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PC WORLD

August 1993

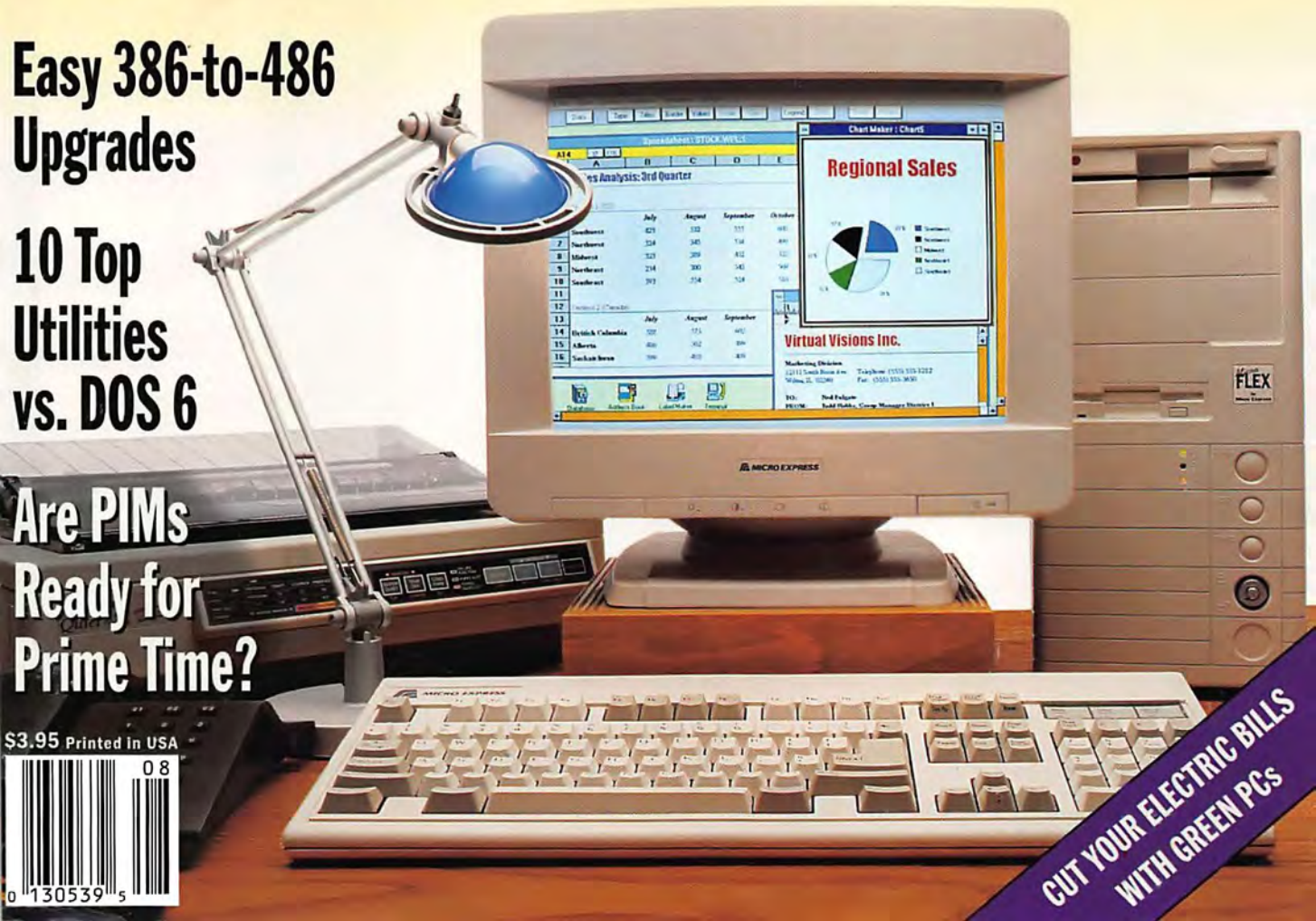
Instant Office

27 Complete 486 Systems From $1900, Including Printer, Software, and More

Easy 386-to-486 Upgrades

10 Top Utilities vs. DOS 6

Are PIMs Ready for Prime Time?



CUT YOUR ELECTRIC BILLS WITH GREEN PCs

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Pardon us, but would you mind if we sat right here on your desk, a mere two feet away from you, for the next few thousand hours?

Easy to live with. Easier to afford.

The new NEC MultiSync FG "e" monitors.

We realize that's a lot to ask. And we kept that firmly in mind when we created our new MultiSync® FGe™ monitors.

More monitor for less money.

For less than you'd expect, they give you everything you ever wanted in a monitor.

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Thank you for inviting us onto your desktop.

Because ⬆ is the way you want to go.

NEC

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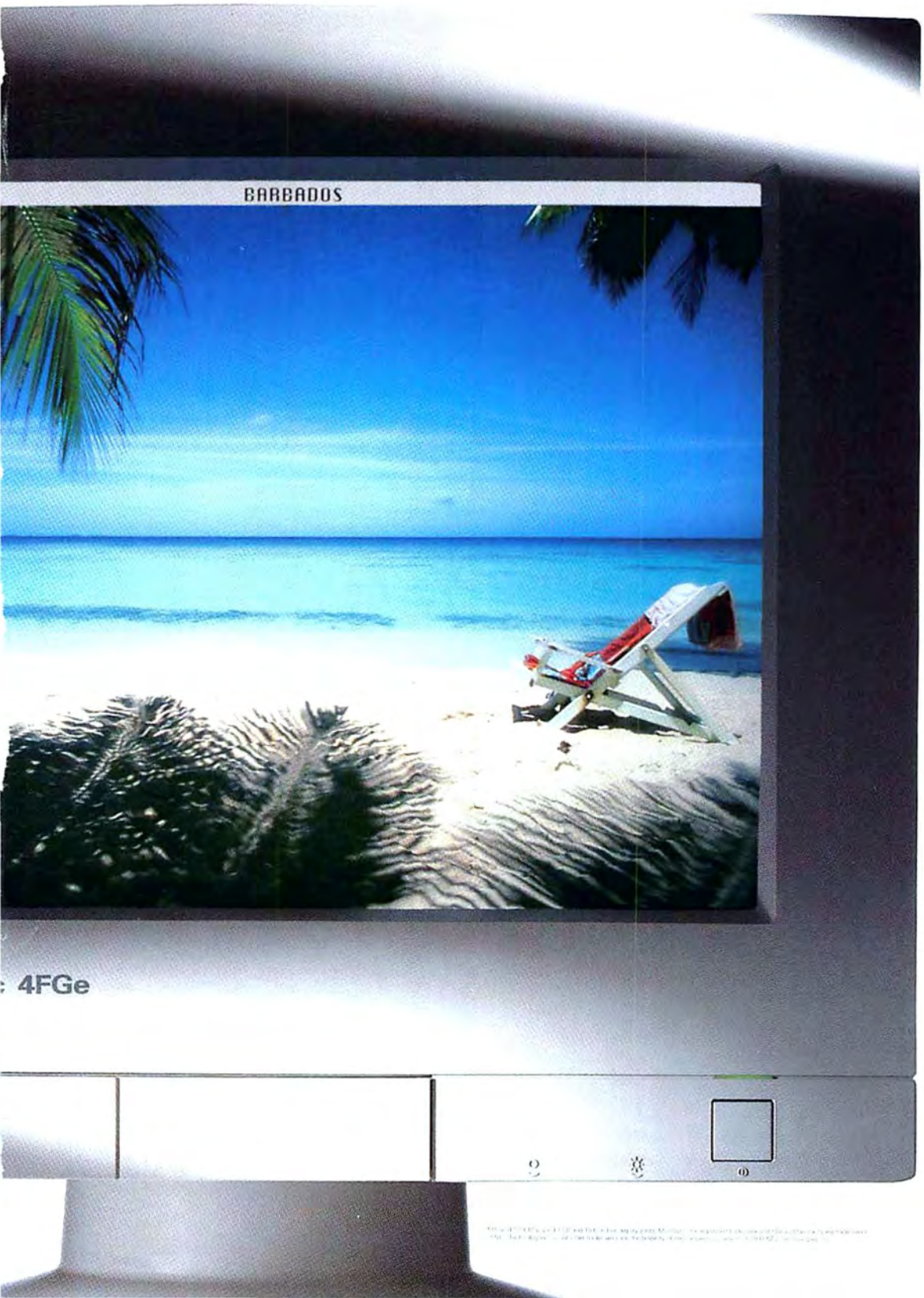
But it'll be okay.



In our new FGe series, the "e" is for ergonomics. And economics. They're easy to use, easy to live with– the way NEC monitors have always been. They're also easier to afford.

it'll
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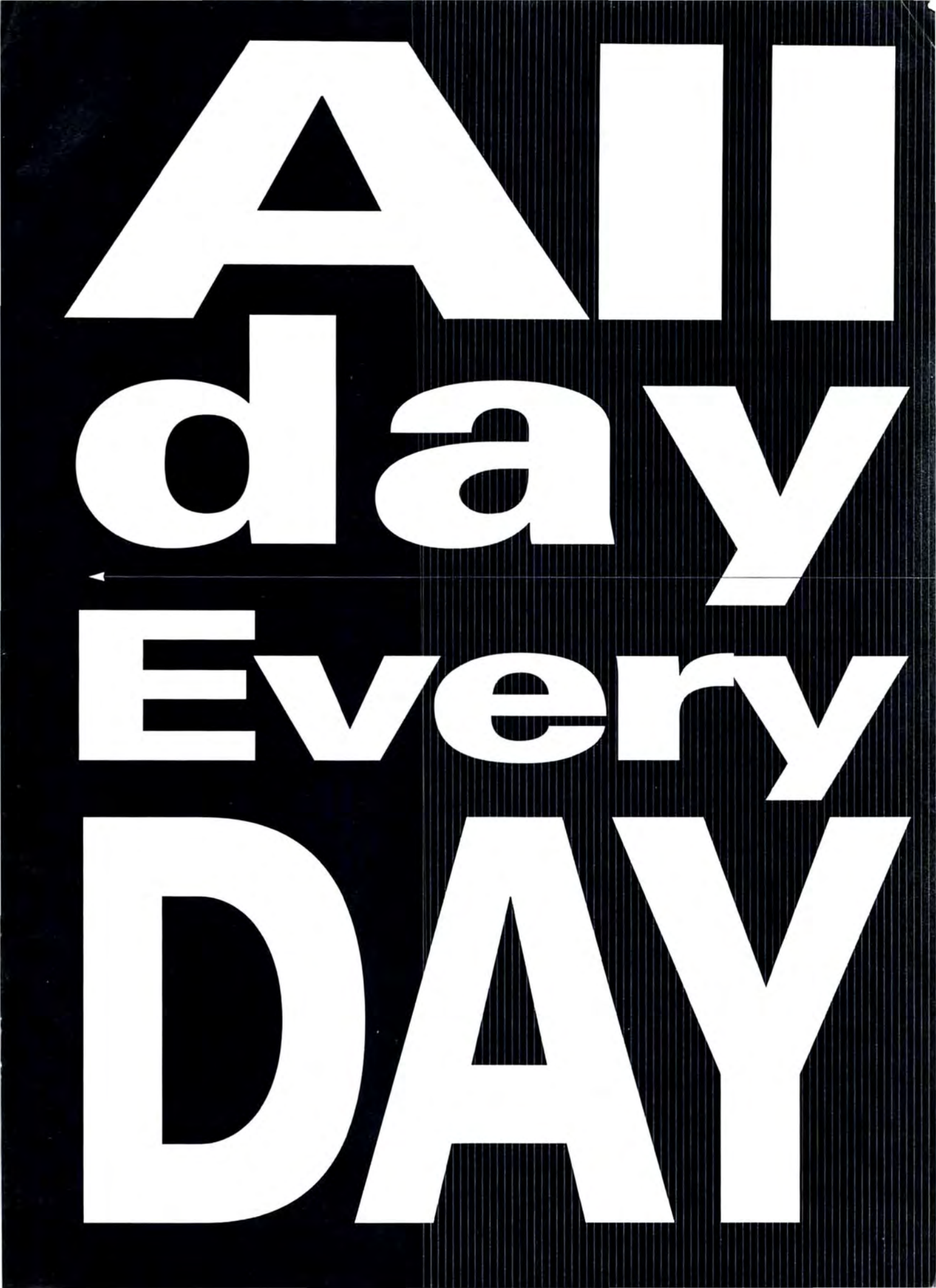
in your
face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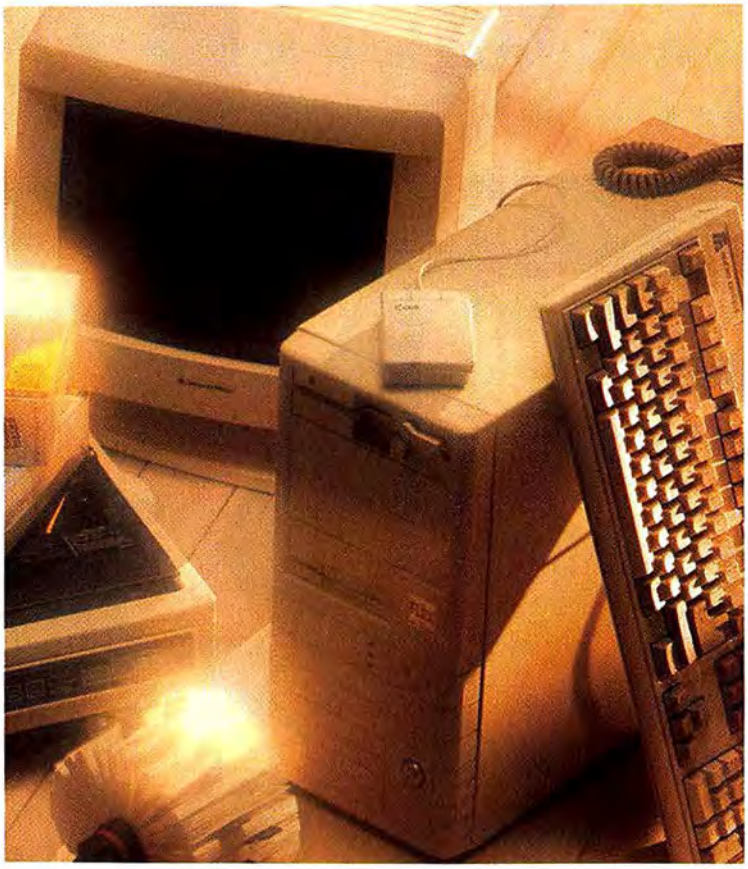
PC WORLD



Cover Story

Instant Office: Best Buys From $1900

124 For outfitting an office fast and affordably, bundled systems can be just the ticket. We choose the top 486 systems bundled with everything you'll need: a printer, essential business software, and more.

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128 Amax 486DX2/50 VESAmax
129 AST Advantage Plus 486DX/33
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Cover photograph by Robert Cardin

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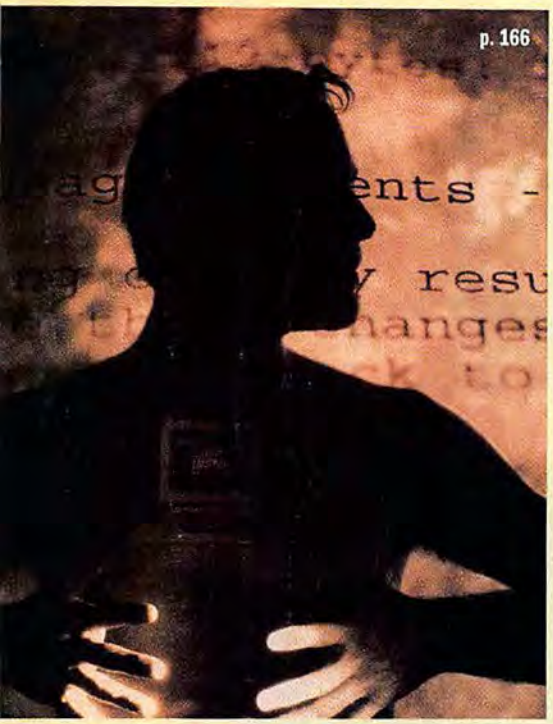
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The new Windows personal information managers claim to be the next-best thing to a personal assistant. Are they up to the job? To find out, we put nine programs through the stresses of an all-too-average business day.

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Are You a Computer Genius?

☑ Yes ☐ No

Of course you are, when you make computer purchase decisions based on real differences between competing brands. If you're already a ZEOS® customer, you're already a Computer Genius. If you're not, take this brief test and see if you qualify!

Please answer YES or NO to each of these Questions:

☐ Yes ☐ No Do you want a system that runs Windows *so fast* it "blows all competitors away—in some cases performing more than ten times as fast as competitors" *(PC Magazine)*...?

☐ Yes ☐ No Would you like to have incredible VL-Local Bus performance—not only in video, but also in a hard drive interface that moves your data up to *125% faster* than regular IDE interfaces?

☐ Yes ☐ No Is surge suppression important to you, and shouldn't it be built right in so you don't have to worry about it?

☐ Yes ☐ No Do these reviewer comments sound good to you?
"A fast, beautifully designed PC with an upgrade path that just won't quit" (PC World) "An array of features to make a user's mouth water" (PC Magazine) "[this system] grabs Windows by the throat and flings it across the screen" (PC Sources)...?

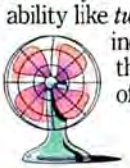
☐ Yes ☐ No Would you like to buy from a company that recently received *PC Magazine's* Readers' Choice award for outstanding Service and Reliability—for both desktop and laptop systems?

Prove it to Yourself.

☐ Yes ☐ No Would you like a system that's *easily upgradable to any Intel CPU*—including the future OverDrive Processor based on Pentium architecture... no matter what CPU you start with?

☐ Yes ☐ No Do you want *even more* upgradability ...such as *Flash* BIOS for easy BIOS upgradability...a low cost built-in SCSI option...and *room* to expand as well, like eight expansion slots and plenty of drive bays?

☐ Yes ☐ No Should your computer have built-in reliability like *two cooling fans*—which are increasingly important given the higher-performance CPUs of today and tomorrow?



☐ Yes ☐ No Even though most vendors offer only part-time technical support, do you deserve to get toll-free help *whenever* you need it 24 hours a day, 365 days a year?

☐ Yes ☐ No Would you also like to receive, *absolutely free of charge* with the purchase of your new computer, your choice of some great Lotus Windows applications, including Lotus Improv, called the most "revolutionary and accessible" spreadsheet ever?

☐ Yes ☐ No *Finally*, are you ready to make the switch to the best PC systems in the industry, based on *price, performance, quality* and *support?*

SCORE BIG INSIDE!

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Congratulations! If you answered *Yes* to at least half the questions you're a bona fide *Computer Genius.* You know that there are *real and meaningful* differences between ZEOS systems and those offered by the others.

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And your video will be fast too. Actually, not just fast, but *real fast.* When you go right to the top, Dell and Gateway don't even come close. There's lots of other

Smart Moves & Grea

Packages 2, 3 & 4 come with Microsoft's new ergonomic Mouse—version

SYSTEM HIGHLIGHTS	PACKAGE 1	PACKAGE 2	PACKAGE 3	PACKAGE 4
NEW: Bigger Drives, Lower Prices!	■ ZIF socket upgradability to Pentium OverDrive CPU ■ 2MB high-speed RAM ■ 107MB local bus IDE hard drive with 32K cache ■ Windows accelerated VL local bus video with 1MB RAM ■ Crisp 14" ZEOS color SVGA .28 NI monitor ■ Your choice of floppy drives ■ MS DOS 6.0 plus Enhanced Tools	■ ZIF socket upgradability to Pentium OverDrive CPU ■ 4MB high-speed RAM ■ 214MB local bus IDE hard drive with 128K cache ■ Windows accelerated VL local bus video with 1MB RAM ■ Crisp 14" ZEOS color SVGA .28 NI monitor ■ Both 1.2MB and 1.44MB floppy drives ■ MS DOS 6.0, Tools, plus Windows & Mouse, plus your choice of Lotus Windows applications	■ ZIF socket upgradability to Pentium OverDrive CPU ■ 8MB high-speed RAM ■ **426MB,** 13ms local bus IDE hard drive with 128K cache ■ Windows accelerated VL local bus video with 1MB RAM ■ Crisp 14" ZEOS color SVGA .28 NI monitor ■ Both 1.2MB and 1.44MB floppy drives ■ MS DOS 6.0, Tools, plus Windows & Mouse, plus your choice of Lotus Windows applications	■ ZIF socket upgradability to Pentium OverDrive CPU ■ 16MB high-speed RAM ■ **540MB,** 12ms local bus IDE hard drive with 256K cache ■ Windows accelerated VL local bus video with 1MB RAM ■ Crisp 14" ZEOS color SVGA .28 NI monitor ■ Both 1.2MB and 1.44MB floppy drives ■ MS DOS 6.0, Tools, plus Windows & Mouse, plus your choice of Lotus Windows applications
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486DX-33	**$1695**	**$1995**	**$2295**	**$2795**
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extras they don't have either—like our inexpensive on-board SCSI option for only $49.

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To try and compare the ZEOS Freestyle to any other notebook is next to impossible. Because nothing else has all its features. And even with all these great features, nobody can match its incredible price. And now, with your choice of a 386SL or 486SL CPU, it would seem the ZEOS Freestyle is the best of all worlds. It is!

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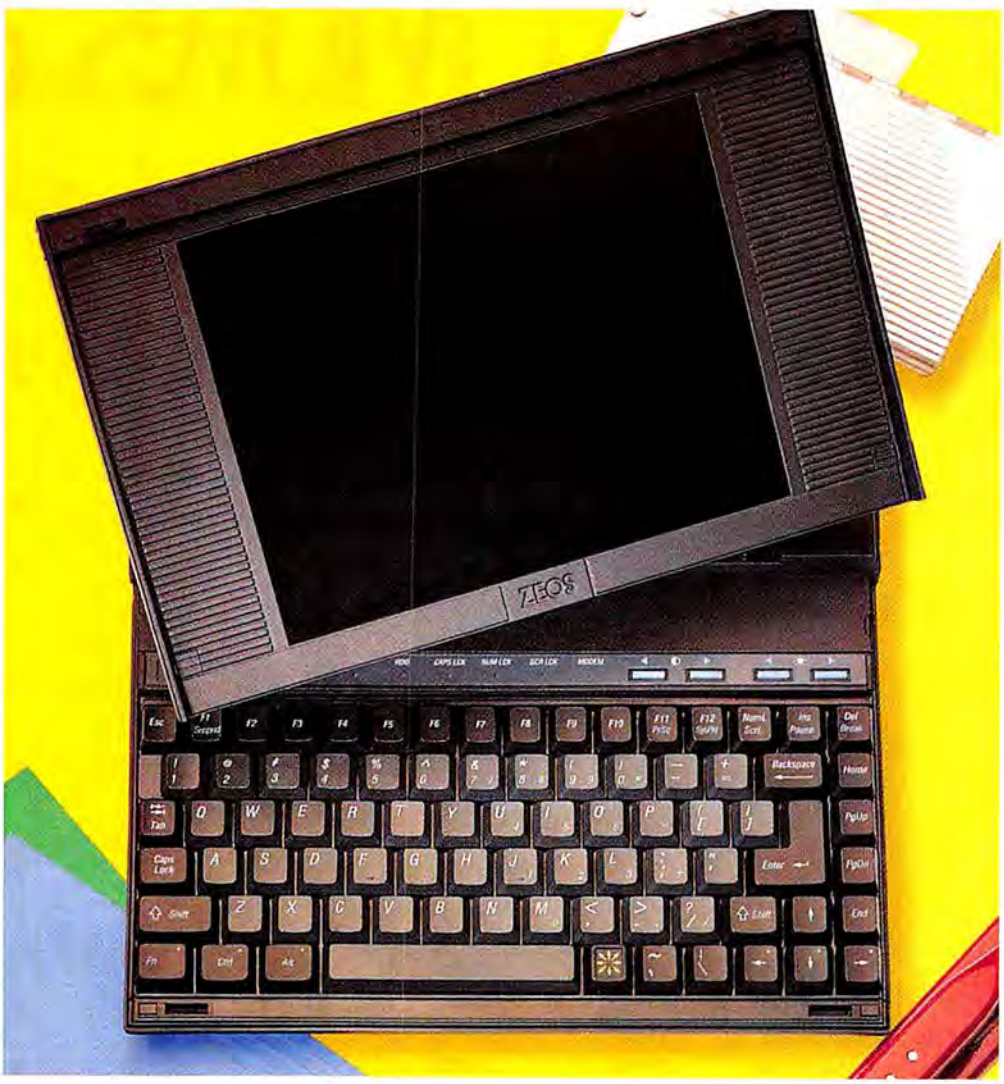
intel inside



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Let's talk about power for a moment. Both Freestyle options include the smart and powerful Intel 25MHz SL CPU, memory up to 20MB and hard drive up to 180MB. The 486SL version also gives you a built-in math coprocessor and more advanced power management. Either one might well replace a desktop for many users. Plus, at only 5.6 lbs. with a built-in soft carrying handle, your ZEOS Freestyle is one of the most *portable* notebooks around!

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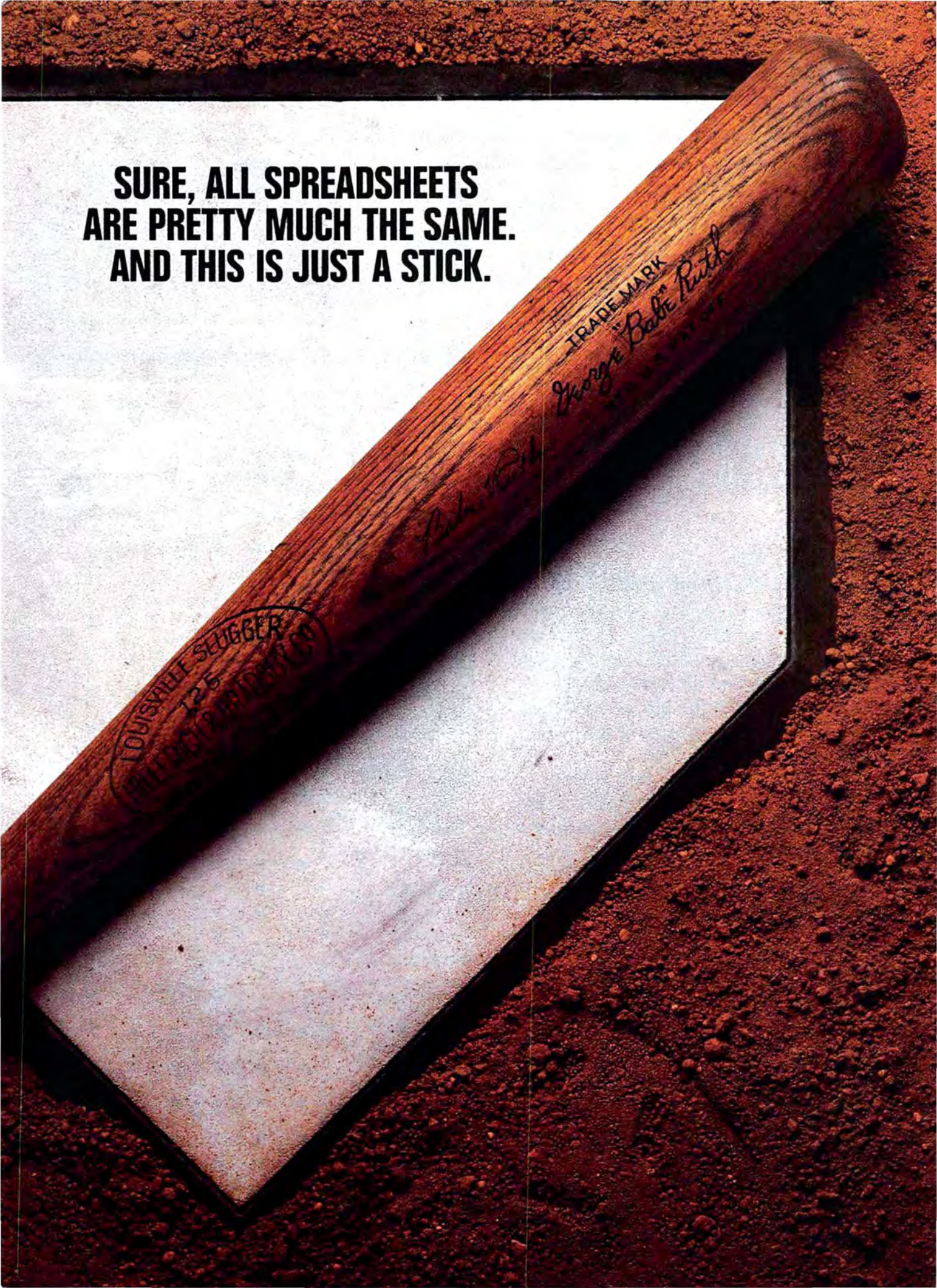
Intel 386SL CPU	■	■	■			
Intel 486SL CPU				■	■	■
25MHz Processor Speed	■	■	■	■	■	■
Memory (expandable to 20MB)	2MB	6MB	10MB	4MB	4MB	8MB
Hard drive (MB) (expandable to 180MB)	80MB	120MB	180MB	80MB	120MB	180MB
Uses 3.3v technology				■	■	■
3.5" 1.44MB floppy drive	■	■	■	■	■	■
VGA 9.5" backlit display; tilt/swivel base. 640x480, up to 64 shades of gray	■	■	■	■	■	■
Video RAM	256K	256K	256K	512K	512K	512K
Simultaneous video with external color monitor	■	■	■	■	■	■
NiCad battery; power up to 3 hours	■	■	■	■	■	■
Full power-saving features including built-in Suspend/Resume	■	■	■	■	■	■
81-key keyboard	■	■	■	■	■	■
Full-size inverted "T" arrow keys	■	■	■	■	■	■
Embedded numeric keypad	■	■	■	■	■	■
Easy-to-use built-in mouse key	■	■	■	■	■	■
Serial, parallel and SVGA ports; port for external keyboard or numeric keypad	■	■	■	■	■	■
Flash ROM for easy BIOS upgrades	■	■	■	■	■	■
DOS 6.0 with Enhanced Tools	■	■	■	■	■	■
Windows 3.1		■	■		■	■
Carrying case		■	■		■	■
Extra battery			■			■
External charging stand			■			■
Internal 9600/2400 baud send/receive fax modem			■			■
24-Hour Toll-Free Technical Support	■	■	■	■	■	■
30-Day Money-Back Guarantee	■	■	■	■	■	■
One Year Limited Warranty	■	■	■	■	■	■
Complete Customer Satisfaction Package	■	■	■	■	■	■
FCC Class B approved	■	■	■	■	■	■


SURE, ALL SPREADSHEETS
ARE PRETTY MUCH THE SAME.
AND THIS IS JUST A STICK.
TRADE MARK
"Babe" Ruth
LOUISVILLE SLUGGER
125

In this my-feature-is-better-than-your-feature world of spreadsheets, one could be convinced there's not an appreciable difference among them.

But, as with any tool, there's always one that's best. One that emerges as the standard by which others are measured.

In the competitive world of spreadsheets, that one is Microsoft® Excel for Windows™.

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And we developed a way to instantly make eye-popping charts and graphs, even if you've never made them before. We named it, appropriately, ChartWizard.

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We tested our improvements. In the field. And in the lab. With experts. As well as with inexperienced spreadsheet users.

To date, we've invested over 400 cumulative years of development and testing to create something truly remarkable: a spreadsheet that actually works the way you do.

Which brings us to our final point, for which we'll refer to that unassuming piece of wood on the other page.

Maybe the Babe could have hit a home run with a rolled-up newspaper. Still, he used the tool that was best for the job. At the risk of sounding presumptuous, don't you think you should too?

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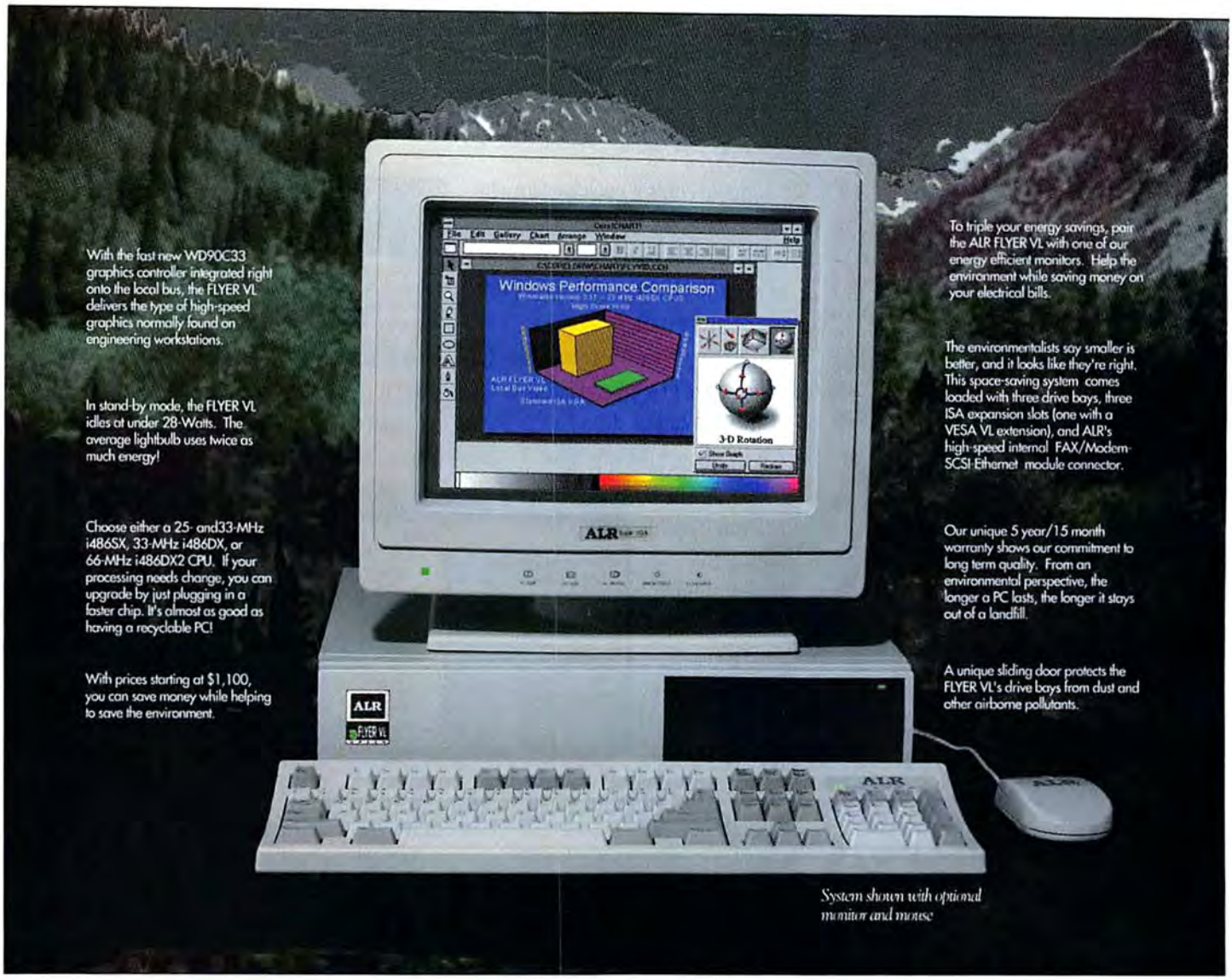

System shown with optional monitor and mouse

Earth, Wind & FLYER VL.

After all these years, designing high performance PCs is second nature to ALR's engineers. So when we decided we really wanted to give them a challenge, we asked them to build a system that was not only fast, but energy efficient and environmentally friendly to boot. In the time that it might have taken lesser engineers to argue that such a goal was impossible, our performance experts designed the ALR FLYER VL, an environmentally friendly PC that makes no excuses when it comes to performance.

With integrated local bus graphics and optimized i486™ processing, the ALR FLYER VL has the type of processing power that makes other PCs look like they're running in slow motion. You should see the way it crunches numbers and flies through complex graphics applications. An advanced single chip upgrade path makes increasing power as easy as plugging in a new processor. The FLYER VL even includes an industry standard VESA VL bus slot, providing access to dozens of high-speed 32-bit enhancement products.

energy EPA POLLUTION PREVENTER

Yet this compact little system is more than just a space saver and a time saver; it's also an energy saver. The FLYER VL comes equipped with an array of automatic power management features, so you don't waste energy powering unused components. Compared to most older PCs, the result can be a dramatic 50% drop in electrical consumption (even more if you're one of those people who leave their PCs on overnight). This efficient design also produces less heat, cutting down the need for air conditioning. In even a small company, these energy savings can translate into hundreds of dollars saved in power bills each year. As businesses become more energy efficient, power plants won't have to burn as much coal or oil to produce electricity. The net result is bluer skies for you and me. And a better future for our children.

intel inside

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The first remote software that isn't designed to try your patience.

Remote control packages love to talk about how fast they are.

But why do they make you stop all your work and sit idle every time you transfer a file?

And why do two-way transfers between your PCs take twice as long as they should?

Why not get Here & There?

Here & There™ lets you transfer files in the background while you stay productive in the foreground.

And lets you do it on both the host and the remote PC—something nobody else does.

It also performs simultaneous, bidirectional file transfers to cut your transfer times—and your phone bills—in half.

And that's only half the story.

Talk about fast data transfers! Here & There sends and receives data simultaneously to cut transfer times—and phone bills—in half.

Our unique Virtual Drives™ not only eliminate slow Windows redraw, they also let you access and update files on a distant PC—even when somebody is using it.

Others make the claim, but only Here & There gives you true background operation so you can stay productive on both your host and remote PC during file transfers.

Unlike other packages, Here & There doesn't make you decide in advance which PC will be the host and which will be the remote.

Instead, you get one module that lets you use *either* PC as the host. And either as the remote.

You can even switch modes in the middle of a session. Without having to buy two copies of the software.

Speaking of switching, there's no better time than right now.

So check out the offer below.

Then pick up the phone and dial 800-388-0362.

We won't keep you waiting.

Here & There Is Beyond Compare

	Here & There	pcAnywhere	Carbon Copy	Close-Up	Reach Out
Single Program Serves Both Host & Remote PCs	Yes	No	No	No	No
Simultaneous Bidirectional File Transfers	Yes	No	No	No	No
Real-Time Multi-Tasking	Yes	No	No	No	No
File-& DOS-Level Security	Yes	No	No	No	No
Virtual Drives	Yes	No	No	No	†
Controls DOS Sessions	Yes	Yes	Yes	Yes	Yes
Controls Windows Sessions	Yes	Yes	†	Yes	Yes
Suggested List Price	$149	$199	$199	$199	$179

†Requires a separate version of the program.

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PC World Test Center: Bringing Reality to Reviews

Since moving into our offices in November 1992, the PC World Test Center has made a science of testing products to extract information of maximum value to you, the *PC World* reader. Whether by surveying readers about their needs or recruiting *PC World* subscribers to carry out trials, the Test Center has focused on developing and running real-world tests based on off-the-shelf business applications. After all, what good is a test that measures something you will never do?

In ten busy months, the Test Center has tested 226 PCs, 32 business applications, 20 laser printers, 18 monitors, 14 hard disks, and 18 disk caching products. In addition, the Test Center has evaluated the relative performance of 7 Intel and Intel-compatible CPUs to give you clear, relevant buying information; investigated the benefits of VESA local bus graphics; performed pioneering usability tests of notebook computers in an airplane simulator; laid bare the pros and cons of upgrading a system with motherboards or processors or replacing the old system with a new one; and attacked the problem of developing application-based testing for new processors like Pentium, the DEC Alpha, and the MIPS R4000 and R4400, running both Windows and Windows NT programs.

All told, the Test Center staff plays a leading role in *PC World*'s mission to provide the most reliable and well-rounded advice on system purchases available today. We'd like to round out your picture of this dedicated group:

Director Greg Smith joined us with an outstanding background in developing tests for *InfoWorld*'s test center, where he acquired a strong foundation in application-based testing and formulated new ways of maximizing staff productivity in a testing operation. He was instrumental in developing the BAPCo (Business Application Performance Corporation) benchmarks, which form part of *PC World*'s system test suite. When Greg isn't marshalling the staff that evaluates scores of computer products every month, he follows local politics and continues his search for an excuse to travel to Paris.

PC World Test Center staff, clockwise from center front: Greg Smith, Ulrike Diehlmann, Susan Silvius, Dean Andrews, Dawn Furseth, Tom Grubb

Tom Grubb joined our hardy band after helping to launch ZD Labs. His substantial technical expertise and years as manager of end-user computing for several large corporations help hone the Test Center's focus on the needs of our management readers. Since joining *PC World*, Tom has spearheaded test development for everything from hard disk caches to spreadsheets, including the usability tests of notebook PCs that appeared in our July special report on mobile computing. Tom unwinds by trying to defy the laws of physics on his mountain bike or pursuing his favorite hobby: brewing beer.

Like Greg Smith, Dean Andrews was a key player at *InfoWorld*'s test center. He has led the effort to develop meaningful benchmarks for systems running Windows NT—a difficult task, because NT is arriving a few months ahead of new versions of major business applications that exploit it. Testing NT systems is a particular challenge for a staff committed to basing benchmarks on real applications that our readers can buy and use. Dean enjoys screenwriting and exploring San Francisco.

Susan Silvius joined *PC World* as an associate technical editor in 1991 and acquired expertise in product testing at the *InfoWorld* test center. During 1991 and 1992, Susan developed such proficiency in testing and analyzing system performance, she seemed a test center all by herself. She continues to play a leading role in testing PCs, contributing information vital to sound purchase decisions. When she's not putting systems through their paces, Susan leads tours of national parks, looks after her rabbit, and writes fiction.

Ulrike Diehlmann joins Susan as a pivotal member of our PC testing team. Ulrike has spent years supporting and developing database applications, including a nationwide credit card billing system for gas stations and cellular call tracking and billing. Ulrike's recreational pursuits include programming (!), skiing, and traveling.

Dawn Furseth is the Test Center's communications and tracking hub. We count on her to tell us when we'll have a quorum for each month's system review, to keep 100 or so machines in the testing pipeline at all times, and to route them to photo shoots and back to manufacturers. Dawn enjoys adding exotic marine life to her aquariums and improving her accomplished golf game.

Phil Lemmons

Phil Lemmons, Editor in Chief

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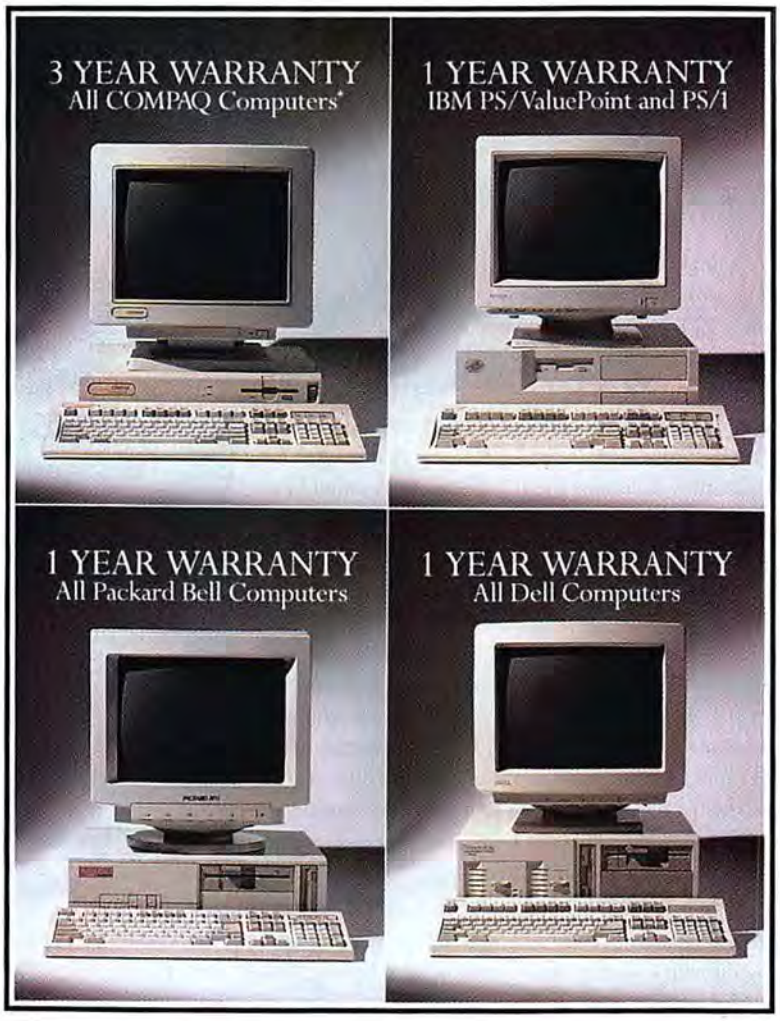

There's a common misconception today that computers are all alike. That they're made from the same components. That a box is a box is a box.

Well, here at Compaq, we have over 9,000 employees who could tell you why all PCs are not the same.

That there are important differences in quality. And reliability. And compatibility.

That, in the end, COMPAQ computers are designed to help you get more done with fewer problems.

The COMPAQ ProLinea, and all our affordable computers, feature high-performance processors from Intel.

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LET'S ALL GIVE EXCEL A BIG HAND.

NOW, INTRODU
YOU'VE BEEN

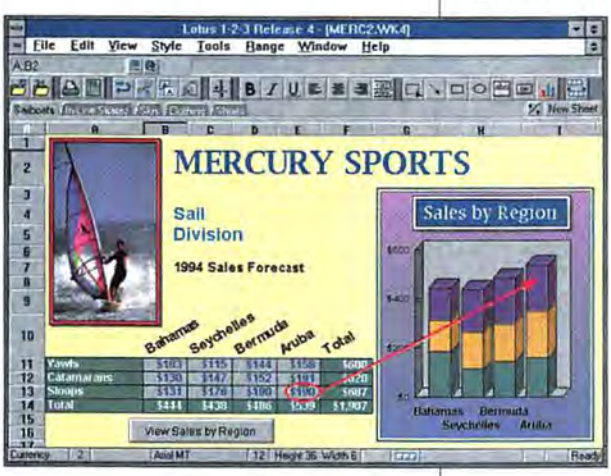
LOTUS INTRODUCES 1-2-3 RELEASE 4 FOR WINDOWS.

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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CING THE ACT WAITING FOR.

ONE-STEP CHARTING.

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.

NAVIGATE THROUGH 3 DIMENSIONS.

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.

12 | Height 14 Width 9

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.

For example, to modify or create a query, you don't generate criteria and output ranges with cryptic commands. Just bring up the Query Dialog Box and select the fields and records by name. Changing your query is as simple as drag-and-drop.

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

THE FIRST SPREADSHEET FOR WORKGROUPS.

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.

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.

Lotus 1-2-3 Release 4 is here. And it's the smoothest path from DOS to Windows.™ Plus, it's network ready. So one box is all it takes to upgrade all your users, whether they're working off a server or their own PC.

Call 1-800-TRADE UP, ext. 8968* for a free demo disk or to order your upgrade for just $119 direct from Lotus. Or visit your Lotus Authorized Reseller.

Lotus 1-2-3 Release 4
SPREADSHEET FOR WINDOWS

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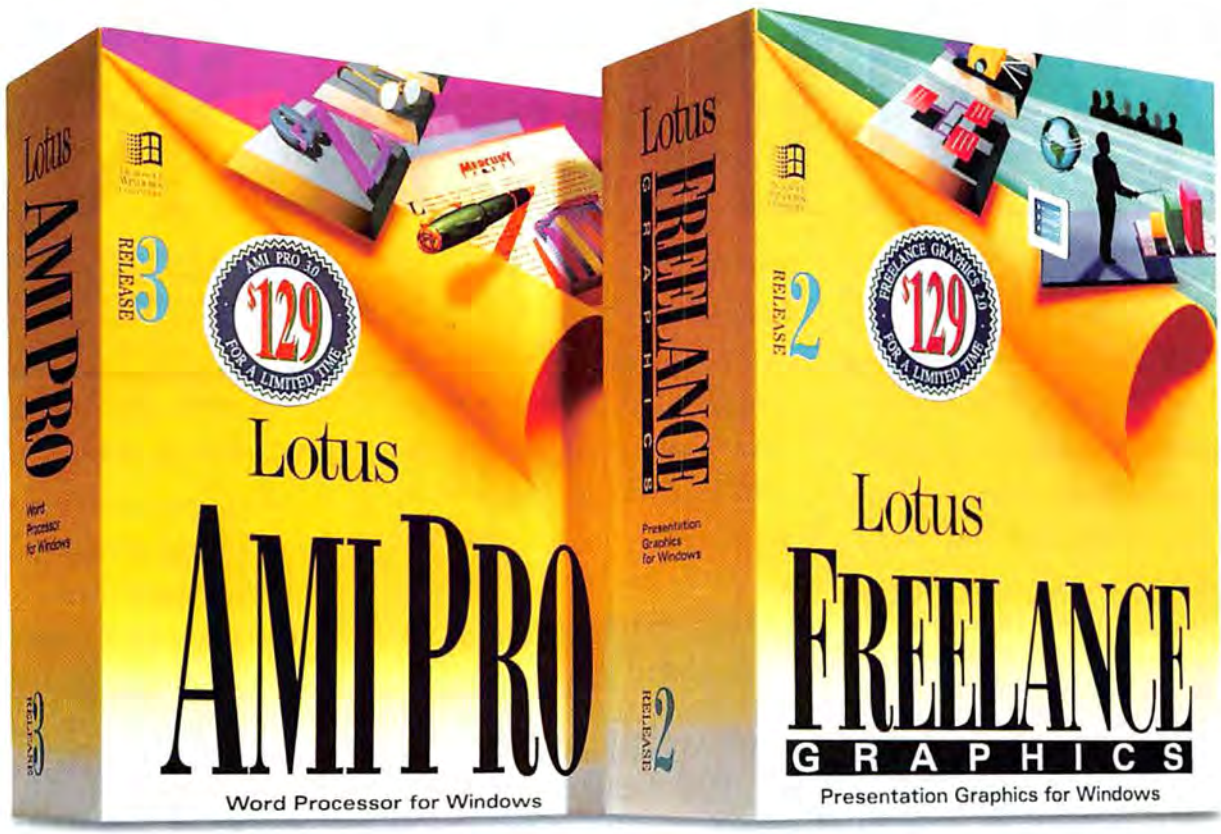
1-2-3 IS BACK. AND



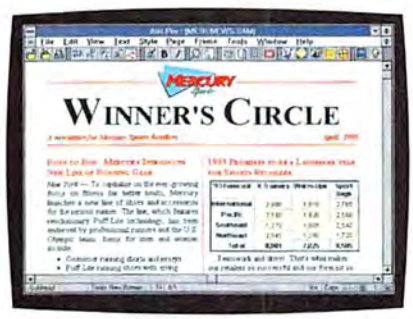
SYNERGIZE AND SAVE

For a limited time, when you get Lotus® 1-2-3® Release 4, you'll save on the industry's top-rated desktop applications. Applications designed to work with and optimize the power of 1-2-3.

In other words, you'll save money, time and work. And if you're just climbing into Windows, Lotus makes the whole transition a lot easier.

BUY 1-2-3 RELEASE 4 AND GET AMI PRO 3.0 FOR $129*

Ami Pro® 3.0 has been rated the number one word processor by virtually every critic and reviewer. Eclipsing both Microsoft® Word and WordPerfect.® If



Ami Pro is rated best word processor. Its tight integration with 1-2-3 Release 4 makes it even better.

you're wondering why, there's no time like the present to find out.

Simply put, Ami Pro is a faster, easier, friendlier word processor to use. It produces such great-looking documents with so little effort, most people never even bother to open the manual.

Plus Ami Pro has the tightest integration with 1-2-3 Release 4. Features like shared Dictionaries, SmartIcons™ and a Live Status Bar make Ami Pro the best choice in word processors for 1-2-3 users.

BUY 1-2-3 RELEASE 4 AND GET FREELANCE GRAPHICS 2.0 FOR $129*

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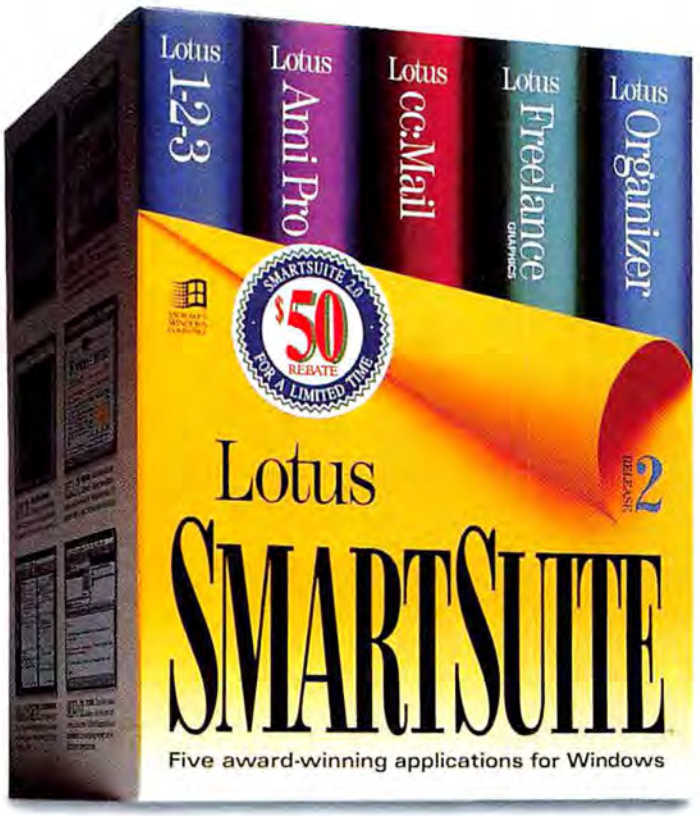
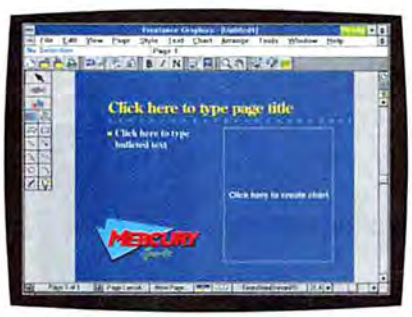


presentation with Freelance Graphics than with Microsoft Powerpoint.*

Like Ami Pro, Freelance offers Working Together™ capabilities with 1-2-3 and other Lotus applications that open up a whole new world of ease and usability. You can simply import a graph from 1-2-3 and it will arrive in your Freelance presentation, fully editable.



Freelance Graphics 2.0 is the easiest presentation software. With the new 1-2-3, if you update the spreadsheet, the presentation updates automatically.

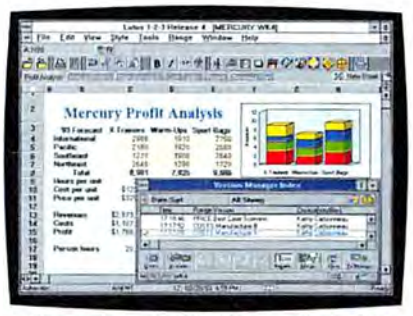
SAVE $50 ON SMARTSUITE 2.0

Upgrade from any Lotus or competitive product and get a $50 rebate coupon from Lotus in the SmartSuite 2.0 box.**

Taken one at a time, the five applications in Lotus SmartSuite™ are a Windows™ desktop All-Star team. The new 1-2-3 Release 4 spreadsheet. Ami Pro 3.0 word processor. Freelance Graphics 2.0 presentation graphics software. cc:Mail,™ far and away the industry's top e-mail system. And Lotus Organizer,™ the multi-award-winning desktop personal information manager.

Others talk about application integration, but compared to SmartSuite, it's all token.

Together, on one desktop, Lotus SmartSuite is unarguably the most powerful, most integrated suite in the industry. Once you're comfortable with one application, like 1-2-3, you're instantly at home in all five. More impressive, SmartSuite now ships with



Once you're comfortable with one application, like 1-2-3, the common look and feel makes you right at home with all five.

the Working Together Bonus Pack, a unique set of features designed to dramatically enhance the integration between Lotus Windows applications. This makes moving from application to application so quick and easy, and using functions from one application while working in another so natural, it feels like the entire suite is one piece of software. And there's absolutely no reason to settle for anything less.

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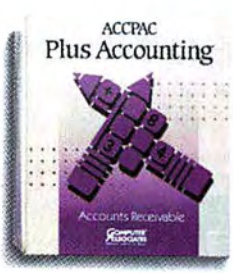

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Circle 78 on reader service card

DOS 6.0 Headaches, Government on Our Hands, Disks vs. Books

The DOS 6.0 Debacle

Your May cover trumpeted "DOS 6: Why You Have To Have It." I eagerly turned to the cover story to see if I really need this upgrade. There I found an ad for DOS 6.0 masquerading as an article by Van Wolverton. The article extols the virtues of DOS 6.0—with a bit of honesty creeping in at the end, where Wolverton admits that "you probably won't miss anything important by sticking with DOS 5.0." Then I noticed that Wolverton is the author of a Microsoft Press book on DOS.

How about an objective article by a writer who doesn't get royalties from the sale of Microsoft Press books? Other magazines are pointing out that DOS 6.0 is little more than DOS 5.0 with a handful of crippled utilities.

J. Brian Stockmar, Denver

DOS 6.0 Ate My Homework

I'm 12 years old. I bought DOS 6.0 because I heard it would enhance my PC and make it run better.

I installed DOS 6.0 and used DoubleSpace, which was supposed to double the size of my hard drive. It did, for a day. The next day it crashed. It left my computer with an inaccessible archive. I was unable to print out my homework.

I believe there are serious mistakes and flaws in this program that were not worked out prior to putting it on the market. I don't think that's ethical.

Jeff Schwaber, Philadelphia

Not the Only DOS

Again this reader has proof concerning the amount of monetary influence Microsoft has with *PC World*. I refer, of course, to your "review" of DOS 6.0 in the May issue, where Van Wolverton obscenely falls over its virtues.

Wolverton writes, "For the first time, DOS is able to compress files (increasing hard disk capacity), defragment files (to speed things up)...." Excuse me, but Digital Research's DR DOS 6.0, released last year, includes both these capabilities. The SuperStor compression utility is standard issue with DR DOS 6.0. Digital Research also bundles the defragmenting utility DiskOpt, which is optimized for use with SuperStor. Where was Wolverton when DR DOS was released?

Ken Simmons, Auburn, Washington

Run for Your Life

Your blazing cover, "DOS 6: Why You Have To Have It," should have read "DOS 6: Run for Your Life." Had Van Wolverton waited 20 minutes and checked out the MS-DOS forum on CompuServe, he would have found hundreds of dismayed, confused, and terrified upgraders who've had major problems with version 6.0.

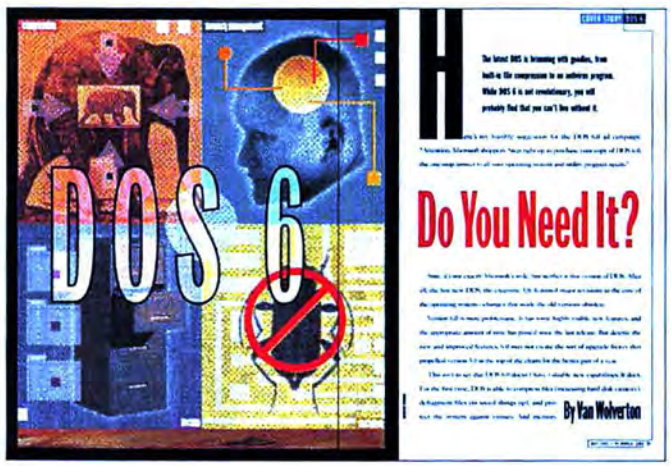
For one thing, the backup utility totally ignores tape drives. Microsoft's response: "Not many people have tape drives." Even worse, DoubleSpace left my PC unable to boot and my drive trashed! To be fair, the core of DOS remains stable, and a few select tools, such as interactive boot, are certainly worth having.

Rob Feiner, Yonkers, New York

Joy of Six?

I just purchased the May issue and can't believe you would write such a glowing description of DOS Sicks without a mention of the hundreds of problems. Your cover should have read "Norton 7: Why You Need It If You Are Going To Use DOS 6." I experienced hang-ups, lost files, weird warm boots, hundreds of cross-indexed files, lost clusters, and so on. The final blow was a message when I was using Microsoft Defragmenter to the effect that my drive was so badly fragmented that I should use a disk repair program. Norton 6.0 would not do the job, so I bought Norton 7.0. I predict this will be a disaster for Microsoft. Please tell it like it is next time.

Fred Stinton, via CompuServe



Author's response: I have nothing but sympathy for those who upgraded to DOS 6.0 and experienced the severe problems described in these letters. Computers are supposed to make our work easier and more productive, not harder and fruitless. I'm thankful that I had no such problems. I started using prerelease versions of DOS 6.0 in November of 1992 and have had no problems since late January, several versions before release. I'm using an IBM PS/2 Model 80 (a 16-MHz 386) and two Gateway 2000 systems (a 386-33 and a 486-33); I installed LANtastic to network the two Gateway machines before the final version of DOS 6.0 was released, and DOS posed no problems.

When I review a product, I can write only of my own experiences. If you'll read the article closely (and realize that I didn't write the cover copy), you'll see that I don't quite fall over myself praising DOS 6.0, but in general I believe it's worth the money (especially at a $40 street price).

For those who don't know how book

GORDON STUDER

contracts work: No matter what I do or say, Microsoft must pay my royalties. So I have nothing to fear from misbehaving. Besides, I haven't signed a contract with Microsoft since 1986; Random House is publishing my most recent books. —*Van Wolverton*

Get Government off These Pages

I'm chagrined at your advocacy of "federal funding of a large-scale study" as expressed in *In This Issue* and your open letter to Hillary Rodham Clinton in *Consumer Watch* in the May issue. You state that "decades of experimentation in the marketplace will eventually reveal satisfactory designs...." I am nonplussed at your dismissal of the power of the market to find a solution, particularly when pioneering attempts in this direction are covered pages later in the same issue.

However, I am incensed at your using my subscriber dollars to advocate the use of my tax dollars for a purpose that I do not agree with and that you have no way of knowing if any of your readership agrees with. Correspondence such as the open letter to the White House carries the implied imprimatur of your readership. To the extent that you have no reason to believe that your readership endorses your position, you weaken your credibility with your subscribers and your addressees.

David Hecht, via PC World Online

Editor's response: Several readers objected to our call to the federal government to take a more active role in investigating the epidemic of repetitive strain injuries (RSI) among computer users, arguing that the magazine should present information, not advocate particular positions. In fact, *PC World* has often been an advocate for its readers—whether by calling on law enforcement to crack down on fraudulent businesses or by bringing to light the practice of rewrapping returned software for resale. It's hard to imagine a more compelling case for advocacy than the disabling of thousands of computer users—an epidemic that government, industry, and the medical community all need to address. —*Roberta Furger*

Victorian Attitudes

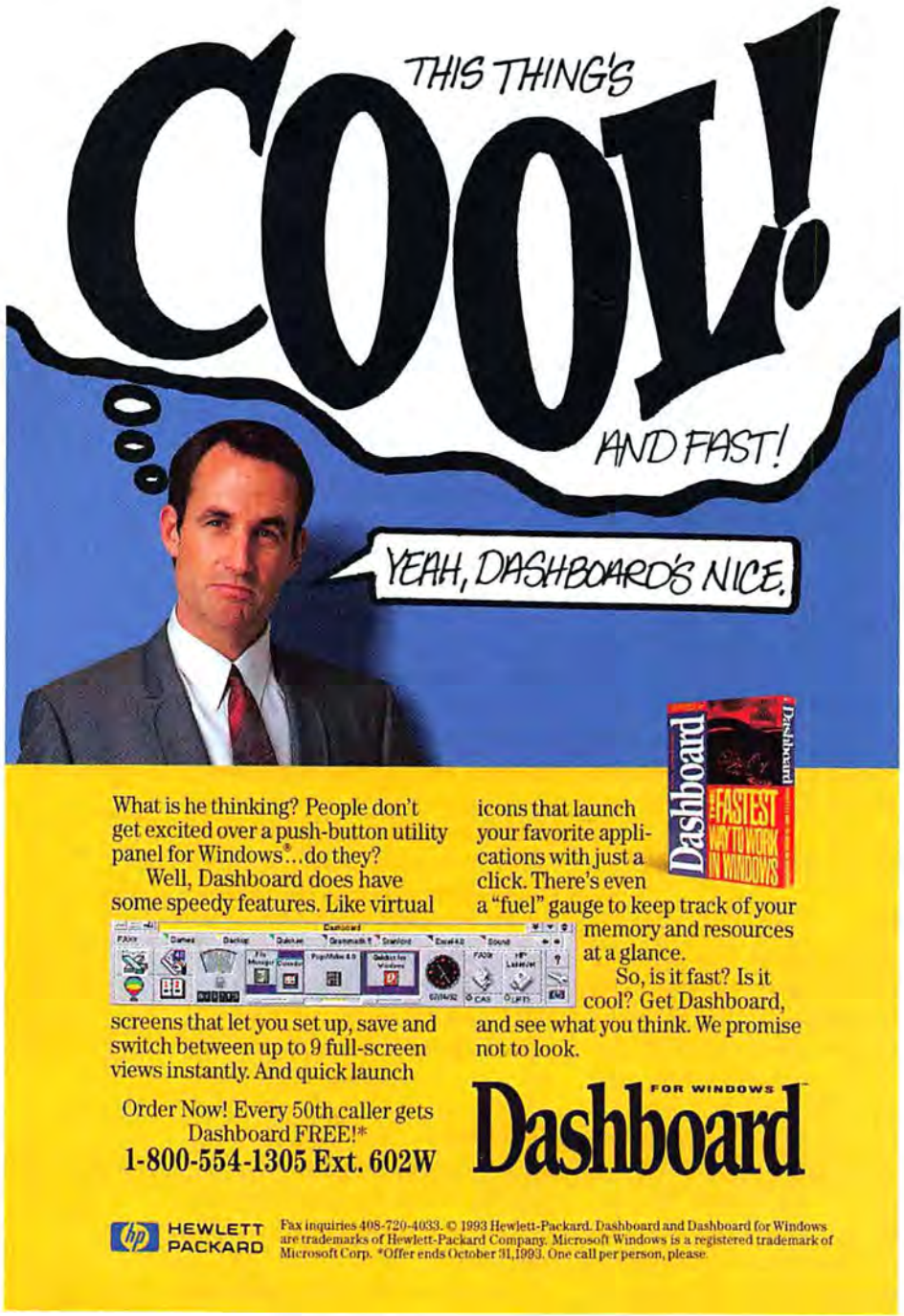
I read your article on repetitive strain injury ["Danger at Your Fingertips"] in the May issue with particular interest. I have a surprising number of friends who have been diagnosed with RSI.

Unfortunately, the Spokane area has too many employers with a Victorian attitude toward their employees. These employers seem to feel that adequate lighting, correctly positioned keyboards, and well-placed monitors are unimportant. They do not seem to comprehend the connection between ergonomics and increased production or morale. Requests for more than a 40-watt light bulb or a desk that's not 6 inches too high are considered to be unreasonable demands by uncooperative employees with negative attitudes.

Louise Ayers, Spokane, Washington

The Ergonomic Alarm

I hope Roberta Furger's article on computer-related injuries ["Danger at Your Fingertips," May] wakes people up to the urgent need to examine our work habits. The too-often-repeated phrase "It can't happen



Circle 114 on reader service card

results and reader feedback continue to suggest that DOS 6.0 DoubleSpace is causing significant problems on a wide variety of DOS machines.

– *InfoWorld*
May 10, 1993

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to me" is not enough to protect us from disaster. Until you are affected, you don't realize that calling these injuries a "disaster" is an understatement.

Your magazine should be commended for raising an alarm to the work force using computers as well as to manufacturers, who will have to consider ergonomics as a major factor when bringing new products to the marketplace.

Reuben Bibi, Brooklyn

Ancient Form of Random Access Storage

In her May article "CD ROM Drives: The Time Is Right," Melissa Riofrio laments the inconvenience of "backbreaking books" for retrieving reference information.

With all due respect to Riofrio, I am not about to throw away my library card. CD ROM drives enable you to quickly retrieve staggeringly large amounts of information, but it's difficult to imagine curling up with one on a rainy day. Let's hope that in our rush to the electronic page, we do not forget the printed page, however anachronistic it may seem.

Kenneth Burns, Chicago

Upgrading IBM Hard Drives

In the May *Help Line*, a reader asked about upgrading an IBM PS/2 Model 50Z. The answer Robert Lauriston gave was correct, though incomplete. In March IBM announced 160MB hard disk upgrades for Models 8555, 8550Z, and 8570. These hard drives come with IBM's 30-day money-back guarantee. They can be purchased through IBM sales representatives or IBM Business Partners.

J. Ralph Hammock, Media Relations, IBM Personal Computer Company, Somers, New York

Peer to Peer: The Missing Link

I feel the need to respond to Kenneth Sax's comments in May's *Letters* regarding installation of a peer-to-peer network atop a company local area network. His comments illustrate the worst possible attitude—arrogance—that a company can cultivate in its information services department. Unfortunately, this attitude is all too prevalent. Instead of ranting about some amateur monkeying around behind his back, Sax should ask himself why a rogue department feels the need to fend for itself. Perhaps its needs were not being met.

Sax's attitude is one of the reasons that the rapidly developing peer-to-peer technology will supplant client-servers as the network of choice.

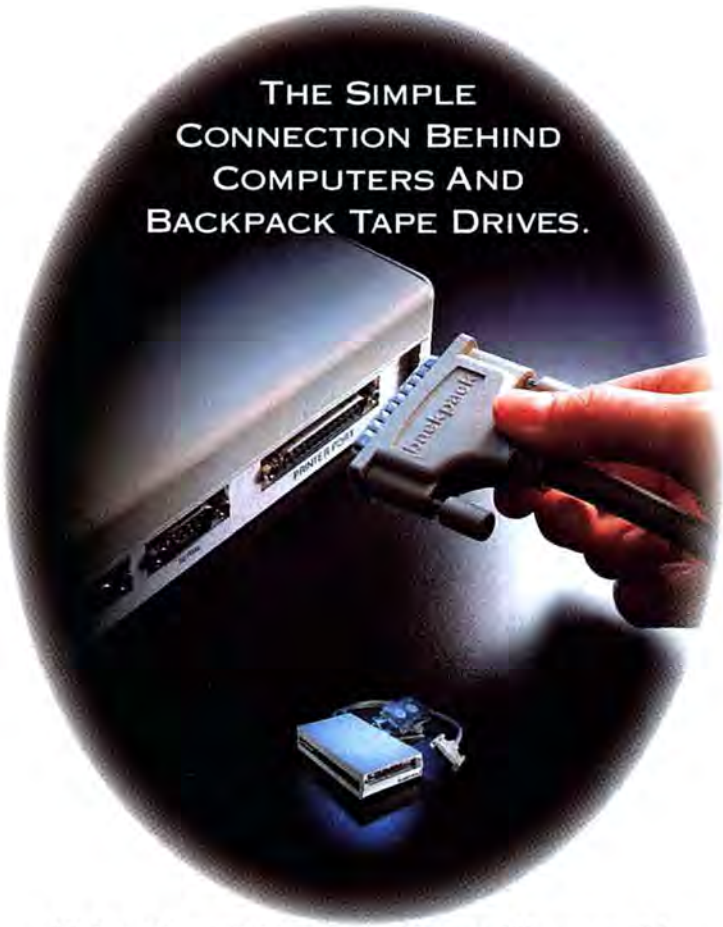
James Stamper, Marietta, Georgia

Correction

In "Caches Pay Off" in the June issue, the figure on page 215 was mislabeled. A hardware disk cache does not use part of system RAM as a software disk cache.

PC World regrets the error.

• Mail your reactions, responses, and ideas to Letters, PC World, *501 Second St. #600, San Francisco, CA 94107; or send them electronically to the Letters forum on PC World Online (see page 12 for more information); MCI Mail, PC World Editorial; or 415/442-1891 (fax). Include your name, city, state, and phone number. We reserve the right to edit letters.*



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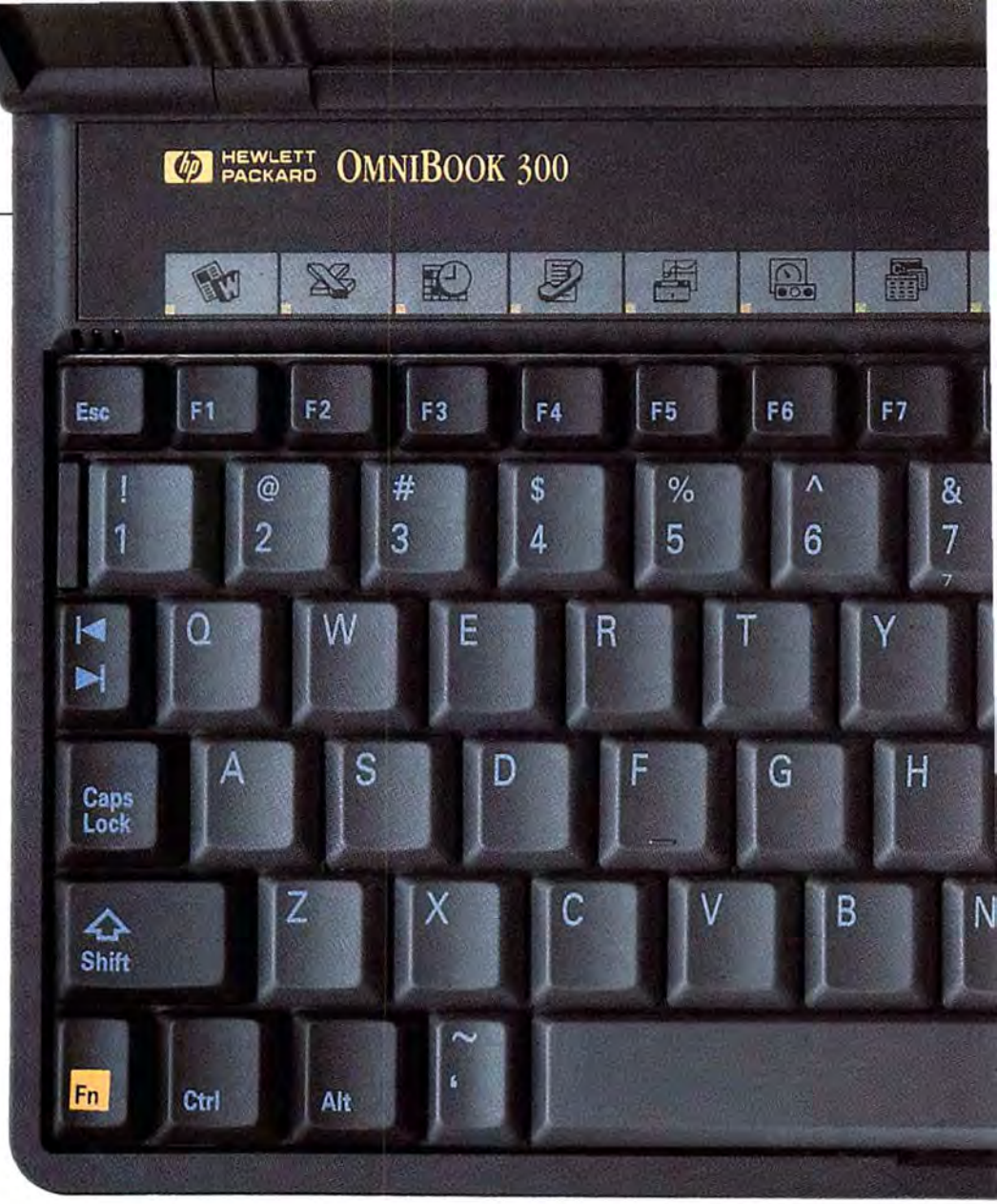

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— Janet Cole, Industry Analyst, Dataquest

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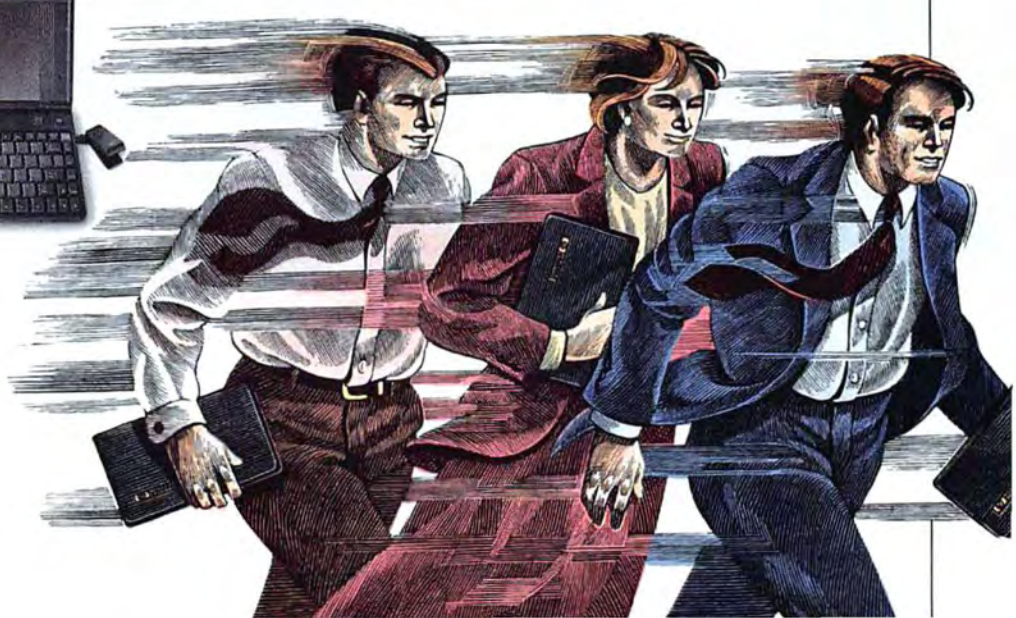

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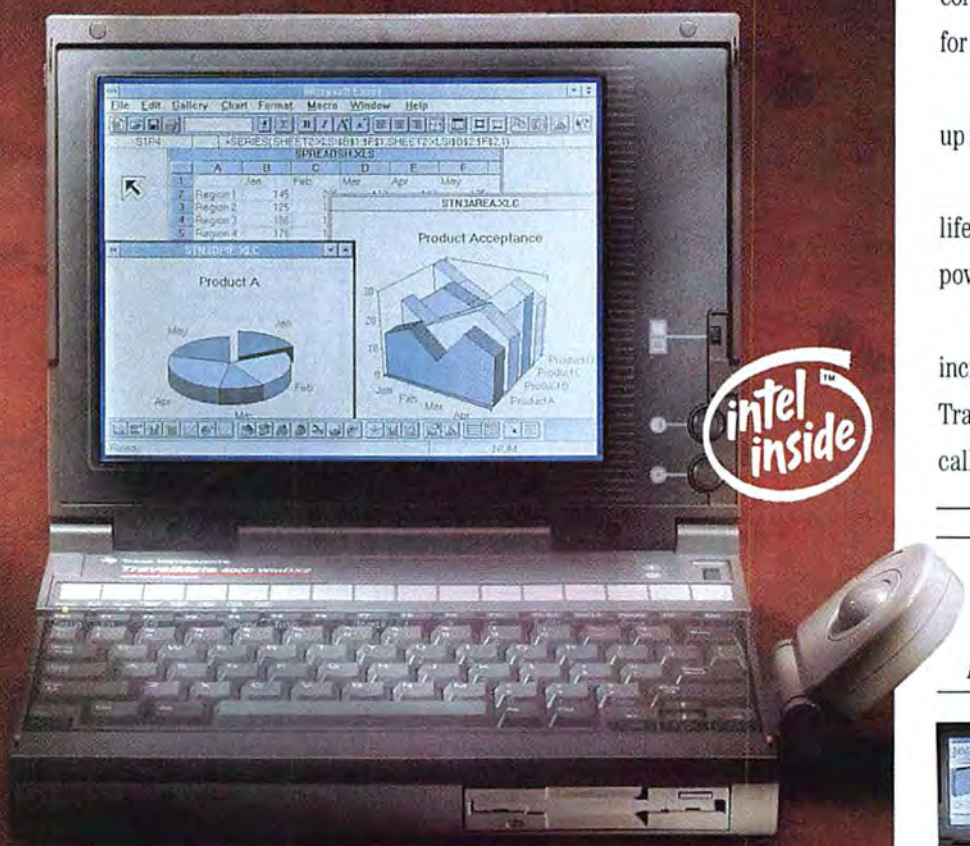

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Shades of Green

Turn out the lights when you leave the room! That refrain rang through my childhood years, as my mother tried—often in vain—to get all of us kids to turn off appliances and lights when they weren't in use.

Judging from Environmental Protection Agency statistics, a lot of us still have a hard time finding the off switch. Between 30 and 40 percent of all PC equipment is left running 24 hours a day, seven days a week—consuming enough electricity to keep at least 12 power plants running year-round.

"It's not that one PC uses so much power, it's that there are so many of them," says Bristol Stickney, research associate with E source in Boulder, Colorado, a clearinghouse for information on electrical end-use efficiency.

According to the EPA, computer products now account for 5 percent of the nation's commercial energy consumption. If the current trend continues, that figure is expected to rise to 10 percent by the year 2000. The ever-increasing load is maxing out the power capacity of many office buildings, says Arthur Kressner of New York's Consolidated Edison utility, forcing many companies to investigate significant upgrade projects. "We're starting to reach the saturation point," he adds.

Go to Sleep

In the ideal world, people would just shut off their computers when they weren't using them. "But that's not ever likely to happen," says Brian Johnson, manager of the EPA's Energy Star Computers program. Started last year, Energy Star teams the EPA and hardware manufacturers in a cooperative venture to reduce energy consumption via more efficient computer equipment.

Nearly 60 PC, monitor, and printer manufacturers had joined Energy Star as of press time, with a host of announcements expected over the summer. Product specifications and timetables for introductions vary (see *Top of the News*), but all products have a low-power sleep mode that kicks in after a set period of inactivity—a prerequisite for carrying the EPA's Energy Star logo. EPA guidelines require PCs and monitors to run at 30 or fewer watts in sleep mode. Laser printers must power down to 30 to 45 watts, depending on their type.

ROBERT HOLMGREN

By the year 2000, the EPA estimates, the Energy Star program and other efforts to increase energy efficiency will yield an annual savings of 26 *billion* kilowatt-hours of electricity, cutting carbon dioxide emissions by 20 million tons. That's equal to the amount produced by 5 million cars over a year.

How Low Can You Go?

Few companies will have problems achieving the EPA's initial standards, since they're primarily a matter of applying the power management facilities of notebooks to desktop designs. Most PC companies, in fact, will ship Energy Star products by the end of the third quarter. Some, such as Gateway 2000, plan power-down features for their entire product line; others will start by offering a separate line of "green" PCs.

"It's not a huge technological challenge," says the EPA's Johnson. "We wanted to define a target that was easy to reach for the first generation of Energy Star products."

According to Johnson, nearly every company he approached about the sleep mode concept had already considered adapting power management to desktop systems, although none had gotten around to it. "They lacked a marketing hook," he says.

By Roberta Furger

PC World Consumer Watch editor Roberta Furger

"Until the Energy Star program, there was no incentive for lower consumption," says E source's Stickney. "The industry didn't care, and the consumer didn't care."

"Customers have focused on price and performance, not energy efficiency," agrees Intel product manager Dave Dent. And although Dent expects tremendous interest in the new energy-saving systems from Intel and others, "Customers aren't willing to pay one penny more" for the benefits, he says. Johnson and others disagree, noting that large firms in particular understand the tremendous savings these new systems afford and will be willing to pay extra for the long-term gains.

Besides the energy savings that sleep mode provides, many new systems will consume less power even when in use. For example, IBM's new Personal System 2/E (sans monitor) runs at 30 watts

at peak consumption (compared with roughly 70 watts for the average desktop computer). The breakthrough system has no fan, since none of the components require cooling.

Although the first systems are just rolling off the line, discussions have already started about the second phase. Opinion is split over whether the EPA should set an even higher standard once everyone has complied with the first level.

Stickney and others believe that now that the EPA has got the ball rolling, customer demand may drive the technology further. "The EPA won't have to do a next generation if energy ratings become a market comparison tool," says Stickney. "The industry always responds to customer demand."

Several factors are coming together to force the issue among even the most hesitant manufacturers. President Clinton has issued an executive order mandating that as of July 21, all federal agencies may purchase only computers and printers bearing the Energy Star logo. Many observers expect state and local governments to issue similar buying requirements. "Anyone wanting to do business with the government has to think seriously about offering an Energy Star system," says Intel's Dent.

Apart from the EPA activity, the National Energy Policy, enacted in 1992, calls for energy efficiency ratings (such as currently appear on refrigerators, for example) on office equipment by 1995. Although the mechanics of such labeling have not been finalized, the deadline is looming, and the ratings will only add to consumer—and vendor—awareness of the issue. "Clearly, we're at a unique point in history," says Dent.

"There's no downside to it," adds E source's Stickney. "And if we can cut consumption by 50 percent, we can shut down a few of those power plants."

Starting Here, Starting Now

You don't have to rush out and buy a new PC, monitor, or printer to conserve energy. Here are a few simple steps that will enable you to do your part now.

- Remove unused peripherals from your system to reduce the overall energy load.
- Use shared peripherals whenever possible. Choose one network printer for your work group, for example, rather than several personal printers.
- If you *are* buying a personal printer, consider an ink jet model, which typically consumes 10 watts while in operation, compared with the 300-watt appetite of a typical laser printer.
- If graphics and splashy colors aren't important in your work, consider a black-and-white monitor, which consumes less energy than a color model.
- Install a fax board for computer-generated faxes rather than using a separate—and less efficient—fax machine.
- Think before you print—you'll save energy *and* paper.
- Turn equipment off when it's not in use. Shut down all computers, monitors, and printers at the end of the day, and consider turning your monitor off when you go to lunch or into a meeting. It takes only a few seconds to get the display back but can mean tremendous savings over a year.

Oh, and don't forget to turn out the lights.

PC NETWORKING IS COMPLICATED, EXPENSIVE AND SCARY.

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Shop Talk

Rumors of Gateway's Death...

I called Gateway 2000 technical support many times over a period of several weeks in March and couldn't get through. In frustration, I called the customer service line and asked how I could obtain a return merchandise authorization number. I was connected with a man who told me that he was very sorry to report that Gateway had just gone under. He said lots of people were out of jobs and that he himself was cleaning out his desk. Is this true?

Richard Plumer, Miami, Florida

Editor's note: Michael Schmith, marketing manager for Gateway, assured us that Gateway is *not* going out of business, adding that the company had received several similar inquiries after a disgruntled employee spent a portion of one Saturday spreading the rumor.

As for the busy technical support lines, Schmith admits that it has been difficult to get through to Gateway technical support (although calls to sales or customer service are put right through). According to ▶

BUG WATCH

The Complete Communicator Gold

The Complete Communicator Gold, a combination fax-modem/voice-mail board from The Complete PC, may conflict with the faster bus speeds of some 486DX-50s, causing some systems to freeze at start-up. The problem is limited to older boards that have version 1.03 ROM chips. Users can check their ROM version by typing ATI3 in the terminal screen of any communications package. The board should return the current version number. The 1.7 upgrade is free from The Complete PC.

The Complete PC
408/434-9600

Norton Speedcache+ 4.0, Untouchable 1.13

During the installation process, Symantec's Norton Speedcache+ 4.0 for DOS and Windows and Fifth Generation Systems' Untouchable 1.13 antivirus program both delete the last carriage return in AUTOEXEC.BAT files. The programs also wipe out some or all of the information on the last line. Neither program makes a backup copy of the file, however. You can avoid having to reconstruct your AUTOEXEC.BAT file: All you have to do is insert a carriage return after the last line of the file.

Symantec
800/441-7234
Fifth Generation Systems
800/766-7283

—Gordon Ung

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 broadest interest.

Gordon Ung is an editorial intern for PC World.

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Circle 18 on reader service card

Schmith, Gateway hired more than 400 people across all areas of the company in the winter months in an attempt to keep pace with projected sales. But with customers experiencing continued delays reaching technical support, at press time Gateway was hiring 15 new technicians per week. "We will continue at this pace until we get rid of the complaint that people can't get through," says Schmith, adding, "Our goal is to have everyone talking to a technician within 5 minutes of calling."

During late 1992 and early 1993, *Consumer Watch* saw a heavy increase in letters from Gateway customers, many complaining about their inability to get through to the company's technical support staff. In the past few weeks, the volume of letters has decreased but we continue to receive reports of slow service.

We'll continue to monitor Gateway's progress and report any new findings.

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Circle 233 on reader service card

What to Do When Your Vendor Leaves You

I did a great deal of research before buying a Lodestar computer. The company had a good record with the Better Business Bureau, had been in business for over six years, and had an outstanding warranty and service plan. *PC World* even awarded Lodestar a Best Buy in its March review "486-DX2-66s: Fastest PCs in the Universe."

But Lodestar went out of business before the ink on that Best Buy had dried. So much for the warranty, lifetime technical support, and on-site service. What do I do next? Should I simply lick my wounds and forget the whole thing?

Jon Muller, Great Lakes, Illinois

Editor's note: We've been asked this question a lot lately, given the steady stream of business failures among PC manufacturers. To get some answers, we asked Marguerite Kirk, a bankruptcy lawyer in Fort Worth, Texas, for advice about what consumers can do when their PC manufacturer goes under.

According to Kirk, if your vendor files Chapter 11 bankruptcy, there's a good chance it's hoping to continue in business. Together with creditors, it will formulate a reorganization plan and work with customers and suppliers to get back on its feet. During this time, says Kirk, it will often honor service and repair contracts, either directly or through a third-party provider.

Not every company reorganizes when it files Chapter 11, though. If the company simply wants to liquidate its assets and you haven't received goods you paid for, you'll find yourself standing in line with other creditors. The good news is that consumers move to the front of the unsecured-creditors' section of the line and will be among the first to be paid (if any funds are left after attorneys and the trustee have been paid). But don't expect to get your full investment back; you'll likely get only a portion of your initial outlay. (Of course, if you paid with a credit card, you probably don't have to worry about all this.)

If, on the other hand, your vendor files Chapter 7, your chances for receiving continued service—or any outstanding products—aren't very good. But Kirk suggests calling the attorney or trustee handling the case (the names are available from the federal bankruptcy court for the region in which the company is located) to see if any-

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Circle 17 on reader service card

one purchased the service contract.

Kirk also suggests calling the trustee if you sent your computer in for repair just before the company closed shop. According to Kirk, "If you can provide evidence that you own it—a serial number and invoice—you stand a good chance of getting your computer back. Often the trustee has a roomful of goods and no idea who the rightful owners are."

Not every failed PC company files for bankruptcy, though. If your vendor crept off in the night—or just chose to deal with creditors outside the bankruptcy court—you don't have a lot of options. If you purchased a number of computers, Kirk says, it may make economic sense to sue for damages according to the particular laws of your state. The hitch is that to collect, you have to be able to find the owners of the company, who may not want to be found.

Unfortunately for reader Muller, Lodestar's owners haven't filed for bankruptcy, leaving its stranded customers with few options. Fortunately, Muller paid with a Visa gold card that has a separate warranty plan for its customers.

The Long, Long Wait

In early January, I ordered—and paid for—an IBM PS/2 Model 9557 from my campus store. I was told the computer would be delivered in two to three weeks. I thought that was a long time but decided to wait. Three weeks passed, and I hadn't received the computer, so I called the store and was told the computer was back ordered and would be delayed another four to six weeks.

I have now waited two-and-a-half months for delivery of a PC that should have arrived in three weeks. IBM is making money with my money. I'm losing warranty time on an unused printer and wasting time driving to the school computer center to do my work. *Julio J. Santos-Munne, Evanston, Illinois*

Editor's note: The current PS/2 line has had ongoing supply problems since IBM introduced it last September, and there's no end in sight. According to JoeAnn Stahel, senior industry analyst at market research firm InfoCorp, the shortage has eased, but PS/2s—which carry the Big Blue name and competitive price tags—are extremely popular, and IBM may never catch up.

IBM spokesperson Michael Reiter says that the company has ramped up production, but that continued high demand and backlogged components have aggravated the situation.

Santos-Munne finally received his computer in early May—four months after he paid for it. According to IBM, the price of the Model 9557 has dropped 10 to 18 percent since Santos-Munne paid for his system. But, says Reiter, "it's up to the dealer to make amends."

Shop Talk *is researched and written by* PC World *assistant editor Christina Wood.*

• *Think you've gotten a raw deal—or a great one? Mail the details to* Consumer Watch, PC World, *501 Second St. #600, San Francisco, CA 94107; or send them electronically to the Consumer Watch forum on PC World Online (see page 12 for more information); MCI Mail, PC World Editorial; or 415/442-1891 (fax). We'll investigate complaints and publish letters with broadest interest.*

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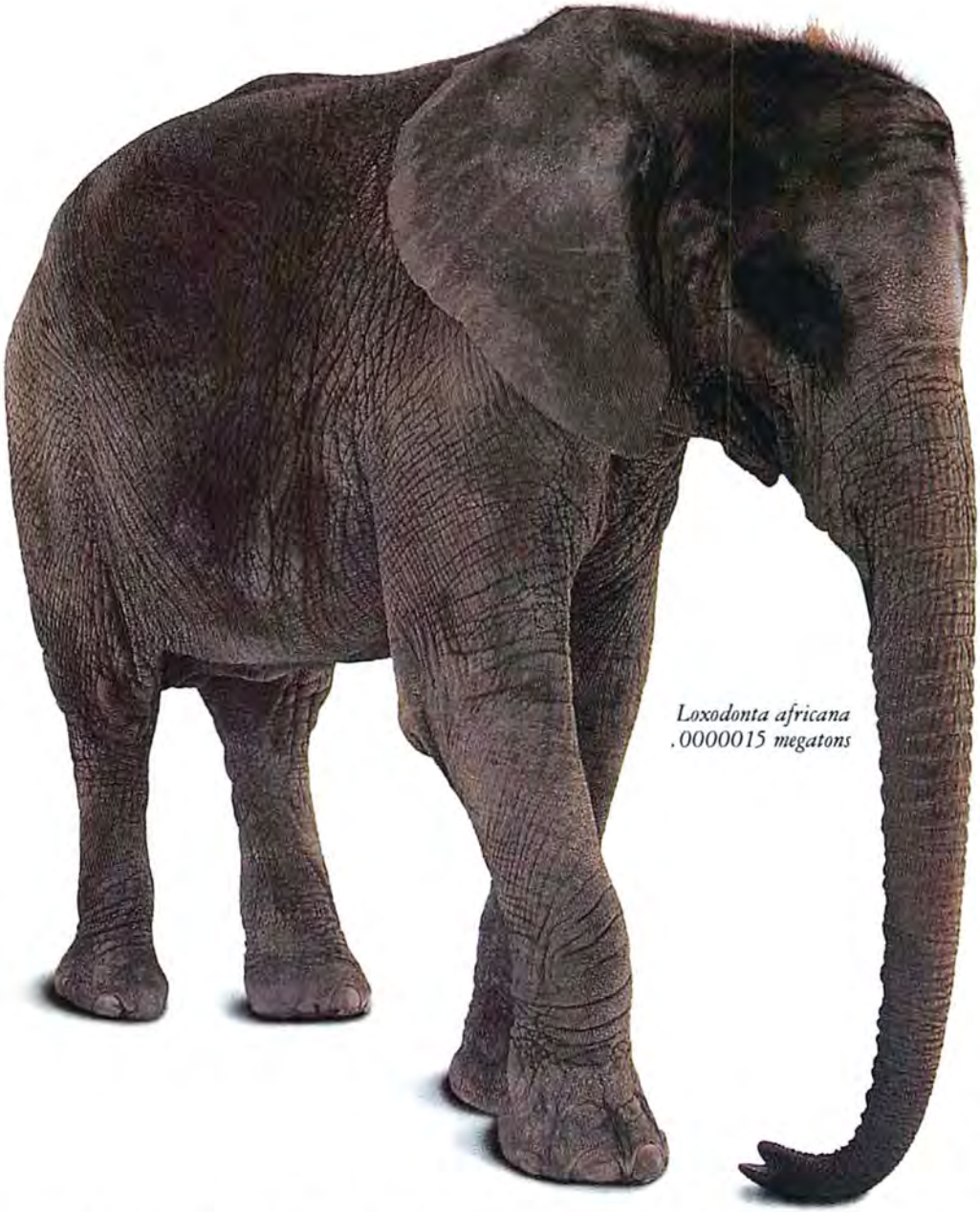

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Circle 153 on reader service card

Who Needs a Network, Anyway?

Using a network to share files, print, and swap ideas is a lot easier than walking down the hall 45 times a day. But with an average price of $20,000 for a full-blown, NetWare-style 15-PC network, plus a salary for a network administrator, LANs don't come cheap. This month Bob Larkin, communications and operations manager for J.A. Jones Construction Company of Charlotte, North Carolina, explains how he developed his criteria for judging when a LAN, peer-to-peer network, or peripheral-sharing device makes sense. —*Ed.*

Bob Larkin, manager for J.A. Jones Construction Company of North Carolina

Rather Switch Than Fight

Most people who read the ads in computer magazines think that to be more productive, they need the newest, most expensive technologies. But I have to spend the company's money carefully. So before submitting purchase orders, I've found that it pays to know how equipment will be used.

My disillusionment with LANs began in 1986, after employees persuaded management that the only way for them to share printers and computer files was by purchasing the hottest new technology on the market: a LAN. We spent $30,000 on a 10-node Nestar LAN for our headquarters in Charlotte. Unfortunately, the network administrator who understood the technical underpinnings of this monster left the company shortly afterward. We were left with a complicated piece of technology no one knew how to operate.

Shortly afterward, my company was constructing a 60-story office building in Chicago. There were ten IBM PCs at the site; the engineers who used them ran a proprietary scheduling software package, as well as MultiMate, 1-2-3, and other programs. With just one printer available, the engineers had to stand in line with a floppy if they wanted to print a file, and they could share files only by passing disks around. We couldn't afford to install individual printers, and installing a LAN at this temporary site was out of the question.

I wondered if there was a way for the engineers to share printers and swap files. I read some articles on printer sharing devices and thought such a solution might work for us.

We bought a switching device from Rose Electronics of Houston, Texas, and used it at the site. Installing the box was easy: I plugged an RS232 cable into the serial port of each PC, connected the cables to the switch, and attached the switch to the printer.

The device also came with TSR software that let users exchange files. We were able to develop a rudimentary file sharing system, in which users could send a file to someone else's mailbox.

We appointed one of the more PC-literate engineers as the point person and taught him how to set up mailboxes and manage the quasi-network. The total bill for installing all the cabling, software, hardware, and connections came to about $1000, and it took only a week to get everything running.

Sighting LAN

By 1991, the number of employees in our tax department had grown from 6 to 14, and every one of them needed to keep on top of rapidly changing tax laws as well as manage the state and federal returns for more than 400 companies. Although a Rose switch had worked successfully in the department for several years, the tax information, which was critical to our business operations, needed to be stored in a central database that could be backed up daily. And because the number of users had more than doubled, it made economic sense for them to run a multiuser LAN version of their corporate tax package, Fast-Tax, rather than try the single-user versions we had originally purchased.

Fortunately, the network market had matured. Networking products were more stable and PC prices dropped, as did the cost of installing a network. So we made the LAN leap, paying around $25,000 to install a 14-node NetWare network—with special 10 Base-T twisted-pair cabling, a CD ROM stacker unit, a 486-25 server, and backup hardware and software—in the tax division.

That LAN worked well, so in 1992 we decided to install two other networks. At one site, the users need to share project management and accounting information and back up this centralized data every day. Another LAN runs in our "heavy" division, where 26 engineers use PCs to develop projects such as bridges, dams, tunnels, and highways. In this division, centralizing

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PCW 8/93

Circle 212 on reader service card

estimate and proposal data for government clients justified the investment.

To LAN or Not to LAN?

These experiences helped me establish criteria for deciding when to set up a switch, a LAN, or a peer-to-peer network.

A device like a Rose switch makes sense when a group's chief need is to share a peripheral, and the group is small—say, fewer than 12. The users don't have a frequent need to share files, and the information they're working with is not "corporate" data that affects the company's bottom line.

On the other hand, a LAN is justified if there is an overriding need to centralize and protect corporate information and when more than 12 must share information and software, such as a database, scheduling, or E-mail system. In this case, the cost of a LAN is small compared with the value of the information stored on its server.

Some people in my firm are interested in peer-to-peer networks, such as Windows for Workgroups. After all, they are inexpensive, let users share resources, and are fun. But to me, these networks make sense only for small groups of computer experts who can take advantage of several Windows programs. And they're dangerous places to hold corporate information because they have limited security, there's no centralized backup, and there's no control over the data.

My conclusion? For many situations, a print sharing device is still a practical buy. However, there are times when going with a LAN makes sense. But when I install a LAN, I take a hard look at the reasons users want it, whether I can support it, and whether my company can really afford it.

Edited by Bronwyn Fryer

• *If you use PCs to manage people and other resources in a business environment, we want to hear from you. Send your article idea—including a brief outline of your company, job, problem, and solution as well as your name, address, and phone number—to* Real Problems, Real Solutions, PC World, *501 Second St. #600, San Francisco, CA 94107; or send it electronically to the Real Problems, Real Solutions forum on PC World Online; 415/442-1891 (fax); or call us at 415/851-4166. We pay $300 per published column. Sorry, we cannot acknowledge unpublished materials.*

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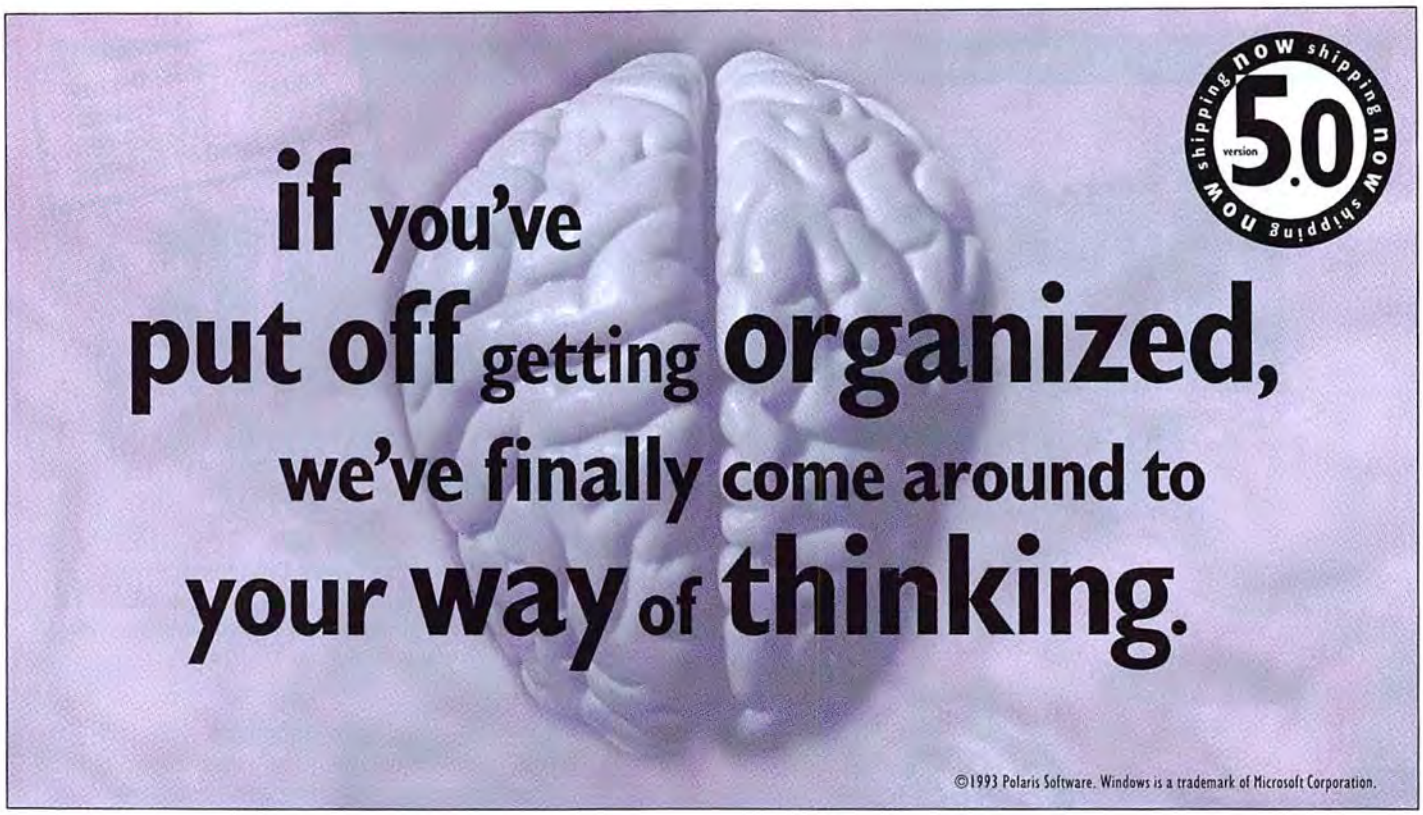
Circle 13 on reader service card



The trouble with getting organized is people don't know where to start. Start with PackRat 5.0.

PackRat 5.0 is the first software to harness the power of the personal computer to integrate all the big ideas and critical details that make the difference between order and chaos in your busy day.

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Trying to Keep the Customer Satisfied

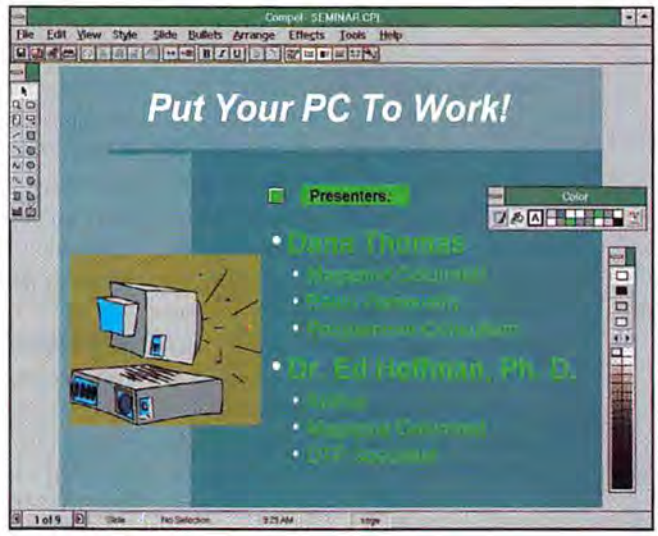
If there's anything I've learned after years of being my own boss, it's that you can never be too prepared. When I give seminars on PC productivity, I always prepare more material than I need. To avoid even the slightest possibility of losing my data, I back up my files like clockwork. And if my clients gripe—heaven forbid—I make sure to keep track of their complaints.

This month, I've turned my attention to three new products that help with these tasks. Compel from Asymetrix is a new multimedia-based presentation package that adds sound and video capabilities to text and graphics so you can put on a real show. To keep my hard work protected, I tried Colorado Backup for Windows, a tape-backup system that is considerably easier to use than most DOS-based backup products, from Colorado Memory Systems Inc. (CMS). And Complaints Desk, a new package from Spectrum Computer Technologies, promises to help keep your customers satisfied.

Compel 1.0

Having spent the last year putting on seminars for small firms, I've become friendly with Microsoft's PowerPoint, which I use to create overheads. Although PowerPoint lets me create a series of slides with occasional limited animation, it doesn't allow me to do anything fancy, like show a moving graphic while playing a sound, or incorporate video segments.

Five minutes into my first look at Compel, I knew that I was ready for the big time. This Foulks Favorite comes with more than 100MB of media clips; using my CD ROM drive, I incorporated sound from the Compel samples into my slide presentation. The result was like seeing a Panavision presentation with Dolby stereo after years of watching old-fashioned silent movies.



As I created each slide in Compel, I'd select the appropriate WAV or MIDI audio files from a drop-down menu, integrate them with graphics and video segments, and tell the program to play them all at the same time. (Compel even lets you cull from Kodak Photo CD images, if your drive is Kodak-CD certified.) Now I'm using Compel to rebuild and enhance my stock seminar materials. (Alas, Compel won't let me convert my present PowerPoint files.)

Special effects add more than fun to your presentation. Sound, music, and moving images can be an extremely effective way to make a point that will linger in the minds of your audience. And if you can't give your presentation in person, Compel also includes a runtime module called Compel Show that you can include with your presentation files, so clients can run the presentation without you.

Of course, this software is not for the hardware lightweight. Asymetrix recommends a minimum 20-MHz 386 with 2MB of RAM along with VGA or super-VGA video. However, you'll probably need more firepower and a speedy hard disk: Audio and video data need to be gulped down rapidly, or the playback will be jerky. I ran the program quite comfortably from the Mitsumi CD ROM drive of a 25-MHz Cheetah Gold 486 with 8MB of RAM and a fast hard disk.

One of Compel's best features is its relatively low price: At $295 suggested retail (and a street price likely to be half that), the product is $200 less than its nearest rivals. If your job involves any form of presentation, treat yourself to a look at Compel.

Colorado Backup for Windows

Doing tape backups using DOS-based backup programs can be a hassle, especially if you want to back up just a few files. But with Colorado Backup for Windows, specially designed for use with Colorado Memory Systems tape backup units, backing up is almost a pleasure. Instead of wading through picky menus or entering arcane command line parameters, just select the files and drag them to the tape icon. Then name the backup volume, and you're done.

Restoring from tape is equally slick—just drag an icon representing a tape volume, and drop it on the proper drive icon. (Yes, it works even on my LANtastic network.) Once you've started a backup, you can move on to other Windows applications while the operation continues in the background. You can also schedule unattended backups. Backup really doesn't get much simpler.

A FOULKS FAVORITE, Compel lets you add highlights such as sound and video to your presentations.

ALSO FEATURED THIS MONTH: Colorado Backup for Windows, Complaints Desk, QFind file searcher, Typecase III, and Automap.

By Thom Foulks

Best of all, owners of CMS's TC-15 data compression cards (with the chip set from Stac Electronics) finally have a full-featured, Windows-based backup product that lets them do a transparent, real-time data compression. I can back up a 510MB hard disk by linking tapes, and I can store as much as 320MB of data on a single DC-2120 cassette.

Colorado Backup for Windows is compatible with QIC-40 and QIC-80 but is currently intended only for users of CMS tape backup systems. It supports the company's full series of Jumbo tape drive interfaces (including the external unit I use). According to the company, versions for its Trakker and PowerTape drives will be available later this year. The package is distributed through major software houses and lists for $59.

Complaints Desk 1.1

The $129 Complaints Desk is one of those "Why didn't I think of that?" products, and one that just about any business that deals with the public could use.

You can use this straightforward database, which is founded on Paradox, for tracking customer complaints, comments, suggestions, and requests. Thanks to its Paradox 3.5 underpinnings, Complaints Desk can generate enough reports, graphs, and charts to keep any quality assurance manager busy. Use the preprogrammed reports or graphs to chart complaints, tracking their sources and frequency so you know where to go to correct the problem. Once the data is entered, you can export it to other data file formats, or create an ASCII list of names and addresses for use in mailing lists.

To set up the program, first determine categories of complaints or comments you expect to receive, and establish a list of departments to whom various complaints should be referred. Happily, the setup is not etched in stone; you can revise it later as needs or conditions change. You also can assign each incoming complaint to various status codes so it can be tracked through departments and actions until the problem is resolved. Complaints Desk even lets you develop scripts, so that an employee receiving a particular complaint can have a ready reply for it. ("Yes, Mrs. Wheeler, we know the sprinkler is leaking. A technician will be there Tuesday.")

Complaints Desk is surprisingly well documented (if you overlook some spelling errors) and easy to set up. The program requires minimal hardware: A mere 640K RAM, 2.5MB of hard disk space, and a printer, and you can run it on just about any LAN. Look for Complaints Desk in catalogs, or order it directly from Spectrum.

Quick Fixtures

Online Reference's QFind is a superfast file finder that's capable of finding a single file on an 80MB hard disk in less than a second. QFind found all of the 71 INSTALL.* files on the six hard disks and CD ROM of my LANtastic network in just under 2 minutes and searched 264 ZIP files along the way. It also proved its compatibility with two MS DOS 6 DoubleSpace drives and one Stacker drive. You can toggle QFind's ZIP search feature on and off and tell it to limit its search to specific drives. You also can tell QFind to jump to the first file located in a given search. A stripped-down version of QFind is available for downloading from PC World Online, with registration of the full version set at $20.

SWFTE Int'l's Typecase III must be a contender for the "most unusual fonts" award. The program gives you more than 100 fonts you've been searching for in addition to off-the-wall fonts you'll probably never need, such as the curling Happy Days font from the long-popular TV show's logo. You'll find a Punch Label font, which resembles the letters that label makers punch onto plastic tape, and a Neon font with rounded corners that looks like the glass tubing of neon signs. Typecase III also includes more than 200 holiday symbols and icons, ranging from Santa images to Halloween pumpkins. All are usable with any Windows 3.1–compatible printer, and scalable from 1 to 999 points.

I recently used Automap for Windows to find my way across 1300 miles and four states. Automap's itinerary of highways and projected mileage totals were completely accurate; it scheduled my projected arrival at a California destination within 20 minutes of the actual arrival time. What's more, Automap selected a route I would not have spotted simply by flipping the pages of a road atlas, saving me 4 hours over a more conspicuous but less direct route.

- **Compel 1.0** Asymetrix Corp.; 800/448-6543, 206/462-0501
  Reader service no. 643
- **Colorado Backup for Windows** Colorado Memory Systems; 800/845-7905, 303/669-8000
  Reader service no. 644
- **Complaints Desk 1.1** Spectrum Computer Technologies, Inc.; 800/879-3225, 716/283-0825
  Reader service no. 645
- **QFind** Online Reference; 916/988-7551
  Reader service no. 646
- **Typecase III** SWFTE Int'l; 800/237-9383, 302/234-1740
  Reader service no. 647
- **Automap for Windows** Automap, Inc.; 800/545-6626
  Reader service no. 648

Thom Foulks is a contributing editor for PC World.

POWERTIP no.291

Keeping Your Sums Checked in Central Point Anti-Virus

VSAFE, the memory-resident virus detector in Central Point Anti-Virus, keeps a number of files, all called CHKLIST.CPS, in various directories across your disk. These files contain checksum data on your COM and EXE files and allow VSAFE to see if the files have been changed. So don't erase a CHKLIST.CPS file when deleting files from a directory; if you do, any infection of the directory's remaining files may go unnoticed.

Gerardo S. Esquerra
Los Baños, Laguna, Philippines

The Heat Is On!
355
GATEWAY2000
intel inside

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 in this race, you're the winner!

weight get out of control (unlike some competitors). We've 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

GATEWAY2000

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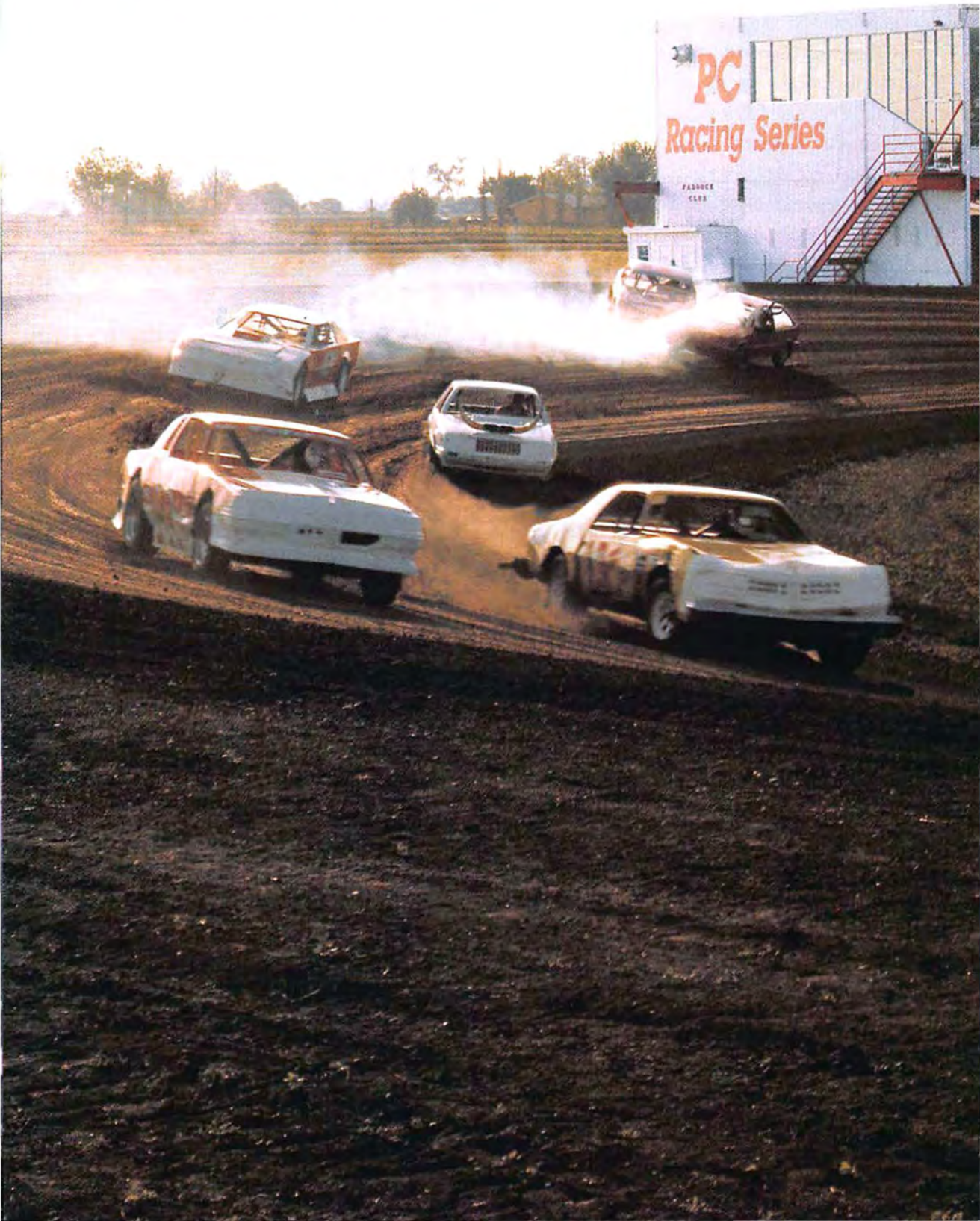
They're In Hot Pursuit Of The Value Leader...



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GATEWAY2000

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 is our Nomad 450DXL. This portable is in the off-the-road vehicle category, but its 50MHz 486 DX2 processor makes its engine that of an open-wheel racer. We'll have colorful, new sprint cars ready to enter in the upcoming notebook and HandBook® races. Watch for them!

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.

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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.

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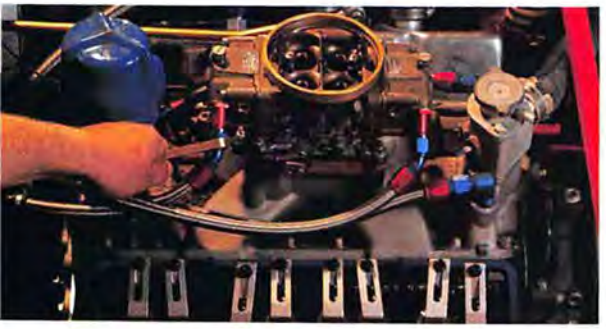

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intel inside

PC MAGAZINE · SERVICE · RELIABILITY · READERS' CHOICE

PC WORLD SERVICE EXCELLENCE AWARD

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

This year's summer fun ad was photographed at Park Jefferson International Speedway, a NASCAR-sanctioned track just a few miles from the Gateway 2000 plant. Our thanks to Park Jefferson people and local stock car drivers for their participation.

And PC Racing Accessories

SOFTWARE

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Many of our systems come with Works, the single program that combines all the tools you need to run a business: word processor, spreadsheet, database and electronic communications. It's simple to use yet provides power and functionality.

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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. **$195**

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!

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- 30-Day Money-Back Guarantee
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- 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, ask for our special add-on components division when you call.

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

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POWER MISER PCs SAVE $$$

Reduce, reuse, recycle. Those three words will reshape the desktop as PCs go "green." The first step is here: energy-efficient PCs.

IBM'S PS/2 E (left) joins Austin's Green PC (top next page) and AST's Bravo LP.

TEST DRIVE The next generation of energy-efficient desktop computers is here and promises to save you money by cutting your utility bills without sacrificing performance. These machines, which in sleeplike mode use an eighth the power of traditional desktops, also herald an age of environment-friendly computers that are recyclable and produced with fewer pollutants.

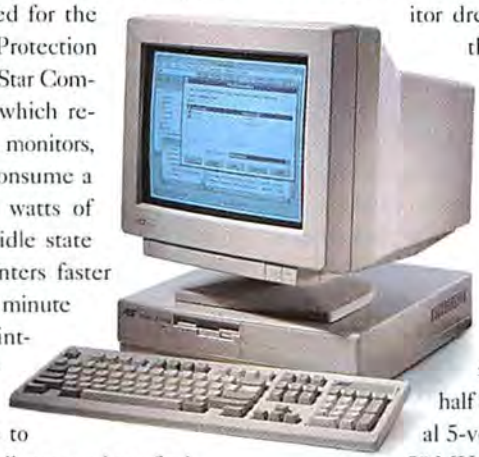
Our evaluation of three of the first energy-efficient PCs to reach the market—AST Research's Bravo LP 486/66dx, Austin Computer Systems' Green PC 486/66, and IBM's PS/2 E—uncovered a wide range of power conservation features and other innovations. All three power down after a period of inactivity to a notebooklike sleep mode from which they can be awakened with the touch of a key or a mouse movement.

Of the models we tested, Austin's Green

Edited by Russell Glitman

PC 486/66 was the clear winner. It offers a sleep mode that draws just 28 watts (system with monitor) and traditional PC pricing—the DX2-66 version starts at $2299. IBM's PS/2 E won high marks for technical innovation and draws just 29 watts in sleep mode, but its high price and limited expandability place the unit in a league of its own. For moderate energy savings and a low estimated street price of under $2700, AST's Bravo LP 486/66dx is a solid choice. It provides a sleep mode of 55 watts.

To have their products included in this test drive, vendors submitted computers they said qualified for the Environmental Protection Agency's Energy Star Computers program, which requires computers, monitors, and printers to consume a maximum of 30 watts of electricity in an idle state (45 watts for printers faster than 15 pages per minute and all color printers). But there is no monitoring program in place to ensure EPA compliance, and our findings indicate that energy consumption—and your savings—will vary greatly from vendor to vendor.



Our advice: Look further than the Energy Star logo to find the most efficient product. Ask vendors for information on how they achieve energy reductions, such as whether they use software modes, low-voltage components, and energy-efficient monitors. And be aware: Each add-in card you install, every peripheral you connect, every bay you fill—even upgrading to a larger hard drive or adding cache memory—will cause your system to use more power. How much power it uses also depends on what you run. For example, the more screen activity, the more power required, so Windows will generally cost you more to run than DOS.

The IBM PS/2 E has the most innovative design of any desktop we've seen in a while. For power management, the PS/2 E employs a number of mobile computing technologies—and likewise suffers from some of the common inconveniences of notebooks, such as limited expandability and a high price. In our tests, a PS/2 E system configured with a maximum 16MB of RAM (8MB is standard) and an LCD monitor drew about 46 watts at the DOS prompt and 47 watts while running Excel. In sleep mode, the combo drew 29 watts.

The power savings start with the CPU, a clock doubler IBM 486SLC2 with a 3.3-volt design that uses about half the power of traditional 5-volt CPUs and runs at 50 MHz in a 25-MHz system. IBM claims the system performs about as fast as a 33-MHz 486. The company shaved off another couple of watts by using a 2½-inch 120MB hard drive, a notebook-size device that draws about 2 watts—half the draw of a comparable 3½-inch drive.

IBM opted against standard expansion slots in favor of four PCMCIA slots. You can hot swap PCMCIA cards simply by slipping them into the slot as you would a floppy, which makes them a lot easier to install than typical AT add-in cards. Unfortunately, PCMCIA cards cost a lot more than AT cards, and you won't find as many options—yet. The four PCMCIA expansion slots draw a maximum of 2 watts per device, or about 25 percent of the power used by

News Monitor

NEW AMD 486S; PENTIUM SHORTAGE CONTINUES: Advanced Micro Devices is shipping a new line of Intel 486-SX–compatible microprocessors while fighting a rearguard action in the courts over its right to make versions of Intel's 386 CPU and 287 math coprocessor and to ship its own Am486-DX line of processors. Unlike its other Intel-compatible CPUs, AMD's new designs don't rely on any Intel micro code. AMD's new line includes the Am486SX-33, Am486SX-40, Am486-SX2-50 and Am486SXLV-33. Like Intel's 486SX chips, they do not have a built-in math coprocessor.

Meanwhile, Intel stands by estimates that it will ship hundreds of thousands of Pentium chips during 1993, or at least 200,000. According to company spokesperson Nancy Pressel, many manufacturers aren't receiving Pentiums because early shipments are going to customers with "world-class engineering talent...who need these large volumes in order to create and expand the market." Intel predicts it will ship more than a million Pentiums in the next 12 months.

HELLOOO OUT THERE: You can send E-mail to the White House, but its inhabitants won't exactly be writing back.

When you send a message to Bill (president@whitehouse.gov) or Al (vicepresident@whitehouse.gov), your message is read electronically via a system that tallies and categorizes messages by subject (handy if the

(continued on page 63)

PHOTOS: JOHN GREENLEIGH; ILLUSTRATION: HANK OSUNA

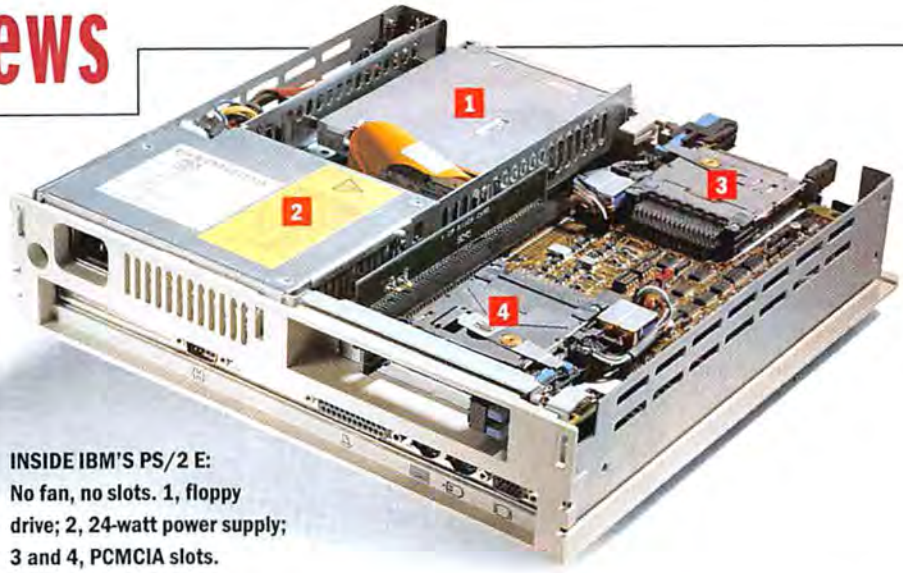
Continued from page 61

standard ISA devices, according to IBM.

The IBM's optional 9-pound monitor is actually a 10.4-inch LCD notebook screen incorporated into a desktop stand. While limited to 16 colors and 640 by 480 graphics, it has two low-power states. The first keeps it ready for quick power-up; the second is a sleep mode. The monitor never draws more than 30 watts and in *PC World* tests drew 30 watts at the DOS prompt, 21 watts in the first ready state, and 16 watts in sleep mode.

The PS/2 E also deserves kudos for achieving lows in three other areas: noise (there's no fan), monitor emissions (the optional LCD monitor is virtually emissionless), and desktop footprint (the system unit measures 12 inches square, plus it's only 2.75 inches high). One low the product doesn't offer is price: The 8MB system with a 120MB hard drive, the VGA LCD monitor, and a floppy drive costs $6780.

For the more price conscious, IBM offers a 14-inch CRT option that powers down to 8 watts. The system with this 1024 by 768 monitor, 8MB of RAM, a 120MB hard drive, and a floppy drive costs $3385. Don't look for the PS/2 E in a retail outlet; IBM is limiting availability to special bid orders.



INSIDE IBM'S PS/2 E: No fan, no slots. 1, floppy drive; 2, 24-watt power supply; 3 and 4, PCMCIA slots.

AST's Basic Philosophy

While IBM flexed its technical muscle, AST drew on its notebook technology to transform its entry-level Bravo line with a redesigned keyboard controller and a new BIOS. The resulting Bravo LP line consists of three processors—486SX-25, 486DX-33, and 486DX2-66—in two basic configurations: 170MB with 4MB of RAM, and 340MB with 8MB of RAM. All of them are expandable to 64MB of RAM and offer local bus video, and you can upgrade to OverDrive for DX2.

The keyboard controller, similar to those used in AST's notebooks for power management, lets the Bravo LPs communicate with a new family of low-emission monitors via a vacant pin in the video connector. After a user-defined period of keyboard inactivity, the controller signals the monitor to go to sleep. The monitors will also be sold separately. While the Bravo LP systems are able to use any monitor, the sleep signal works only with monitors equipped to receive it. AST also reached into its bag of mobile computing tricks to implement a hard drive power-down state that's user definable in setup.

A relatively austere prototype configuration—the Bravo LP 486/66dx with a single floppy drive, 8MB of RAM, a 170MB hard disk, and an energy-efficient 15-inch monitor—pulled 55 watts in sleep mode. With Windows idle, the unit—including monitor—pulled 100 watts. This 486DX2-66 unit will have a street price under $2700.

The 486SX-25 Bravo LP 425s with a 170MB hard drive, 4MB of RAM, 1MB of video DRAM, and the 15-inch, flat-screen, low-emission monitor sells for about $1600 ($1200 without the monitor). That's $100 to $200 more than similar Bravo PCs, but, company officials note, the system includes local bus graphics, a larger hard drive, and a larger monitor.

Austin's Optimum Innovation

For price and performance, the unit we preferred was Austin's thoughtfully designed Green PC 486/66. Even with a 14-inch monitor, 16MB of RAM, a 340MB hard drive, a tape drive, and two floppy drives, it had a sleep mode of just 28 watts in our tests—less than half the EPA ceiling. The prototype we tested drew 79 watts at the DOS prompt and 31 watts with the monitor off and the hard drive spinning. The tested configuration sells for $3199.

In addition to turning off the monitor, Austin's Green PCs can shut down the hard drive after a user-configurable period of time, putting the unit in its 28-watt sleep mode. Or the system can leave the monitor

PHOTOS: JOHN GREENLEIGH; ILLUSTRATION: HANK OSUNA

PC WORLD TEST CENTER REPORT

Power Play: IBM Leads in Energy Efficiency

Total power consumption of system and monitor in watts

	AST Bravo LP 486/66dx	Austin Green PC 486/66	IBM PS/2 E with LCD monitor
DOS prompt, idle	90	79	46
DOS edit, in use	92	86	45
Windows, idle	100	94	46
Performing Excel test suite	102	99	47
Sleep mode	55	28	29

off while performing some activity, such as backup, at night after you've gone home. Power management is activated after a user-configurable period of time or via a button on the front of the PC. To reduce noise pollution and energy use, the fan varies its speed according to the operating temperature. The company plans to offer a low-radiation monitor.

The Green PC 486/66 is the high end of Austin's new Green PC line of 15 systems; the low end is a 486SX-25 model with 4MB of RAM expandable to 32MB and a 170MB hard drive for $1499. The basic Austin Green PC 486/66 with 4MB of RAM, a 340MB hard drive, and a 14-inch monitor is $2299. All the systems offer several configurable power management options and solid Energy Star benchmarks, and they include a low-emission, 14-inch super-VGA monitor, local bus graphics, and an IDE hard drive adapter.

How does the power consumption of these PCs compare with that of traditional computers and business equipment? A Texas Instruments DX2-50 notebook, fine-tuned for power management, hovered around 21 watts for every task except an animated sequence in Microsoft Golf that pulled 27 watts. A 66-MHz 486DX2 from CompuAdd's new high-performance Centura line with a 500MB hard drive and Diamond's Viper local bus video card drew 95.6 watts at the DOS prompt. A Hewlett-Packard DeskJet 550C drew 7 watts while idle and around 11 watts while printing. The new Energy Star LaserJet 4L draws 180 watts while printing and powers down to 10 watts when idle, according to HP.

There's More to Being Green

Cutting energy use is all well and good, but it's only a start in creating truly "green" computers. Recyclability is also important, and some vendors are already addressing the issue. Many of the parts in the IBM PS/2 E are easily recycled, and 25 percent of the plastic used in the unit is recycled plastic. Apple and TI were the first companies to accept laptop batteries for disposal. You can get advice on where to drop off your computer's packaging for recycling by calling 800/944-8448.

Industry watchers predict that within a year, energy-saving features will be built into nearly every computer, monitor, and printer sold. Once all computer equipment is energy efficient, computer power use should drop by as much as 75 percent. Computers currently account for about 5 percent of total U.S. power use, according to EPA estimates. What does that mean in dollars and cents? According to the EPA, if energy-saving computers and monitors are left on 24 hours a day, you could save as much as $120 a year per system, or $600,000 for a corporation with 5000 PCs.

Makes you think: Is your PC on now?

—Joe Abernathy and Randy Ross

AST Bravo LP 486/66dx

The top system in an extension of the Bravo line.

Key Features: Energy-efficient monitor • Upgradable to OverDrive for DX2 • Power-down hard drive

Pricing: Under $2700

Availability: Immediate

AST Research Inc., 800/876-4278, 714/727-4141

Reader service no. 753

Austin Green PC 486/66

Power management features at the same price as traditional PCs.

Key Features: Multiple power management settings • Local bus IDE and graphics

Pricing: $3199

Availability: Immediate

Austin Computer Systems, 800/752-1577, 512/339-3500

Reader service no. 754

IBM PS/2 E

A radical design wraps notebook technology in desktop form.

Key Features: No-fan, noiseless operation • Four PCMCIA slots

Pricing: With LCD monitor $6780, with 14-inch CRT monitor $3385

Availability: Immediate

IBM Personal Computer Co., 800/772-2227

News Monitor

(continued from page 61)

administration is measuring voter opinion on a new proposal). Don't expect a personal response to your message; The White House is sending out only acknowledgments of receipt.

The House of Representatives is testing a similar project, but only a handful of members have Internet addresses. To find out if your rep has one, use this address: congress@hr.house.gov. White House media affairs spokesperson Jonathan Gill expects a more interactive system to be in place by year's end. For now, if you want your mail to be read, send a letter.

LOTUS TAKES A NEW APPROACH: Lotus Development intends to purchase Approach Software, developer of Approach for Windows, an easy-to-use Windows database. The acquisition was to be completed in July.

The product will help Lotus round out its application offerings and make future versions of its SmartSuite application collection more competitive with suite products from Microsoft and Borland, says Wayne Kernochan, a research director at the Boston-based Aberdeen Group. SmartSuite currently consists of 1-2-3 for Windows, Ami Pro, Freelance Graphics, cc:Mail, and Organizer—but no database product. Borland and Microsoft include or intend to include a database in their suites.

Lotus will not include the $399 Approach in version 2.0 of SmartSuite, which is to be introduced during the summer, according to CEO Jim Manzi.

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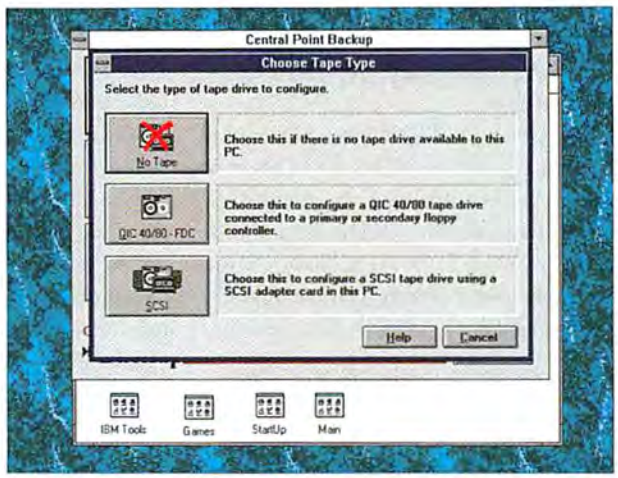
IBM DOS One-Ups DOS 6

TEST DRIVE DOS just gets better and better. First Microsoft adds data compression, antivirus, memory management, defragmentation, and backup capabilities in its latest DOS offering, 6.0. Now it's IBM's turn, and Big Blue doesn't disappoint: IBM DOS 6.1 offers the same features—sans data compression—and adds tape backup, support for PCMCIA devices and pen-input systems, an enhanced text editor, a system diagnostics utility, and several other cool tools. (So you don't recall an IBM DOS 6.0? No wonder—there wasn't one. IBM is attempting to distinguish its DOS 6 from Microsoft's and will likely market DOS 6.1 as an upgrade to MS-DOS 6.0.)



CENTRAL POINT BACKUP IN IBM DOS 6.1 lets you back up files to tape drives. MS-DOS 6.0 supports only floppy drive backups.

Tape Backup and More

IBM's DOS 6.1 is in many ways better than Microsoft's DOS 6.0, although not by a wide margin. Both let you run most of their utilities from the DOS command line, the DOS Shell, or Windows. In a comparison of utilities, IBM DOS's greatest advantage lies in its backup software: Licensed from Central Point Software, Central Point Backup supports backup to tape drives. MS-DOS's scaled-down version of Symantec's Norton Backup supports only floppy drive backups. Why is tape support so important? Try backing up a 200MB hard drive with a mile-high stack of floppies, and you'll find out soon enough.

Also included in IBM DOS is the Central Point Scheduler utility, which allows you to schedule unattended backups and the automatic launching of other programs. For example, you could use Scheduler to run your data compression program after work hours. Microsoft DOS 6.0 doesn't provide a scheduler utility.

However, not every utility in IBM DOS 6.1 is superior to its Microsoft counterpart—some are equal. For instance, both products include a defragmenter licensed from Symantec; the utilities appear to be identical, right down to their point-and-click interface. The antivirus utilities sport different interfaces but offer similar capabilities, and both scanned effectively in informal *PC World* trials.

The Intelligent Office at Work:

Imagine having the same control over your office equipment and the documents that pass through it as you do over your desktop system. By this time next year, your PC could command a new generation of copiers, fax machines, printers, and even phones that run a Windows-compatible operating system. Called Microsoft At Work Architecture, this multitasking OS will let PCs and properly equipped office devices communicate so documents can be routed, combined, duplicated, and shared easily. It also promises to simplify complex office equipment functions—the graphical At Work interface will also run on 320-by-240-pixel touch screens on the machines themselves, replacing today's cryptic buttons and LCD panel commands.

Microsoft At Work includes communications and printing software. The communications features will let networked PCs treat At Work–based office equipment like any other peripheral. For instance, a fax machine receiving a document could route that file over the network to the recipient's E-mail box. Two fax machines supporting At Work could send and receive files in the files' native format, so you could fax a spreadsheet and the recipient would receive a live document in its original file format, not as a scanned, uneditable image.

These communications features could also let a PC manipulate voice mail from a phone supporting At Work: Messages could be forwarded to the same PC mailbox that stores your E-mail and faxes. From a PC, you could listen to, forward, sort, and store those voice messages. For example, instead of forwarding an irate customer's voice message using your phone, you could insert the message into a document, add the customer's billing file and recent correspondence, and send the whole package over the network to the customer service department.

Sixty office equipment manufacturers, including NEC, Ricoh, and Xerox, have pledged to develop At Work products.

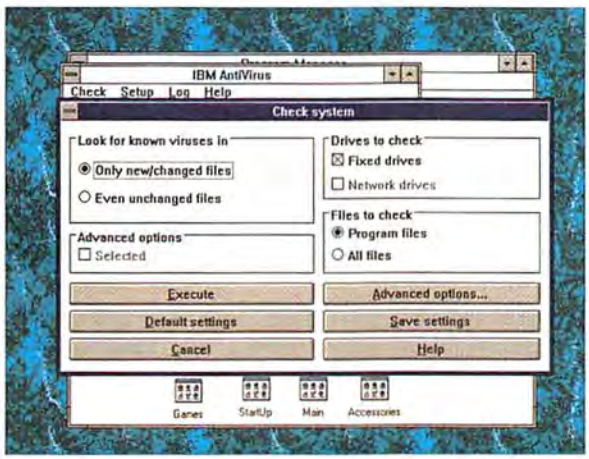
SI HUYNH

IBM DOS 6.1 includes Central Point RAMBoost, a memory manager that helps optimize system memory by moving device drivers and terminate-and-stay-resident programs (TSRs) to upper memory, freeing more conventional RAM (the PC's first 640K) for DOS programs. Like MemMaker in Microsoft DOS 6.0, RAMBoost operates automatically. Type RAMSETUP at the DOS prompt, and RAMBoost reconfigures and reboots your PC to get the best fit for your TSRs and drivers in upper RAM. I found this utility as easy to use as MemMaker and got similar results—it freed about 620K of conventional RAM. Both RAMBoost and MemMaker work with 386-class or better processors.

Also new in IBM DOS 6.1 is a diagnostic utility that quickly displays your system's hardware configuration. Need that information handy when you call tech support? Simply type QCONFIG at the DOS prompt; you'll get a list of important details about your system, including PC identification number, BIOS revision and type, processor type, and information on the keyboard, mouse, serial and parallel ports, hard and floppy disks, and memory usage. You can redirect this information to a file as well as print it. IBM DOS 6.1 also includes Microsoft DOS's MSD configuration utility. While QCONFIG merely scrolls your system information across the screen, MSD comes with an easy-to-use mouse-driven interface.

Utilities aside, IBM DOS 6.1 includes all the operating system enhancements you'll find in MS-DOS 6.0, including the SmartDrive disk cache, a new MOVE command that moves files to a different directory or disk, and a multiple configuration facility that lets you choose a system configuration at start-up—useful if you've got a motley collection of TSRs or device drivers to load.

Nobody wants to load a full-featured and slow-loading word processor to dash off a memo or edit a simple text file. IBM DOS 6.1 has a new text editor that makes it easier than past IBM versions did to write quick notes and edit system files such as CONFIG.SYS and AUTOEXEC.BAT. Like Microsoft's DOS, it lets you create multiple configurations. Simply type an E at the DOS prompt (or double-click the IBM DOS E Editor listing if you're using the DOS Shell), and up pops a no-frills word processor. You can use key combinations and function keys to move, copy, or delete text as well as perform other basic editing tasks. While the IBM DOS editor is ideal if you enjoy memorizing keyboard commands, I found the menu-driven text editor in MS-DOS 6.0 easier to learn.



IBM ANTI-VIRUS offers Windows and DOS users a plethora of virus-checking options to choose from.

PenDOS and PCMCIA Support

IBM had a future generation of hand-held, pen-based PCs in mind when it added PenDOS to DOS 6.1. This pop-up utility is a scaled-down version of CIC's Handwriter Recognition System. If you have a pen tablet computer or a conventional PC with

HANK OSUNA

News Monitor

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To integrate Approach into its product line, the company's next version is expected to have such common Lotus application features as SmartIcons, status bars, and the capability to send files via E-mail from within the application. Lotus expects to have an updated product by year-end and incorporate it into the next version of SmartSuite.

Meanwhile, the $795 SmartSuite 2.0 is vying with Microsoft's $949 Office Professional application bundle, which adds the Access 1.1 database application to the Microsoft Office lineup of Excel, Word, PowerPoint, and Microsoft Mail.

BEAT THE HOME OFFICE BLUES: Running a business from your home gives you unparalleled freedom, but it can limit your access to business contacts and resources. Home Office Network On-Line gives home office professionals a variety of ways to promote their business, tap into useful information, and network. The service offers a directory of members' products and resources; E-mail; on-line conferencing; tech support panels; question-and-answer columns by corporate sponsors; business shareware files; a financial resource library; job listings; and résumés. The $89 annual membership includes 3 hours of use per month plus a custom color ad for your goods or services. EntreNet Corp., 908/647-6530.

Contributors: Joe Abernathy, Anita Hamilton, Caroline Jones, and Randy Ross

Continued from page 65

an external digitizer, you can use PenDOS to enter simple numbers and symbols into your DOS applications by hand. PenDOS's pop-up QWERTY keyboard lets pen tablet users input letters by tapping them on the screen.

PenDOS is designed for users who want to learn more about pen-based computing, and the company plans to sell a full-featured version that recognizes uppercase and lowercase letters, numbers, punctuation marks, and symbols. Currently PenDOS could prove useful to site workers who need a simple text entry tool, but its usefulness for most desktop PC users is probably limited.

PCMCIA slots are rapidly becoming de rigueur in portable PCs—and soon will appear in desktops. These slots hold compact, credit card–size devices such as fax-modems, network adapters, memory cards, and miniature disk drives. IBM DOS 6.1 includes software licensed from Phoenix Technologies that lets you install and remove PCMCIA cards without rebooting, as well as receive information about each PCMCIA socket and card in your system (such as card name, socket number, and so on).

IBM DOS 6.1

Big Blue's latest DOS one-ups Microsoft's DOS 6.0 with a better collection of utilities.

Key Features: **Central Point Backup with tape drive support • Antivirus software • RAMBoost memory manager • PenDOS pen-input utility • PCMCIA support**

Pricing: **Unavailable at press time**

Availability: **Immediate**

IBM, 800/772-2227

Blue DOS Best

Is IBM's DOS better than Microsoft's? My initial impression is yes. Overall, IBM's DOS offers a superior collection of utilities—unless you simply must have data compression. But IBM is expected to enhance its DOS in later versions, starting with a free 6.1 upgrade with data compression, by the end of the summer. (IBM's DOS 5.0 was bundled with Stac Electronics' Stacker compression software and Qualitas's 386Max memory manager.) Later this year IBM should release an innovative version that incorporates its Workplace Shell, a graphical interface with drag-and-drop capabilities and Macintosh-style folders.

All these improvements to DOS lead to one conclusion: Competition gives users the best choices.

—Jeff Bertolucci

Dueling DOSes

IBM and Microsoft offer competing versions

	IBM DOS 6.1	MS-DOS 6.0
Antivirus	IBM Anti-Virus, scans memory and drives for viruses	licensed from Central Point Software, similar to IBM Anti-Virus
Backup	Central Point Backup, supports tape drives and scheduled backups	scaled-down version of Norton Backup, supports floppy-only backups
Data compression	none (may be added to later version)	DoubleSpace, provides up to 2:1 compression
Memory management	RAMBoost, automatically optimizes system RAM on 386 or better, frees memory below 640K	MemMaker, similar to RAMBoost
PCMCIA support	drivers for PCMCIA cards, utilities that provide information about PCMCIA sockets and installed cards	none
Pen support	PenDOS, a utility for entering numbers and symbols into DOS applications by hand	none
Price	n/a	$129.95

Shout It Out:

With any of IBM's three new voice recognition programs, your PC will follow your spoken commands—navigating Windows, retrieving database information, even taking dictation.

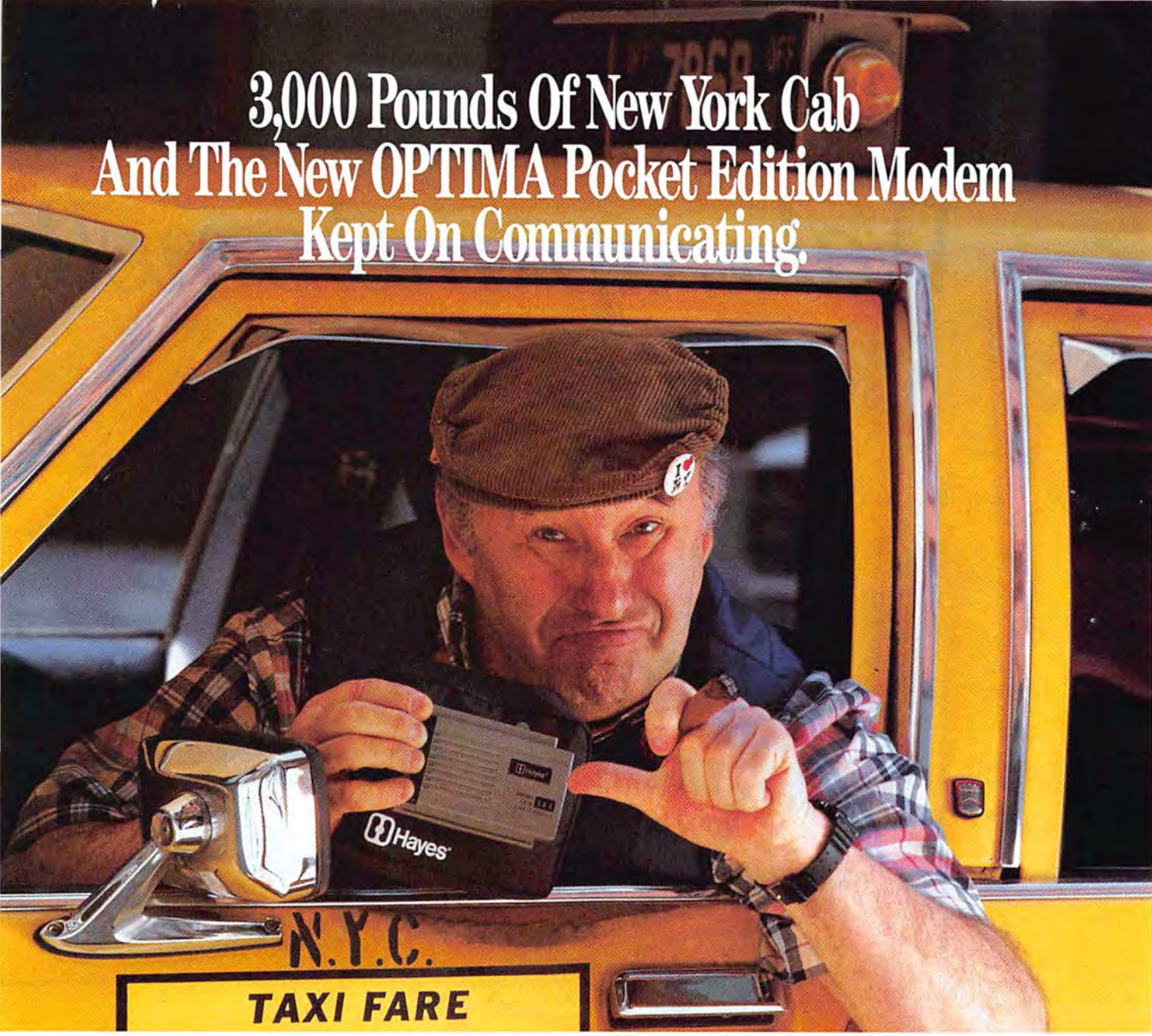
VoiceType Control for Windows ($129) ships with 32 voice commands, such as "file save," "font bold," and "next window," and lets you create 32 voice commands for each of your Windows applications. The 32 preset commands are modifiable, but IBM doesn't recommend changing them. The software comes with your choice of a headset or a hand-held microphone. To use it, you need a 386SX or better with a Sound Blaster card.

If you need to dictate short documents, IBM VoiceType 2 for DOS ($2195) fills the bill. The software's 5000-word vocabulary can be expanded to 7000 words. While the typical person's vocabulary contains around 32,000 words, 7000 should cover common business documents, says IBM. The software also has preset voice commands for Microsoft DOS 5.0 and 6.0, IBM DOS 5 and 6.1, and nine other DOS applications, including WordStar, 1-2-3, and dBASE. You can create commands for other common DOS apps. The program requires a 386SX or better and IBM's Audio Capture Playback Adapter, which costs about $180. The adapter card comes in ISA and Micro Channel versions and is standard in IBM multimedia PCs.

The high-end IBM Speech Server Series (ISSS) offers serious word power. At $2495 for the stand-alone version with a 20,000-word vocabulary and $6950 for the multiuser version with 32,000 words ($695 for each client), it takes dictation at 70 words a minute. It's available on the RISC 6000 client-server platform.

ILLUSTRATIONS: TOP, JEFF BERLIN; LEFT, SI HUYNH

3,000 Pounds Of New York Cab And The New OPTIMA Pocket Edition Modem Kept On Communicating.



OPTIMA™ 144 + FAX144 Pocket Edition®

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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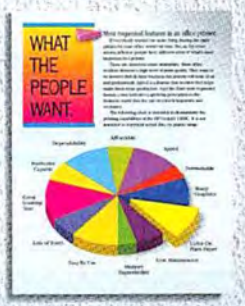

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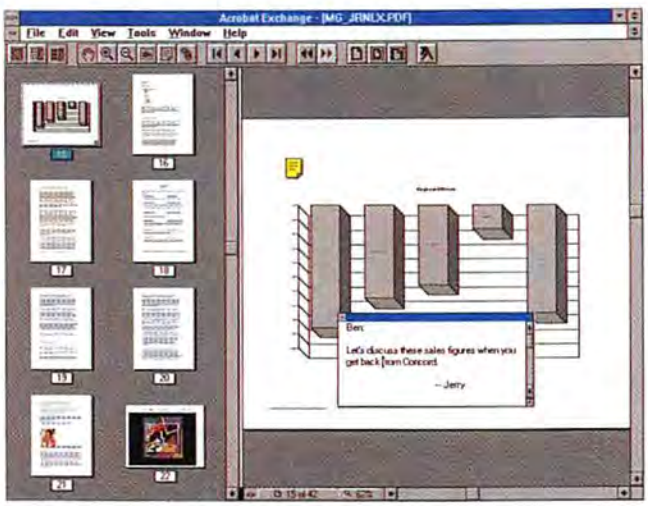

ACROBAT EXCHANGE LETS YOU NAVIGATE a document via thumbnail pages, attach notes, then send it to your colleagues for review.

TEST DRIVE It's no secret that the fastest, cheapest way to distribute information across a company is electronically. The trouble comes when you want to send the same document to executives who use Windows, support personnel running DOS, engineers strapped to UNIX workstations, and a graphics department that would rather die than part with its Macs.

Until recently, your only option was to give up the document's graphics, fonts, and formatting and convert it to simple ASCII text—or invest in an expensive, proprietary document management system.

Adobe Acrobat 1.0 aims to change all that by creating fully formatted documents that can be read (though not edited) on all the major desktop platforms. The Windows and Macintosh versions are shipping, and versions for DOS and UNIX are due before year-end. We looked at prerelease copies of the Windows and Mac versions and found Acrobat to be an agile, if slightly flawed, performer.

Like the Flying Wallendas, Acrobat is a family act. It consists of four products. At the low end, Acrobat Reader lets you view, navigate, and print files formatted for Acrobat; copy text or graphics from an Acrobat file into another program; and perform simple text searches. Designed for the vast majority of users, Reader is priced from $35 to $50 per copy, depending on volume.

Until Acrobat, you had to give up a document's graphics, fonts, and formatting and convert it to ASCII.

If you want to create Acrobat files as well as view them, you'll need Acrobat Exchange. Exchange gives you all the tools found in Reader, plus the capability to create Acrobat-readable files from inside applications, annotate them, and add navigation aids such as bookmarks. The price of Acrobat Exchange ranges from $195 for a single-user package to $14,625 for a 100-user package.

If your documents employ unusual fonts or Encapsulated PostScript (EPS) graphics files, or if you want to distribute high-quality publications such as annual reports, you'll need Acrobat Distiller. (The DOS and UNIX versions of Acrobat will also require Distiller.) Adobe sells two versions: a two-user Personal Distiller for $695, and a server-based network version for $2495. (A starter kit featuring ten copies of Exchange and one copy of Personal Distiller retails for $1395.)

Acrobat works by translating files into its own portable document format (PDF), PostScript-like ASCII code that Reader and Exchange use to re-create the look of the file on screen.

Creating a PDF file from inside your applications is as easy as printing. In Windows, you simply go to your program's Print Setup dialog and select the PDFWriter driver from the list of printers. Then you issue the print command and name the directory where you want to store the file—Acrobat takes care of the rest.

Using Acrobat Distiller is equally painless. First you print each document to a PostScript or an EPS file. Then you convert files by opening them inside Distiller or by moving them into a directory that Distiller checks at regular intervals, processing them automatically.

To make PDF files truly useful, however, you've got to bring them into Acrobat Exchange. There you can annotate the document with Post-it–like notes, insert bookmarks, or create miniature versions of each page (called *thumbnails*) and move from page to page simply by clicking on one.

Exchange also lets you create hypertext links to, say, cross-reference all occurrences of a word or link a chart to text on another page. Unfortunately, its linking talents are limited: There's no way to create links across documents, for example, or to link all occurrences of a word at once. This can make indexing long documents tedious.

The real test of Acrobat's success will be how well it lets you

Adobe Acrobat 1.0

This family of products lets you create fully formatted documents you can read on Windows and Mac systems.
Key Features: Retains document formatting and graphics across platforms • Preserves font sizes and widths • Creates hypertextlike links between text and/or graphics
Pricing: Single-user packages Acrobat Reader $50, Acrobat Exchange $195; two-user Acrobat Personal Distiller $695; Acrobat Network Distiller $2495
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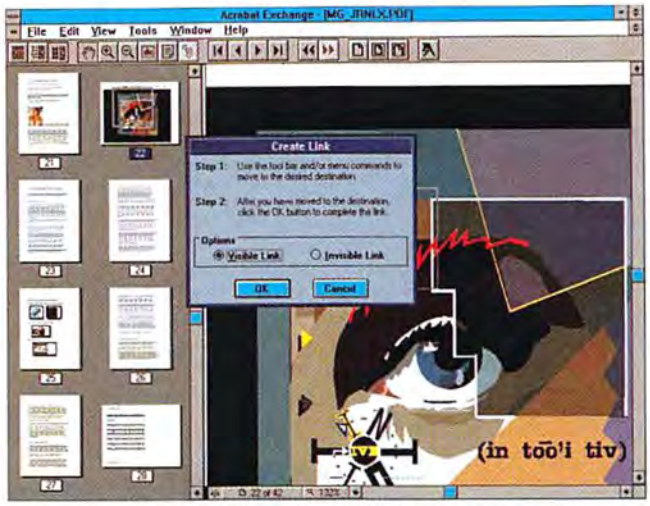
Continued from page 70

move documents across platforms with the documents' fonts and graphics intact. In our informal tests of a beta version, Acrobat nimbly juggled graphics in a variety of formats—PCX, BMP, CGM, CorelDraw CDR, and MacPaint PICT—from Windows to the Macintosh and back. When it came to moving fonts, however, Acrobat stumbled.

When you open a PDF file that contains fonts not installed on your system, Acrobat creates substitutes for them using its Multiple Master technology. While not an exact duplicate of the missing font, the new typeface is designed to retain the original's size, weight, and style—keeping the document's line breaks and overall formatting intact.

If the only typefaces you ever use are Helvetica, Times, and their close cousins, Multiple Master fonts should work just fine. But if you want to get fancy, you may have problems. When we moved our test documents from Windows to the Mac, script faces lost their cursive characteristics, and some heavy sans serif fonts turned into wimpy serif typefaces. Adobe says that it's continually fine-tuning its Multiple Master fonts and will be coming out with enhanced versions in the future.



ADOBE ACROBAT LETS YOU CREATE LINKS between text, graphics, or any other objects in your files and jump quickly between them.

When document design is crucial—and you use Adobe typefaces—you can embed the fonts in a PostScript file and use Acrobat Distiller. But if you use TrueType fonts, your only options are to accept the Multiple Master substitute or else convert the font into a graphic, sacrificing some quality.

Maintaining small file sizes also makes it easier to move documents across platforms. Acrobat employs a variety of compression schemes to keep PDF files trim, but with varying success. For example, an Ami Pro 3.0 document stuffed with 400K of bit-mapped graphics shrank to a relatively svelte 85K PDF file with my beta version. However, a 3K WinWord 2.0 document containing symbolic fonts ballooned to 111K when Acrobat treated them as embedded graphics. The number of notes, bookmarks, and thumbnails a PDF file contains will also affect its size—factors you need to consider if you hope to shuttle big documents across a LAN.

Big Plans

Despite its flaws, Acrobat shows promise. Adobe has big plans for future versions, including more powerful text searches, improved hypertext linking, and the capability to retain the document's structure as well as its format, making it easier to manage huge documents.

Adobe may have to share the spotlight with other vendors—such as Interleaf, which is expected to ship low-cost DOS and Windows versions of WorldView this year; Frame Technology, with FrameReader; and No Hands Software, with Common Ground. Like Acrobat, these products will spur the move away from paper toward network, CD ROM, and on-line distribution of information—bringing the long-sought paperless office one step closer to reality.

—Daniel Tynan

Expand Your Horizons:

Computer users want to see more of Windows, and they're tired of eyestrain. That's the word from industry analysts, who say sales of 15-inch and 17-inch monitors are increasing as buyers opt to spend more for larger displays rather than stick with the standard 14-inch displays that ship with most systems.

Sales of 15-, 16-, and 17-inch monitors should constitute more than 40 percent of all monitor sales by the third quarter of 1993, according to market research firm Dataquest. That's up from just over 12 percent of all monitor sales for the same period in 1992.

While monitor prices are dropping, people are spending a larger percentage of their overall PC cost on their display. According to Dataquest analyst Jack Roberts, the monitor now accounts for 25 percent of the system price—up from just 10 percent two years ago.

Why the change? "In a word: Windows," Roberts says. To get the most out of Windows' graphical interface, you need a large screen, high resolution, and a high refresh rate—typical attributes of 15-inch and 17-inch monitors.

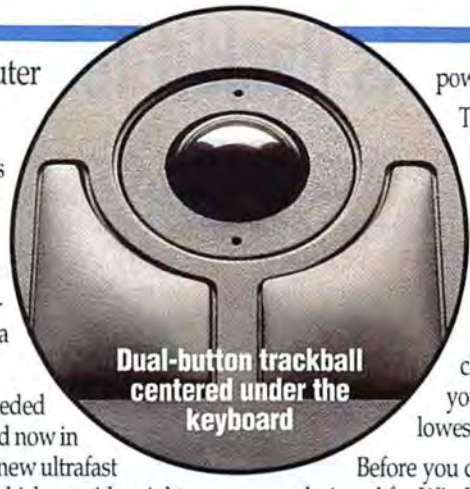
JEFF BERLIN

Windows at Your Fingertips

WinBook™, the first notebook computer designed specifically for Windows

The WinBook by Micro Electronics™ gives you all the power to run Windows, and the unique 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.



The WinBook comes with the power and speed needed to run Windows effectively—in monochrome and now in dual-scan STN color. 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.

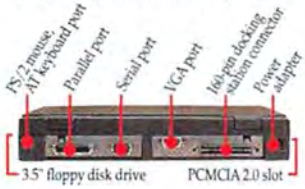
The WinBook was engineered for Micro Electronics, a division of MEI/Micro Center, Inc. MEI is America's leading direct source for computer accessories. Micro Center has been selling PCs for more than 14 years—longer than IBM or Compaq—with over 736,000 units sold. And with over 2.2 million satisfied 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 only one designed for Windows.

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

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

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



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 and includes parallel, serial, PS/2 mouse, external keyboard and VGA ports.

And it's just $399!

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.

Service, warranty and support

- 72-hour service turnaround guarantee.
- 45-day unconditional money-back warranty.
- 24-hour burn-in protection.
- One-year limited warranty on parts and labor.
- Toll-free technical support for the life of the computer.

Your satisfaction is unconditionally guaranteed for 45 days from date of purchase. If for any reason whatsoever you are not satisfied with your purchase from us, we want you to return it. We will be glad to repair the product or give you your money back.

No-risk, 45-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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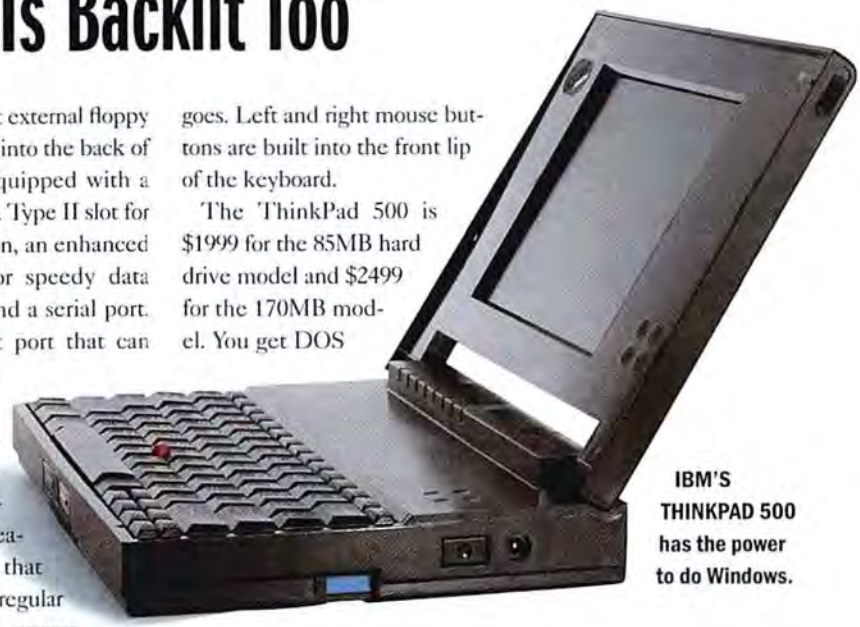

IBM'S THINKPAD 500 has the power to do Windows.

TEST DRIVE The IBM ThinkPad 500 is about as superior to IBM's first portable computer as it could be. The inauspicious IBM Portable had all the heft of a desktop but none of the power. The ThinkPad 500, however, stands in sharp contrast: This 3.9-pound subnotebook runs on IBM's 50-MHz 486SLC2—setting a pace that's faster than the Intel 486DX-33's but not quite the speed of the 486DX2-50—and holds 4MB of RAM and an 85MB or a 170MB hard disk. The unit's backlit VGA screen has 64 levels of gray and measures a comfortable 7.4 inches diagonally, making it easy on the eyes.

Battery With a Plug

IBM designed this very portable (10.1 by 7.2 by 1.6 inches) PC with travel in mind. Its most significant feature is a self-charging battery that can be slipped out of the unit and plugged directly into any U.S. power socket via an unfolding two-prong plug. As long as you don't travel internationally, you'll be able to take the system on the road without the added burden of an AC adapter.

Battery life is respectable thanks to a good range of power management functions, including a doze mode that turns the LCD screen on or off with a hot key, and a hibernate mode that acts like suspend/resume but also saves the data and system status to the hard drive. The ThinkPad 500 supports the Advanced Power Management (APM) specification, and IBM claims a battery life of about 3.5 hours from its lead acid battery.

The ThinkPad 500 comes with a slim, light external floppy drive that plugs into the back of the unit. It's equipped with a single PCMCIA Type II slot for future expansion, an enhanced parallel port for speedy data transmission, and a serial port. A VGA output port that can operate simultaneously with the subnote's screen is complemented by a full-featured keyboard that is 90 percent of regular size. I found a preproduction unit perfectly usable and had no trouble touch-typing immediately.

Fashion Accessory?

Can't tell your notebook from the others lying around the office—or you just want everyone to know who's working away in seat 2B? When you register the ThinkPad 500, IBM sends you a nameplate that fits into a small indentation at the top of the system unit cover. Besides vanity, the nameplate serves some practical purposes for security and identification. However, if you're serious about theft prevention, we recommend a third-party security device such as CMG's Notelock or Intelligent Security Systems' Firmloc access control system.

Tracking the Point

Yet another bonus is the TrackPoint II pointing device. Resembling a red pencil eraser, it's embedded between the G and H keys. You push it in the direction you want the on-screen pointer to move. It's pressure sensitive; the harder you push, the faster the mouse pointer goes. Left and right mouse buttons are built into the front lip of the keyboard.

The ThinkPad 500 is $1999 for the 85MB hard drive model and $2499 for the 170MB model. You get DOS 5.02, Prodigy, and a coupon for a free upgrade to IBM DOS 6.1 when the product becomes available. Those are very competitive prices for a 486-based subnote, and ones that pit the IBM squarely against the Zeos Contenda, a similar subnotebook that's been available for a few months but that lacks a PCMCIA slot and has a slower processor and a smaller hard drive. In fact, the ThinkPad is competitive on features with most monochrome full-size notebooks and has enough power to let you run Windows applications on the road.

Are there drawbacks to using the ThinkPad 500? Well, there's no such thing as no-compromise computing, and one of the biggest sacrifices you'll make is in dealing with the unit's small screen. It's adequate for most common tasks, but I'd prefer not to run a large spreadsheet or edit a complex presentation on it. However, most competing subnotebooks use screens of a similar size, so this isn't a major competitive drawback. Since the ThinkPad 500 is capable of driving an external VGA signal simultaneously with the built-in display, you could even use it for making presentations on the road—as long as a color monitor is available at the site where you give your presentation.

The TrackPoint II is a wonderful pointing device, although it takes about half an hour of practice to get used to it. One minor disadvantage is that to get to the serial port, you have to plug in the external floppy drive, which has an additional cable leading out of it that terminates in the serial port.

—Owen Linderholm

IBM ThinkPad 500

This 3.9-pound subnote has a bright screen, a comfortable keyboard, and lots of power.
Key Features: Self-charging battery • 486SLC2-50 processor • TrackPoint II pointing device • PCMCIA slot
Pricing: With 85MB hard disk $1999, with 170MB hard disk $2499
Availability: Immediate
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Zeos and Leading Edge: 486s for All Budgets

Two new low-cost lines from Zeos and Leading Edge bring 486 power to you for under $1500. Whether you need network workstations in a large office or 486s for your small business or home office, there's something here for even the smallest budgets.

Zeos built its Intel 486SX–based LiteLine PCs to be compact while still providing expansion features such as open slots and an OverDrive socket. The plug-and-play Leading Edge line includes the Cyrix 486-SLC–based WinPro 486s and the Intel 486SX–based WinPro 486e series.

Trade-Offs

The low prices of these lines involve some trade-offs; for example, there's no local bus video and no upgrade path to OverDrive for DX2.

Zeos lets you choose from four standard LiteLine configurations. With 4MB of system RAM, 512K of video RAM, and a 107MB IDE hard drive, the 486SX-25 is $1395; the SX-33 is $1495. With 8MB RAM, 1MB of video RAM, and a 214MB IDE hard drive, the 486SX-25 is $1695; the SX-33 $1795. The systems have 5¼- and 3½-inch floppy drives. At such bargain prices, home offices can snap up these space-saving PCs without breaking the bank.

In tests by *PC World* labs, we found them to be competent performers, with the SX-25 scoring above average in our application benchmark suite. For speed, all the systems have a 64K SRAM cache. They include the same monitor as more expensive Zeos PCs: a 14-inch super-VGA noninterlaced model, with 1024 by 768 resolution and a .28-millimeter (mm) dot pitch. And the LiteLine's firm keyboard response is impressive. MS-DOS 6.0 and Windows are preloaded.

When you're ready to upgrade, you'll discover a nice bonus when you open the PC: The five available 16-bit expansion slots are easily accessible. The systems, which provide a 16.25-by-16.5-inch footprint, have four bays (one empty). They also accept up to 32MB RAM using standard SIMMs.

Leading Edge

For small or home offices, Leading Edge's WinPro series offers easy plug-and-play setup. The manual is one of the most comprehensible we've seen, and software, including Microsoft Works, Microsoft Productivity Pack, and Quicken for Windows, is preloaded on hard drive models.

The WinPro 486 systems, which originally used the 25-MHz Cyrix 486SLC but should be available in 33-MHz models by the time you read this, come in various configurations: with 2MB or 4MB (expandable to 16MB) of system RAM; a 107MB, 130MB, or 213MB hard drive; a 3½- or both 3½- and 5¼-inch floppy drives; and a 512K super-VGA controller. The two 4MB, dual-floppy standouts in the pack are the 1244 (130MB hard drive) and the 1264 (213MB hard drive) for $1019 and $1149, respectively. Monitors are sold separately; we suggest you get at least the $449 noninterlaced, .28mm-dot-pitch, super-VGA model.

All models have five 16-bit expansion slots (three open) for upgrading.

For more expansion, consider the WinPro 486e series, Leading Edge's Intel-based 486SX-25, SX-33, DX-33, DX2-50, and DX2-66 systems that come with a Western Digital–based Windows accelerator. Their 4MB RAM expands to 32MB, and the 120MB hard drive upgrades to 260MB. These systems also sport six expansion slots (four open) and four drive bays (one open). The CPU sits in a 169-pin OverDrive socket, so you can upgrade SX and DX models to DX2 speeds. The SX-25 is $1099 with a 120MB hard drive, $1149 with a 170MB hard drive.

—Laurianne McLaughlin

ZEOS FOR LESS: Zeos's low-cost LiteLine PCs come with RAM, hard drive, and your choice of Intel 486 processor but lack local bus video and a Pentium upgrade path.

Zeos LiteLine PCs; Leading Edge WinPro 486, 486e PCs

These low-cost lines aim to bring 486 power to everyone's desk and include large hard drives and room to upgrade in the bargain.

Zeos Int'l
800/554-5220, 612/633-4591
List price: $1395 to $1795 with monitor
Reader service no. 651

Leading Edge Products, Inc.
800/874-3340, 508/836-4800
List price: WinPro 486s (Cyrix-based) $899 to $1019 without monitor, WinPro 486e's (Intel-based) $1099 to $1299 without monitor
Reader service no. 652

Toshiba Enhances Its Notebook Family

TOSHIBA'S T4600C color notebook features an active-matrix display, Intel's 33-MHz 486SL processor, 4MB RAM, and two PCMCIA slots.

Low cost or top performance? That's the question Toshiba poses with its latest round of notebooks, including two additions to its bargain-priced Satellite family and two premium notes featuring Intel's power-stingy 486SL processor.

Toshiba's T1900 and T1900C Satellites offer interesting enhancements such as a PCMCIA expansion slot, a power-conserving 20-MHz 486SL processor, and a Microsoft BallPoint trackball that plugs into the side of the notebook.

With prices starting at around $2000, the T1900 comes with 4MB of RAM (expandable to 20MB); an internal 80MB, 120MB, or 200MB hard drive; and a 9½-inch monochrome VGA display. A single PCMCIA slot can hold Type II cards such as fax-modems or LAN adapters, or larger Type III cards, including removable hard drives.

The T1900's nickel metal-hydride (NiMH) battery provides over 3 hours of computing and charges in 2 hours, Toshiba says. This 6.4-pound note comes with DOS 6.0 and Windows 3.1 and features Microsoft's BallPoint trackball.

The T1900C has all the features of the T1900 but adds an enhanced passive color display with a faster response time and a wider viewing angle than Toshiba's previous passive-color display. Its NiMH battery runs for over 2 hours between charges and recharges in 2 hours. The T1900C is priced at around $2600 and weighs just under 7 pounds.

Toshiba's extension of its T4500 family, the T4600 is available with a monochrome or active-matrix color display and Intel's 33-MHz 486SL processor, equal to a 486DX with built-in power management.

T4600 notes come with 4MB of RAM and either a 120MB or 200MB hard drive. They include two PCMCIA slots: a Type II slot and an oversized 16mm slot for today's removable hard drives or future communications devices such as pagers and wireless modems. The T4600C has a 9½-inch active-matrix color display.

The monochrome notebook model will be priced around $2800; the T4600C will sell for approximately $3400.

—Jeff Bertolucci

T1900, T1900C Satellites; T4600, T4600C

Four Toshiba notebooks with energy-saving 486 processors and PCMCIA slots.

Toshiba America Information Systems, Inc.
800/334-3445
List price (approximate): T1900 Satellite $2000, T1900C Satellite $2600, T4600 $2800, T4600C $3400
Reader service no. 653

Voice Recognition Offers Alternative to Mice

Pro AudioStudio 16

Media Vision builds on past success with a 16-bit sound board that features limited voice recognition and enhanced control.

Media Vision, Inc.
800/348-7116
List price: $349
Reader service no. 654

Why make your fingers do the walking when you can use your voice instead? With Media Vision's new Pro AudioStudio 16 sound board, business users can stop mousing around the menu bar and use voice commands to cruise through applications. The $349 Pro AudioStudio 16 is basically an enhanced Pro AudioSpectrum 16 card with more sophisticated editing tools, greater input control, and limited voice recognition.

Like its predecessor, the Pro AudioSpectrum 16, the Pro AudioStudio 16 supports full 16-bit sound and a 44.1-kHz sampling rate for CD-quality recording and playback. It includes a sound mixer, full MIDI support, and an interface for a SCSI CD ROM player. New features include line-level and 4-watt speaker output, selectable input gains, and improved sound fidelity.

Where Pro AudioStudio 16 really stands out is in voice recognition. Using technology licensed from Dragon Systems, the board features a dynamic 300-word library of verbal commands. Once installed, the ExecuVoice recognition program runs through a training session that customizes the system for your voice and lets you set up specific word libraries.

The Pro AudioStudio 16 fits into a full-length ISA slot and includes input jacks for an audio CD ROM player and a microphone as well as outputs for speakers and an amplifier.

—Michael Desmond

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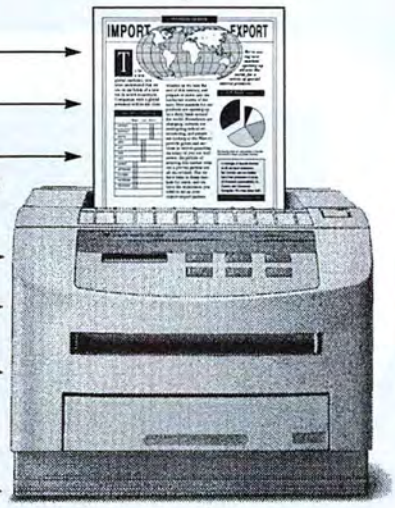

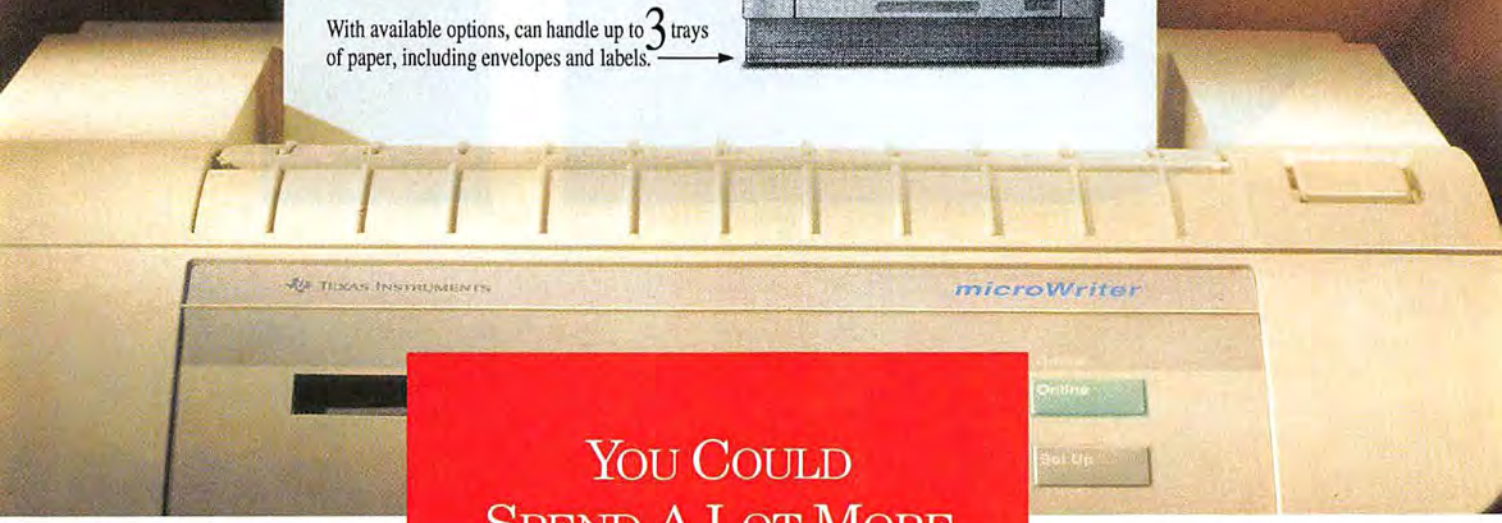

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Circle 242 on reader service card

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Photo-Quality Color Printing Hits a Brilliant Price

Kodak ColorEase PS

Near dye-sublimation-quality printing is now available at thermal transfer prices.

Eastman Kodak Co., Desktop Imaging Division
800/344-0006, 716/253-0740
List price: $7999
Reader service no. 655

Until recently, the color printer market was three-tiered. At the bottom were color ink jets, which are affordable (in the $500 to $3000 range) but are technically limited to producing solid blocks of color. Next came thermal wax transfer printers, which produce finer, more saturated colors than ink jets, but typically cost $4000 or more.

The third tier, dye-sublimation printers, was reserved for graphics professionals with wads of cash—entry-level units cost about $10,000. These printers produce continuous-tone prints by vaporizing colored inks onto the page—meaning no dots and no dithering—and the quality of their output can rival color photos.

Kodak's ColorEase PS printer breaks the $10,000 barrier with a list price of $7999, which puts it in the thermal transfer range. But its technology, which Kodak calls "thermal dye transfer," is closer to dye sublimation. Like a dye-sub printer, the ColorEase melds its translucent dyes into the paper or transparency film, instead of just laying them on the surface. The result: near-dye-sub quality.

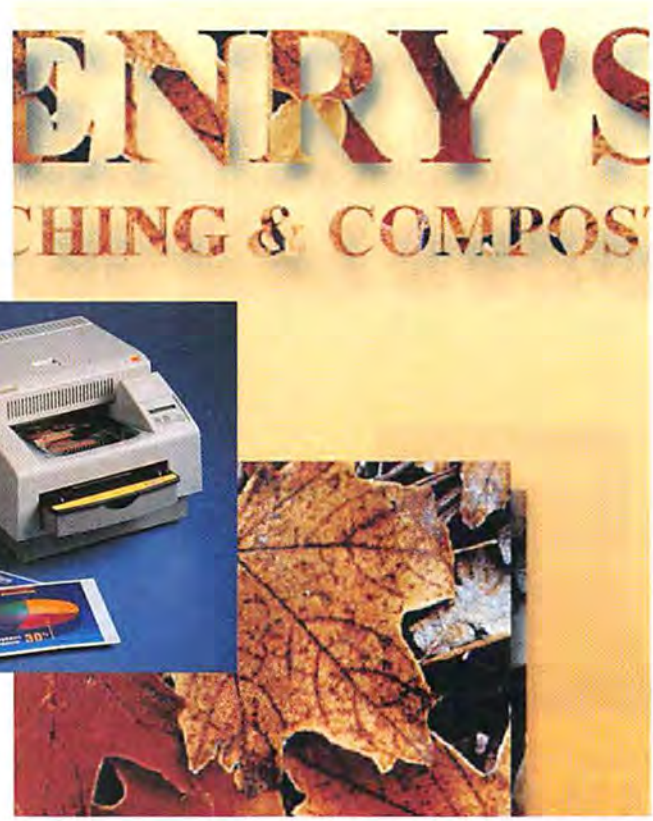
So who needs this high-quality color printing? Anyone who wants to gain a competitive edge by incorporating superior color reproduction into report covers and flip charts, or anyone who currently pays a service bureau to produce 35mm slides for presentations. Desktop publishers and graphics departments are also prime candidates; the ColorEase could be used to print proofs of a new brochure before a job is sent to an offset press for production.

The Kodak ColorEase uses three color ribbons: cyan, magenta, and yellow, which it combines to produce black. In the print samples we've seen, the blacks are solid; with many three-color printers, blacks have a washed-out brownish tint. Transitions between colors are smooth, with none of the obtrusive dithering patterns you see on output from thermal transfer printers and ink jets. The ColorEase rasterizes images at 300 dpi, but these dots are blended by the dye diffusion process.

Like dye-sublimation printers, the ColorEase requires expensive special paper and transparency media. Kodak estimates that paper and dye ribbons will add up to $2 for each paper print and $2.50 for each transparency.

The ColorEase is equipped with a 40-MHz Sparc RISC processor, 16MB RAM, and a 120MB hard drive. The printer uses PostScript Level 2 and comes with 35 resident Adobe Type 1 fonts. It has serial, parallel, and LocalTalk ports.

—Dan Miller



KODAK BREAKS THE $10,000 BARRIER with its $7999 ColorEase PS, a printer with output that rivals the quality of color photos.

Video Seven Revamps Board Line

Video Seven has revamped its product line after its acquisition by SPEA AG and introduced the Vega TC and Mirage boards.

Mirage, Vega TC boards

Video Seven makes a quick change with the new Mirage and Vega TC boards.

Video Seven
800/238-0101, 510/659-9285 (fax)
List price: Vega TC ISA and VL $169, Mirage ISA and VL $249
Reader service no. 656

The Vega TC, like the Win.Swift before it, employs Cirrus Logic's GD5426 chip, and ships with 1MB of DRAM. The Vega displays up to 65,000 colors at VGA resolution and 72-Hz screen refresh. The ISA and VL versions list for $169.

The Mirage takes its cue from the Win.Pro, with S3's ISA-based 801 and VL-based 805 chips. The Mirage comes with 1MB of DRAM, which is expandable to 2MB, and supports up to 65,000 colors at VGA resolution and a high 85-Hz refresh. Both ISA and VL models list for $249.

—Michael Desmond

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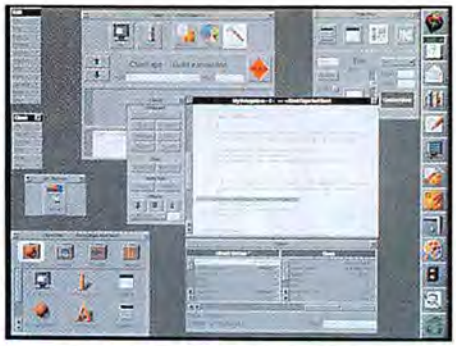
Circle 225 on reader service card

Full-Power UNIX on the PC: NeXTStep and Solaris



NEXTSTEP LIVES: NeXTStep for Intel offers a variety of object-oriented tools, many of them easing the job of developing software.

It's a sign of the times. As PCs get more powerful, they're beginning to compete with low-end UNIX workstations. And how are the companies that make UNIX workstations reacting to this? In the case of SunSoft and NeXT, by bringing their UNIX-based operating systems to the PC.

Taking the NeXTStep

NeXT, whose distinctive black boxes were once considered the next step in computer evolution, is getting out of the hardware business. Instead, NeXT will focus on its UNIX-based NeXTStep operating system, both for its installed base and in a new version for 486 and Pentium PCs.

NeXTStep's object-oriented design earned the environment its reputation as the easiest for developing applications. With that in mind, NeXT is primarily targeting NeXTStep for Intel processors at Fortune 500 MIS departments that are developing custom applications. There's a catch, however: Software developed in NeXTStep can only be run in NeXTStep.

Converting to the PC will require some expensive hardware—you'll need at least a 486DX with 8MB of RAM. If you want color graphics, you'll need a minimum of 16MB, with 24MB recommended (our review machine came with 32MB). The fully installed system requires 120MB of hard disk space.

NeXTStep has an easy and powerful GUI interface and ships with a number of miniapplications, including a low-end word processor; E-mail; a fax reader; and the complete known works of William Shakespeare, which provides a solid demonstration of NeXT's text-retrieval engine.

NeXTStep for Intel is source code–compatible with the NeXT hardware version, so developers can support it by doing little more than recompiling their code. It's therefore safe to assume many applications will be available for both platforms.

NeXTStep will ship with a demonstration version of Insignia's SoftPC, which will let you run DOS and Windows within NeXTStep for 20-minute periods. A real version will cost extra, although exact pricing wasn't set at press time.

Computing Where the Sun Shines

Meanwhile, SunSoft's Solaris operating system, which runs on the majority of RISC systems, is available for PCs.

As a minimum, Solaris for x86 requires a 33-MHz 386DX, a math coprocessor, and 12MB of RAM. That sounds less demanding than NeXTStep for Intel, but the company recommends a 486DX with 16MB of RAM. Since the operating system is distributed only on CD ROM, you will need a drive for that as well.

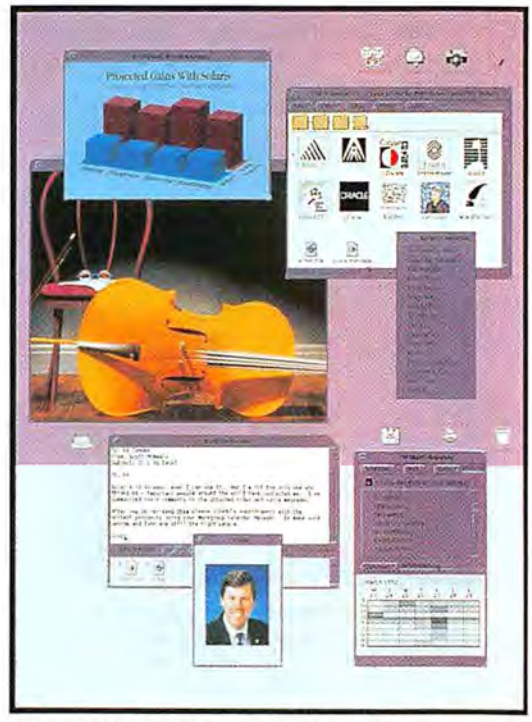
Still, such a computer comes cheap compared with the high-end workstations that Solaris was originally designed for. And Solaris for SPARC workstations or PCs was never intended for the average user. Solaris for x86, like its RISC-based sibling, is designed for people who use work group-related, processor-intensive applications such as CAD, or for multiuser, distributed processing such as client-server databases.

Thousands of such applications are available for Solaris, and many of them may be migrating to the x86 platform. Like NeXT, SunSoft has made this migration easy by designing the two versions to be source-code compatible.

What you won't find for Solaris is the wide variety of basic productivity applications, such as spreadsheets and word processors, available for DOS and Windows. But with Solaris for x86, you won't have to, since you'll be able to run DOS and Windows through Solaris. Unlike with NeXTStep for Intel, there will be no extra charge.

These operating systems may hold little interest for the average PC user. But for the users who need this kind of power, PC versions can mean big savings in hardware.

—Lincoln Spector



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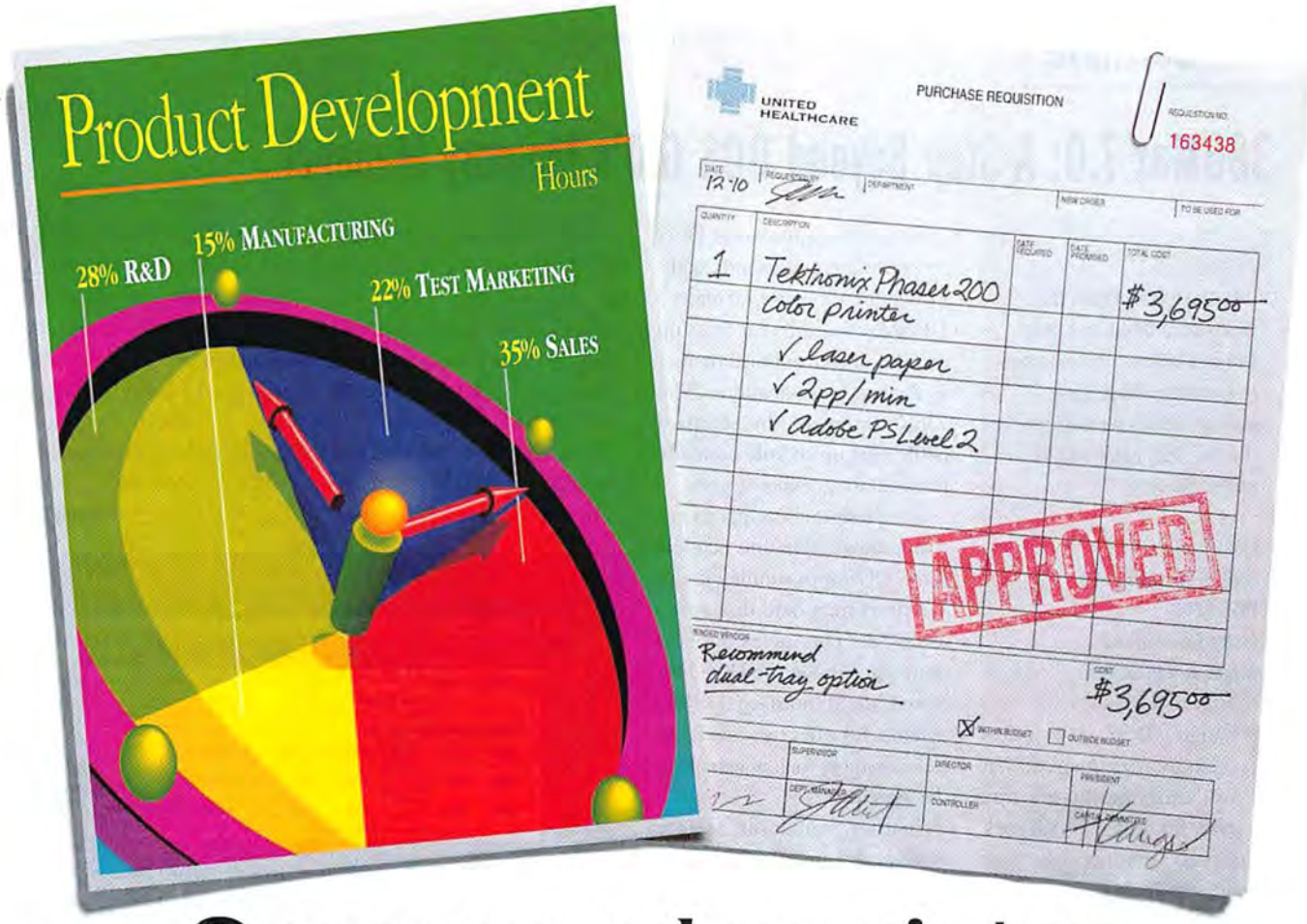
Reader service no. 657

SunSoft
800/227-9227, 510/460-3267
List price: $795
Reader service no. 658



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Circle 124 on reader service card

386Max 7.0: A Step Beyond DOS 6.0's Memory Manager

386Max 7.0

DOS 6.0 hasn't taken the wind out of Qualitas's sails: The new version of this memory manager can provide smooth sailing for anyone running DOS applications under Windows.

Qualitas
800/676-6386, 301/907-6700
List price: $99.95
Reader service no. 659

Though DOS 6.0 offers memory management that will satisfy most users, true memory hounds will still seek third-party products, such as Qualitas's 386Max 7.0. This release tries to make life easier for anyone who wants to run DOS applications from Windows and frees more memory than DOS 6.0's MemMaker memory optimizing utility.

To run character-based DOS programs more efficiently within Windows, version 7.0 offers a DOSMax feature that frees up to 736K of conventional memory for these applications. The 736K comprises the standard 640K plus up to 96K normally reserved for graphics screens.

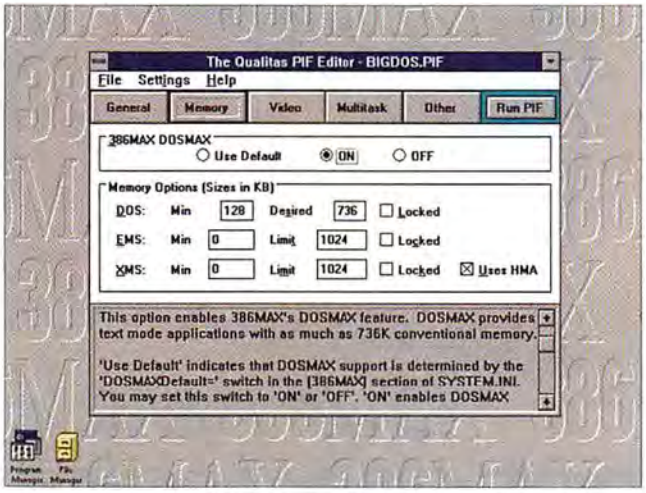
The product also supports virtual memory, a feature that lets some DOS apps running under Windows treat hard disk space as RAM. This gives applications that support the DOS Protected Mode Interface (DPMI) version 1.0 effective access to more memory than is actually in the system.

Another significant feature is designed for users of DOS 6.0's multiple boot feature, which lets you choose from among different system configurations at system start-up. To optimize multiple configurations with DOS 6.0's MemMaker, you must create separate CONFIG.SYS and AUTOEXEC .BAT files for each start-up situation you might encounter, optimize each one, and then combine them into a single set of CONFIG.SYS and AUTOEXEC.BAT files.

This is a time-consuming and arduous task. 386Max 7.0, however, lets you create a single set of CONFIG.SYS and AUTOEXEC.BAT files with all the configuration variations you want to choose from and then optimize it.

Finally, Qualitas claims that 386Max 7.0 can free up to 70K more base memory than DOS's MemMaker.

—Randy Ross



386MAX 7.0 offers a DOSMax feature that frees up to 736K of conventional memory for character-based DOS apps running within Windows.

Instant Recipes for Frugal Desktop Publishers

Anyone who's ever cracked a desktop publishing package can tell you that creating tasteful documents is no picnic—unless you've got a program like Microsoft Publisher 2.0 to lend a helping hand. This $199 package lets even DTP amateurs whip up great-looking newsletters, fliers, and reports.

The key ingredient is Microsoft's Page Wizard Design Assistants, on-line tutorials that step you through the process of creating a document. Select the Page Wizard for a newsletter, for example, and Publisher guides you through a series of screens from which you choose a style (such as classic or modern), the number of columns, page length, and other elements. Thumbnail images of each option and bite-size design tips help ease the decision-making process. Once you've made your selections, just add text and graphics, then stir. Voilà! Out pops a finished document, ready for printing.

Publisher 2.0 includes 17 Page Wizards plus 35 prefab templates.

Version 2.0 also mixes in a batch of new features, such as the capability to flow text around irregular objects automatically; define paragraph styles for fast global format changes; and link text between, say, a frame on page 1 and one on page 8. You also get a table editor, a logo-creation tool, and a clip art gallery. An improved version of WordArt, Publisher's type-manipulation utility, now supports TrueType fonts—a big improvement over those funky bit-mapped fonts in version 1.0. Publisher also supports the new OLE 2.0 specification for data links between applications.

To top it off, Microsoft tosses in 20 new TrueType fonts along with a copy of its low-end Draw package and Note-It, a utility for annotating documents with Post-it–like notes. You can order Publisher for $139 until December 31, or $79 if you're upgrading from 1.0.

—Daniel Tynan

Microsoft Publisher 2.0

WINDOWS The easy way to cook up tasty newsletters, fliers, and more.

Microsoft Corp.
800/426-9400, 206/882-8080, 206/936-7329 (fax)
List price: $199, before December 31 $139, upgrade from 1.0 $79
Reader service no. 660

Micrografx Designer 4.0 Gets a New Look

Micrografx Designer 4.0

A completely redesigned Designer makes precision drawing a thing of beauty.

Micrografx, Inc.
800/733-3729, 214/234-1769, 214/994-6334 (fax)
List price: $695, upgrade $149.95
Reader service no. 661

The first thing you notice about the new version of Micrografx Designer is its look. Users of version 3.0 will be impressed with the completely rewritten user interface: No more flat-looking primitive tools—4.0 is a looker. And the changes aren't just cosmetic.

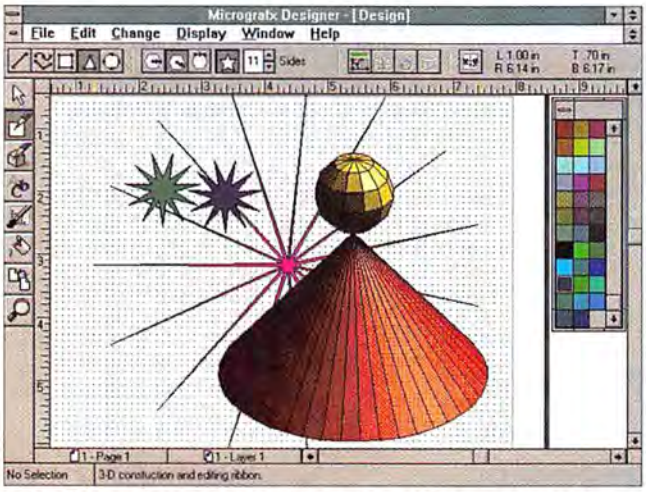
The new interface will be comfortable for anyone who uses other Micrografx programs. There is the familiar hint line at the bottom of the screen that tells you what each tool does as you wave the mouse over it. And to keep the workspace tidy and sparse, each tool has its own associated workspace. Click on the selection tool, and the button bar changes to tools for editing. Select the drawing tool, and tools for drawing circles, polygons, and rectangles occupy the tool bar. Pick one of these drawing tools and the tool bar changes yet again: Pick the polygon tool, for example, and you get a new group of tools relating to polygons—including a nifty one that lets you create gear-like drawings very quickly by defining the number of sides you want, drawing a shape, and pulling the edge toward the center of the object.

Perhaps the snappiest new feature is the capability to draw three-dimensional objects. Simply click the 3-D tool, drag an outline in the document, and your 3-D object appears. You can rotate the object in three dimensions, adjust the direction and intensity of the light source, and control ambient light.

Text handling is also vastly improved. Designer will align text along a curve, fill text with symbols and blends, and stretch and warp it—and the text remains editable throughout. You can fill shapes with text and link the text containers so that overflowing text pours from one shape to the next. It will even spell-check your drawings.

If you occasionally need to do bit-map editing, Micrografx has included a complete image editing program. If you have scanned images you want to include in drawings, bring them into Designer and trace them. It will change them to vector images to reduce file size and simplify resizing. Designer even does slide shows, complete with transition effects, a slide sorter, and a run-time player.

—Christina Wood



DESIGNER GOES 3-D: Micrografx's Designer 4.0 lets you create three-dimensional objects. You can rotate the object in three dimensions and adjust the direction and intensity of the lighting.

Forms That Follow Function

Microsoft Electronic Forms Designer

WINDOWS A design program Visual Basic users will feel at home with.

Microsoft Corp.
800/426-9400, 206/882-8080
List price: $395
Reader service no. 662

WordPerfect InForms

WINDOWS WordPerfect's forms package lets you design forms that can act as a front end to a database, then fill out and route forms over E-mail.

WordPerfect Corp.
801/225-5000
List price: InForms Designer and Filler $495, InForms Filler $199
Reader service no. 663

Forms for travel expenses, purchase orders, and invoices are a big part of any business. Fortunately, software companies are developing products that let you automate the design and routing of forms over E-mail. Now, two of the biggest names in the software business have jumped onto the forms-automation bandwagon.

Microsoft's Electronic Forms Designer relies on Visual Basic to develop forms for Microsoft Mail users. If you know Visual Basic, developing a form is relatively easy: Just select the drag-and-drop tools from the Visual Basic control palette, position them directly on the form, set the control properties, and create the executable.

Once it's created, you can send, receive, and route a form through Mail. The product comes with a Generic template that includes basic messaging functions and fields such as recipient, subject, and comment. Priced at $395, Microsoft's package requires Visual Basic Edition 2.0 or later and Microsoft Mail for Windows.

WordPerfect's InForms is a two-part product that separates the design and fill-in functions.

A Designer package lets you create forms, and a Filler package lets you fill in forms created with the Designer.

The Filler lets you look up and edit database information, so you can fill in forms easily.

InForms Designer and Filler cost $495; InForms Filler costs $199. The product is available in 5- and 20-pack licenses.

—Bronwyn Fryer

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Picture Publisher 4.0: Three Big Features Speed Image Editing

PICTURE PUBLISHER 4.0 makes fast work of image manipulation with improved editing tools and more color correction options.

Editing and retouching photos with Windows software used to be very time-consuming, but breakthrough technology called *object layering* makes short work of this task. Micrografx's $595 Picture Publisher will be one of the first to deliver this technology.

Version 4.0 is easy to use for beginning desktop publishers or business users, yet full-featured enough for high-end graphics work. Picture Publisher offers three critical ease-of-use and speed improvements over the previous version. First, object layers speed work with bit-map graphics by eliminating a lot of reediting. Since bit-map graphics are made up of individual pixels on a single plane, moving an element of a picture leaves a hole on the background, which has to be reedited. No more. Object layers put each element in its own layer, so you can move one element without affecting the others. The screen becomes a collage of rearrangeable pieces.

The FastBits feature lets you edit a small area of a large image quickly. From a grid, you preview an image and pick a section to load in memory and edit. Picture Publisher combines the section back into the image.

A Low Res Image Open Option quickly applies editing changes, such as color correction, to a whole image. It allows you to open an image at a low resolution, which speeds work. When you've finished making corrections, they're stored as a macro, which can be applied later to the high-res image.

We found Picture Publisher 4.0 easy to use and suitable for nondesign professionals, thanks to helpful features such as thumbnail sketches that show color balance, contrast, and brightness. For more speed, a macro recording and playback feature can automate any function. The software also supplies an image browser that stores thumbnail images in albums, with search capabilities.

There is also a suite of new high-end features—including the capability to open, edit and save CMYK (cyan, magenta, yellow, black) files—as well as improved masking and color-correction options. Picture Publisher's ease of use, speed, and cost make it a smart choice.

—Laurianne McLaughlin

Picture Publisher 4.0

WINDOWS This upgrade to Micrografx's image editing program sports three big ease-of-use features, including object layering.

Micrografx, Inc.
800/733-3729 ext. 5050, 214/234-1769
List price: $595, competitive upgrade $149.95
Reader service no. 664

Morphing Your Presentations

Morphing—short for creating a metamorphosis—is the latest special effect to become available to PC business presenters. These complex transformations, popularized in Michael Jackson's *Black and White* video and Spielberg's *Jurassic Park*, can now be done on PCs using Gryphon Software's Morph.

Morph can turn an otherwise ordinary presentation into a dazzling display of creativity. For example, an architect's proposal transforms a dilapidated building into a renovated landmark. You can review the evolution of your product line from original to the latest prototype at 60 frames in 5 seconds.

To create a morph, all you need are two images and a little imagination. Simply select key points you want transformed on the starting image, adjust the corresponding points that automatically appear on the ending image, then let Morph create the images in between until the first image smoothly blends into the last. You can check the progress of your morph frame by frame with Morph's playback viewer. Then specify the number of intervening frames between the start and end images and save entire transformations as AVI, FLI, or FLC movies for video or film output, or as Morph stills in TIFF, GIF, or Targa format.

The quality of your morph depends on how well you prepare your start and end images, both of which must be the same size and have at least a 72-dpi resolution.

Individual morph frames take about 12 seconds to process on a 486DX2-66 with 8MB of RAM. Gryphon Software recommends at least a 386-class PC with 5MB RAM, an 800 by 600 display with 256 colors, and Video for Windows.

—John Goddard

Morph for Windows 1.0

WINDOWS Transform ordinary presentations with high-end video effects.

Gryphon Software Corp.
619/536-8815, 619/536-8932 (fax)
List price: $169
Reader service no. 665

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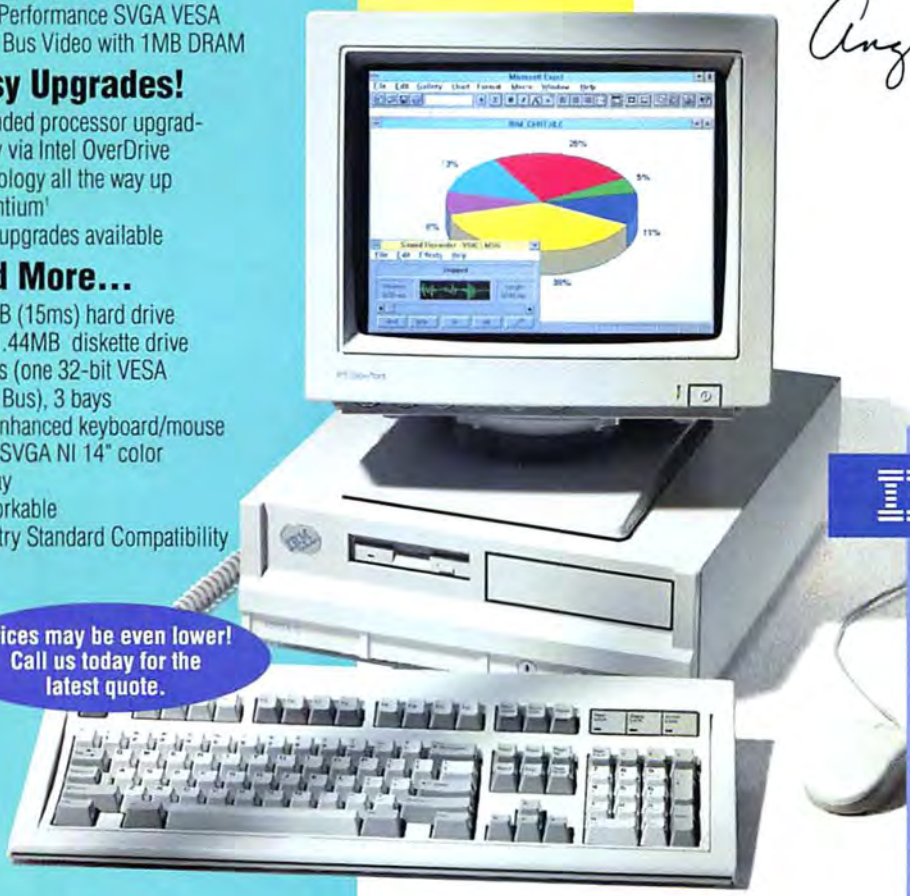

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Kiplinger's CA-Simply Money: A Wiz at Financial Management

Kiplinger's CA-Simply Money 1.0

WINDOWS Computer Associates' first personal finance program handles everything from check writing to investment portfolio management.

Computer Associates
516/227-3300
List price: $69.99 (first million copies $6.95 each)
Reader service no. 666

Managing personal finances just got easier. Kiplinger's CA-Simply Money tracks where you spend your money and advises you on how to manage it better.

The program offers financial advice that is both context- and goal-sensitive. You specify your goals. As you set up accounts or enter other information, you may trigger the product's advisor, which dispenses information based on the editors of the *Kiplinger Letter*, through a pop-up window.

The advice is as solid and useful as that given by your banker or CPA.

Like its competitors Quicken for Windows from Intuit and Microsoft Money, CA's program lets you track spending by filling out a check on screen and allocating it to an expense account. But CA-Simply Money is head and shoulders above the others at managing a portfolio of investment securities. Setting up an investment account lets you track capital gains, interest and dividend income, and expenses such as margin interest. You can dial up an on-line database and automatically update your stock prices.

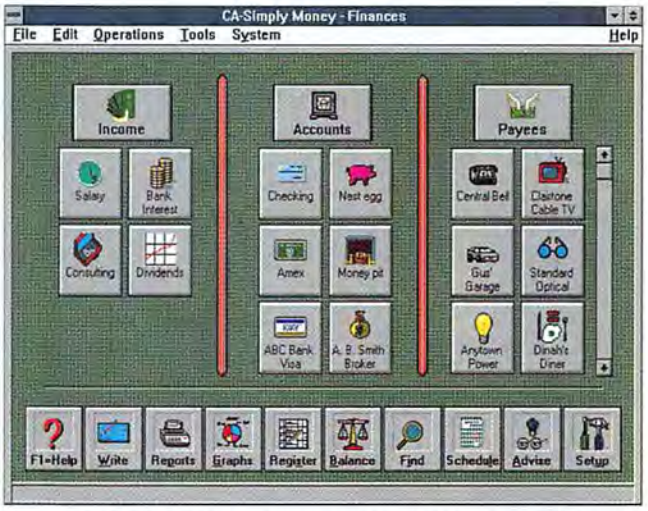
The icons in the program are attractive—with the exception of the shifty-looking advisor. They include miniature representations of credit cards, boats, and, of course, money. There are more than 200 you can choose from to represent your sources of income, expenses, and bank and credit card accounts visually.

A scheduler allows you to set up regular or one-time transactions in the future. These transactions could range from your regular monthly car lease payment to quarterly dividend receipts from your stocks.

CA-Simply Money is aptly named. It's easy to learn and help is readily available. If you float the cursor over an icon button, you'll see a line of help at the bottom of your screen. However, a few operations could be more intuitive. For example, to change an address for a payee, you must enter the setup portion of the program. It would be handier if you could simply click on the payee's icon and modify it directly.

If you want to manage your money more effectively and track your investments, CA Simply Money fills the bill.

—Richard Morochove



Kiplinger's CA-Simply Money allows you to select from over 200 icons to represent your accounts visually.

More Power for Nonprogrammers

Alpha Software's Alpha Four, one of the friendliest and most capable DOS databases for nonprogrammers, is now even more powerful.

Version 3.0 includes full mouse support and field rules that let you design databases that make data entry just about foolproof. For example, a cascading lookup feature lets you nest lookup tables. A conditional lookup feature means you can display different sets of choices from different databases under different conditions. For maintaining real-time inventory or account balances, a posting feature automatically updates related databases.

Additional relational database design features provide referential integrity and provide one-to-many links across related databases. This means, for example, that if you change or delete a record, all associated records in other databases are similarly affected.

To make designing data entry forms easier, Alpha Four 3.0 includes a scrollable region feature. Now you can choose to display, say, only three lines at a time of a table that contains up to 1000 items.

Another design feature allows you to customize the menus at the bottom of each screen in the modes that are most commonly used, View and Browse. With this feature you can customize the wording of the menus and the actions taken by particular selections.

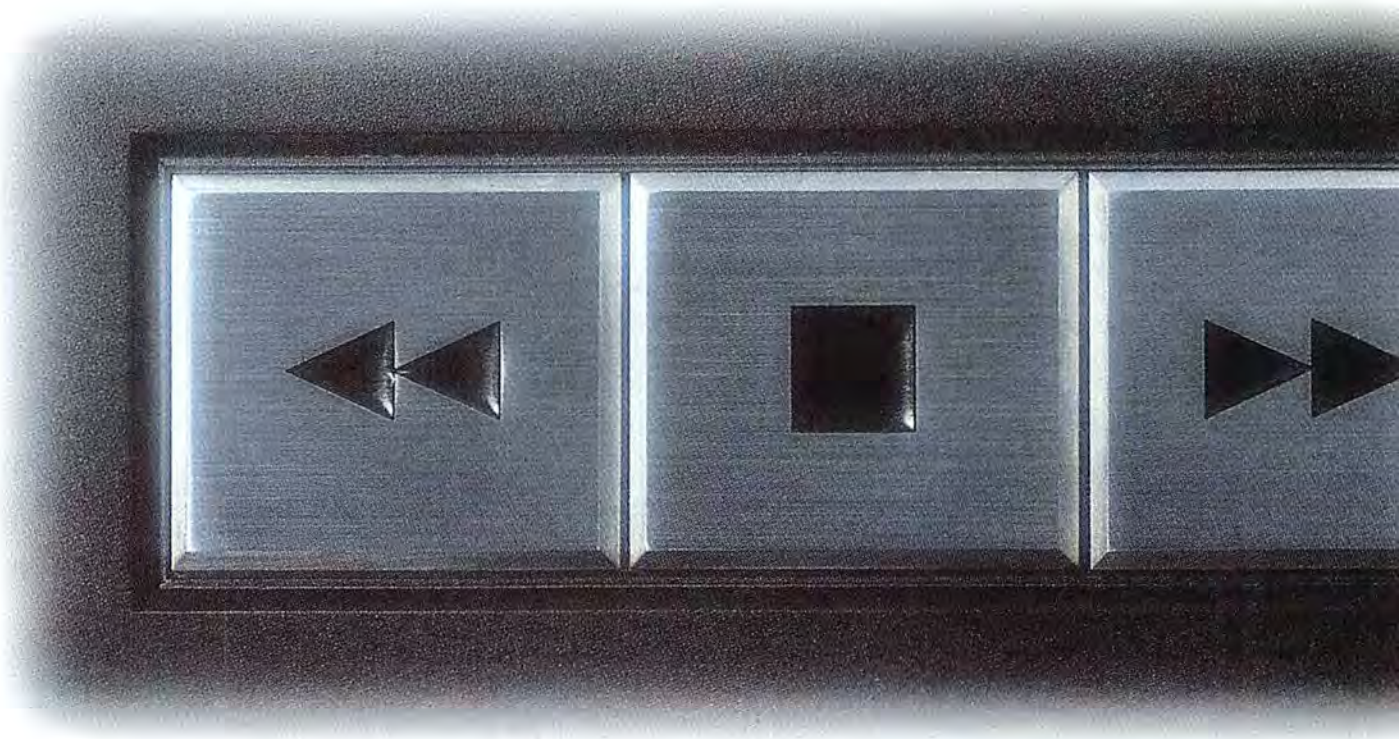
Alpha Software added 11 new functions and 7 script commands to its database. All things considered, Alpha Four version 4.0 is a solid upgrade to an already solid product.

—Randy Ross

Alpha Four 3.0

New database tools make this easy-to-use DOS database more powerful.

Alpha Software Corp.
800/451-1018 ext. 117,
617/229-2924 ext. 117
List price: single-user module $495, multiuser module $595
Reader service no. 667



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.

Recording with the Smart Video Recorder is as simple as pushing a button. And it's fast. It only takes one minute to capture and compress a one-minute video clip. (Other products take up to 15 minutes.) One-step recording also cuts the Smart Video Recorder's disk space requirements—other systems can require

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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.

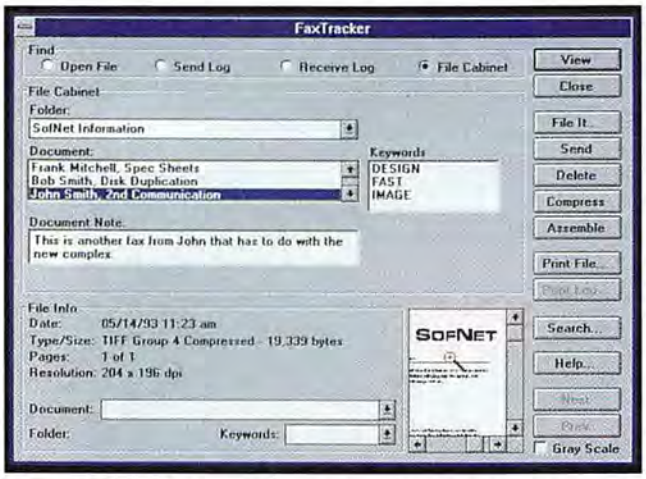
You can get started right away, too, because Microsoft Video for Windows* and Asymetrix Compel* and MediaBlitz* software programs are included in the Intel Smart Video Recorder box.

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.

intel®

Circle 109 on reader service card

SofNet's Latest Helps Keep Your Fax Straight



FAXWORKS PRO 3.0 features FaxTracker, a utility that lets you view, modify, combine, and resend faxes.

FaxWorks Pro 3.0 is a full-featured Windows fax program that includes extensive file management, fast fax viewing, enhanced optical character recognition (OCR) and scanner support, and a cover sheet designer. The company also built all the fax send and receive functions into Windows, tossing out the DOS TSR found in its popular FAXit product and previous versions of FaxWorks.

The highlight of this program is FaxTracker, which lets you view any fax file; modify, resend, or combine it with other faxes for resending; and compress it to almost half its original size for storage.

FaxTracker includes an on-screen file cabinet for managing faxes. You can give fax files full names instead of trying to squeeze meaningful titles in DOS's restrictive eight-character limit, and create folders for storing those faxes. You can even attach up to three search keywords to each file.

On-Screen Fax Preparer

With FaxTracker and editing tools, SofNet aims to provide users with complete on-screen fax preparation. For example, a real-estate agent who wants to fill out and fax a Purchase and Sales agreement to a potential buyer can perform a search for the appropriate P&S form, fill it out on screen using the program's text editor, paste a signature to it, send it, and save and store the agreement.

SofNet claims its program will display and rotate faxes in less than a second. The company also added right- and left-landscape rotations, a very handy tool for viewing spreadsheets—a feature lacking in FAXit. FaxWorks also lets you view thumbnails of as many faxes as can fit comfortably on screen.

FaxWorks Pro 3.0 includes an OCR engine from Calera, which lets the fax program scan a fax document and convert it to editable text. You can set it to launch your favorite word processor automatically and load the newly created text file. Since the OCR process can tie up your computer for up to several minutes for just one page of text, FaxWorks saves time by letting you select just part of a page to scan.

Other welcome additions include support for the TWAIN scanner protocol and a cover sheet designer so users can design and create their own templates. FaxWorks' "cue-card" help system, similar to Macintosh help balloons, pops up a minibox of information on how to use whatever button or menu item your mouse cursor is passing over.

DOS and Windows

Do you leave Windows to work in DOS? You can use FaxWorks Pro 3.0 with FaxWorks 3.0 for DOS ($64.99) and never miss a fax. These two programs work tightly together, sharing the same phone book and log of sent and received faxes. You can schedule a fax to send in FaxWorks for DOS, and later modify the same fax from FaxWorks Pro 3.0. For example, you can use WordPerfect for DOS to write a memo and use FaxWorks for DOS to schedule it for sending. You can then go back into FaxWorks Pro 3.0, view this document, and add your signature to it. The DOS version uses a TSR, but it is automatically unloaded and reloaded when switching between Windows and DOS.

—Bryan Hastings

FaxWorks Pro 3.0
WINDOWS Fax program with extensive file management and OCR.

SofNet, Inc.
800/432-9967, 404/984-8088
List price: $129.99
Reader service no. 668

WinBeep for Networks

WinBeep for Networks
Send messages to pagers from a LAN.

Fourth Wave Technologies
313/362-2288
List price: $495; additional five nodes $495
Reader service no. 669

This network-to-pager communications program enables you to send text messages directly from the office LAN to your mobile work force. You can send messages directly from popular E-mail programs such as Microsoft Mail and cc:Mail or send them from WinBeep. Once you fire off a message, it's routed via modem to a paging service like SkyTel or MobileCom, and from there to the pager. The size of your message is determined by the receiving pager—some hold up to 6000 characters, or three pages. WinBeep for Networks is targeted at mobile professionals in health care, sales, manufacturing, and other fields. WinBeep users on Windows for Workgroups networks can access one another's phone books and local modems (rather than being restricted to a designated shared modem). WinBeep for Networks costs $495 for the server edition and a single-node license.

—Jeff Bertolucci

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CallCost Tracks Phone Expenses

CallCost

A hardware and software product tracks phone expenses for small businesses.

Call Management Products, Inc.
800/245-9933, 303/465-0651
List price: $289
Reader service no. 670

Small businesses and professionals such as attorneys, contractors, and consultants often find keeping track of telephone expenses tedious. To the rescue comes CallCost, an ingenious hardware and software combination that stores time, date, and pricing information about your phone calls.

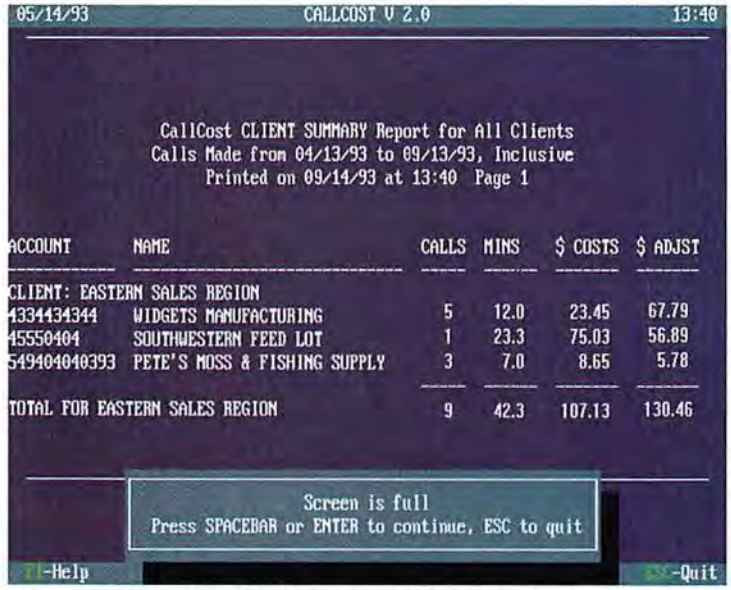
CallCost consists of DOS software and a small buffer box that plugs into your PC's serial port. You can plug one or two phone lines into the buffer box (or you can use up to four boxes to support a maximum of eight phone lines). When you install the software, CallCost requests your local area code; it then tabulates the charges of your outgoing calls to any city in the United States.

You can create account codes to assist in billing calls to your clients. Simply press a predefined code during an incoming or outgoing call to assign it to an account. Or you can assign a code to a group of phone numbers, which is useful in automatically flagging a client's calls, for instance.

CallCost's buffer box stores phone call information regardless of whether the program is loaded in RAM. However, you'll periodically need to upload the data from the buffer box. After uploading the data, CallCost's software creates a detailed report listing the date, time, number, destination, length, and cost of each call. CallCost also allows you to set up flat-rate fees for your telephone time (the default setting is $1 per minute).

CallCost is priced at $289 and includes the buffer box, an AC power supply, software, two standard phone cables, and a serial port cable. For small businesses and professionals, it could be a good call.

—Jeff Bertolucci



CALLCOST LETS YOU CREATE ACCOUNT CODES to help you bill calls to your clients. You can create detailed reports that list information about your calls.

U.S. Robotics Rolls Out High-Speed PCMCIA Modems

U.S. Robotics has jumped on the PCMCIA bandwagon with three new credit card–size fax-modems, including two high-speed V.32bis models that operate at 14,400 bits per second (bps).

U.S. Robotics has two PCMCIA designs. The first—the company's own design—uses a detachable DAA (also known as the RJ-11 adapter, or phone connector) that plugs into the modem card. The second design was developed by PNB, a French modem manufacturer that was purchased by U.S. Robotics earlier this year.

Like PCMCIA modems from Intel, Toshiba, AT&T, Paradyne, and others, the PNB model features an external DAA cable that extends several inches from the modem's edge.

The PNB-designed modems come in two flavors: the WorldPort 14,400 lists for $649, and the WorldPort 2496 (2400-bps data/9600-bps fax) costs $349.

The top-of-the-line WorldPort HST Dual Standard PCMCIA modem includes many features you'll find in the company's pricey Courier line. In addition to 14,400 performance, you get support for U.S. Robotics' HST protocol, which allows data communications speeds of up to 16,800 between HST-compatible modems.

The modem also supports cellular transmission (provided you have a cellular phone and interface) and includes Quick Connect, a proprietary feature that allows two U.S. Robotics Courier modems to connect within 5 seconds, as opposed to a normal handshaking period of up to 15 seconds.

The U.S. RoboticsWorldPort Dual Standard PCMCIA modem lists for $995.

—Jeff Bertolucci

U.S. Robotics PCMCIA modems

Three PCMCIA fax-modems with a variety of speeds and features.

U.S. Robotics
708/982-5010, 708/982-5235 (fax)
List price: WorldPort 2496 Fax/Data PCMCIA $349, WorldPort 14,400 Fax/Data PCMCIA $649, WorldPort Dual Standard PCMCIA $995
Reader service no. 671

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Introducing PC Tools for Windows. "The ultimate desktop."

– PC Computing

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Windows is a great product. And some day, it'll be even better. But why wait? New PC Tools™ for Windows is here right now. It saves time, reduces clutter and gives easy access to the functions and files you use most often.

Only PC Tools has the MultiDesk™ interphase–an intuitive desktop manager that organizes your work by project, task, or client, letting you work the way you want.

PC Tools for Windows is so innovative that the editors of InfoWorld said, "PC Tools for Windows... a slick design that will immediately have you working more productively in Windows."

Just stop by your local dealer for great summer values on PC Tools for Windows. Or ask about our competitive upgrade for Norton Desktop users. This may be the best thing since, well, Windows.

Central Point Software INC.®

1·800·759·1805

Circle 52 on reader service card

Get a hold of the best value in LAN power protection

Now just $139!

suggested list price

Blackouts, brownouts, sags... Your data and hardware are vulnerable to problems that surge suppressors and power directors are just not equipped to handle.

Now there's a complete Uninterruptible Power Supply solution to suit any budget. The Back-UPS™ 250 is reliable protection for LAN nodes, 386SX machines, 286, small PS/2 systems, and internetworking hardware such as routers, bridges, gateways and repeaters.

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).

NEW!

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).
- UL, CSA and Novell approved with a 2 year warranty
- Full-time surge protection and line filtering
- Most models include LAN interface for automatic-shutdown of Novell, LAN Manager, LAN Server, LANtastic, Banyan, SCO Unix, and others
- Ask about PowerChute® UPS monitoring software and Novell compatible UPS monitoring boards
- 230V models available

LAN TIMES READERS CHOICE 1992

Computer Reseller News Editors' Choice

1991, 1990

	Model	Application	List	New List
	Back-UPS 250	LAN nodes, 386SX, 286, internet hardware, POS	~~$169~~	$139
	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
NEW!	**Back-UPS 1250**	Multiple systems, LAN hubs, small minis, telecom equipment		$799

The Back-UPS™

by American Power Conversion

(800)800-4APC, Dept. P3

APC 132 Fairgrounds Road, West Kingston, RI (401)789-5735
APC Europe TEL: (+33)1.64.62.59.00 FAX: (+33)1.60.17.80.29

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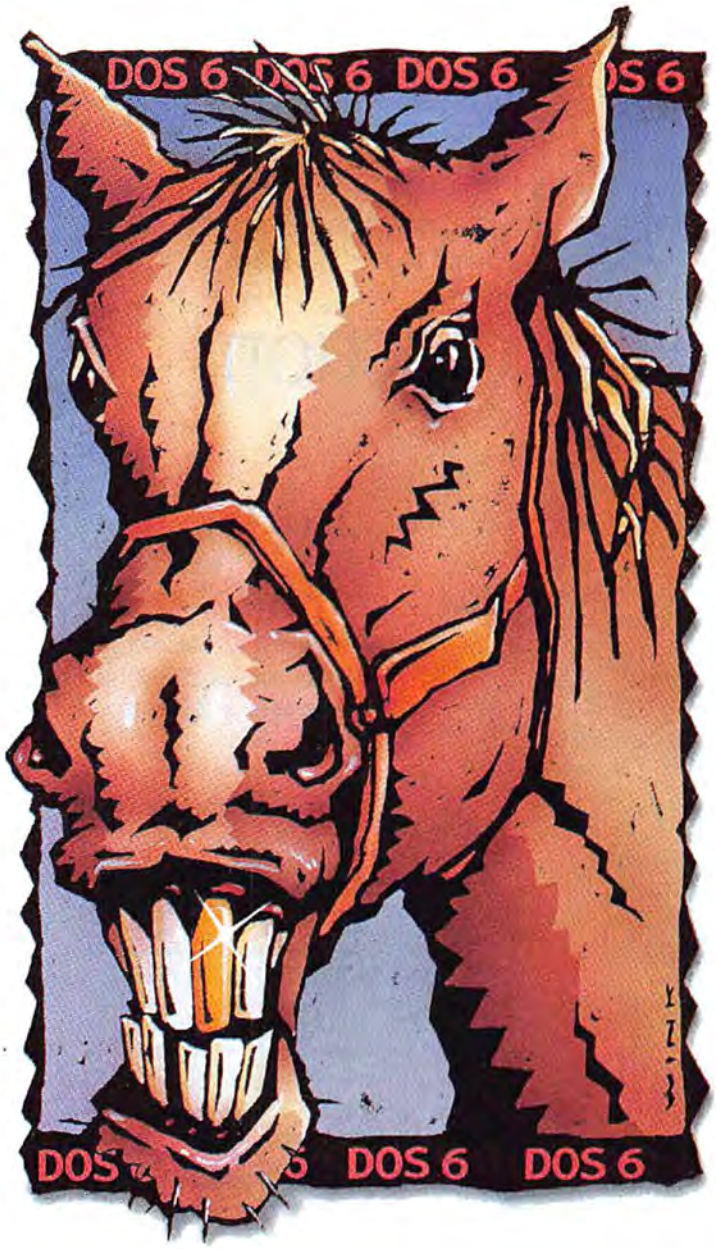
Circle 45 on reader service card



How to Look a Gift Horse in the Mouth

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.

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.

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.

Prior versions of QEMM won just about every competition in sight, as well as remaining the #1 best-selling memory manager 5 years straight.

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

Quarterdeck Office Systems, 150 Pico Boulevard, Santa Monica, CA 90405 (310) 392-9851 Fax (310) 314-4219
Quarterdeck International Ltd., B.I.M. House, Crofton Terrace, Dun Laoghaire Co. Dublin, Ireland Tel. (353) (1) 284-1444 Fax: (353) (1) 284-4380

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 VEISA 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, SND8K12.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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Circle 189 on reader service card

Edited by Jeff Bertolucci

Microsoft's multimedia reference work, Encarta, uses sound, animation, and video to convey information in a way that grabs attention.

Microsoft Encarta

This multimedia encyclopedia packs a world of information into a single CD ROM. Microsoft Encarta includes the 29-volume *Funk & Wagnalls New Encyclopedia*, an interactive world atlas, 800 maps, a dictionary, and a thesaurus, as well as additional articles. Designed to appeal to both adults and kids, Encarta employs sound, illustrations, animation, graphs, and pictures. You can create your own presentations by cutting text and graphics from Encarta and pasting them into other Windows applications. Encarta normally costs $395, but students and educators pay only $249. Future updates will cost under $100, the company says. Microsoft, 800/426-9400, 206/882-8080.

Reader service no. 672

Port-Able Sound Plus

Even a rank novice can wire a PC for sound with the Port-Able Sound Plus. This external unit integrates microphone, speaker, and DSP processor into a foldable housing that plugs into a PC's parallel port. With 16-bit sound and 44.1-kHz playback, it's more than adequate for business use, and the connector's pass-through provides access to the printer. The Port-Able Sound Plus includes output for speakers and headphones and comes with software for recording and embedding sounds in both DOS and Windows. It lists for $198.95. DSP Solutions (formerly Digispeech, Inc.), 415/494-8086, 415/494-8114 (fax).

Reader service no. 678

Insight Multimedia PC

Insight's feature-packed Multimedia PC lets you do sound and video in style. For starters, the system offers Intel's clock-doubling 66-MHz 486DX2 processor and Talon's TA 200 half-height CD ROM drive. With its impressive 300-kilobyte-per-second data transfer rate and 280-millisecond (ms) access time, the TA 200 drive is fast enough for motion video. For quality sound, the Insight system includes a Media Vision Pro AudioSpectrum 16-bit sound board and an amplified stereo speaker set with headphones. A New Media Graphics WatchIt TV video board lets you watch TV in a small window on your PC. The Multimedia PC has plenty of room for add-in boards, including eight EISA slots and one VESA local bus slot. A ZIF socket makes future CPU upgrades easy. Other standard features include 16MB of RAM (upgradable to 128MB), a 32-bit EISA SCSI bus-mastering controller with a 2MB cache, a 520MB SCSI hard drive with a 240K buffer, two floppy drives, and a 17-inch noninterlaced super-VGA monitor. The Multimedia PC costs $5999. Insight Computers, 800/755-9628, 602/902-1000.

Reader service no. 674

PC-Kwik Power Pak 3.1

Few users need an introduction to PC-Kwik Power Pak. It includes the fast, compatible, and flexible Super PC-Kwik disk cache and Power Disk optimizer in a package that has gained favor with DOS and Windows users alike. PC-Kwik Power Pak also provides other useful tools: screen and keyboard accelerators, a print spooler, and more. Version 3.1 adds full DOS 6.0 compatibility and provides caching for CD ROM drives, an aptitude that boosts performance of these drives from 50 to 1000 percent, according to the company. Power Pak 3.1's KwikBoot multiple boot configuration utility and command line editor give you more control over some of the new functions of DOS 6.0. Power Pak 3.1 lists for $129.95; upgrades from version 3.0 are $19.95, from prior versions $39.95. PC-Kwik, 800/759-5945, 503/644-5644.

Reader service no. 677

SlimSCSI

While laptops are catching up to desktops in terms of performance, desktops still offer a far greater variety of storage options. But that's changing: Trantor Systems' SlimSCSI is a PCMCIA-to-SCSI adapter for laptops. SlimSCSI fits in a PCMCIA Type II slot and offers up to 2-megabit-per-second throughput—somewhat slower than many SCSI add-in cards for desktops. The convenient two-piece design lets you quickly detach the unit's external SCSI connector and cable from the PCMCIA card—useful for disconnecting your laptop in a hurry when you've got a flight to catch. SlimSCSI lists for $349. Trantor Systems Ltd., 800/872-6867, 510/770-1400, 510/770-9910 (fax).

Reader service no. 680

PanelBook

Do you need a compact LCD projection panel that's small enough to fit in your briefcase? In Focus Systems' PanelBook is a color LCD projection panel with a 9.4-inch diagonal screen—ideal for giving eye-popping business presentations when you visit clients away from the office. PanelBook's active-matrix display projects over 1.4 million colors simul-

PANELBOOK color LCD projection panel fits in your briefcase.

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WordPerfect®

SIX.0

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639 of them, to be precise.

Capabilities that will let you work faster. With less effort. And with a lot better results.

For starters, here are just a few examples.

21. DESKTOP PUBLISHING You don't need another program to make things look great. Not when WordPerfect brings you advanced features like drag-and-drop text and graphics, customizable borders, even contour wrap-around text!

54. QUICKFINDER Now you can index files and with one key word or phrase, locate files instantly.

277. WYSIWYG EDITING With WordPerfect, you don't have to switch to "print preview" to see text, graphics, attributes — even headers and footers — exactly as they'll end up on paper. It's the way you can work all the time.

37. SCALABLE FONTS For the sharpest, clearest typefaces possible, WordPerfect 6.0 displays and supports TrueType™, CG Intellifont, Bitstream Speedo®, and Type 1 font technologies.

315. SPREADSHEET FUNCTIONS Now you can actually crunch numbers while word processing. Because nearly 100 spreadsheet functions are built right into WordPerfect 6.0.

82. COACHES WordPerfect is easier than ever. But when you want to try something new, this is like having a personal instructor for quick advice or step-by-step instructions.

86. EXPANDED WINDOWING These days, nobody has the luxury of working on one thing at a time. WordPerfect 6.0 lets you open and edit up to nine documents at once.

238. SELECTABLE MERGE Once, merging data was a difficult all-or-nothing proposition. Now WordPerfect lets you easily select the records you want to merge into letters or reports.

143. ENVELOPES & BAR CODES Addressing envelopes and labels is about as fun as licking stamps. But now you can do it automatically, even adding bar codes to speed the mail along.

256. FAX FROM YOUR DESK Next time, don't take that hike to the fax machine. With WordPerfect and a FaxBios, Class I, II or CAS compliant fax board, you can fax right from your PC.

The other 629 new features and enhancements to WordPerfect 6.0 include its GUI interface, color printing and sound board support, collapsible outlines, Undo, Button Bar, Grammatik and macro conversion.

But no matter how many new features it has, one thing stays the same: it's still WordPerfect.

Which means all your present WordPerfect 5.1 files are fully compatible. And you have toll-free access to the best user support in the business.

Get the full details about WordPerfect 6.0 today.

Visit your local reseller, or for your free demo disk (along with a list of all 639 features and enhancements) just call (800) 228-2720 ext. 105.

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GLOBAL EXPLORER displays a likely commercial air route from New York to Rome on an easy-to-read map.

taneously and features a VGA resolution of 640 by 480 pixels. Designed to complement the smaller form factors of today's portable PCs, PanelBook connects to your notebook's video port and has an excellent 100-to-1 contrast ratio and 25ms screen response time. PanelBook projects both U.S. and international video signals, including NTSC, PAL, and SECAM, with no loss of image area, the company claims. In addition, PanelBook's universal power adapter lets you use the product around the globe. PanelBook costs $5995. In Focus Systems, 800/327-7231, 503/692-4968, 503/692-4476 (fax).

Reader service no. 676

Global Explorer

If you have a CD ROM drive, you can have the world on a platter. Global Explorer, a CD ROM–based world atlas, is loaded with details you won't find on the globe in your office. You can view the entire world or zoom in—there are 15 levels of magnification—to see street-level detail for 100 major cities. Search for places of interest such as diving sites, libraries, museums, or sports complexes. Or look up important statistics on the government, economy, or population of selected countries. Global Explorer lists for $169. Delorme Mapping, 800/452-5931, 207/865-1234, 207/865-9291 (fax).

Reader service no. 673

HiJaak Pro 2.0

Do you have a great graphic, but in the wrong format? Don't sweat it. HiJaak Pro 2.0 can import, convert, capture, enhance, and print over 70 graphics file formats. Featuring clearer menus and enhanced status bar help messages, version 2.0 is easier to use and handles image files faster than the previous version, the company claims. A new thumbnail browser makes managing your images easier, and you can also organize them into project folders. With HiJaak's new TWAIN interface, scanners and electronic cameras can save images to one of 29 raster formats. If you're pinched for hard disk space, you can squeeze files up to 200-to-1 with JPEG compression. HiJaak Pro's newly supported formats include Photo CD, TIFF 6.0, and Sun raster. Also included are 300 color metafiles for your graphics applications, plus 200 more when you register. HiJaak Pro 2.0 lists for $169; upgrades are $7 to $10 (for shipping and handling). Inset Systems, 800/374-6738, 203/740-2400, 203/775-5634 (fax).

Reader service no. 675

Hercules Graphite VL, Hercules Graphite VL Pro

More local bus graphics cards are reaching the market—and they're selling at affordable prices. Hercules Computer Technology's Graphite VL is a VESA local bus version of its ISA-based Graphite Windows accelerator card. Based on IIT's AGX015 chip, the Hercules board comes with 1MB of fast VRAM. The Hercules Graphite VL displays up to 16.7 million colors at 640 by 480 resolution with an eye-pleasing 70-Hz refresh rate. Maximum resolution is 1280 by 1024 with 16 colors. A 2MB version, the Graphite VL Pro, offers greater color depth as well as higher resolutions and refresh rates. The Graphite VL is priced at $449; the Graphite VL Pro is $649. Hercules Computer Technology, 800/532-0600, 510/623-1112 (fax).

Reader service no. 679

Computer Parts Connection, Computer Listings

Are you looking to buy or sell computers, peripherals, or parts? Computer Listings is an on-line database that's divided into three sections: dealers, businesses, and individuals. When you come across a product listing that you find interesting, you can either leave an on-line message or call the advertiser. Computer Parts Connection includes listings for hardware, software, and computer services such as repair and consulting. Computer Listings membership costs between $5 and $39 per month, depending on which section you access. Computer Parts Connection is free for potential buyers; advertisers pay $75 and up, depending on the size of their listings. Computer Listings, 404/978-2760 (voice), 404/736-0604 (modem); Computer Parts Connection, 714/858-5187 (voice), 714/858-3368 (modem).

Reader service no. 681

MobileWriter, MobileWriterPS

Two new compact page printers from Mannesmann Tally combine the speed and quality of the office laser printer with the compactness of a portable ink jet. Using a thermal-transfer engine that prints on both plain paper and transparencies, the MobileWriter weighs approximately 8 pounds and offers 6-page-per-minute (ppm) speed and 300-dot-per-inch (dpi) resolution.

The MobileWriter includes a nickel-cadmium battery that prints 150 pages between charges, the company claims. A built-in sheet feeder folds out to hold 80 pages of letter-, legal-, or A4- (European) size paper. The MobileWriter comes with 1MB of RAM and lists for $875; the MobileWriterPS comes with 2MB of RAM installed and 35 scalable PostScript fonts and lists for $999. Mannesmann Tally, 800/843-1347, 206/251-5524, 206/251-5520 (fax).

Reader service no. 682

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

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HavenTree has cranked up the power on **EasyFlow** with a release that lets you **create your own shapes**, offers a host of **new text handling features**, exports charts in a wider variety of graphics formats **than any other flowcharting program** and **supports more printers and plotters** than any other DOS-based competitor. We've even given our already highly **intelligent line router** an IQ boost. These **new and improved** features, combined with those listed below, make EasyFlow the **World's #1 flowcharter.**

- *Create new shapes or modify existing ones.*
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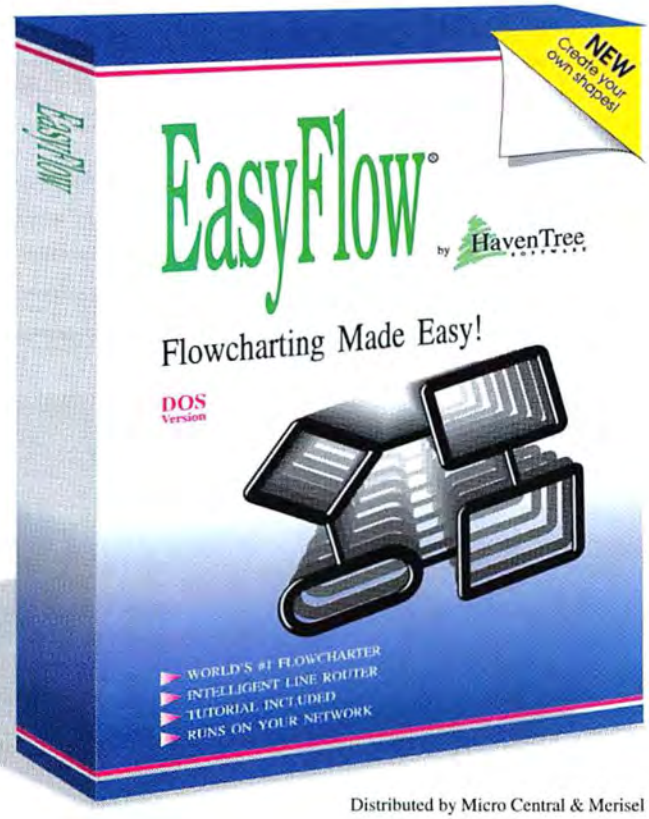
- *Charts compatible with EasyFlow Mac version.*
- *Improved color output - HP DeskJet 500C, HP PaintJet, Epson LQ2550.*
- *Tutorial included.*

Introducing EasyFlow 8.0 (for DOS)



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Marketplace

A Monthly Survey of Prices on Popular Models

Over the Counter

What you pay at retail stores for popular PCs (with monitors)

n/a = not applicable

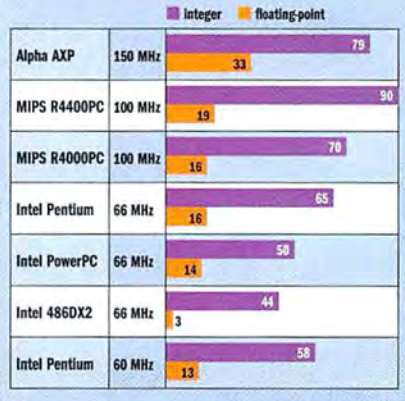
	Configuration			National	
	CPU/speed (MHz)	RAM (MB)	Hard disk (MB)	List price	Average street price
386-class desktop PCs					
ALR Flyer SC 3/33s	i386SX-33	2	170	$1268	$1078
AST Bravo 3/33s	AMD386SX-33	4	120	$1495	$1358
Dell Dimension 386DX/33	i386DX-33	4	212	$1449	$1449
DECpc 333sx LP	i386SX-33	4	52	$1399	$1399
HP Vectra 386/33N	i386SX-33	4	80	$1898	$1667
IBM PS/ValuePoint 325T	IBM386SLC-25	2	80	$1339	$1339
486SX-class desktop PCs					
ALR Flyer SC 4/33s	i486SX-33	2	240	$1568	$1298
AST Bravo 4/33s	i486SX-33	8	213	$2360	$2171
Compaq ProLinea 4/25s	i486SX-25	4	240	[1]	$1731
CompuAdd 433S	i486SX-33	4	200	$2285	$2285
Epson America Progression 486SX/25	i486SX-25	4	240	$2538	$2177
HP Vectra 486/25N	i486SX-25	4	170	$2338	$2059
Gateway 2000 4SX-33	i486SX-33	4	170	$1495	$1495
IBM PS/2 Model 85XP 486[2]	i486SX-33	8	212	$4739	$4300
NEC Image 425	i486SX-25	4	170	$2319	$2081
ZDS Z-Station 433Sh	i486SX-33	4	200	$1922	$1922
486DX-class desktop PCs					
AST Bravo 4/66d	i486DX2-66	8	210	$2560	$2348
Compaq ProLinea 4/33	i486DX-33	4	340	[1]	$2235
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 4DX2-66	i486DX2-66	8	340	$2495	$2495
IBM PS/ValuePoint 433DX/D	i486DX-33	4	120	$2169	$2169
Insight 486DX2-66	i486DX2-66	4	250	$2099	$2099
NEC Image 466	i486DX2-66	4	340	$3374	$3120
Zeos 486DX/33	i486DX-33	8	245	$2095	$2095
Portable PCs					
AST PowerExec 3/25SL	i386SL-25	4	60	$2099	$1907
Compaq Contura 3/25	i386SL-25	4	80	[1]	$1584
Compudyne 386SL/25 Notebook	i386SL-25	2	80	$1499	$1499
Dell 320SLi	i386SL-20	2	80	$1699	$1699
Gateway 2000 Nomad 450DXL	i486DX2-50	8	200	$2995	$2995
HP 95LX	NEC V20-5	1	n/a	$799	$589
Hyundai Courier Spectra	Cx486SLC-25	4	120	$2499	$2499
IBM ThinkPad 700	IBM486SLC-25	4	80	$2639	$2639
IBM ThinkPad 700C	IBM486SLC-25	4	120	$4139	$4139
NEC UltraLite SL/20	i386SL-20	2	80	$1499	$1294
Swan 486SLC/25 Notebook	Cx486SLC-25	2	80	$1499	$1499
TI TravelMate 4000WinDX	i486DX-25	4	120	$2799	$2530
Toshiba T4400C	i486SX-25	4	120	$3999	$3683
ZDS Z-Note 325Lc	i386SL-25	4	120	$3384	$3384

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.

Sorting Out the New CPUs

Estimated performance ratings by processor

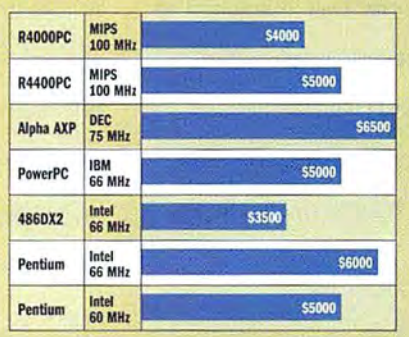


When it comes to the new CPUs, how fast is fast? One way to answer that question is to test how fast each CPU performs integer and floating-point calculations. The integer rating measures the speed at which a processor can run standard business apps, such as word processors. The floating-point rating indicates how fast a chip handles complex modeling and graphics-intensive programs. In this chart, higher numbers represent better performance.

Source: InfoCorp

The Price of Power

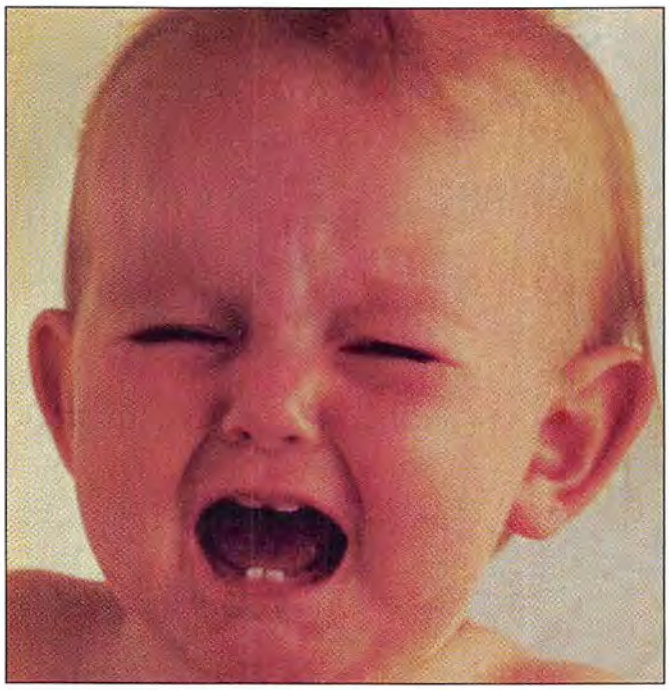
Estimated prices for Windows NT systems by CPU (with monitor, 16MB of RAM, 200MB or larger hard drive)



For business users who run standard applications, Intel's Pentium processor delivers strong integer performance at a good price, says InfoCorp vice president Lew Brentano. The higher-priced machines offer significantly better floating-point performance. Though MIPS-based systems offer a better price/performance ratio in both areas, applications compiled for Pentium chips are expected to appear first. Another plus for Pentium: System pricing could drop 20 percent within a year, Brentano says. If MIPS systems don't follow, they'll become less attractive.

Source: InfoCorp

THINGS THAT SCREAM.



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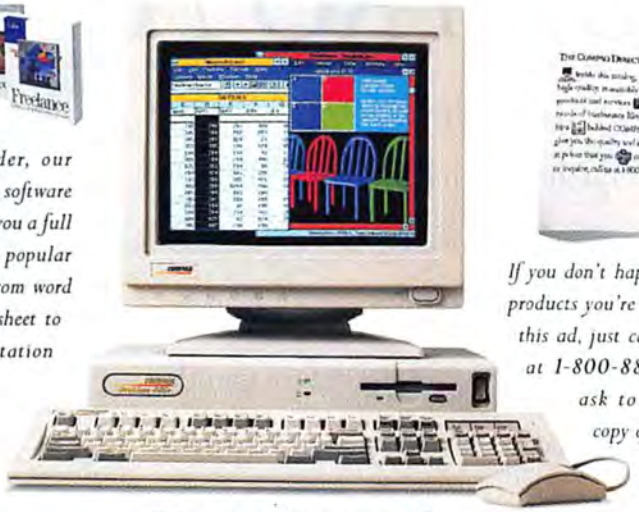

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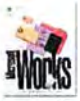

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WinFax PRO for Windows

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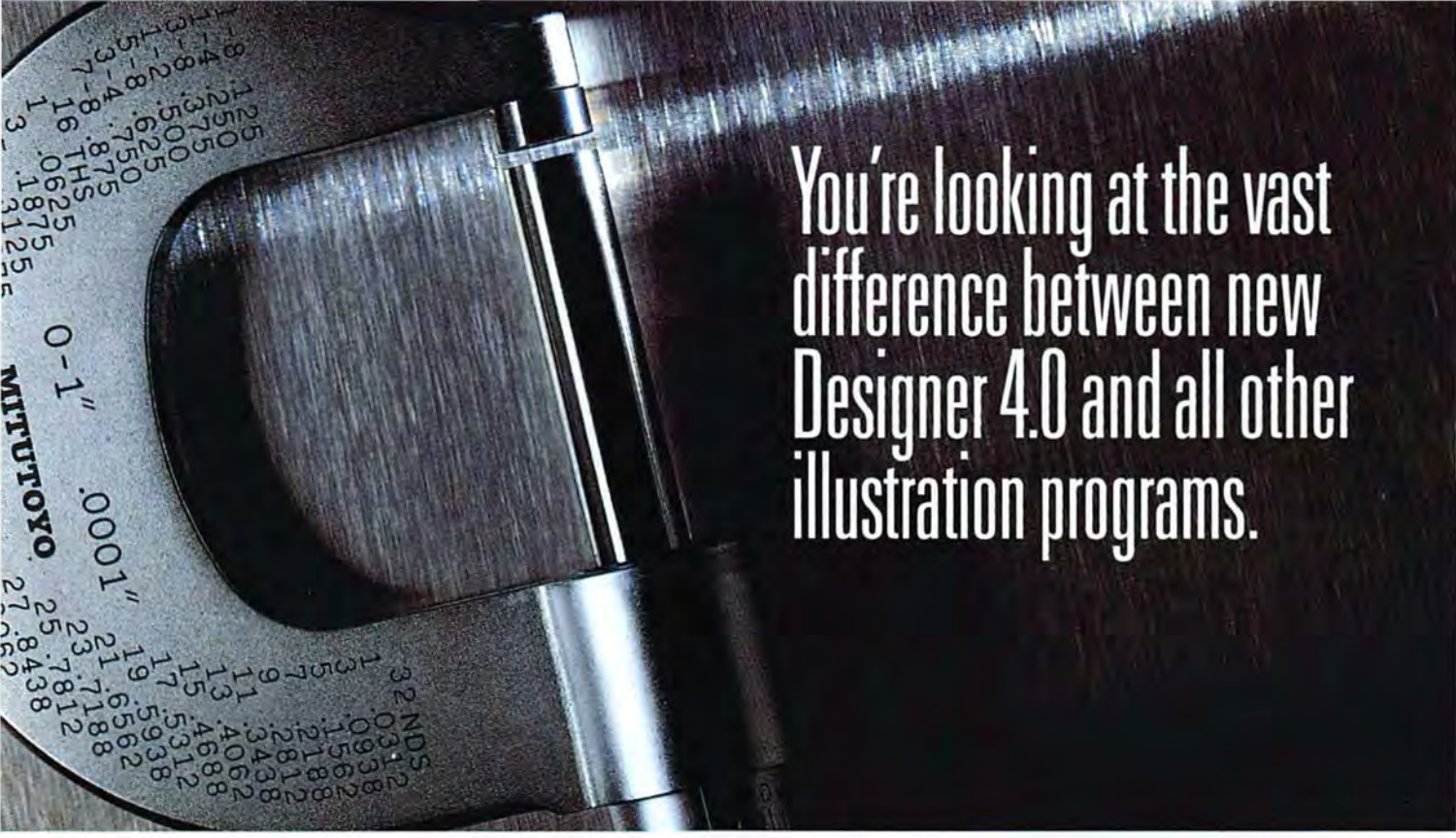

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Instant Office

BEST BUYS

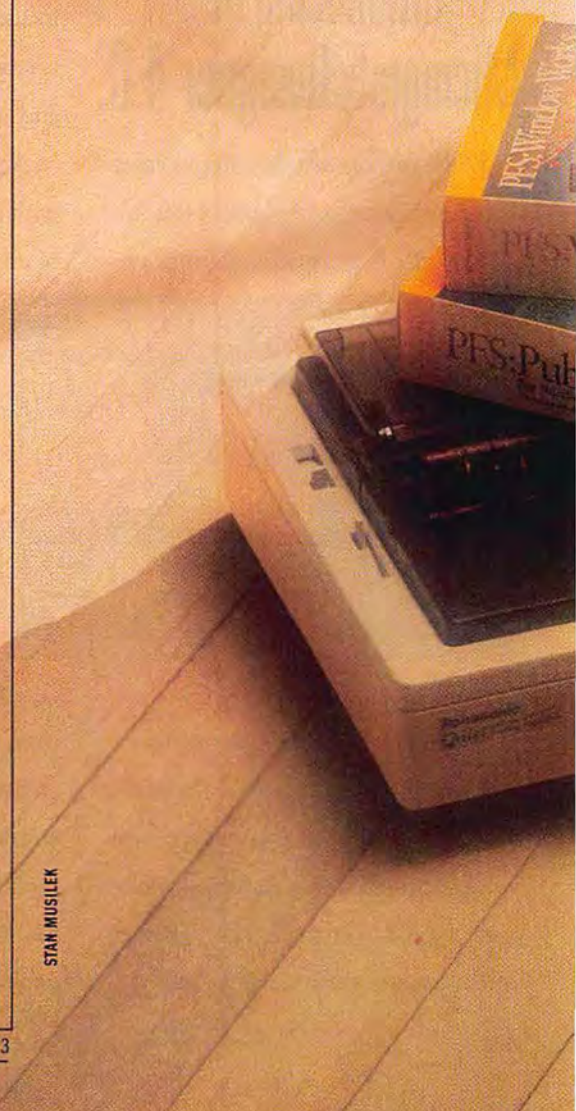
Need to set up a home office or equip your start-up business? We evaluate 27 bundled 486 PCs, complete with monitors, printers, and essential business software.

Thinking about taking the big plunge into equipping your own business or setting up your own office? Maybe you're pursuing a start-up opportunity or buying a system for your college-bound child. If so, you'll need a good, basic business PC—but your needs won't end there. To make a real splash, you'll need a printer and software, including DOS, Windows, and basic business applications. The need for these starter components hasn't changed much in the last few years—but what you get and how you buy it have.

This kind of purchase used to involve walking into a broad-based computer dealership where you could ask questions and be guided to a decision by knowledgeable staffers. One of the best things about the traditional dealership was its ability to bring together all the components you needed and provide solid advice on which ones to take home. Nowadays not many buyers have the time or money for

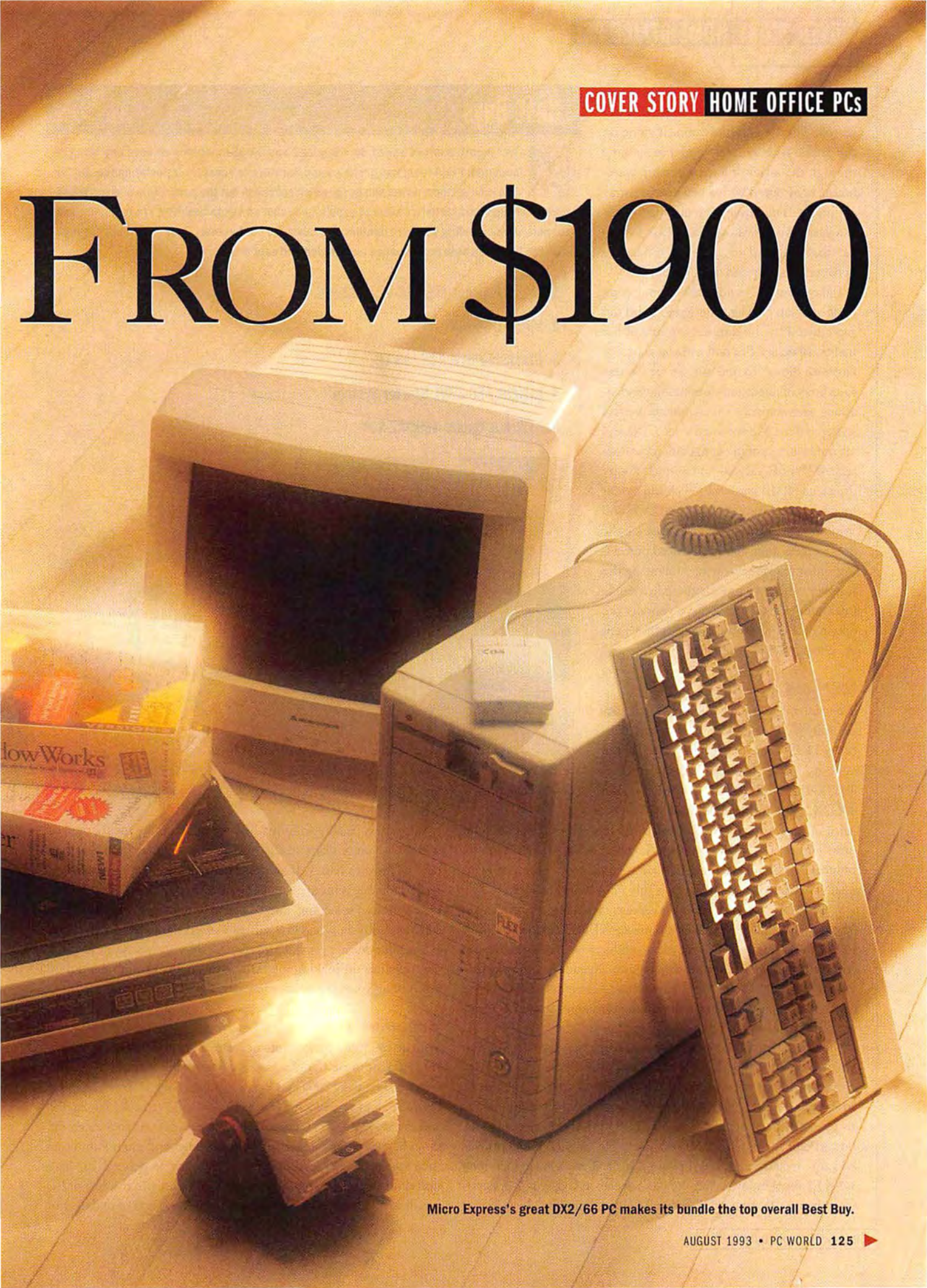
By Rex Farrance and Melissa R. Riofrio

Testing by Ulrike Diehlmann and Susan Silvius; research and support by Dawn Furseth, John Goddard, and Anita Hamilton



STAN MUSILEK

FROM $1900



Micro Express's great DX2/66 PC makes its bundle the top overall Best Buy.

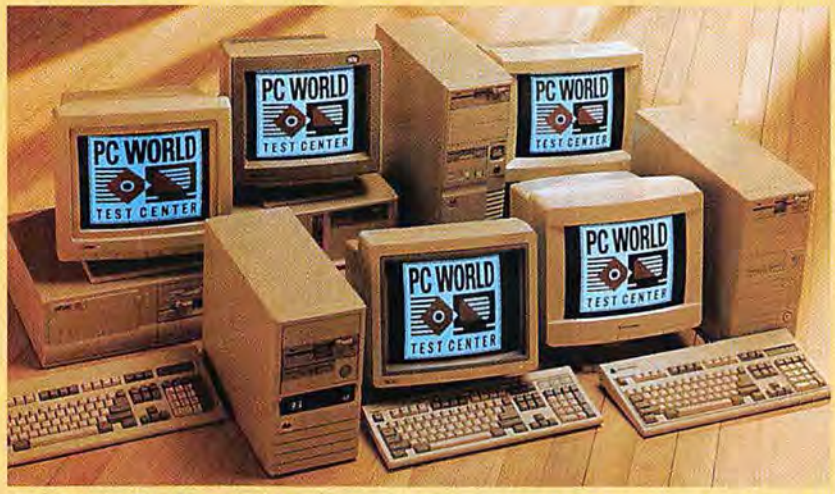
that kind of hand-holding. You're more likely to have to do your own basic research. Then you'll find yourself alone on the phone with a direct vendor or stalking through the aisles of a membership warehouse, confronted with a bewildering array of options. That leaves you putting together a jigsaw puzzle whose pieces look so similar that it's hard to spot the difference between blue sky and deep water.

Today many PC vendors are offering complete start-up packages designed to fill the gap created by the diminishing role of the traditional dealer. But how can you expect to fare with them? To find out, we sent letters to an array of direct and distribution vendors, asking each company to assemble its perfect starter system. We specified a 486 CPU and set minimum system configuration parameters: 4MB of RAM, 5¼- and 3½-inch floppy drives, an 80MB hard disk, VGA and a color monitor, a keyboard, a mouse, and DOS and Windows. We also required at least a basic dot matrix printer, along with word processing and spreadsheet software (allowing the supplier latitude to provide these in a single integrated package). We gave vendors the option of adding extras, as long as they kept close to our $2500 price range.

Best Buys

This month's mixed bag of Best Buy DX2 and DX-33 machines all have one thing in common: VESA local bus graphics accelerators to boost their performance. But in this race systems do not win by speed alone; check out the particulars and you'll find other sterling characteristics such as excellent design and expandability, great service and support, or outstanding software bundles. For example, our foremost Best Buy, Micro Express, took top honors in both performance and service and support.

1. **Micro Express ME 486-VL/DX2/66**
2. **Mitac D4466R**
3. **Blackship BLK 486/33 LB**
4. **Insight 486-33VL Starter System**
5. **Axik Ace Cache 486DX2-50V**



CLOCKWISE FROM RIGHT FRONT: Micro Express ME 486-VL/DX2/66, Blackship BLK 486/33 LB, Mitac D4466R, Insight 486-33VL Starter System, Axik Ace Cache 486DX2-50V

PCs, Printers, and Software

We received a total of 27 systems that successfully ran the gauntlet of our tough Windows, DOS, and compatibility tests. All the systems' processors came from Intel: 4 486SX-25s, 3 486SX-33s, 11 486DX-33s, 3 486DX2-50s, and 6 ultrahot 486DX2-66s. Most of the printers were dot matrix models, with 2 low-end 9-pin units joining 17 24-wire printers. Seven vendors provided ink jet printers that offer better output quality, and Epson sent us its high-quality ActionLaser 1000 printer, a July *PC World* Best Buy.

When it came to software, most vendors sent integrated packages: Microsoft Works for Windows, Spinnaker's PFS:WindowWorks, or Lotus Works 3.0 for DOS. All these products will take care of simple word processing and spreadsheet tasks. In addition, they all provide a basic database. More experienced users, or those whose needs transcend the basics, will want a more sophisticated dedicated word processing or spreadsheet program.

Nine companies provided dedicated packages: Lotus's Ami Pro 3.0 paired with 1-2-3 1.1 for Windows, or WordPerfect 5.2 for Windows combined with 1-2-3 1.1 for Windows; Digital, Gateway, Insight, MIS, and Mitac provided Microsoft Word for Windows 2.0 and Excel 4.0 as part of Microsoft Office 3.0, which also includes PowerPoint for Windows 3.0 and Microsoft Mail. Hyundai provided Lotus Smart Suite for Windows 1.2, a robust package including 1-2-3 1.1 for Windows, Ami Pro 3.0, Freelance Graphics 2.0, Lotus Organizer for Windows 1.0, and cc:Mail for Windows 1.0.

Software is usually an individual choice. If you're inexperienced with PCs, you're likely to choose the most popular applications or take whatever's handy. If you're already practiced with a package, you'll probably want to continue using it. In most cases, PC vendors offer a limited selection: They make arrangements with individual software publishers and don't usually offer competing applications. If a vendor doesn't provide the specific software you want or need, you're better off making the best hardware deal you can and then assembling your own application suite from discount outlets.

An Affordable Start

With all the value packed into our starter systems, it's amazing how small a dent these bundles make in your bank account. Only two vendors, Gateway 2000 and Zeos, exceeded our $2500 target price by more than 10 percent: Gateway's 4DX-33V model ran $2859, and Zeos's 486DX-33 Upgradable came in at $3006. To their credit, though, both companies added value well beyond the minimum in their storage capacities and software bundles. In general, big hard disks and dedicated applications add significantly to the cost of PC bundles, and their inclusion can save you hundreds of dollars. For

example, Microsoft Office alone costs $450 on the street, even through a bare-bones discounter.

The low-price king is Computer Sales Professional's Pro 486DX/33. Equipped with 4MB of RAM, a 256K secondary RAM cache, a 160MB hard disk, a 24-pin dot matrix printer, Spinnaker's PFS:WindowWorks 2.0, and Intuit's Quicken for Windows 2.0, this system provides an impressive value at a mere $1899.

Test-Driving the PCs

Even when you're buying a bundle, the performance of the PC component is crucial. The computer is the centerpiece of your package and the most expensive part. Chances are you'll want to avoid upgrade expenses for a few years while you work with a system that provides all the power you need.

We measured the performance of all the PCs we received by pitting them against the PC World Test Center's tough suite of test applications, starting with our Windows group and finishing with the DOS-heavy BAPCo SYSmark92. The systems' performance rankings yielded few surprises, with 486DX2-66s and 486DX2-50s locking up the top 9 positions in overall performance. The next 14 positions were taken by 33-MHz 486DXs and 486SXs, and the final 4 slots went to 486SX-25s.

One minor problem emerged from our testing, as a few machines showed anomalous results on the BAPCo SYSmark92 test. Test results on the Harvard Graphics 3.0 test only, which includes several print jobs sent to a null printer, were very slow for PCs with a June 92 AMI BIOS. Control tests with a real printer installed indicated a still noticeable degradation of performance. All but one vendor, Swan, sent a replacement BIOS version. Each of the upgraded systems showed a marked performance improvement on the Harvard Graphics 3.0 test. We could not detect a statistically significant impact on performance with other applications.

Upgrade Issues

While you won't want to be forced to upgrade soon after buying a system, it's important to have a clear idea of your upgrade options. All the motherboards support a system clock that users can adjust or replace, and every PC is capable of accepting an Intel OverDrive for SX or OverDrive for DX. Not all CPU upgrades make sense; for example, if your PC is a 486DX2-50, a move to 66 MHz may not increase speed enough to warrant the cost.

If you want to ensure practical upgradability with your DX2 system, buy one that comes with the new 238-pin socket that will accept the forthcoming Intel OverDrive for DX2. Only two of the DX2 systems reviewed have these sockets: the 50-MHz Canon Innova 486 and Axik Ace Cache 486DX2-50V. But five 33-MHz systems have the OverDrive for DX2 socket: the Dell 433s/L, Eltech 4330, Insight 486-33VL Starter System, Polywell 486SX-33VZ, and Zeos 486DX-33 Upgradable. If you like a 486DX2 system and it lacks the 238-pin socket, however, remember that DX2 speed means you're less likely to need a performance upgrade.

Configuration Counts

Configuration is also an important factor in ensuring good performance. Most of the systems came with our 4MB minimum RAM requirement, but the Blackship, Gateway, and ZDS systems came with 8MB. If you plan to use Windows, either buy your system with

Best Performance

It's no surprise that 486DX2s are the quickest machines in a roundup that also includes 486SXs and 486DXs at speeds varying from 25 MHz to 66 MHz. But we were blown away by the Micro Express, which beat its nearest competitors by a fantastic 24 percent margin.

1. Micro Express ME 486-VL/DX2/66
2. Silicon Valley 486DX2 Turbo VESA
3. Amax 486DX2/50 VESAmax
4. CompuAdd Express 466DX2
5. ZDS Z-466X+ Model 245

Best Price

The price-busters in this review—ranging from $1899 to $2299—refute the econobox stereotype by offering considerable value. All have 33-MHz or faster CPUs. There were so many good prices, we had to expand our top five to a top six, with two-way ties at third and fourth position.

1. Computer Sales Professional Pro 486DX/33
2. Canon Innova 486
3. Acma 486/33 Starter Package
3. ATS AMI 486-33
4. Eltech 4330
4. Micro Express ME 486-VL/DX2/66

Best Service and Support

The common factor among all these companies was prompt, accurate, toll-free tech support. But to join the elite, they had to offer perks such as low-cost on-site repairs. Axik and Blackship tied for second place.

1. Micro Express ME 486-VL/DX2/66
2. Axik Ace Cache 486DX2-50V
2. Blackship BLK 486/33 LB
3. MIS Computer M4SX
4. Dell 433s/L
5. Computer Sales Professional Pro 486DX/33

8MB installed or extend your memory with standard SIMMs after purchase. You'll reap big benefits in increased task-switching speed and in improved performance with multiple applications.

A secondary memory cache complements the 8K internal RAM cache built into every Intel 486 and extends another healthy boost in speed. It seems that vendors agree: Only four—AST, Canon, Epson, and ZDS—sent systems without a secondary RAM cache installed. Previous PC World Test Center control tests indicate that a secondary cache boosts a system's performance by 7 to 10 percent in typical business applications. So we generally advise buying a system with at least 64K of secondary cache. Nine vendors sent PCs with 256K secondary caches, and all our Best Buys came with a 128K or larger secondary cache.

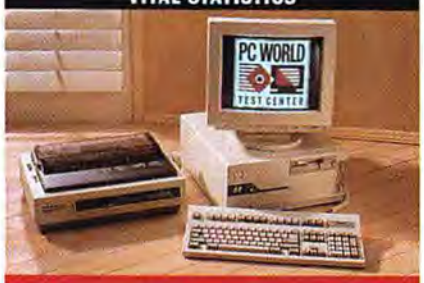
Storage needs must be evaluated carefully. Let's face it: It's expensive to add a second hard disk after purchase. Only Silicon Valley sent a hard disk smaller than 100MB; its 80MB drive, while within our minimum, will pinch most users. At the high end, nine vendors sent 200MB or larger hard disks, with AST providing the largest, a big 240MB Western Digital Caviar 2250.

Expandability

You need enough slots and drive bays to accommodate your peripherals. Most users will need a total of four bays, one internal and three externally accessible, and four or five free expansion slots. Your own situation may differ, however, and it's worth thinking out your future needs. Better now than after you've bought the wrong PC! Pay a lot of attention to how many externally accessible bays you have, especially if you decide to take our advice and add a tape backup drive and possibly a CD ROM drive. If you're pinched for bays, you can always buy external drives—if you're ready to pay a

Acma 486/33

VITAL STATISTICS



DIRECT PRICE: $2195
PROCESSOR: Intel 486DX-33
PRINTER: Panasonic KX-P2123 with color kit
PROS: Great price, 45-day money-back guarantee
CONS: Tech support responsiveness a little slow
CONTACT: Acma Computers, 800/786-6888, 510/623-1212 **Reader service no. 702**

Acma has been a rock-steady player in recent reviews, and the 486/33 Starter Package is no exception; at $2195, it's one of this review's price leaders. The system provides a business-standard 33-MHz 486DX CPU, a 64K secondary RAM cache, and a 120MB Conner CP-30104H hard disk. The Acma's overall performance didn't deal us any surprises, shuffling out square in the middle of the 33-MHz pack and middle-of-the-road overall. On the DOS-heavy BAPCo SYSmark92 test, however, the system's 512K caching disk controller helped; only one 33-MHz machine turned in a better score.

There's plenty of room for peripherals in its five free full-length slots, but with just one free externally accessible drive bay, you may feel a pinch. The bundle is respectable considering the price: You get Panasonic's 24-pin KX-P2123 printer and a color kit. Microsoft Works for Windows 2.0, a basic but functional integrated package, provides word processing, spreadsheet, database, drawing, and charting functions. Acma went so far as to throw in two boxes of floppies, a ream of printer paper, a surge protector, and a printer stand.

Service and support are reliable, including a year of free on-site service and toll-free technical support. The tech staff is generally responsive and competent, although we had to wait once for them to call back. Acma doesn't get a Best Buy this time; there are better overall deals. But bargain hunters will find this package tempting.

Amax 486DX2/50 VESAmax

VITAL STATISTICS

DIRECT PRICE: $2499
PROCESSOR: Intel 486DX2-50
PRINTER: Panasonic 1180i
PROS: Very fast performance, fine expandability
CONS: Toll call for tech support, poor responsiveness, 9-pin printer **CONTACT:** Amax Computers, 800/800-6328, 510/651-8886
Reader service no. 703

Wow! Amax really knows how to put together a scorcher. Otherwise, how do you explain a 50-MHz 486DX2 finishing in a virtual dead heat with Silicon Valley's 66-MHz 486DX2 Turbo VESA for second in overall performance? The Amax 486DX2/50 VESAmax beat out four other 66-MHz DX2s, and only the amazing Micro Express ME 486-VL/DX2/66 passed them (and all the other PCs here), taking a decisive 24 percent edge over this fast 50. Granted, this is a VESA local bus system with 256K of secondary RAM cache. More important, Amax complemented the Diamond Stealth 24VL local bus video accelerator with a 2MB local bus caching hard disk controller.

This big tower has room to spare inside, and its complement of five free full-length slots and five available bays adds up to plenty of growing room, although its 200MB Conner CP-30204 hard drive should mean you won't need to upgrade soon. Amax's bundle does leave something to be desired: Its 9-pin Panasonic 1180i printer is disappointing, since business users will want at least a 24-pin model to produce acceptable letter-quality correspondence. Like many other vendors, Amax provided the solid, basic Microsoft Works for Windows 2.0.

Service and support policies look fine at first, with the lack of a toll-free support line the one glaring exception. Saturday hours, a two-day service turnaround, and a year of TRW on-site service for a reasonable $69 sound very good. Unfortunately, Amax's lack of responsiveness diminished an otherwise pretty fair rating. We had to make repeated attempts to get our questions answered, and a number of our calls went unreturned. Amax's bundle still rates as a solid value, primarily because of the system's blazing speed. But if support response is on your list of essentials, you'll have to find it elsewhere.

premium of $100 or more over an internal drive and give up desk space that may already be tight.

Putting It in Print

If you haven't used a lot of different printers, you have to understand that all printers are *not* created equal. Start by making a realistic assessment of your needs. Do you require speed? High output quality? The ability to handle multipart invoices?

If you have to pump out reams of letter-quality hard copy, bite the bullet and shell out the extra bucks for a laser printer. While an ink jet printer can give you quality that's hard to distinguish from laser output, it can't match laser printer speed. But if fast output isn't essential, ink jets are hard to resist. If your budget's tight or your application demands an impact printer (for example, to print multipart forms), you'll have to give up some speed and quality and buy a dot matrix printer. Demand a 24-pin model; 9-wire models are really not suitable for business correspondence.

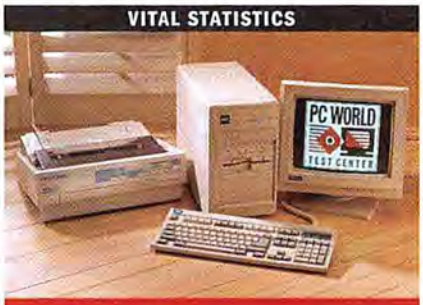
Because they are much less expensive, printers are less important in our ratings than the PC they accompany. And printer choices didn't distinguish themselves among our Best Buys; Insight provided the best among the five: the Canon BJ-200 ink jet printer.

Keeping Service in the Picture

Service and support issues are perhaps even more essential to the start-up buyer than they are to a major corporation. After all, big businesses have staff dedicated to maintaining and repairing PCs. Warranties on the systems reviewed here vary from one year to the impressive two-year coverage offered by Micro Express, Silicon Valley, and Swan. More companies are extending their labor warranties; for example, Polywell repairs its equipment free of labor charges for parts. But a year's on-site service policy is rather pricey at 10 percent of the cost of the system, and when you call tech support, you pay the toll. We have no bones to pick with the support itself, as the responsiveness was superb and our questions were answered with remarkable courtesy and accuracy. We'd like to see a toll-free line, of course, and a less expensive charge for on-site service. Still, the quality of components and the fine printer make this economy-priced package a real bargain.

AST 486DX/33

VITAL STATISTICS



STREET PRICE: $2308
PROCESSOR: Intel 486 DX-33
PRINTER: Epson ActionPrinter 5000 (Epson LQ-570)
PROS: Dedicated Lotus applications, 240MB hard disk **CONS:** Support lines often busy, mediocre performance **CONTACT:** AST Research, 800/876-4278, 714/727-4141 **Reader service no. 704**

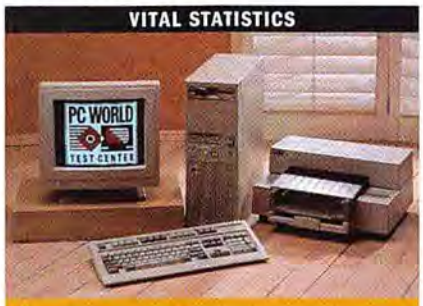
Customers look to AST for quality and reliability and take comfort in the company's enduring presence among the top ten PC vendors. The bundle of applications AST combined with this 486DX-33 system is first-tier too: 1-2-3 1.1 for Windows, Ami Pro 3.0, Delrina WinFax Lite, a fax-modem, and a 24-pin Epson ActionPrinter 5000. Not a bad lineup for a bundle that sells for $2308 on the street!

The Advantage Plus 486DX/33 was not among the fleetest, however, although it has storage and expandability in its 240MB hard disk, five free slots, and two free externally accessible drive bays.

This is an attractive package. AST's classy software bundle and large hard disk add big value to this system, and all you have to do to beef up the performance is order it with 8MB of RAM and 64K or more of secondary RAM cache.

ATS AMI 486-33

VITAL STATISTICS



DIRECT PRICE: $2195
PROCESSOR: Intel 486DX-33
PRINTER: HP DeskJet 500
PROS: Excellent price, ink jet printer, four-year labor warranty **CONS:** No toll-free technical support, expensive on-site service
CONTACT: ATS Computers, 619/279-1305, 619/279-4159 (fax) **Reader service no. 705**

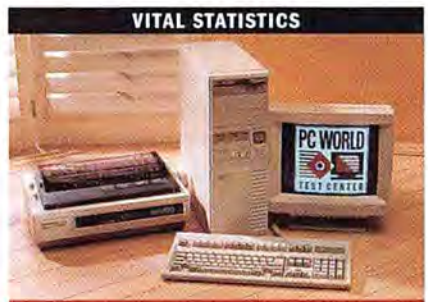
If you're looking for a bundle that delivers quality components, a fine printer, and one of the best prices in this roundup, ATS's AMI 486-33 system should grab your attention. This roomy half-size tower unit uses a 33-MHz 486DX set in an American Megatrends (AMI) motherboard. The bundled Microsoft Works for Windows 2.0 is adequate, but we were really impressed to find a near-laser–quality Hewlett-Packard DeskJet 500 printer tossed in with a $2195 bundle.

ATS installed a 120MB Western Digital Caviar 2120 hard disk, and there's room left to add three externally accessible drives and two internal drives. Seven free full-length slots should meet any desktop user's need for peripherals expandability.

ATS has an outstanding labor warranty of four years to complement the one-year pro-

Axik 486DX2-50V

VITAL STATISTICS



DIRECT PRICE: $2498
PROCESSOR: Intel 486DX2-50
PRINTER: Panasonic KX-P2123 **PROS:** Excellent service and support, OverDrive for DX2 socket, caching drive controller **CONS:** None
CONTACT: Axik Computer Inc., 408/735-1234, 408/735-1437 (fax) **Reader service no. 706**

With its $2498 Ace Cache 486DX2-50V midtower, Axik has dealt another winning hand, with a Best Buy payoff wrapped up in its fast, eminently upgradable system. The performance of this 50-MHz PC was good enough to score in the top 25 percent of systems overall, beating

an amazing five years, and ATS covers labor charges for four years. More than 80 percent of the vendors provide a year of on-site service for their PCs for $100 or less, and 17 throw it in free with purchase—an extra comfort for the start-up buyer. As for printer support, check with vendors when you buy your bundle; some will provide it and some will send you to the printer vendor.

For most minor support problems, you need fast, accurate advice—and you should be able to get it without having to make a toll call. Only Amax, ATS, Quill, and Silicon Valley lack toll-free support lines. We base our tech support evaluations on company policies and on calls we make simulating technical problems. Because of the human factor, responsiveness and accuracy tend to vary from review to review. This time Micro Express, Axik, Blackship, MIS, Dell, and Computer Sales Professional proved to be the cream floating to the top.

Huge Values in the Top Bundles

As the most expensive component in our starter bundles, the PC system was the largest single factor in our evaluation. And we were delighted by the kind of PC bargains we received. Our top overall value, the Best Buy Micro Express ME 486-VL/DX2/66, is a 66-MHz local bus machine with the fastest performance overall. Micro Express threw in a big 2.5MB caching controller and a generous 200MB hard disk, and with the ME 486-VL/DX2/66's reasonable $2299 price, there's plenty of room left under our $2500 target to allow an upgrade from its pedestrian 9-pin printer. Furthermore, the company's service and support rating topped the chart, just as it did in June ("486s for $1250").

Mitac made a big-time showing in our review as well, with its 66-MHz 486DX2-based D4466R. This nimble Best Buy just missed the top five in overall performance and placed near the top on a one 66-MHz PC. If your needs grow and you want more speed, just flip the lever on the 238-pin ZIF socket, extract the DX2, crank up the clock, and insert Intel's forthcoming OverDrive for DX2. As it is, Axik wrings plenty from this 486DX2-50 by providing a 256K secondary RAM cache and a 1MB caching local bus hard disk controller.

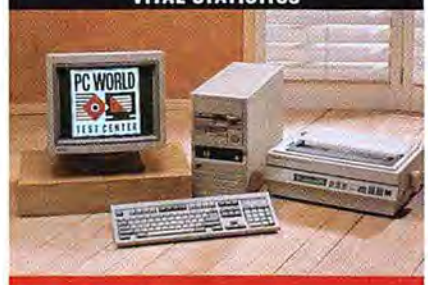
Axik's motherboard has three VESA slots: One is taken by the drive controller, a second by the Diamond Stealth 24VLB graphics accelerator, and a third is free. Four other 16-bit slots and five free drive bays provide plenty of capacity for peripherals. Axik ensures you won't run out of hard disk space soon by providing a capacious 160MB Conner CP-30174 hard drive.

Design is one factor that separates top-tier manufacturers from vendors who just assemble systems from third-party components. Open a Compaq, Dell, or Hewlett-Packard box, and you'll immediately be struck by the easy access of important components. While Axik doesn't manufacture its own cases, it does a superior job of integrating components. The result is a PC that's a dream to expand, whether you're adding memory or peripherals.

Service and support are also winners with Axik, tying with Blackship for second by providing a year of free on-site service, a two-day service turnaround policy, toll-free support even on Saturdays, and BBS and fax support. Best of all, we found no fault with Axik's responsiveness or accuracy. This system doesn't come with a delectable array of bundled goodies—just vanilla Microsoft Works for Windows 2.0 and the 24-pin Panasonic KX-P2123. But Axik hits the jackpot in the fantastic value of its fast, super-upgradable PC.

Blackship BLK 486/33 LB

VITAL STATISTICS



DIRECT PRICE: $2495
PROCESSOR: Intel 486DX-33
PRINTER: Panasonic KX-P1124i
PROS: Fine price, excellent service and support, 8MB of RAM **CONS:** None
CONTACT: Blackship Computer Systems, 800/531-7447, 408/432-7500
Reader service no. 707

Blackship does a superb job of showing how best to spend your money to fit an application—and wins a Best Buy in the process with its BLK 486/33 LB bundle. For a reasonable $2495, Blackship provides an attractive package. While the 24-pin Panasonic KX-P1124i is just a good basic printer, 1-2-3 1.1 for Windows and WordPerfect for Windows 5.2 are high-class apps. Blackship got fine performance out of this 486DX-33 minitower system by putting together an optimum configuration: 8MB of RAM, 256K of secondary RAM cache, an Orchid Fahrenheit VLB VESA graphics accelerator, and even a local bus drive adapter to run its 160MB Conner CP-30104H hard drive. As a result, its overall speed surpassed all except two other 33-MHz PCs, and it wound up just 16 percent behind the 66-MHz leader on our Excel 4.0 spreadsheet benchmark.

Despite its thoughtful configuration, this system is by no means maxed out. The upgrade path extends to 66-MHz OverDrive for DX, and its two free externally accessible drive bays and six free slots give you room to grow. Service and support are wonderful, tying with Axik for second position with a year of free on-site service; a two-day service turnaround policy; prompt, correct toll-free support; and BBS and fax support. Considering the great software bundle, intelligent configuration, fine performance, and super service, how could we *not* recommend this outstanding Best Buy?

Canon Innova 486

VITAL STATISTICS

STREET PRICE: $1934
PROCESSOR: Intel 486SX-33
PRINTER: Canon Bubble-Jet BJ-200
PROS: Great price, ink jet printer, fax-modem
CONS: Limited expandability
CONTACT: Canon Computer Systems Inc., 800/848-4123, 714/438-3000
Reader service no. 708

The Canon Innova 486 is a bargain compact workstation—priced at an incredible $1934, which includes Microsoft Works for Windows 2.0, a fax-

number of benchmarks. Mitac placed its software bundle among the best, offering the classy and complete Microsoft Office 3.0 with its impressive array of useful business applications. Blackship's Best Buy 486DX-33 BLK 486/33 LB also made a terrific impression. The company tied with Axik for second place in service and support, and Blackship's combination of the popular WordPerfect 5.2 for Windows and Lotus's 1-2-3 1.1 for Windows makes for a software offering that's hard to resist.

Insight's Best Buy 486-33VL Starter System was another smash hit. This 486DX-33 provides an affordable VESA local bus package with an impressive bundle, including Microsoft Office 3.0 and a Canon BJ-200 ink jet printer. Our fifth Best Buy is from Axik: Its Ace Cache 486DX2-50V comes with an appealing combination of 50-MHz 486DX2 performance and great service. Like the Insight Best Buy, this local bus system offers an upgrade path to the forthcoming Intel OverDrive for DX2.

Whether you're treading the entrepreneur's road to riches or sprucing up your skills with a retraining course, you can't get going these days without PC assistance. Longtime PC users reminisce about the heyday of the full-service dealers. But these dealers lost their foothold as a result of powerful competition from vendors like the ones in this review. And the values you'll find here outmatch anything the old-line dealers ever had to offer.

Rex Farrance is an associate editor and Melissa R. Riofrio an assistant editor for PC World. *They can be reached on PC World Online (see page 12 for more information).*

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

modem, Delrina WinFax Lite, and the excellent Canon BJ-200 ink jet printer. But you get only three free expansion slots and one free drive bay. The system does come with a substantial 160MB Conner CP-30174E hard disk.

Canon's Innova bundle is wrapped around a 33-MHz 486SX processor; this is a reasonably quick CPU that will equal a 486DX-33 in any application that doesn't require a coprocessor. That means that you can easily handle light spreadsheet work; if you have to build big, recalculation-heavy worksheets, however, you'd better stick with a DX or DX2. This particular model lagged a little in our tests: Only 3 of the 14 33s ran our benchmarks more slowly. If you decide you really want next-generation speed, this system has a 238-pin Intel OverDrive for DX2 socket. Just be careful about moving this PC around when you have the top off; the case must be closed to provide real rigidity.

Service and support are basically good, with one full year of on-site service provided at no extra charge, dependable toll-free technical support, and BBS support. All in all, this setup is a pretty fair value—but only for those installations that have limited need for growth.

Late List Prices

Our late list price research for this review occurred near the anniversary of last summer's earthshaking, price-slashing announcement from Compaq that sent PC prices everywhere through the floor. In a year's time, prices have settled and remain low. Only seven systems in this review showed changes.

At press time Zenith Data Systems had upgraded its standard Z-466X+ model to include a 256K secondary cache and raised the price to $2922, $240 more than the model sent us for review.

Prices Stable—Only Seven Systems Change

	List price as of June 1993	Price drop from April 1993
Eltech 4330	$2169	$130
Epson Equity 4SX/25	$2604	$170
Gateway 2000 4DX-33V	$2729	$130
MIS Computer M4SX	$2300	$95
Mitac D4466R	$2295	$200
Silicon Valley 486DX2 Turbo VESA	$2495	$100
Zeos 486DX-33 Upgradable	$2761	$245

CompuAdd Express 466DX2

VITAL STATISTICS

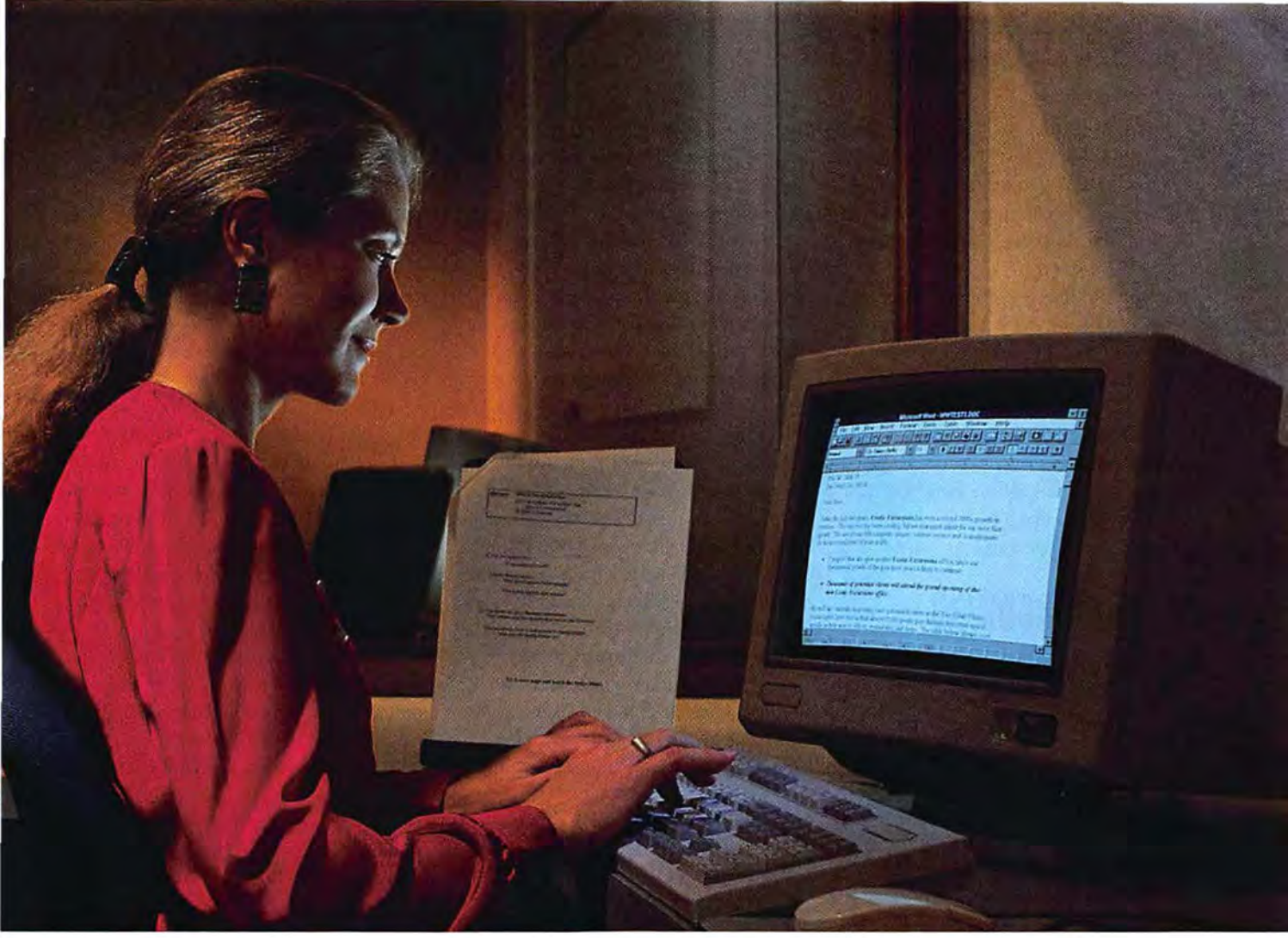
DIRECT PRICE: $2544
PROCESSOR: Intel 486DX2-66
PRINTER: Canon Bubble-Jet BJ-200
PROS: Excellent performance, fine service and support, ink jet printer **CONS:** Limited software bundle
CONTACT: CompuAdd Express, 800/925-3000, 512/219-1800 **Reader service no. 709**

Look out—here comes another hot 486DX2-66! The CompuAdd Express 466DX2 tallied a strong fourth place overall, joining a tight pack of systems clustered in positions two through six—that started about 24 percent behind the extraordinarily fast Micro Express ME 486-VL/DX2/66 and varied less than 4 percent from each other. A 256K secondary RAM cache, integrated local bus video, and a 160MB Western Digital Caviar hard disk are all desirable features on a starter system, and CompuAdd Express included the fine Canon BJ-200 ink jet printer. The software selection is not quite as strong: You must choose among Lotus Organizer, 1-2-3 for Home, Lotus Write, or Lotus Works, an unintegrated DOS package.

The 466DX2 has six 16-bit expansion

NO WONDER WORDPERFECT USERS ARE SWITCHING TO MICROSOFT WORD. AFTER ALL, THEY HELPED DEFINE IT.

Word for Windows is available separately or as a part of The Microsoft Office.



At last count, nearly a million WordPerfect® for DOS users have moved to the world's most popular word processing software for Windows™: Microsoft® Word version 2.0 for Windows. And there are plenty of good reasons why that's so.

First of all, WordPerfect for DOS users actually helped us make Word for Windows easier to use.

During the development process of Word for Windows, we invited WordPerfect users to try it out on the things they do every day at work. We call these types of sessions "usability studies." They help us find out the way in which people use their computers, and how we can make it easier for them.

In this case, we were able to design features that not only can make your everyday work easier, but also the transition from WordPerfect.

Like the customizable Toolbar. It gives you one-step access to inserting bullets and printing envelopes. Word for Windows can also take all your familiar commands in WordPerfect, and then display the equivalent commands. So you can learn while you're working on your everyday tasks.

If, at this point, we've gotten your attention, rest assured you're not alone. Recently, Word for Windows received numerous industry awards, including "Editors' Choice" from *PC Magazine* and "Best Buy" from *PC World*.

To see how we've helped other people like you make the switch, call (800) 323-3577, Dept. KN9, and ask for our free videotape. And then spread the Word.

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slots and three drive bays free. Two other externally accessible bays are occupied by the receptacle for an optional 60MB removable hard drive, a choice you'll appreciate if you plan to generate high-security data that needs off-site storage.

CompuAdd Express offers a year of free on-site service and toll-free tech support.

At press time, the company informed us of plans to enhance this product line with a local bus IDE adapter and a 238-pin OverDrive for DX2 ZIF socket. The new line will be called Centura and should replace the current models by the time you read this. This sounds like a good improvement to an already solid package.

CSP Pro 486DX/33

VITAL STATISTICS

DIRECT PRICE: $1899
PROCESSOR: Intel 486DX-33
PRINTER: Panasonic KX-P1124i
PROS: Best price in roundup, excellent service and support **CONS:** None
CONTACT: Computer Sales Professional, 800/950-6660, 908/560-1143 **Reader service no. 710**

If you're trying to get going on a shoestring and you need all the essentials, Computer Sales Professional has you covered. The Pro 486DX/33 gives you 33-MHz 486DX power, a 256K secondary RAM cache, a 160MB Western Digital Caviar 1170 hard disk, a no-frills 24-pin Panasonic KX-P1124i printer, Spinnaker's basic PFS:WindowWorks 2.0, *and* Intuit's popular Quicken for Windows for just $1899 direct. Not bad for a system with STB PowerGraph VL-24 VESA local bus video, especially considering that the no-surprises performance figures ended up right where you'd expect, in the middle of the pack.

This midsize tower model has plenty of room for peripherals, with one free VESA slot and four free 16-bit slots. Want to add drives? Not a problem: You have three bays free that will take an externally accessible drive and another five free bays inside the case. Even the accessibility is good. CSP placed a heat sink with a cooling fan on top of the 486DX-33: While it's probably not necessary on this relatively cool-running CPU, it'll help when you decide to upgrade to a 66-MHz OverDrive in the future.

Whether buying a pricey system or an inexpensive one, good support is a must. And CSP gave us no cause for concern. The year of free on-site service, terrific one-day service turnaround, and 12-hours-a-weekday toll-free support combines with outstanding responsiveness, accuracy, and a 45-day money-back guarantee to win Computer Sales Professional a service icon. Power users will want a stronger spreadsheet and word processor, and the printer included is pretty basic. Balanced against these factors, however, is another plus: Many home offices will be able to use Quicken for Windows to keep their books. If you have to keep your expenditure under $2000, this is your best deal here.

CompuTrend Premio VL486DX2-66

VITAL STATISTICS

STREET PRICE: $2433
PROCESSOR: Intel 486DX2-66
PRINTER: Panasonic KX-P1123
PROS: One-day service turnaround, 200MB hard disk **CONS:** Motherboard unsupported at one end
CONTACT: CompuTrend Systems, 800/677-6477, 818/333-5121 **Reader service no. 711**

CompuTrend's Premio VL486DX2-66 66-MHz local bus system is a good performer, but it took longer than any other 486DX2-66 system to complete our benchmarks. That surprised us at first: The system has a 256K secondary RAM cache, and even two 50-MHz machines were faster. When we popped the top, we noticed that CompuTrend had installed a standard 16-bit Western Digital Paradise graphics accelerator rather than a VESA card. CompuTrend reasons that the 16-bit board keeps initial costs down while allowing a future upgrade to a 32-bit accelerator. Unfortunately, that hurts graphics performance now and increases your eventual cost.

The case has room for two additional externally accessible drives, and everything is well laid out inside. This rosy picture is flawed by a deficiency in the way CompuTrend installs its tiny motherboard, however. The end where the VL extensions and CPU socket reside is completely unsupported. We shudder to think of the stress and flexing the motherboard will endure every time you insert a VESA card. Placing peripherals in the other four free slots, however, shouldn't cause undue strain.

Service and support is good, although we received incorrect answers to some of our inquiries. The one-day service turnaround policy is great, a year of on-site service runs $140, and it's easy to get a technician on the toll-free support line. The software bundle is the solid and basic Microsoft Works for Windows, and CompuTrend supplies the good Panasonic KX-P1123 24-pin printer. Actually, this package presents a solid overall value, but it's marred by the flimsy support of the motherboard, so we can't encourage you to go out and buy it.

Dell 433s/L

VITAL STATISTICS

DIRECT PRICE: $2505
PROCESSOR: Intel 486SX-33
PRINTER: Epson LQ-570
PROS: Excellent service and support, fast Paradox performance **CONS:** Limited expandability
CONTACT: Dell Computer Corp., 800/289-3355, 512/338-4400 **Reader service no. 712**

Dell put its new modular design to work in this package, and you couldn't find a nicer PC to work on. The case opens with just a twirl of the

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You wanted the power to choose from a world of different applications. DOS applications. Windows™ applications. OS/2® applications. OS/2 2.0 gave you the power. And the response was impressive, to say the least. Over two million copies shipped in less than one year. More than 1,200 OS/2 applications already available.* But now you want more. More features. More functions. More applications to choose from. That's why we're introducing OS/2 2.1.

The new OS/2 2.1 lets you run the latest Windows 3.1 applications, in addition to the DOS, Windows and OS/2 applications you can already run. We've also added TrueType fonts, select Windows applets, File Manager and support for Windows 3.1 printer and display drivers, including 32-bit seamless SVGA support. And now you can start DOS and OS/2 applications from a WIN-OS/2 session, too.

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There's no need to buy DOS and Windows to run DOS and Windows applications.

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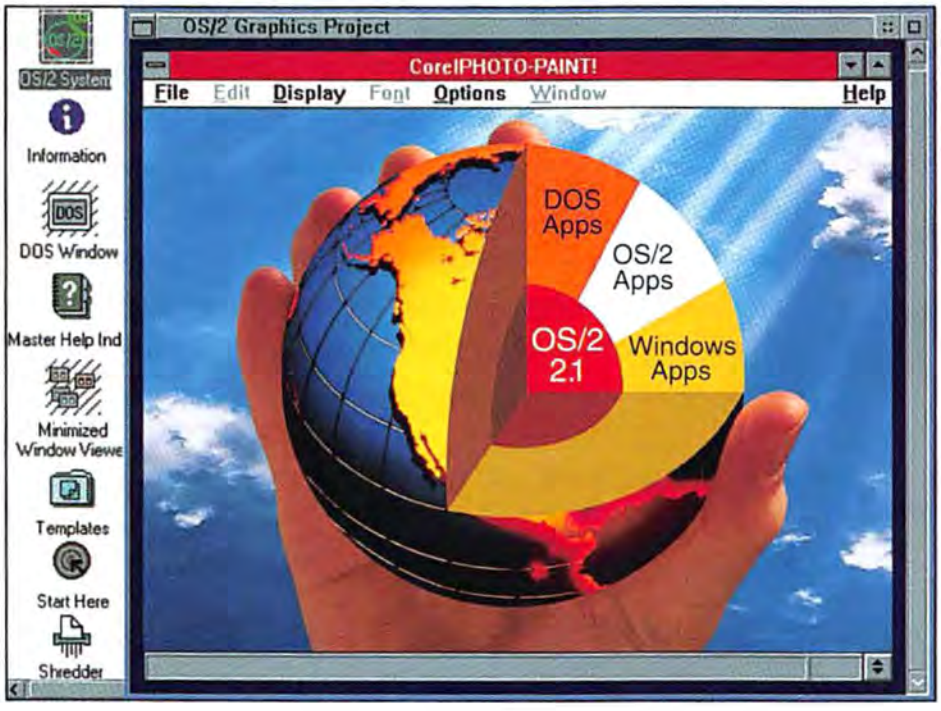

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- Seamless SVGA support.
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thumbscrews, and externally accessible drives snap in and out without your having to twist any screws at all. Even the motherboard is installed with quick-release attachments. And the well-conceived design extends to every facet; as always, you have perfect access to every component. The 486SX-33 system has its cache filled out to 128K, and it's surprisingly quick. Among the 33-MHz machines, only Gateway's pricey 4DX-33V beats the 433s/L on overall performance. And the Dell really turned our heads on our Paradox benchmark, with a third-place finish just 24 percent slower than the blazing 66-MHz Micro Express ME 486-VL/DX2/66. That's outstanding performance from a system without a caching controller or local bus drive control. And you're definitely not at a dead end when it comes to upgrades: You can go either to a 66-MHz OverDrive CPU or use the 238-pin socket as a future home for an Intel OverDrive for DX2.

This system has integrated local bus video, and Dell bundled Microsoft Works for Windows 2.0 along with a nice 24-pin Epson LQ-570 printer. Expandability is not this system's strong point, however. Although you shouldn't feel a storage pinch with the 160MB Western Digital Caviar 2170 hard disk, you had better pick the next drive you add carefully, because you have only one bay left. Fortunately, it will accept an externally accessible drive. The peripherals picture is similarly darkened by the limitation of just three free expansion slots.

Sometimes it seems Dell wrote the book on providing great service, and its superb, free on-site service seems old hat now precisely because Dell was the first to offer it so long ago. The company provides 24-hour technical support seven days a week for this model. Do the technicians answer promptly and give correct advice? You bet. Does all this add up to a service icon for Dell? Of course. But despite this machine's superb design and great service, its limited expandability keeps us from giving it an A+ as a starter system—we'd suggest buying a more expandable model.

Digital DECpc 425sx LP

VITAL STATISTICS

DIRECT PRICE: $2572
PROCESSOR: Intel 486SX-25
PRINTER: DECwriter 95
PROS: Superior software bundle
CONS: Mediocre performance, limited expandability
CONTACT: Digital Equipment Corp., 800/722-9332, 508/493-5111 **Reader service no. 713**

Digital puts out an attractive software bundle for the start-up buyer. Its DECpc 425sx LP offering comes with Microsoft Office 3.0, which includes Word for Windows 2.0, Excel 4.0, PowerPoint for Windows 3.0, and Microsoft Mail. The high-quality dedicated word processor, super spreadsheet, and fine presentation graphics package should be a big help to just about any start-up business. The DECwriter 95 24-pin printer completes the bundle in respectable fashion, and Digital Equipment outfitted this system with a 128K secondary RAM cache as well as a 120MB Digital hard disk.

You can't put a price on the confidence you get when you buy from a company with longevity and an impeccable reputation.

The Digital 25-MHz 486SX DECpc could not match the standard of performance set by the lion's share of systems in this review, however. As you might expect, all four of the 486SX-25s wound up at or near the bottom on every speed test. Furthermore, this system looks as if it's aimed more toward a LAN environment than a home office. There are only three free slots, one free internal bay, and no place to put a tape backup or CD ROM drive.

One factor Digital really scores on is buyer confidence. For most buyers, there's no question that a company with Digital's reputation and longevity in business will be there to support them. It's hard to put a price on that kind of security. When you buy this package, you get a two-year warranty on the printer to complement the year of protection for the PC. The company provides the first year of on-site service free and toll-free technical support. Responsiveness could have been better this time, and some of the advice we got strayed a bit from the mark. Looking at this deal as a whole, we love the great software offering. But a PC with this little expandability will be of limited use in most start-up circumstances, and you can buy other systems with similar bundles and much faster processors.

Eltech 4330

VITAL STATISTICS

DIRECT PRICE: $2299
PROCESSOR: Intel 486DX-33
PRINTER: Panasonic KX-P1123
PROS: Very good price, multimedia bundle, fax-modem **CONS:** No on-site service option, limited expandability **CONTACT:** Eltech, 800/358-8330, 510/438-0990 **Reader service no. 714**

We must admit we had more fun with Eltech's setup than with many faster machines that came bundled with burly business apps. The $2299 Eltech 4330 is not only priced well, it's a multimedia PC par excellence. This 33-MHz 486DX system comes with a Sony CD ROM drive; a Thunder Media sound board; CS-150 speakers; and a mess of software on CD ROM, including Microsoft Bookshelf, Works for Windows, and a variety of audio software and games. If you find enough time in between playing with the CD ROM applications, you can print something on the nice 24-pin Panasonic KX-P1123 printer. Eltech even supplied an internal fax-modem.

When you get inside, you'll find a pretty businesslike box, with an upgrade path all the way to Intel OverDrive for DX2 ensured by the 238-pin ZIF socket. As configured, however, the system fell on the lower end of the 33-MHz section of the performance scale despite its 128K of installed secondary cache. The 120MB Maxtor 7120 (AT) hard drive should be adequate for most start-up users.

Most of the service and support policies

A Lotus 1-2-3 you can really count on.

Talk about strength in numbers. Lotus® 1-2-3,® The World's Most Popular Spreadsheet,™ is now optimized for OS/2.® 1-2-3 for OS/2 offers the ease of use 1-2-3 is famous for, while exploiting the 32-bit power and advanced graphical environment of OS/2.

Now you can crunch nonstop with multithreaded background printing and Solver. With OS/2 Crash Protection,™ you can simultaneously print, recalculate and input data without thinking twice. And 1-2-3 for OS/2 takes full advantage of the Workplace Shell™ object-oriented interface. Drag and drop a data object onto the printer or shredder. Drop it onto the 1-2-3 program object, and OS/2 launches the application and loads the file in one simple step.

There are even more enhancements, like SmartIcons®—one click shortcuts to frequently used commands. The new Draw Layer lets you paste, position and size graphical objects from the OS/2 clipboard to anywhere on the worksheet. Plus you get features you already know, like true 3-D worksheets, Solver and BackSolver, file linking, and external database access.

Of course there's compatibility with previous 1-2-3 versions and other Lotus products, too. In fact, there's incredible integration when installed with Freelance Graphics® for OS/2. All in all, when you see how much it offers, you have to give this 1-2-3 a 10.

To order or to find out more about OS/2 2.1 or Lotus 1-2-3 for OS/2, call **1 800 3-IBM-OS2.** In Canada, call **1 800 465-7999.**

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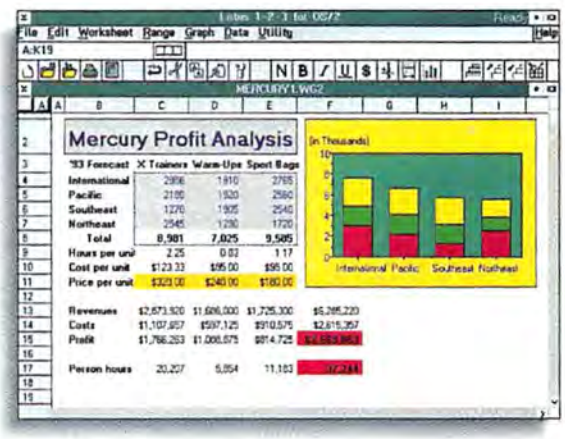

A true 32-bit implementation of Lotus advanced spreadsheet technology.

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are good: The three-day service turnaround policy is pretty fair, and the toll-free technical support, available weekdays during business hours, yielded outstanding help. There's no on-site service option, however. Eltech has been working to recover from the Chapter 11 protection it sought last fall, and the fact that the company is still taking orders and shipping products speaks well for its potential to survive. It's encouraging to see the company continue to produce enjoyable and useful products.

Epson Equity 4SX/25

VITAL STATISTICS

STREET PRICE: $2316
PROCESSOR: Intel 486SX-25
PRINTER: Epson ActionLaser 1000
PROS: Great laser printer **CONS:** Mediocre performance, poor support response, limited room for expansion **CONTACT:** Epson America, 800/922-8911, 310/782-0770 **Reader service no. 715**

The best printer in this review by far is the excellent ActionLaser 1000, which Epson tossed in as part of its $2316 Equity 4SX/25 package. This printer is so good that it earned a Best Buy in July. Epson also bundled Microsoft Works for Windows 2.0 as an all-in-one solution.

The PC box itself is a trim, handsome design that's brand-new and incorporates a ZIF socket to accommodate its 25-MHz 486SX CPU. That translates into a very easy upgrade path to OverDrive for DX; unfortunately, the system as configured significantly underperformed every PC in our review, even the other 25-MHz machines.

Expandability is a problem with this PC as well, as both of the externally accessible drive bays and the internal one are already taken up by the two floppy drives and the 120MB Conner CP-30104H hard disk. Having four free expansion slots isn't bad, although one of them is obstructed by the 4MB SIMM. You would need to save this position for a short card, such as an internal modem, because even a half-card won't fit.

Service is decent: Epson provides a year of free on-site service, two-day service turnaround, and toll-free support. Although we wistfully dream of hooking up to a great printer such as the ActionLaser 1000, with all the fast, expandable systems in this review, even the ActionLaser can't make us ignore this system's shortcomings.

Gateway 2000 4DX-33V

VITAL STATISTICS

DIRECT PRICE: $2859
PROCESSOR: Intel 486DX-33
PRINTER: Panasonic KX-P2123 with color kit
PROS: Outstanding Freelance performance, super software bundle **CONS:** High price, poor tech support response **CONTACT:** Gateway 2000, 800/846-2000, 605/232-2023 (fax) **Reader service no. 716**

Even some top vendors seem unable to keep technical support response up to snuff lately. For several reviews, we've had trouble getting through on Gateway's toll-free lines, although representatives tell us that phone staff has grown to 200 and the company is adding 15 technicians a week. Support promptness is crucial, however, and Gateway's formerly superb ratings have plunged. On the positive side, Gateway offers a year of free on-site service and lifetime phone, BBS, and fax tech support.

Gateway's $2859 package comes with 8MB of RAM, a 160MB Western Digital Caviar 2170 hard disk, Microsoft Office 3.0, a utilities collection, and a 24-pin Panasonic KX-P2123 with a color kit.

This local bus 486DX-33 was the fastest 33-MHz machine overall. If you don't need a coprocessor, you can save $150 and get comparable performance with Gateway's 4SX-33V—or pay $50 more to bump speed up a notch with the coprocessor-equipped 4DX2-50V. Despite its high price, this bundle's quality makes for a deal that really turns us on. We're hoping we can soon say the same once again for Gateway's support.

Hyundai 433DP

VITAL STATISTICS

DIRECT PRICE: $2500
PROCESSOR: Intel 486DX-33
PRINTER: Epson LQ-570
PROS: Excellent software bundle
CONS: Poor support responsiveness
CONTACT: Hyundai Electronics America, 800/933-3445, 408/473-9200 **Reader service no. 717**

Is a poor-response bug sweeping the PC business? If so, Hyundai seems to have been bitten. We were unable to get through on multiple tries, but when we finally made a connection, a technician answered our question correctly after just 5 minutes on hold. We can't kick about the rest of Hyundai's service picture: An 18-month system warranty, a year of free on-site service, toll-free weekday tech support, two-day service turnaround, and BBS and fax support all sound good.

The compact, low-rise Hyundai 433DP comes with a 128K secondary cache, a capacious 200MB Conner CP-30204 hard drive, and integrated local bus video. As with most small boxes, you're pinched for storage expansion, and only one drive bay is free. But four slots remain free, even with Hyundai's fax-modem installed, although only two accept full-length cards. And a future CPU upgrade would be a snap thanks to the ZIF CPU socket.

This package really shines in its software bundle, which is so bright that you can hardly see it all at once: You get Lotus SmartSuite for Windows 1.2, which includes 1-2-3 1.1 for Windows, Ami Pro 3.0 for Windows, Freelance Graphics for Windows 2.0, cc:Mail for Windows 1.0, and Lotus Organizer for Windows 1.1—along with a nice 24-pin Epson LQ-570 printer. Now that's a setup that should really get you started. While this system lacks storage expandability, its super application bundle makes it hard to resist. Imagine how attractive it would be if it were paired with prompt technical support.

This TalkThru will leave you speechless.

Ooohs and aaahs aside, what can you say about a communications product that combines incredible flexibility with the awesome performance and rock-solid reliability of OS/2®? You might say it's...dynamic. Inspired would be equally appropriate.

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Of course, to really understand how much TalkThru for OS/2 has to offer, you have to see it in action. That'll speak much louder than words. To order or to find out more about OS/2 2.1 or TalkThru, call 1 800 3-IBM-OS2.

In Canada, call 1 800 465-7999.

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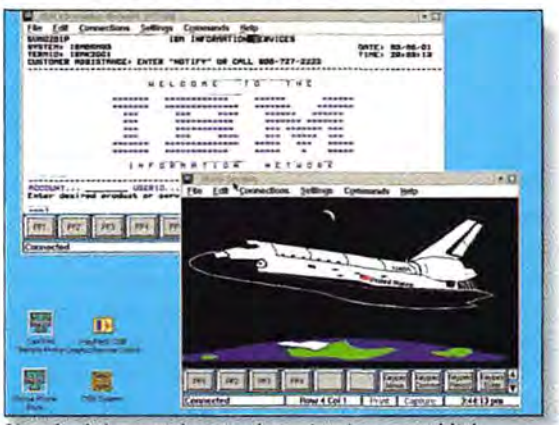

You don't have to be a rocket scientist to establish reliable communications links.

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Insight 486-33VL

VITAL STATISTICS

DIRECT PRICE: $2499
PROCESSOR: Intel 486DX-33
PRINTER: Canon Bubble-Jet BJ-200
PROS: Great software and printer bundle, OverDrive for DX2 socket **CONS:** No on-site service option **CONTACT:** Insight Distribution Network Inc., 800/927-7848, 602/350-1176
Reader service no. 718

Insight put it all together this time—and the result is one of the most irresistible Best Buy combos here. This 486DX-33 has a 128K secondary RAM cache, a 200MB Western Digital Caviar 2200 hard drive, and local bus video and drive adapters. The compact desktop case has room for two more externally accessible drives, and you get four full-length slots. Performance lands in the middle overall, but on the upper arc of the 33-MHz curve. And if you need to step up your speed in the future, you'll be able to make an easy move to a 66-MHz OverDrive or a giant step to OverDrive for DX2, thanks to the nifty 238-pin ZIF socket.

We really got excited when we unpacked the terrific Canon BJ-200 ink jet printer, Microsoft Office 3.0's wealth of applications, Dr. Solomon's Anti-Virus Toolkit, Stacker 2.0, and MirrorFax by SoftKlone to complement Insight's fax-modem. It's hard to believe Insight can stuff all these goodies into a package that costs just $2499.

Insight's accurate, responsive toll-free phone support is available 24 hours a day on weekdays, 10 hours a day on weekends. Insight doesn't offer an on-site service option, however, preferring to plow its resources into its fine technical support. Although Insight doesn't specify a turnaround policy, it promises to make every effort to get service jobs back out the door in 48 hours. So what do we have here? A great PC, a slew of super software, a free modem, a terrific printer, *and* (you guessed it) a Best Buy.

Micro Express DX2/66

VITAL STATISTICS

DIRECT PRICE: $2299
PROCESSOR: Intel 486DX2-66
PRINTER: Panasonic KX-P2180
PROS: Best performance and service and support of all the systems reviewed
CONS: 9-pin printer
CONTACT: Micro Express, 800/989-9900, 714/852-1400 **Reader service no. 719**

Hold on a minute! Sure, the Micro Express ME 486-VL/DX2/66 is a 66-MHz 486DX2, but how does it beat five other 66s and three 50s by 24 percent or more on overall performance? Well, this system not only has a 256K secondary cache and a 200MB Western Digital Caviar 2200 hard drive; it also has a 2.5MB SuperIDE caching controller and an ATI/VLB Mach32 local bus graphics accelerator. You won't lack for growing room, either, with five free slots—including one VESA local bus slot and four free drive bays.

Micro Express winds up with the top service and support rating too. Its excellent tech support department is ready 24 hours a day; technicians are paged after business hours. The PC warranty lasts two years, and a year of on-site service costs just $50. The rest of the bundle is less imposing. We suggest spending an extra $75 to upgrade from the 9-pin printer to a 24-pin Panasonic KX-P2123. Although Spinnaker's PFS:WindowWorks and PFS:Publisher for Windows are serviceable, they're not top of the line.

Micro Express has won Best Buys in a number of past reviews, and as in June, it rules the roost as the top-ranked Best Buy here. Let's face it, you won't buy this bundle for its applications or printer—you can find better. But if you want fantastic service and support backing an incomparable system that's so fast it could almost have won without any help—here it is.

MIS Computer M4SX

VITAL STATISTICS

DIRECT PRICE: $2395
PROCESSOR: Intel 486SX-25
PRINTER: Panasonic KX-P1124i
PROS: Excellent service and support, fax-modem
CONS: Mediocre performance
CONTACT: MicroNiche Information Systems, 800/733-9188, 408/730-9188
Reader service no. 720

MIS really delivers on service and support. A lot of companies here can match or better a year of on-site service for a reasonable $20 and toll-free support available 10 hours a day on weekdays, but only two others provide a one-day service turnaround policy. Where MIS really stands out is on its snappy and unerring responses to all our technical inquiries. MIS's service and support are so good, in fact, that it really lifts the value of this setup.

The biggest handicap the M4SX has to overcome is its pedestrian 486SX-25 CPU. You could get more out of this PC by boosting the RAM to 8MB and installing a larger secondary cache, but performance will still be limited by the 25-MHz processor. MIS did include a solid Diamond SpeedStar 24X video accelerator and a quality 120MB Quantum ProDrive ELS. We're just afraid you'll feel the need too soon to take the OverDrive upgrade path to 66 MHz.

We did notice one design flaw: The corner of the motherboard under the CPU socket is poorly supported. Fortunately, the ZIF socket mitigates this oversight. And MIS's bundle is outstanding. Microsoft Office 3.0 includes Word for Windows 2.0, Excel 4.0, PowerPoint for Windows 3.0, and Microsoft Mail. You also get BitCom and BitFax for DOS, a fax-modem, and Panasonic's fine KX-P1124i 24-pin dot matrix. That makes for a terrific starter package—especially at the moderate $2395 price. But as with the other 25-MHz systems, we suspect you'll be dissatisfied with performance.

This Fax/PM will really send you.

We think it'll be pretty well received, too. Fax/PM™ is a full 32-bit OS/2® application that makes it easy to send and receive faxes right from your computer. Whether you're in a DOS, Win-OS2 or OS/2 session running under OS/2 2.1, now you have the ability to send faxes from any full-screen DOS, Windows,™ or OS/2 application—without leaving the application. Just select the Fax/PM driver as your printer. Fax/PM also really capitalizes on the advanced features of the Workplace Shell™ object-oriented interface.

You can send faxes right from the Workplace Shell by simply dragging and dropping a data object to the fax object. And thanks to OS/2's true pre-emptive multitasking capabilities, you can send, receive and print faxes in background mode while you continue working with other applications.

Features like these are too good to keep to yourself, so there are also OS/2 versions available for LAN and client-server environments, all CID enabled. And application developers will appreciate APIs that allow for integration of the Fax/PM engine into custom applications.

We could go on about how Fax/PM and OS/2 can make your PC an even more productive place. But we'd rather let the fax speak for themselves.

Send faxes right from the Workplace Shell, or from any full-screen DOS, Windows or OS/2 application.

To order or to find out more about OS/2 2.1 or Fax/PM, call 1 800 3-IBM-OS2.* In Canada, call 1 800 465-7999.

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*Microformatic U.S.: (1 203 644-1708), P.O. Box 722, 610 Niederwerfer Road, South Windsor, CT 06074; Europe: (33 1 48 70 19 00), 2, rue Navoiseau, 93100 MONTREUIL-SOUS-BOIS, France. IBM and OS/2 are registered trademarks and Workplace Shell and "Operate at a higher level" are trademarks of International Business Machines Corporation. Fax/PM is a trademark of Microformatic. Windows is a trademark of Microsoft Corporation. ©1993 IBM Corp.

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Mitac D4466R

VITAL STATISTICS

STREET PRICE: $2495
PROCESSOR: Intel 486DX2-66
PRINTER: Citizen GSX-230
PROS: Quick performance, super software bundle
CONS: Only one drive bay free **CONTACT:** Mitac, 800/777-1688, 510/440-3604 (fax)
Reader service no. 721

Mitac has put together a quick, well-designed system and combined it with a dynamite starter bundle. Does that sound like a Best Buy to you? It does to us! With its torrid 486DX2-66 CPU and 256K secondary RAM cache, this PC ended up right on the border of the Best Five in overall performance, with a consistent showing on all tests and an outstanding second place on Word for Windows, just 7 percent behind the leader.

The Mitac box sports a convenient cover that you simply lift off the top—forget having to fiddle around in the back every time you want to add an expansion card. One look inside will tell you why we really like this design: You have easy access to the ZIF socket and to almost everything else you need to get to. The only exception is that you have to hold back some cables to get to the memory sockets. And only one drive bay is available. If you want to add a tape backup unit and a CD ROM drive, one will have to be externally accessible. The system has six slots free, one of which has VESA local bus extensions. Another local bus slot is filled by a Diamond Stealth 24VLB VESA graphics accelerator.

The printer and software bundle included with the Mitac system played a big role in our Best Buy decision. The Citizen GSX-230 24-pin dot matrix printer does letter-quality output with the best of them, while the Microsoft Office 3.0 software bundle is a terrific package.

Mitac's central service and support program is strong; its technicians answered all our questions impeccably, although there was a lag in getting a couple of calls returned. As the company phases out its direct-sales division, it will discontinue its 30-day money-back guarantee and allow dealers to set their own service policies. But Mitac will continue answering its toll-free support lines 9 hours a day, even on Saturdays. Speed and service and support form the core of this package; this great bundle ties for a Best Buy award.

Polywell 486SX-33VZ

VITAL STATISTICS

DIRECT PRICE: $2500
PROCESSOR: Intel 486SX-33
PRINTER: Star NX-2430 Multifont
PROS: Terrific CD ROM drive bundle, fine service and support **CONS:** Low Paradox performance score **CONTACT:** Polywell Computer, 800/999-1278, 415/583-7222 **Reader service no. 722**

The Polywell 486SX-33VZ's CD ROM bundle—a Sierra Vquest CD ROM drive, a MediaVision 16-bit ProSpectrum sound card, Labtech CS-150 speakers, and a King's Quest V game—adds luster to an already well-appointed 486SX-33 VESA minitower. This PC is ultra-upgradable, with a 238-pin ZIF CPU socket ready for a future upgrade to Intel OverDrive for DX2. Polywell also supplied both a local bus drive adapter and a 32-bit Orchid Fahrenheit VLB local bus graphics accelerator. If not for a so-so showing on Paradox, this unit's overall performance rating would have been high in the 33-MHz pack.

Polywell's solid if unexciting business bundle includes Microsoft Works for Windows and the Star NX-2430 24-pin printer. Service and support, with an unusual five-year labor coverage plus a one-year service warranty, just missed our Best list. On-site service costs $75 for the first year, and responsive and accurate toll-free tech support is available even on Saturdays. With that kind of backing and the CD ROM bundle to sweeten the deal, the Polywell 486SX-33VZ package moves beyond its showing on Paradox to take its place among the convincing values in this review.

Quill Qtech Startup

VITAL STATISTICS

DIRECT PRICE: $2499
PROCESSOR: Intel 486DX-33
PRINTER: Epson Stylus 800
PROS: 200MB hard disk, internal modem, good printer and software bundle **CONS:** Mediocre performance, toll call for tech support
CONTACT: Quill Computers, 708/634-6650, 708/634-6743 (fax) **Reader service no. 723**

Quill Computers loaded its 486DX-33 Qtech Startup system with a spacious 200MB Maxtor 7213 (AT) hard disk. And the company didn't stop there—it put everything into a case that accommodates both sizes of floppy drives and the hard disk and still has room for you to add up to three externally accessible drives. Four 16-bit slots, one of which has a VESA local bus extension, allow elbow room for adding full-length peripherals—especially when you consider that an internal fax-modem is already installed.

Despite its 128K secondary cache and local bus video, performance is just decent with this system. But its Epson Stylus 800 printer is a terrific 48-nozzle ink jet with lovely output quality. And the software bundle just gets started with Spinnaker's PFS: WindowWorks, a basic integrated package. If you're into serious financial calculations and need super graphing capabilities, you can really get the job done with Borland's excellent Quattro Pro for Windows 1.0. And Quill provides Delrina's WinFax UltraLite as a complement to the fax-modem.

Service and support are good, with only one glaring exception: Calls to technical support are on your dime. Although support is available only on weekdays, to Quill's credit, responsiveness to our calls was very good, and answers were correct. A year of

A more perfect WordPerfect.

Your search for the perfect word processor has ended. Now the world's most preferred word processor is native for OS/2.® WordPerfect® 5.2 for OS/2 takes advantage of the strengths that separate OS/2 from other operating systems, giving you an object-oriented, easy approach to creating fantastic looking documents.

WordPerfect 5.2 lets you access powerful features right from the Workplace Shell.™ The new Automatic Document Detection (ADD) feature registers previous WordPerfect files so they're Workplace Shell enabled. Then just double-click on a data object to open a document—to print, drag and drop a data object onto the printer object. It's that easy. Advanced Workplace Shell integration means increased productivity for you. For example, multithreaded background printing lets you send a document to the printer without tying up your keyboard.

WordPerfect 5.2 for OS/2 looks like other graphical versions of WordPerfect, so more people already know how to use it. And there's no need to worry about converting old WordPerfect files.*

Other advanced features like Button Bar,™ Ruler, QuickFinder, and Grammatik all help make the writing process smoother and more flexible. In fact, this WordPerfect has so many features that exploit our advanced technology, you could say it's a perfect match.

To order or to find out more about OS/2 2.1 or WordPerfect 5.2 for OS/2, call **1 800 3-IBM-OS2.** In Canada, call **1 800 465-7999.**

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WordPerfect's Button Bar brings frequently used features right to your screen.

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*WordPerfect for DOS, Windows, RS/6000 and VAX files are fully compatible with WordPerfect 5.2. You can also exchange all your AS/400 and IBM 370 files. IBM and OS/2 are registered trademarks and Workplace Shell and "Operate at a higher level" are trademarks of International Business Machines Corporation. WordPerfect is a registered trademark and Button Bar is a trademark of WordPerfect Corporation. © 1993 IBM Corp.

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free on-site service, two-day turnaround, and BBS and fax support round out the support offerings. When you look at this whole package, you'll see plenty to recommend it. Despite the unexceptional performance numbers and toll call for tech support, the nifty printer and great spreadsheet help make this setup very tempting.

Silicon Valley 486DX2

VITAL STATISTICS

DIRECT PRICE: $2595
PROCESSOR: Intel 486DX2-66
PRINTER: HP DeskJet 500
PROS: Excellent performance, two-year system warranty **CONS:** Central support only on direct purchases, toll call for tech support
CONTACT: Silicon Valley Computers, 415/967-1100, 415/967-0770 (fax) **Reader service no. 724**

No doubt about it, the Silicon Valley 486DX2 Turbo VESA knows how to bring in the fast one. It hurled a virtual tie with the Amax 486DX2/50 VESAmax for second place on overall performance, 24 percent behind the superfast Micro Express ME 486-VL/DX2/66. This hot local bus PC also hit for extra bases by providing a 2MB VESA local bus IDE caching drive controller and a 32-bit Paradise local bus graphics accelerator. Under the compact desktop hood, the extremely compact motherboard is very accessible.

You get four free 16-bit expansion slots, and all the bays accept externally accessible drives. Two free bays are just right for adding a tape backup unit and a CD ROM drive. With all the batting power, however, the 80MB Conner CP-30084E hard disk—although within our minimum guidelines—is barely adequate. But the software bundle is more than decent: Microsoft Works for Windows 2.0 is augmented by Publisher for Windows and Central Point's Anti-Virus 1.0. The fine Hewlett-Packard DeskJet 500 ink jet printer also puts runs on the scoreboard.

Silicon Valley's service and support rating was helped by a two-year system warranty. But to get Silicon Valley's central support, you have to buy direct; otherwise, all service and support must come from your dealer. Although we had to pay the toll on our calls, the company should have toll-free support in place by the time you read this. We got through easily, but some answers strayed outside the strike zone. To be fair, Silicon Valley only recently started offering support to end users, so accuracy should improve. This fast, good-looking slugger almost earned a Best Buy, which indicates the value packed into this bundle. If the toll-free lines had been up and running, this system just might have hit a home run.

Swan 486SX/25DB

VITAL STATISTICS

DIRECT PRICE: $2518
PROCESSOR: Intel 486SX-25
PRINTER: Panasonic KX-P2124
PROS: Two years of free on-site service, fax-modem
CONS: Mediocre performance
CONTACT: Swan Technologies, 800/468-9044, 814/234-2236 **Reader service no. 725**

Swan bundles something with its 486SX/25DB that you won't find with any other system here: two years of free on-site service. Add to that a two-year warranty on its system and printer and quick access to precise telephone tech support 12 hours a day on weekdays and 8 hours on weekends. In addition, Swan takes advantage of the latest trend in service, giving its customers the extra option of remote diagnostics by throwing in the terminal portion of Triton's CO/Session, along with a modem.

Unfortunately, this system is built around the ho-hum 486SX-25 CPU. Even with a 128K secondary cache and a Diamond Stealth 24VL local bus graphics accelerator, this system wound up with its three 25-MHz classmates as cellar dwellers on overall performance. Swan decided to stick with its June 92 AMI BIOS, although a number of other machines using it improved their performance on the BAPCo SYSmark92 test when they switched to other BIOS versions. To its credit, however, Swan's PC far exceeded the performance of the last-place Epson Equity 4SX/25.

To provide storage, Swan gives you a healthy 170MB hard drive along with a combination floppy drive that puts both formats in one half-height bay. This sprawling full-size desktop machine features four free bays, any of which can handle an externally accessible drive. A modem is already installed, so with four 16-bit expansion slots free, including one with VESA extensions, you're sitting pretty when it comes to adding full-length peripherals.

Swan puts the personal touches on its PCs: The assembler even signs a label on the back, and the general level of Swan's quality control is excellent. While the Microsoft Works for Windows 2.0 integrated software package can't stack up against a muscular array of dedicated applications, the Panasonic KX-P2124 24-pin dot matrix printer is an able workhorse. Considering the less-than-scintillating performance of this 25-MHz machine, the fact that this package still rates as a respectable value speaks volumes about Swan's quality, expandability, and service.

USA Flex VL486DX2 50MHz

VITAL STATISTICS

STREET PRICE: $2449
PROCESSOR: Intel 486DX2-50
PRINTER: Canon Bubble-Jet BJ-200
PROS: 24-hour phone support, good expandability
CONS: One inaccurate support response
CONTACT: USA Flex, 800/846-0002
Reader service no. 726

USA Flex always seems to roll a winner on service and support, although this time it didn't make quite as many points as usual.

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Freelance Graphics for OS/2 is the first 32-bit presentation product, so it's ready to exploit the 32-bit strengths of OS/2. Screen re-draw and file retrieval are lightning fast. Since it's optimized for OS/2, you can print presentations right from the Workplace Shell™—just drag and drop the presentation file object to the printer object. Multithreaded background printing even lets you print one presentation while you start the next.

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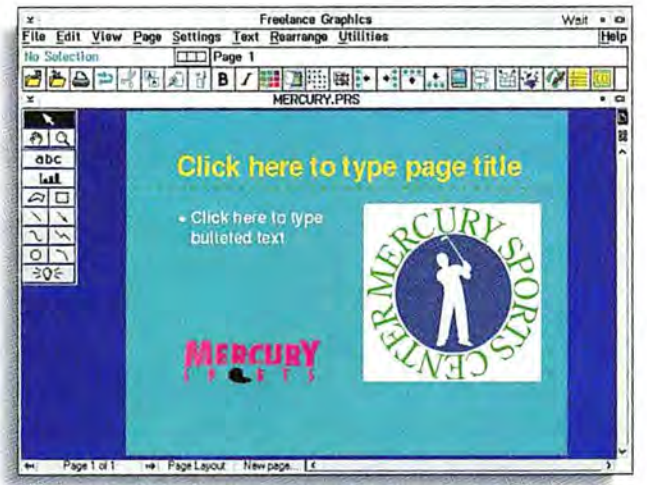

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With all the added power of OS/2, you'll be so impressed with this Freelance, you'll want to hire it full-time. To order or to find out more about OS/2 2.1 or Lotus Freelance Graphics for OS/2, call **1 800 3-IBM-OS2.** In Canada, call **1 800 465-7999.**

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PC WORLD TEST CENTER REPORT

Micro Express's Hot 486DX2-66 Easily Outdistances Competition

	Word for Windows 2.0	Excel 4.0	Freelance for Windows 1.0	Paradox 3.5 in DOS window	BAPCo SYSmark92
Micro Express ME 486-VL/DX2/66*	1:55	1:53	3:19	2:24	190
Silicon Valley 486DX2 Turbo VESA	2:19	2:16	3:02	3:33	145
Amax 486DX2/50 VESAmax	2:21	2:26	3:16	3:05	147
CompuAdd Express 466DX2	2:19	2:16	2:45	3:23	138
ZDS Z-466X+ Model 245	2:34	1:59	2:27	3:23	124
Mitac D4466R*	2:04	2:14	2:47	3:42	122
Axik Ace Cache 486DX2-50V*	2:25	2:32	3:27	3:31	139
CompuTrend Premio VL486DX2-66	2:23	2:27	3:17	3:51	122
USA Flex VL486DX2 50MHz	2:26	2:25	3:14	2:48	108
Gateway 2000 4DX-33V	2:39	2:18	2:40	3:18	107
Dell 433s/L	2:41	2:44	3:51	2:58	112
Blackship BLK 486/33 LB*	2:35	2:11	3:37	3:41	93
Insight 486-33VL Starter System*	2:53	2:51	4:05	3:49	105
ATS AMI 486-33	2:43	2:39	4:00	4:11	100
CSP Pro 486DX/33	2:52	3:02	4:05	3:49	103
Acma 486/33 Starter Package	3:02	3:11	4:50	4:16	107
Hyundai 433DP	3:26	3:10	3:41	3:47	101
Zeos 486DX-33 Upgradable	2:57	2:56	6:09	4:37	99
Quill Computers Qtech Startup	3:36	3:22	4:02	4:48	92
Canon Innova 486	3:34	3:30	4:01	4:44	91
Polywell 486SX-33VZ	3:41	3:30	4:22	5:30	100
Eltech 4330	3:23	3:47	4:38	5:04	87
AST Advantage Plus 486DX/33	4:01	3:50	5:06	5:14	87
MIS Computer M4SX	3:51	3:35	5:13	5:01	78
Digital DECpc 425sx LP	4:42	4:23	5:11	5:02	76
Swan 486SX/25DB	4:21	4:17	5:46	5:44	67
Epson Equity 4SX/25	5:20	5:17	5:54	6:44	64

*Best Buy

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

Methodology
All units were configured with 4MB or 8MB of system RAM and DOS 5.0. If we had to install Windows, we chose the default installation. We configured Windows with a Hewlett-Packard LaserJet III as the default printer, disabled Print Manager, and attached a null printer to LPT1. Using vendor-supplied video drivers when provided, we set the resolution to 800 by 600 pixels in 16 colors. On systems unable to support 16 colors, we used 256.

Word for Windows 2.0 We spell-check and scroll through a 27-page document; create, format, print, and save a single-page business letter; and open a business proposal document, add a paragraph, then preview and print it.

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

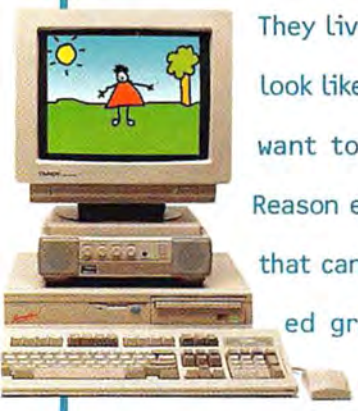
Freelance for Windows 1.0 We load a single-page starter file, enter preformatted text in preset headings, add a second page, and enter text as bulleted items. We add three pages, each with a single 3-D bar chart, and import data from a WK1 file; then we add a sixth page with four 3-D pie charts and preview a slide show using a vertical-louver fade effect between each slide. We apply various views to the presentation and preview the slide show four more times, applying a different fade effect between slides each time. Finally we save the presentation to disk.

Paradox 3.5 in DOS window We perform a variety of data entry, record searching, and updating tasks, then generate reports against a customer list.

BAPCo SYSmark92 We run a scripting program that loads common applications and executes a variety of typical tasks with each. The following software packages are used in this test: 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.**

Statistics Say You Already Have 2.3 Good Reasons To Buy A Tandy Sensation.



They live in your house and they look like you. And someday you'll want to send them to college. Reason enough to own a computer that can demonstrate with animated graphics just how a plant converts sunlight into energy. And combine text and graphics to produce a truly amazing 5th grade science paper. And produce a list of the country's top-ranked universities. And answer the phone when the young Einsteins are busy. And even let you get some work done—if you ever get to use it. But if demographics alone aren't going to convince you to add a Sensation to your household, then perhaps a positive review by a well-respected computer journal will. Which, in fact, we have as a result of a recent article written by Greg Loveria for *BYTE* Magazine. In it, Mr. Loveria chose the Sensation, with its built-in CD-ROM drive and powerful 486SX microprocessor, as his overall recommendation for multimedia personal computer systems. A statistically significant ranking, we're sure you'll agree. And one which gives you yet another reason to stop by your neighborhood Radio Shack and see 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*

Now *BYTE* Magazine Has Added Another.

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TANDY® Sensation!™

intel inside

Not just IBM®-PC Compatible, Family Compatible.

Available exclusively at Radio Shack.

Still, only one wrong answer to a technical question and a slightly longer wait on hold than we're used to kept USA Flex out of the service winner's circle. This month's slight deficiencies aside, it's hard to find better support policies. A year of free on-site service; two-day service turnaround; and around-the-clock toll-free technical support are nothing to sneeze at—especially when the company throws in BBS and fax support.

Sometimes you will base your decision more on a system's speed, quality, and service than on the merits of its bundle.

The system itself is a solid player, with performance in the top third overall and a reasonable $2449 price. On the Paradox test, the Flex VL486DX2 50MHz ran right past 25 other systems into second place, just 17 percent behind the sizzling Micro Express ME 486-VL/DX2/66 with its formidable 2.5MB caching hard disk controller. We guess those results show how much help a local bus hard disk adapter can give. Adding to the USA Flex's strong performance are an STB PowerGraph VL24 graphics accelerator and a 256K secondary RAM cache.

A 160MB Western Digital Caviar 1170 hard drive should give you all the hard disk storage even a Windows power user will need, and there's plenty of room left over to put additional drives in this compact desktop case as well, with two externally accessible and two internal positions available. The free slot count is generous at six. USA Flex's software bundle of Spinnaker's PFS:WindowWorks integrated package is only adequate, but Computer Associates' Up To Date 2.66 for Windows scheduling program is a nice extra. And we really liked the Canon BJ-200 ink jet printer with its terrific near-laser–quality output.

USA Flex machines have received well-earned accolades in many *PC World* reviews. Service and support, speed, and expandability all contribute to a successful mix. While this package didn't *quite* make a Best Buy, it is still a fine value.

ZDS Z-466X+ Model 245

VITAL STATISTICS

STREET PRICE: $2682
PROCESSOR: Intel 486DX2-66
PRINTER: Okidata ML-380
PROS: Excellent performance, big 230MB hard drive **CONS:** Limited drive capacity
CONTACT: Zenith Data Systems, 800/553-0331, 708/808-5000 **Reader service no. 727**

The compact system sent to us by Zenith Data Systems packs a hefty punch for its size, not surprising, given its 66-MHz 486DX2 processor and 8MB of RAM.

While ZDS's $2682 street price noticeably exceeds our $2500 target, ZDS quality is

FEATURES COMPARISON

486 Starter Systems: The Sum of Their Parts Is Great!

● Yes
○ No
n/a = not applicable

Standard features	Acma 486/33 Starter Package	Amax 486DX2/50 VESAmax	AST 486DX/33 Advantage Plus	ATS AMI 486-33	BEST BUY Axik Ace Cache 486DX2-50V	BEST BUY Blackship BLK 486/33 LB	Canon Innova 486	CompuAdd Express 466DX2	Computer Sales Professional Pro 486DX/33	CompuTrend Premio VL486DX2-66	Dell 433s/L	Digital DECpc 425sx LP
Selling price as of 4/3/93[1]	$2195	$2499	$2308	$2195	$2498	$2495	$1934	$2544	$1899	$2433	$2505	$2572
CPU	486DX-33	486DX2-50	486DX-33	486DX-33	486DX2-50	486DX-33	486SX-33	486DX2-66	486DX-33	486DX2-66	486SX-33	486SX-25
Installed/maximum RAM (MB)	4/32	4/64	4/32	4/32	4/32	8/64	4/48	4/32	4/32	4/32	4/64	4/64
Secondary RAM cache installed/maximum (K)	64/256	256/256	0/256	64/256	256/256	256/1024	0/256	256/256	256/256	256/256	128/128	128/256
1.2MB/1.44MB/combo drive	1/1/0	1/1/0	1/1/0	1/1/0	1/1/0	1/1/0	1/1/0	0/0/ 1	1/1/0	1/1/0	0/0/1	1/1/0
Caching controller RAM	512K	2MB	n/a	n/a	1MB	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Hard disk	120MB Conner CP-30104H	200MB Conner CP-30204	240MB WD Caviar 2250	120MB WD Caviar 2120	160MB Conner CP-30174	160MB Conner CP-30104H	160MB Conner CP-30174E	160MB WD Caviar 1170	160MB WD Caviar 1170	200MB Maxtor 7213 (AT)	160MB WD Caviar 2170	120MB DEC/PCXAR-CA
Motherboard manufacturer	Acma	Impression	AST	AMI	Axik	Blackship	Canon	BCM	Biostar	CompuTrend	Dell	DEC
Graphics adapter	Diamond Stealth 24	Diamond Stealth 24VL	WD-Paradise	Diamond SpeedStar 24X	Diamond Stealth 24 VLB	Orchid Fahrenheit VLB	integrated	integrated local bus	STB PowerGraph VL-24	WD-Paradise	integrated local bus	integrated
Graphics adapter memory	1MB DRAM	1MB DRAM	1MB DRAM	1MB DRAM	1MB DRAM	1MB DRAM	512K	1MB DRAM	1MB DRAM	1MB DRAM	1MB DRAM	512K VRAM

[1] All systems include an Intel 486 CPU and at least 4MB RAM, an 80MB hard drive, two floppy drives, VGA and color monitor, a keyboard, a mouse, and DOS 5.0 or later. Vendors had to provide Windows, a spreadsheet, and a word processor at minimum, as well as a printer. Selling price is either direct or the lowest price we found in calls made to multiple dealers.

worth the extra dollars. Special features such as integrated local bus video and cleanly integrated ports make more room for adding full-length peripherals to the five free 16-bit slots. The 66-MHz CPU sits in a ZIF socket and uses an extra-large heat sink to dissipate heat. At press time, ZDS raised the ante to $2922 and added a 256K secondary cache and a dual combo floppy drive to free a drive bay.

All these goodies are backed by a solid service and support plan that includes a year of free on-site service, two-day service turnaround, a toll-free connection to knowledgeable tech staffers who are available 16 hours every weekday, and BBS support.

The applications bundle doesn't measure up to the superior quality of the rest of the offering, however. Microsoft Works for Windows 2.0 looks pretty plain sitting next to this quality PC, and the Okidata ML-380 24-pin dot matrix printer is good but not outstanding. So if you buy this package—and you may well choose to—you'll base your decision more on the system's speed, quality, and service and support than on the merits of its bundle.

Zeos 486DX-33

VITAL STATISTICS

DIRECT PRICE: $3006
PROCESSOR: Intel 486DX-33
PRINTER: Panasonic KX-P2123
PROS: 200MB hard disk, 24-hour tech support, excellent software bundle
CONS: High price, slow support response
CONTACT: Zeos, 800/554-5220, 612/633-4591
Reader service no. 728

The Zeos 486DX-33 Upgradable earned top honors in both design and expandability. The first thing you'll notice when you open the case is the clean, thoughtful layout, from the integrated ports to the sparkling jewel of a 238-pin ZIF socket, ready for the forthcoming Intel OverDrive for DX2.

There's plenty of room for peripherals in the seven free slots, one of which has VESA local bus extensions. The other local bus slot is filled by a Diamond Viper VLB VESA graphics accelerator. Zeos even integrated a SCSI port. With its roomy 200MB hard drive, the big Zeos scored well on all our performance tests, marching into the middle of the 33-MHz ranks.

When you consider the quality of design and great software you get, the $3006 price doesn't seem so high. Zeos's bundle of both 1-2-3 1.1 for Windows and Ami Pro 3.0 add $249 to the price, but Zeos also throws in Lotus Organizer for Windows 1.0, worth about $100 on the street.

Zeos continues to offer one of the best service and support lineups, including 24-hour toll-free lines. The only blemish was somewhat slow responsiveness. But a year of on-site service costs just $49, and Zeos provides three-day service turnaround. With the highest price in this roundup, this is not a bargain-hunter's special. But it is a combination of super design, fine support policies, good performance, and terrific applications.

	Eltech 4330	Epson Equity 4SX/25	Gateway 2000 4DX-33V	Hyundai 433DP	BEST BUY Insight 486-33VL Starter System	BEST BUY Micro Express ME 486-VL/ DX2/66	MIS Computer M4SX	BEST BUY Mitac D4466R	Polywell 486SX-33VZ	Quill Computers Qtech Startup	Silicon Valley 486DX2 Turbo VESA	Swan 486SX/25DB	USA Flex 50MHz VL486DX2	ZDS Z-466X+ Model 245	Zeos 486DX-33 Upgradable
	$2299	$2316	$2859	$2500	$2499	$2299	$2395	$2495	$2500	$2499	$2595	$2518	$2449	$2682	$3006
	486DX-33	486SX-25	486DX-33	486DX-33	486DX-33	486DX2-66	486SX-25	486DX2-66	486SX-33	486DX-33	486DX2-66	486SX-25	486DX2-50	486DX2-66	486DX-33
	4/32	4/32	8/64	4/64	4/32	4/64	4/64	4/64	4/32	4/64	4/32	4/64	4/32	8/64	4/64
	128/256	0/0	64/256	128/256	128/256	256/1024	64/256	256/256	128/256	128/256	64/256	128/256	256/256	0/256	128/256
	1/1/0	1/1/ 0	1/1/0	1/1/0	1/1/0	1/1/0	1/1/0	1/1/0	1/1/0	1/1/0	1/1/0	0/0/1	1/1/ 0	0/0/1	1/1/0
	n/a	n/a	n/a	n/a	n/a	2.5MB	n/a	n/a	n/a	n/a	2MB	n/a	n/a	n/a	n/a
	120MB Maxtor 7120 (AT)	120MB Conner CP-30104H	160MB WD Caviar 2170	200MB Conner CP-30204	200MB WD Caviar 2200	200MB WD Caviar 2200	120MB Quantum ProDrive	120MB Conner CP-30104	160MB Conner CP-30174E	200MB Maxtor 7213 (AT)	80MB Conner CP-30084E	170MB Quantum ProDrive ELS	160MB WD Caviar 1170	230MB Seagate 3283A	200MB Seagate ST3243A
	Eltech	Epson	Micronics	HTM	ASUS	Micro Express	Micronics	Micronics	Intercom	TMC	SVC	TMC	Plus Data	ZDS	Zeos
	Diamond SpeedStar 24X	integrated	ATI Graphics UltraPro	integrated local bus	STB/ PowerGraph	ATI/VLB Mach32	Diamond SpeedStar 24X	Diamond Stealth 24VLB	Orchid Fahrenheit VLB	TMC/ HG426	Paradise local bus	Diamond Stealth 24VL	STB/ PowerGraph VL24	integrated local bus	Diamond Viper VLB
	1MB DRAM	512K DRAM	1MB VRAM	1MB DRAM	1MB DRAM	1MB DRAM	1MB DRAM	1MB DRAM	1MB DRAM	1MB DRAM	1MB DRAM	1MB DRAM	1MB DRAM	1MB DRAM	1MB DRAM

Table continues on following pages

FEATURES COMPARISON

486 Starter Systems continued

● Yes
○ No
n/a = not applicable

	Acma 486/33 Starter Package	Amax 486DX2/50 VESAmax	AST Advantage Plus 486DX/33	ATS AMI 486-33	BEST BUY Ace Cache 486DX2-50V	BEST BUY Axik 486/33 LB	Blackship BLK	Canon Innova 486	CompuAdd Express 466DX2	CompuAdd 486DX/33 Professional Pro	Computer Sales VL486DX2-66 Premio	Computrend CTX	Dell 433s/L	DECpc 425sx LP	Digital DEC
Standard features cont'd															
Monitor	Mag LX1460	Mag MX 15H	AST SVGA CM6D	Shamrock/ SRC1452	ViewSonic 6E	KFC/ CT1428	Canon/ 7033D	CompuAdd 5118	Sony CPD-1304S	CTX/ CMS-1461	Dell Ultra-Scan VC5	DEC PC7XU-DA			
Screen diagonal (inches)	14	14	14	14	14	14	14	14	14	14	14	14			
Case style	compact	tower	minitower	tower	midtower	minitower	compact	compact	midtower	compact	compact	compact			
Expandability															
Free 32/16/8-bit expansion slots	0/5/0	0/5/0	0/4/1	0/6/1	0/5/0	0/6/0	0/3/0	0/6/0	0/5/0	0/5/1	0/3/0	0/3/0			
VESA local bus slots/number free[1]	0/0	2/0	0/0	0/0	3/1	2/0	0/0	0/0	2/1	2/1	0/0	0/0			
Externally accessible 3½/ 5¼-inch drive bays	1/3	0/4	1/3	2/3	2/3	2/2	1/2	2[2]/3	0/5	2/3	0/2	1/1			
Internal 3½/5¼-inch drive bays	0/0	2/2	0/1	3/1	3/0	1/0	1/0	2/0	5/1	0/0	1/0	2/0			
Ports: parallel/serial/mouse	1/2/0	1/2/0	1/2/0	1/2/0	1/2/1	1/2/0	1/2/1	1/2/0	1/2/0	1/2/0	1/2/1	1/2/1			
SCSI/game/fax-modem	0/1/0	0/1/0	0/0/1	0/0/0	0/1/0	0/1/0	0/0/1	0/0/0	0/1/0	0/1/0	0/0/0	0/0/0			
User-adjustable or user-replaceable system clock	●	●	●	●	●	●	●	●	●	●	●	●			
Accepts OverDrive CPU	●	●	●	●	●	●	●	●[4]	●	●[4]	●	●			
OverDrive for DX2 socket	○	○	○	○	●	○	●	○	○	○	●	○			
ZIF socket	○	○	○	○	●	○	○	○	○	○	○	○			
Bundled hardware and software															
Printer	Panasonic KX-P2123	Panasonic 1180i	Epson ActionPrinter 5000	HP DeskJet 500	Panasonic KX-P2123	Panasonic KX-P1124i	Canon BJ-200	Canon BJ-200	Panasonic KX-P1124i	Panasonic KX-P1123	Epson LQ-570	DECwriter 95			
Printer type	impact dot matrix	impact dot matrix	impact dot matrix	thermal ink jet	impact dot matrix	impact dot matrix	ink jet	ink jet	impact dot matrix	impact dot matrix	impact dot matrix	impact dot matrix			
Word processor	MS Works for Windows	MS Works for Windows	Ami Pro	MS Works for Windows	MS Works for Windows	WordPerfect for Windows	MS Works for Windows	Lotus Works	PFS: Window-Works	MS Works for Windows	MS Works for Windows	MS Office[5]			
Spreadsheet	MS Works for Windows	MS Works for Windows	1-2-3 for Windows	MS Works for Windows	MS Works for Windows	1-2-3 for Windows	MS Works for Windows	Lotus Works	PFS: Window-Works	MS Works for Windows	MS Works for Windows	MS Office[5]			
Service and support															
Warranty (months)	12	12	12	12/48[7]	12	12	12	12	12	12	12	12			
On-site service price for first year	free	$69	free	$220[9]	free	free	free	free	free	$140	free	free			
Turnaround policy (days at service center)	3	2	2	3	2	2	none	3	1	1	none	none			
Free unlimited support	●	●	●	●	●	●	●	●	●	●	●	●			
Central support	●	●	●	●	●	●	●	●	●	●	●	●			
Toll-free support number	●	○	●	○	●	●	●	●	●	●	●	●			
Daily support (hours)	11	10.5	24	8.5	9.5	9	11	12	12	9	24	11.5			
Weekend support	●[12]	●[12]	●	●[12]	●[12]	○	○	○	○	○	●	○			
BBS support	●	●	●	●	●	●	●	●	○	○	●	○			
Fax support	●	●	●	●	●	●	○	●	●	●	●	●			
Dedicated support staff required	direct	●	○	○	direct	direct	○	direct	direct	●	direct	direct			
Support staff training required	direct	○	n/a	n/a	direct	direct	n/a	direct	direct	○	direct	direct			
Dedicated support line for dealers	direct	○	●	○	direct	direct	●	direct	direct	●	direct	direct			
Inventory and parts requirement	direct	○	○	○	direct	direct	○	direct	direct	○	direct	direct			

[1] Also included in free 32/16/8-bit slot count.
[2] Both bays are used by connector for optional 60MB removable hard disk.
[3] Internal connector–external extension is optional.
[4] Already has fastest currently available CPU installed.
[5] Includes Word for Windows 2.0, Excel 4.0, PowerPoint for Windows 3.0, and Microsoft Mail.
[6] Includes 1-2-3 1.1 for Windows, Ami Pro 3.0, Freelance Graphics for Windows 2.0, cc:Mail for Windows 1.0, and Lotus Organizer for Windows 1.1.
[7] 12 months parts, 48 months labor.

	Eltech 4330	Epson Equity 4SX/25	Gateway 2000 4DX-33V	BEST BUY Hyundai 433DP	BEST BUY Insight 486-33VL Starter System	BEST BUY Micro Express ME 486VL/ DX2/66	Micro Express M4SX	MIS Computer D4466R	Mitac	Pohwell 486SX-33VZ	Qtech Startup	Quill Computers Turbo VESA	Silicon Valley 486DX2	Swan 486SX/25DB	USA Flex VL486DX2 50MHz	ZDS Model 245 Z-466X+	ZDS Upgradable 486DX-33	Zeos CTX CMS-
	Arche 214MH	Epson T1183A	Gateway Crystal Scan	Hyundai HCM 433E Ultra	TVM/ Media Scan 4A+	Micro Express FM360	CTX/ CVP 5468A	Mitac M1448	ADI Micro-Scan 3E	Mag MX15F	Eye-Q CM6P	Sanpo/ KDM 1566	Mag MX14H	ZDS ZCM- 1430	CTX CMS- 1561			
	14	14	15	14	14	14	14	14	14	15	14	15	14	14	15			
	compact	compact	desktop	compact	compact	minitower	compact	compact	minitower	compact	compact	desktop	compact	compact	desktop			
	0/3/0	0/4/0	0/7/0	0/4/0	0/4/0	0/5/0	0/4/0	0/6/0	0/4/0	0/4/0	0/4/1	0/4/0	0/6/0	0/5/0	0/6/1			
	0/0	0/0	2/1	0/0	2/0	2/1	0/0	2/0	2/0	2/1	2/0	2/1	2/0	0/0	2/1			
	2/3	0/2	0/3	2/2	2/3	2/3	2/3	0/3	2/2	2/3	2/3	0/5	2/3	1/1	1/2			
	0/0	1/0	0/2	0/0	0/0	2/0	0/0	1/0	0/1	0/0	0/0	0/1	2/0	1/0	2/1			
	1/1/0	1/2/1	1/2/0	1/2/1	1/2/0	1/2/0	1/2/0	1/2/0	2/2/0	1/2/0	1/2/0	1/2/0	1/2/0	1/1/1	1/2/0			
	0/1/1	0/0/0	0/0/0	0/0/1	0/1/1	0/0/0	0/1/1	0/1/0	0/1/0	0/1/1	0/1/0	0/0/1	0/0/0	0/0/0	1^3/0/0			
	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
	●	●	●	●	●	●	●	●	●	●	●[4]	●	●	●[4]	●			
	●	○	○	○	●	○	○	○	●	○	○	○	○	○	●			
	●	●	○	●	●	○	●	●	●	○	○	●	○	●	●			
	Panasonic KX-P1123	Epson Action-Laser 1000	Panasonic KX-P2123	Epson LQ-570	Canon BJ-200	Panasonic KX-P2180	Panasonic KX-P1124i	Citizen GSX-230	Star NX-2430 Multifont	Epson Stylus 800	HP DeskJet 500	Panasonic KX-P2124	Canon BJ-200	Okidata ML-380	Panasonic KX-P2123			
	impact dot matrix	laser	impact dot matrix	impact dot matrix	ink jet	impact dot matrix	impact dot matrix	impact dot matrix	serial impact dot matrix	48-nozzle ink jet	thermal ink jet	impact dot matrix	ink jet	impact dot matrix	impact dot matrix			
	MS Works for Windows	MS Works for Windows	MS Office[5]	Lotus Smart-Suite[6]	MS Office[5]	PFS: Window-Works	MS Office[5]	MS Office[5]	MS Works for Windows	PFS: Window-Works	MS Works for Windows	MS Works for Windows	PFS: Window-Works	MS Works for Windows	AmiPro			
	MS Works for Windows	MS Works for Windows	MS Office[5]	Lotus Smart-Suite[6]	MS Office[5]	PFS: Window-Works	MS Office[5]	MS Office[5]	MS Works for Windows	Quattro Pro for Windows	MS Works for Windows	MS Works for Windows	PFS: Window-Works	MS Works for Windows	1-2-3 for Windows			
	12	12	12	18	12	24	12	12	12/60[8]	12	24	24	12	12	12			
	none	free	free	free	none	$50	$20	free	$75	free	$99[10]	free	free	free	$49			
	3	2	none	2	none	2	1	3	3	2	3	none[11]	2	2	3			
	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
	●	●	●	●	●	●	●	●	●	○	○	●	●	●	●			
	8.5	12	18	10	24	24	10	9	9	10	8.5	12	24	16	24			
	○	○	●[12]	○	●	●	○	●[12]	●[12]	○	○	●	●	○	●			
	○	●	●	●	○	○	○	●	○	●	●	●	●	●	●			
	●	●	●	●	●	●	●	●	●	●	●	○	●	○	●			
	direct	○	direct	○	direct	direct	direct	○	direct	direct	●	direct	direct	○	direct			
	direct	n/a	direct	n/a	direct	direct	direct	n/a	direct	direct	●	direct	direct	n/a	direct			
	direct	●	direct	●	direct	direct	direct	○	direct	direct	●	direct	direct	○	direct			
	direct	○	direct	○	direct	direct	direct	○	direct	direct	●	direct	direct	○	direct			

[8] 12 months parts, 60 months labor.

[9] 10 percent of system price.

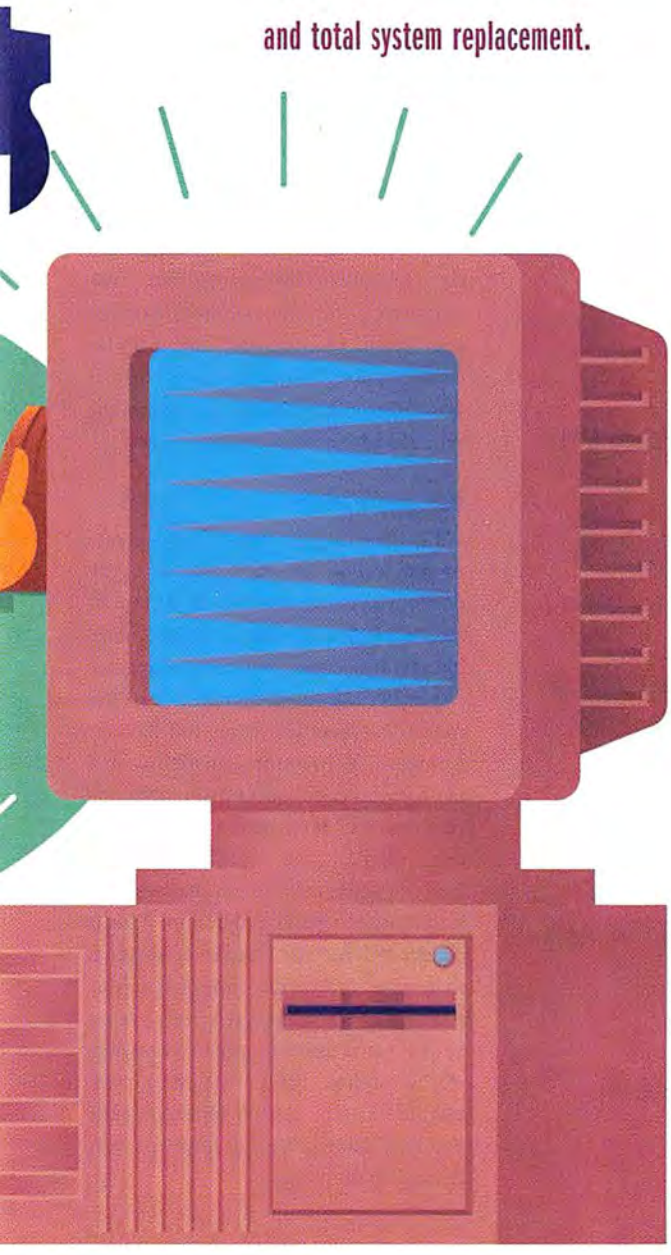
[10] This is an average; actual price depends on customer's location.

[11] On-site response policy is one day.

[12] Saturday only.

The Path to 486 POWER

What's the best way to give your 386PC new life? PC World compares three routes to revving up your system: CPU upgrades, new motherboards, and total system replacement.



ILLUSTRATIONS BY STEVE MUSGRAVE

Just three years ago, 386DX computers were hailed as the first true Windows machines, and vendors sold them by the truckload to power users. Now that high-power Windows apps are in regular use and with the advent of demanding GUIs such as Windows for Workgroups, your 386DX may be straining in a way you never noticed before. Those spreadsheet recalculations take too long, and database searches leave you time to reflect on your looming deadline while sand trickles through Windows' hourglass. You've seen the performance others are getting with 486s, and you want to know how to get it for yourself.

Future performance is also a motivation for moving to a 486. Even if your 386DX is managing just fine right now, one day your company may talk about standardizing on Windows NT and want you to move to more powerful Windows applications that your current ma-

By Bryan Hastings and Owen Linderholm

chine can't handle. You don't want to throw your investment in this system away—so can you turbocharge it?

Three Paths to PC Power

You have several options to get to 486 power. The easy solution is to replace your system. You could run out and buy a new 486-based PC—if you have the spare cash. Alas, instead you may be stuck with the same box on your desk for the next few years while you or your company wrings every last drop of depreciation out of it. Understandably, your company may not be so eager to buy new systems when it spent big money on 386DXs last year or the year before—especially if it invested in the expensive IBM PS/2s. If you do move up, your company can recoup some of the old system's value by selling it, passing it along to other employees, or even donating it to charity and writing off some of the cost. But none of these options will help you avoid that initial cash outlay.

Are upgrades the answer? Can minor equipment improvements hide from the auditor's beady gaze under a different line item on the department's budget? Replacing your PC's processor with a 486DX-based upgrade card (which sells for a fraction of the cost of a new system) will get you a big performance boost without eating a big hole in your capital-equipment budget. Another, more radical option is to replace the system board. This option will take work but should get you slightly better performance and keep your system a little more up-to-date. Finally, software solutions and minor hardware improvements can give your machine extra fizz in exchange for a little cash.

Which option is preferable—new system, system board replacement, or CPU board upgrade? For our February 1993 feature "Are Upgrades Worth It?" *PC World* interviewed dozens of businesspeople who grappled with the decision of whether to buy new systems or upgrade current ones. For this article, we took our research one step further. We collected CPU upgrade boards and two system boards, performed the upgrades in our lab, and compared the costs and hassles of upgrading to those of buying a new system.

Software solutions and minor hardware improvements can give your machine extra fizz for a small cash outlay.

Checking the Choices

We reviewed the system replacement, system board replacement, and CPU board upgrade scenarios for both ISA (Industry Standard Architecture) and MCA (Micro Channel Architecture) PCs. Systems with ISA expansion slots account for virtually all 386DX clones, while most IBM PS/2s have MCA expansion slots. The PCs we upgraded were an ISA Compaq Deskpro 386DX-20 and an MCA IBM PS/2 Model 70, based on a 386DX-25. These two models are among the best-selling PCs from a few years ago. The Compaq's performance can be regarded as representative of most IBM-compatible PCs, although it does use a nonstandard system board. Our aim was to pump up each of these PCs so it was as close as possible to a full 486DX-33 desktop, the typical high-end business computer.

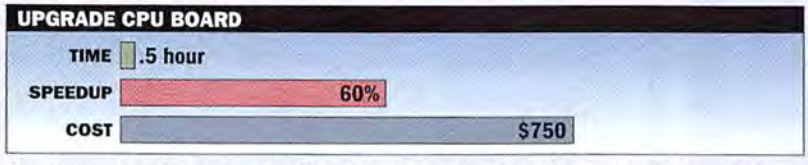
The Upgrade Dilemma

Is PC upgrading for you? First you need to decide whether or not you need the performance of a new 486DX system. If so, then forget about upgrading and replace your system: In no case is upgrading either the most economical or the most convenient way to get full 486 performance. Will you be satisfied with a fair to significant boost in your 386DX's performance? If so, then a careful shopper may find that a CPU or system board upgrade may be the cheapest and fastest way to achieve that aim. This is especially true for owners of systems that have proprietary upgrade paths. Also, PS/2 owners get a relatively sweeter deal when upgrading than do owners of ISA-based PCs. Whether you upgrade or not, "Other Options" tells you how you can further improve your system's performance.

Your Upgrade Options

Requires minor effort to back up and restore files, provides best speedup, and costs about $1100 after sale of old system.

Requires serious effort and knowledge of PC internals, gives system fairly good speedup, and costs about $550.



Requires minimal to moderate effort, results in only minimal to moderate speedup, and cost of boards varies widely.

If you decide to upgrade, bear two points in mind. First, when shopping, demand a list from the upgrade vendor specifying the exact makes and models of computers it has *verified* will work with its upgrade card or system board. If you are thinking of upgrading many machines, buy one card first and put it through a pilot run. Second, make sure the person performing the installation feels comfortable delving into the inner workings of a PC.

Most of the 486DX CPU board and system board companies told us that the bulk of their sales were volume sales. This stands to reason. Since upgrading offers only a slim savings in cost and time over desktop replacement, the benefit becomes significant only when revamping many PCs at a time. So much the better if all the machines to be upgraded are the same. If your budget for new systems is drained, then upgrading may be the only path you can take to get significantly increased performance out of your old machine.

If you want to tread the processor upgrade path, scope it out as much as possible beforehand. Make sure that the vendor has tested its product in your machine and offers a good return policy. Then, unless you feel comfortable rummaging around the insides of your PC, let a dealer install the upgrade. Depending on your PC, a CPU upgrade board can offer you an easy, low-cost method to semi-486 power or to an Excedrin headache—or anything in between.

SYSTEM REPLACEMENT: SIMPLE, NOT CHEAP

Our first scenario is simplest: replace the desktop. The work involved is still not trivial, however. You have to decide what to buy. Then you'll have to back up your hard drive and restore the data to the new system's hard drive.

According to the Boston Computer Exchange (BoCoEx) and the National Computer Exchange (NaComEx), leading brokers in used computers, a used 20-MHz Compaq Deskpro 386 sells for $900 on average. Our target 33-MHz 486DX ISA-bus computer sells for around $2000 in a standard configuration with 8MB of RAM and a 160MB to 250MB hard drive. The net cost for replacing our ISA system is $1100, and you get slightly more than twice the performance of the original machine. We should point out that you can buy a perfectly good 486-based system for under $1000 nowadays—but that's for a 486SX, and one with a smaller hard drive and less RAM than the system we are using as a comparison.

Replacing a PS/2 system is more expensive. Even though the 25-MHz 386DX-based Model 70s started at $6000 several years ago, BoCoEx and NaComEx put the current value of our test Model 70 at only $1100. A new PS/2 Model 76 486DX2-66 (the PS/2 that IBM offers that's closest in power to our goal 33-MHz 486DX) sells for $3100, including the 14-inch XGA-2 monitor. Thus, the net cost of replacing the PS/2 system is $2000. We found the Model 76 to be almost three times faster than our unimproved test PS/2.

Replace System

COST: $1000 to $1500 after selling old system

PERFORMANCE IMPROVEMENT: 100 percent to 200 percent

TIME TO UPGRADE: Several hours for backing up and restoring files

PROS: Most-improved performance, up-to-date peripherals, upgrade has longest future life

CONS: High cash outlay, expensive if you can't sell the old computer

SUMMARY: Probably the most cost-effective way to upgrade in the long run, unless you own a proprietary system such as a PS/2

OVERHAUL: SYSTEM BOARD REPLACEMENT

Replacing the system board is like rebuilding a car's engine. It is the most radical of PC improvements, and it can come with a minefield of installation snags to tiptoe through—from BIOS incompatibilities with your peripherals, to wedging the system board into a nonstandard box, to figuring out where you should plug in every unmarked cable.

To sum up the process: You will have to open your computer, unplug every power and ribbon cable, and carefully remove and set aside each expansion card. You'll probably also have to take out the floppy and hard disk drives just to make enough room to remove the system board. You'll want to take out the electrostatically sensitive system RAM and unplug the power supply from the system board. You should also label every cable before you unplug it, just to make sure you don't put it back in the wrong place or upside down.

You'll need to check whether the RAM in your old system will fit on the new system board (if not, you'll have to spend more money). Then you'll need to slide the new system board into the case, making sure that it really fits, that you'll be able to screw it into the case, and that all the expansion card slots line

Replace System Board

COST: $450 to $650 for a 486DX-33 system board

PERFORMANCE IMPROVEMENT: 80 percent to 110 percent

TIME TO UPGRADE: 6 hours to two weeks depending on system

PROS: Best performance improvement for least cash outlay

CONS: Difficult to install, and you remain stuck with outdated peripherals

SUMMARY: Worth considering if you aren't afraid of opening your PC and dealing with potential complications

up with the brackets and cable holes at the back of the case. Then you'll have to put all those boards, cables, and peripherals back into the new system board.

Once the swap is done, potential problems include setting the CMOS of the new board to match your peripherals, and making sure the BIOS works, (fire up the upgraded PC to check). The whole job could take anywhere from half a day in the best case to a worst case of weeks of troubleshooting and ordering replacement parts.

If you're willing to wage this battle with high technology, you stand to save a lot of money. DataExpert's product is a case in point. The company sent us an ISA system board replete with 486DX-33 processor, two VL-bus slots, and 128K of secondary cache RAM. In testing this board with the test Compaq's hard drive, plus a Diamond VRAM video controller and generic ISA disk controller, we got about a 90 percent increase in performance over the base system, or slightly more than three-quarters of the power of the average 486DX-33, for a respectable $495. Of course, that's with regular VGA video, not SVGA, and you don't get any extra hard drive space. We also tested an American Megatrends (AMI) system board with almost identical specs (it had only 64K of secondary cache) and got nearly identical performance numbers.

If you want to make up the remaining performance, you'll have to spend a lot. If your old system's RAM isn't transferable to the new system board, you'll have to shell out $250 to $300 for new RAM (8MB is standard for 486DX systems). If you have a typical VGA subsystem, that's another $500 for an SVGA system to match the video performance of a typical 486. Add another $400 for the hard drive and controller. As described, the peripherals could add $1000 to $1500 to your cost. Your total outlay would be twice the net expense of replacing your system.

The only PS/2 system board vendor we found was Reply Corporation, which puts out a range of 486-based PS/2 system boards. Reply makes it easy to upgrade the peripherals by offering many such options with its system board. As with the other upgrades, however, you'll pay more to get the full power of a new system if you upgrade. To upgrade the Model 70 with a 486DX2-66 system board stocked with 8MB of RAM, a 200MB hard drive, 256K of secondary cache RAM, and an integrated SVGA video subsystem with a graphics accelerator would come to nearly $3000—almost $1000 more than the net cost of selling the Model 70 and buying the Model 76 486.

Your original peripherals are crucial in determining how cost-effective a system board upgrade will be. The better armed your 386DX is with very high performance peripherals and components, the better value a system board upgrade will seem.

WHERE TO BUY

American Megatrends
800/828-9264,
404/263-8181
Reader service no. 739

DataExpert
800/328-2397,
408/737-8880
Reader service no. 740

Reply Corp.
800/473-7592
Reader service no. 741

Other Options

You can transfuse your system with at least some new blood in a number of ways. Some involve software tricks and practices, while others require minor hardware improvements.

The first and usually the cheapest upgrade is a software disk cache. Such a program is generally very cheap and radically improves average disk access time, enhancing overall system performance. Caching works by pulling large chunks of data from the disk into cache RAM with each disk read. The next time an app requests data, the caching software checks for it in the cache. If the data is there, reading the disk, which is time-consuming, is unnecessary. You likely already have one of the best disk caches going. If you run Windows 3.1, DOS 5.0, or DOS 6.0, you received a disk cache called SmartDrive for free. Like most other software caches, SmartDrive selects a good cache size automatically.

Another improvement can be achieved using a memory manager. Such a product allows you to make the most of the memory you have. With Windows every last byte can count, and the availability of a few extra K can improve the way Windows operates. Refer to "Top Ten Utilities vs. Dos 6.0" for details on some popular memory managers.

You likely already have one of the best disk caches going–SmartDrive.

Windows users who like to keep a lot of applications open will see a marked speedup if they add cache RAM. In a recent review of DX2-66 systems, we noted that on average 8MB-equipped PCs ran PC World Test Center tests 10 percent faster than equivalent systems with 4MB of RAM. Currently, RAM costs about $40 per megabyte, and it is truly a worthwhile investment for heavy-duty Windows users.

Beyond RAM, your hardware enhancement options get more expensive. A video accelerator board will set you back about $200, and you may want to invest over $300 more in a new monitor to make the most of it. For your

CPU UPGRADES: A SPECIALIZED OVERHAUL

If swapping the system board is like rebuilding a car's engine, upgrading your CPU is like changing your car's oil. It's not rocket science, but depending on the car, it can be a breeze or a royal pain in the neck. On some cars, the oil filter and drain plug are easy to find and remove; on others, they are recessed or hidden behind masses of cables, making it difficult to get a wrench in there. So it is with processor upgrades.

Our two test PCs happen to be relatively easy to upgrade—none of the cards reviewed took more than a half-hour to install. In both the Compaq and the IBM, it was easy to lift out the drive bay to expose the CPU underneath, pry out the CPU, install the upgrade card, and then install either a BIOS chip or a software driver to enable the 486's internal cache. But installing these cards into other clones is going into uncharted and sometimes hazardous territory. Since clones come in all shapes and sizes, there's no telling what obstacles you'll face, from not having enough room to pry out the processor comfortably, to having a processor card block valuable expansion slots. Some clones simply don't have the room to accommodate some processor upgrade boards.

Extracting the old CPU can be especially tricky. Since this is not a $6 oil filter but a sensitive several-hundred-dollar component that you will need in case your upgrade card is defective, take extra care to remove it in one piece. While all the upgrade kits we looked at came with a small flat-tined fork specifically designed for CPU removal, you must work the chip out gently and s-l-o-w-l-y, or risk snapping off its contact pins. Even when you've got it out of the socket, you're not out of the woods. If there's a lot of static electricity around, a brush of a finger or a sweater sleeve across its pins can lobotomize the processor in a flash. If your upgrade board fails, you're left with a brain-dead PC.

Some manufacturers—AST, Compaq, PC Brand, and others—provide specialized mechanisms for upgrading systems to new processors. These specialized upgrades typically cost more than third-party solutions but are usually engineered well enough that they also give you a better performance boost. They are worth considering as an alternative to a new system but are obviously limited to those systems whose manufacturers offer them.

CPU upgrade boards for the Compaq ranged from $399 to $1100. None of them single-handedly infused the test systems with the full performance of our target desktop. Nor could they. A PC's performance depends on the performance of its peripherals—the speed of the RAM and video and hard drive subsystems—as well as on the processor. The processor upgrade only speeds the CPU; you're still using your original peripherals. And if they're old and slow, you won't see much improvement.

For the Compaq, the All Computers product gave us the most bang for the buck. It boosted the Deskpro by 20 percent to slightly more than half the speed of a new 486DX-33. This boost cost $399, about one-third the net cost of a new system. Further increases to

system performance, however, require upgrading peripherals. You'll get about 10 percent improvement by adding 4MB of RAM for another $160. A new, faster hard drive and controller will probably add about 20 percent more speed for $400. Upgrading the monitor and video card to SVGA level will certainly ease your eyes but will probably give you only another 10 percent or so of performance for about $500. In the best case, using the ALL DX 486, you've spent $1450—$350 more than the net cost of a new system as described earlier. And despite the higher net cost, you still don't get full performance, since this product is based on Cyrix's 25-MHz 486SLC chip, which has a slower clock, offers only 1K of internal cache compared to the 8K in the Intel 486DX, and lacks the latter's internal math coprocessor.

What about Kingston's 33-MHz 486DX CPU upgrade, which is based

CPU Upgrade

COST: $300 to $1300

PERFORMANCE IMPROVEMENT: 20 percent to 100 percent

TIME TO UPGRADE: 15 minutes to 1 hour depending on the PC

PROS: Easy to install, can be inexpensive, better value for PS/2s

CONS: Least performance improvement, leaves you with outdated peripherals

SUMMARY: Worth a serious look; easier than system board replacement but can require hardware savvy in many cases; probably the most cost-effective upgrade in the short run for moderate performance improvement

money, you'll see an improvement of about 10 percent in most standard Windows applications.

For about the same cost, a newer, larger, and faster hard drive might be a better bet. For about $300 you can get a 200MB hard drive that should give you a noticeable speedup in access times and data transfer rates over any drive of a past generation.

Most of these choices cost considerably less than a processor upgrade. While they won't give you as much extra speed as a new system or even a CPU or system board upgrade, they may give you enough of a lift to satisfy you for now.

on the same processor as our target upgrade PC? This upgrade board sells for $695, which means you pay $1745 for the upgraded system once all the peripherals are added—$645 over the net cost of system replacement. It turned in performance numbers roughly equivalent to those of the All DX 486, ahead in some areas, behind in others.

Our top-performing CPU upgrade board for the Compaq was Performance Pursuit's product based on the hefty DX2-50 processor. This board alone brought the Compaq within two-thirds to three-quarters of the performance of our target computer, or about 80 percent faster than the original Compaq Deskpro. It's reasonable to expect that with the peripherals upgrades described here, the final result would surpass the performance of our target 486DX-33. Unfortunately, so does the final cost. Adding the $895 Performance Pursuit card and all the peripherals, the resultant machine costs over $2100, or $1000 more than net system replacement cost.

We looked at two CPU upgrade boards for the PS/2. Performance Pursuit's DX2-50 board for the PS/2 plugs into the processor socket like the others previously discussed. The results were not as good as for the Compaq Deskpro version, principally because the original PS/2 test PC, the 25-MHz 386DX-based Model 70, is itself considerably slower than the Deskpro. Overall the Performance Pursuit boosted the original PS/2 speed by about 50 percent. So for $895 direct—a little over half the net cost of selling the Model 70 and buying a new Model 76—the Power Up gets you at most a third of the way to the performance of the Model 76.

The other board, from Kingston, is a full-length bus-mastering card that plugs into an expansion slot. (The original processor remains in its socket, but MicroMaster shuts it off and takes over the system.) Unlike the CPU upgrade boards, MicroMaster comes with sockets for RAM and cache RAM—our test board came with 8MB of RAM and 128K of secondary cache RAM. At $1395, MicroMaster is the more expensive of the PS/2 upgrades we looked at. While it has the advantage of painless installation and better performance, you still don't get the performance of a new PS/2. The MicroMaster made the old PS/2 perform with up to twice the speed; for Windows applications it was about twice as fast as the Performance Pursuit, but it was only slightly faster on DOS apps. If you are upgrading mostly for Windows performance, this board could be a smart way to go.

Adding a CPU board can be faster and simpler than buying a new PC, but it isn't for amateurs, no matter how easy the vendors make it sound.

When to Use a CPU Upgrade

It's clear that apart from specific cases, CPU upgrade cards aren't a cost-effective way to get the full power of a new 486DX. So why use one?

There are four good reasons. The first is a cost savings to get some performance enhancement. CPU upgrade boards can be cost-effective for someone who needs significantly increased power, but who is willing to settle for less than the power of a new 486DX. They may be just the ticket for light-to-moderate-duty Windows users. If you work mostly with one or two applications, adding the 486DX upgrade and selectively upgrading peripherals to accommodate those programs may be cheaper than buying a new system. Do you spend most of your time in databases? A CPU upgrade and a new hard disk and controller can make a dramatic change in database performance. The better your original peripherals, the better the performance increase you'll get.

Then there's the budget "stealth" angle. In most company budgets, funds for new systems and for system improvements are separate line items. CPU upgrade boards offer a way to get a beefier PC when there's nothing left in the budget for new systems.

The third reason is that upgrade cards can let you get more depreciation out of your 386DX computers. With the fast pace of computer enhancement, computers become obsolete before their full value can be depreciated. CPU upgrade cards offer a way to extend the useful life of your 386DX.

Finally, the upgrade *can* be a faster and simpler solution than buying a new PC. The last point comes with a big caveat, though. Adding a CPU upgrade board is often not for amateurs, no matter how easy the vendors make it sound. It *might* take 15 minutes, in which case it's faster and easier than copying all the files to a new machine and reconfiguring them for the new system. Or the upgrade could take all afternoon, making it much less time-effective. Or the upgrade may not fit in your PC at all.

Beware of any vendor's claim that its card will upgrade all 386DX machines. Our research has yet to turn up such a card. Kingston sent us a list detailing exactly which PC models its cards work in. All Computers, on the other hand, refused to furnish a list of the computers it has verified will accommodate its cards. In fact, the company told us that the 33-MHz version of its All DX486 upgrade board will fit into the Model 70, when in fact it doesn't. You can't be too careful when shopping for a CPU upgrade card.

Bryan Hastings is an associate editor and Owen Linderholm a senior editor at PC World. *They can be reached on PC World Online (see page 12 for more information).*

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416/960-0111
416/960-5426 (fax)
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503/757-0934
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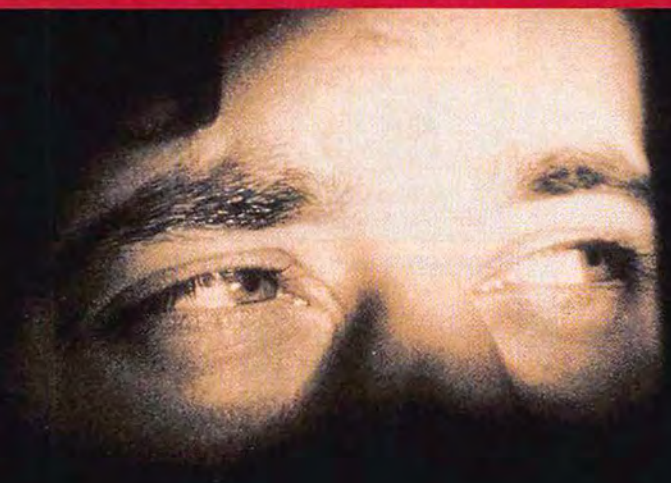

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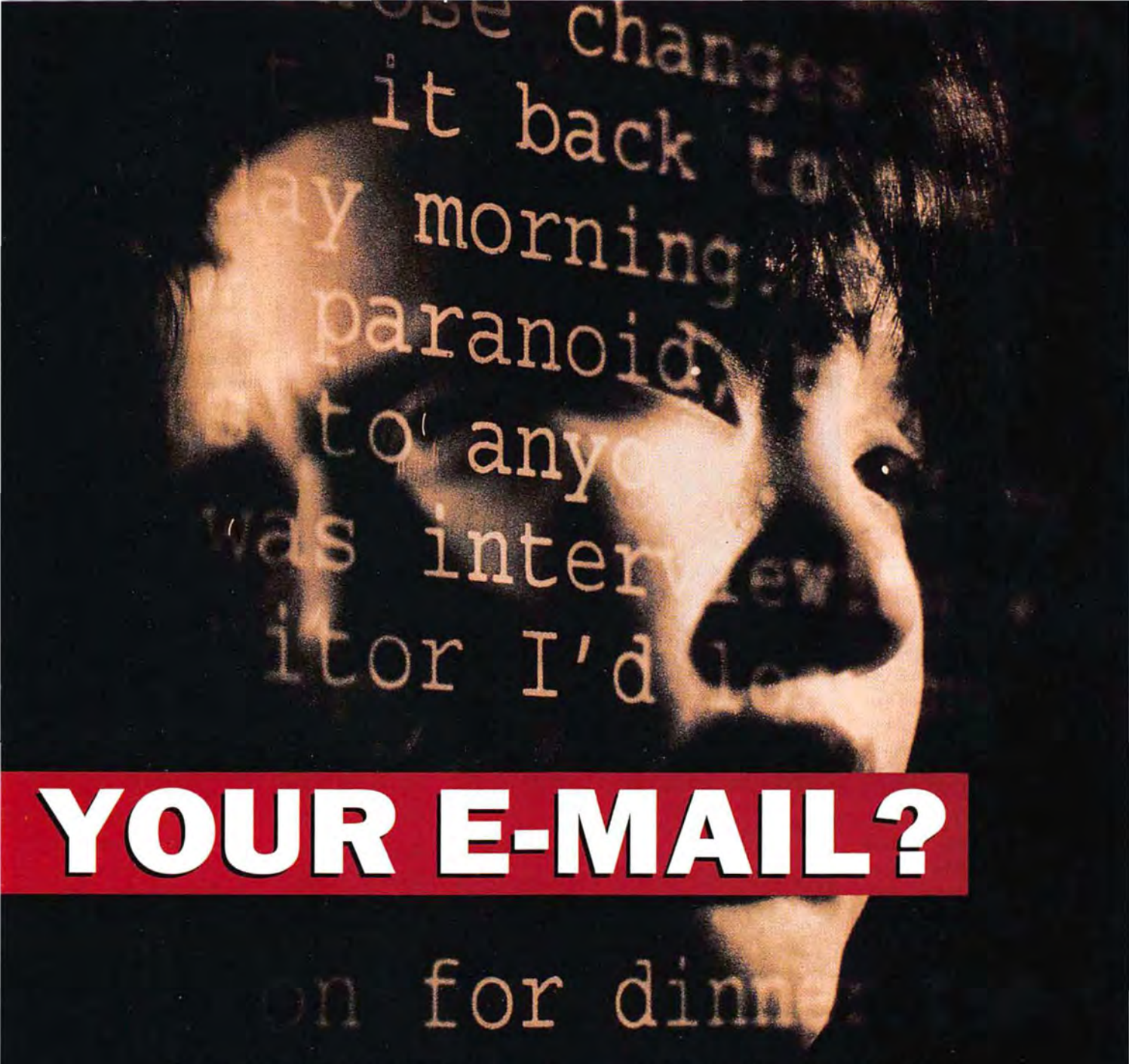

YOUR E-MAIL?

JEFFERY NEWBURY

Remember that E-mail message you sent to your pal in sales last week? You know, the one complaining about the new vice president? Do you know who else read that message? What if it fell into the wrong hands?

Every day more than 10 million business professionals rely on electronic mail to communicate with co-workers. But few of us ever think about the possible ramifications of sending those messages. We tap them out as casually as we pick up the phone, "talking" about everything from sensitive corporate issues to what we're doing this weekend.

Should we assume that E-mail messages are really private? Probably not, say most experts. "A lot of people are getting into trouble," says privacy advocate and employment attorney Cliff Palefsky. "They feel that a message is private. They press a button and think it's gone, but it's not."

The issue of E-mail and privacy has recently come to prominence through a series of high-profile incidents. After last year's beating of Rodney King, the Christopher Commission, investigating practices of the Los Angeles Police Department, found some 700 offensive messages sent between officers. During the Iran-Contra trial of Marine Lieutenant Colonel Oliver North in 1987, North's E-mail messages were one of the principal sources of the information used against him.

More recently, Eugene Wang, a former vice president with software firm Borland International, was charged with passing sensitive company documents to one of Borland's chief rivals, Symantec Corporation. After Wang left Borland for a position at Symantec, Borland management looked into Wang's corporate MCI Mail account and discovered evidence that ultimately led to Symantec president Gordon Eubanks being named a defendant in the case.

Protecting Your E-Mail: Do's and Don'ts

- **Read your company's E-mail policy. If no such policy exists, work with your human resources staff to create one.**
- **Change your password at least once a month.**
- **Don't use an obvious password, such as your name.**
- **Know whom you're sending a message to. Double-check addressees and avoid inadvertent, potentially embarrassing broadcasts.**
- **Don't send highly sensitive, confidential, or potentially embarrassing messages over E-mail. Think twice before sending inflammatory messages, which you may later regret.**
- **Exit E-mail when you leave your desk, or use a password-protected screen saver.**

A Patchwork Quilt

These celebrated E-mail controversies are not isolated incidents. They are, in fact, indicative of the confusion surrounding employees' and employers' rights where E-mail is concerned. Laws governing internal E-mail communications "are like a patchwork quilt," says Marc Rotenberg, Washington director of Computer Professionals for Social Responsibility (CPSR), a group that debates the social and political implications of technology.

The Electronic Communications Privacy Act (ECPA) of 1986 establishes clear guidelines for monitoring E-mail messages sent over public systems such as MCI Mail or CompuServe. But no such regulations govern the monitoring of internal E-mail messages sent on a company-owned system.

In *Protecting Electronic Messaging: A Guide to the ECPA*, authors John Podesta and Michael Sher state that private businesses' E-mail systems are not subject to the same laws that govern public E-mail services. From a corporate perspective, that means managers can legally review E-mail communications as they would paper memos.

But doing so can cause a range of problems, from employee discontent and distrust to time-consuming and expensive litigation. In California, for example, employees have filed lawsuits alleging that their employers violated their right to privacy by monitoring their E-mail communications. But even in this state, which has a constitutional right to privacy, it's still not clear where employees' rights stop and employers' rights begin.

"We can all agree that you have a right to privacy when you're in the restroom. That's an easy one. But does an employee have the right to assume that a locker, a desk drawer, or an E-mail message is private? That's not so clear," says Jeffrey Kingston, a partner with the San Francisco law firm of Brobeck, Phleger, and Harrison, and author of *Privacy in Computer Networks*.

The absence of laws inevitably leads to confusion, anger, and mistrust when an employer's actions run counter to an employee's expectations. Consider this scenario: A network administrator routinely monitors E-mail traffic to make sure the system doesn't get overloaded. During the course of that review he discovers an "inappropriate" message that eventually leads to disciplinary action against an employee. The employee, who believes his or her right to privacy has been violated, files a lawsuit. Litigation of this type takes years to wind its way through the courts—and so far, none of these cases has resolved the privacy rights issue. "It's never a pleasant circumstance when you discover E-mail is not as private as we might have thought," comments Rotenberg of CPSR.

The Need for Policies

Employers, civil libertarians, and communications experts hold a variety of opinions when it comes to employers' versus employees' rights. But there's one point on which they all agree: The best way for employers to respond to the absence of clearly defined laws is to establish a policy, publicize it, and stick to it.

According to E-mail privacy expert Walter Ulrich, managing director of the consulting firm Arthur D. Little, fewer than 10 percent of U.S. companies have a policy on E-mail

JEFFERY NEWBURY

privacy and security. Most businesses don't consider it a priority because they haven't had problems. But waiting until you're hit with a lawsuit, says Ulrich, is "foolhardy."

Until the Borland/Symantec case, Symantec Corporation had no written policy on E-mail privacy. Then the company was slapped with subpoenas. Now Symantec has a policy warning against the use of corporate E-mail for private correspondence. Borland, for its part, still does not have an explicit E-mail policy, though access to corporate information of all types is covered in the employee manual, according to company spokesperson Steve Grady. Reviewing the E-mail of current or former employees is not standard practice, says Grady, emphasizing that Wang's MCI account was reviewed after a series of "extraordinary and suspicious events."

One Size Doesn't Fit All

Policies can run the gamut from the draconian ("E-mail messages are the property of the company and can be accessed at any time and for any reason, without notice") to the permissive ("Employees can be assured of the privacy of their messages and no employee is permitted to review another employee's message without the permission of the originator"). Both kinds of policies are flawed, says Ulrich. The first creates an atmosphere of mistrust and inhibits the use of E-mail. The second can cause unnecessary headaches for co-workers and managers. "If I'm exchanging E-mail messages about a proposal that's due and I go to the hospital, it can create problems if my mail is considered strictly private," says Ulrich.

A productive policy, say E-mail experts, is one that is enforceable, that fits the company's culture, and that allows for the incidental and occasional use of E-mail for personal communications. A good E-mail policy should state that while the company reserves the right to review all electronic records, it prohibits employees from reading other employees' E-mail except in those situations that require access for legitimate business reasons. And even under these circumstances, attempts should be made to obtain the originator's consent. A company's E-mail policies should be updated regularly and communicated to all employees.

Encryption: The Ultimate Protection?

Imagine checking your E-mail in-box and finding a message that read, "mQA/AivFwWYAAAEBeQ8dG9tQHRoZy5ob2JieS5ubD4==F7CL"

Gibberish? A scrambled file? Neither of the above. In fact, your E-mail system receives mail like this all the time—messages that have been encrypted (coded so that they can be read only by their intended recipient). You're just not aware that it's happening.

Data traveling over networks is highly vulnerable. Messages can be intercepted, altered, or copied, whether as acts of corporate espionage, as part of a regular automated backup routine, or by supervisors or managers monitoring an employee's work. Digital encryption schemes provide an electronic shield to protect communications from prying eyes. Network administrators can encrypt the central database of an E-mail system so that even if messages are intercepted, they will be unreadable. And individual users—if they're equipped with the proper tools—can encrypt each message separately, using a secret code available only to them and the intended recipient. (Such schemes will also play a critical role in authenticating electronic messages by setting up "digital signatures," encrypted blocks of code that only the person "signing" has the key to encrypt.)

Encryption schemes range from simple strategies to complex theorems that even the National Security Administration would have a hard time cracking. But at the most basic level, all involve using a *key*—an alphanumeric sequence—as the basis for the transformation of characters or bits of a message. The resulting output is an unintelligible stream of characters—unless, of course, you know the key. Keepers of the key, like young sleuths using a decoder ring, can decipher the contents of the otherwise secret message.

There are two major types of encryption schemes: private key and public key. Private key systems use a single secret code to encrypt and decrypt a message. Public key encryption uses what are called public/private key pairs. A message encrypted using the public key, a widely known code, must be decrypted using the private key, known only by its owner—and vice versa. In both scenarios, encryption and decryption often happen automatically; users don't have to invoke a code to read or send E-mail.

Who's Doing What?

Leading E-mail vendors handle encryption differently, providing users with different levels of control and security. Lotus cc:Mail and Microsoft Mail store every message in a database on a server, and the entire database is encrypted. Messages are decrypted on the fly, as data is sent from the database to your screen. In each of these cases, encryption is completely automatic. Encoding and decoding are driven by the use of individual user passwords, and a single key protects the entire database. The downside of this approach: Messages in these systems are only as secure as individual passwords.

In contrast, Lotus Notes uses a more elaborate and flexible encryption scheme. Encryption is activated when users click on the Encrypt button before sending a message. The system encrypts the outgoing message by applying the public key of the intended recipient. When the intended recipient reads the message, his or her account knows the private key associated with the sender's public key and can decrypt the message. Since private key information is associated with each user's individual ID file (maintained on the user's own system and not on the server), an illicit reader would need to know a user's password and log in at that user's workstation in order to read his or her messages. For an even higher level of security, a user could keep his or her ID file on a floppy disk.

In addition to this initial level of protection, Notes users can assign a special, sep-

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Information traveling over networks is highly vulnerable.

Encryption: The Ultimate Protection?

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arate encryption key to any individual field of a document. This allows a document or form to be distributed widely yet contain data that only certain people are able to access.

WordPerfect Office 4.0 implements encryption using an internally developed standard shared by various WordPerfect products. Virtually every component of the mail system is automatically encrypted at all times. Users can also password-protect individual messages or file attachments, in effect double-encrypting a message. Someone who tries to impersonate a user logging on at the right workstation and using the correct password still couldn't read a message for which he or she did not have the right password.

The above systems offer the strongest security against an outside intruder who simply tries to capture messages in transit or on a server. As far as we could determine, none of the systems offer any protection for message transmission through gateways into other systems.

Encryption Pitfalls

Are there potential problems with encrypting electronic communications? In some cases, yes. For example, with such packages as cc:Mail and Microsoft Mail, network administrators can read any mail regardless of encryption by changing a user's password. This limits the security and privacy of messages (although the user would know that the password had been changed the next time he or she logged on).

On the other hand, an encrypted message can be made unreadable until the recipient applies the correct password or key. This level of protection is possible, for example, in both Lotus Notes and WordPerfect Office. Although messages may remain private in these systems, this scenario is not problem free. For example, if an employee is using E-mail to run another business or send next year's marketing plans to your biggest competitor, you may never find out—or be able to prove it. Similarly, if an employee who works with valuable information is fired and decides to encrypt all your records before he or she leaves, you may never be able to retrieve the information.

Employees started to feel like Big Brother was watching.

One company we spoke with gave perhaps the ultimate example of this problem: The Clinton White House, it said, has been calling a lot lately. It seems that many of the Bush administration's old E-mail messages are still on the White House servers. The only problem is that they're encrypted—and the key, needless to say, may not be forthcoming.

—Thomas Gewecke

Thomas Gewecke is research manager for *PC World*.

When Big Brother Backfires

While having some kind of E-mail guideline is better than having none, a poorly written policy can create new problems. At Brown Group, a footwear and specialty retailing company in St. Louis, Manager of Office Applications Diane Burkard is revising the company's strict E-mail policy.

In 1991, Brown Group management developed the following E-mail directive: "All computer programs, hardware, and data are the sole property of Brown Group Inc.; any use of the computer or application for other than company and business purposes is expressly prohibited. Contents of E-mail communications will be monitored by our audit department as deemed necessary."

The policy backfired when employees protested that their messages were being needlessly monitored. Problems started, Burkard says, "when people got in trouble for using E-mail for personal reasons." As a result of the auditing, she notes, "employees became paranoid and were very careful about any message they sent. They felt like Big Brother was watching."

Having learned from its mistake, Brown Group is asking for input from end users, division managers, and the human resources and legal staffs. In researching other companies' E-mail policies, Burkard notes, "I found that no one had ever heard of E-mail actually getting audited."

Using Good Judgment

The 5000 E-mail users at Nordstrom, the Seattle-based fashion retailing chain, adhere to a policy that has been carefully crafted to protect the rights of both employees and management. "We pride ourselves on the use of good judgment, and we wanted to create a policy that lets our employees know we trust them. We knew that an absolutist policy would not be successful," says Network and Computer Operations Manager Bob Hatch.

Hatch and other managers developed a policy that dovetails with Nordstrom's corporate culture. The policy, which is posted quarterly on the E-mail system, states: "Electronic mail is a company resource and is provided as a business-communications tool. Employees with legitimate business purposes may have the need to view your electronic mail messages. It is also possible that others may view your messages inadvertently, since there is no guarantee of privacy for an electronic mail message. Please use your good judgment as you use the electronic mail system."

While it might seem that an E-mail policy that is broadcast quarterly would deter widespread E-mail use, the opposite is true. A few users at Nordstrom have asked whether their messages are being read, says Hatch, but most are satisfied with the policy. "The policy has not had any dampening effect on E-mail traffic," he notes.

Where to Go From Here

Ulrich advises companies to be proactive when it comes to setting an E-mail policy. "Companies without a policy should make it a priority for 1993," he notes. "Once you start thinking seriously about the issue, you need to do something about it."

"Some companies may be afraid to address the issue for fear of employee backlash," observes Bill Moroney, executive director of the Electronic Mail Association. But by doing nothing, he adds, companies open themselves to employee dissatisfaction and to possible litigation. In addition,

The Pundits Speak Out

Where do you come down on the issue of E-mail and privacy? Should messages be monitored? Should personal notes be barred? We asked business leaders, politicians, and pundits. But not everyone was eager to share their views. Ross Perot, Lee Iacocca, and American Airlines CEO Robert Crandall all said the issue was too loaded and declined comment. Even notables typically quick to comment on a host of political and social hot potatoes begged out, among them Peter Drucker and Senator Bill Bradley. Here's what those who dared to comment had to say.

"If you received a sealed letter addressed to you in your mailbox at work, and your employer opened the letter and read it, you probably would consider it an invasion of privacy. As Americans, we feel that our mail is privileged and private, regardless of where or how we receive it."

—Paul Simon, U.S. senator and author of The Privacy for Consumers and Workers Act

"People expect exactly the same thing from E-mail that they expect from voice mail or from a conversation—that is, no monitoring or bugging. If the employee doesn't want an E-mail message or a conversation passed along, they should indicate that to the recipient."

—William Gates, chair and CEO, Microsoft Corporation

"Employees should be allowed to use electronic mail the same way they use the phone. That, of course, means there will be some personal use, which is fine, as long as it's kept to a reasonable level. I can't think of any business needs that necessitate the monitoring of employee E-mail. I think it's wrong to monitor people. You have to trust them to be reasonable in using all of the company's services responsibly, whether you're talking about car rental policies or electronic mail and the phone system."

—Ray Noorda, president and CEO, Novell

"My personal expectation of privacy is not all that great with E-mail. It's not greater than if two people went into the restroom and had a conversation about a blatantly illegal act. If the boss were in the next stall, I would hardly call that a private conversation. Still, it's important to stress that the whole idea of monitoring E-mail is bullshit, strategically. If senior management start acting like cops, then they are going to destroy the potential of the system. Of course, if you're doing something illegal and you leave an audit trail, that's fair game when it's significant to the courts or to the company. Despite being a privacy freak, I think that anything other than that is expecting too much."

—Tom Peters, author and business guru

"If you're doing something for your company on company time, then I suppose the company has the right to look at what you've done. But anything else, including private mail, ought to be totally removed from any eyes but your own. Personally, though if I had a sensitive communication, which had to be put on the record, I wouldn't want to use E-mail. I'd prefer to put it in a sealed envelope. Very, very heavily sealed."

—Nat Hentoff, *Village Voice* columnist on First Amendment issues

"John or Mary Doe should not lose any personal privacy rights in the electronic age. But since electronic systems are almost always shared, devices need to be established that provide means of assuring others' privacy in communal computers. Once those devices have been established, you would hope that people would not poke about, any more than they would do so to read someone else's mail lying on the desk. It would be a pity to have to ask each employee to encrypt personal messages, but in offices fetid with voyeuristic curiosity, this might be necessary."

—William F. Buckley, political commentator

—Marion Long

Marion Long is a freelance journalist in Fairfield, Connecticut.

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"until a larger number of companies do establish policies, the issue will remain murky and ripe for legislation."

Such legislation is already in the works. The Privacy for Consumers and Workers Act, introduced in 1992 by Illinois senator Paul Simon, would require employers to provide employees with prior written notice of electronic monitoring. Although not explicitly mentioned in the bill, E-mail monitoring would be covered. Simon intends to reintroduce a revised version of this legislation during the current session.

According to Simon, the need to establish policies is made even more imperative by the dizzying speed of advances in technology. E-mail privacy is just one of a host of issues, he believes, that will come to the forefront as we grow increasingly dependent on technology. "Just beyond the horizon are more breakthroughs and refinements that we can't even envision today," says Simon. "Weighing these issues now will allow us to be the masters of the technology, instead of its slaves."

Bronwyn Fryer is a contributing editor and Roberta Furger a senior editor for PC World.

Resources

- Electronic Mail Association (703/875-8620); the EMA publishes a $45 E-mail policy handbook and offers a membership directory
- *Privacy Times*, a biweekly newsletter (202/829-3660)
- *Privacy Journal*, a monthly newsletter (401/ 274-7861)
- "Privacy in Computer Networks," a paper by attorneys with Brobeck, Phleger, and Harrison (415/442-0900)

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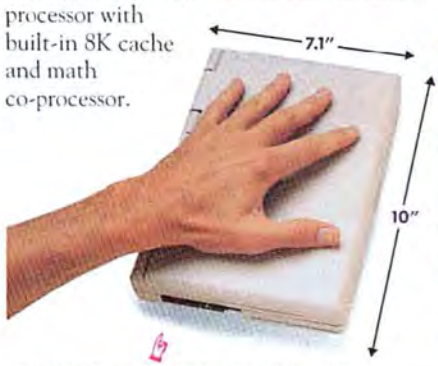

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Weight (lbs)	3.6	3.5	4	3.9	2.75
Removable Hard Drive	Yes	No	No	No	No
RAM standard/ and maximum	4/20	4/10	4/10	2/4	1/3
PCMCIA Type II Slot	Yes	Yes	No	Yes	No
Backlit VGA Display	Yes	No	Yes	Yes	No (CGA)
Battery Life	4	3	3	3.5	4
Integrated Trackball	Yes 16mm	No	Yes 12mm	No	No
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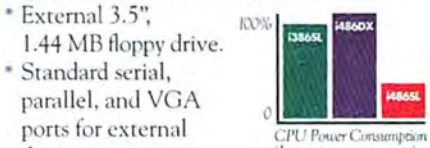

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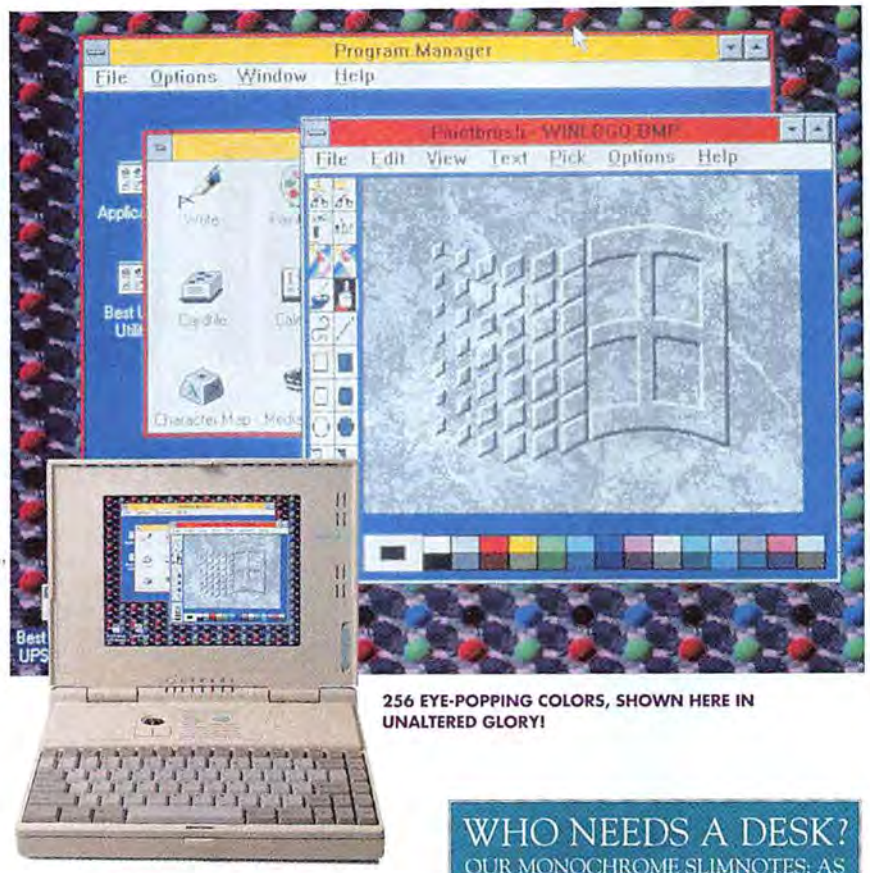

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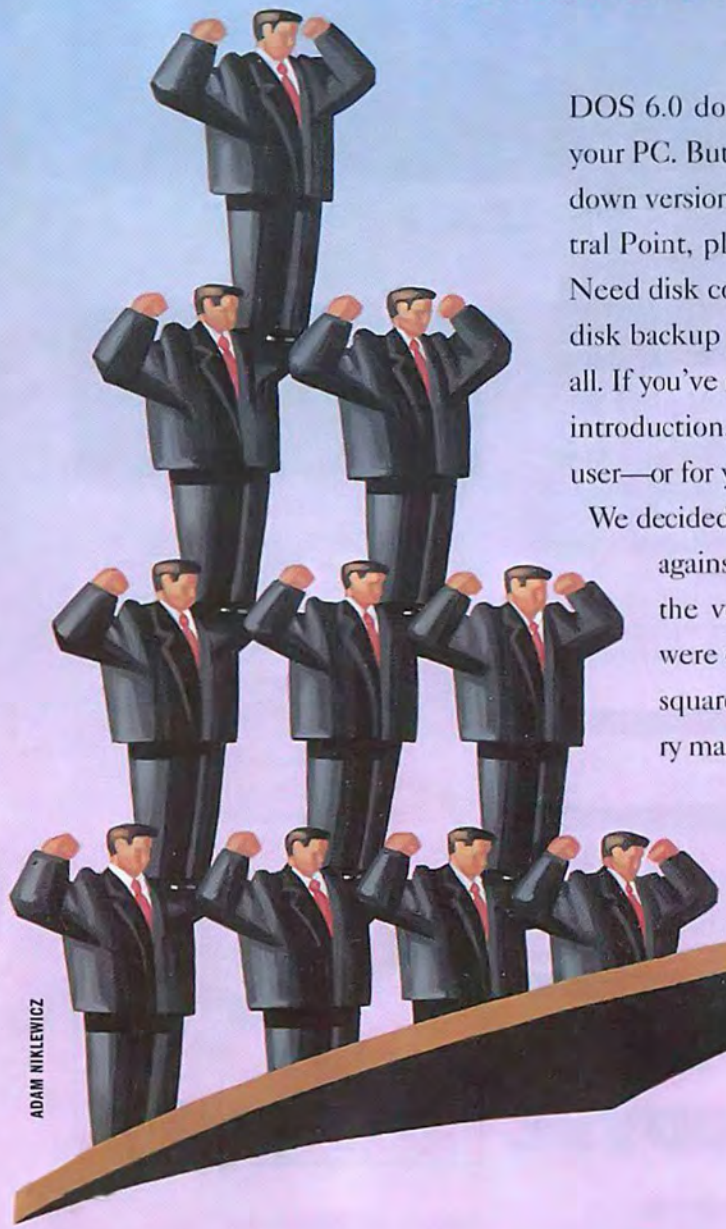
Top Ten Utilities

DOS 6.0 comes with a full set of utility programs, but are they good enough?



ADAM NIKLEWICZ

DOS 6.0 doesn't promise to revolutionize the way you use your PC. But it does offer a passel of goodies, including stripped-down versions of utility heavyweights from Symantec and Central Point, plus a full-blown operating system, all for $129.95. Need disk compression, a memory manager, a virus checker, a disk backup program, and a disk defragger? DOS 6.0 has them all. If you've never used one of these utilities, DOS 6.0 is a cheap introduction. But are these tools good enough for the average user—or for you?

We decided to put that question to the test, by pitting DOS 6.0 against a gaggle of third-party utilities, including some of the very programs that DOS 6.0's simplified versions were cast from. In the disk compression arena, DOS 6.0 squares off against Stacker and SuperStor Pro; in memory management, against QEMM386 and 386Max; in virus

vs. DOS 6.0

Here's how they stack up against The Norton Utilities, PC Tools, Stacker, and other top-flight competitors.

checking, it's DOS versus Norton AntiVirus and Virex for the PC; in backup, PC Tools and Norton Backup for DOS; and in disk defragging, DOS challenges The Norton Utilities and PC Tools. The two compression programs are market leaders; the rest are all past *PC World* Best Buys or runners-up.

Our evaluations are based not only on recent performance tests conducted by the PC World Test Center, but also on ease of installation, configuration, and use. For example, "Software and Hardware Caches Pay Off" (July 1993) clearly showed that most cache programs, if properly set up, will boost your PC's performance by about the same amount. But configuring some cache utilities is a royal pain—enough for you to consider simpler alternatives. We've applied this same acid test to DOS 6.0's suite of tools and

By Robert Luhn

to those offered by third-party vendors.

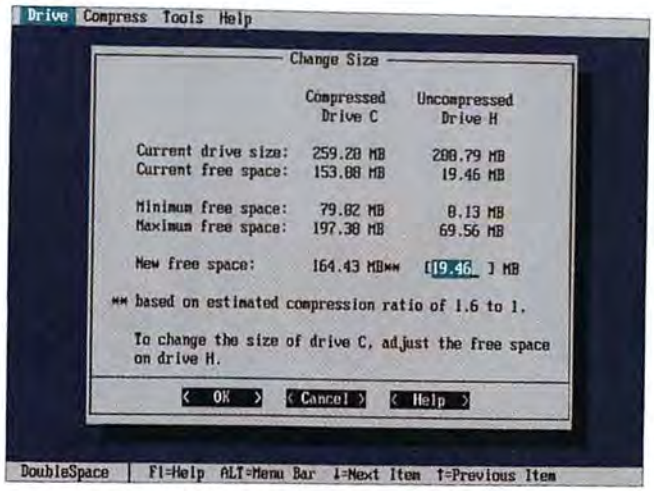
Note: Many of these products come in both Windows and DOS flavors and are sometimes included as part of a larger bundle. For example, Norton Backup appears in stand-alone DOS and Windows versions as well as in Norton Desktop for Windows and Norton Desktop for DOS. In this roundup, we examine only the latest versions—stand-alone or bundled—that reflect the developer's most current technology.

Simplify, Simplify

Ease of use is the first rule—and maybe the second and third. System-level programs such as disk compressors and virus checkers must be simple, foolproof, and exceedingly clear. On this score, DOS 6.0's utilities generally beat most comers. Installation requires minimal user intervention, with only one or two menus to dig through and a handful of options to pick from. Of course, the simpler the program, the less you can fine-tune it. But I suspect most users—even PC pros—will be relieved. DOS 6.0 does 90 percent of what you need, and much of it automatically.

Nevertheless, there are plenty of reasons to consider the third-party packages reviewed here. For example, DOS's memory manager frees up far less conventional RAM than QEMM does. Tape backup isn't part of the DOS deal, and Microsoft's online help is rather sparse. And while DOS's virus checker is plenty capable, most experts think you should run at least *two* checkers to cover all your bases.

Finally, don't fall for Microsoft's pitch about the superior safety of its products. As millions of Windows users can attest, Microsoft products can be mercurial, and DOS 6.0 is no exception. If your system is a little out of the ordinary (if you use a CD ROM player, dual hard disk drives, third-party disk caches, or some other disk compression program), running DOS's memory manager or disk compressor may require a lot of work. Before you do anything, play it safe: Create a boot disk and back up your system.



DOS 6.0 COMPRESSION: To size a DoubleSpace volume, fill out a single field that gives space to or takes space away from your uncompressed drive.

DISK COMPRESSION

Twice the Space, Twice the Trouble?

Winner: None With 340MB hard disks selling for under $500, does anyone really need disk compression software? Microsoft apparently thinks so. It has joined the ranks of market leaders Stacker and SuperStor Pro with DoubleSpace, a disk compression program built into DOS 6.0.

The allure of disk compression is certainly considerable: Select a few commands, and after an hour of digital squeezing, your hard disk has twice as much capacity. From then on, you can run all your Windows and DOS programs as before (open and save files, use standard DOS commands such as DIR and CHKDSK, and copy files to and from your hard disk transparently) while the compression program automatically expands outgoing files and shrinks incoming ones.

But take advertised compression ratios of 2:1 or 3:1 with a grain of salt (a 2:1 ratio means that a 10MB file will be squeezed into a 5MB space). Although DoubleSpace and Stacker initially claim to double usable capacity, it ain't necessarily so. As you save new files, you discover that compression varies wildly by file type (see "Average Compression by File Type"). According to *PC World*'s tests, DoubleSpace's real-world compression ratio is about 1.6:1, and Stacker's 1.9:1. Desktop publishers and graphics mavens take special note: TIFF files barely shrink, and at best, Stacker can deflate EPS and PCX files by a factor of 2.5:1.

Managing a compressed drive is a pain, too, because free space is calculated on an *estimated* compression ratio. If the estimate is 2:1, but you're packing the disk with TIFF files, the difference between reported and true space can be huge. DOS's DoubleSpace is especially vulnerable to this shell game, because it doesn't automatically recalculate its estimates; as the disk fills up, you may get erroneous out-of-space error messages when megabytes of space remain. The solution? You must periodically defrag the disk and run utilities that scan your files and update estimates with real compression values.

Still, disk compressors are a lot faster, safer, and simpler than they used to be. Although some applica-

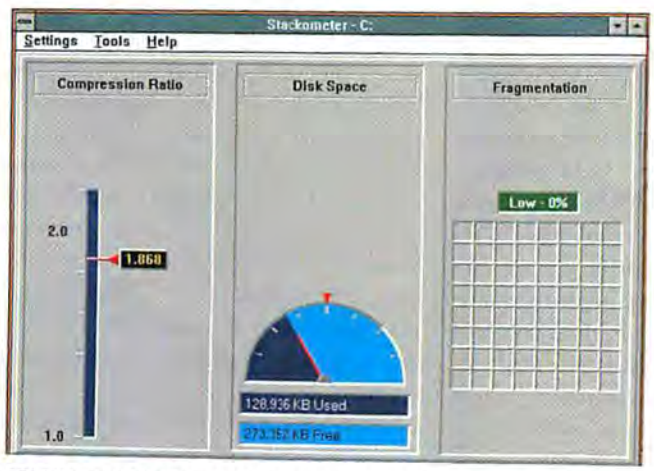
Average Compression by File Type

A NOT-SO-DOUBLE DOUBLESPACE: Compression ratios—the amount of uncompressed versus compressed data that will fit on a hard disk—vary according to file type.

	DOS 6.0 with DoubleSpace	Stacker 3.0	SuperStor Pro		DOS 6.0 with DoubleSpace	Stacker 3.0	SuperStor Pro
BMP	3.8 to 1	4 to 1	2 to 1	TIFF	1 to 1	1.2 to 1	1.4 to 1
COM	2 to 1	1.9 to 1	2.4 to 1	PCX	1.8 to 1	2.3 to 1	2 to 1
EPS	1.9 to 1	2.5 to 1	1.8 to 1	TXT	2.3 to 1	2.6 to 1	1.8 to 1
EXE	1.6 to 1	1.5 to 1	1.5 to 1	ZIP	1 to 1	1 to 1	1 to 1

tions will drag a bit during disk access, most will zoom right along; in fact, some operations may even be faster. Reliability and compatibility of compressors are also much improved. You can run Windows, databases with compressed indexes, PKZip (which won't compress things further), and just about anything else on a compressed drive without a hiccup. Even more impressive: If a power outage strikes while you're creating, resizing, or defragging a DoubleSpace, Stacker, or SuperStor drive, your data is usually secure. If an error does occur, Stacker and SuperStor have disk repair tools just a menu option away. DoubleSpace doesn't, which means you'd better pray for a disk error CHKDSK/F can fix—or have a copy of The Norton Utilities nearby.

In the ease-of-use sweeps, though, DOS's DoubleSpace comes up a winner. Type a command or two and DoubleSpace runs CHKDSK, defrags your disk, and in under an hour, creates a speedy compressed drive. Unlike SuperStor, DoubleSpace doesn't require you to keep an eye on duplicate AUTOEXEC.BAT and CONFIG.SYS files or to disable all your TSRs and drivers during installation. To later create, expand, or shrink a drive, you select a menu option or two, enter the desired size, press <Enter>, and it's done in a flash.



STACKER'S GAUGES, whether you're using DOS or Windows, display "live" disk space and compression data; to view file fragmentation, you must issue a Refresh command.

Stacker takes a similar if more convoluted approach; it analyzes your disk over and over again and reboots to activate new settings. But Stacker can be installed from Windows and even offers some measure of control from there. You can check gauges that actively calculate compression and free space, refresh a third gauge to view file fragmentation, and click icons that drop you down to DOS so you can create and manipulate compressed drives. Stacker also offers far more goodies than DoubleSpace. You can fine-tune compressions (trading speed for space), create compressed floppies that can be read on non-Stacker systems, and easily uninstall the program.

On the other hand, SuperStor Pro is a challenge to get going. Although it matches Stacker's advanced features, SuperStor is crippled by a ham-fisted installation process, confusing prompts, and a misleading manual that omits vital information—following these instructions you can't even install SuperStor. Later, if you want to resize a compressed drive or run SuperStor's built-in defragger, you must disable your disk cache once more—even if you use DOS's own SmartDrive. With Stacker and DoubleSpace around, there's little reason to put up with such hassles.

So which package gets the nod? None, for now. Stacker offers better file compression, disk repair, and uninstall, but it's somewhat difficult to use. That may change, however, with the release of Stacker 3.1, which is intended specifically for use with DOS 6.0 and is due out before you read this. Like DoubleSpace, Stacker 3.1 will be much more tightly integrated with DOS, which means no duplicate AUTOEXEC.BAT and CONFIG.SYS files, and generally more streamlined operations.

AddStor also has a DOS 6.0-specific product on the way: DoubleTools. (SuperStor will be aimed at DOS 5.0 and earlier setups.) The company claims DoubleTools will enhance DoubleSpace, providing Windows-based controls, background defragging, better compression, more accurate disk stats, and advanced disk repair. Let's hope it also provides a sensible installation program and better documentation.

And what about DoubleSpace? It's fast, simple, and seemingly stable, but it has an uninstall option, which should give pause even to experienced users. Worse, a casual scroll through various CompuServe forums reveals that DoubleSpace can sometimes screw things up royally, from failing to install properly, to scrambling video, to even trashing your hard disk. Until Microsoft figures out what's causing the growing thicket of problems, it's best to wait a bit.

MEMORY MANAGEMENT

Finding a Place for Everything

Winners: DOS 6.0 and QEMM386 For most people, managing memory ranks up there with getting a root canal. Small wonder—your typical 386 or 486 has *five* different kinds of memory to keep track of, from conventional (the fabled first 640K) to the megabytes of extended. That's why memory managers were invented. Memory managers such as past Best Buys QEMM386 and 386Max ("Memory Managers," July 1992) can also ferret out memory and configure it for optimal use, something that DOS 5.0's memory manager couldn't do. With DOS 6.0, Microsoft has added MemMaker, a program designed to do just that job.

Memory managers have their work cut out for them. After the first 640K of conventional RAM—where DOS, drivers, TSRs, programs, and data are stored if your PC has no other memory—come upper memory blocks (UMBs). UMBs encompass the memory addresses between 640K and 1MB reserved for video RAM and the ROM chips that control your PC, video, hard disk, and other adapter cards. Many of these addresses aren't used, so memory managers "remap" pieces of extended memory into those unused addresses, then stuff that memory with drivers, TSRs, and other special programs that normally take up conventional memory. Then there's the high memory area (HMA), the first 64K of RAM above 1MB. This is where a chunk of DOS is relocated when you place the DOS=HIGH statement in CONFIG.SYS. Finally, there's extended memory—any memory above 1MB (which Windows, disk caching software, and some large DOS applications can use)—and expanded memory, a fading standard that is typically required by older DOS programs.

Of course, few users worry about these

QEMM'S MANIFEST UTILITY spells out what's loaded in conventional and upper memory, and where.

distinctions. They simply need as much conventional and extended memory as possible, with the fewest hassles. Unfortunately, these two desires are seldom satisfied by the same memory manager. Although DOS 6.0's MemMaker program optimizes memory with just a few keystrokes, it doesn't liberate much more conventional memory than DOS 5.0 did. Fire up QEMM or 386Max, however, and you discover (albeit with some effort) that there is more RAM to be had—lots more.

Whichever manager you use, the process of optimizing memory (especially ferreting out UMBs) is pretty much the same. The manager's optimizer program analyzes your system, determines how much memory the drivers and TSRs in your AUTOEXEC.BAT and CONFIG.SYS will probably need, and reboots your computer several times to figure out which programs will fit into upper memory and in what order.

When the manager finishes, AUTOEXEC.BAT, CONFIG.SYS, and Windows' SYSTEM.INI are modified. You'll find a memory manager listed in CONFIG.SYS, new commands inserted before certain programs, and your drivers and TSRs now loaded into upper memory, leaving more conventional RAM free. The next time you add a new driver or TSR to your system, just run the optimizer again and let it reshuffle the deck. You don't have to fuss with extended versus expanded memory either—the manager provides them to applications on demand.

How well and easily these managers do the job varies considerably. MemMaker, QEMM, and 386Max are simple enough to install and run. The programs prompt you along the way, automatically find and remove conflicting memory managers, and back up AUTOEXEC.BAT and CONFIG.SYS before making any changes to your system. All three come with memory analysis programs, but QEMM's Manifest is the best at identifying which drivers and TSRs are loaded and where.

Novices will likely prefer DOS 6.0's MemMaker. The manual is about 20 pages, the prompts are unambiguous, and there are few choices to make. QEMM's prompts are sometimes confusing, and it's easy to confirm the wrong option. Worse, QEMM's manual mixes techno-jargon in with the basic instructions, has sparse illustrations, and is out-of-date—there are no specific references to Windows 3.1, for example.

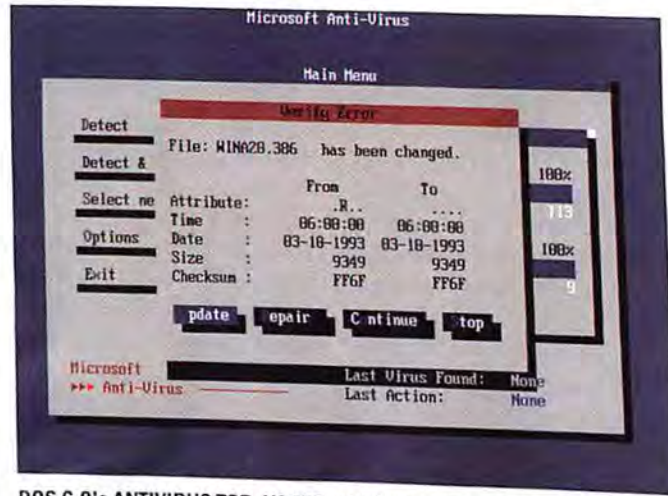
But if you have a lot of TSRs and device drivers, and MemMaker can't find UMBs for all of them, QEMM is the best game in town. Although I hesitate to use the words *intelligent* and *software* in the same sentence, QEMM is clearly the smartest program when it comes to recovering upper memory and moving drivers and TSRs out of conventional memory. QEMM recovered nearly 211K of upper memory and relocated our entire test suite of drivers and TSRs. 386Max matched QEMM byte-for-byte in finding upper memory, but it wasn't always quite as successful at relocating our test suite. MemMaker uncovered only 155K, and it stranded even more programs in conventional RAM. If you usually run text-only applications, QEMM can boost conventional RAM to 715K. Now that's memory optimization with a vengeance.

Just keep in mind that none of these memory managers is bulletproof. If the system hangs or is accidentally rebooted while QEMM is scrutinizing memory, the manager may pick up where it left off—or it may not. If it does continue optimizing, you may discover at the end that nothing has been changed. However, if you exit to DOS and run QEMM from scratch, optimization is properly performed.

DOS's MemMaker is only a little less flaky in the same situation. It notes that there's been an interruption and will start the optimization process over again. But in some cases, CONFIG.SYS is only partially modified; in others, every time you boot up, AUTOEXEC.BAT displays an error message. And on still other occasions, MemMaker picks up the beat and finishes optimization without a hitch.

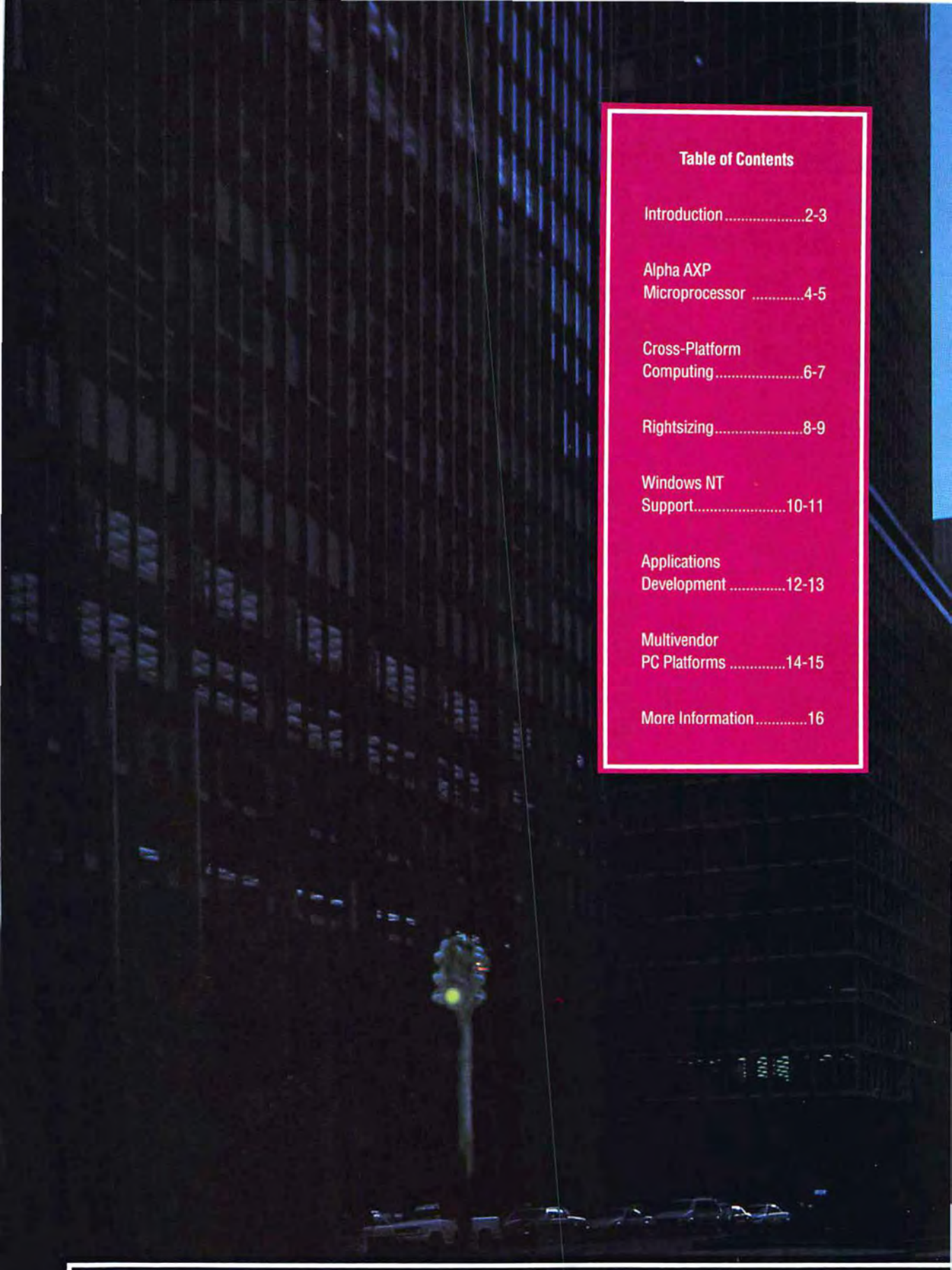
Previous Best Buy 386Max has a good reputation, an appealing interface, and a great manual. But the version I looked at, 6.03, was an interim bug fix in desperate need of an interim bug fix. The installation program stalled in the middle of operations, sometimes failed to open CONFIG.SYS properly, and insisted that the program be installed on drive C:. Worse, on one of the three test systems, a 33-MHz Gateway 386, 386Max obliterated the CMOS settings, rendering the hard disk temporarily inaccessible. Qualitas already has a fix for the CMOS problem and promises to squash the other bugs before releasing version 7.0 this summer. Later—and earlier—versions of 386Max may be fine, but steer clear of 6.03.

In the meantime, upgrade to DOS 6.0, and when you start **continues on page 195**



DOS 6.0's ANTIVIRUS TSR, VSAFE, will flag a number of suspicious activities—including any changes in a system file.

imagine



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Hardly! AXP processors differ from other RISC chips in several significant ways. Alpha AXP architecture offers you the flexibility of running UNIX® (with DEC OSF/1) and OpenVMS™ as well as the Windows NT operating system. Alpha AXP architecture is the only leading RISC architecture designed from the outset to encourage high-performance multiprocessor (and even massively parallel) implementations. Starting two instructions in each clock cycle improves performance without the need for faster silicon. A streamlined design, plus Digital's outstanding CMOS processor fabrication capability, make the AXP microprocessor fastest in the world. The combination of these three factors will allow AXP systems to achieve a performance increase of at least 1000 times during the 25-year design life of the architecture.

The wheel, circa 3500 B.C.

Imagine a breakthrough that changes the way you work.

The invention of the wheel? Surely we exaggerate. After all, the AXP processor looks like any other chip. It sits on the motherboard. It has transistors and a cooling fan.

Even though it's the world's fastest chip, the AXP microprocessor runs remarkably cool, thanks to an extremely efficient heat sink.

But while it uses industry-standard components and runs industry-standard software, Alpha AXP architecture is anything but standard.

Consider this: our first AXP chip runs up to 200MHz and can process at the world-record speed of 400 MIPS.

Alpha AXP technology is scalable. It can be used in PCs, supercomputers, and everything in between.

And while the data addressed by a 32-bit chip could fill 111 file cabinets, the data addressed by a 64-bit AXP microprocessor could fill enough file cabinets to circle Earth 5,000 times.

In short, the AXP processor is to other chips what the wheel is to round stones.

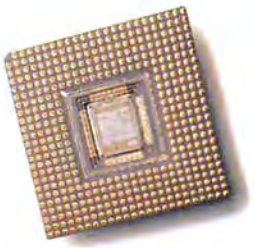
But at Digital, we're aware of the remarkable technologies that were either too expensive or had no real world applications.

To this point, AXP platforms are priced at the heart of the market, and, even as you read this, are already running everyday applications in dozens of companies.

Will Alpha AXP technology help seismologists predict earthquakes? Help doctors cut the time of an MRI scan by two-thirds? Help designers cut costs and time-to-market by testing simulated airplanes in "virtual" wind tunnels?

"We're thrilled by...the combination of Microsoft Windows NT and Digital Alpha AXP technologies. It's like having a supercomputer in a shoe box." Doug Hamilton, President, Hamilton Laboratories™

Will AXP systems fuel the biotechnology explosion? Read on to see how AXP technology, coupled with the Windows NT operating system, can revolutionize your business.



Performance of the AXP processor can ultimately be scaled up by a factor of 1000.

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Shortening your time-to-market

The drug development process typically takes years. Pharmaceutical companies need to conduct patient testing, analyze results and report them to the FDA, which must then do analyses and reports of its own. Each step of this process involves delays. Client/server computing, made possible by the Windows NT operating system running on AXP platforms, allows manufacturers to put test patients directly on-line with the labs and the FDA. So everyone who needs access to data gets it as it develops. In other words, client/server computing turns what had been a serial process into a parallel process. Saving literally months and years, plus significant expense. Now think of the serial processes in your company that could be accelerated if you made them parallel.

Imagine the flexibility of cross-platform computing. Analysts say that by 1996, the Microsoft Windows NT operating system will represent more than 50% of all Windows products used on PCs, and Windows NT applications will represent 48% of the entire systems software market.

Microsoft®

Our alliance with Microsoft brings you seamless hardware/software/operating system integration across all platforms.

Surprising behavior for an industry that usually can't agree on the color of the sky. To make the most of the new operating system, Digital is supporting Windows NT across more platforms than any other manufacturer, from enterprise and workgroup-based AXP systems to low-cost Intel 486s.

intel inside

Support across the broadest range of Intel and AXPplatforms is part of what makes Digital the #1 supplier of Windows NT solutions worldwide.

Windows NT gives you the reliable, scalable and secure performance you need for workgroup computing, application development, computer-aided design, manufacturing and engineering, and production-class business applications. Of course, Windows NT is just

αXP

one of the operating systems Digital supports on high-speed AXP platforms. Please turn to pages 8-9 for information about running OSF/1 and OpenVMS operating systems on the DECpc AXP 150. *Performance:* Windows NT runs new-breed 32-bit applications. It also runs today's MS-DOS® and 16-bit Windows apps right out of the box. *Robustness:* Memory protection insures that no one process can bring down another — or the entire operating system. *Capacity:* Windows NT can access 4GB of RAM and multiple terabytes of disk storage, while applications can address 2GB of RAM. *Responsiveness:* Pre-emptive scheduling guarantee that higher-priority processes take precedence over lower-priority processes. An asynchronous input/output model allows you to switch from one application to another, even if an app is printing or hung. *Security:* Designed to meet U.S. Government C-2 security standards, users cannot delete system files or critical data. *Built-in networking:* Offering secure, peer networking capabilities, Windows NT systems can be servers or clients at any platform level.

The "Dream machine of the Windows NT world," (PC Week, February 1993). AXP systems are recognized as the platform of choice for the new operating system.

Distributed computing: Windows NT takes networking all the way to true distributed applications. With a Remote Procedure Call facility, Windows NT is able to communicate with DCE services on OpenVMS, UNIX and other systems.

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Opening Windows

Digital is in the unique position of having three supported operating systems. This means we can be equally good at supporting OSF/1, OpenVMS or Windows NT. So AXP PCs running Windows NT will complement and enhance current and new generations of Digital systems for years to come. This is an important and unique feature of Digital — the choice of operating environments. It allows you to "right-size" to a radically lower cost solution without giving up performance or losing functionality.

imagine downsizing without scrapping what you've already got.

It comes as no surprise in this age of reduction and cost-consciousness that applications are finding their way from the glass room data center to the desktop. It's also no surprise that Windows NT is the operating system of choice for many companies looking to downsize or consolidate their computing. What may be news to you is that Digital can help you incorporate Windows NT while preserving what you have now. What is your downsizing goal?

For help in moving information up, down and across your enterprise more cost-effectively, talk to the company that pioneered downsizing: Digital.

To have affordable, general purpose PCs perform tasks that always required special purpose workstations? Tasks like imaging, 3-D modeling, database crunching, real-time video or floating-point math? Or are you simply looking for less-expensive ways to run mission-critical applications? Either way, Digital's software products for Windows NT such as PATHWORKS™, eXcursion™, DECmessageQ™, Desktop ACMS™ and POLYCENTER Scheduler™, enable systems running the Windows NT operating system to fit comfortably into existing networks. Beyond this, AXP platforms support OpenVMS and OSF/1 as well as Windows NT and, in the future, NetWare™. Which means you protect your hardware investment and continue to run the apps you have today, while you integrate Windows NT and move toward client/server computing at your own pace. And though Windows NT on AXP systems handles the most sophisticated apps, it's quick to learn and easy to use for anybody who's used DOS or Windows™ 3.1. At Digital we understand rightsizing can be a rocky road. We have more resources than any other manufacturer to make it a Sunday drive.

Move to Windows NT on AXP systems and get the benefits of downsizing without the headaches.

digital™

imagine Windows NT support no matter where you go.

You want to integrate Windows NT as quickly as possible. But you can't just boot up and go. Who'll guide you through planning and implementation? Who'll train your end users? For that matter, who'll train your support people? Who'll be there at 3 am when the Auckland office calls to say they're stuck? Digital offers more services and support for Windows NT in more locations worldwide than anybody else. Take a look at the services listed here.

Digital's 35,000 person worldwide service force means you're never far from help.

You'll see why exploring Windows NT, with Digital and Microsoft behind you, means you'll never have to search for help.

Training: Digital offers dozens of training options, from awareness seminars and strategic planning courses to technical, developer and programming training.

Installation and start up: Full installation and integration of multivendor hardware, software, operating systems, Network Interface Cards and more. Service includes an orientation for system administrators and users.

End user support: Includes 24-hour advisory support, plus Help Desk technical support. Help Desk provides user access to Digital's extensive symptom/solution databases.

Repair service: Available 24 hours, 7 days a week, on-site and remote.

Migration support: To help integrate Windows NT into your current computing environment, Digital offers porting, converting, re-engineering and application migration services. Please turn to page 9 for information on downsizing.

With the most extensive Windows NT service and support of any manufacturer, if you're thinking Windows NT, think Digital.

LAN design services: Customized LAN design services provide on-site technical expertise to configure both Digital networks and those of other vendors.

Developer support: Please turn to page 13.

For more information on DECpc systems please call Digital at 1.800.722.9332.

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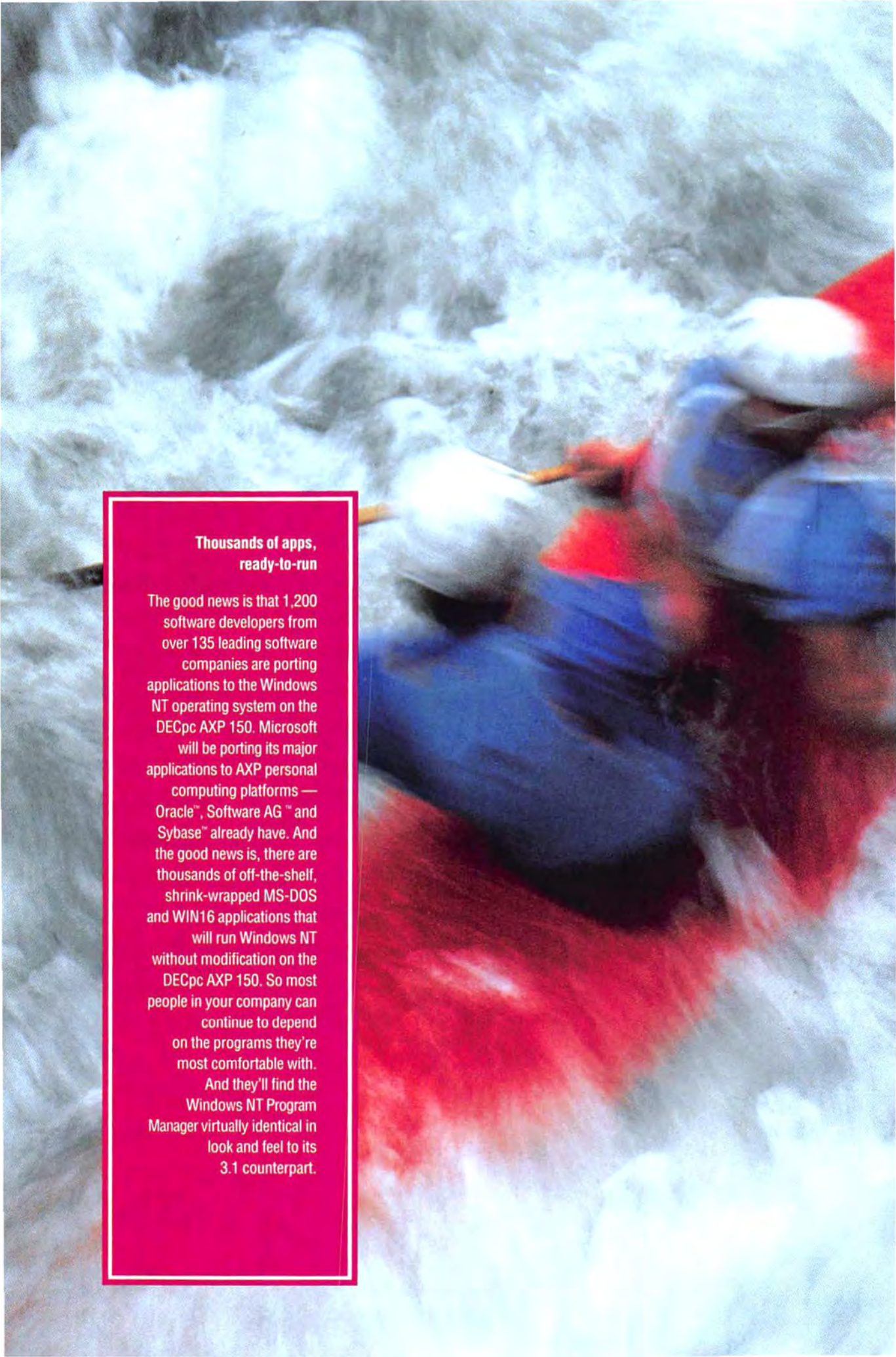
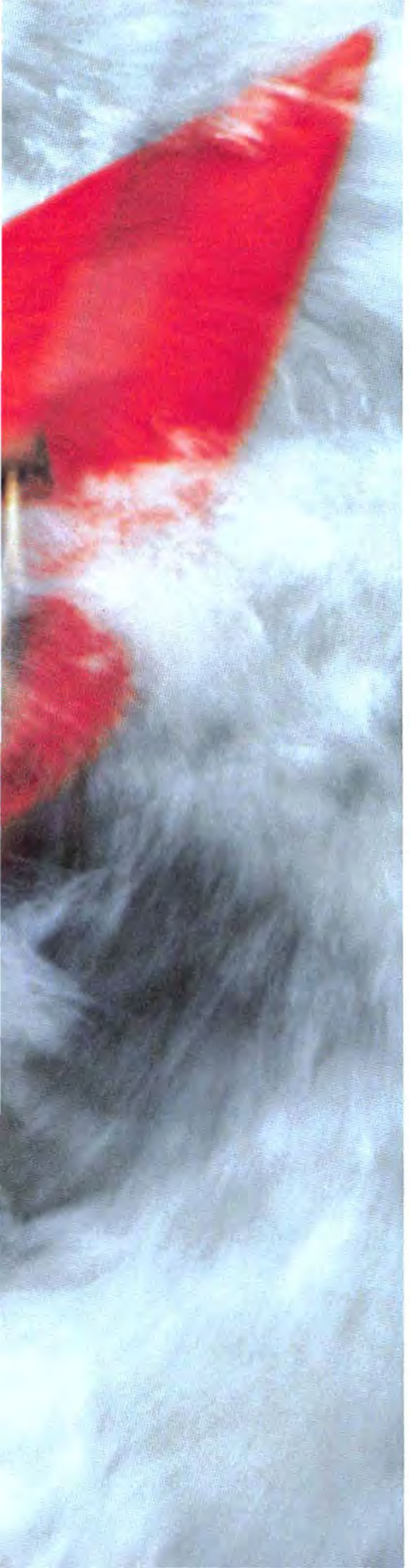


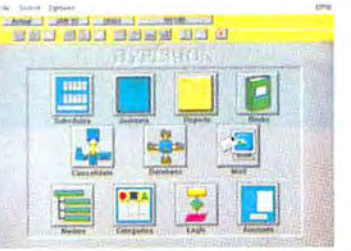
Thousands of apps, ready-to-run

The good news is that 1,200 software developers from over 135 leading software companies are porting applications to the Windows NT operating system on the DECpc AXP 150. Microsoft will be porting its major applications to AXP personal computing platforms — Oracle™, Software AG™ and Sybase™ already have. And the good news is, there are thousands of off-the-shelf, shrink-wrapped MS-DOS and WIN16 applications that will run Windows NT without modification on the DECpc AXP 150. So most people in your company can continue to depend on the programs they're most comfortable with. And they'll find the Windows NT Program Manager virtually identical in look and feel to its 3.1 counterpart.



imagine a developer partner who can get you through any rough spots.

The unknown. It's what excites rafters on a new river. It's what unnerves developers on a new operating system. When you develop applications for Windows NT on the DECpc AXP 150, you'll find that Digital's tools and developer training, along with the base work we did with Microsoft, remove a lot of the obstacles. In fact, moving WIN32 API applications to DECpc AXP platforms can be as simple as recompiling and relinking.



Hyperion™, network-based business information software from IMRS™, is one of many programs already ported to the Windows NT operating system on the DECpc AXP 150.

For Hamilton C Shell™ from Hamilton Laboratories, this took only 10 hours. Developing new WIN32 apps on DECpc AXP systems? You get Windows NT programming expertise for all aspects of development. More than just traditional documentation and reference

materials, there's a toll-free technical hotline, access to Alpha AXP™ migration centers worldwide and Windows NT training for developers. Beyond migration, there's marketing support, including special promotions and co-op opportunities with the world's premier supplier of Windows systems, services and solutions. At Digital, we've taken every step to make sure developing and porting apps on the world's most powerful PC, driven by the world's fastest chip, is a thrill, not a scare.

To find out how you can take advantage of Digital's Software Developer Program for Windows NT on Alpha AXP, please contact Digital via the Internet at alpha@aimhi.enet.dec.com, or call 1.800.332.4403.

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Power

DECpc AXP 150

DECchip™ 21064,
64-bit AXP RISC processor
running
at 150MHz

16 to 128MB Memory

512KB on-board Cache

EISA I/O local bus

245MB, 426MB or 1Gbyte
hard drive available

6 EISA slots,
5 storage bays

4.2GB maximum
internal storage,
29.4GB total storage

Imagine what you could do with the world's most powerful PCs.

You could give your end users the distributed power they need: Intel i486 notebooks for the sales force. Award-winning, low-profile i486 PCs and powerful Pentium PCs for the office staff. High-performance AXP systems for the folks in finance and sprinkled throughout the office as servers. You could have them all running Windows NT from day one. Or bring the powerful new operating system into your existing MS-DOS, UNIX and OpenVMS environment one department, or even one desk, at a time. And you could do it all with the only vendor that has the experience and expertise to meet your business needs by tying together any mix of platforms, operating systems, software and networking you choose to run.

At Digital, we understand that power without flexibility is never enough. We bring you Windows NT on systems ranging from low-cost 486s to a PC as powerful as the original $7.5 million CRAY-1supercomputer, and back it all with the world's largest Windows NT service organization. That's something.

Flexibility

Whether you need systems for simple word processing or complex graphics, databases and floating-point math, Digital offers the most complete line of PCs, designed to give you the best price/performance at every platform level.

i486 notebooks

upgradeable PC family

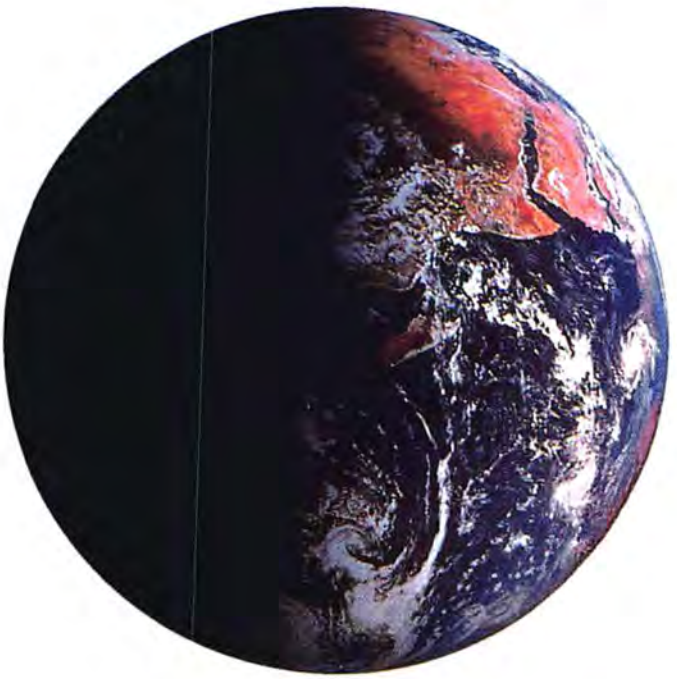
DECpc AXP 150

digital™

imagine the most powerful operating system for client/server computing, running on the world's most powerful PC.

Imagine Windows NT on the DECpc AXP 150.

And the world turning a little faster.



"The dream machines of the Windows NT world."
— *PC WEEK*, United States

"Product of the Year."
— *KapitalDATA*, Norway

"Alpha AXP is one of the most significant developments in terms of innovation, performance and price."
— *BYTE*, United States

"Credit for the most important product announcement of the past year has to go to Digital."
— *UnixWorld*, United States

For further information or if you have any questions, please call Digital at 1.800.722.9332. Please reference priority code BHE when you call.

PUTTING IMAGINATION TO WORK

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continued from page 178 feeling cramped in the lower 640K, and you're ready for a little book work, buy QEMM. Just remember: Even idiotproof memory managers such as MemMaker require patience to get the most out of them.

ANTIVIRUS PROGRAMS

One Deal, One for Real

Winner: Norton AntiVirus Antivirus programs are the sentinels at your PC's gate: They keep the software barbarians from entering your system and pillaging your hard disk. If you log onto BBS's, swap floppies with office mates, or even buy supposedly sealed software from retail and mail-order outlets, you need protection.

A capable virus checker isn't foolproof. There are thousands of known viruses, and dozens of new strains are created every week. But it can foil many intruders. DOS 6.0's Anti-Virus, *PC World* Best Buy Norton AntiVirus, and runner-up Virex for the PC ("Search and Destroy: Antivirus Software," May 1993) all provide basic protection and then some. They can detect viruses that infect executable files, hard disk boot sectors, and partition tables, and write-protect these areas from attack. These programs also fix or at least remove infected files and load memory-resident TSRs that actively scan for suspicious activity and prevent infected programs from running. In our tests, conducted with 13 common and uncommon viruses provided by the National Computer Security Association, all three virus checkers caught the lion's share of these software intruders (see "Antivirus Program Performance").

However, Norton AntiVirus didn't win May's Best Buy by accident. Its streamlined interface (a rarity among virus checkers) can be handled even by PC novices, and its virus detection and prevention are among the best. The program does things almost intuitively; for instance, it immediately offers to inoculate a suspect file it finds during a scan. Installation and setup are just as thorough and straightforward. Like any good virus checker, Norton scans your system's memory and drives before installing itself, then edits AUTOEXEC.BAT and CONFIG.SYS so memory and disk scanning are automatic every time you boot up. The program comes with both DOS and Windows user interfaces, making it easy to use in the environment of your choice (Norton Desktop for DOS and Norton Desktop for Windows each come with the appropriate single-interface version).

With DOS 6.0, however, you must crack open AUTOEXEC.BAT and CONFIG-.SYS and manually add references so that memory and disk scanning run at start-up. DOS does install its disk scanner onto the Windows desktop, but to receive messages from the TSR, you must add a command to WIN.INI or an icon to the StartUp group.

> Norton AntiVirus didn't win May's Best Buy by accident–the program does things almost intuitively.

Virex is even clunkier. You can install either Virex or VirexPro (a more thorough and configurable version), but not both. For some reason, Virex insists on nestling at the bottom of AUTOEXEC.BAT—curious, since an antivirus program should be the very first thing your system runs. Another quirk: When installation is complete, only the memory-resident virus monitor is referenced in your AUTOEXEC.BAT; you must add the disk scanner manually.

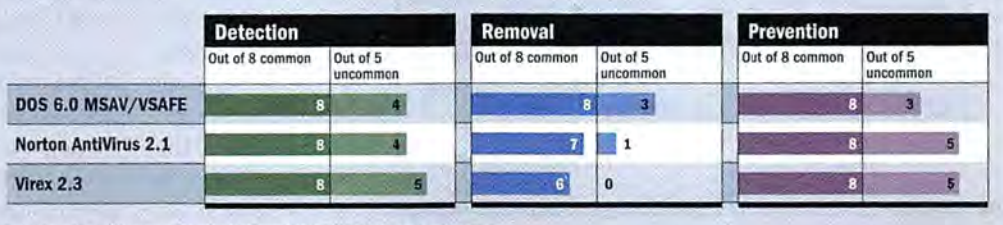
Configuring Norton is a snap—you just type **NAV** at the DOS prompt or click the Windows icon and pick the options off a few menus. DOS 6.0's Anti-Virus (which is based on Central Point's Anti-Virus) is even simpler, offering a few on-screen buttons that reveal a half-dozen check boxes. Virex is configured with a handy menu-driven shell, while VirexPro forces you to run the installation program again. Fine-tuning either program is complicated by an ambiguous and maddeningly repetitive manual. Key technical details, such as inoculating files or adding DOS-level switches, are explained fuzzily, and the manual isn't indexed—a sin no matter how slim the tome. But don't write off Virex yet; a new version that integrates both programs and fixes the manual should be released by the time you read this.

Compatibility is another key issue. Both DOS's and Norton's TSRs are easily loaded into upper memory via MemMaker, but Virex's is not (you can, however, manually use the LOADHIGH command to load Virex high). And since most virus experts strongly suggest you run two checkers to ensure system integrity, your second program should at least work with DOS's Anti-Virus. Norton's AntiVirus runs merrily with either DOS's Anti-Virus or Virex, but Virex and DOS's Anti-Virus together are like gasoline and matches.

When it comes to keeping your checker up-to-date, all three vendors offer good deals. If you've got a modem, you can download new virus definitions free from each company's BBS (Symantec and Datawatch also post updates on CompuServe and other on-line services). Monthly floppy updates from Norton cost $12 a month or $69 a year; Virex's annual subscription runs $50. Microsoft will provide two updates for

Antivirus Program Performance

DOS HOLDS ITS OWN: Although Norton is still the best antivirus weapon, DOS 6.0's Anti-Virus is effective at catching software intruders.



See "Search and Destroy: Antivirus Software" (May 1993) for test methodology.

$19; after that, support will come directly from Central Point Software.

But cheap updates do not a virus checker make. Although DOS's Anti-Virus is a solid contender, this is one area where I'm not inclined to skimp. Buy Norton. For starters, Norton detects over 1400 viruses, while Virex flags about 1300 and DOS about 1000. Second, Norton automatically scans memory and drives for viruses when installed, and completely edits AUTOEXEC.BAT, CONFIG.SYS, and SYSTEM.INI, while Virex and especially Anti-Virus do not. What's more, an antivirus program that ships with DOS is a big temptation for the antisocial types who write viruses; as one Microsoft insider admitted, "Adding a virus checker to DOS was like painting a big bull's-eye on our backs." So when you upgrade to DOS 6.0, go ahead and install Anti-Virus—then get the latest version of Norton AntiVirus and double your protection.

DISK BACKUP

Floppy Madness

Winner: Central Point Backup Backing up is no longer hard to do, thanks to Best Buy programs such as Norton Backup and Central Point Backup for DOS and Windows ("Backup Software," July 1992), which set the standard for both ease of use and copious features. DOS 6.0 follows in these Brobdingnagian footsteps with Microsoft Backup, a DOS and Windows tool that resembles a slim and trim Norton. My only reservations are that MSBackup doesn't support tape drives, a rather crucial omission in a world where 200MB drives are becoming the norm. Nor can it schedule backups—a useful feature for prodding lackadaisical workers.

But if you don't mind collecting floppies (and a lot of them; MSBackup requires a fresh disk for even incremental backups of just a few files), MSBackup is still a good deal—the equivalent of Norton Backup's basic mode. It doesn't offer the big-time goodies—superfast backup, multiple data compression techniques, configurable backup sets, or macros. But it's a meat-and-potatoes program that most users can probably use.

The simplest backup in the world is a full backup to tape, which Microsoft Backup doesn't support.

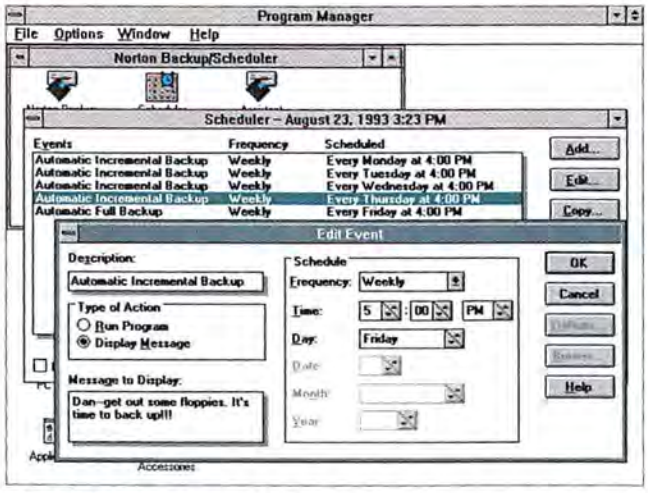
Installing Microsoft Backup in DOS or Windows is a breeze—you're prompted at every juncture, it does a quick backup and restore to verify system integrity, and that's it. Click the Backup button, select the mode (full, incremental, or differential), tag desired files in a directory tree, select Start Backup, and just pop in the floppies. As with Norton, you can verify and compress backup data, use error correction, and slap on password protection. The Windows version can also conduct backups in the background. A final advantage: If Norton Backup is your company's program of choice, MSBackup is a cheap way to spread Norton-like backup around the office while keeping support costs low.

But Norton Backup and Central Point's latest backup program (found in PC Tools 8.0a and PC Tools for Windows 1.0) offers a much wider range of features for power users and novices alike. The simplest backup in the world is a full backup to tape, which MSBackup doesn't support. And with the tools built into Norton and PC Tools, the office guru can easily create a one-click backup system that anyone can run. The program you choose is a matter of taste, because both offer very similar features, from tape drive support to unattended backups.

If you have your own way of doing things, you'll find Norton Backup more flexible than Gumby. You can create reusable setup files that tell Norton to back up only certain files and file types, such as worksheets. With a little work, you can even create a Windows icon that runs the whole show with a double-click. That's a backup system any novice can master. If you fill out a simple electronic schedule, Norton will remember to run a backup on a specific day or at regular intervals. What's more, DOS 6.0 MSBackup users who want this automation can move to Norton and find a familiar interface.

Central Point's edge? It matches Norton's features and tries just a little bit harder. For example, Central Point's facile directory tree has everything you need in one place. You can tag files, pop open a menu and exclude specific file types, reconfigure the windowpanes, split the screen to view files, and more. Central Point can also automatically scan backup files for viruses and back up NetWare bindery files (if you have a SCSI tape drive), and it even sports a friendly calendarlike scheduler.

In short, Central Point Backup is just a shade more intuitive and powerful, and it beats Norton by a hair.



NORTON BACKUP FOR WINDOWS: Scheduling an automatic backup is as easy as filling out an appointment book. A backup can be targeted for a specific day and time or for regular intervals.

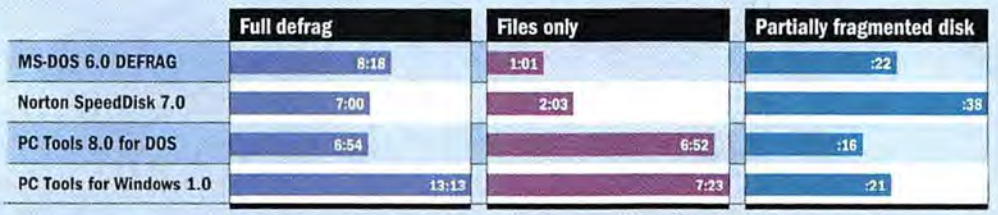
DISK DEFRAGGING

All You Need Is DOS

Winner: DOS 6.0 Defragging or optimizing a hard disk is a pretty straightforward affair. All the programs reviewed here suggest the best defragging approach, execute the chore quickly and efficiently, and include more than enough options (see "Defrag Time"). DOS 6.0's DEFRAG command, based on The Norton Utilities' SpeedDisk program, is the simplest of the lot, and the recommended buy. DEFRAG does all the basics: The full option defrags each file, puts all files at the front of the disk, and moves all free space to the back; a quick option just defrags each

Defrag Time

FOR DEFRAGGING, DOS IS ALL YOU NEED: DOS 6.0's DEFRAG program isn't a Swiss-army-knife optimizer like Norton's SpeedDisk, but it handles all the basics—and quickly.



Time in minutes: seconds

file; and there's the capability to sort files by date, size, extension, and so on while defragging them. If you haven't bought a disk defragger, don't—DEFRAG is enough.

Power users may want to consider The Norton Utilities 7.0's more capable and up-to-date SpeedDisk, or the Compress program found in PC Tools for DOS 8.0a and PC Tools for Windows 1.0, all Best Buys in last month's disk utilities roundup ("The Complete Hard Disk Toolkit"). DEFRAG's workspace is limited to conventional RAM, so it may have problems defragging drives over 300MB; SpeedDisk and Compress can tackle drives in the 1 to 2GB range.

Note that although the SpeedDisk found in the Norton Desktop series is similar to The Norton Utilities 7.0, the latter incorporates the latest technology, including compressed disk defragging. Symantec won't confirm whether or when this version of SpeedDisk will appear in a Desktop product.

Other Norton and PC Tools talents, such as moving selected directories or files to the front of the disk for faster loading, may look good on paper, but they do little to speed up your hard disk. You can't beat their superb disk repair tools, however, and they may come in handy if your optimization is interrupted by a power failure.

When it comes to the pull-out-the-plug test, all three programs flag the disk errors that result when an optimization is rudely interrupted. Norton and PC Tools fix the disk errors on the spot; DOS 6.0 lamely suggests you get your hands on a disk repair program—such as Norton or PC Tools.

But at $179, The Norton Utilities and PC Tools are overkill if all you need is a good defragger and your disk isn't huge. DOS 6.0 wins this round—for now.

By Any Other Name

If you already have DOS 5.0 and a garland of powerful add-ons such as Norton AntiVirus and QEMM-386, don't waste your money on DOS 6.0. But if you're two or three programs short and cash is tight, DOS 6.0 is a tempting solution. It's not a Best Buy; it's more like a Good Deal.

Just remember that although our informal tests showed DOS 6.0 to be relatively stable, compatible, and bug-free, complaints are coming in. Of course, not all the blame can be laid at Microsoft's feet. By their nature, disk compressors and memory managers push your operating system and hardware to the limit, and with the myriad BIOS, video, and software combinations, problems are bound to crop up.

But that doesn't let Microsoft off the hook. When confronted with DOS 6.0's faux pas, including growing complaints about DoubleSpace, the lack of disk repair or tape backup, and poor integration among the tools, the response is often a shrug and a "Well, we ran out of time." That's a weak excuse from a company with hundreds of millions of customers. DOS 6.0 is still a good deal, but think of it as training wheels until you're ready for the likes of Norton Backup, QEMM, and PC Tools.

Robert Luhn is a contributing editor for PC World.

For information about all the products featured in this article, please circle reader service no. 903.

WHERE TO BUY

386Max 6.03
List price: $99.95
Qualitas
301/907-6700
Reader service no. 606

MS-DOS 6.0
List price: $129.95
Microsoft Corp.
800/426-9400
Reader service no. 607

Norton AntiVirus 2.1

Norton Backup for DOS 2.2

Norton Backup for Windows 2.0

The Norton Utilities 7.0

Norton Desktop for DOS 1.0

Norton Desktop for Windows 2.2
List price: $129 (NAV); $149 (NBD); $149 (NBW); $179 (NU); $179 (NDD); $179 (NDW)
Symantec Corp.
800/441-7234, 408/252-3570
Reader service no. 608

PC Tools for DOS 8.0a

PC Tools for Windows 1.0

Central Point Backup for DOS

Central Point Backup for Windows
List price: $179.95 (Tools for DOS), $179.95 (Tools for Windows); $129 Central Point Backup (DOS or Windows)
Central Point Software
800/964-6896, 503/690-8090
Reader service no. 609

QEMM386 6.02
List price: $99.95
Quarterdeck Office Systems
800/354-3222, 310/392-9851
Reader service no. 610

Stacker 3.0
List price: $149
Stac Electronics
800/522-7822
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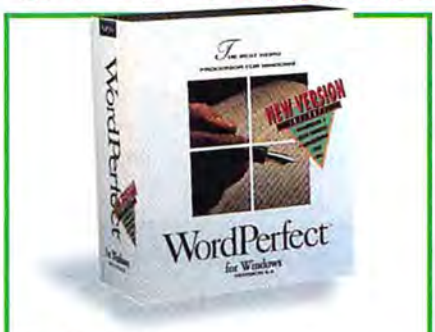

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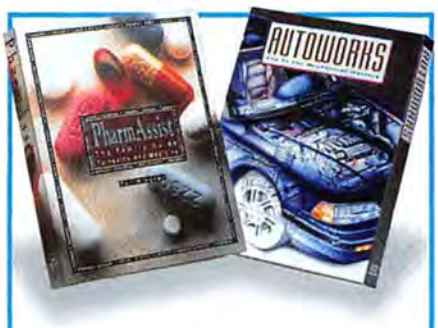

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25-MHz 486SL, 9.5" Passive Matrix Monochrome
STN Display, 4 MB expandable to 20 MB,
209 MB Hard Drive, 8K Cache, Compaq Trackball,
NiCD Battery, MS-DOS and Windows 3.1 ..... **$2199**

11415 Contura 4/25CX Model 209/w
25-MHz 486SL, 8.4" Active Matrix Color Display, 4 MB
expandable to 20 MB, 209 MB Hard Drive, 8K Cache,
Built-in EasyPoint Trackball, NiMH Battery, MS-DOS
and Windows 3.1 ..... **$3399**

COMPAQ HOTLINE

PC Connection® 800-998-0003

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COMPAQ

Contura '486

as low as $2199

Now Everyone Can Afford To Take 486SL Power On The Road.

Winner of *PC Laptop Computers Magazine* first-ever "Value Award", Contura notebook computers offer the most affordable way to take full-powered computing on the road. The 486 models listed here feature the energy-efficient 486SL processor which has an internal cache and integrated numeric coprocessor for full 486DX performance. And the new 4/25CX has a dazzling CRT-quality active-matrix color display with a built-in EasyPoint Trackball.

Contura Features:

- 3.5" 1.44 MB floppy drive
- NiMH Battery Pack (4/25CX) for 2-3 hours of life; Enhanced NiCd Battery Pack (4/25) for 3-4 hours of life
- MS-DOS and Windows 3.1
- Ports: parallel, serial, external VGA, external numeric keypad, external keyboard/mouse
- 8.9"D x 11.7"W x 2.1"H/6.7 lbs (4/25 CX)
- 8.9"D x 11.7"W x 1.9"H/6.2 lbs (4/25)

Pre-Installed Software!

Purchase any of the following programs with your Compaq and we'll load them at no extra charge! And, while we're at it, we'll even install and de-compress Windows—saving you a good chunk of valuable time. Your machine will arrive totally ready to run.

Microsoft

8326	MS Access for Windows	$99.
7811	MS Word for Windows	299.
5680	MS Excel for Windows	299.
8423	MS PowerPoint	299.
2735	MS Works for Windows	129.
8138	MS Office for Windows	449.
4348	MS Works	95.

WordPerfect

3497	WordPerfect for Windows	279.
3795	WordPerfect for DOS	265.
7582	WordPerf. Presentations	279.

Borland

10710	Paradox for Windows	129.
10616	Quattro Pro for Windows	95.
11915	Office for Windows	395.

Lotus

12786	Organizer for Windows	79.
12740	1-2-3/Windows Rel .4	259.
12742	AmiPro for Windows	199.
12785	Freelance for Windows	289.
12788	SmartSuite for Windows	375.

Aldus

4247	PageMaker	499.

Delrina

10936	WinFax PRO 3.0	60.

Crosstalk

5611	Crosstalk for Windows	119.

Symantec

2360	Norton Desktop/Windows	115.

Application Techniques

10950 WinDings – *free with any other pre-installed software listed above.*

Contura 4/25CX Color (Active Matrix)

8.4" screen; 256 colors in 640 x 480
25-MHz 486SL; 4MB expandable to 20 MB

11415 **Model 209/w** 209 MB Hard Drive, 8K Cache, Built-in EasyPoint Trackball, NiMH Battery **$3399**

Contura 4/25 Monochrome

9.5" screen, 16 Gray Scales at 640 x 480
25-MHz 486SL; 4MB expandable to 20 MB

11420 **Model 209/w** 209 MB Hard Drive, 8K Cache, Compaq Trackball, NiCD Battery **$2199**

Additional Hardware/Accessories*

No additional charge for installation (where required)

1073	Colorado Trakker 250 Tape Backup (parallel)	429
12357	Kingston 4MB memory upgrade	199
12356	Kingston 8MB memory upgrade	369
10517	Megahertz 2400 data, 9600 S/R fax (int.)	215
10518	Megahertz 9600 data, 9600 S/R fax (int.)	479
10515	Megahertz 14,400 data, 14,400 S/R fax (int.)	499
10648	Compaq NiMH battery	121
10647	Compaq NiCd battery	84
10642	Compaq Auto adapter	112
10646	Compaq External FastCharger	93
10650	Compaq Slipcase	14
7060	Kensington MicroSaver (security device)	39

Note: All Compaq hardware options (drives, modems, etc.) are also available from us. Call for more information.

**We'll install and test the additional hardware or software listed here at no extra charge. And, if you order your customized Compaq any weekday by 10 p.m. ET, we'll still ship it for next-day delivery. With, of course, those same old delicious caveats: Continental U.S. only. Includes Saturday delivery in many locations. Remote locations may require an extra day.*

COMPAQ

ProLinea '486

as low as $1099

(monitor not included)

The prices are way down. The speed is way up!

All ProLineas now feature local bus graphics so they're two to five times faster (equivalent to the Dell ME line) *at a better price than ever!* These desktop PCs come complete with **MS-DOS** and **Windows 3.1** ready to run, and we'll install and test any of the "Additional Hardware" listed below or the software on the opposite page at no extra charge. Order your customized Compaq any weekday by 10 p.m. and we'll still ship it for next-day delivery for only $5.*

ProLinea Features:

- Local bus 1024 x 768 video with 1 MB VRAM/256 colors
- The 4/33 is upgradable using OverDrive or VersaChip processors.
- 3.5" 1.44 MB floppy drive
- 101-key keyboard and mouse
- Three 16-bit ISA expansion slots
- 145-watt power supply
- Two serial and one parallel port
- Compact footprint: 15.9"W x 15.1"D x 4.0"H

Monitors

11899	Compaq SVGA 14" Color Monitor	$349
10844	Samsung Sync Master 15" Color Monitor	499
10063	Mag Innovision MX15 15" Color Monitor	599
4249	NEC 4FG 15" Color Monitor	799
10694	Compaq QVision 17" Color Monitor	1146

Additional Hardware

Installed and tested at no extra charge

4194	Colorado Jumbo 120 Tape Backup	$149
4354	Colorado Jumbo 250 Tape Backup	215
10941	Practical Peripherals 2400 data, 9600 S/R internal fax/modem	95
10942	Practical Peripherals 14,400 data, 9600 S/R internal fax/modem	199
6502	Iomega Bernoulli Insider 90 MB PRO	579
6951	Teac 1.2 MB Floppy Drive	59
10744	Kingston 4 MB memory upgrade	179
10743	Kingston 8 MB memory upgrade	395

Note: All Compaq hardware options (drives, modems, etc.) are also available from us. Call for more information.

ProLinea 4/25s

25-MHz 486SX; 4 MB expandable to 32 MB

12166	**Model 120/w** 120 MB Hard Drive	$1099
9549	Model 240/w 240 MB Hard Drive	1299
12168	Model 340/w 340 MB Hard Drive	1449
6418	Intel Overdrive 486SX-25	469

ProLinea 4/33

33-MHz 486DX; 4 MB expandable to 32 MB

12172	**Model 240/w** 240 MB Hard Drive	$1659
12164	Model 340/w 340 MB Hard Drive	1799
8943	Intel Overdrive 486DX-33	599

ProLinea 4/50

50-MHz 486DX2; 4 MB expandable to 32 MB

10893	**Model 240/w** 240 MB Hard Drive	$1899
10894	Model 240/w+ 240 MB Hard Drive, PFS WindowWorks, 5 1/4" Drive, Modem (2400 data, 9600/4800 S/R fax), Prodigy	1999

ProLinea 4/66

66-MHz 486DX2; 4 MB expandable to 32 MB

12176	**Model 340/w+** 340 MB Hard Drive, PFS WindowWorks, 5 1/4" Drive, Modem (2400 data, 9600/4800 S/R fax), Prodigy	$2299

We have DESKPRO Models too!

12174	DESKPRO 4/33i Model 240/n: 33-MHz 486DX, 240 MB Hard Drive, DOS, Windows 3.1, Mouse, Ethernet NIC	$2079
12157	DESKPRO 4/66i Model 340/w: 66-MHz 486DX2, 340 MB Hard Drive, DOS, Windows 3.1, Mouse	2499
11646	DESKPRO 4/66M Model 510/w: 66-MHz 486DX2, 510 MB Hard Drive, DOS, Windows 3.1, Mouse, QVision Video, Business Audio	3649

**Here's that fine print again: Continental U.S. only. Includes Saturday delivery in many locations. Remote locations may require an extra day.*

BILL WESTHEIMER

Are PIMs Ready for Prime Time?

WINDOWS PERSONAL INFORMATION MANAGERS

PROMISE TO ORGANIZE YOUR BUSINESS LIFE. IMPOSSIBLE?

WE REVIEW NINE PACKAGES TO SEE IF ANY FINALLY

DESERVE A PLACE ON EVERY DESKTOP.

You wouldn't dream of writing a report on a typewriter. And if you assembled a budget proposal using an adding machine and ledger paper, your officemates would probably put you in a padded room and take away all the sharp objects.

Yet it's a safe bet that you keep all your important phone numbers in a Rolodex and your schedule in a datebook or on a wall calendar. And when you really need to remember something, you stick a Post-it note on the closest available surface—probably your computer screen. And you wonder why it takes so long to get your work done.

While word processors and spreadsheets have made crunching words and numbers easier than ever, another genre of software, personal information managers (PIMs), has taken on all the other niggling details of your average business day. If the examples we've seen lately are any indication, PIMs could soon become as essential to your working life as your word processor and spreadsheet.

Exactly what is a PIM? While no two are exactly alike, any PIM worthy of the name should have four basic components: a database to hold names and addresses, a calendar for appointments, a to-do list to keep track of your projects, and some kind of word processor or notepad. The best PIMs also help you tie all this information together—linking, say, a name in your address book to an appointment in your calendar, and attaching notes and data files you'll want to review before a meeting.

PIMs today are both easier and more powerful than

BY DANIEL TYNAN

ever. The biggest reason for the change—and stop us if you've heard this one before—is Windows. Windows PIMs have several advantages over their character-based DOS counterparts:

- The graphical interface, which can be made to imitate familiar items such as Rolodex cards or appointment books, makes Windows PIMs much simpler to learn.
- The Windows interface can help make the PIM more customizable, so it can be made to fit the way you want to organize your work space.
- Multitasking makes it easy to use your PIM while juggling spreadsheets, word processor, and E-mail.
- Windows' ability to link data from application to application makes PIMs much more powerful than they could be under DOS.

Picking the Perfect PIM

To find out which Windows PIMs are best, we picked nine of the top products—including a prerelease copy of Arabesque's Ecco—and put them through a workout re-creating all the things you'd do with a PIM in the course of a typical overstuffed business day. Our product list ranged from straightforward PIMs like Lotus Organizer to full-fledged contact managers such as Act and Maximizer. (Contact managers typically require you to tie every bit of information to a name in the address book.)

Of course, we weren't able to look at every PIM that will be available by the time you read this. For example, two new products from Symantec and Parsons Technology weren't available for review. The eagerly anticipated PackRat 5.0 was available to us only in a beta version; for our initial impressions, see "Do the Rat Thing."

The Windows Advantage

We're suckers for a graphical interface. Most of these programs use some kind of familiar visual metaphor, such as a Rolodex, an index card, or an appointment book. Some programs take fuller advantage of Windows than others, using iconized tool bars and exploiting drag-and-drop. As for customizing the interface by redefining buttons and tool bars, Commence and Ecco are the most malleable.

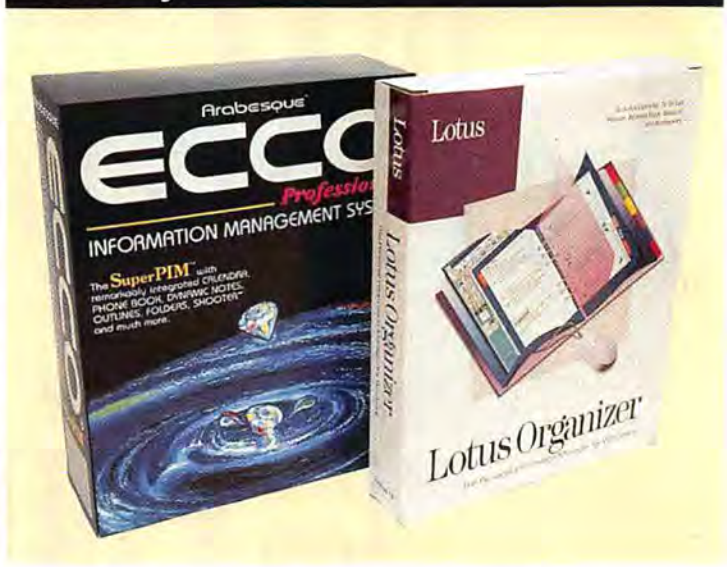
We also like programs that take advantage of Windows' ability to link different applications. Both Lotus Organizer (cc:Mail) and Ecco (Microsoft Mail, cc:Mail) will check your E-mail in-boxes and alert you to any new messages; Ascend plans to support E-mail in an upcoming release. Several of these programs let you link their address books to Windows word processors for easy mail merging. Ecco's Shooter utility, however, is the ultimate in linking information from your PIM to all your other Windows apps. For ease of use, Lotus Organizer was the obvious choice.

Addressing for Success

You may already keep your contact information in a database or even a simple text file, which is why all PIMs let you import data from one or more common file formats. Good PIMs let you map your data file's field names to theirs and even add new fields.

No electronic address book would be complete without an auto-dialer and a phone log. The best auto-dialers let you specify dialing prefixes and suffixes for long-distance carriers and credit card calls. The phone log should record the time and date of both outgoing and incoming calls and let you take notes as you gab. For handling phone book data, Act for Windows and Ecco Professional are best, with DeskTop Set for Windows a close second.

Best Buys



Well-Appointed Scheduling

Quick—what does your schedule look like next month? If you were using a PIM, you could view or print a monthly calendar faster than you could find your datebook. These electronic calendars also let you see your schedule in daily, weekly, monthly, or even yearly views; set alarms to remind you of appointments; and find blocks of free time quickly.

All PIMs allow you to set recurring appointments (such as a staff meeting every Monday at 2 p.m.). Most also let you set more complex *conditional* recurring appointments, such as on the third Tuesday of each month. A PIM should be alert to scheduling conflicts, especially with recurring appointments, since you usually set those up without looking at the days in question. It should also let you know if you missed any alarms while your PC was turned off. Finally, a few PIMs let you do group scheduling by accessing other users' calendars across the network (as long as you're all using the same PIM, of course).

For our money, no PIM does a better job of scheduling than Ecco, though Above & Beyond is also quite good.

Much Ado About Noting

Anyone with a pen, a piece of paper, and two brain cells to rub together can create a to-do list. But reorganizing that list in order of priority or by due date gets a mite trickier. PIMs excel at this brand of task juggling. While all of these PIMs let you sort your to-do list

PIMs today are both easier and more powerful than ever. The biggest reason for the change is Windows. Windows PIMs have several advantages over their character-based DOS counterparts.

PIMs come in two basic flavors: easy to use and powerful. That's why we picked two Best Buys. For our money, the best easy-to-use PIM is Lotus Organizer—it looks just like an appointment book and is just as easy to use. It will get you up and running in no time. If you want more power (and have the time to learn to use the program), Arabesque's new Ecco is your best bet. Using its powerful outlining tools, you can organize any information you want—appointments, names and addresses, to-do's—any way you want.

by due date, we prefer those that also let you sort by project, priority, and completion status. Among the PIMs we looked at, the ablest task masters are Commence and Ascend.

In addition to to-do functions, most PIMs let you take notes and produce simple output using their notepads. The top built-in notepads are found in contact managers such as Act and Maximizer.

You also want a PIM to be portable. Products such as Act and Maximizer make it easy to keep their associated data files consistent on your notebook and desktop machines. If you use a datebook such as the Day Runner, FiloFax, or Franklin Day Planner, you'll want a PIM that lets you choose those formats as options on the print setup menu. When it comes to printing, DeskTop Set and Lotus Organizer are the best PIMs here.

PIM and Proper

Is there such a thing as the perfect Windows PIM? Not yet. If you could combine Lotus Organizer's ease of use and Ecco's power with the reporting talents of Act or Maximizer, the scheduling smarts of Above & Beyond, the extensive feature set of DeskTop Set, and the interconnectivity of Commence, then maybe you'd have something approaching perfection.

Two programs come closer to the ideal than the others. For a simple, quick solution to your contact and scheduling needs, buy Lotus Organizer. Even if you've never cracked open a Day Runner, let alone a PIM, you'll find this $149 program remarkably easy to use. If you're in the market for something meatier, try Ecco. Though it requires some learning time, Arabesque's groundbreaking outliner/address book/scheduler gives you unprecedented power for sharing information across applications. For truly powerful personal data management, there's nothing better.

Contact Software's Act for Windows is a solid third-place finisher, particularly for salespeople and executives whose jobs consist mainly of staying in touch with others. But project- or appointment-oriented managers may find it too contact centered to be useful. You should also keep an eye out for PackRat 5.0. Once it's in shipping shape, it may well give our Best Buys a run for your money.

As our two Best Buys prove, there's no longer any excuse for doing things the old-fashioned way. Your most important information is your personal information—and a personal information manager on a personal computer is the perfect tool for managing it.

Daniel Tynan is a contributing editor for PC World. *He can be reached on PC World Online (see page 12 for more information).*

For more information about all products in this article, circle reader service no. 902.

Above & Beyond for Windows 2.1

PROS: Excellent scheduling skills
CONS: Limited address book, phone accessories, and notepad, poor interface

Above & Beyond made a name for itself with its scheduling flair and stylish accessories. These days, however, this $149 package is surpassed by newer rivals like Ecco and Lotus Organizer.

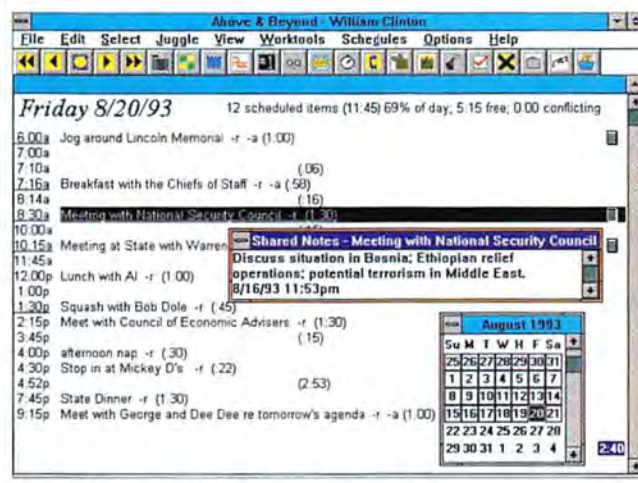
Above & Beyond still knows its way around a calendar. Double-clicking on the blank daily view calls up a dialog box where you can fill in an event description, add notes, set an alarm, and create virtually any kind of recurring appointment you could imagine. Don't like your new appointment time? Drag the meeting to a new slot or let Above & Beyond juggle it earlier or later in the day or the week.

Above & Beyond is the only program we looked at that tells you how much free time you have between appointments and what percentage of your day is filled with meetings. The program's built-in group scheduler lets you search for free time on all active users' calendars. And a unique timer module lets you associate a dollar figure to each minute or hour so you can keep track of how much that phone call is going to cost, or how much to bill a client for the time spent working on a project.

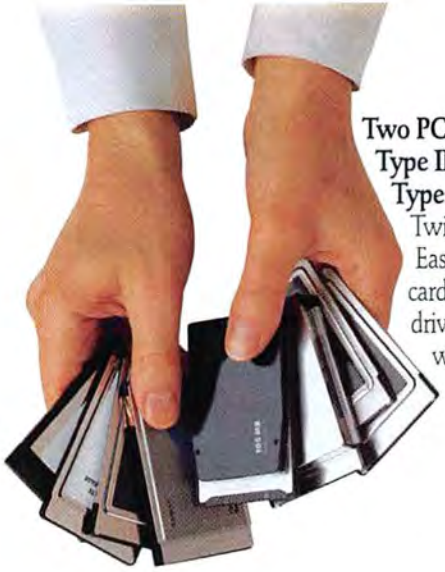
Unfortunately, Above & Beyond falls below and behind in other categories. The address book is a slightly enhanced version of Windows' Cardfile with straight text input—there are no data fields, and thus no way to sort or filter records except by name. It offers virtually no phone skills beyond a rudimentary auto-dialer. Call up the notepad in Above & Beyond and you get Windows' Notepad; the program provides no links to full-fledged word processors and no mail merge capabilities. Finally, it doesn't have any predefined appointment book formats for printing.

Above & Beyond is also in dire need of an interface-lift. It uses text characters like -a and -r to mark alarms and recurring appointments, and its pulldown menus—some of which stretch from the top of the screen to the bottom—are downright scary. If you need a low-cost scheduler for you or your work group, Above & Beyond is a powerful, if unexciting, solution. But if you want a full-featured PIM, it won't win you over.

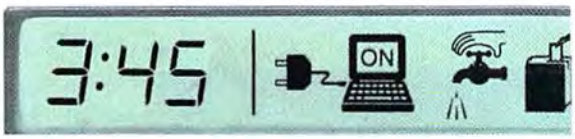
1Soft Corp., 800/326-4391, 707/987-0256. **Reader service no. 729**



ABOVE & BEYOND PACKS PLENTY of scheduling power, but its drab interface is the least graphical of the lot.



Two PCMCIA 2.0 Slots, Type II (5mm) and Type "IV" (16mm): Twice the expandability. Easily accepts multiple cards including hard disk drives, modems and network adapters.



LCD Status Bar: Delivers an instant read of the battery life remaining, power-saving mode, and a host of other key notebook settings.

Blazing 33MHz i486™SL: With built-in coprocessor support, delivers the ultimate in notebook processing power.

Some say the T4600 is Because in life, there

T4600C
- 9.5" color active matrix TFT-LCD screen
- 120/200/320MB HDD
- 6.9 lbs.
- NiMH battery

T4600
- 9.5" high-contrast, black and white LCD screen
- 120/200MB HDD
- 6.4 lbs.
- NiCd battery

BOTH MODELS
- Intel 486SL/ 33MHz, 3.3 volt processor with 8K cache
- 4MB RAM expandable to 20MB
- Type II (5mm) and Type "IV" (16mm) PCMCIA slots
- BallPoint™ mouse w/QuickPort™
- Toshiba MaxTime™ Power Management system, and extensive 3.3v components provide industry-leading battery life.
- Pre-installed software: DOS 6.0, Windows® 3.1, and UltraFont™.

intel inside

Large 9.5" Color Active Matrix TFT-LCD Screen: This exceptional technology delivers spectacular color for vivid graphics and dazzling presentations.

BallPoint™ Mouse with QuickPort™: Attaches easily, without messy cords, for ergonomically ideal input—perfect for Windows® applications.

Replace Your Desktop: Just snap your notebook into the Desk Station IV, and you're instantly connected to your printer, VGA monitor, mouse, and full-size keyboard. Now you only need one computer.

better than life itself. is compromise.

Introducing the T4600 Series. Make no compromise.

Get the awesome power of a 33MHz i486™SL processor, and don't sacrifice battery life. Add a 9.5" color active matrix TFT-LCD screen, and access all 185,193 eye-popping VGA colors. Pack a massive 320MB hard drive and never have to leave a file at home. Get your hands on the BallPoint™ mouse, snap it into its QuickPort™, and never waste a moment or a motion.

Carry two slots for industry-standard PCMCIA cards—including one large enough for the new generation of removable hard drives—and take the next big step in peripherals. Glance at the QuickRead LCD status icon bar for an instant read of battery life, power management, keyboard settings, and more. This is no time for compromise. This is the time to get your hands on the T4600 Series.

For a dealer near you, call 1 (800) 457-7777.

In Touch with Tomorrow

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Circle 228 on reader service card

Act for Windows 1.1

PROS: Strong contact history, excellent mail merge/word processor
CONS: Awkward scheduling

If you need to enforce order on your daily chores, Contact Software's Act for Windows will do it. But whether this $395 contact manager is a good fit for you depends largely on how much time you spend meeting with or talking to people.

In keeping with its contact orientation, Act's address book is like a massive Rolodex, with more than 70 pieces of information on each card, including your latest call or meeting with each person. You can define up to 15 custom fields per record and create pop-up lists of possible entries. Once your data is entered, you can perform sophisticated searches and save your search criteria.

An icon tool bar gives you access to a variety of powerful features. Clicking on the letter tool, for example, brings up a letter template with the name and address of the currently selected person in place. Yet another icon calls up an activities list with this contact.

Act really sweats the details of staying in touch with people. Make a phone call? Act will ask if you reached the person and prompt you to schedule a follow-up call. Print a letter? Act will ask if it was an intermediate draft or a final copy, then prompt you to print an envelope. Each activity goes directly into the contact's history log automatically.

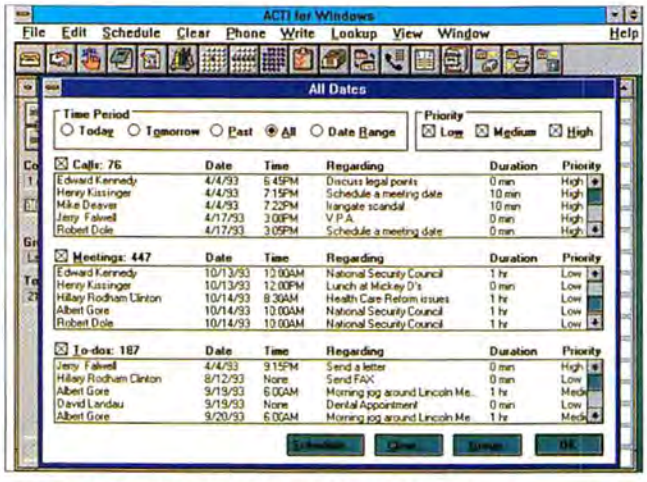
Act is also a fine traveling companion. You can download records to a notebook and merge them with existing records on your return, or write letters and print them later. And you can swap information with a miniature version of Act that runs on HP's hand-held 95LX.

Unfortunately, Act's scheduling talents are only so-so. You have to tie everything you do in Act to a contact. Keeping track of personal chores, for example, means setting up meetings or tasks with yourself, which may take some getting used to.

Act is ideal for people whose jobs are contact heavy and who need detailed, thorough histories of each transaction. If your job is more task or project oriented, however, you may find Act's insistence on contacts a little overbearing.

Contact Software Int'l, 800/365-0606, 214/919-9500.

Reader service no. 730



ACT FOR WINDOWS GIVES YOU THE LOWDOWN on all calls, meetings, and tasks with each contact.

ASCEND'S TASK MANAGER IS FIRST-RATE, but its scheduler leaves plenty of room for improvement.

Ascend for Windows 4.0

PROS: Attractive interface, extensive task lists and reporting
CONS: Scheduler module is unusable

Ascend is more than a software package, it's a way of life. Along with the $199.95 program, you get a complete organizer/binder with three years' worth of blank schedules and audiotapes of a Franklin Institute time management seminar—not terribly surprising since Ascend is the software companion to the Franklin Day Planner.

Ascend can help you articulate your basic values, formulate long-term goals, and then structure your daily life to attain those goals. Thanks to its goal orientation, Ascend boasts some of the best to-do tools of any of the PIMs here. You can create up to five master task lists and a prioritized daily list and set the program to shuffle tasks between them after a certain amount of time.

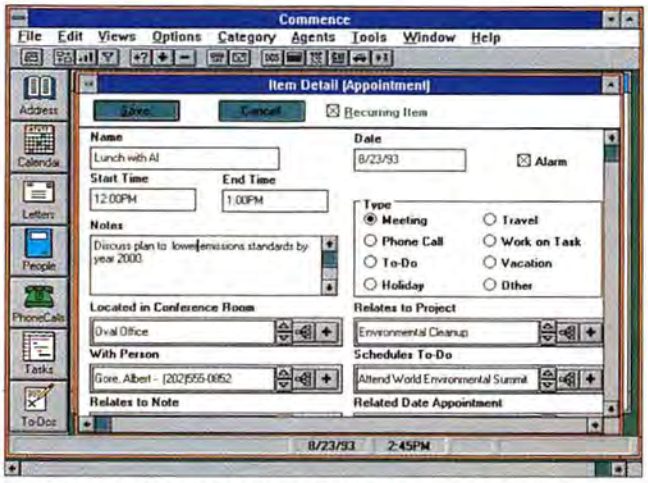
The letter-tabbed address book is also handy. The data entry form holds dozens of fields of data and a built-in notepad. Once your names and addresses are entered, Ascend sorts them by individual and company names automatically. If you enter a record for a new contact at a company already in the database, Ascend fills in the address, phone number, and other essentials automatically.

Ascend's calendar, on the other hand, is less appealing. While you can type directly into time slots on the appointment schedule, descriptions are limited to 30 characters each. To set meeting durations, you must either specify a number of 15-minute "blocks" or drag the mouse along a time bar in the weekly view.

Setting recurring appointments is also a hassle. You can't customize default settings for durations, dates, or times, so you have to set up each new recurring appointment from scratch. And the daily calendar displays only recurring appointments or checks for conflicts up to 30 days in advance.

Ascend has some features you won't find in other PIMs; in keeping with the self-improvement theme, it has tools for storing favorite quotations and positive affirmations about your overall values, both of which can be set to display at start-up. If you're ready to change your life, Ascend is definitely the PIM for you. Otherwise, you're better off choosing a PIM with better scheduling.

Franklin Quest, 800/877-1814, 801/975-9992. **Reader service no. 731**



COMMENCE HELPS MAKE THE CONNECTIONS among meetings, people, projects, and more.

Commence 1.0

PROS: Excellent linking between items, tracks resources
CONS: Bare-bones interface, difficult to master

In a former life, Commence was IBM's Current. The $395 package's pedigree is obvious: Its buttoned-down look screams Big Blue. The address book is unadorned, and the daily calendar is a bare-bones list of times and dates—Commence's interface is the software equivalent of a white shirt and black wingtips.

While Commence may not look very interesting, it's certainly powerful. The package's greatest strength is its ability to make connections between different pieces of information. When you enter an event in the calendar, for example, fields inside the appointment dialog box let you link it to other people, appointments, projects, to-do items, and conference rooms. You can select from a list of existing contacts or projects or add new ones on the fly. Each new item can also be linked to other items. This is the only package that lets you factor in travel times for appointments; Commence also boasts sophisticated search and reporting capabilities.

All this power comes at a price: To get the most out of Commence, you'll have to learn to think its way. A prime example of this is Commence's "agents." These macrolike routines perform a task when certain conditions are met—for example, you can create an agent to print your next day's to-do list each afternoon at 4:30. However, uncovering these agents' secrets is no trivial task, and the program's obtuse on-line help system doesn't make the process any easier.

Unfortunately, some of the basic functionality you want from a PIM—such as the ability to notify you of passed alarms at start-up—is available only through these agents. Other features, such as a speed-dial list, a weekly view of appointment details, and predefined printing formats for common appointment books, aren't available at all. Also, the program hasn't taken full advantage of Windows, so you won't find any drag-and-drop scheduling or dialing.

Commence could well be irresistible for corporate users once it adds group scheduling (due in version 2.0) to its resource tracking and interconnectivity features. In the meantime, version 1.0 is a good, if thorny, start.

Jensen-Jones, 800/289-1548, 908/530-4666. **Reader service no. 732**

DeskTop Set for Windows 4.0

PROS: Customizable address forms, great printing options, phonetic searches, excellent phone accessories, highly portable
CONS: Inconsistent interface, poor integration between modules, no conflict checking

Working in DeskTop Set 4.0 is like preparing a gourmet meal in the kitchen of a brilliant but eccentric chef. While the $89 program is well stocked with clever features, its idiosyncrasies may make it hard for new users to get cooking.

Because DeskTop Set's free-form daily calendar looks like a blank piece of notebook paper, you can enter appointments anywhere on the page. That means it's easy to see all of your schedule at once. However, DeskTop Set won't sort your schedule unless you tell it to, and it offers no conflict checking.

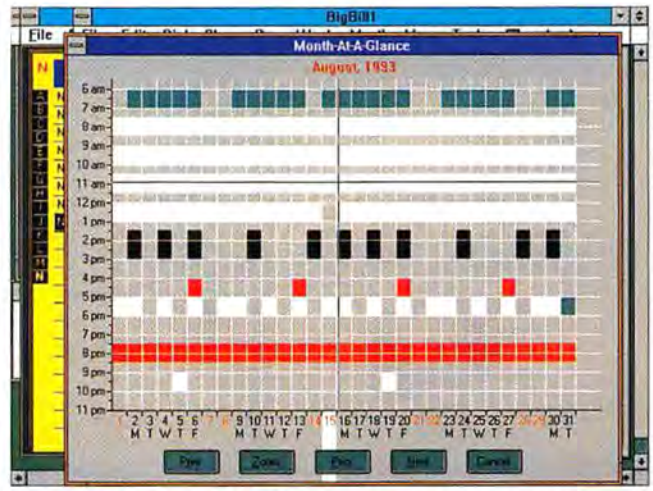
DeskTop Set's highly mousable interface lets you schedule appointments without typing. You can drag a name from the address book to the calendar—up pops a dialog box where you can choose start and end times by clicking on a time bar, set an alarm by clicking on a clock face, and even choose an event description (such as "Business meeting") from a scrollable list.

DeskTop Set's phone book also provides plenty of ways to slice and dice your data, with 58 fields per record. You can then add up to 32 custom fields and 128 keywords per record and use them to sort and search the database. And DeskTop Set is great at whipping up schedules to go, producing attractive printouts in a variety of formats and downloading data to hand-held devices like the Sharp Wizard and HP 95LX.

However, these sweet features are soured somewhat by DeskTop Set's inconsistencies. For example, you can link files to phone book entries and to-do items but not to appointments. Even worse, commands sometimes vary from one module to the next. All of this is guaranteed to send you running for Help (which, inexplicably, is hidden under the File menu).

If portability is your cup of consommé, and you're willing to put in the time, you may develop a taste for DeskTop's idiosyncrasies. Otherwise, it's a case of a few too many quirks spoiling the broth.

Okna, 201/909-8600. **Reader service no. 733**



DESKTOP SET'S MONTHLY TIME LINE gives you a 30-day forecast of your schedule. To view meeting details, just click on a time slot.

Ecco Professional 1.0

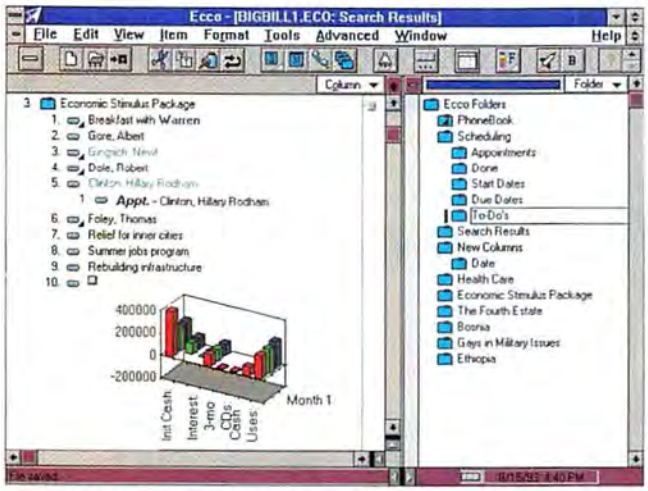
PROS: Powerful outliner, good search capabilities, shares data between Windows apps
CONS: Difficult to master

Arabesque's $395 Ecco gives you the world in an outline, and we were so impressed with this powerful approach to information management that we awarded it a Best Buy.

Because everything in Ecco is an outline, you can store tons of information inside any of the modules and then expand or collapse them with a click of the mouse. Take, for example, Ecco's phone book. In addition to the usual letter-tabbed list of names and numbers, you can expand the view into a table with up to 50 columns for addresses, alternative phone numbers, and any other categories you want to add. You can also add information below each person's name—text notes, file names, spreadsheet data, even graphics—and tuck it away until you need it.

To create an appointment, simply select a name in the address book and drag it over to the calendar with the mouse. Ecco attaches a record of the meeting beneath the person's phone book entry automatically. (You can also create appointments by typing directly on the calendar, but Ecco won't link it to the contact.) A pop-up dialog box lets you adjust the time or date, set a multitude of alarms, create recurring appointments, add the item to your to-do list, and more. As with the phone book, you can add notes and other items beneath the appointment.

Ecco's third major component is folders. Folders let you organize data by project, person, or any other way you want. Simply drag items from the address book, calendar, or to-do list into a folder icon. The data doesn't actually move or copy from its original location; Ecco just gives you a different way of looking at it.



ECCO'S FOLDERS ARE PERFECT PLACES to stash all the information relating to a project—from meeting details to spreadsheet charts.

Do the Rat Thing

For years Polaris Software's PackRat has been one of the ablest Windows PIMs around—and one of the most aptly named. If a feature existed, PackRat had it stuffed away somewhere in its bag of tricks.

Unfortunately, all this power made the learning curve a tad slippery. PackRat 5.0 promises to change all that with a highly customizable interface that's also extremely powerful. Judging from the prerelease copy we looked at, it may well succeed.

The first time you fire up the new PackRat, you can choose from a list of more than a dozen professions—administrative, managerial, legal, medical, and so on. PackRat will then start up with the modules it thinks you need already loaded. Lawyers, for example, will see a five-day calendar, a contact list, and a phone book. A manager, on the other hand, will get an employee directory and a list of assignable to-do's. You can also choose to add or delete modules at start-up or customize the PIM later to your heart's content.

The key to PackRat's malleability is its folders. With version 5.0, folders are more than just places to store related bits of information—they can be custom work spaces. For example, you can store all your to-do's and contacts for each project in a separate folder. Or you can have your to-do list and Gantt chart in one folder, and your address book and speed-dial list in another. You can also run other Windows applications on top of a folder, or have each application iconized in every folder and call it up with a click. In essence, PackRat becomes a substitute for Windows' Program Manager.

PackRat's support for OLE data links gives you another way to use folders. You can link charts in one folder to master spreadsheets

You don't even have to be inside Ecco to use it, thanks to its Shooter utility. The Shooter icon plants itself in the title bar of every active Windows application and lets you copy data from other programs and "shoot" it directly into an Ecco module—as either a simple cut and paste or an Object Linking and Embedding (OLE) object with live data links. You can use Shooter to send data from Ecco to your apps, or even from one Windows program to another. Another nice touch: You get predefined templates for printing in several popular appointment book formats.

However, as with many high-end PIMs, power comes at a price. Though adding records and entering calendar events are fairly straightforward, taking full advantage of Ecco's power requires some careful study. Fortunately, the on-line help is superb, with plenty of screen shots, a handy hypertext glossary, and a slide-show tutorial.

In the case of Ecco, the extra work pays off. It may be the first PIM that truly manages personal information—which is why it earns our recommendation as a Best Buy.

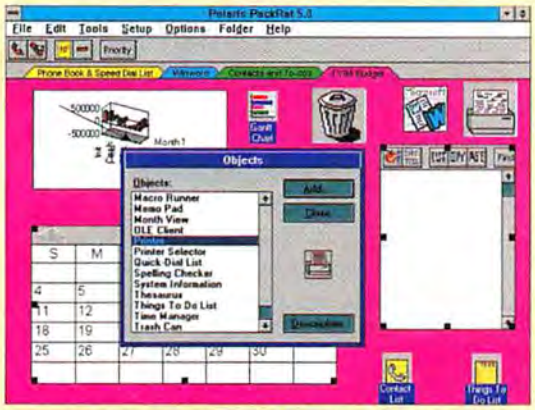
Arabesque Software, 800/457-4243, 206/869-9600. **Reader service no. 734**

Lotus Organizer 1.0

PROS: Gorgeous interface, easy linking, hooks to E-mail
CONS: Sparse, uncustomizable address book, won't allow overlapping appointments, no monthly view

Looking for a quick, painless cure for your personal info woes? Look no further than Lotus Organizer. This $149 Best Buy won't strain your brain or your budget—all it will do is make your life easier.

Organizer's interface looks just like what it's trying to imitate—a paper-based datebook. Colored tabs on the side of the book make it



PACKRAT 5.0 HAS CUSTOMIZABLE FOLDERS that will hold any of the program's many modules.

All of this functionality is supplemented by a slew of hot new features, such as hooks to popular E-mail packages, drag-and-drop printing, and support for hand-held computers.

Whether PackRat can balance all this power with the ease of use necessary to attract large numbers of users is hard to judge; fully functional copies of the program were not available at press time. But if PackRat delivers on its promise, it (along with Ecco and Organizer) could be the program that will finally make PIMs as necessary and popular as word processors and spreadsheets.

Polaris Software, 800/722-5728.

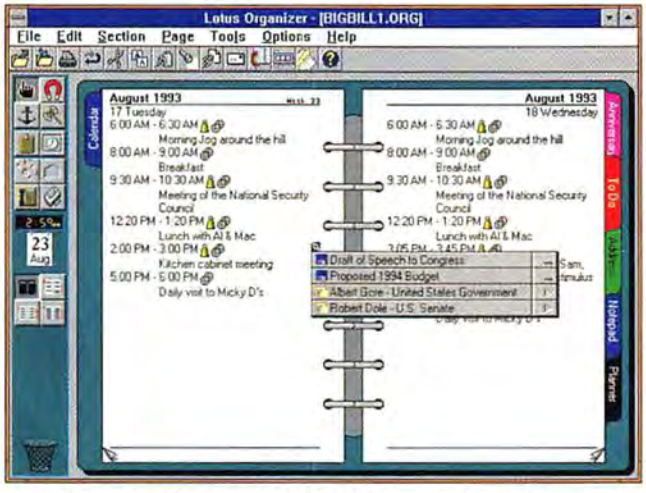
Reader service no. 738

on the network server. Every time you open the folder, the charts update with the latest information—turning PackRat from a PIM into an executive information system.

easy to jump among the program's address, calendar, to-do, notepad, anniversary, and year planner sections.

To create an appointment, open the calendar and click on a day. Up pops a dialog box where you can enter a description of the appointment and click icons to set alarms, make it a recurring event, mark it confidential, and even run another program at a specified time. You choose meeting times by sliding two clock faces up and down a time line. And to delete the appointment, just drag it over to the trash can, where it's consumed by an animated ball of flame.

Organizer has brains, too. When the program detects conflicts for recurring appointments, you can jump to the day of the conflict and tell it to find the next available time slot. This is the only PIM smart enough to warn us against scheduling recurring appointments on



GRAPHICALLY RICH LOTUS ORGANIZER lets you link appointments to address records, data files, and just about anything else.

nonexistent dates (such as the 30th of February). Not a major feature, exactly, but it indicates the thought that went into this product.

A clever set of iconized tools lets you link data between modules. The anchor tool creates links between items—such as an address record and an appointment, or a to-do item and an external data file. Clicking on the chain link in the corner of a linked item jumps you to the item it's linked to. Change your mind about the connection you've made? Use the ax tool to cut the link. Forget what an icon does? A click of the right mouse button calls up a cartoonlike bubble identifying each tool's purpose.

You can create live DDE links between Organizer's notepad and other Windows applications. You can import spreadsheets, text, graphics, and more to notebook pages, where they will be updated automatically as the original data changes. You can also set up a notepad page as a launching pad for other programs, which along with the program's link to cc:Mail could let you use Organizer as your main Windows interface. As for portability, this is the only PIM we found that can print in every major appointment book format as well as Rolodex cards and user-customizable formats.

If Organizer has a weakness, it's the address book. There's no way to customize the address form, which contains only three user-definable fields and no fields for city or state, making it difficult to sort your contacts by region. It also lacks monthly views and weekly time lines and won't let you set overlapping appointments.

However, these are relatively minor faults that we can live with easily. If you need to manipulate tons of data, you'll want something stronger. The next version of Organizer (due to ship by the time you read this) promises to include group scheduling, using cc:Mail as the connection. You won't find an easier way to bring order to the chaos of your professional life than Lotus Organizer, which is why it earns a Best Buy recommendation.

Lotus Development Corp., 800/635-6887, 617/577-8500.

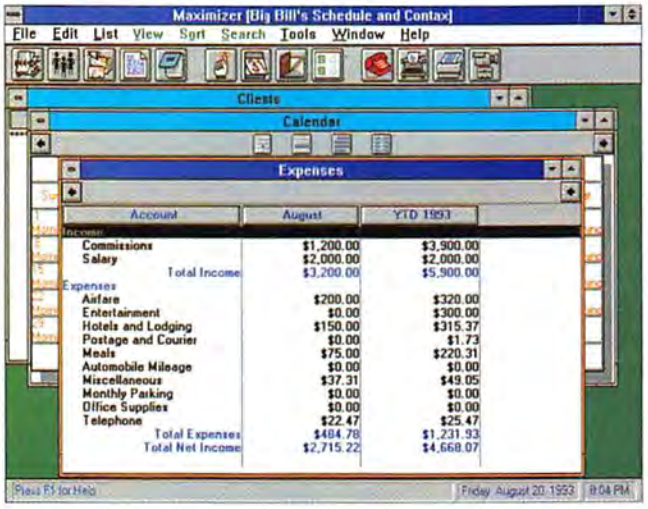
Reader service no. 735

Maximizer for Windows 1.1

PROS: Good reporting, simple expense tracker, built-in macro recorder, easy mail merge

CONS: Unfriendly interface, weak scheduling

Maximizer gives you the basics you need for managing contacts and creating reports, but as an all-around PIM, this $249 program is a bit of a hard sell. As with all contact managers, everything in Maximizer revolves around the phone book—which, in this case, consists of a table of names and numbers with other contact data displayed in customizable columns alongside it. You can create new fields when



MAXIMIZER'S HANDY EXPENSES MODULE makes it easy for traveling professionals to keep an eye on their accounts.

you import data or add them individually later, but there's no way to assign new fields to all of your existing records at once without using the program's macro facility.

The day calendar and to-do list look like the phone book but have slightly different columns. You can drag names from the phone book to the calendar or to-do list, or from the to-do list to the calendar. But there's no easy way to get a person's contact information from inside the calendar if, say, you need to reschedule a meeting. You have to find the name in the phone book or hunt through lists.

Maximizer is full of such extra steps. When you create an appointment, you always have to type in an end time—there's no way to set up a default duration. You can create simple recurring appointments—daily, weekly, and so on—but not on more complicated dates like the third Tuesday of each month. But if you set a recurring appointment, there's no way to change it other than by modifying each appointment individually.

Fortunately, Maximizer does a good job of keeping records and producing reports. Its expense reporting module is a snap to use and customize, providing cumulative monthly and yearly totals and day-by-day printouts. The Editor module is a mini–word processor, complete with formatting tools, and prefab mail merge documents for invoices and letters. Like Act, Maximizer lets you download your contact and schedule info to a notebook, make changes on the road, and then merge the changed records with the existing ones when you return to your desktop PC.

This portability makes Maximizer a good choice for traveling salespeople and executives. But for busy managers who need to keep track of their appointments as much as their contacts, hassling with Maximizer's calendar tools is too much work.

Richmond Technologies & Software Inc., 800/663-2030, 604/299-2121. **Reader service no. 736**

Like Act, Maximizer lets you download your contact and schedule info to a notebook, make changes on the road, and then merge the changed records with the existing ones when you return to your PC.

YourWay 3.2

PROS: Easy-to-use calendar, displays all tasks and appointments on one page
CONS: Limited conflict checking, limited links between modules

While many people may find the $99 YourWay a capable-enough PIM in most respects, we don't think it can match the ease of use of Lotus Organizer or the flexibility and strength of Ecco.

YourWay offers some of the best to-do-list tools in the roundup. There's a task list for long-term projects and a daily list for jobs that need to be done right away. To each item on the list, you can assign several levels of priority, due dates, categories (such as the name of a project or a client), and the person responsible for the task.

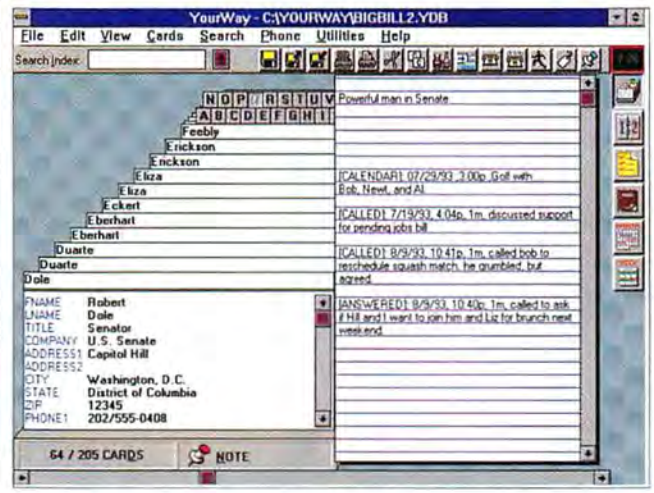
YourWay's address book is also well designed, if somewhat limited. It looks like a desktop business-card holder, with letter tabs across the tops of the cards. Each card contains data fields you can shuffle and customize and then sift using Boolean operators. Since the cards are fairly small, you'll be able to view only about ten fields at a time without scrolling.

The daily calendar page is split into separate lists of calls, events, and tasks. However, the crowded screen makes it hard to see more than a few hours of your schedule at a time. You can type directly into a time slot or call up a dialog box, where you can scroll down a list of predefined events and link one directly to an address record.

You can reschedule events by dragging and dropping, but the method is far from obvious—you first have to select the event, by holding down <Ctrl>, double-clicking on it, then clicking once more in the item's far left column. You can set up recurring events, and YourWay will search for conflicts automatically. But unlike Organizer, if you choose not to overwrite the existing appointment, YourWay doesn't give you the opportunity to reschedule your event at another time.

For some users, especially those who need to manage small projects, YourWay may be the right way. But if you are looking for the best PIM around, you would be better off buying either Lotus Organizer or Ecco.

Prisma Software, 800/437-2685, 319/266-7141. **Reader service no. 737**



YOURWAY'S CARDFILE ADDRESS BOOK logs calls and calendar events in notes attached to each record.

Windows PIMs: Calendar, Address Book, and More

● Yes n/a = not applicable
○ No

	Above & Beyond for Windows 2.1	Act for Windows 1.1	Ascend for Windows 4.0	Commence 1.0	DeskTop Set for Windows 4.0	BEST BUY Ecco Professional 1.0	BEST BUY Lotus Organizer 1.0	Maximizer for Windows 1.1	YourWay 3.2
Standard features									
List price	$149	$395	$199.95	$395	$89	$395	$149	$249	$99
Disk space required (MB)	0.7	2.5	2.5	6.0	2.0	4.0	3.0	3.0	2.0
Customizable tool bar	○	●	●	●	○	●	●	○	●
Built-in text editor	○	●	●	○	●	●[1]	●	●	●
Printing templates									
Day Runner	○	○	○	○[2]	●	●	●	○	●
FiloFax	○	○	○	○[2]	○	●	●	○	○
Franklin Day Planner	○	○	●	○[2]	○	●	●	○	●
Links to E-mail	○	○	○	○	○	●[3]	●[4]	○	○
Sorts to-do list by									
Due date	●	●	●	●	●	●	●	●	●
Priority	●	●	●	●	●	●	●	●	●
Project	○	○	●	●	○	●	○	●	●
Searches									
Query by example	○	●	○	○	○	○	●	○	○
Boolean operators	●	●	●	●	○	●	○	●	●
Keywords	○	●	●	○[2]	●	●	●	●	●
Across modules	●	○	●	○[2]	○	●	●	○	○
Calendar									
Reschedule event by dragging with mouse	●	●	●	○[2]	●	●	●	○	●
Schedule event by dragging name from address book	○	○	○	○	●	●	○	●	○
Conditional recurring events	●	○	●	○	●	●	●	○	●
Conflict checking	●	●	●	●	○	●	●	●	●
Notify passed alarms at boot-up	●	●	○	●	●	●	○	●	○
Monthly view	●	●	●[5]	●[5, 6]	●	●	○	●	●
Yearly view	○	○	○	○[2]	●	○	●	○	○
Group scheduling	●	●[7]	●	○[2]	●[7]	●	○[8]	●	○
Merges files from notebook	○	●	○	○	●	○	○	●	●
Imports/exports files to hand-held computers[9]	○	●[10]	○	●[10]	●[11]	●	○	●	○
Address book									
Imports to/exports from									
CSV	○	●	●	●	●	●	●	●	●
dBASE	○	●	○	●	●	○	●	○	●
Creates new data fields during import	○	●	●	●	●	●	●	●	●
Drag-and-drop dialing	○	○	○	○	●	●	●	○	○
Speed-dial list	○	●	●	●	●	○	●	○	●
Phone log (outgoing/incoming)	○	●	●	○	●	●	●	●	●
Keeps contact history automatically	○	●	●	●	●	●	○	●	●
Links record in address book to									
Appointment	○	●	●	●	●	●	●	●	●
Note	●[12]	●	●	●	●	●	●	●	●
Phone log entry	n/a	●	●	●	●	●	○	●	●

[1] Can take notes as part of outline in any module.
[2] Available in version 2.0, due to ship by the time you read this.
[3] cc:Mail, Microsoft Mail.
[4] cc:Mail.
[5] Time line only.
[6] Version 2.0 will have a regular calendar view.
[7] Extra-cost option.
[8] Available in version 1.1, due to ship by the time you read this.
[9] Sharp Wizard, HP 95LX, Casio Boss.
[10] With third-party utility.
[11] Export only.
[12] Can make notes as part of address.

Our sporty new compact can outrun a flatbed.

Introducing the NISCAN GS Plus hand scanners.

It used to be that speed, quality and resolution were reserved for flatbed monsters. No more.

Meet the new NISCAN/GS Plus scanners. The first generation of hand-held scanners that don't need a lot of hand-holding.

With a 16-bit interface, 256 gray shades, optional OCR and up to 400 dpi, it's no wonder why. The GS Plus is faster, leaner and more accurate than many flatbed scanners on the market. And all this capability fits right in the palm of your hand. What's more, the GS Plus is Windows-based, comes with Picture Publisher LE software, a lifetime warranty and free technical support.

The NISCAN/GS Plus and GS Plus OCR scanners, new from NISCA. Because image is everything.

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GSA # GSOOK93AG56180

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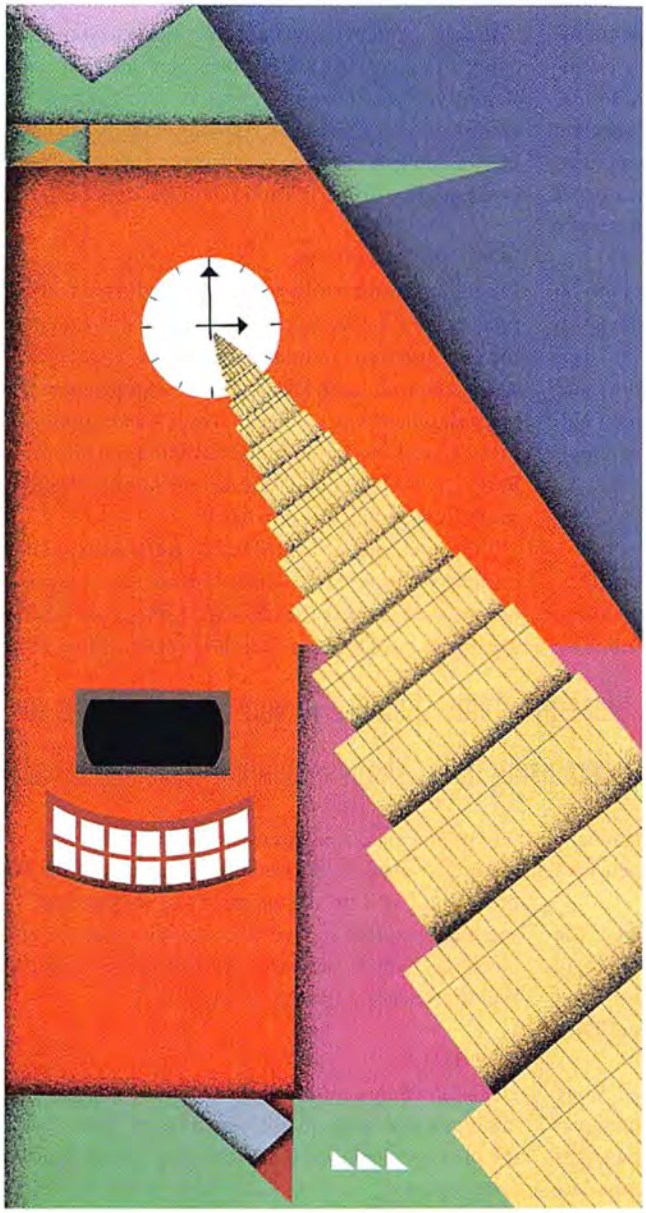
Circle 139 on reader service card

Electronic Forms Fill the Bill

BY SCOTT SPANBAUER



TERRY ALLEN

You'll never get rid of paper entirely, but with these four Windows programs you can bypass your file cabinets—and save a few trees in the process.

Invoices, bills, tax forms, expense reports, employment applications, reviews, terminations—virtually every company, large or small, relies on forms. Employees spend hours printing, filing, tracking, reproducing, and ultimately getting rid of forms. Forms processing software can move these piles from in-boxes and file cabinets to the network, saving time and trees and changing organizations for the better.

Ending the Paper Chase

Electronic forms processing offers significant print cost savings and the capability to revise forms easily whenever necessary. You may also enjoy lower data-entry costs as well as greater productivity, because forms data is available to anyone with access to the network. And you can still print data on paper forms when necessary.

Linking the worlds of printed and electronic data is forms processing's raison d'être. Using design modules reminiscent

Best Buys

Two contenders, JetForm and PerForm Pro Plus, tied for Best Buy. These programs excelled for different reasons: JetForm's exclusive cache of E-mail support in addition to its solid feature set puts it on top, but PerForm Pro Plus shoulders in with stronger forms design, data management, and programmability. Either program is an excellent choice for a forms processing application, but be sure to consider which one's strengths most suit your needs.

of draw programs, you create on-screen versions of the paper forms you currently use and link them to database files. For example, while most large companies keep track of employee information (such as salary, performance evaluations, and accrued vacation time) by means of a database, related transactions such as vacation requests are usually performed manually—you fill out a paper request, route it to personnel, and hope it gets the necessary approval before your plane takes off.

Simple forms processing allows employees to fill in the form on screen, see how many vacation days they have available through an automatic database lookup, and enter the number of vacation days requested. The department head then reviews the form and approves it using a password-protected electronic signature field. The vacation leave, once approved, is automatically subtracted from the number of available days stored in the database.

The Good, the Better, and the Ugly

We evaluate the four top Windows forms processing packages: Spinnaker Software's FormWorx 2.01, JetForm's JetForm Design 3.1, Delrina's PerForm Pro Plus, and GDI's WindForm 1.0. The four include a range of prices and features, from WindForm's bare-bones approach, to PerForm Pro Plus's complete application development environment.

The capability to link forms to data files separates forms processing applications from those that merely let you design and print blank forms. All four programs dynamically link on-screen forms to underlying database files, although with widely varying dexterity.

We chose to review Windows applications only, because the WYSIWYG display and greater ease of use enhance your ability to create and use forms. JetForm is the only program reviewed that has a character-based filler program for offices with a mix of Windows and DOS PCs.

JetForm and PerForm Pro Plus both earned Best Buys. Along with E-mail linking, JetForm offers two unique features—multipart forms and the capability to combine portrait and landscape pages in a single form. PerForm Pro Plus offers better design tools, data management, and programmability at a lower price. Delrina's FormFlow program, which should be shipping by the time you read this but was not ready for our review, adds sophisticated E-mail routing capabilities to the excellent feature set it inherits from PerForm Pro Plus (see the sidebar "On the Horizon").

Match Function to Form

The application that's right for you depends on the number and type of forms you use now. At the very least a program should give you a range of basic tools for drawing forms using lines, shapes, shading, text labels, and graphics. FormWorx boasted the most complete selection of tools, with PerForm Pro Plus and WindForm close behind. Only JetForm contained noticeably fewer tools than the others.

You also need to assign data entry fields to your form easily, select a font size and style, and set the order in which users fill in fields. Better programs augment the basics with compound objects—prefabricated tables, rows, and columns of fields—along with the capability to group and duplicate objects and align them with one another. Again, FormWorx provided the most options, JetForm the least.

Forms Design Made Easier

Designing your own forms from scratch is not a terribly exacting process. You'll want a program that gives you a lot of control over the measurement systems and displays object positions and sizes accurately at all zoom levels. All the programs here include libraries of predesigned forms you can use as is or customize—a real timesaver. FormWorx's warehouse of 500 sample forms looms largest; PerForm Pro Plus and WindForm offer 150 and 166 samples, respectively, while JetForm has 12.

A forms-tracing utility, which converts scanned images of printed forms into editable electronic ones, can cut hours from the design process. All the reviewed programs offer some tracing capability, but Delrina's PerForm Tracer add-on is the best.

> These programs should give you the basic tools for drawing forms using lines, shapes, shading, text labels, and graphics.

Reproducing printed forms also calls for the very best in text formatting controls—the kind you're used to in a Windows word processor. Look for the capability to set text size, style, and line spacing; the capability to include multiple text formats within a text block will simplify and speed the design process. FormWorx and WindForm lacked this versatility.

Color My Form

Hard-copy forms are usually black and white, but color can play an important role in distinguishing different form areas on screen. All the programs included in this roundup except JetForm can display forms in color.

The capability to import graphic images easily may not seem crucial—until you discover you can't import or manipulate the file con-

taining your company's logo. As a minimum, forms design packages should read TIFF and PCX files; only PerForm Pro Plus adds the capability to crop and size imported images.

One of the key benefits of forms software is its ability to act as a front end to your company's existing data files, or as a stand-alone data manager. Even if you already use and plan to keep using a relational data manager, you'll need a forms program with some relational capabilities if you want to access multiple database files simultaneously. Currently, only PerForm Pro Plus fills this need.

If you plan to link to existing data files, make sure that the program you choose is able to read and write your data and index files' format and that it offers tools for browsing the file structure during the forms design stage. Applications that support Windows' Object Linking and Embedding (OLE) or Dynamic Data Exchange (DDE) standards enable you to maintain updated links between your forms and other Windows applications. Both JetForm and PerForm Pro Plus allow you to establish such links.

To ensure accurate and complete data entry, you'll want a complete selection of input controls. Validation ensures that data entered matches an expected data type and pattern, such as a 10-digit phone number, and prompts the user to retype inconsistent entries. Lookup tables let users choose from a list of possible entries stored in the form itself, or an external data file, and can either prohibit or allow entries not listed in the lookup. Masking automatically inserts characters, such as parentheses or spaces, in an entry. A macro language can let you automate complex operations.

Electronic Forms Reshape the Office

Forms processing is changing in ways that should attract networked businesses as never before. E-mail application programming interfaces (MAPIs) recently developed by Microsoft, Lotus, and Novell allow other applications to reach anyone with an E-mail address. This means that forms needing approval by a number of people can be programmed to route themselves to each person in order. Dealing with forms could end up being as easy as reading and replying to E-mail. Sooner than later, electronic forms will transform static, paper-based business procedures into dynamic methods for collecting and conveying information.

Forms needing approval by a number of people can now be programmed to route themselves via E-mail to each person in order.

FormWorx for Windows 2.01

PROS: Comprehensive set of drawing tools
CONS: Clumsy interface, buggy program, badly written documentation

FormWorx's $99.95 price, prefab design objects, and large library of predesigned forms are attractive on the surface. But FormWorx suffers from bugs; a nonstandard Windows interface; and conflicting, vague documentation and on-line help. Even Spinnaker's tech support personnel admitted that FormWorx is difficult to use.

Windows compatibility notwithstanding, FormWorx's design model is flawed. After you create a form in FormWorx itself, you must save the file and load it into a companion program, Fill & File, where you painstakingly create links to database files and set up field attributes one field at a time. Should you need to change the forms design, all the work done in Fill & File is lost when FormWorx writes a new filler file.

FormWorx's best feature is its toolbox, which is filled with easy-to-customize draw objects—from simple boxes, circles, and arrows to complex invoice grids complete with colored title bars and row numbers. But the nifty toolbox doesn't make up for FormWorx's frustrating interface. It's hard to select objects, and on-screen rulers display in units of inches only. Often the screen won't redraw properly, even with the Auto Redraw feature enabled.

FormWorx frequently places text differently at different zoom levels, defeating the purpose of zooming to align objects carefully. The PrintView option, which the manual says causes line endings to display properly on screen, turned out to be buggy (confirmed by tech support) and crashed Windows.

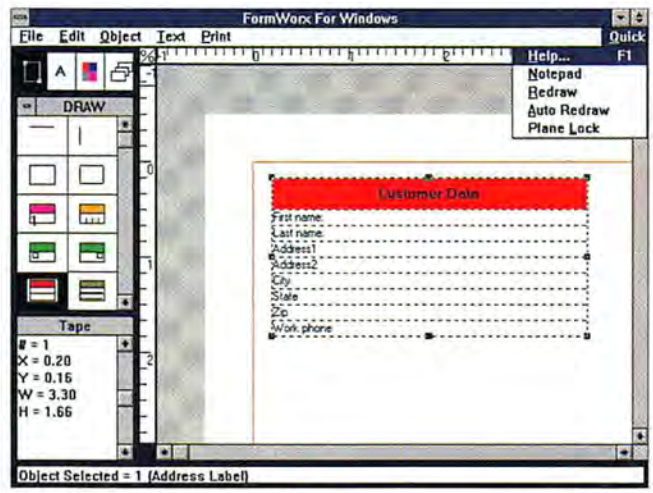
Text handling is flawed as well. Type is limited to only eight fixed sizes, even for TrueType fonts. And blocks of text must be all one size, style, and type, which means you can't underline or boldface a particular word in a sentence.

FormWorx comes with a forms library, called Forms-On-Demand (FOND), containing 500 generic business forms and government agency forms. Theoretically, you can add your own form creations to the library. We were unable to test that feature, however, because FOND repeatedly crashed our test machine. Spinnaker Software's technical support claimed that the problem lay with Windows or a lack of memory. But with more than 600K free, FOND still corrupted Windows consistently.

You might be able to accomplish useful work with FormWorx for Windows, but only if you avoid anything complex, and only if you're willing to spend a lot of time.

List price: $99.95. Contact: Spinnaker Software, 800/851-2917, 800/826-0706.

Reader service no. 683



FORMWORX'S TOOLBOX IS FILLED with easy-to-use compound objects such as the one shown here, but the program's bugs and quirks render it almost unusable.

JetForm Design 3.1

PROS: Fast printing, E-mail routing
CONS: Some forms design and data management limitations

JetForm is a solid, well-executed forms processing program and the only one, at press time, offering the convenience of E-mail routing. Thus it earns one of two Best Buys in this review. It doesn't, however, offer as many design and data management options as our other Best Buy, PerForm Pro Plus. Most notably it does not incorporate a fully relational database, so if you need one, look elsewhere.

JetForm's design tools and commands are easy to find and use, and the program has a customizable command button bar. Zooming is easy—just hold down the right mouse button and drag, and the display responds in a snap. With the variable grid you can place objects precisely on the form and modify the grid values at any time during the design process. Selecting objects is also quick and easy.

Text formatting and graphics tools are less impressive but adequate. You can use multiple fonts and styles within a single text block, but only one spacing. Although JetForm uses a color to highlight tracing templates and selected objects, forms are limited to black and white. JetForm lets you import PCX, PIC, MSP, and TIFF images, as long as they contain no more than 16 shades. Color images convert to black and white, and large images display very slowly. Plus, there's no way to crop or resize bit maps.

JetForm's semiautomatic form tracing function is convoluted, but it works. You first convert a scanned image into a JetForm-compatible template file using a DOS command-line utility. Back in JetForm, you open, scale, and position the template on screen, then adjust the grid to match the pattern of the template's lines and boxes. Next, using either the line or box drawing tools, you simply click on the parts of the template you want to trace. JetForm does its best to duplicate the original. The result is fairly accurate, especially if you set up the grid properly.

Most of your data management tasks are performed within JetForm, so revisions to your form won't wipe out links to data files. You can set up sophisticated lookups from multiple files, but a form can write data to only a single file. You can link form fields to a single external dBASE or Paradox data file, and JetForm Design provides a list of fields to choose from. Or you can use JetForm-Filler/G (sold separately at $495 for a 5-user license), the Windows-based form filler module, to create new files in those formats, comma-delimited ASCII, or JetForm's own format. (In addition, a character-mode filler program should be available by the time you read this.) JetForm also lets you set up password-protected electronic signature fields, if you

On the Horizon

Three Windows-based forms programs, still in beta testing at press time, push the state of the art in forms software. They go beyond the simple electronic replication of paper-based forms, into the realm of custom network application development, and all three incorporate E-mail forms routing capabilities.

Delrina Corporation's FormFlow, which started shipping in late June, unites the company's excellent PerForm Pro Plus application design and database management tools with sophisticated E-mail routing capabilities. WordPerfect's InForms, scheduled to ship sometime this summer, takes a page from the Delrina/JetForm book with its design tools and database compatibility. Microsoft's Electronic Forms Designer, which should be available by the time you read this, adds E-mail–aware forms design to the company's Visual Basic Professional Edition 2.0 development environment, targeting professional in-house developers who aren't afraid of BASIC coding.

> These three Windows forms programs go beyond the state of the art in forms software, into the realm of custom network application development.

FormFlow

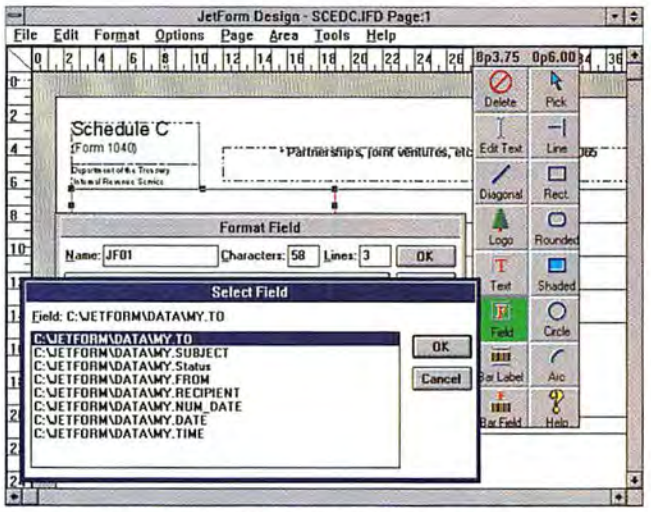
Take a PerForm Pro Plus form application, add conditional E-mail routing logic to fields and compatibility with Microsoft Mail, cc:Mail, and Novell's MHS standard, and you have an application that could replace your LAN database and a good portion of your company's paper trail. Delrina says the $399 FormFlow will replace PerForm Pro Plus as the company's flagship forms product when it ships, and PerForm Pro Plus's price will be reduced. FormFlow will work seamlessly with PerForm Pro Plus's filler program, according to Delrina.

FormFlow gives you a smorgasbord of options for routing forms over a LAN. Should you send the form, or just the data, or both? All linked databases, or just the main file? Should graphics files in the form travel with it, or will a simple reference to the file's location on the LAN suffice? Most users will give up before they figure these choices out. Fortunately, FormFlow's Intelligent Form Language (IFL) scripts allow form designers to embed any FormFlow menu command in a routing macro to automate many of these decisions.

WordPerfect InForms

WordPerfect's entry into the forms market is clearly informed by a close study of existing programs. It aims to outdo others with broad database linking support and bonus features. InForms' $495 designer module offers a toolbox comparable to that of leading programs such as PerForm Pro Plus and JetForm, with compound form design objects such as check boxes, drop-down lists, and radio buttons, as well as drawing tools, electronic signatures, and graphic support. Unlike those programs, the design program lets you create 256-color forms, and it comes with a stand-alone file manager/viewer that would make a good replacement for File Manager. InForms' applications can read and write dBASE, Paradox, Btrieve, and FoxPro files, as well as a number of SQL database file formats.

The $199 filler program offers a button-bar user interface similar to that of its competitors and will support E-mail forms routing with



JETFORM'S TOOLBOX IS SIMPLE BUT RICH with precision controls, making it the perfect choice for building an interface to existing data.

like. The program is light on data file tools, however; you can't index, sort, or otherwise alter file structure.

JetForm's custom printer drivers support multipage forms containing more than one page size or orientation and are faster than Windows', according to JetForm officials. Even without downloading a forms macro in advance, printing a form and data took only seconds; using a downloaded macro further accelerated printing.

JetForm-E-Mail/G is an extra-cost ($495 for a 5-user license) modified version of JetForm-Filler/G that can embed forms in cc:Mail and Microsoft Mail messages. The program allows you to attach forms and data files to your message if necessary, along with a note. Recipients see a form as an icon in an inbound message. All they have to do is double-click the icon to load JetForm-E-Mail and open the form.

If you do leap into E-mail forms routing, which currently only JetForm offers, check first for compatibility with your company's mail package. E-mail routing should let you pick and choose which elements to send, including the form, the form data, or multiple data records—the entire linked database if necessary. The elements you decide to send will depend on whether recipients have network access to forms and data files.

At $495 JetForm is the most expensive program reviewed, but it won't shortchange you. Although its design and data management tools leave room for improvement, its E-mail module raises forms processing to a new level.

List price: $495. Contact: JetForm, 800/267-9976, 613/594-8886 (fax).

Reader service no. 684

WordPerfect Office, cc:Mail, and Microsoft Mail. Initially the InForms form filler will be available in Windows and DOS versions, with Macintosh, OS/2, UNIX, VMS, and PenPoint versions due later this year.

InForms' form-design module comes with a spelling checker and a thesaurus, as well as a copy of Adobe Type Manager, and lets you store forms design elements in a library for reuse in other forms. You can link data among forms and choose from more than 100 forms templates for a head start on your designs. The filler module includes a Query language that lets you store and reuse data queries and supports links to multiple database files.

Microsoft Electronic Forms Designer

Microsoft's $395 Electronic Forms Designer is a programming tool kit that works with the company's Visual Basic Professional Edition 2.0 application developer. It lets you write programs that send what Microsoft calls "structured messages" over supported E-mail systems. Like Borland's ObjectVision, Visual Basic isn't geared to replicating paper forms electronically, aiming instead at custom Windows application development. Unlike other forms applications, there is no need for a separate filler program—routable forms run in place of the E-mail program's interface, while using the program's underlying messaging architecture.

FormFlow, InForms, and Electronic Forms Designer all incorporate E-mail forms-routing capabilities.

The only E-mail program supported in the beta version we received is Microsoft Mail, although Microsoft says its electronic forms will work with any messaging application program interface (MAPI)–compliant mail application. Unfortunately, there are no other MAPI-compliant E-mail applications available, and few vendors have announced plans to add MAPI compatibility to their products. Microsoft promises that an extended version of MAPI due in late 1994 will make any Windows program MAPI-compliant.

To design forms, you need both the tool kit and the $495 Visual Basic Professional Edition 2.0—quite a hefty price tag if all you intend to do is create an electronic phone message slip. Electronic Forms Designer's collection of predefined functions lets Visual Basic programmers add E-mail functionality, such as controls for addressing and sending messages. The tool kit includes sample electronic forms and a generic forms template that project developers can modify. Visual Basic is the most painless way to write general Windows applications, but still requires complex programming for anything other than interface design. As a result, Electronic Forms Designer is best suited to professional programmers, and most part-time forms designers will probably stick with easier-to-use products such as JetForm, FormFlow, or InForms. —S. S.

Delrina FormFlow $399
Delrina Corp.
800/268-6082
Reader service no. 687

WordPerfect InForms $495
WordPerfect Corp.
801/225-5000
Reader service no. 688

Microsoft Electronic Forms Designer $395
Microsoft Corp.
206/882-8080
Reader service no. 689

PerForm Pro Plus

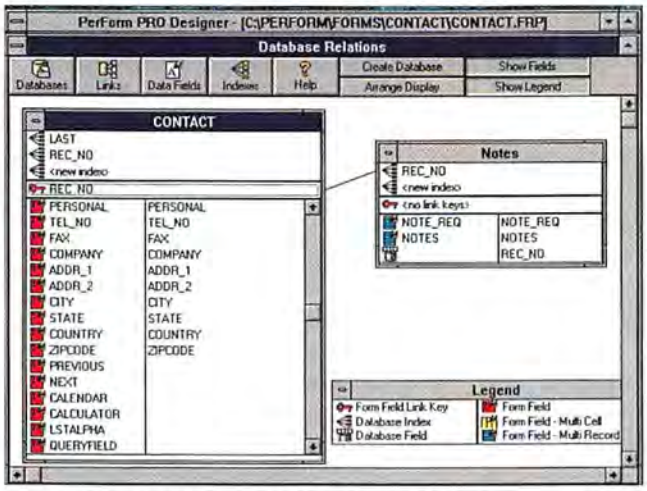
PROS: Richest feature set, best data management
CONS: No E-mail support (due late 1993)

Delrina's $399 PerForm Pro Plus is the most sophisticated forms processing package in this review. Sample forms applications included with the program resembled stand-alone Windows programs more than single electronic forms. Everything about this program is well designed, well executed, and easy to use, thanks to a flawless interface. Just sit back and enjoy the program's top-notch tools and superior data management capabilities, all of which earned it our Best Buy.

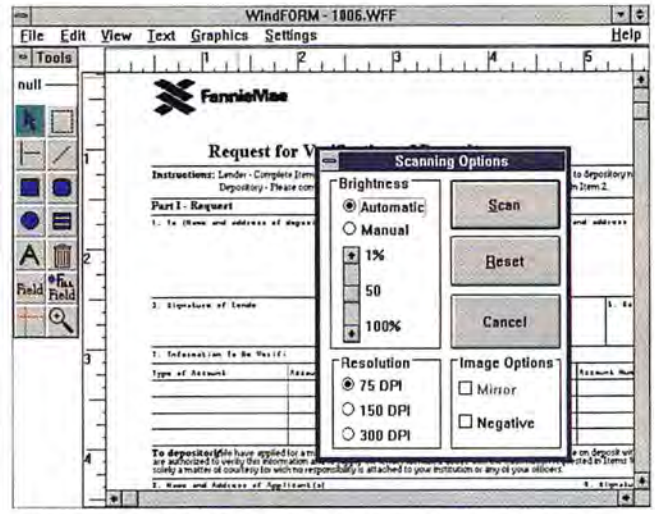
PerForm Pro Plus has the most current interface of all the programs reviewed, allowing you to work on multiple documents and customize the button-based design toolbox and command button bar. Your designs may materialize quicker, thanks to compound object tools for creating rows, columns, and tables of fields. As with JetForm, every line in a text block must use the same spacing. You can import, scale, and crop almost any graphic, including TIFF, PCX, BMP, EPS, and GIF files. Any object can be set to one of a handful of basic colors or shades of gray.

PerForm Tracer, a $99 extra, does an outstanding job of converting TIFF, PCX, or MacPaint files into PerForm files and is worth the money if you plan to replicate many preprinted forms. PerForm Tracer scans images for horizontal and vertical lines automatically, then converts them to objects in a form. Editing tools let you combine, break apart, and delete objects. PerForm Tracer had no trouble recognizing most of the lines in a badly skewed, hand-scanned form.

PerForm Pro Plus's built-in macro language allows you to create custom applications—much as you would using any programmable database. And since the program supports OLE, forms-based applications can also contain other data objects, such as voice annotation, animation, or AVI movie clips. PerForm Pro Plus's electronic signature fields can lock and/or hide data entered into other fields and can be protected so that only the original signer is able to unlock the secure data.



PERFORM PRO PLUS'S DATABASE RELATIONS SCREEN gives you total control over relational database files and will even generate forms based on existing file structures.



WINDFORM ALLOWS YOU TO SCAN in existing forms. Its dearth of design and data features make it suitable for only the simplest applications, however.

The program's relational database manager sets it apart from other forms programs. A single form can read and write data stored in multiple linked files, and you can set up one or many relationships. PerForm Pro Plus also gives you control over data files, letting you set up complex relational systems from scratch or restructure and manipulate existing files. The program is also unique in its capability to generate a form based on existing linked data files.

PerForm Pro Filler lets you download a macro for each form page in a print job, in addition to separate macros for graphics that repeat on every page. For HP LaserJet–compatible printers choose Fast or Extra Fast printing modes, which will take a few shortcuts in drawing graphics on your printout.

As we went to press, Delrina had plans to ship an E-mail–aware forms program, Delrina FormFlow, in late June (see "On the Horizon"). Although PerForm Pro Plus's lack of E-mail support at the time of this review stops it just short of perfection, that missing link is scheduled to ship by late 1993. Add that to the program's superior design and data management capabilities, and you have a real forms processing Best Buy.

List price: $399. Contact: Delrina Corp., 800/268-6082, 408/363-2345.

Reader service no. 685

WindForm 1.0

PROS: Locks forms designs with password protection
CONS: Bare-bones feature set, limited data management

Graphics Development Int'l's $99.95 WindForm, aimed at the small-business market, is far less ambitious than its industrial-strength competitors. In fact, the program's design and data tools are about as lightweight as you can get. It lets you whip up simple designs and link them to a single data file with nary a bell nor whistle to get in the way.

WindForm's toolbox contains just the basics, along with a tool for drawing columns of fields. Your options in formatting objects are likewise limited. Text that's contained in a box must be all one size and style, and WindForm doesn't give you any line spacing controls.

However, you can import and resize PCX and TIFF graphics and apply color to everything but text. Grid and ruler measurement units are easy to customize, and you can group and align objects as you please.

WindForm is the only program reviewed here that actually scans forms directly, using an HP ScanJet, but it doesn't convert them automatically into electronic forms. The program also lets you import a TIFF or PCX file to use as a template for manual tracing, as long as it matches the size of your WindForm page. The program also promised to convert PCL PRN files produced by other applications, including PerForm (which version is unclear) and PageMaker. We tried this feature using PerForm Pro and PerForm Pro Plus files, with unusable results.

The program comes with plenty of predesigned forms, including generic, office-related, and standard government forms. It's also the only program included in this review that allows you to password-protect your form designs.

WindForm lets you save form data to ASCII files, but that's it—no masking, data validation, calculations, field order, or other controls. When creating fields, you can type in some optional help text, including suggested field entries, for a kind of lookup table, but there's no way to create real form- or file-based lookups. When it's time to print, you have only two options: print the current form and data or all records in the attached data file.

WindForm is a poor relation to the more advanced forms processing applications in this review, but it doesn't pretend to be more than it is: a no-frills, base-level forms processor.

List price: $99.95. Contact: Graphics Development Int'l, 415/546-1917, 415/546-0361 (fax).

Reader service no. 686

For more information about all products featured in this article, circle reader service no. 900.

Scott Spanbauer is a contributing editor for PC World. *He can be reached on PC World Online (see page 12 for more information).*

FEATURES COMPARISON

Forms Processing: Less Paper, Less Work, Less Waste

● Yes
○ No

	FormWorx 2.01	JetForm Design 3.1 (BEST BUY)	PerForm Pro Plus (BEST BUY)	WindForm 1.0
Standard features				
List price	$99.95	$495	$399	$99.95
Context-sensitive help	●	●	●	○
Quick-start guide	○	●	●	●
Forms design				
Sample forms included	500	12	150	166
Multipage forms	○	●	●	○
Multipart forms	○	●	○	○
Imports TIFF and PCX graphics	●	●[1]	●	●
Aligns objects	○	●	●	●
Groups objects	●	●	●	●
Traces scanned forms	○	●	●	●
Data handling				
One-to-many relationships	○	○	●	○
Calculated fields	●	●	●	○
Information linked among forms	●	●	●	○
Field masking	●	●	●	○
Compulsory fields	●	●	●	○
Look-up tables	●	●	●	○
Specify field fill-in order	●	●	●	○
Generates serial numbers automatically	●	○	●	○
Data file formats read/written				
DBF	●	●	●	○
NDX	●	○	●	○
Paradox	○	●	●	○
ASCII	●[2]	●	●	●

	FormWorx 2.01	JetForm Design 3.1 (BEST BUY)	PerForm Pro Plus (BEST BUY)	WindForm 1.0
Data handling continued				
OLE and DDE support	○	●	●	○
Forms management				
Long file descriptions	●	●	●	●
Forms linking	○	●	●	○
Forms locking	●	●	●	●
Hides field data	●	●	●	○
Read-only fields	●	●	●	○
Password protection	○	○	●	●
E-mail routing support				
cc:Mail	○	●	○	○
Microsoft Mail	○	●	○	○
DaVinci eMail	○	○	○	○
Novell MHS	○	○	○	○
Electronic signatures	○	●	●	○
Printing				
Supports downloaded and cartridge fonts	●	●	●	●
Downloads multipage form macros	○	●	●	○
Printer support				
HP LaserJet II/III	●	●	●	●
PostScript	●	●	●	●
Epson LQ dot matrix	●	●[3]	●	●
HP DeskJet	●	●[4]	●	●

[1] Displays black and white only.
[2] Import/export only.
[3] Data only, using JetForm driver.
[4] Windows printer driver; no JetForm driver.

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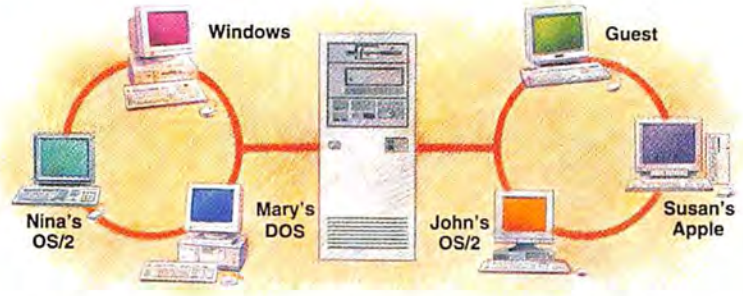

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nano

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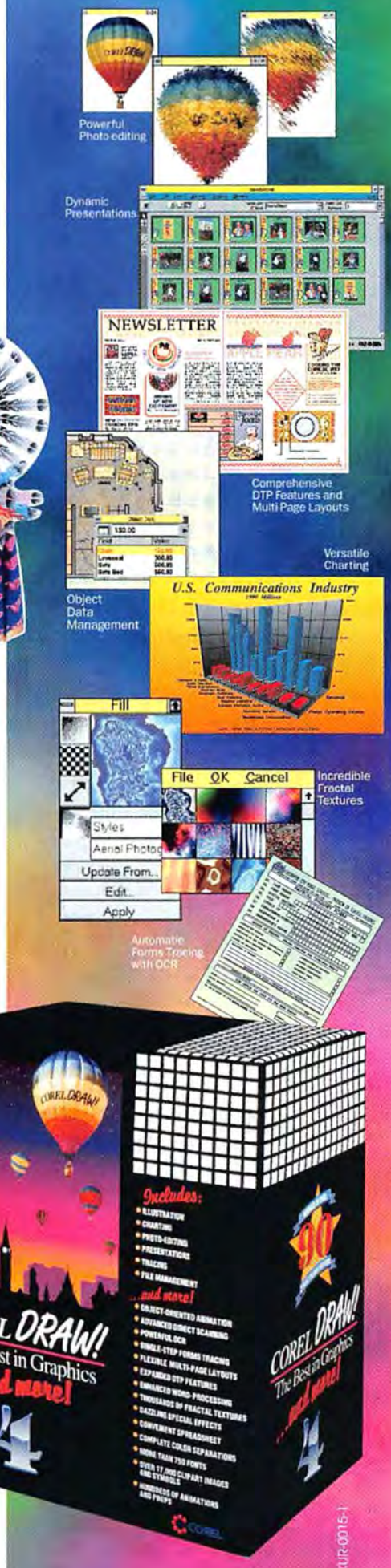

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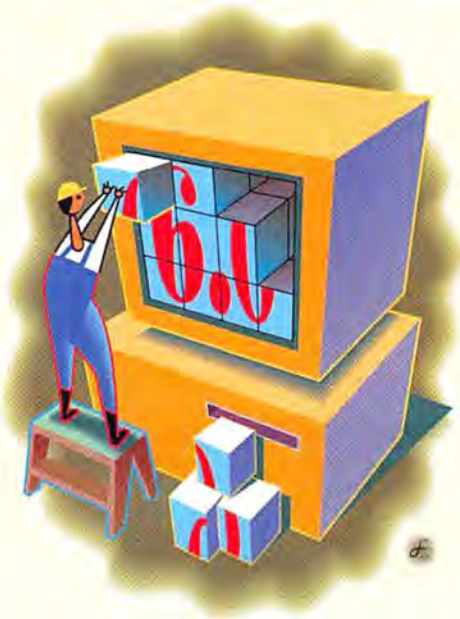

Tip of the Month

DOS 6 INSTALLATION OPTIONS: DOS 6's installation command, SETUP, provides many handy alternatives to its standard routine. Run SETUP by inserting Disk 1–Setup into drive A: or B: and typing the drive letter and a colon followed by one of the commands discussed below.

To create a bootable *rescue* floppy disk that includes critical DOS programs such as FORMAT, CHKDSK, FDISK, and others, type SETUP/F. DOS will ask you which floppy drive to use. If you're installing DOS 6 on a PC with a small C: partition and a larger D: partition, you can use SETUP/M to make drive C: bootable, then use SETUP/Q to copy the rest of the files and SETUP/E to install the Windows and MS-DOS optional programs to your D: drive (use BUSETUP/E if you originally installed DOS 6 by booting the Setup disk). There's more: If you want to stop SETUP from creating an uninstall disk, use SETUP/G (you can use the /G switch with SETUP/M, just put a space before it). Installing on a monochrome notebook? Add a space and /B to any of the commands to force SETUP to display in monochrome. And one last trick: Type SETUP/? to get a look at the complete list of setup options.

Steve Bass, Contributing Editor

Use DOSKEY Macros for Risky Commands

Q I have a BAT file in which I use the command ERASE A:*.*. When I run the batch file, I get the expected 'All files in directory will be deleted! Are you sure (Y/N)?' message, which requires me to enter *Y* to proceed. Is there a way to have the batch file supply the *Y* and let the file run nonstop?
Kerry Shea, via PC World Online

A There are several ways to accomplish this. The simplest is to replace ERASE A:*.* with **ECHO Y|ERASE A:*.***, which uses DOS's pipe (the |) to feed ECHO's output (the *Y*) to ERASE.

But before you fire up DOS's editor, stop and think. Batch files that bypass the confirmation message built into a potentially destructive command like ERASE (or DEL—the two are identical) can backfire. If you inadvertently issue the command when the wrong disk is in the floppy drive, you'll have to restore the files from a backup (and how many of us really back up our floppies?), or use a third-party undelete utility. Running other sensitive batch files (such as one that searches your hard disk and deletes TMP files) at the wrong time can also have disastrous results. As a precaution, at least rename the batch file with a nonexecutable file name extension, such as TXT, when you're not using it. Better yet, execute your batch file as a DOSKEY macro.

In addition to letting you redisplay and edit past commands, DOS 5's and 6's DOSKEY utility lets you load batch-like macros into memory. DOSKEY macros execute faster than batch files because they are already loaded into memory. Also, you can remove them from memory when you are done.

To load your file-deletion command as a DOSKEY macro, type **DOSKEY DELA=ECHO Y $B ERASE A:*.*** at the DOS prompt and press **<Enter>**. The $B is DOSKEY's equivalent for the pipe. Entering DELA at the DOS prompt will now run your macro. If your original batch file contained additional commands, you can create a multicommand macro using $T (DOSKEY's equivalent of the <Ctrl>-T command separator introduced in DOS 5) between each of the macro's DOS commands, as in: DOSKEY DELA=CLS$Trem$Trem $Trem$Trem Insert disk to wipe clean in drive A:$Trem$Trem$TPAUSE$T ECHO Y$BERASE A:*.*$TDIR A:. Bear in mind that DOS commands are limited to 127 characters.

To remove the macro from memory, simply redefine it without any associated commands by typing **DOSKEY DELA=**, or press **<Alt>-<F10>** to remove all DOSKEY macros from memory.

Once the macro is in memory, you can easily copy it to a file for reference and with a little editing, use that file to reload the macro. Enter **DOSKEY /M >***filename*.**BAT** (*filename* should be a name you'll easily remember) to copy all the currently loaded DOSKEY macros to a batch file. Load that file onto an ASCII text editor and add **DOSKEY** plus a space to the beginning of each line. You could even add a warning to the end of the batch file, such as **@ECHO Attention! Dangerous macros now resident in memory! Unless you know what you're doing, press Alt-F10 now.** Finally, save the file and move it to a directory listed in AUTOEXEC.BAT's PATH command. Whenever you want to reload the file's DOSKEY macros, just run the batch file.

ILLUSTRATIONS: DAVE EMBER

Upgrading From 486 to Pentium

Q Later this year I will be buying a new 486-based PC. In about a year I would like to upgrade to Intel's Pentium chip. I understand that processor card upgrades can be expensive, so is the 238-pin upgrade socket on most DX2 systems a good alternative?
Angus D. F. MacKinnon,
Port Moody, British Columbia

A Even if your system board comes with a 238-pin socket, you'll never be able to yank your 486 chip and plug in a real Pentium processor. That socket is intended to house an Intel processor that uses some of the technology that's in a Pentium. That chip, which will be called the OverDrive for DX2 and is expected sometime in 1994, will include many of the Pentium's internal advances, including the ability to execute CPU instructions one and one-half to two times as fast as the 486. But if you want to take full advantage of the Pentium's rumored power, including tight links with Intel's PCI local bus technology, save your money for a system built from the ground up around the new CPU—it won't be cheap.

Hard Disk Noises, Good and Bad

Q My Maxtor hard drive's making a sound similar to feedback from a speaker—very different from the usual drive-access sounds. When I asked about the whine, I was told it's "normal hard drive noise." Is this true?
Heather Kantz, via PC World Online

A Anytime your hard disk makes a sound other than the gentle sputtering during read/write operations, you should be concerned—and backed up. Any loud crunching is a sure sign that something is wrong with the drive's bearings, and the whine you describe could signal just that. If you hear either of these sounds, stop what you're doing, back up important files, and contact the company that sold you the drive.

Having said that, some drive sounds, although they may send a chill up your spine, may not presage a hard disk crash. An occasional intermittent whine in a new hard disk like yours could simply be a sign that the drive's bearings are wearing in, and the sound may disappear after a few weeks or months. In a perfect world, drive bearings shouldn't require a break-in period, and your drive should make the same sounds every time you use it. In the real world, however, drives often make noise, either consistently or intermittently, and continue to function for years.

Maxtor's technical support says that anytime your drive makes an unusual noise, you should call them (800/262-9867). They'll try to identify the noise and will replace the drive if necessary, providing it's still under warranty. They'll even ship you a new drive before receiving the old one if you give them a credit card number as insurance, so you can replace the questionable unit with minimum downtime. If your drive is still under warranty, just crossing your fingers and hoping for the best is probably an unnecessary gamble.

Put Color in DOS

Q I use MS-DOS 5 and sometimes find it difficult to read the standard white-on-black display. Is there some way to alter the appearance of the screen by changing the text and/or background colors without having to buy additional software?
Hai Tang, San Francisco

A DOS's ANSI.SYS driver lets you do exactly that. First, add the line **DEVICE =C:\DOS\ANSI.SYS** to your CONFIG.SYS file. You issue ANSI.SYS commands by sending them to the screen, but because they begin with the Escape character (ASCII 27), which causes DOS to erase the command line, you can't just enter them at the DOS prompt. Fortunately, DOS's PROMPT command affects what's sent to the screen (the DOS prompt itself) and provides a code ($E) for the Escape character, giving you an easy way to set the color of your DOS text and background.

USER GROUP OF THE MONTH

Napa Valley PC User's Group

The August User Group Tips come from the Napa Valley PC User's Group. NVPCUG's meetings are held on the second Wednesday of every month and are open to the public. The club publishes *dVINE Blues*, a monthly newsletter that includes computer tips, meeting topics, reviews, and special offers. The Napa Valley PC User's Group also maintains a BBS with more than 2500 shareware and public domain programs and a library of demo disks, videos, magazines, and newsletters from numerous other user groups.

For more information, contact Lee Schwab at P.O. Box 2653, Napa, CA 94558-0265, or call 707/257-2675. The BBS number is 707/257-2338. Membership costs $15 a year.
Reader service no. 642

A PROMPT CHANGE OF PROMPT: Personally, I like my DOS prompt to display more than the typical C:*current directory*>, so I've configured it as two bright-blue lines with the date, the time, and a friendly message on one line and the current drive and directory on the other. But when other users are on my computer, they're sometimes overwhelmed. And even I find two-line prompts annoying when there's a lot to read on screen.

Fortunately, I have discovered that the command ECHO OFF quickly removes my complex DOS prompt and that the ECHO ON command just as quickly brings it back.

Frank Sommer
Napa Valley PC User's Group

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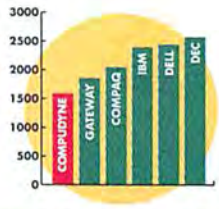

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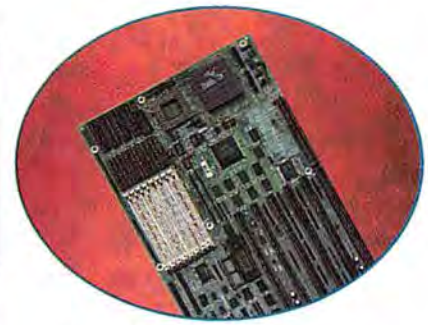

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```
@ECHO OFF
ECHO PLEASE WAIT...
IF X==X%1 GOTO HELP
GOTO %1
:NORMAL
 PROMPT $E[0m
 GOTO EXIT
:BRIGHT
 PROMPT $E[1m
 GOTO EXIT
:REVERSE
 PROMPT $E[7m
 GOTO EXIT
:BLACK
 PROMPT $E[30m
 GOTO EXIT
:RED
 PROMPT $E[31m
 GOTO EXIT
:GREEN
 PROMPT $E[32m
 GOTO EXIT
:BROWN
 PROMPT $E[33m
 GOTO EXIT
:YELLOW
 PROMPT $E[33;1m
 GOTO EXIT
:BLUE
 PROMPT $E[34m
 GOTO EXIT
:MAGENTA
 PROMPT $E[35m
 GOTO EXIT
:CYAN
 PROMPT $E[36m
 GOTO EXIT
:WHITE
 PROMPT $E[37m
 GOTO EXIT
:BBLACK
 PROMPT $E[40m
 GOTO EXIT
:BRED
 PROMPT $E[41m
 GOTO EXIT
:BGREEN
 PROMPT $E[42m
 GOTO EXIT
:BBROWN
 PROMPT $E[43m
 GOTO EXIT
:BBLUE
 PROMPT $E[44m
 GOTO EXIT
:BMAGENTA
 PROMPT $E[45m
 GOTO EXIT
:BCYAN
 PROMPT $E[46m
 GOTO EXIT
:BWHITE
 PROMPT $E[47m
 GOTO EXIT
:EXIT
 SHIFT
 ECHO ON
 ECHO OFF
 CLS
 ECHO Please wait...
 IF NOT X==X%1 GOTO %1
 PROMPT $P$G
 CLS
 GOTO DONE
:HELP
 TYPE C:\BAT\COLOR.HLP
:DONE
```

FIGURE 1: COLOR.BAT CHANGES TEXT AND BACKGROUND COLORS of the DOS screen. Directions for its use are in its help file, shown in FIGURE 2.

```
ANSI.SYS must be in C:\DOS, and your
   CONFIG.SYS must contain the line
   DEVICE=C:\DOS\ANSI.SYS or the line
   DEVICEHIGH=C:\DOS\ANSI.SYS.
Type COLOR and your choice(s) of text
   color and intensity and background
   color (indicated by the B prefix),
   selected from these parameters:
For color displays:
      BLACK          BBLACK
      RED            BRED
      GREEN          BGREEN
      BROWN          BBROWN
      YELLOW
      BLUE           BBLUE
      MAGENTA        BMAGENTA
      CYAN           BCYAN
      WHITE          BWHITE
For color and monochrome displays:
      NORMAL
      BRIGHT
      REVERSE

For example: COLOR RED BRIGHT BGREEN
```

FIGURE 2: COLOR.HLP IS COLOR.BAT'S HELP FILE.

Your AUTOEXEC.BAT probably contains the command PROMPT PG, which instructs DOS to display the current path ($P) followed by the > (greater-than) character ($G). You can simply insert **$E[** followed by the ANSI.SYS command codes for the text and background colors you want (with a semicolon separating any two) and a lowercase **m** to terminate the command. For example, **PROMPT $E[30;46m$P$G** sets your DOS screen to black on cyan. You can even set the prompt to one set of colors and the rest of the screen to another by following PG with more ANSI.SYS codes (**PROMPT $E[37;1;44m PG$E[0;30;46m** yields a bright-white-on-blue prompt on a black-on-cyan screen). The 0 (normal attributes) before the 30 (black text) is needed so that the 1 (bright) following the 37 (white) doesn't turn the black text gray.

Trying out all the permutations of these codes would be tedious. Instead, use EDIT (DOS's editor) to create COLOR.BAT and COLOR.HLP (**FIGURES 1** and **2**) and save them in a directory listed in your AUTOEXEC.BAT's PATH command. COLOR.BAT is one long column and assumes that directory is called C:\BAT; if you save the files to a different directory, change that reference in COLOR.BAT's second-to-last line. Now at the DOS prompt you can issue commands such as COLOR RED BRIGHT BGREEN to see what bright red on a green background will look like (note the B prefix denoting green as a background color). COLOR.HLP lists the parameters COLOR.BAT accepts (you can see COLOR.HLP's contents on screen by entering COLOR without any parameters). There are even some commands for black-and-white (or LCD) screens.

Note that bright brown is the same as yellow; what you see depends on your monitor. Also, yellow cannot be a background color, and COLOR.BAT does not protect you from misspelled parameters, which may leave you temporarily without a DOS prompt. When you settle on text and background colors, look up their codes in COLOR.BAT's listing, and put them in your AUTOEXEC.BAT's PROMPT command.

By Scott Spanbauer

Scott Spanbauer is a contributing editor for PC World.

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SPREADSHEETS Q&A

Just Skip It

Q I like to create a label column in my Excel spreadsheets so when I sort my data, similar information is grouped together. The problem is, I end up with an entire column that repeats the same labels. It would be nice if I could easily clean up this column so only the first occurrence of a label shows. Crosstabs do this, but only for summary data. Do you know of an "identical suppress" macro for this kind of thing?

Tom Ruta, Calgary, Alberta, Canada

A While it's not exactly an identical suppress macro, there is a simple way to accomplish this task. Let's say you have two columns, as in **FIGURE 1**. One column contains regions, the other states—like the ones shown at the upper left of the figure—and you want to suppress the duplicate regions. First, insert a column to the right of your sorted column. To do this with the example, select column B and select *Edit•Insert*. In cell B2, enter the formula **=IF(A2=A1,"",A2)**. This formula displays a blank whenever the label in the current row of column A is identical to the one just above it; otherwise it displays the label itself. Copy the formula for each state: Highlight cell B2, select *Edit•Copy*, highlight cell B3, and select *Edit•Paste*. Now highlight cells B2 through B10 and select *Edit•Fill Down*. To tidy up your report, put the cell pointer in column A, highlight *Format•Column Width*, and click *Hide* to hide the redundant column A.

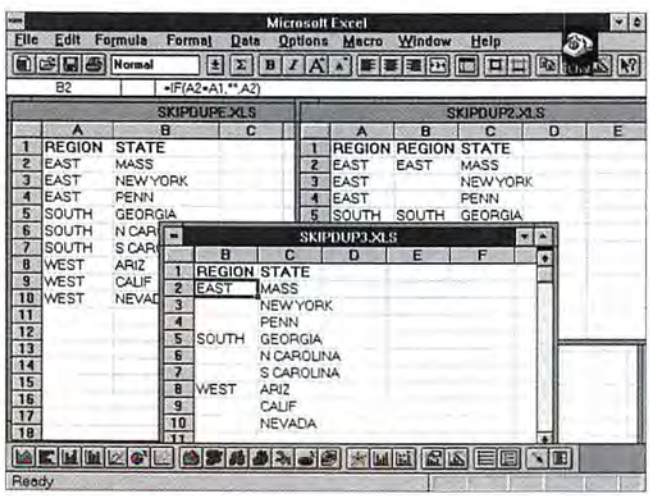

FIGURE 1: A TRICKY WAY TO CLEAN up redundant labels in a spreadsheet by seemingly suppressing the duplicates.

Vanishing Printer Setup in 1-2-3 for Windows

Q How can I save printer settings with my work in 1-2-3 for Windows? In 1-2-3 release 2.3, I could choose the page size (legal or letter) using WYSIWYG and save that setting with the worksheet. With 1-2-3 for Windows, I have to change the printer setup every time I switch from letter to legal or back again.

List Thomson, Dayton, New Jersey

A Unfortunately, 1-2-3 for Windows doesn't provide direct control of paper size. Its File•Page Setup dialog box lets you set the page header, page compression, and so on. And these settings are stored with your worksheet. But the File•Printer Setup dialog box—where you change the paper size—is not really a 1-2-3 for Windows dialog box. It's a general Windows dialog box, accessible from most Windows applications. And its settings are not saved with the worksheet. Most other applications provide document-specific controls that override the Printer Setup selections. 1-2-3 for Windows provides controls for page orientation, but not for paper size.

You can create an auto-start macro that brings up the printer dialog box when you open the worksheet. In a suitable cell, enter **{Alt}ft{Tab}~**. Select *Range•Name•Create*, enter **\0** in the Range name text box, and press **<Enter>**. Save your worksheet, and the next time you open it, you'll be in the default printer setup dialog box ready to change the paper size. Be sure to change the paper size back for the next worksheet.

Ask 1-2-3 How to Pay Off a Loan

Q In these days of plunging interest rates, my clients often want to know how soon they can retire their mortgage if they pay, say, an extra $100 every

Spreadsheet Toolbox

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month. Although 1-2-3 has an @TERM function, this problem would call for it to accept the present value (the current loan balance) in place of its normal future value argument. How can I perform this calculation using 1-2-3?
Manish Umarwadia, Gurnee, Illinois

A In 1-2-3 release 2.01 and later, you can use a negative number as the @TERM function's third argument (the future value). Let's say your client has a $100,000, 30-year mortgage at 8 percent per year, and her monthly payments are $733.76. Let's say she has paid off 180 of the 360 payments. First you would calculate the remaining balance using the formula **@PV(733.76,.08/12,180)**. The result is $76,781.08. Assuming an extra payment of $100 per month, you can calculate the remaining term using **@ABS(@TERM(833.76,.08/12,-76781.56))**.

To let your client see how different payments would affect the mortgage's term, put the formula **@ABS(@TERM(A1+733.76,.08/12,-@PV(733.76,.08/12,180)))** in B2. She can enter an amount by which she might want to increase her payment in A1 and see the term's remaining number of months in B2.

Data Labels in Excel Charts

Q I'm trying to build a bar chart with Excel that shows special text labels above each bar, the way my 1-2-3 graphs used to be. The only way I've

Master Class: Arrays That Count

Array formulas are one of Excel's least understood, least used, but most elegant features. They can reduce what would otherwise require several formulas to a single, simple formula that works on several cells at once. This month we'll introduce array formulas and use them to perform a couple common spreadsheet tasks. First we'll show how to count the number of times an item appears in a list or table—which would normally require either the Crosstab Wizard or the database function DCOUNTA—using a single array formula. Then we'll use the array function FREQUENCY to count the number of times certain values occur in a range.

An array is simply a range of cells containing a set of values. Array formulas work with these ranges in two ways. A single array formula operates separately on every cell in a range, and an array formula outputs a set of results to a range of cells.

Let's take a look at two examples of array formulas, using the worksheet in FIGURE 1. The first counts the number of employee evaluations for the Training department, and the second finds the number of evaluation ratings that fall between certain scores. To follow the examples, first enter the labels and numbers in the shaded cells of the sample worksheet or download the file ARRAYCT.XLS from the Featured in August folder on PC World Online. Next, build the set of logical formulas in column C: In C2, enter =(A2="Training")*1. The expression A2="Training" has the value TRUE when the word 'Training' appears in cell A2; multiplying it by one converts that logical value to a numeric one, as shown. Now—to copy the formula into cells C3 through C14—select the range C2:C14 and choose *Edit • Fill Down*. The result is a 1 in column C wherever 'Training' appears in column A. Now put the cell pointer in C15, and

double-click the sum button (shown at left) on the tool bar. Excel puts the formula =SUM(C2:C14) into cell C15 to add up the number of times 'Training' appears in column A.

Wouldn't it be nice if you could combine all those individual logical formulas and the sum function into a single cell? Well, you can with an array formula. Go to cell F5 and type the formula =SUM((A2:A14="Training")*1). Then, to enter it, hold down the <Shift> and <Ctrl> keys at the same time and press <Enter>. This key combination converts an otherwise ordinary formula into an array formula—notice the special braces ({}) that Excel has added to the beginning and end of the formula.

To understand the array formula, note that it works the same way as the formulas in column C: It compares each item in the array A2:A14 with the string "Training", multiplies each logical expression to convert it to either a 1 or 0, and then adds up the entire set of values. Neat. You can get a count for the Operations and Accounting department by typing in their sum formulas in cells F6 and F7, respectively. Just remember to replace "Training" with the proper department name in quotes and enter each formula with <Shift>-<Ctrl>-<Enter>.

Now for our second example of an array formula, let's turn to the numerical scores in column B. Here we're not interested in the absolute number of 12's, 7's, and so forth; we want to know the number of employee evaluation ratings that fell between 0 and 5, between 5 and 10, and so forth. A single array formula can produce all the answers at once. Select the range F10:F14, type the formula =FREQUENCY(B2:B14,E10:E14), and press <Shift>-<Ctrl>-<Enter>. Now peruse the formula bar for each cell (F10 through F14). What appears to be a set of five formulas is really a single formula, spread across all five cells. Again, notice the braces that denote an array formula.

Arrays aren't hard once you get the knack, and with a bit of experience, you'll find yourself using them more and more.

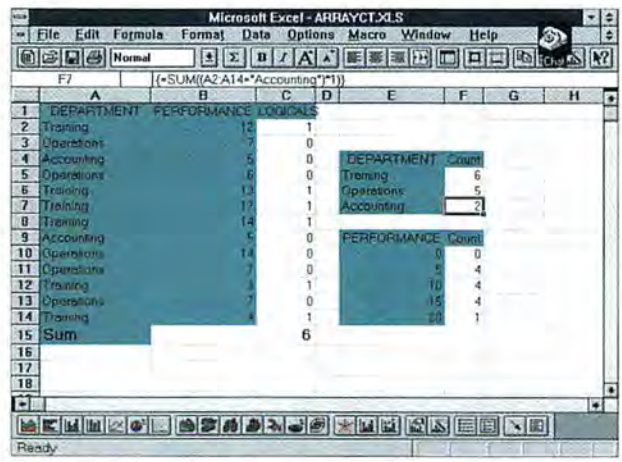

FIGURE 1: ARRAY FORMULAS can do what would otherwise take several formulas and many cells with a simple formula and a single cell.

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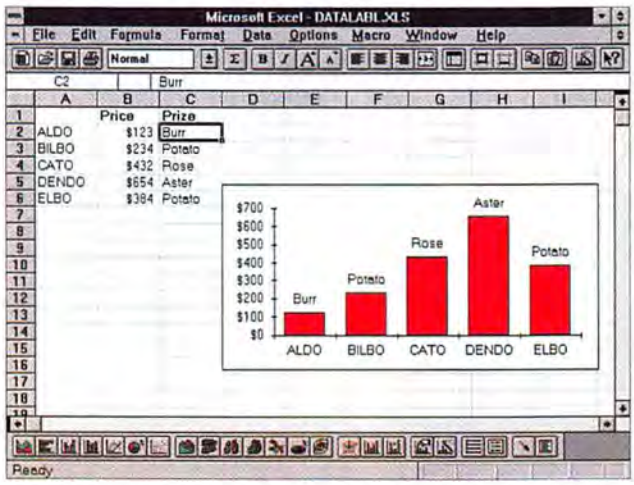

FIGURE 2: USE EXCEL'S 1-2-3–COMPATIBLE MENU to attach a text label above each bar in a chart.

Irritating, isn't it? Especially since this was so easy to do with 1-2-3's Data Labels command. Hey, wait a minute! Doesn't Excel have a 1-2-3-compatible menu system that can perform that same command? Yes, indeed, and therein lies the solution.

Let's say you've entered the data shown in **FIGURE 2** in the range A1 through C6. Select *Options•Workspace*, and make sure that the Alternate Menu or Help Key box has a backslash (/) in it and that the 'Lotus 1-2-3 Help' radio button is filled. Click *OK*. Now, select cell A2 and type /. The 'Help for Lotus 1-2-3 Users' dialog appears. Make sure the Demo radio button under Help Options is filled. Type **G** to select Graph, then press **X**, select the range A2:A6, and press **<Enter>**, then **A**. Select cells B2 through B6 and press **<Enter>**. Press **T** for Type and **B** for Bar chart. Ignore the screen activity that ensues. Then type **O** for Options, **D** for Data Labels, and **A** to attach the labels to the first series. Select cells C2 through C6 and press **<Enter>**. Now type **/G** again, then **S** to save and **A** to attach. Drag a rectangle in your worksheet to display the graph object and press **<Enter>**. Press **Q** to quit the menus, and there's your graph, complete with labels over each bar.

found is to use the chart menu command *Chart•Attach Text* and enter the text for each bar individually. But I have about 40 bars to annotate. This method seems unnecessarily tedious. Isn't there a way to tell Excel to pick up the labels from a range of worksheet cells?

Susanne Miller, Washington, D.C.

By Richard Scoville

PC World *contributing editor Richard Scoville is a software training consultant in Chapel Hill, North Carolina.*

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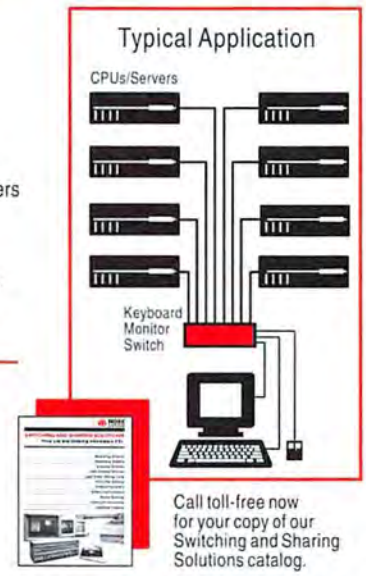

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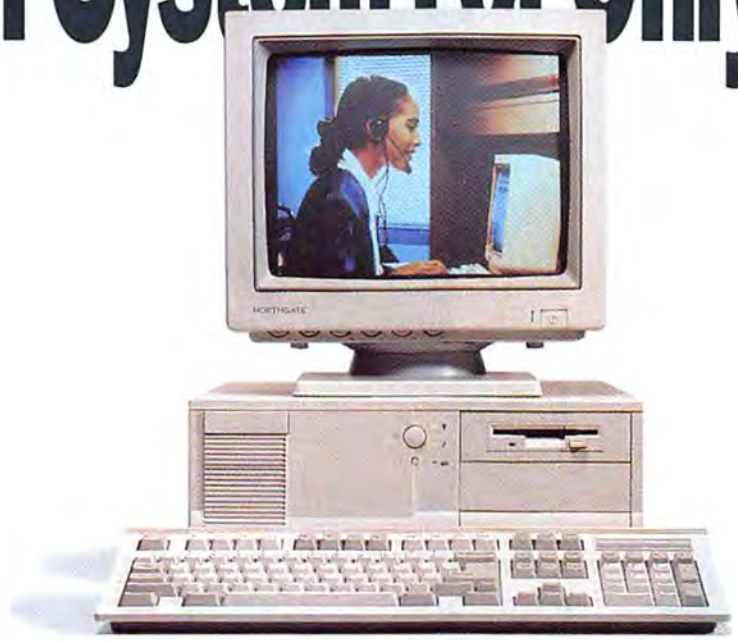

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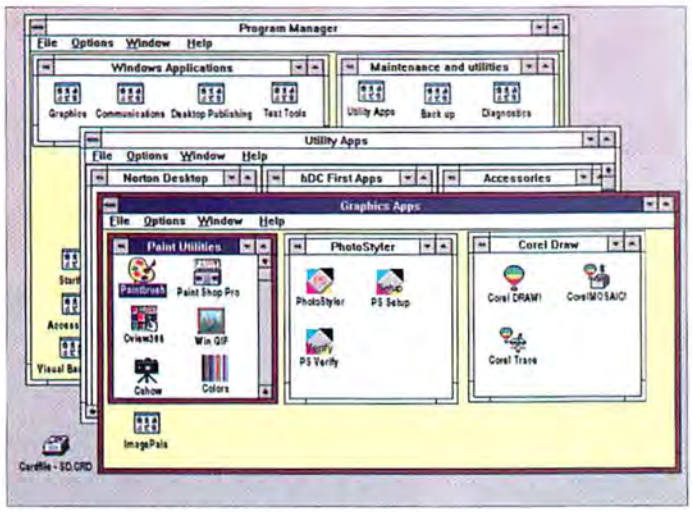

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Next launch Windows Write, open PROGMA2.EXE, and when asked to convert the file, click *No Conversion*. Choose *Find•Replace* and type **PROGMAN.INI** in the Find What text box and **PROGMA2.INI** in the Replace With text box. Click *Replace All*.

Now, to customize your new subgroup's title bar, type **Program Manager** in the Find What text box. In the Replace With text box, type a descriptive name. This name *must* have the same number of characters as 'Program Manager' (15, counting the space). For example, if you enter the name 'Graphics Apps', you must follow it with two spaces so the field holds exactly 15 characters. Click *Replace All*. Then click the *Close* button, and select *File•Save*.

Now you'll need to edit the INI files. Open PROGMAN.INI in Write and click *No Conversion*. Locate the [Groups] section and remove any Group= lines that refer to groups you're turning into subgroups. In this example, you would delete the line for the Accessories group, Group1=C:\WINDOWS\ACCESSOR.GRP (the group number will vary). Now renumber the remaining lines in the list in sequence, starting with 1 (Group1=, Group2=, and so on). Finally, jump up to the Order= line in the [Settings] section and make sure that the numbers following it correspond to the numbered items in your group list (the order of their appearance here isn't important). Save PROGMAN.INI.

Open PROGMA2.INI and click *No Conversion*. Go to the [Groups] section and remove every Group line that's already in PROGMAN.INI. Leave only the ones that refer to your new subgroups—in this example, the line for C:\WINDOWS\ACCESSOR.GRP. Renumber the groups in order, starting with 1. Jump to the [Settings] section and make sure the numbers that follow the Order= line match the group numbers listed below. In this case, Order=1. Save PROGMA2.INI and exit Write.

If you normally have Save Settings on Exit checked on Program Manager's Options menu, uncheck it now. (If you leave it checked, Windows will undo the changes you just made to PROGMAN.INI.) Exit and restart Windows. After restarting, you can check *Options•Save Settings on Exit* again.

Now select the group that will hold your new subgroup, in this case, the Applications group. Choose *File•New*, select the Program Item radio button, and click *OK*. In the Description text box, enter the subgroup name, such as 'Graphics Apps'. In the Command Line text box, enter **PROGMA2.EXE**. For the final, cosmetic touch, give your subgroup a group icon. Click the *Change Icon* button, scroll to the eighth icon to the right (or any other icon that catches your fancy), and click *OK* twice to confirm your changes. You're finished.

Some caveats: When you double-click the new subgroup icon, you'll discover that you're essentially loading a complete copy of Program Manager. If you close this copy (as opposed to minimizing it), you'll be invited to exit Windows. If you have any programs listed on the load= or run= lines of WIN.INI, Windows will also attempt to launch them every time you open a subgroup. But aside from these quirks, you now have fully functioning subgroups in Program Manager. Enjoy.

Slipping Through the Norton Search Net

Q I like Norton Desktop's extra functionality, but I've discovered a problem with the SuperFind function. When I search for a file that I know is on my hard drive, the program digs through every directory and comes up blank, saying '0 Found'. I clicked the More button and made sure that the Attributes check boxes were all empty so it wouldn't take those file attributes (Read Only, System, Hidden, and so on) into account, but to no avail. Why does it find some files and not others?
Hal Ashton, Boston

A You don't want the check boxes to be blank; that tells SuperFind to locate only those files that do *not* have these attributes. To make sure SuperFind ignores all attributes, the check boxes must be gray. Click each box in the Attributes section once or twice until it turns gray. Then try running your search again.

By Scott Dunn

Scott Dunn is a contributing editor for PC World *and co-author of* 101 Windows Tips *(Peachpit Press, Berkeley, California, 1992).*

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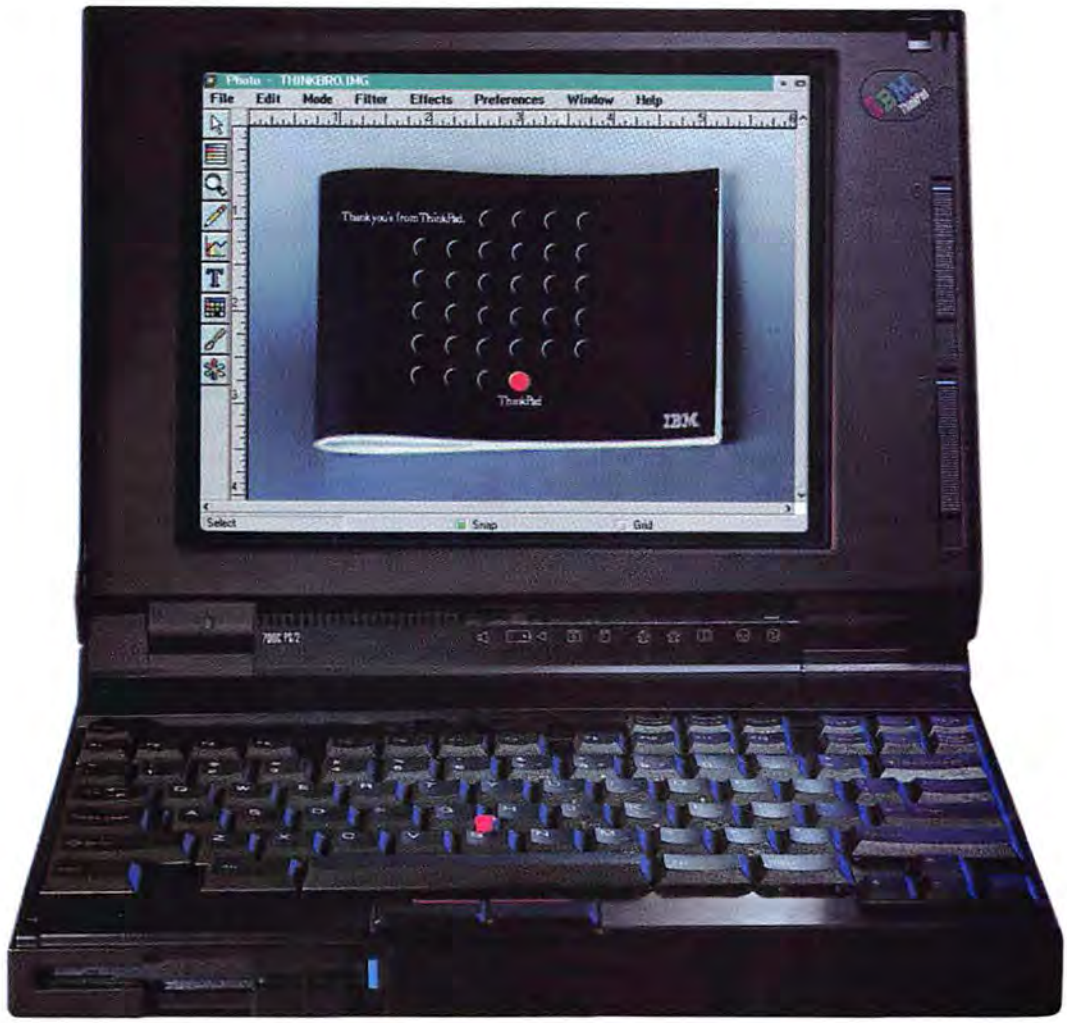

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entry, I selected *File•Template* and specified that glossary entries be available in all documents, but it didn't work. If I use another template, my signature block glossary entry doesn't appear. What am I doing wrong?
Eric Rigby, Fernie, British Columbia

A You left out just one step. No doubt you saved the template file, but that's not quite enough. Here's the correct procedure for creating and saving a global glossary entry that will appear in *every* template:

Start by typing the text that you want to include in the glossary entry, and then select the text. Choose *Edit•Glossary*, type an abbreviation for your text in the Glossary Name text box, and select *Define*. Next, select *File•Template*, check the Global (Available to All Documents) radio button, and click *OK*.

And now for the missing step: Select *File•Save All*. You can choose *No* when you're asked whether to save changes to the current document, but answer *Yes* when you're asked if you want to save the global glossary and command changes. Once you've done this, you'll find those elusive glossary shortcuts in every template.

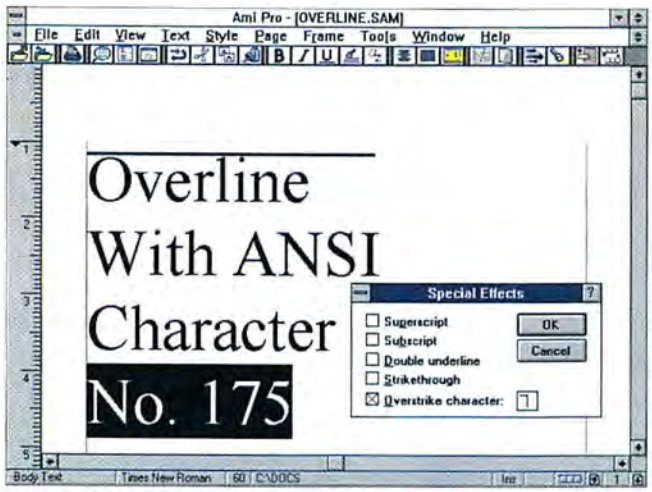
Over the Line in Ami Pro

Q I use Ami Professional 3.0 for all my word processing and occasionally need to add a line over some text. It's just like an underline, but instead of being under the character, it needs to be just above the character. I could do this in the equation editor in WordPerfect 5.1 for DOS, but that doesn't work here. I tried putting the text in a frame, then adding a line to the top of the frame, but it's not the effect I want. Can Ami Pro do this job?
Marcus Whidbey, Topeka

A Absolutely. Here's what to do: Type the text you want overlined as you normally would, then select it. Now choose *Text•Special Effects*. In the Special Effects dialog box, click in or tab over to the empty box to the right of the Overstrike character checkbox. Hold down the **<Alt>** key while you type **0175** on the numeric keypad (the top-row numbers won't work). Release the <Alt> key and click *OK*. You'll see the line over your text on the screen, and it will print correctly.

Unfortunately, Ami Pro's otherwise outstanding Fast Format feature won't copy this overline formatting, and there's no way to add it to a style. Consequently, you'll have to manually format text this way each time you want to produce overlining.

Note that not all fonts contain this overstrike character. If the text on your screen looks incorrect after you perform the steps above, you'll need to find a font with the correct character. Most normal TrueType and PostScript text fonts include an overstrike character. Try experimenting with different fonts to get the effect you want, since the spacing of the line above the text will vary from font to font.



AMI PROFESSIONAL LETS YOU ADD A LINE above text and spaces.

From Footnotes to Endnotes

Several readers wrote about an answer I gave in the March 1993 issue. I offered a method for converting WordPerfect 5.1 for DOS footnotes into endnotes. While my solution worked fine, I neglected to notice that WordPerfect ships two handy macros, FOOTEND.WPM and ENDFOOT.WPM, with every copy of the program. In one step, these macros do the same job I did in several. To use either of the macros, simply press **<Home><Home><Up>** to move to the beginning of the document, then press **<Alt>-<F10>**, type FOOTEND or ENDFOOT, and press **<Enter>** to convert footnotes to endnotes or vice versa. For my sins, I promise to do all my word processing in EDLIN for one week. Thanks to the readers who pointed out my slip.

George Campbell is a contributing editor for PC World.

• *Mail your word processing questions to* Word Processing, PC World, *501 Second St. #600, San Francisco, CA 94107; or send them electronically to the Word Processing forum on PC World Online (see page 12 for more information); CompuServe, 71571,222; MCI Mail, GCAMPBELL; or 415/442-1891 (fax).* PC World *pays $50 for published questions. Sorry, we cannot acknowledge unpublished materials.*

USER GROUP TIP

Graphic Envelopes in WordPerfect

If you want a bar code or another graphic on an envelope but want to avoid the complicated routine of modifying the envelope macro, try this easy solution in WordPerfect for Windows 5.2. Open the document that includes the graphic you want to use/import, then select Macro • Play • envelope.wcm. In the Options section of the resulting dialog box, check Append to Document and uncheck Print Envelope. Type in an address if necessary, then press OK. WordPerfect will insert your envelope at the end of your file, where it's a simple matter to copy and position the graphic and then print that page.

Lee Schwab
Napa Valley PC User's Group

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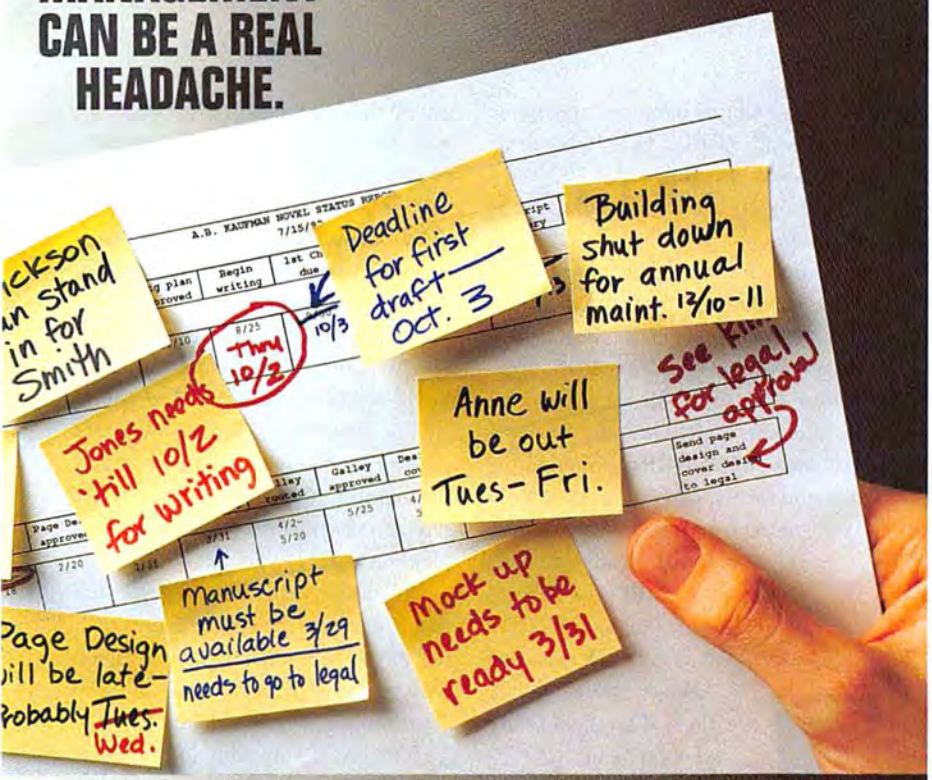
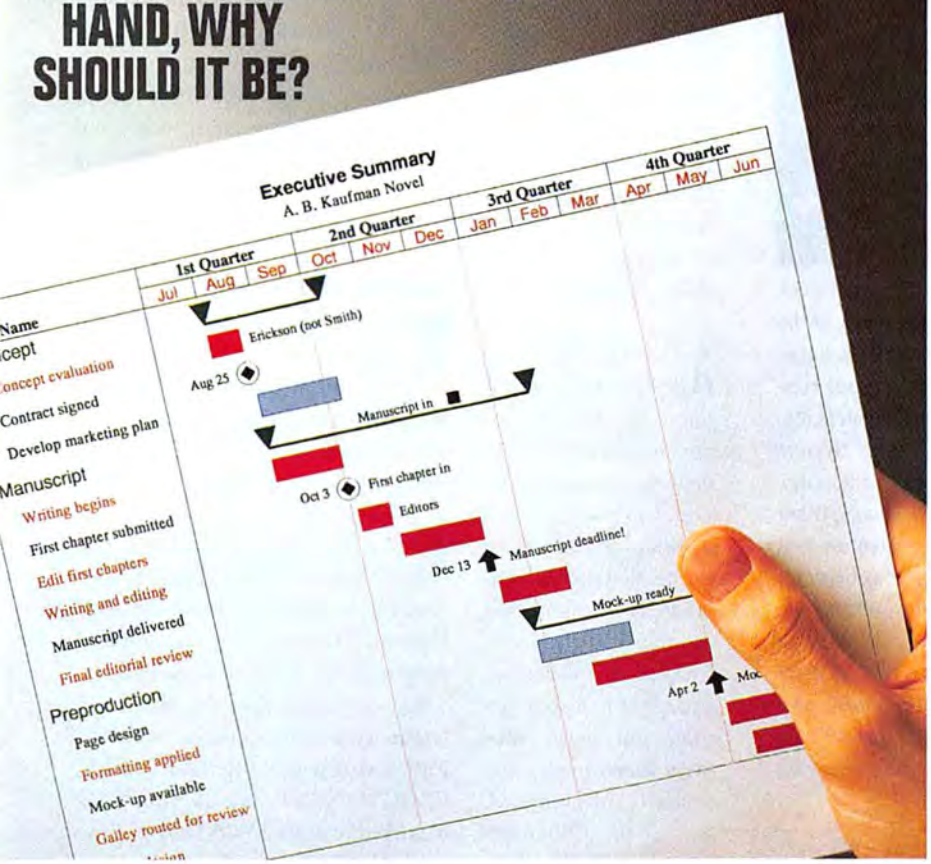


ON THE OTHER HAND, WHY SHOULD IT BE?



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WINDOWS Q&A

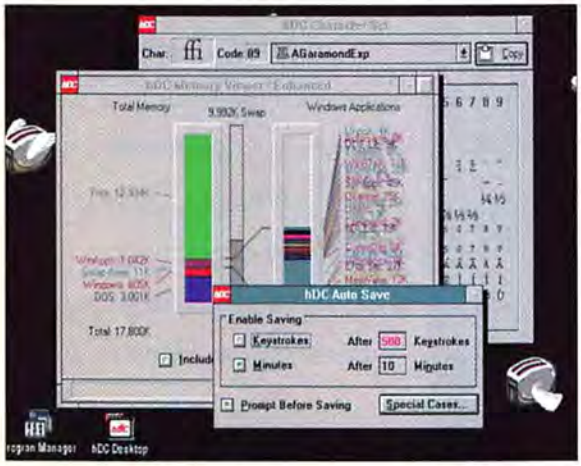
OLE Gone Astray

Q I have recent copies of Excel and Word for Windows and upgraded to Windows 3.1 to take advantage of Object Linking and Embedding (OLE). But now I can't get the OLE features to work. What's going on?
Brad Smith, Glendale, California

A If you upgraded to Windows 3.1 *after* installing OLE-compatible software, chances are Windows' registration database doesn't have the information it needs for OLE to work correctly. However, it's a simple matter to update the database file (REG.DAT) in the same directory as Windows.

First, open the Registration Editor, found in your WINDOWS/SYSTEM directory. In File Manager or Program Manager, choose *File•Run*, type **REGEDIT**, and click *OK*. When the Registration Editor opens, choose *File•Merge Registration File*. In the dialog box, locate the appropriate REG file for Word for Windows—WW20.REG, found in the directory in which you installed WinWord. Select it and click *OK*. Repeat for Excel, using the file XL4.REG in Excel's main directory. Then exit the Registration Editor when you're done. This should solve your problem.

Windows Toolbox



With version 2.0, hDC has turned its plucky FirstApps utility collection into a robust array of fun and useful tools. Many of the new gizmos are adaptations from hDC's FileApps package, including File Search and File Enhancer Plus, which place common file tools, such as copy, create directory, and undelete file, on the control menu of every application. With System Enhancer, you can use the control menu to close or arrange windows or run a macro written with hDC's macro language. Other nifty features include an alarm clock, an auto-save feature that works with any application, Disk Share for transferring files over a serial or parallel cable, and Memory Viewer for spotting the RAM hogs on your system. For fun, the product includes an Asteroids-like game, and a utility that turns any After Dark screen saver image into animated wallpaper that runs as a desktop background while you work. Available for $99.95 from hDC Computer Corporation, 6742 185th Ave. NE, Redmond, WA 98052; 800/365-8553, 206/881-9770 (fax).

Reader service no. 750

The Invisible Calendar

Q Why can't I print the actual calendar (not the daily appointments list) in Windows' Calendar accessory? If I print while the month view is on screen, all I get is a blank page with 'Untitled' at the top.
Nick George, Reno, Nevada

A The Calendar was designed to output only the daily list of appointments. To generate the actual calendar grid, you must perform a print screen, then dump that image into another program that can print it.

Open the Calendar, press **<F9>** to display the grid, and press **<Alt>-<Print Screen>** to copy the image to the clipboard. Switch to a Windows word processor or desktop publishing program that can accept graphics from the clipboard (most can), open a new file if necessary, and press **<Shift>-<Insert>** to paste in the picture. If the program allows it, crop and resize the calendar, then output it on a printer that supports graphics.

You could paste the calendar image into Windows Write, but if you use a high-resolution video driver (anything above 640 by 480 resolution), Write will probably choke when you try to print. Switching to Windows' generic VGA driver would fix the problem, but a simpler solution is to paste the calendar into Windows Paintbrush instead. Just make sure you maximize Paintbrush before you paste the image, or it will be whacked off at the bottom. Select *File•Print* and voilà—you're done.

However, if you want the calendar printed full-page and minus the clutter (like Calendar's menu bar), select *just* the calendar with Paintbrush's scissors tool, then click *Edit•Copy To* and supply a file name, like CAL.BMP. Load CAL.BMP back into Paintbrush using *File•Open*, select *File•Print Setup*, select the Landscape radio button, and click *OK*. Select *File•Print*, set Scaling to **200** percent, and click *OK*. You'll get a jumbo version that's easier to read.

Create Groups Within Groups

Q My Program Manager is cluttered with hundreds of icons in dozens of groups. Can I nest some groups inside others for neater organization?
Louise Hannover, Grand Forks, North Dakota

A Not in Windows 3.1, although shells like Norton Desktop offer this function. But by making custom copies of Program Manager, you can simulate subgroups and eliminate some clutter.

Say you want to place the Accessories Group within the Applications Group. First, save copies of PROGMAN.EXE, PROGMAN.INI, and all your GRP files (they're in your WINDOWS directory) to a floppy or another directory.

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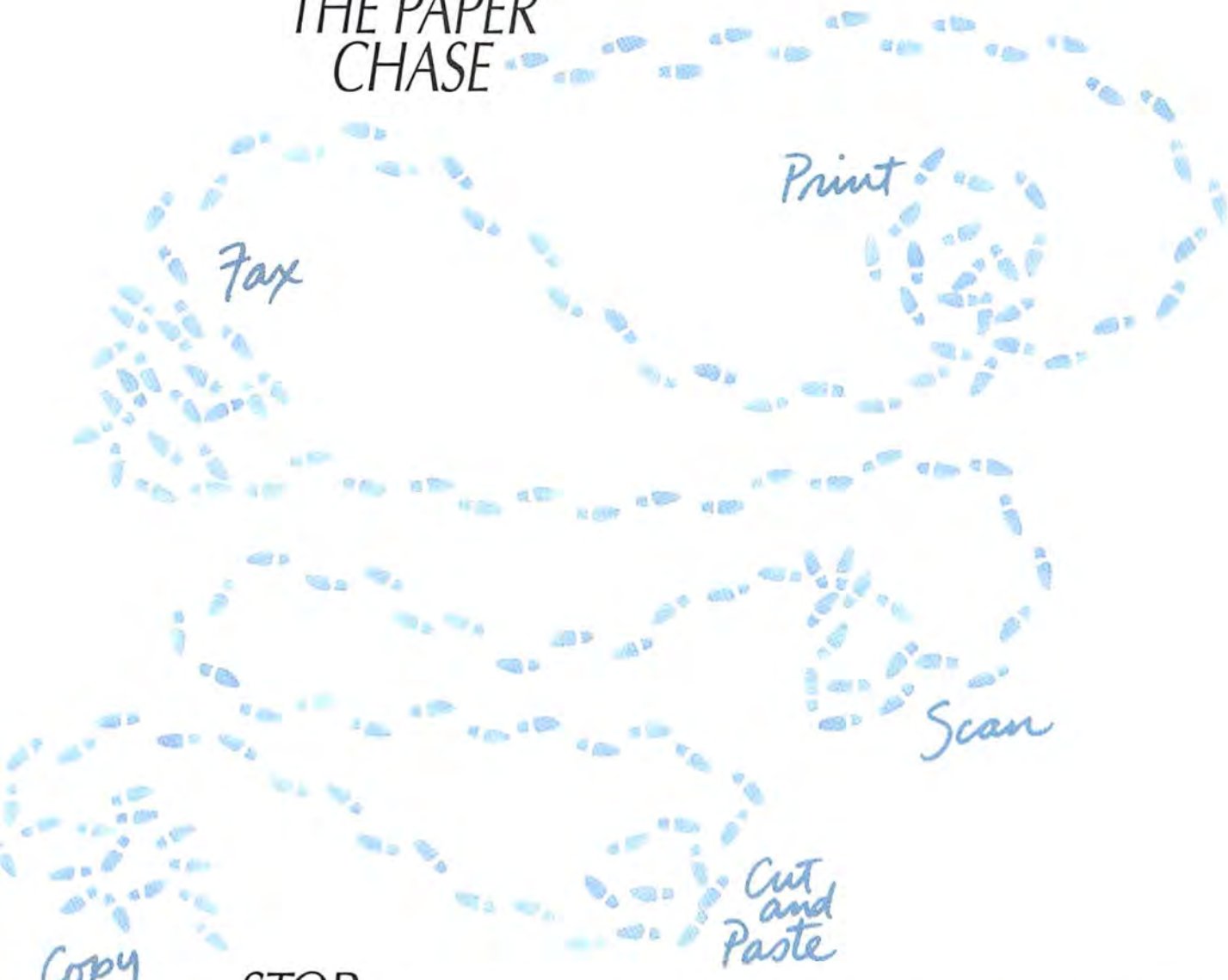

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WORD PROCESSING Q&A

Font Sizes in WordPerfect for DOS

Q I have trouble getting WordPerfect 5.1 for DOS to print in different sizes. I use a Panasonic KX-P1124 printer, but when I specify different font sizes using the <Ctrl>-<F8>S command, I don't get what I want. For example, the Large, Very Large, and Extra Large settings produce the same size of type. I'm not sure what to do here. Can you help me print the larger type I need?

Daniel Vedamuthu, Bradenton, Florida

A WordPerfect tries to give you what you want but is limited by your printer. Since WordPerfect can't *create* fonts, it can use only the fonts on your printer. In your case, the largest size available shows up in all three of the large settings you mentioned.

Assuming you don't want to switch to a Windows word processor that includes built-in TrueType fonts, you could get a program like MicroLogic's $99.95 TrueType for DOS. The program works directly with WordPerfect to produce 36 fonts, all of which can be scaled from 2 to 999 points, and even offers special effects like shadows and outlines. You can use normal WordPerfect commands to access all of the fonts. Contact MicroLogic Software at 800/888-9078.

Where's the Repeat Key in WordPerfect for Windows?

Q One of my favorite features in WordPerfect 5.1 for DOS lets me repeat a keystroke or macro by pressing <Esc>, then typing a number at the Repeat Value prompt to indicate how many times I want to repeat the action. Now I've switched to WordPerfect 5.2 for Windows, and I can't find this function in the program. It's hard to believe WordPerfect would leave out such a useful feature. Is there an equivalent command in the Windows version?

A To the dismay of many users like yourself, WordPerfect eliminated the Repeat feature from its Windows versions. The problem is that the <Esc> key is reserved in Windows and can't be reassigned by a program. Since the function no longer exists in WordPerfect for Windows, you'll need to write a macro to do the same job.

Start WordPerfect for Windows with a blank screen, and type the lines in **FIGURE 1** exactly as they appear. You can indent lines while entering the macro by pressing <Tab>.

Before you can use the macro, you have to save it in the directory in which WordPerfect stores its macros. To find that directory, select *File*•*Preferences*•*Location of Files*. Make a note of the directory listed in the Files field, then select *Cancel* to return to the editing screen. Now, choose *File*•*Save As*, type REPEATWCM in the Save As text box, select the macro directory you noted in the Directories text box, and select *Save*. Select *File*• *Close* to remove the macro code from the screen. Now you have an equivalent for the old WordPerfect Repeat command, which will work in WordPerfect for Windows versions 5.1 and 5.2.

To make the macro easier to use, assign it to the WordPerfect for Windows Macro menu. After saving the macro, select *Macro*•*Assign to Menu*. In the dialog box, select *Insert*, then type REPEATWCM in the Macro Name text box, and Repeat in the Menu Text text box. Select *OK* twice.

To use the macro after assigning it to the menu, select *Macro*•*Repeat*. In the first dialog box that appears, type the number of repetitions you want, then click *OK*. In the next dialog box, type a character or phrase you want to repeat, or leave this text box blank if you want to run a macro, then select *OK*. Any characters you've typed will appear in your current document repeated the number of times you specified. If you left this dialog box blank, you'll see a new dialog box. Type the name of the macro you want to execute here, then click *OK*. The macro you chose will run the number of times you specified. Note: New macros *must* be run from the Macro menu (to compile them) before this Repeat macro can use them. Also, some macros, such as the BULLETWCM macro included with WordPerfect, contain internal commands that prevent them from being repeated.

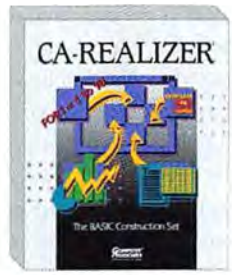
```
Application (WP;WPWP;Default;"WPWPUS.WCD")
GetWPData (MacroPath;MacroPath!)
GetNumber (Rept;"Repeat how many times?";"Repetitions")
GetString (ReptChar;
 "Type characters to repeat or leave blank to run macro";
 "Repeat Character")
If (ReptChar = "")
     GetString (Macname; "Enter Macro name: ";
 "Macro to Repeat")
     If (Macname = "")
          Quit
     EndIf
     For (Count; 0; Count<Rept; Count+1)
          Run (MacroPath + Macname)
     EndFor
Else
     For (Count; 0; Count<Rept; Count+1)
          Type (ReptChar)
     EndFor
EndIf
Quit
```

FIGURE 1: THIS WORDPERFECT FOR WINDOWS MACRO repeats characters or a macro, just like WordPerfect for DOS's <Esc> key.

Missing Glossary Shortcuts in WinWord

Q Word for DOS's Glossary feature lets me store fragments of text I use often and then insert them in documents by typing a keyword and pressing <F3>. But I'm confused by the way Word for Windows 2.0 handles glossary entries. After creating a signature block for my letters and making it a glossary

OS/2 The Limit.



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DATA MANAGEMENT Q&A

Getting Out of a Jam With dBASE Labels

Q Every now and then, my printer jams when I'm using dBASE III Plus to print labels. When I get the printer back on line, is there some way to make dBASE restart the printing where it left off, rather than at the beginning of my database? I do all my printing either in alphabetical order or by ZIP code.

Blaine A. Fuhrman, Schaumburg, Illinois

A Printer jams can waste a lot of labels, especially if you have to print your whole list over again. Here's a short program that lets you start printing from any name or ZIP code in your database. To create the program, enter the text in **FIGURE 1** in an ASCII text file called RESTART.PRG; to use the text editor that comes with dBASE, enter **MODIFY COMM RESTART** at the dot prompt. As you enter RESTART.PRG, replace the field names "'Last"' and "'Zip"' in the third and fourth lines with the names of your last name and ZIP code fields, retaining the quotation marks, and replace the word 'Lablist' in the last line with the name of your label format. You can also download RESTART.PRG from PC World Online.

Next time your printer jams, correct the source of the problem and enter **DO RESTART** at the dot prompt. RESTART.PRG first asks you if your records are ordered by name or by ZIP code, then it has you enter the name or ZIP code of the last record that printed successfully. If you're working with names, be sure to enter the name exactly as it appears in your data file: If the name is Brown, typing brown or BROWN won't work. The program assumes that the proper data file and index are already in place from your earlier printing attempt.

You didn't say how you're selecting which records to print, so I couldn't incorporate that in the program. You can change the last line of the listing to place additional restrictions on how dBASE determines which records it should print. For example, if you're printing labels only for people in Schaumburg, change the last line to **LABEL FORM Lablist FOR &fldname > startval .AND. City = "Schaumburg" TO PRINT.**

```
* RESTART.PRG  Program to restart printing
*      labels after specified record
NameChoice = "Last"
ZipChoice = "Zip"
CLEAR
@ 10,30 SAY "(N)ame order"
@ 12,30 SAY "(Z)IP order"
WAIT TO rptorder
IF UPPER(rptorder) = "N"
  fldname = NameChoice
 ELSE
  fldname = ZipChoice
ENDIF
CLEAR
startval = SPACE(20)
IF fldname = NameChoice
  @ 10,10 SAY "Enter last Name that printed OK:"
 ELSE
  @ 10,10 SAY "Enter last ZIP that printed OK:"
ENDIF
@ 10,45 GET startval
READ
GO TOP
LABEL FORM Lablist FOR &fldname > startval TO PRINT
```

FIGURE 1: RESTART AN ABORTED PRINT JOB where you left off by using this simple dBASE program.

Colorizing dBASE III Plus

Q Each time I load dBASE III Plus, the screen colors are gray and white. I know that I can change the colors to pleasing blues and blue-greens if I use the command SET COLOR TO W/B, W+/BG, but I haven't been able to figure out how to make these the default screen colors. Is there a way to do this?

Frank Conrad, Littleton, Colorado

A You can use the ASCII text file CONFIG.DB, located in your DBASE directory, to customize your setup. Edit or create CONFIG.DB with any text editor (enter **MODIFY COMM CONFIG.DB** at the dot prompt to use the one built into dBASE). When you have the file up, add a new line: **color = w/b, w+/bg,** save the file, and exit the editor. Next time you load dBASE, you'll get your preferred blue and blue-green screen. CONFIG.DB's color = command takes the same arguments as dBASE's internal SET COLOR TO.

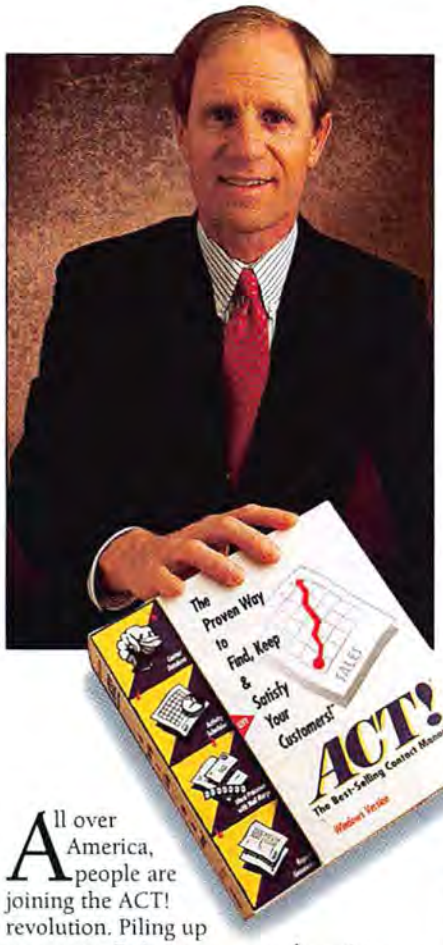
Eliminating Duplicate Records in Paradox

Q I use Paradox 4.0 to track bills and payments. At the end of each month, I copy the records in my BILLS table to another table called OLDBILLS, then I empty BILLS to start the new month. But I accidentally added one month's records to OLDBILLS twice. Is there an easy way to delete the duplicate records?

Judy Greenfield, New Orleans

A If you add a *primary index* to OLDBILLS, you'll both eliminate those duplicate records and prevent the problem from happening again. A Paradox primary index keeps records sorted according to one or more key fields and insists that the combination of all key fields be unique for each record. First, look at OLDBILLS' structure and decide which fields make up a unique key. For example, if you have a Due Date field and a Payee field and you don't have more than one bill due to the same person on the same day, you could make both of these key fields.

The next step is to set up your key fields and the primary index. Select *Modify•Restructure,* and load your OLDBILLS table. Your desired key fields must be the first fields listed in the table structure. To move a field, go to the top of the field list and press **<Insert>**, which creates a place for a new field; then in the Field Name column, type in the name of the field you want



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to move. When you press <Enter>, Paradox will move the existing field. To make the field a key, enter an asterisk (*) after the field type. Press <F2> when you've moved and identified all your key fields, and Paradox will update the form. As soon as you've saved the new structure, Paradox will move any records with duplicate key values to a temporary table called KEYVIOL, which will automatically be deleted when you exit Paradox.

The next time that you use Tools•More•Add to add records from BILLS to OLDBILLS, Paradox will display a menu with the choices New Entries and Update. New Entries places any duplicate records in a KEYVIOL table, while Update replaces any old records with new records that have matching keys. Either way, you won't end up with duplicates in OLDBILLS.

Avoiding Duplication of Data With FileMaker Pro

Q I'm a librarian, and I use FileMaker Pro to catalog books. Each book needs a complete set of cards: one author, one title, one shelf list, and several subject cards. I haven't been able to figure out how to input multiple subjects without ending up with multiples of each card. Can you help me? *Francine Heiks, Mobile, Alabama*

A FileMaker Pro lets you report on only one file at a time, so you'll have to type your author, title, and shelf information on each subject card record, duplicating the information. But FileMaker can do the grunt work of copying the data.

First, fill out a form for a book's first subject card. Then, if you need to create another subject card for the same title, select *Edit•Duplicate Record* from FileMaker's menus. This step will create a new record with the same data as the old one, and all you have to do is change the subject.

This sort of duplication is never really a good idea—it wastes disk space and makes future changes in the data difficult—but with FileMaker there's really no other solution. A more relational database program such as Approach Software's Approach or Microsoft Access would let you store subject information separately from everything else, bringing everything together when you print the cards and thus eliminating the duplication problems. Of course, a more relational program would probably be harder to set up and learn, so it's a trade-off.

In your case, the duplication shouldn't be too much of a problem—book information isn't likely to change much. Just be sure to change every record for a particular book if its shelf location (or other information) needs to be updated.

By Celeste Robinson

Celeste Robinson is the author of The Paradox 4.0 Handbook *(Bantam Computer Books, New York, 1992) and a contributing editor for* PC World.

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Circle 145 on reader service card

PUBLISHING & PRESENTATIONS Q&A

PageMaker Copying Made Easy

Q I want to copy multiple blocks of text from a PageMaker 4.0 document and paste them into other PageMaker documents. But the copy-and-paste method I'm using—open document 1 and copy the text, close document 1, open document 2 and paste the text—is tedious. Can you suggest a faster technique?

Peter Wittreich, Chicago

A First, I recommend that you upgrade to PageMaker 5.0. It lets you open two or more documents at once so you can copy and paste text blocks more easily from one document to another.

In the meantime, however, try PageMaker's Place command. It includes a filter that lets you view and import text from other PageMaker 4.0 documents (files with PM4 extensions) without making you open the original document. To use this technique, open the PageMaker document you want to copy text into and follow these steps:

1. Select *File•Place* to open the Place File dialog box. Locate and select the PageMaker PM4 file you want to copy text from, and click *OK*.

2. In the Place PageMaker Stories dialog box, select the story that contains the text you want to copy, and click *View*. PageMaker will display the text in a pop-up View Story window. If you aren't sure which story to select, click the *Select all* and *View* buttons, and PageMaker will display as many as ten of the text files in cascading windows.

3. In the View Story window containing the text you're after, use the mouse to select the portion you want to copy, and choose *Edit•Copy* from the View Story menu bar. Press **<Alt>-<F4>** to close each View Story window, then click *Cancel* in the Place PageMaker Stories dialog box.

4. Back in your current PageMaker document, select the Text tool, insert the cursor where you want to paste the text, and choose *Edit•Paste*.

You can also use this method to import an entire story from one document into another by clicking *OK* (instead of *Cancel*) in the Place PageMaker Stories dialog box in step 3.

Multiple Indexes With Ventura

Q I use Ventura Publisher 4.1 to produce a movies-on-video catalog. In addition to a title index, I want an actor index. But Ventura doesn't support multiple indexes. Got any ideas?

Joanne McMahon, Albany, California

A It's true that Ventura won't do multiple indexes. But you can use Ventura's sort key to get a single index that groups the actors together and the movie titles together.

The sort keys override an entry's alphabetical position. For a title index, for instance, you can use a sort key to alphabetize *The African Queen* under *A*. If you use numbers with the sort keys, you can divide entries into separate groups within the same file. The following steps explain how to produce indexes for the movie catalog. You can do the same for any publication that requires multiple indexes.

1. With your Ventura chapter open, select the Text tool and insert the cursor before or after the text you want to reference in the first part of the index—such as the actors.

2. Select *Text•Insert Special Item•Index Entry* to open the Insert/Edit Index Entry dialog box. For this example, we'll create a reference for Katharine Hepburn in *The African Queen*. Type **Katharine Hepburn** in the Primary Entry text box, **0Hepburn** (the actor's last name preceded by a 0) in the Primary Sort Key box, **The African Queen** in the Secondary Entry box, and **African Queen** in the Secondary Sort Key box. Click *OK*.

3. To reference an entry that belongs in the second part of the index—in this case, the movie's title—insert the cursor before or after the text you want to reference, and repeat step 2, this time *without* adding a 0 to the sort key. For example, type **The African Queen** for Primary Entry and **African Queen** for Primary Sort Key. Click *OK*. No secondary entries are required.

Repeat step 2 or step 3 for each additional index entry. After you've inserted all the index entries in your document, generate the index file. All the actors will be listed first (the zeros won't show). Now simply load the index file into your document and format the text. You can easily break this one long index into two indexes.

Flashy Freelance Graphics Presentations

Q I use Freelance Graphics for Windows 2.0, and I want to liven up a presentation by creating a sequence of screens in which each successive image reveals a new line of bulleted text. I also want to add a clip art symbol, such as a hand, that points to each new bulleted line when it is revealed. What's the best way to create these effects?

Mindy Mellini, Carmichael, California

USER GROUP TIP

Steady Mouse in CorelDraw

When moving an object in CorelDraw, you can lock the motion to a vertical or horizontal axis by holding down <Ctrl> while you drag the mouse. But if you're moving the object a small, precise distance, Corel isn't sure whether you want to lock out horizontal or vertical movement. The object jumps back and forth as you try to place it exactly.

The solution is to hold down <Ctrl> while you quickly move the object a longer distance on the axis than you want it to go. With <Ctrl> still down, release the mouse button, click the object again, move it back to the area you moved it from, and do the fine placing. Only then should you release <Ctrl>. If you clearly set an axis and keep <Ctrl> down, Corel will remember whether to lock the motion vertically or horizontally.

Cydney Hansen
Napa Valley PC User's Group

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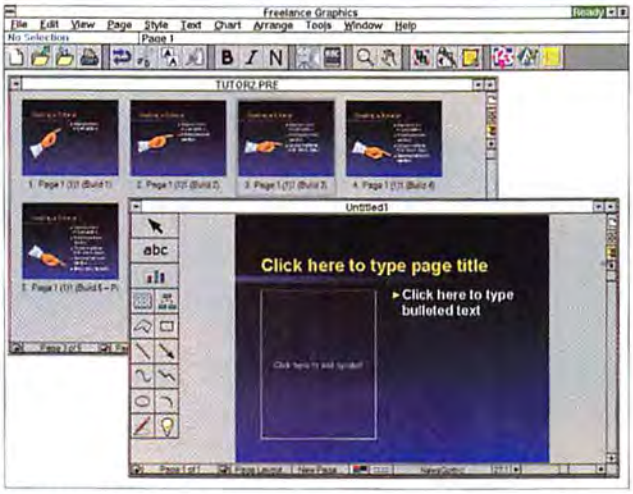
A Try using Freelance's build feature, which creates several slides from a single one, with each successive slide adding a bulleted item. To create a typical build sequence using a symbol as you described, open Freelance and begin a new presentation. Select a SmartMaster (we used one called ELEGANCE.MAS to create the example shown below), and click *OK*.

In the Choose Page Layout dialog box, select *Bullets & Symbol* and click *OK*. Click in the appropriate text block and type a title. Click in the 'Click here to type bulleted text' block and insert your bulleted lines. (You must type at least two lines.) Click the 'Click here to add symbol' box to open the Add Symbol to Page dialog box, choose *HANDS.SYM* for the symbol category, choose the hand with pointing finger (two of four), and then click *OK*.



ANIMATE A FREELANCE GRAPHICS 2.0 presentation with a build series that displays an additional bulleted item on each screen.

Select *Page•Create Build*, and Freelance creates the build sequence automatically. All that's left to do is to adjust the position of the symbol until it points directly at each new bullet. Go to each page in the build sequence, select the symbol using the Selector tool, and use the mouse to move or rotate it (by first choosing *Arrange•Rotate*).

To preview the sample build series you've created, select *View•Screen Show•Edit Effects*, choose the effects and advance options you prefer, and click *Run Show*.

By Richard Jantz

Contributing Editor Richard Jantz is an electronic publishing and presentation consultant in Berkeley, California.

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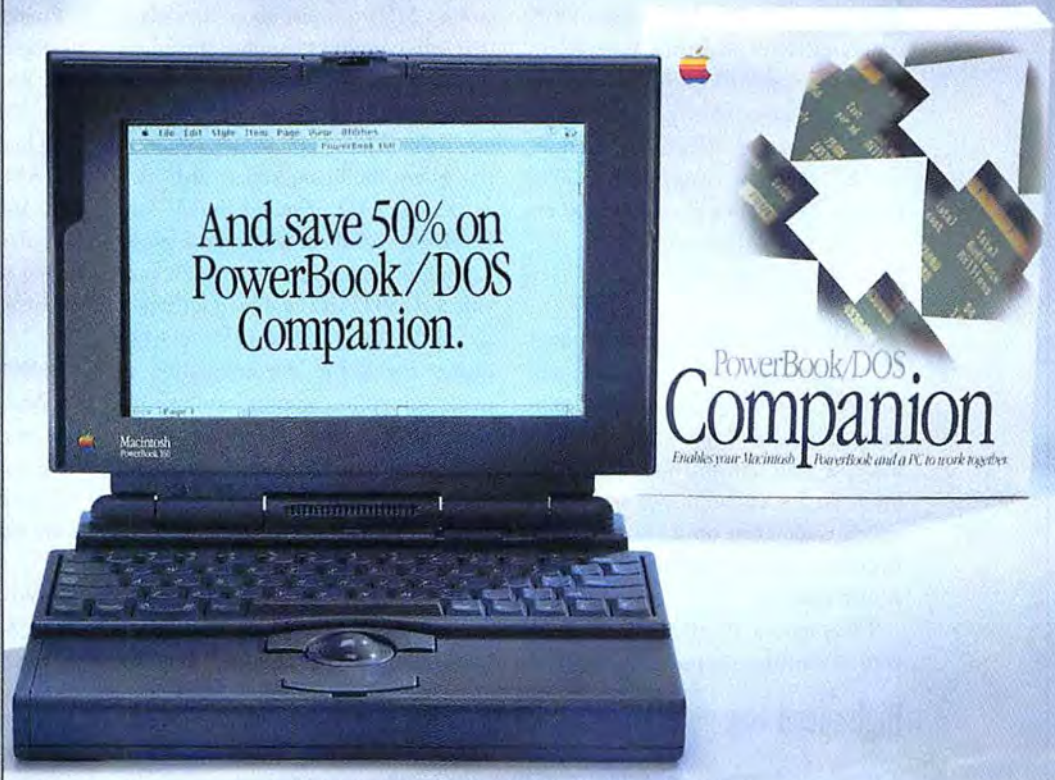

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COMMUNICATIONS Q&A

DOS Communications Under Windows

Q I do background downloads under Windows at 9600 bps using a DOS communications program. The problem is that standard packet sizes of 80 or 90 bytes transfer too slowly. I use Columbia University's MS-DOS Kermit, which supports extended packet lengths, but it loses characters and errors out. Any suggestions?
Dave James, Irvine, California

A High-speed communications under Windows is a perilous venture, and you may have one of a number of problems. When Windows is running, it intercepts your transmissions and sends them to its communications driver, which can't keep up at high speeds. Lost characters are common, especially at high speeds.

If you have a 16550 UART chip on your system board, make sure you're using Windows 3.1 and give it a new communications driver. The UART (universal asynchronous receiver-transmitter) is the central control of communications in the PC—every PC has one. Windows 3.1's driver, COMM.DRV, won't allow DOS communications programs to utilize a 16550 fully. One that will is TurboCom. It's $47.50 from Pacific CommWare, 503/482-2744.

High-speed communications under Windows is a perilous venture, and it's possible that you will have one of a number of problems.

Or your computer may have an old UART chip. Older UARTs send the PC's microprocessor an interrupt signal every time they receive a byte of data. If the PC doesn't respond before the second byte comes in, the first byte is lost. If you're multitasking while receiving files, your PC's processing resources won't have enough time to attend to hardware interrupts from the serial port, and information will be lost. New UARTs have a 16-byte buffer and are able to accommodate a fast flow of data.

An up-to-date UART can be had for around $15 from just about any place that sells computer supplies. Just drop the UART into the appropriate socket on the system board (assuming the old one isn't soldered in). A pricier alternative is an intelligent serial card, such as the Hayes Enhanced Serial Port, which goes for about $200 on the street. Among other things, these cards provide a 16550 UART and high serial port speed. If you install a 16550 chip or board, check the documentation to make sure your communications software is 16550 aware.

For an internal high-speed modem, lowering the connect speed may be the only way to prevent lost characters.

Here's one more thing you can do to make Windows safe for high-speed traveling: Create a Windows program information file (PIF) for DOS communications. Some programs, like Procomm Plus, come with a PIF, so just make sure you use it instead of the program's EXE file when you create an icon in Program Manager. If you need to create a PIF, load Windows' PIF Editor. In the Program Filename text box, enter the path and file name (with the EXE extension) for your communications program. If the program is in a directory other than your WINDOWS directory, enter that directory in the Start-up Directory text box. Check the Background check box. Then boost the value of foreground and background priorities by clicking *Advanced* and replacing the numbers in the Background Priority and Foreground Priority text boxes with higher ones. The numbers that work depend on your software and modem, so you'll have to experiment. Check the Lock Application in Memory box to prevent Windows from swapping the communications software out of memory while characters are arriving. Then click *OK*, select *File•Exit*, and click *Yes* when you get the Save Current Changes dialog box.

Finally, in your communications package's setup screen, activate hardware flow control. This will regulate the flow of data over the serial port. Look for a line like 'Hardware Flow Control (RTS/CTS)—OFF/ON' and set it to ON. Also, if you're running error correction, the computer's port speed should be set to four times that of the telephone line speed.

Host-Mode Hiccups

Q Whenever I set up my communications program to answer calls in host mode, the log-in prompts scroll across the screen ad infinitum. What's wrong?
Andy Blackstone, River Falls, Wisconsin

A Your computer thinks calls are coming in when they're not. The data-terminal-ready (DTR) signal on the connection between the modem and the PC is probably set to send a high signal. If your modem has DIP switches, look in its manual to see which switch controls DTR, and set it so it's not forcing the signal high. If your modem supports the command &D2 (most modems of speeds of 2400 bps and higher do), insert the command in your modem's initialization string: In your program's configuration screen, look for 'Modem Initialization String'. Insert **&D2** after the 'AT'.

By Judy Heim

Judy Heim is a contributing editor for PC World.

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HARDWARE Q&A

Those Old Monitor Blues

Q I have an NEC MultiSync 3D monitor that's served me well for a couple of years. Recently I bought a super-VGA video board that claims to do 1024 by 768 resolution. They work fine at 800 by 600 resolution, but when I try them at 1024 by 768, the image flickers.
Elena Otero, New York City

A What you see is what the NEC MultiSync 3D was designed to do. The higher the resolution, the more scan lines a monitor draws and the longer it takes to complete a screen. At 800 by 600, the NEC 3D draws 60 screens every second (60 Hz); at 1024 by 768, it manages only 43.5 screens per second (43.5 Hz). The fewer the screens per second, the more noticeable the flicker.

Many of the latest models can run all their resolutions *flicker free*, which means they produce 70 or more screens per second. (The screen still flickers, but at that speed, most people don't see it.) Flicker-free monitors do reduce eyestrain. You can buy a 14-inch monitor that can do 1024 by 768 flicker-free for about $350 on the street. Don't run a 14-inch monitor at a resolution higher than 800 by 600, because the screen characters at 1024 by 768 are too small to read comfortably.

PC Versus TV

Q My home office doubles as the TV room, but if I turn on the PC and the TV at the same time, my TV reception goes haywire. My PC is FCC Class B, which I thought would let me avoid this kind of problem. What gives?
Hal Hornburg, Scranton, Pennsylvania

A All PCs generate some radio frequency interference (RFI) no matter what the Federal Communications Commission rating. To earn Class B certification, a device must not disturb the reception of a radio or TV *farther than 10 feet and one wall away*. In other words, the FCC is concerned about your PC interfering with your neighbors' TV set, not yours. Often slight adjustments in the position of either the TV, the PC, or the PC monitor can solve the problem. If not, you may have to give up running Quicken and watching *Unsolved Mysteries* at the same time.

Two Drives In One

Q My system came equipped with two floppy drives, a 5¼ inch and a 3½ inch, and I need them both. I want to add a tape backup, but I can't —the front of the machine provides access to only two half-height drives. Am I stuck with buying an external model tape backup?
Tom McFarland, Seattle, Washington

A You have a couple of options. The TEAC America combination FD-505 integrates a 5¼-inch and a 3½-inch floppy drive into one compact, half-height unit. You can pick one up at a superstore for about $150. (This means you must remove your existing floppy drives.) Installing the TEAC is easy: Just slip the drive into an open, externally accessible bay, screw it into the drive cage, and hook up the power and data cables. You don't need to mess with your system's setup software, since your system BIOS will recognize the unit as two separate drives and think that nothing has changed. Now you have a free bay for your tape drive.

Another way to make the most of those two bays is to go the *floptical* route for your backups. Floptical drives use 3½-inch disks that look like the usual 1.44MB or 720K standbys. In fact, the magnetic media inside the plastic shell is quite different, offering a data capacity 14 times greater than the usual 1.44MB. Depending on the type of floptical drive, either an LED or a laser helps position a magnetic read/write head so precisely it can pack 1245 sectors per track instead of the usual 18, for a grand total of 21MB per 3½-inch disk. And guess what? These drives are compatible with ordinary 1.44MB and 720K 3½-inch disks.

I tried installing the latest laser-based floptical from Iomega (800/456-5522) just to get the feel of it. The PC Powered Floptical Subsystem costs about $350 on the street and installs like a floppy drive—except that it hooks up by ribbon cable to its own expansion board instead of using your system's floppy drive cable. A bundled utility helps you set up the board so it doesn't conflict with other devices, and you don't need to run your system's setup software. Part of the installation routine extends DOS's FORMAT command to handle the new media. All in all, it's pretty much plug and play.

In an era of ballooning graphics files and huge applications, 21MB floptical disks may very well be the floppies of the future.

You can find a cheap tape drive for about $200, with preformatted 120MB tapes costing about $25 each. Compare that with a $350 floptical and its 21MB disks (about $20 each), and floptical doesn't look as attractive. On the other hand, most people back up only changed files, and have you ever tried to find a specific file on a 120MB tape? Many believe that in an era of ballooning graphics files, 21MB floptical disks are the floppies of the future, and some software vendors are already distributing applications on floptical media.

Press Here for What?

Q Along with the hard disk light, the power-on indicator, and maybe a reset button, every PC I've used has had a "turbo" button and light. I first thought it was some kind of booster, like the computer equivalent of an afterburner. But when you push the button, the light goes *off*, and your PC runs slower. What's the point?
Paul Miller, Reno, Nevada

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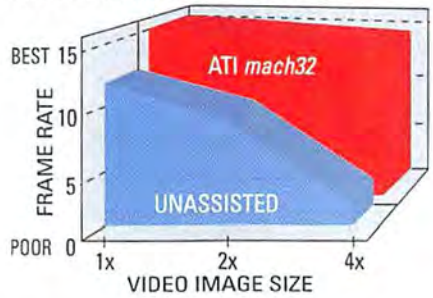

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Circle 5 on reader service card

A Probably the real point is to impress you with the word *turbo*. But the turbo button also has a practical use. Old software programs, particularly games, run much too rapidly at the high speeds of today's machines, and some may not run at all. Most "turbo" systems let you slow down to the equivalent of an old IBM AT or even an XT so that the most antiquated software will run. Afterward, you can kick into turbo mode again—your PC's normal speed!

Q All the systems in our office have 1.2MB floppy drives except a few old, reliable IBM XTs, which have 360K floppy drives. For some reason, the XTs give me an 'Abort, Retry, Ignore' message if I try to read a 360K floppy disk that's been written to by a 1.2MB drive. Aren't 1.2MB drives supposed to read and write 360K disks?
Blake Thomasson, New Haven, Connecticut

A Sure they are, and they do so nicely. But as you so shrewdly deduced, 360K drives fail miserably when they try to read 360K disks that 1.2MB drives have written to—though they don't fail all of the time.

The problem occurs because tracks written by a 360K floppy drive are twice the width of tracks written by a 1.2MB disk drive. When a 1.2MB drive overwrites data written by a 360K drive, the new data is like a stripe inside the old, wider track. The 1.2MB drive has no trouble reading that stripe. But the 360K drive, whose read/write head is twice as wide, reads *both* the new data and some of the old data—a mess that gives you your fatal error message.

If you want to keep swapping floppies between the two drive types, you need to follow two rules. The first is obvious: Never write to a 360K disk using a 1.2MB drive unless the disk has never been written to before—not even formatted, because formatting involves writing data—by a 360K drive. This means all 360K floppies used in both drives must be formatted right out of the box (or after they've been erased by a bulk eraser) by a 1.2MB drive. The command to format a 360K disk in a 1.2MB drive is FORMAT A:/4.

You have a choice of second rules. Either you'll never be able to delete files on these disks (deleting simply marks an area to be overwritten, and you know what that means), or you can never write to them again with a 1.2MB drive after you've formatted them.

Many people skip the second rule, but if you transport floppies between drives often, sooner or later you'll have problems. If you do, slip the disk in a 1.2MB drive and do a DISKCOPY; the 360K drive will read the duplicate disk just fine, since the 1.2MB drive won't copy any overwritten data.

By Eric Knorr

Eric Knorr is a contributing editor for PC World.

• *Mail your hardware questions to* Hardware, PC World, *501 Second St. #600, San Francisco, CA 94107; or send them electronically to the Hardware Forum on PC World Online (see page 12 for more information); MCI Mail, 459-7102; or 415/442-1891 (fax). PC World pays $50 for published questions. Sorry, we can't acknowledge unpublished materials.* ■

COMING UP

- **21 PCs That Do It All for Under $4000**

Okay, they don't do the dishes—but they do come loaded with 486 processors, CD ROM drives and software, 200MB-plus hard drives, sound boards, speakers, and fax-modems. Our review unveils the top performers in a quest for the fully integrated PC.

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STAR-DOT-STAR TIPS

WinWord: Blank in the Fills

If you're like me, you need to create forms or questionnaires occasionally with underlined blanks for people to fill in: 'Name:_____' and so on. Typing all of those underlines can get to be tiresome, so here's a Word for Windows macro that will find and underline a string of tabs (**FIGURE 1**). This macro is especially valuable if several questions need blanks, since it eases the mind-numbing task of underlining them all.

To create the macro, select *Tools•Macro*, enter the macro name **UnderlinedBlanks** and press **<Enter>**. A macro edit window will open with the first and last lines of the macro ('Sub MAIN' and 'End Sub') already there. Type the rest exactly as shown. Exit the edit window with **<Ctrl>-<F4>**, then **Y**.

To use the macro, type all the questions in the form, inserting tabs where you want the blanks. For instance, to create a fill-in-the-blank statement like "I have not had my eyes examined in_____years," you would type **I have not had my eyes examined in**, press **<Tab>** repeatedly until you have a blank space that's as long as your desired line, then type **years**. When you're ready to create the underlines, run the macro. The cursor will find each series of one or more tabs and ask you if you want that particular series underlined.

S. Emilio Marroquin, Fayetteville, North Carolina

Editor's note: This macro is a big time-saver when you're creating any kind of form or test. I altered the code a bit to make it work in a loop, finding and asking about each series of tabs in your document.

You can launch the macro by selecting *Tools•Macro•UnderlinedBlanks•Run*, but for easier access, you'll want to attach the macro to a toolbar icon, a menu, or a key combination. You can affix the macro to any of these from the *Tools•Options* dialog box, which is pretty self-explanatory. UnderlinedBlanks is available, as an ASCII file called UNDRBLNK.WWM, in the Featured in August folder on PC World Online.

```
Sub MAIN
StartOfDocument
EditFindClearFormatting
EditFind Chr$(9), .Direction = 2
While EditFindFound()
    While Right$(Selection$(), 1) = Chr$(9)
        CharRight 1, 1
    Wend
    CharLeft 1, 1
    DoIt = MsgBox("Underline this one?", 4)
    If DoIt Then  Underline 1
    CharRight 1
    EditFind .Direction = 2
Wend
End Sub
```

FIGURE 1: TO CREATE UNDERLINED BLANKS in forms or questionnaires, use this Word for Windows macro.

Shifting C:'s

I sometimes have the office CD ROM drive or Bernoulli Box or both attached to my system. I also use a RAM disk for certain applications. But every time I change the system configuration, the disk drive letters shift. Since most devices always take the first available drive letter, I'm never sure whether my CD ROM drive is D:, E:, or F:.

Unfortunately, varying drive letters wreak havoc with batch files and give Windows' Program Manager fits. Whenever the letters change, Program Manager is suddenly unable to find program files or directories, resulting in "blank screen" icons and error messages. Batch files give you just the error messages.

Luckily, I've discovered a solution: I use environment variables to steer each program to the right drive. For instance, I had one configuration where the CD ROM drive is D:, and another where it's E:. I needed separate AUTOEXEC.BAT files anyway, so I put the command SET CDROM=D in one and SET CDROM=E in the other. In the Windows Program Manager, I altered the Command Line setting in each program that ran off the CD ROM drive (by selecting the program's icon and pressing <Alt>-<Enter>), replacing the drive letter with %CDROM%:. Now Program Manager sees '%CDROM%:' as 'D:' when the CD ROM is configured as D:, and as 'E:' when the drive is configured as E:. I also used the variable names and percent signs to help my batch files learn their way.

This trick isn't limited to the CD ROM drive, either; I use the environment variable BBOX to identify my Bernoulli Box, whose drive letter also shifts. Once this system is in place, it's a breeze to adapt to any rearrangement of drive letters, whether the variation is caused by an upgrade or a temporary hardware change.

Annie Franklin, Columbus, Ohio

Editor's note: I use a similar system to keep track of drive letters on my computer. One caveat, however: Some programs, such as ETA's Enterprise Computing Database CD ROM, hard-code drive letters into their configuration files when you install them, and therefore can't be helped by this technique. If you find that one of your programs has this problem, the simple solution is to put that program on the first partition of your first permanent hard drive, C:, so the program can find itself.

Think Twice

In the February 1993 issue, you showed how an EXIT command in a batch file could keep you from accidentally running programs in Windows that you shouldn't ("Windows Detection Redux"). However, there are several potential problems with that approach. First, you need to create a batch file for every prohibited command. Second, if the program file is in the current direc-

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tory and the BAT file is not, the batch file will do no good. And, a batch file can't override a DOS internal command, such as DEL.

A better solution is to use DOSKEY macros. DOSKEY, a RAM-resident program that comes with DOS 5.0 and later, allows you to assign any command to any other command. Since one batch file can load several DOSKEY substitutions into memory, you don't need to create a battery of batch files. Also, DOSKEY macros take priority over all commands, including DOS's internal commands and programs located in the current directory.

I've written a sample batch file (**FIGURE 2**) that sets up three macros, each effectively stopping you from running a particular program from a command prompt. The batch file then loads Windows, and when you exit Windows, it turns off the macros. When you attempt to run one of the prohibited programs in a Windows DOS box, a message tells you of your error. You'll need about 4K of memory for DOSKEY.

Wang Yang, Pinedale, California

Editor's note: Yang's technique is extremely useful in any situation in which a command must be executed with caution. Besides the advantages Yang mentions above, using DOSKEY has a few others. First, DOSKEY macros do not take precedence over batch file commands, which presumably know what they're doing. Second, users who know what they're doing can simply type a space at the beginning of a command to override a DOSKEY macro and run the original command. A power user can also wipe out *all* current macro definitions by pressing <Alt>-<F10>. All in all, this batch file is a good way of issuing a warning without tying a knowledgeable user's hands or interfering with the operation of batch files.

To use Yang's batch file or one like it, type Figure 2 into an ASCII text file. You can modify it to include other programs that shouldn't be run in a DOS box. Save the file as **WIN.BAT** in a directory in your AUTOEXEC.BAT's PATH statement. You'll find WIN.BAT in the Featured in August folder on PC World Online.

```
@ECHO OFF
DOSKEY
DOSKEY SUBST=ECHO Can't run SUBST in Windows
DOSKEY JOIN=ECHO Can't run JOIN in Windows
DOSKEY ASSIGN=ECHO Can't run ASSIGN in Windows
WIN %1 %2 %3 %4
DOSKEY SUBST=
DOSKEY JOIN=
DOSKEY ASSIGN=
```

FIGURE 2: TO PREVENT CERTAIN COMMANDS from running in a Windows DOS box, load Windows from a batch file with multiple DOSKEY commands.

Quashing Quotes

In the October 1991 *Star-Dot-Star*, you described a way to display the < and > characters in batch file ECHO commands, which normally can't accept them ("Drawing a Blank in a Batch File"). The trick was to place quotation marks around the string, preventing DOS from interpreting the special characters as redirection instructions. While this works, it leaves the quotes visible, making for an ugly message.

Luckily, you can hide those quotation marks by making DOS backspace and overwrite them with other characters. If you use the line '@ECHO '^*H*Press <ENTER> to Continue"^*H*_', where ^*H* indicates a backspace and _ a space, your on-screen message will not have quotes in it.

Of course, you'll need to know how to enter embedded backspace characters with your text editor. If you're using DOS's EDIT program, press **<Ctrl>-P<Backspace>**. In EDLIN, use **<Ctrl>-VH**.

Some text editors delete trailing spaces from the ends of lines, making it impossible to end a line with a space. If your text editor has this problem, just move the closing quotation a character or two to the left, as in '@ECHO "^HPress <ENTER> to Continu"^He'.

George H. Trudeau, Sandwich, Massachusetts

BASIC Upgrade

Do you have GW BASIC programs that you'd like to run with MS-DOS 5.0's or 6.0's superior QBASIC? GW BASIC stores its programs in an unreadable binary form, but if you know how, you can convert them to standard ASCII

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CUSTOMIZING WINDOWS 3.1

Windows and Windows applications store their settings in *initialization* (INI) files that they read at start-up. You change INI files indirectly when you use utilities like Setup and Control Panel and when you or an app saves an app's settings. You can change INI file settings directly with an ASCII text editor like Notepad.

Note: Keys to press are shown here in **boldface**. Keys to press simultaneously are joined by a hyphen. *Italic* indicates an entry you must provide. A bullet (•) links menu, option, and button names in a series.

USING SETUP

Use Setup to change hardware options, add or remove device drivers, add or remove Windows files, and set up applications.

Note: Some changes take effect only after restarting Windows.

Set display type	**O**ptions • **C**hange System Settings • **D**isplay, select type, OK
Set keyboard type	**O**ptions • **C**hange System Settings • **K**eyboard, select type, OK
Set mouse type	**O**ptions • **C**hange System Settings • **M**ouse, select type, OK
Set network type	**O**ptions • **C**hange System Settings • **N**etwork, select type, OK
Set up application path and program group manually	**O**ptions • **S**et Up Applications • Ask you to specify an application • OK, type path and file name, select program group, OK

Fold Here

Search for and set up installed application(s) automatically	**O**ptions • **S**et Up Applications • OK, select places to search, **S**earch Now. For each unknown app, select app name, OK; or Cancel. **A**dd All; or select application(s), **A**dd, OK
Add/remove Windows component files	**O**ptions • **A**dd/Remove Windows Components, clear check box for component(s) to remove, select component's Files button to remove or install specific files, select files, **A**dd/**R**emove • OK

USING CONTROL PANEL

Use Control Panel to set the appearance and operation of Windows elements and to control input and output devices. For each command in this section, first open the respective Control Panel utility.

Note: The 386-enhanced icon appears only if you're running Windows in enhanced mode on a 386 system or better.

Color

Set predefined scheme for Windows elements	Color **S**chemes, select name, OK
Define color for Custom Colors palette	Color **P**alette • **D**efine Custom Colors. Click or drag to color in grid, and drag luminosity triangle (on right) up/down or set Hue, Sat, and Lum or Red, Green, and Blue values. **A**dd color • **C**lose
Set color for specific Windows element	Color **P**alette, click element in sample screen or select it in Screen **E**lement list, select color
Save custom scheme	Set elements' colors, **S**ave Scheme, type name, OK
Remove color scheme	Color **S**chemes, select name, Re**m**ove Scheme • **Y**es

Ports

Set COM port's default baud rate, number of data bits, data parity method, number of stop bits, handshake method	Select port, **S**ettings, select default(s) from drop-down list(s), OK
Set COM port's base I/O port address or interrupt level	Select port, **S**ettings • **A**dvanced, select address or level, OK

Fonts

Add font(s)	**A**dd, select drive/directory containing fonts, select font(s), OK
Remove font(s), optionally delete font file from disk	Select font(s), **R**emove, **D**elete Font File From Disk (if desired), **Y**es/Yes to **A**ll
Enable/disable TrueType fonts	**T**rueType • **E**nable TrueType Fonts • OK
Show/hide non-TrueType fonts in apps' font list	**T**rueType • **S**how Only TrueType Fonts in Applications • OK

Mouse

Set speed at which pointer moves on screen	Adjust **M**ouse Tracking Speed scroll box. Move mouse to try setting
Set minimum speed for double-click	Adjust **D**ouble Click Speed scroll box. Double-click Test box (color changes if double-click registers)
Swap mouse buttons	**S**wap Left/Right Buttons
Enable/disable mouse trails (EGA, VGA, and super-VGA drivers only)	Mouse **T**rails

Desktop

Set desktop pattern	Select pattern from **N**ame drop-down list, OK

Fold Here

Create/edit desktop pattern	Edit **P**attern, create/select name, click in center square to set/reset pixel(s), **A**dd/**C**hange • OK
Select screen saver	Select name from Screen Saver **N**ame drop-down list, OK
Set time (in minutes) of inactivity that triggers screen saver	Click **D**elay box's up/down arrows or type number (1 to 99) in **D**elay box, OK
Set screen-saver options	Se**t**up, set options, OK
Enable/disable screen-saver password	Se**t**up • **P**assword Protected. If enabling, **S**et Password, type old password if required, type new password, retype new password, OK
Select wallpaper	Select name in **F**ile drop-down list, **C**enter/**T**ile • OK
Set width (in pixels) of window border	Click **B**order Width box's up/down arrows or type number (1 to 50) in **B**order Width box, OK
Set horizontal spacing (in pixels) between icons	Click **S**pacing box's up/down arrows or type number (32 to 512) in **S**pacing box, OK
Wrap/unwrap icon labels	**W**rap Title • OK
Set cursor blink rate	Adjust Cursor Blink **R**ate scroll box, OK

Keyboard

Set delay before first character repeat	Adjust **D**elay Before First Repeat scroll box. Select **T**est box and hold down key to test
Set character repeat rate	Adjust **R**epeat Rate scroll box, select rate. Select **T**est box and hold down key to test

Printers

Select default printer	Double-click name in Installed **P**rinters list
Turn Print Manager on/off	**U**se Print Manager
Add/update printer driver	**A**dd, select name in **L**ist of Printers scroll box, **I**nstall, insert floppy disk or type directory if requested, OK
Remove printer driver	Select name in Installed **P**rinters list, **R**emove • **Y**es
Set printer options	Select printer, **S**etup, set options, OK
Assign printer to port	Select printer, **C**onnect, select port in **P**orts list, OK

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CUSTOMIZING WINDOWS 3.1

International

Set country/language/keyboard layout/measurement scale	Select name in **C**ountry/**L**anguage/**K**eyboard/**M**easurement drop-down list
Set character to separate elements in a list	Type character in List **S**eparator box
Set date/time/currency/number format options	**D**ate Format/**T**ime Format/**C**urrency Format/**N**umber Format, set options, OK

Date/Time

Set system date/time	Select value to change, type value or click section's up/down arrows, OK

386 Enhanced

Always/never warn about devices in contention	Select port, **A**lways Warn/**N**ever Warn
Set seconds to idle port	Select port, **I**dle, set seconds
Set number of time slices Windows apps normally share when Windows app is in foreground	Click Windows in **F**oreground box's up/down arrows or type number (1 to 10000) in Windows in **F**oreground box, OK
Set number of time slices Windows apps normally share when DOS app is in foreground	Click Windows in **B**ackground box's up/down arrows or type number (1 to 10000) in Windows in **B**ackground box, OK

Fold Here

View virtual memory (swap file) settings	**V**irtual Memory
Set up or remove virtual memory	**V**irtual Memory • **C**hange, set options, OK • **Y**es
Increase number of DOS apps you can run, switch between them faster, and speed up disk access for multiple active DOS apps	**V**irtual Memory • **U**se 32-bit access • OK (option is available only if your system supports 32-bit access)

Drivers

Add driver	**A**dd, select driver, OK, insert disk or type drive/directory if needed, OK
Update driver	**A**dd, select driver, OK • **N**ew, insert disk or type drive/directory, OK
Remove driver	Select driver, **R**emove • **Y**es

Sound

Attach sound to event	Select event, select sound file, OK
Enable/disable sounds	**E**nable System Sounds • OK

EDITING INI FILES

Bracketed headers divide INI files into sections of settings. If a setting or section doesn't appear in your file, simply type it in. Typically the entries listed here are not set by programs; you make them by editing WIN.INI and SYSTEM.INI for Windows and PROGMAN.INI for Program Manager. You can load an INI file into Notepad by selecting *File • Run* in Program Manager or File Manager, typing the INI file's name, and pressing **<Enter>**.

Note: Always make a backup copy of an INI file before editing it.

WIN.INI

[Windows]

List extensions denoting documents (unassociated and not in [extensions]) (e.g., doc txt xls)	**Documents=***ext1 ext2 ext3*
Set twice the pixels mouse can move up or down during double-click (default = 4)	**DoubleClickHeight=***pixels*

EDITING INI FILES (continued)

Set twice the pixels mouse can move left or right during double-click (default = 4)	**DoubleClickWidth=***pixels*
Set menu drop alignment left/right	**MenuDropAlignment=0/1**
Set number of mouse trail pointers	**MouseTrails=***number*
Set vertical and horizontal offset of upper left corner of wallpaper image from upper left corner of screen	**WallPaperOriginX=***pixels* **WallPaperOriginY=***pixels* (0,0 centers image; negative values are OK)

[Desktop]

Set icon label font	**IconTitleFaceName=***fontname*
Set icon label font point size (default = 8)	**IconTitleSize=***number*
Set vertical spacing (in pixels) between icons	**IconVerticalSpacing=***pixels*

SYSTEM.INI

[Boot]

Set Windows shell program	**shell=***d:\path\filename*
Set sound driver	**sound.drv=***filename*

Fold Here

Set application <Ctrl>–<Esc> brings up	**TaskMan.Exe=***filename*

[NonWindowsApp]

Increase environment for DOS apps	**CommandEnvSize=***bytes*
List TSRs to load in each DOS box (e.g., dosedit,ced)	**LocalTSRs=***TSR1,TSR2*
Set number of screen lines in DOS box	**ScreenLines=***number*

[386enh]

Force/don't force DOS apps to run in full-screen, exclusive mode	**AllVMsExclusive=On/Off**
Turn DOS shell instructions box on/off	**DOSPromptExitInstruc=On/Off**
Turn informing File Manager of DOS app's changes to files on/off	**FileSysChange=On/Off**
Set <Ctrl>–<Alt>–<Del> to quit non-responding app/reboot system	**LocalReboot=On/Off**

PROGMAN.INI

[Settings]

Set startup group	**Startup=***groupname*

[Restrictions]

Disable/enable File • Run	**NoRun=1/0**
Disable/enable File • Exit	**NoClose=1/0**
Remove/show File menu	**NoFileMenu=1/0**
Set restrictions for what users can modify	**EditLevel=***number* (0 = no restrictions; 1 = can't create, delete, or rename groups; 2 = also can't create or delete program items; 3 = also can't change program item command lines; 4 = also can't change any program item property)

Note: You can add comment line(s) by beginning each line with a semicolon (;).

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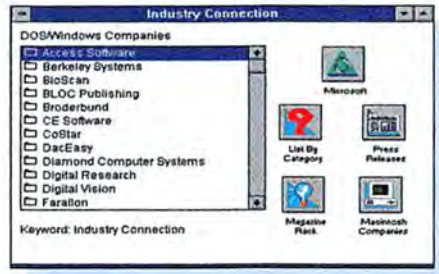

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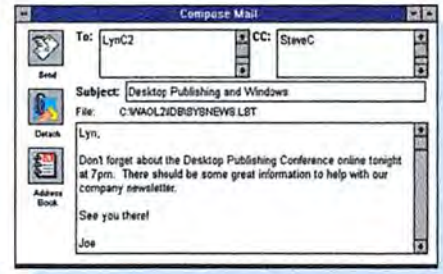

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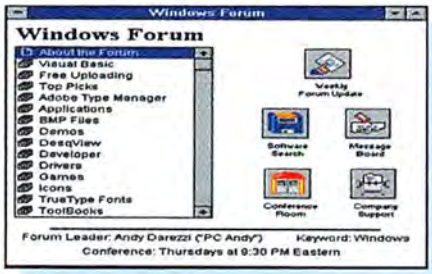

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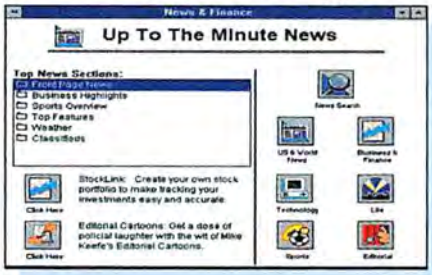

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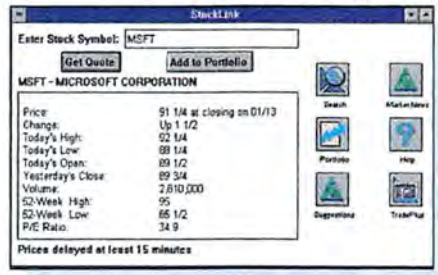

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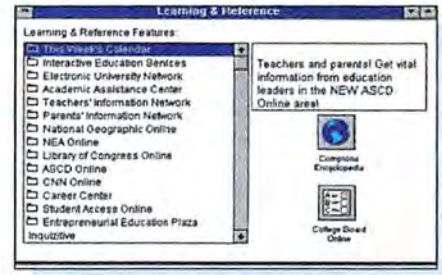

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```
AUTO      LIST      NEW
CONT      LLIST     RENUM
DEF USR   LOAD      SAVE
DELETE    MERGE     USR
EDIT      MOTOR
```

FIGURE 3: SWITCHING FROM GW BASIC TO QBASIC? These keywords and commands aren't supported in the newer dialect.

text files for use with QBASIC.

The command that outputs GW BASIC files in ASCII format isn't obvious or well documented. To perform the conversion, load your program into GW BASIC and run the command **SAVE "***filename***",A**, *filename* being the name you want to save ASCII text to. GW BASIC will create a standard ASCII file that QBASIC—and just about any other version of BASIC—can use.

Seth Hillbrand, Mora, Minnesota

Editor's note: Bringing your GW BASIC programs into QBASIC will give you far more options for changing and improving them. IBM's BASICA is virtually identical to GW BASIC, and Hillbrand's tip applies to BASICA programs too.

Once you've translated your code into ASCII form, there are a few other tricks that might prove handy. To make QBASIC read and write GW BASIC binary data files (*not* programs), start QBASIC with the **/MBF** command line switch. Also, if your program uses any of the GW BASIC commands listed in **FIGURE 3**, you'll have to do some rewriting; these commands are not in QBASIC. You can locate this list as NOTINQB.TXT in the Featured in August folder on PC World Online.

By Brett Glass

Brett Glass is a contributing editor for PC World.

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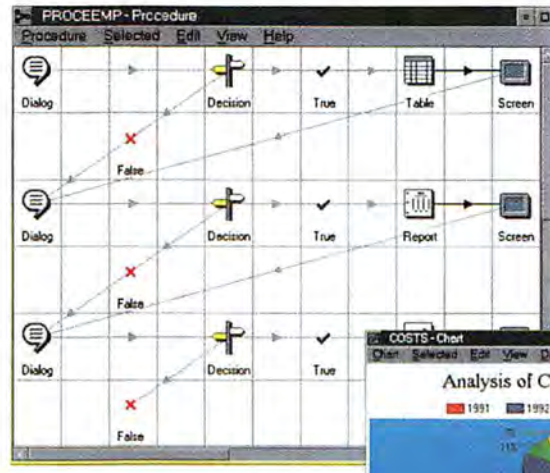

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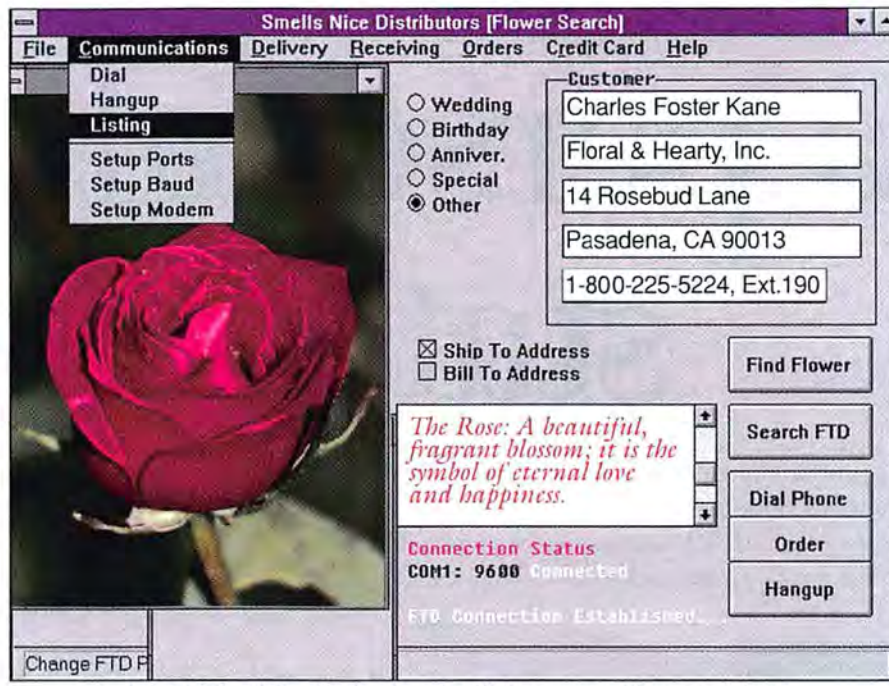

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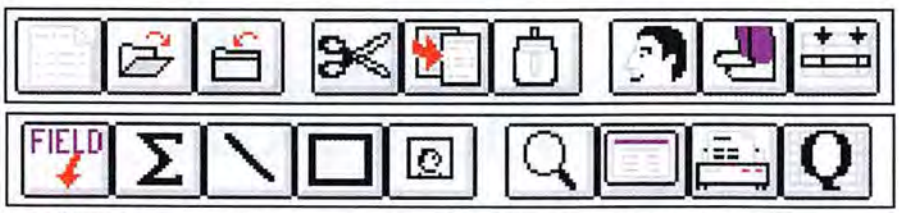

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First name

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2	○	○	○		○	○	○		○	○	○	○
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Spreadsheets (page 234)	○	○	○	○	○	○	○
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SE 4/50 EISA Server 16MB,1 Floppy	3224.04
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Bravo 3/33 / 4/25S 4MB 120HD	969.28/1049.10
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IBM PS/1 386SX 4MB UPGRADE	179.91
IBM 386 VALUE POINT 4MB	179.91
IBM 486 VALUE POINT/PS1 4MB	209.20
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NEC IMAGE 16MB	659.12
NEC 8MB ULTRALITE	435.51
NEC SILENTWRITER 2MB	108.31
NEC SW MOD 95 2MB	108.91
NEC 2MB ULTRALITE III/SL20	113.91
OKI LASER 400 2MB	127.31
OKI LASER 800 2MB/4MB	127.31/199.50
OKI LASER 810 2MB UPGRADE	194.31
OKI LASER 840 2MB	147.40
PANASONIC 4410, 4430, 2-4MB	125.71
TOSHIBA 1800, 1850 2MB	99.00
TOSHIBA 1800, 1850 4MB	169.00
TOSHIBA 1900, 4500C, 4600C, 8MB	449.82
TOSHIBA 4400SX/C, 4400C, 6400 4MB	199.00
TOSHIBA 4400SX/C, 4400C, 6400 8MB	445.33
TOSHIBA 4400SX/C, 4400C, 6400 16MB	859.40
TOSHIBA 5200 8MB MODULE	332.91

ACCELERATOR/OVERDRIVE

INTEL Overdrive 486/25DX / 486/33DX	479.66 / 639.55
INTEL Overdrive 486/SX,25Mhz /20 Mhz	449.20 / 329.44
INTEL Overdrive 486/33SX	719.49
KINGSTON SX Now, 25 MHz, IBM 50, 60, 50Z	169.20
KINGSTON 486SX Now, 25 MHz, Compaq	399.72
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CDW 29578 ..... **$4319.20**

i486 DX, 33 Mhz, 4 MB RAM,
210MB HD.
CDW 27191..... **$1,438.14**

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CDW 24371..... **$1,377.12**

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4Meg 239.00/8Meg 419.00

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256 x 1	3.00	2.60	2.20	2.00
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8087	49.00
8087-2	69.00
8087-1	89.00
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80387-16 DX	54.00
80387-20 DX	59.00
80387-DX (Does All)	89.00
Intel SX (Does All)	89.00
Intel SL Mobil	89.00
Intel 16SX	54.00

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1 x 36 4Meg	EISA	–	169.00	159.00	149.00	–
2 x 36 8Meg	EISA	–	329.00	299.00	299.00	–
4 x 36 16Meg	EISA	–	619.00	609.00	599.00	–
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MODEL	AMT. UPGRADED	AST PART #	PRICE
Advantage 12-386	4Meg Kit	500510-004	Call
Bravo 486/25, 33	2Meg Kit	500760-005	120.00
	8Meg Kit	500760-001	298.00
Bravo 486	2Meg Kit	500987-001	99.00
	4Meg	500987-002	159.00
	8Meg Kit	500987-003	318.00
	16Meg	500987-004	599.00
	32Meg Kit	500987-005	1200.00
Premium 386/25, 16 SX	1Meg	500718-002	55.00
Premium 386/33	1Meg	500718-002	55.00
Premium II 386SX/20, 486-25, 25E, 33	1Meg	500760-003 WPB	60.00
	4Meg	500760-004 WPB	149.00
Premium Tower, 386/33TE, 486/25TE, 486/33TE	8Meg	500760-001 WPB	298.00
Cupid Memory Board	0-32Meg	500818-001	Call

ZENITH MEMORY MODULES

MODEL	AMT. UPGRADED	AST PART #	PRICE
Z386/33, 25, 20, 33E	1Meg	ZA3800ME	56.00
Z386/33, 25, 20, 33E, 486/25E	4Meg	ZA3800MK	149.00
Z386SX	2Meg	Z-605-1 modules	99.00

MAGNAVOX

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0-K – **$99.00** 1Meg **$179.00** 2Meg – **$219.00**

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0Meg	2Meg	4Meg	8Meg	16Meg	32Meg	64Meg
$179.00	$259.00	$329.00	$477.00	$799.00	$1,499.00	Call

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USES 1 X 9 SIMMS 80CA 86-95-80

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0K – **119.00** 2Meg – **189.00** 4Meg – **259.00** 8Meg – **399.00**

IBM PS/2 SIMM MODULES

IBM PART NO.	WORKS WITH MODEL NO.	PRICE
30F5348 (512K)	30-286	30.00
30F5360 (2Meg)	30-286, 25-286, 50 MTHR BD	79.00
33G9288 (2Meg)	Thinkpad 300,	109.00
33G9288 (8Meg)	Thinkpad 300	359.00
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	179.00
6450603 (1Meg)	35SX, 40SX, 55SX, Model-70's, P-70	45.00
6450804 (2Meg)	70-061, E61, 121, 50Z, 55SX, 65SX, P-70, 55LS, 65LS, X-Station 120 & 130, 35SX, 35LS, 40SX	74.00
6450608 (2Meg)	70-A21, A-61, B-21, B-61, 35SX, 35LS, 40SX Value Point 325T	79.00
78X8955 (128K)	25	35.00
34F2933 (4Meg)	35SX, 40SX, 55SX, 65SX, 65LS, 65LS	149.00
8759977 (4Meg)	55SX, 55LS, 65SX, 40SX, 35SX, 35LS	149.00
10S7035 (512K)	P/S1-286	40.00
92F9935 (2Meg)	P/S1 & P/S1/386SX-2121	84.00
92F9694 (4Meg)	P/S1 & P/S1/386SX, Model-2121	139.00
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	149.00
6450129 (8Meg)	35SX, 40SX	299.00
6450130 (8Meg)	56, 57, 57SX, 90, 95, P-75, 57SLC Value Point 77 486DX2, 486SX, SVR 85	299.00
79F0999 (2Meg)	LX40, N33SX, PS Note	89.00
79F1000 (4Meg)	LX40, N33SX, PS Note	159.00
79F1001 (8Meg)	LX40, N33SX, PS Note	309.00
07G1826 (2Meg)	N51 (all)	99.00
07G1827 (4Meg)	N51 (all)	169.00
07G1828 (8Meg)	N51 (all)	309.00
07G1420 (4Meg)	CL57LSX LpTp, Thinkpad 700, 700C, 720, 720C	189.00
07G1421 (8Meg)	CL57LSX LpTp, Thinkpad 700, 700C, 720, 720C	319.00
92F8804 (2Meg)	N45SL	99.00

COMPAQ MEMORY MODULES

MODEL	AMT. UPGRADED	CMPQ PART #	PRICE
DeskPro 386/33, 386/33L, 486/25, 486/33L	2Meg Module	115144-001	89.00
	8Meg Module	115561-001	319.00
486/50L System Pro	32Meg Module	115568-001	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	219.00
	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	219.00
	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	128377-001	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	2Meg	141738-001	99.00
	8Meg	141742-001	299.00
Prolinea 486	1Meg	141682-001	55.00
	2Meg	141683-001	99.00
	4Meg	141684-001	159.00

COMPAQ LAPTOPS & NOTEBOOKS

	8Meg	141685-001	319.00
LTE/286	2Meg Bd	117091-002	99.00
LTE/286	4Meg Bd	117091-003	179.00
LTE/386S/20	4Meg Module	121125-002	179.00
LTE LITE/20, 25, 25C	4Meg Module	129769-002	179.00
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	339.00
LTE LITE 4/25C	16Meg Module	142337-004	749.00
SLT/286	1Meg Module	110235-001	79.00
SLT/286	4Meg Module	110237-001	209.00
SLT/386	1Meg Module	118303-001	79.00
SLT/386	2Meg Module	118304-001	99.00
SLT/386	4Meg Module	118305-001	169.00
Contura 320, 325	2Meg	139497-001	99.00
	4Meg	139498-001	169.00
	8Meg	139499-001	299.00
Contura 4/25, 4/25C, 4/25CX	4Meg	146520-001	219.00
	8Meg	146521-001	395.00
	16Meg	146531-001	939.00

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MODEL	PRICE	MODEL	PRICE
S-RAM Cards 1MEG	159.00	Flash Memory	Call
S-RAM Cards 2MEG	259.00	OTP	Call
Palm Modem™ 2400 V.42 bis	Call	Ethernet	Call
Fax Data ModemCard 9600/2400	279.00	Token Ring	Call
Optical Media Card	Call	3270 Emulation Adaptors	Call

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T2000,T2000SX	2Meg	PC19-PA8317U	75.00
T2000SX,T1000LE	4Meg	PC-PA8314U	149.00
T2000SX/T1000LE	8Meg	PC14-PA8315U	279.00
T2000SXE/2200SX/T1800, 1850, C	2Meg	PC-PA2000U	75.00
T2000SXE/2200SX/T1800, 1850, C	4Meg	PC-PA2001U	149.00
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	4Meg	PC-PA2012U	239.00
T4500, T4500C, T4600 (3.3 volt)	8Meg	PC-PA2013U	419.00
T3300SL	4Meg	PC-PA2007U	169.00
T3300SL	6Meg	PC-PA2008U	229.00
T3300SL	8Meg	N/A	369.00
T3300SL	16Meg	PC-PA2009U	749.00
T1200XE	2Meg	PC13-PA8306	85.00
T1600	2Meg	PC8-PA8302U	85.00
T3100	2Meg	PC3-PA7135E	129.00
T3100e	2Meg	PC9-PA8340U	85.00
T3100SX	2Meg	PC15-PA8308U	85.00
T3100SX	4Meg	PC15-PA8310U	164.00
T3200	3Meg	PC6-PA7137U	159.00
T3200SX	2Meg	PC12-PA8307U	85.00
T3200SX	4Meg	PC12-PA8909	164.00
T3200SXC	2Meg	PC19-PA8318U	84.00
T3200SXC	4Meg	PC19-PA8319U	164.00
T5100	2Meg	PC7-PA8301U	85.00
T5200/T8500	2Meg	PC10-PA8304U	89.00
T5200/T8500	8Meg	PC10-PA8313U	299.00

NOTEBOOK, LAPTOP MEMORY

AER Venture		4Meg		229.00
AST Notebook Prem Exec 386SX/20/25/25L		4Meg	500814-003,	139.00
AST Power Exec 3/25C, 425EL		4Meg		179.00
AST Power Exec 425SL		4Meg		249.00
AST Power Exec 425SL		16Meg		1299.00
AT&T Safari NSX/20		4Meg	PEC 37651	189.00
Bondwell B310, Plus		1Meg	23050-09100	109.00
Bondwell B310V, SX		1Meg		109.00
Bondwell B310V, SX		4Meg		219.00
Dell 212, 320N, 320N+		2Meg	310-3204	119.00
Dell 325N, 325NC		2Meg	310-3210	119.00
Epson NB3		4Meg	A808511	179.00
Epson NB SL 20,25,25C		2Meg	A808771	129.00
		4Meg	A808781	219.00
		8Meg		419.00
Everex Tempo LX, LX20		2Meg	PCA 00053-0001	89.00
Everex Tempo Carrier		2Meg	PWA 0884-A-J000	119.00
Goldstar GS520 386SX/16		4Meg	S386-4M	239.00
Leading Edge D/LT 386SX		1Meg		109.00
Magnavox Metalis	1Meg.	4Meg	286, 386SX	99.00/139.00
NCR 3170		4Meg	3123-K104-V001	239.00
NCR 3170		8Meg		319.00
NCR 3170		16Meg	3123-K116-V001	999.00
NEC Prospeed 286, 386SX-16		1Meg	PC21-21	105.00
NEC Prospeed 286, 386SX-16		4Meg	PC21-22	179.00
NEC Prospeed 386		2Meg	PC31-21	159.00
NEC Prospeed 386		8Meg	PC31-22	359.00
NEC Prospeed 386SX-20		1Meg	PC43-21	109.00
NEC Prospeed 386SX-20		4Meg	PC43-22	199.00
NEC Prospeed 486SX, SX/L		1Meg	GP-4104204	Call
		4Meg	GP-4104205	Call
NEC Ultralite III/20, 20P, 25C		2Meg	PC47-21	119.00
NEC Ultralite III/SL/25C		4Meg	PC47-22	219.00
NEC Ultralite SL/20, 20P		6Meg	PC49-21	289.00
NEC Ultralite III/25C		8Meg	PC47-23	349.00
NEC Ultra Versa	4 Meg.	8Meg		299.00/399.00
Packard Bell 386SX, 286	1Meg.	4Meg	286, 386SX	89.00/189.00
Panasonic CF170, CF270, CF370		1Meg	CF-BA165	54.00
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HP 4SI	–	–	–	80	–	–	149	–	–	309	–	–
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IBM Laser 4029	–	–	–	–	–	–	139	–	–	–	–	–
IBM Laser 4039	–	–	–	–	–	–	169	–	–	319	–	–
NEC 90, 290	–	–	–	109	–	–	–	–	–	–	–	–
NEC 93	–	–	–	99	–	–	–	–	–	–	–	–
Oki 400	–	–	–	94	–	–	–	–	–	–	–	–
Oki 830, 840	–	–	–	109	–	–	–	–	–	–	–	–
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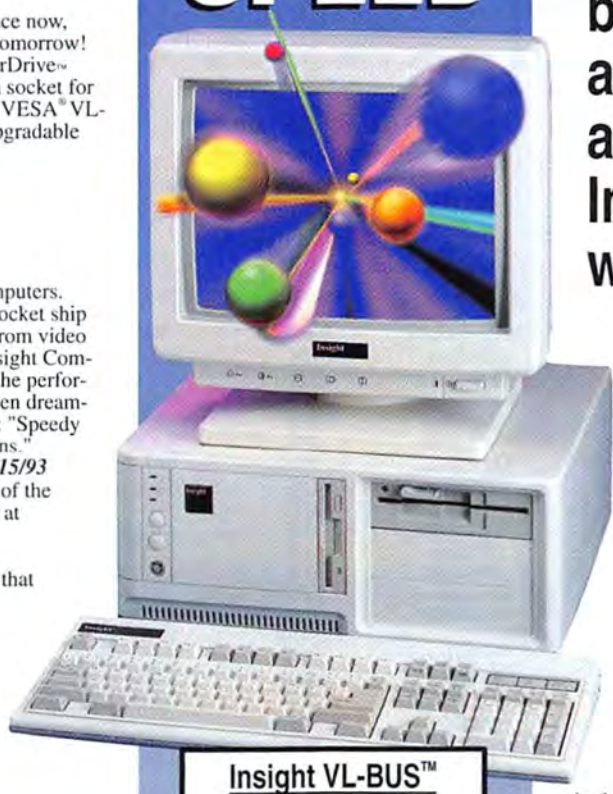

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1.0GB MC1526	15MS	FH	1579
1.6GB MC1627	14MS	FH	1729
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130MB ST3144A	15MS	3.5/1"	329
340MB ST3390A	12MS	3.5/1"	499
SCSI			
240MB ST3283N	12MS	3.5/1"	399
470MB ST4766N	12MS	3.5/1"	599
670MB ST4767N	11MS	FH	1399
1.2GB ST11200N	11MS	FH	1599
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2.1GB ELITE-2	11MS	FH	1999
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340MB WD2250	14MS	3.5/1"	599
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340MB CP30544	12MS	3.5/1"	CALL
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Comtrade Zaps The Competition!

486/66 Processor Harmonic

AST	16,213
Compaq ProLinea	12,312
COMTRADE	**17,493**
Dell	16,268
Gateway 2000	16,400
IBM	11,525
Zeos	15,067
The Rest	14,000

Sources: PC MAG & Computer Shopper review in Jan. July 1993. Compaq ProLinea has no external cache.

Processor & memory performance are the most important elements to achieve top performance. It is foundational, unchangeable, determined by a systems actual design. As you can see, Comtrade is technologically superior by design. And Comtrade takes this design excellence even further: To maximize performance, every Comtrade system has a 32-bit ultra fast Hard Drive controller and a VESA Local Bus graphics accelerator for a total 32-bit video and hard drive solution.

The Comtrade 486 achieved the best processor performance of all profiled systems - PC Sources, February 1993.

EISA Win-Station (VL-Bus)

- OverDrive Socket for Future **Pentium™** Technology
- High Speed EISA DMA with 2 VL-Bus Slots
- 128K Cache SRAM & Expandable to 256K
- 4MB RAM & Expandable to 128MB
- 1.2MB 5.25" & 1.44MB 3.5" Floppy Drives
- VESA Local Bus IDE Hard Disk Controller
- **250MB** 12ms IDE Drive with 64K Cache
- 32-Bit VESA Local Bus **WinPro** Graphics Accelerator with 1MB RAM (Up to 1280x1024 & up to 16.7 million Colors) (Up to 50 times faster than standard Super VGA)
- 14" Non-Interlaced .28mm 1024x768 Color Monitor
- 2 Serial, 1 Parallel & 1 Game Ports
- Enhanced 101-key Keyboard
- Hi-Resolution 400 DPI Serial Mouse
- Anti-Virus MS-DOS 6.0 & Windows 3.1
- Three-Year System & Lifetime Labor Warranty

486/33 DX $1675
486/66 DX2 $1925

- 32-Bit VL-Bus IDE Smart Cache HD Controller Add $120
- Replace 1.2MB Drive with 350ms CD-ROM Add $170

EISA SCSI-2 (VL-Bus)

- OverDrive Socket for Future **Pentium™** Technology
- High Speed EISA DMA with 2 VL-Bus Slots
- 128K Cache SRAM & Expandable to 256K
- **8MB** RAM & Expandable to 128MB
- 1.2MB 5.25" & 1.44MB 3.5" Floppy Drives
- 32-Bit VL-Bus Fast ASPI SCSI-2 HD Controller
- **250MB** 12ms SCSI-2 Drive with 256K Cache
- 32-Bit VESA Local Bus **WinPro** Graphics Accelerator with 1MB RAM (Up to 1280x1024 & up to 16.7 million Colors) (Up to 50 times faster than standard Super VGA)
- 14" Non-Interlaced .28mm 1024x768 Color Monitor
- 2 Serial, 1 Parallel & 1 Game Ports
- Enhanced 101-key Keyboard
- Hi-Resolution 400 DPI Serial Mouse
- Anti-Virus MS-DOS 6.0 & Windows 3.1
- Three-Year System & Lifetime Labor Warranty

486/33 DX $1955
486/66 DX2 $2225

- 15" Flat Screen & **Low Radiation** Monitor Add $100
- 545MB / 1,370MB SCSI-2 Drive Upgrade $450 / $1050

EISA Dream Machine (VL-Bus)

- OverDrive Socket for Future **Pentium™** Technology
- **256K** Write-Back Cache SRAM & 2 VL-Bus Slots
- **8MB** RAM & Expandable to 128MB
- 1.2MB 5.25" & 1.44MB 3.5" Floppy Drives
- EISA or VL-Bus IDE **Smart Cache** HD Controller (8,000/19,000KB/Sec Data Transfer Rate on EISA DMA)
- **340MB** 12ms IDE Drive with 64K Cache
- 32-Bit VESA Local Bus **WinPro** Graphics Accelerator with 1MB RAM (Up to 1280x1024 & up to 16.7 million Colors) (Up to 50 times faster than standard Super VGA)
- 15" Flat Screen .28mm 1280x1024 Color Monitor (**Low Radiation**, 36% larger edge to edge display)
- 2 Serial, 1 Parallel & 1 Game Ports
- Enhanced 101-key Keyboard & Serial Mouse
- Anti-Virus MS-DOS 6.0 & Windows 3.1
- Three-Year System & Lifetime Labor Warranty

486/33 DX $2075
486/66 DX2 $2325

- 17" Flat Screen .28mm 1280x1024 Monitor Add $420
- VL-Bus Diamond Viper Accelerator Add $220

VESA Local Bus WinMax

- OverDrive Socket for Future **Pentium™** Technology
- True **VESA Standard Local Bus** Graphics Accelerator
- 128K Cache SRAM & Expandable to 256K
- 4MB RAM & Expandable to 32MB
- 1.2MB 5.25" & 1.44MB 3.5" Floppy Drives
- VESA Local Bus IDE Hard Disk Controller
- **210MB** 12ms IDE Drive with 64K Cache
- 32-Bit VL-Bus **Diamond SpeedStar Pro** Accelerator with 1MB RAM (Up to 1280x1024 & up to 16.7 million Colors) (Up to 30 times faster than standard Super VGA)
- 14" Non-Interlaced .28mm 1024x768 Color Monitor
- 2 Serial, 1 Parallel & 1 Game Ports
- Enhanced 101-key Keyboard
- Hi-Resolution 400 DPI Serial Mouse
- Anti-Virus MS-DOS 6.0 & Windows 3.1
- Three-Year System & Lifetime Labor Warranty

486/33 DX $1545
486/66 DX2 $1795

- 15" Flat Screen & **Low Radiation** Monitor Add $100
- Replace 1.2MB Drive with 350ms CD-ROM Add $170

VESA Local Bus Spitfire

- OverDrive Socket for Future **Pentium™** Technology
- 128K Cache SRAM & Expandable to 256K
- **8MB** RAM & Expandable to 32MB
- 1.2MB 5.25" & 1.44MB 3.5" Floppy Drives
- VESA Local Bus IDE Hard Disk Controller
- **250MB** 12ms IDE Drive with 64K Cache
- 32-Bit VL-Bus **Diamond SpeedStar Pro** Accelerator with 1MB RAM (Up to 1280x1024 & up to 16.7 million Colors) (Up to 30 times faster than standard Super VGA)
- 15" Flat Screen .28mm 1280x1024 Color Monitor (**Low Radiation**, 36% larger edge to edge display)
- 2 Serial, 1 Parallel & 1 Game Ports
- Enhanced 101-key Keyboard
- Hi-Resolution 400 DPI Serial Mouse
- Anti-Virus MS-DOS 6.0 & Windows 3.1
- Three-Year System & Lifetime Labor Warranty

486/33 DX $1825
486/66 DX2 $2075

- VL-Bus **Smart Cache** HD Controller (17,500KB/Sec) Add $120
- Replace 1.2MB Drive with 350ms CD-ROM Add $170

MultiMedia (VL-Bus)

- OverDrive Socket for Future **Pentium™** Technology
- 128K Cache SRAM & Expandable to 256K
- 4MB RAM & Expandable to 32MB
- 1.2MB 5.25" & 1.44MB 3.5" Floppy Drives
- VESA Local Bus IDE Hard Disk Controller
- **250MB** 12ms IDE Drive with 64K Cache
- 32-Bit VL-Bus **Diamond SpeedStar Pro** Accelerator with 1MB RAM (Up to 1280x1024 & up to 16.7 million Colors) (Up to 30 times faster than standard Super VGA)
- 14" Non-Interlaced .28mm 1024x768 Color Monitor
- 2 Serial, 1 Parallel & 1 Game Ports
- Enhanced 101-key Keyboard & Serial Mouse
- Fast 350ms **CD-ROM, Galaxy Sound Card** & 2 Speakers (CD Titles: US Atlas, World Atlas, ChessMaster 3000, Typing Tutor)
- Anti-Virus MS-DOS 6.0 & Windows 3.1
- Three-Year System & Lifetime Labor Warranty

486/33 DX $1895
486/66 DX2 $2145

- Many more CD title options are also available
- 15" Flat Screen & **Low Radiation** Monitor Add $100

ONCE AGAIN **"THE COMTRADE PC"** HAS THE COMPETITION RUNNING FOR COVER. IN REVIEW AFTER REVIEW, CRITIC'S APPLAUD COMTRADE SHOCKING SPEED AND EXTRAORDINARY VALUE. ACCORDING TO THE RECENT PC MAGAZINE, COMTRADE'S 486 SYSTEM "HAS THE PERFORMANCE ISSUE LICKED." IT'S NO WONDER COMTRADE IS AWARDED PC SOURCES MAGAZINE "**DIRECT HIT**" (BEST BUY/EDITOR'S CHOICE) (FEBRUARY 1993). "IT'S A VERY SWIFT GRAPHICS MACHINE," SAYS COMPUTER SHOPPER (MAY 1992). "THAT DESERVES SERIOUS CONSIDERATION FROM ANYONE WHO WANTS TO JUICE UP WINDOWS." COMTRADE'S LATEST VESA LOCAL BUS WINPRO OR VIPER GRAPHICS ACCELERATORS ARE EVEN UP TO 3 TO 10 TIMES FASTER THAN OUR PREVIOUSLY REVIEWED SYSTEMS.

NO CONTEST!
COMTRADE PROCESSOR OUTPACED ALL THE OTHER - WINDOWS SOURCES, JUNE 1993.

Comtrade's Thunderous VL-Bus Video

COMTRADE DIAMOND VIPER	62
COMTRADE WINPRO	21
VL-B SPEEDSTAR PRO	17
ATI ULTRA PRO	14

First-Place Graphics. COMTRADE OUTDISTANCED THE REST OF OUR TEST GROUP - WINDOWS SOURCES, JUNE 1993.

WinMark 3.11 (Million pixels per second)
Diamond Viper with new caching driver.

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- **15" Flat Screen .28mm 1280x1024 Color Monitor (Low Radiation, 36% larger edge to edge display)**
- 2 Serial, 1 Parallel & 1 Game Ports
- Enhanced 101-key Keyboard
- Hi-Resolution 400 DPI Serial Mouse
- Anti-Virus MS-DOS 6.0 & Windows 3.1
- Three-Year System & Lifetime Labor Warranty

486/33 DX $1925
486/66 DX2 $2175

- Replace 1.2MB Drive with 350ms CD-ROM Add $170
- VL-Bus Diamond Viper Accelerator Add $220

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- VESA Local Bus IDE Hard Disk Controller
- **340MB** 12ms IDE Drive with 64K Cache
- 32-Bit VESA Local Bus **WinPro** Graphics Accelerator with 1MB RAM (Up to 1280x1024 & up to 16.7 million Colors)
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- Hi-Resolution 400 DPI Serial Mouse
- Anti-Virus MS-DOS 6.0 & Windows 3.1
- Three-Year System & Lifetime Labor Warranty

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486/66 DX2 $2625

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- VL-Bus Diamond Viper Accelerator Add $220

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Processor	Drive	Price
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486SX/33	170MB	$1099*
486DX/33	170MB	$1259
486DX/33	260MB	$1369
486DX2/66	260MB	$1599

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$979*

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- 4MB RAM expandable to 32MB
- 3.5" floppy drive
- Local Bus graphics
- MS-DOS 6.0, Windows 3.1, Mouse

Model	Hard drive	Price
486SX25	120MB	$1099*
486SX25	240MB	$1299
486DX33	120MB	$1489
486DX33	240MB	$1679
486DX2/50	240MB	$1899

Bundles also available
Monitors sold seperately.
Lease for $50/mo.

$1099*

AST

Bravo Desktops

- 4MB RAM expandable to 64MB
- 120MB hard drive
- MS-DOS, Windows 3.1, MS Mouse
- 14" SVGA color monitor .28mm

Processor	Model 213/W
4/25s	$1359*
4/33	$1629
4/50d	$2179
4/66d	$2249

Lease for $50/mo.

$1359*

AST

PowerExec

- 4MB RAM, expandable to 20MB
- Trackball, 2 PCMCIA slots
- Windows 3.1

Screen	Model	Price
386SL25Mono	83/W	$2009*
386SL25Mono	123/W	$2049
386SL25Active Color	203/W	$3499
486SL25Mono	203/W	$2429
486SL25Active Color	203/W	$4029

Lease for $73.73/mo.

$2009*

COMPAQ

Contura 4/25

- 25 MHz 486SL
- 4MB RAM expandable to 20MB
- 209MB hard drive
- 9.5" mono display
- MS-DOS, Windows 3.1, trackball

$2199*
Active matrix color display configuration
$3479

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$2199*

TOSHIBA

T4600

- 33MHz 486SL processor
- 4 MB, expandable to 20MB
- 2 PCMCIA slots
- 9.5" diagonal display

Display	Hard Drive	Price
Mono	120MB	$2879*
Mono	200MB	$3139
Active matrix color	120MB	$4099
Active matrix color	200MB	$4359
Active matrix color	340MB	$4799

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March 30, 1993
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TEXAS INSTRUMENTS

TravelMate 4000 WinDX2/40

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- 640x480 VGA color display (9.4")
- 256 colors
- MS-BallPoint/QuickPort connection
- MS-DOS 6.0, Windows 3.1

Processor	RAM	Hard Drive	Price
486SX/25	4MB	120MB	$2599*
486DX2/40	8MB	200MB	$3649

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$2599*

TEXAS INSTRUMENTS

TravelMate 4000 WinDX2/50

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- 200MB hard disk drive
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- MS-BallPoint/QuickPort connection
- MS-DOS 6.0, Windows 3.1

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- Automatic emulation switching
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NEC

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- PFS:Windows Works,
- Prodigy, Quicken
- Mouse

Screen	Hard drive	Price
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486DX33	170MB	$1479

NEC SVGA color monitor $349

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$1179*

NEC

UltraLite Versa

- 25MHz 486SL processor
- 4MB RAM, expandable to 20MB
- 2 PCMCIA slots
- Local bus graphics
- MS-DOS 6.0, Windows 3.1, trackball

Screen	Hard drive	Price
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Mono	180MB	$2999
Active color	120MB	$3839
Active color	180MB	$4049

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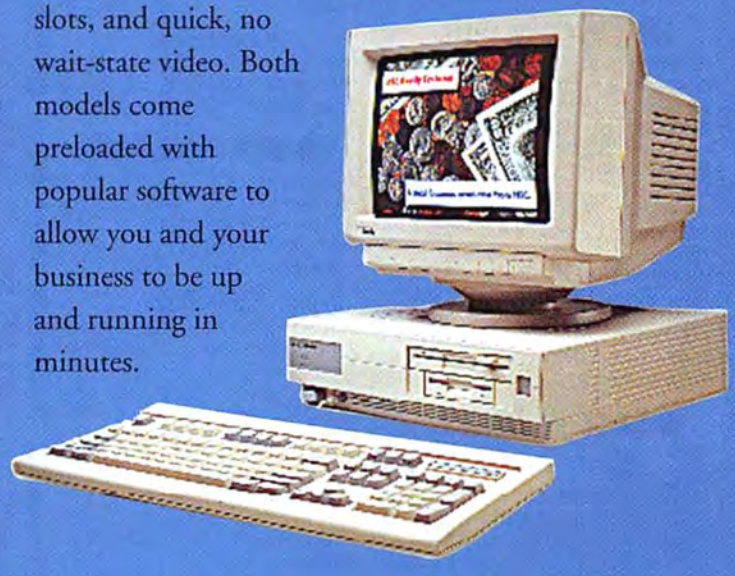

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Epson 800C..... $1069
Logitech ScanMan $135
Logitech ScanMan 256 . $229
Mustek Color Artist..... $289
Summasketch 12×12.... $255
Summasketch 12×18.... $499

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P9300 ..... $825
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Model 95FX Laser $1429

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NEC

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4 FGE $689
5 FG..... $1245
5 FGE $1049
6 FG..... $2249

MITSUBISHI

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Diamond Pro 17..... $1019
HL6955 20" $1759

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ATI Graph Prof 2 MG... $399
Diamond Stealth Pro ... $359
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80387-16/20/25/33..... $85
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Overdrive SX33 ..... $549
Overdrive DX25/33 $425/$549

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Hayes Optima 96 ..... $309
Hayes Optima 14.4/Fax . $369
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Hayes Ultra 96 14.4..... $589

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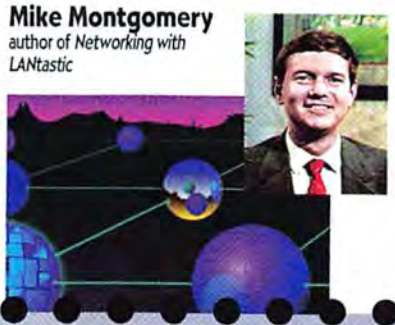

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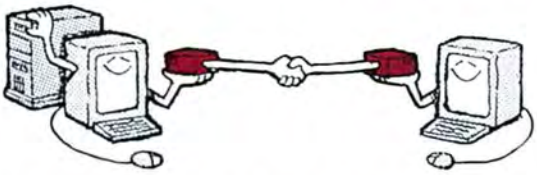

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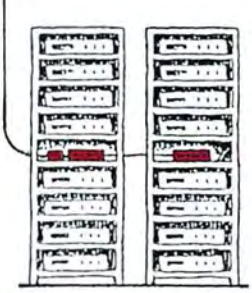

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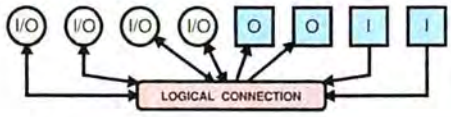

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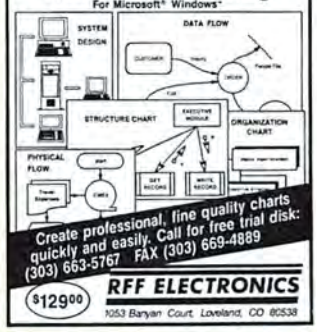

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Advertised Products

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952 Notebook computers
953 DTP/Presentation software
954 Monitors and video boards
955 Accounting software
956 Draw/paint software
957 Network/sharing products
958 Printers
959 Multimedia products
960 Utilities
961 Mail order companies
962 Storage devices

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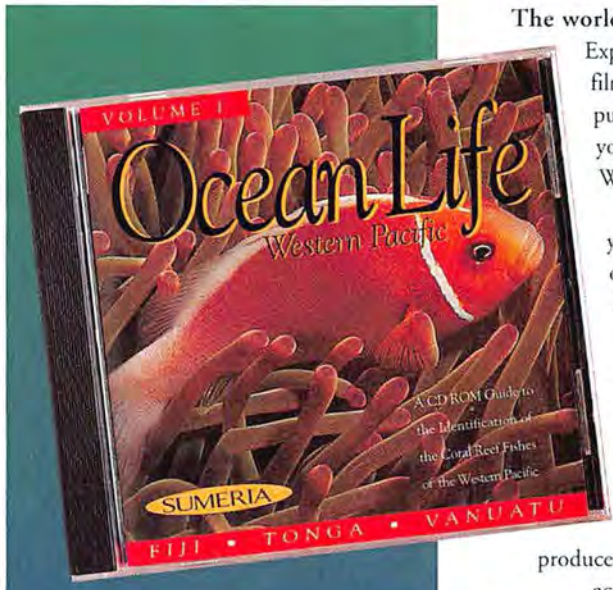

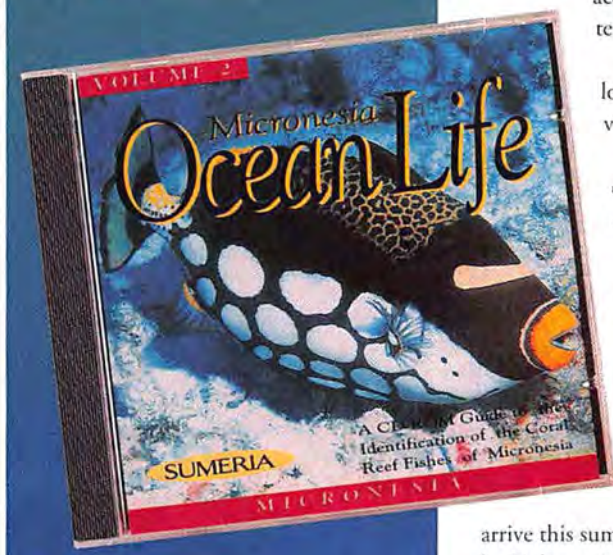

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Taking a Gamble

Life, love, business—it's all a gamble. Which is one reason why a casino is increasingly likely—say, a probable 12-to-7—to move into your state, or even your city, before the century's end. And if that isn't soon enough, a casino is ready to move into your PC right now.

Unlike Microsoft's marvelous Dr. Black Jack (reviewed in May 1993 as part of Entertainment Pack 4), Capstone/IntraCorp's Trump Castle 3 won't teach you how to win, but it *will* teach you how to play. All the major casino games are included: blackjack, roulette, keno, craps, baccarat, four kinds of poker, and 36 different slot machines. There's even a waitress in an abbreviated uniform who comes around and asks if you want a drink—although IntraCorp has not figured how to make Absolut martinis pour from your computer.

While the comprehensive collection of casino games is impressive, IntraCorp's implementation of them is not. It takes about 15 minutes of swapping floppy disks to install Trump Castle 3, and if you're unlucky, it may be longer. As soon as I tried to play one of the games, my computer crashed. Half an hour (and five crashes) later, I determined that the sound board setting was the culprit. For some reason, Trump Castle's Sound Blaster setting didn't work with my board's sound board emulation. No big deal: It happens all the time. I went looking for the Preferences menu to reinstall the sound driver. The menu was there, all right, but it did *not* include a sound board selection. In the end, I had to reinstall the entire program from scratch. Heaven help me if I'd had to do it more than once!

Even when I had Trump Castle 3 running reliably, I wasn't very impressed. The poker game is typical. You can play up to four opponents at once; in fact, you can create their on-screen images yourself, using a design menu that lets you choose everything from hats to glasses, eye color, and names. The other players are controlled by the computer—except for one person who can join the game via modem. So far so good. But once the cards have been dealt, you'll find yourself stuck with a losing interface. For instance, you use your mouse to grab chips and push them into the pot—but you can't read the denomination on the chips. If you want to avoid accidentally betting $1000 on that lousy low pair, you have to click on the base of your chip stack before every wager to confirm what they are worth!

If slots are your thing, you can choose from 36 different models in Trump Castle 3. Another slot room offers five-wheel machines—and the same lousy odds.

Worse yet, it's almost impossible to follow the betting. When another player makes a bet, a small window at the bottom of the screen opens to announce the bet and closes instantaneously. If you happen to be looking at your cards, or checking the other hands around the table during the moment when the bet window opens, you have no way of knowing what the bet is. Your only choice is to click on the Call box and hope you have enough to cover the bet—whatever it was.

All the games include an on-screen explanation of the rules, but graphics are unexciting, sound and speech effects are primitive, and performance is slow. Trump Castle 3 is not a winner.

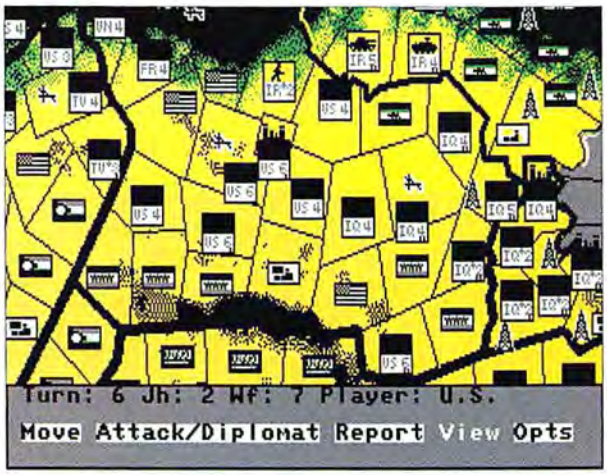
The Mother of all Computer Games

For gamesters with a yen to mow down armies of villains, SSI's A Line in The Sand offers destructive power far beyond sword-and-sorcery adventures that let you skewer only one bad guy at a time. This detailed simulation of the Gulf War offers all kinds of heavy weaponry as well as a nuclear option (but beware—dropping the big one doesn't necessarily mean that you'll win the game).

There are six scenarios, everything from Desert Storm (the basic game) to variations such as Holy War and Israel Surrounded. You can take the role of any participant you wish, but be advised that some smaller countries aren't counted individually—they are combined in either of two groups, Moderate Arabs and Volatile Arabs (unfortunate stereotypes). You can definitely play as Saddam Hussein (Iraq) if you're in a bad mood. Once you choose the scenario and the country you want to play, use your mouse to deploy air power, ships, and ground forces on a fairly detailed map of the Middle East, or let the computer do it for you. The other countries (which can be controlled by human players or the computer) do the same.

The action starts when you decide where you want your air forces to attack. If they survive antiaircraft fire,

By Michael Goodwin



OIL WELLS AND AIRSTRIPS ARE OBJECTS OF DESIRE in A Line in The Sand, a war gamers' look at the recent Gulf War.

they'll soften up the enemy ground troops with bombs and air-to-ground missiles. Then you send in the grunts to capture strategic assets such as oil fields, airports, weapon plants, and so forth. When you've completed your turn, each of the other countries or groups involved will take the opportunity to have at you in return.

Many optional factors come into play to make the simulation more realistic. If you play as the Allied side, "war fever" at home can keep domestic support high—but random terrorist attacks may derail your carefully laid plans. Arab countries can raise fighting spirit by means of a Jihad, or holy war. Rebellions and revolutions have a substantial effect on fighting capabilities. The Iraqi commander may employ chemical weapons if he or she wishes; U.S. and Israeli warriors can make use of tactical nukes—but you lose points if you use one, and there are political penalties as well. If you're feeling diplomatic, you can even make speeches at the United Nations or enter into an alliance with other countries.

Air-to-air combat and ground warfare are shown on screen by a series of animated icons, enlivened with realistic sound effects; but you'll still need to use your imagination to bring the battles to life. The game's limited graphics reflect the fact that A Line in The Sand is basically a computerized version of a board-based war game. Even so, the action is pretty fast in this battle simulation, and the drama is intense. I intended to spend only a short time exploring the game, but before I knew it I'd been at the controls for almost 10 hours! And even if you disapprove of war in general, or the Gulf War in particular, A Line in The Sand provides terrific hands-on background on Middle East geopolitics.

- **A Line in The Sand** $39.95; Strategic Simulations, Inc.; 408/737-6800 ext. 186
  Reader service no. 640
- **Trump Castle 3** $59.95; Capstone/IntraCorp; 800/468-7226
  Reader service no. 641

Michael Goodwin is a contributing editor for PC World. *He can be reached on PC World Online (see page 12 for more information).*

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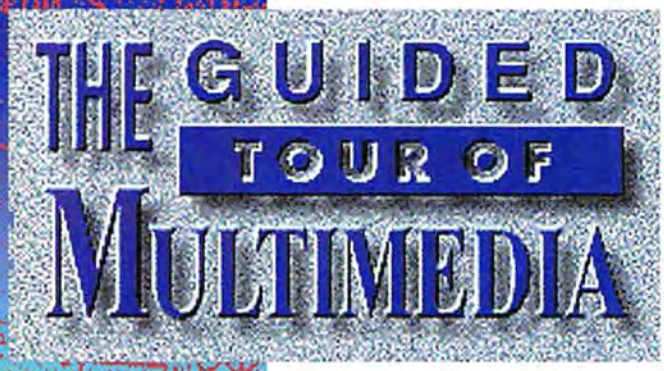

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The Burglarproof Office

By Steve Bass

I like working at home. The commute's a snap, the restaurant's good, and I don't have to wear a tie. But home offices can be burglarized; mine was, despite the presence of my faithful dog, Kirby. That's why I've taken a few precautions.

Protecting your home office and its contents is a two-step process. Step one is securing the hardware, making it difficult—or at least time-consuming—for a thief to cart it away. My local sheriff told me that most home burglaries are over in 10 minutes; the crook wants to get in and out as quickly as possible. So I've nailed things down with Secure-It's Kablit cabling package, a $49.95 kit that comes with a 10-foot cable, a lock, and a clever system of fasteners. The fasteners attach to the computer and peripherals, and the cable threads through the fasteners and then wraps around an immovable object. Since Kirby is marginally movable, I strung the cable behind my desk between the leg and a lower shelf. Don't worry if your desk doesn't have legs—Secure-It offers several fasteners for different situations. • *Kablit $34.95 to $49.95; Secure-It Inc.; 800/451-7592, 413/525-7039, 413/525-8807 (fax). Reader service no. 601*

Making the Insurance Assessment

Step two is to review your homeowner's or renter's insurance and assess your needs. My homeowner's replacement policy covers the usual stuff plus up to $5000 worth of computer equipment. But even at today's prices, $5000 may not cover all your peripherals, so consider an extra, specialized computer policy. Most include coverage for things your homeowner's insurance wouldn't touch, such as power surges and virus attacks. The yearly cost for a typical system—computer, monitor, and printer—is about $70 to $100 for roughly $5000 of coverage. I know of two nationwide firms that offer this type of insurance: Safeware Insurance and The ComputerInsurance Agency. • *Safeware Insurance; 800/822-2345, 614/262-0708. Reader service no. 602* • *The ComputerInsurance Agency; 800/722-0385. Reader service no. 603*

Because I run my business from home, I opted for a combination home-office and business policy. Most homeowner policies won't cover business liability or interruption, or assets like inventory and business equipment. After a considerable amount of searching, I finally found a firm with a home policy that would: Powell-Walton-Milward Insurance, a Kentucky-based outfit whose coverage focuses on home businesses with a lot of computer equipment. • *Powell-Walton-Milward Insurance; 606/254-8023, 606/254-8020 (fax). Reader service no. 604*

If you live in a high-crime area and want to boost your existing policy, check out the Federal Crime Insurance Program (FCIP), a specialized policy you might want to get to supplement your homeowner or computer policy. Underwritten by the federal government, it provides secondary coverage at a subsidized rate and ignores non–crime-related losses like fire and liability. If your primary policy doesn't cover your burglary losses completely, the secondary kicks in, up to an additional $10,000. Because some states have their own program, the feds offer the coverage only in Washington, D.C.; Florida; Illinois; Kansas; Maryland; New Jersey; New York; Pennsylvania; Puerto Rico; Virgin Islands; and, thank goodness for me, California. To find out more, call FCIP or your state's insurance commission. • *Federal Crime Insurance Program; 800/638-8780*

I know what it's like to be victimized by burglars—and claims adjusters. To protect myself, I've videotaped every blessed component for proof (photographs will do as well). I've also inventoried my equipment, both to see how much coverage I really need and to make it easier if I ever have to fill out another burglary report. I use Nolo's Personal RecordKeeper 3.0 to record every component, including add-in cards, memory, and hard disk size, and I update my inventory monthly. You can use a regular database program for the job, but be sure to set up fields for serial number, purchase price and date, manufacturer, and model number. Then print a report and keep it in a safe place; the inventory won't do you much good if it's stolen along with the computer. • *Nolo's Personal RecordKeeper 3.0 $49.95; Nolo Press; 800/992-6656, 510/549-1976, 510/548-5902 (fax). Reader service no. 605*

Actually, you should make sure that all your data is safe. Back up your system, and keep the backup off-site. That way, if your home is burgled or is hit by a natural disaster, you won't lose anything but the hardware.

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 more information) or on CompuServe, 71333,310.

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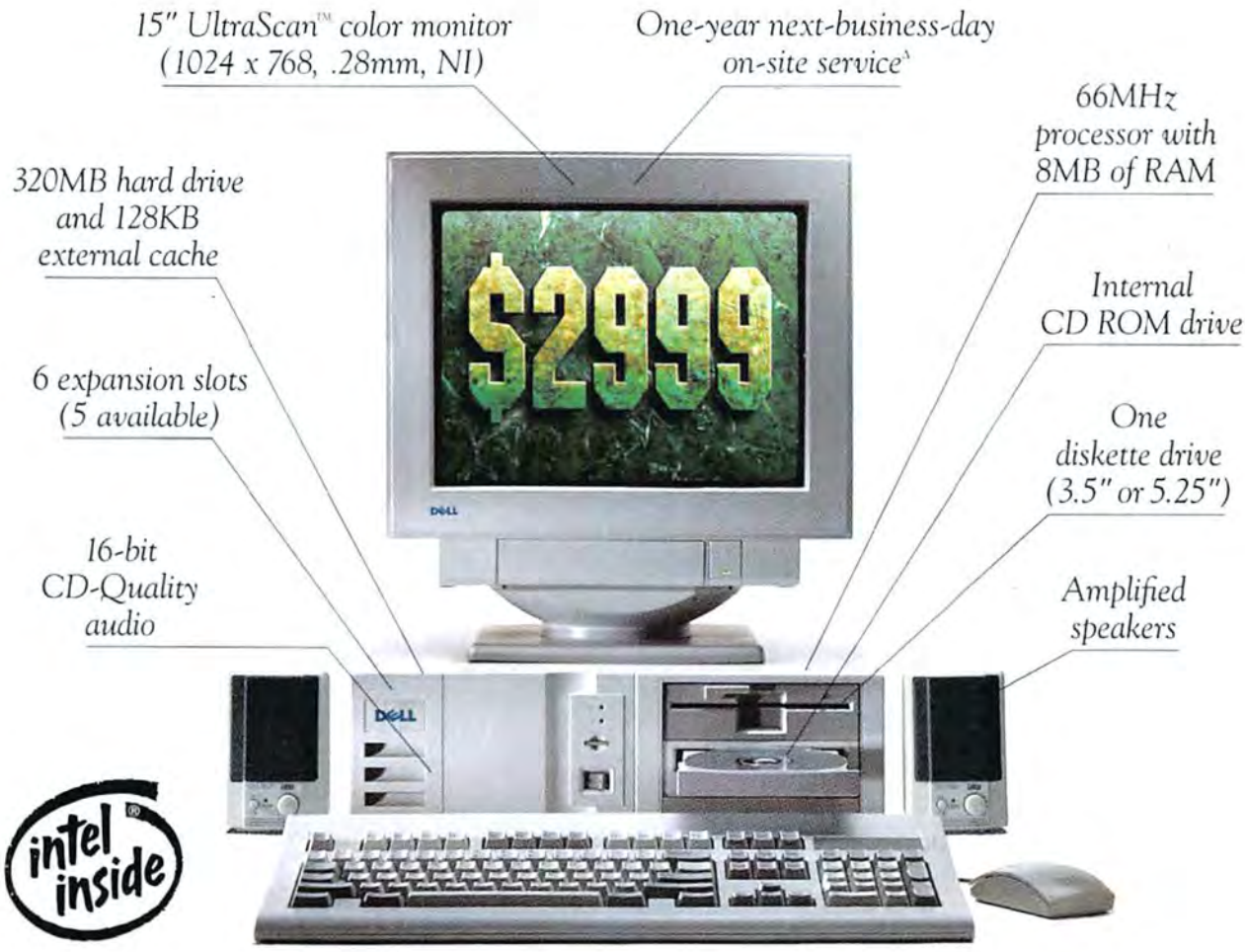

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