing aids. If you enable the auto-driving features, your gears and brakes will be controlled automatically, so all you have to do is keep the pedal to the metal and try to make the turns. You can also employ antispin circuitry and an Indestructible mode that keeps you in the race even after a crash. As you get the hang of the controls, you can turn off these aids one by one for a more authentic race. The manual includes detailed maps of each course, complete with recommended gears—and telemetry from the pits helps you make the correct driving decisions.

You can control acceleration, braking, and steering with a mouse (sloppy), the keyboard (highly precise but not very lifelike), or a joystick (the best). And you can play solo, racing against the entire 1991 Grand Prix lineup—or against some friends. In multiplayer mode, the PC stops the action every so often to let you switch, and it declares a winner at the end of the race.

Most of the action takes place with you in the cockpit, but trackside camera angles, chase views, and instant replays are available too. There's a strange, masochistic pleasure in watching yourself spin out into a multicar catastrophe, and of course roaring into the winner's circle has its own appeal.

World Circuit's pit stops are just as realistic as the action on the track and just as important—unless you enjoy blowing out your tires at 168 mph.

State-of-the-Art Stick

These days, most games are designed for a mouse or keyboard interface. But since World Circuit was clearly designed for a joystick, I decided to try out Suncom's state-of-the-art FX 2000. I'm impressed. Mounted on desk-grabbing suction cups, the ergonomically sculptured pistol grip, with its smooth-action trigger, kept me in control no matter how tense (or sweaty) the racing action. Even the tiniest movement of the stick had an instant on-screen effect. Also, it's a snap (literally) to orient the FX 2000 for your most comfortable hand position: Simply pull up on the stick and reseat it to the best angle. Although I didn't need the topside fire buttons or the auto-fire switch for this game, if you favor flight simulators or shoot-'em-up games, you'll love them.

Trust Him You Can

If, on the other hand, your sense of adventure exceeds your dexterity, ditch the joystick and let your mouse and keyboard guide you through a role-playing fantasy game. A current favorite is Strategic Simulations' The Summoning, which drops you into a universe that requires skill with sharp-edged weapons and the mystical forces of wizardry. Unfortunately, to appreciate The Summoning's magical kingdom fully, you'll have to spend far too much time reading screen after screen of pulp-fiction dialogue, in which characters say things like "Trust him you can," instead of "You can trust him."

And yet, there's something about The Summoning that makes it irresistibly amusing. It's not the plot or the characters, which are built from standard parts. It's certainly not the graphics, which seldom surpass comic-book quality. Maybe it's the surreal setting, with a random assortment of talking skulls whose comments are almost entirely meaningless. Or the realistic special effects during combat. Whatever the reason, I found myself returning to The Summoning long after I completed my review—sheerly for fun.

While most of the action takes place in sewers, labyrinths, mazes, and subterranean corridors, you'll find yourself

By Michael Goodwin

IN THE SUMMONING, YOU CAN CONTROL MAGIC with mystical hand gestures. Once you've crafted a spell, it transmigrates into a blue gem (lower right), ready to be cast at your command.

gazing down at the scene from just over the shoulders of the participants. And moving your viewpoint character is a snap. Simply point out your path with the mouse, and the ultraresponsive interface causes the character to follow. It's even easy to zigzag around obstacles—a rare treat in this sort of game.

The Summoning's designers have avoided tedious Use, Look, and Take commands. If you see something you want, simply stand on top of it and click; it goes right into your stash. If you want to use something, just hold it in your left hand and special icons appear. Hold a potion, and you'll see a Drink icon; if it's a weapon, you'll see various Attack icons.

While the program's interface is ingeniously designed, it has its drawbacks. You've probably got all sorts of useful stuff in your pack, but you can't open the pack without holding it. Since you're permitted to hold only one thing at a time in each hand, you'll need to drop your weapon in order to open the sack. More than once, I was killed when I ran out of hands trying to juggle sacks, potions, and weaponry.

You'll need to get up to speed fairly quickly, too, because the bad guys in The Summoning are tough, and they're looking for you. And you'd better settle in for a long quest, because there are at least 24 levels, along with teleportation terminals that send you to uncharted realms. Best of all, this is a nonlinear game with many different paths and possible endings, so once you've got your martial arts down, you can start all over for a different adventure.

- **World Circuit** $59.95; MicroProse Software; 410/771-1151
  Reader service no. 761
- **FX 2000 flight control joystick** $39.99; Suncom Technologies; 708/647-4040
  Reader service no. 762
- **The Summoning** $59.95; Strategic Simulations, Inc.; 800/245-4525
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Michael Goodwin is a contributing editor for PC World. *He can be reached on PC World Online (see page 12 for contact information).*

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Making Windows Better

Sure, you've switched to Windows, and maybe you even like it. But aren't there days when you say, "I wish Windows could..." Well, with a little help, Windows can. I've found some ingenious—and cheap—utilities out there that make my Windows sessions easier and make me more productive. And the best part? They're all shareware—you can try any of the products here for the price of a download.

But first let me explain the ground rules: With shareware, you're expected to pay a registration fee if you continue to use the software. (One of the programs here is actually free.) CompuServe and America Online subscribers will find all these programs on the PC World Online forum. (See the sidebar "Shareware at Your Service" in "Instant Payback Software" for other ways to acquire shareware.)

Great Little Programs

Do you ever have too many windows on screen to find what you're looking for? You won't with Auto-Raise, which can easily send your front window to the back, revealing the ones behind it. What's more, you can switch programs without clicking—just hold the mouse over the window or icon and wait a millisec (or longer if you choose). It's the quickest way I've found to switch between applications. • *Auto-Raise $10; Robert F. Nee; 201/798-1344. Available online as AR116.ZIP.*

High on my list of handy utilities is Plug-In, a program that doesn't replace Program Manager but makes it reasonable to work with. For example, Plug-In lets me replace Program Manager's dull folder icons with others of my choice so I can identify a folder by sight (isn't that what icons are all about?). The program also automates installation of new applications by looking for—and running—SETUP or INSTALL programs on floppy drives. Hot keys allow me to minimize my program groups or bring up the Run command box in a flash. And speaking of the Run box, it now remembers the last 25 commands I've given it, saving a slew of keystrokes. Custom cursors for the pointer and hourglass are available, and there's an on-screen display of my system resources with an alarm to warn me when I'm running low. • *Plug-In $20; Plannet Crafters; 404/740-9821. Available online as PLUGIN13.ZIP. Reader service no. 639*

The Windows File Manager is okay, but I used to envy Mac-using friends with their little trash can. Well, now I have one of my own. Trash Manager's icon sits at the bottom of my screen waiting for me to drag and drop unwanted files. And it's safe—Trash Manager won't erase files until I explicitly ask it to empty itself. • *Trash Manager $25; CheckBox Software; 908/545-3010. Available online as TRASHM.ZIP. Reader service no. 640*

Would you use your video card's 1024 by 768 resolution if only you could read the icon titles? Are you sick of the Windows help engine's ugly shade of green? With More Control, you can change your icon's fonts, adjust Help's colors, and make over a dozen other system modifications. More Control is free—there's no registration fee—but for $12.50 you can get a more powerful version with a handy INI file editor, a restart Windows button, and a module to add apps to the Control Panel. • *More Control; Sloop Software; 719/260-0433. Available online as MORECN.ZIP (freeware) and MCICLB.ZIP (shareware). Reader service no. 641*

In the past, I'd have to drop to a DOS box to manage ZIP, LZH, and ARC files. But with WinZip, I get to view, run, extract, add, delete, and even check files for viruses—all by dragging and dropping. WinZip lets me archive files by dragging and dropping from File Manager, and restore files by dragging and dropping from WinZip. It can even create a temporary directory and Program Manager group to let me try an extracted program. You can even drag a file from WinZip to an application. WinZip is just a front end—you still need an archive program. Still, it's pretty handy. • *WinZip $29; Nico Mak; 800/242-4775, 713/524-6394 (orders only). Available online as WINZIP.ZIP. Reader service no. 642*

I admit it: I tend to collect duplicate files. When I ran CleanUp for Windows, it discovered I was wasting about 4MB of hard disk space with duplicate and similar files. This Kirby Vacuum Cleaner of Windows is adroit at ferreting out duplicates and letting me view, tag, and delete them. • *CleanUp for Windows $29.95; Foley Hi-Tech Systems; 415/882-1730, 415/882-1733 (fax). Available online as CLUPW1.ZIP. Reader service no. 644*

Contributing Editor Steve Bass is the president of the Pasadena IBM Users Group. He can be reached on PC World Online (see page 12 for contact information).

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By Steve Bass

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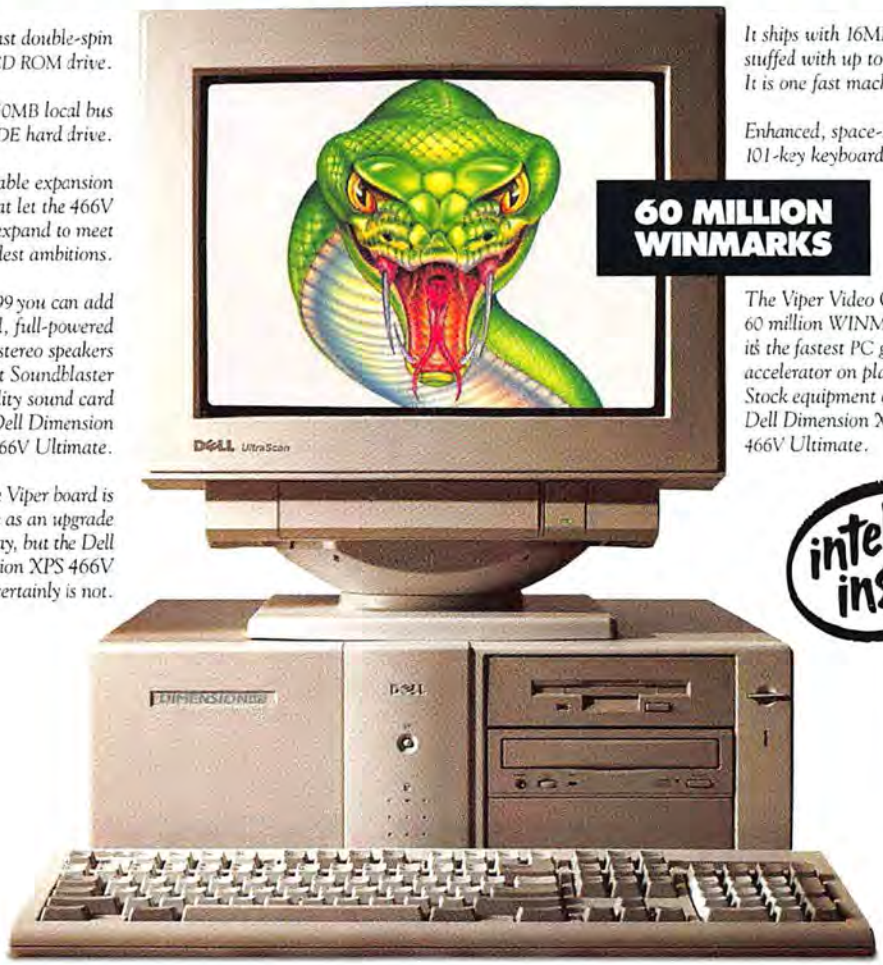

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