

PC WORLD

July 1993 \$3.95

**FIRST
SPEED
TESTS!**

Pentium PCs

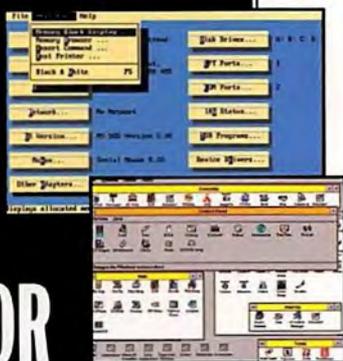
**Real '586' PCs Arrive:
Acer, ALR, Compaq, and HP**



PLUS:

75

**TIPS FOR
WINDOWS & DOS**



9 Low-Cost Lasers:

**Great Buys
for \$700**



**WELCOME TO
THE MICROSOFT OFFICE.**



Dear Mr. Bent

It is with great pleasure
to include your
conversation
order, the

Wickets
(3,000)

Also,
and 1
for

Si



Ferguson

SUMMER PRODU

Ferguson and Bardell

our new line. A complete

Vermont wicker collection

this spring. Attention

EQUIPMENT SALES



APPAREL

Suppose you're responsible for the monthly report. Gulp.

You're going to write it, including enough solid data to make the numbers guys jealous. Some very impressive stuff.

If you're fortunate enough to have The Microsoft® Office for Windows™ on your computer, this is not a problem.

Because you can easily turn all those numbers into charts and graphs with Microsoft Excel. Then cut and paste them right into your Word document.

All kinds of text, data and graphics can be shared back and forth between applications. And you won't lose the formatting.

With a few more clicks, you can cut and paste your document into Mail, attach a note, and send it all around the office for input and admiration.

You can go on to make the report presentable at the status meeting or even the client presentation. PowerPoint® presentation graphics turns what's on your computer screen into eye-riveting slides or handouts.

And once you become familiar with one Microsoft application for Windows, you're well on your way to knowing them all.

Even the first time, things like toolbars, menus and icons will look comfortably the same. (What's wrong with a little instant gratification?)

So now you can focus on doing your job, and maybe even discover talents you never knew you had. But what you need first is more information. Call us at (800) 323-3577, Dept. KA2.

Who knows? You could actually enjoy doing more than one thing at a time.



The Microsoft Office for Windows includes the complete Microsoft Excel, Word, PowerPoint, and a Microsoft Mail workstation license.

Microsoft
Making it easier

**WORDSMITHS AND
NUMBER CRUNCHERS UNITE.**

Bardell, Outfitters Monthly Sales Projections.

Outfitters is projecting increased sales volume based on the introduction of a new line of graphite rods, reels, sportsman's pocketed vests, durable waders, fishing boots, gourmet salmon eggs, and hand-tied flies will be available at retail prices. The quality and variety should place F and B fly fishing equipment at the top of every angler's list. Western region projections for the new line are included here. Samples of the new fly fishing line will be available at the upcoming Western sales conference in Coeur d'Alene next month. Another F and B favorite, our classic hexagonal nylon tent, has been redesigned to be more colorful than ever. Plan to review both of these exciting new product lines. The complete Ferguson and Bardell, Outfitters catalogue will be available to you at the conference, as well.

SIZE	QUANTITY	COLORS	PRICE
S,M,L,XL	40,000	Khaki, Olive	27
8-14	65,000	Khaki, Blue	30
S,M,L,XL	45,000	Olive, Yellow	89
S,M,L	60,000	Khaki, Bark	35

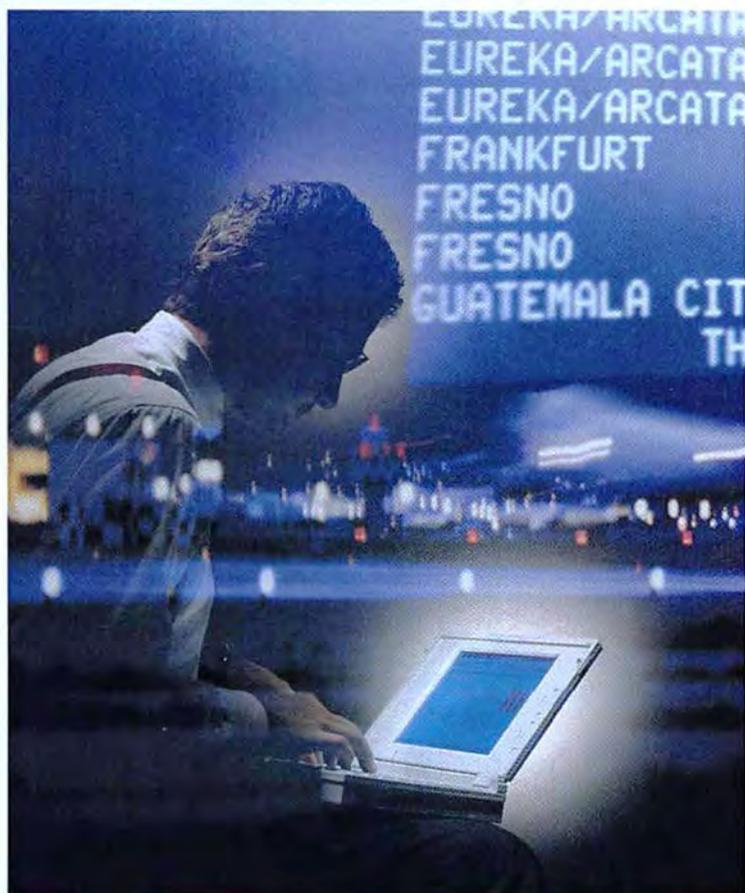
Available for inspection at the upcoming Western region sales conference in Coeur d'Alene next month, including the new fly fishing line and the newly designed, colorful nylon tent line as well.



SALES PROJECTIONS



PC WORLD



Special Report: Mobile Computing

What's the Easiest Notebook to Use at 30,000 Feet?

218 To find the most practical notebook design, the PC World Test Center and American Airlines strapped six business travelers into a coach-class airplane cabin with top-rated notebooks. Here's their report.

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230 A buyers' guide to the mobile market, from versatile hand-held models to no-compromise 486 notebooks on a par with deskbound PCs.

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244 The best advice? Be prepared. Here's what to look for in a notebook, how to stretch its resources, and tactics for staying plugged in and productive.

246 Data Compression Programs: Squeezing More Into Less

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Cover photographs by Robert Cardin

Windows/DOS

110 75 Tips for Windows and DOS

A compendium of hot-off-the-press tips to help you master your PC, from managing Windows' File and Program Managers to navigating PATHS and directories in DOS.

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Top of the News

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Coming to desktops soon: the ultimate power PCs. The PC World Test Center clocks the first Pentium PCs from Acer, ALR, Compaq, and HP at nearly the twice the performance of the fastest 486s.

54 The Real Trick to Reengineering

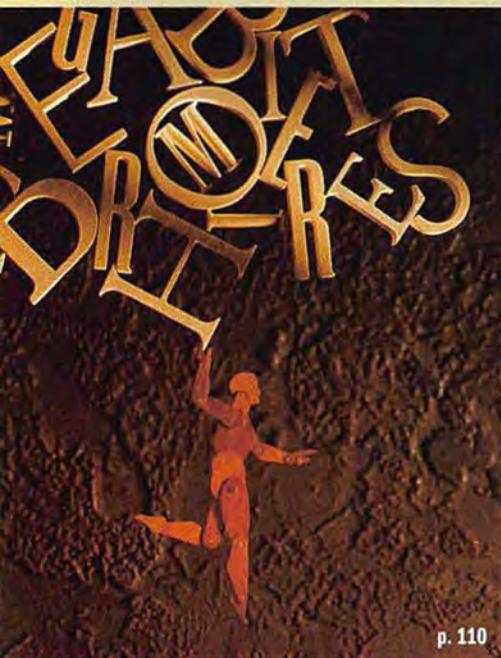
Team up technology with revamped processes for dramatic productivity gains.

58 Subnote Packs Pop-Out Mouse and Excel in ROM

The innovative HP OmniBook includes an infrared port for wireless file transfer.

62 CorelDraw 4.0: One-Stop Graphics Shop

64 WordPerfect 6.0: A Graphical Change



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Hard Disks

158 The Complete Hard Disk Toolkit

Why wait to stock up on essentials for hard disk maintenance and emergencies? Our reviewers select a full suite of utilities priced from \$60 to \$179 that belong in every PC owner's toolkit.

Systems

180 Double-Duty: 486 Notebooks

The appeal of a 486 notebook: It's powerful and portable enough to serve in office, home, hotel room, and plane. We test 16 lightweight 486-class notebooks equipped with all you'll need for desktop-class computing.

Printers

138 Laser Printers From \$700

Is the HP LaserJet 4L the undisputed champ among compact, low-cost personal lasers? Not necessarily. We weigh the pros and cons of nine models and recommend two smart buys for low price, top quality, and speed.



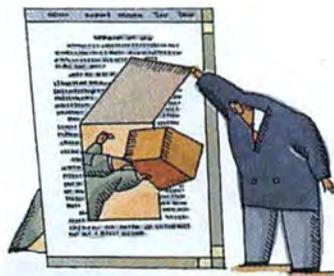
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| 78 Drag and Zip 2.15, WinZip 4.0a, Zip Chunker 2.01 | 84 GPS MapKit SV | Prices for popular PCs nationwide. |
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Choose Your Weapon



THE ZEOS® CONTENDA



The "fasten seatbelt" sign just went off. Already you're cranking away on that spreadsheet. Gotta love it: A machine *this size does Windows!* • Tonight: Albuquerque. Tomorrow: Back to the coast. Nothing like doing Windows all over the world. You glance at your briefcase, jammed with file folders and a few magazines. That review in *PC/Computing* this month said the Contenda "makes taking Windows on the

road a no-brainer." What was really a no-brainer, you think, was the decision to buy one in the first place. • It's starting to rain. Good thing this Contenda has a backlit display. It makes working in even dim cabin lighting a pleasure. And the keyboard: it's so close to full size, touch-typing is a piece of cake. Not to mention the built-in trackball. Sure is nice not having to take along a mouse these days. • Now, where were you? Ah, yes. The spreadsheet. Now if you could just remember whether you packed that file folder with all the sales figures...



THE ZEOS FREESTYLE

There you are. Poolside. The light is so bright you're squinting behind your Ray-Bans. Thanks to the speed of your new Freestyle Notebook, you finished your sales report hours ago. So now you can work on what's really important: Your Novel. The one with the plot so exciting it's going to catapult you instantly into fame, fortune, and the talk show circuit.

• You adjust the screen to the perfect viewing angle, take a long sip from your drink. You detect a few envious glances your way.

Yes, your Freestyle sure is sleek. No one's ever seen a tilt and swivel display like this before. And when you made that presentation last night

where you plugged in a color monitor for simultaneous

display, you could tell that even that old stone-faced Senior VP was impressed. As if you didn't notice. • Back to Your Novel. Where to begin? The keyboard is so comfortable, your fingers just fly. "It was a dark and stormy night..."



THE ZEOS CONTENDA

Choose from three money-saving packages for each CPU.
Or, we can custom-build a system to your exact specifications. Just give us a call!

	386SL			486SL		
	#1	#2	#3	#1	#2	#3
	\$1495	\$1795	\$1995	\$1795	\$1995	\$2395
Intel 386SL CPU	■	■	■			
Intel 486SL CPU				■	■	■
25MHz Processor Speed	■	■	■	■	■	■
Intel's PI local bus for video acceleration				■	■	■
Memory	2MB	4MB	4MB	4MB	4MB	8MB
80MB hard drive	■	■	■	■	■	■
Uses 3.3v technology				■	■	■
VGA backlit display; 640x480, .23mm dot pitch, up to 64 shades of gray	■	■	■	■	■	■
Video RAM	256K	256K	256K	512K	512K	512K
Simultaneous video with external color monitor	■	■	■	■	■	■
NiMH battery; power up to 4 hours	■	■	■	■	■	■
Fully-featured power management	■	■	■	■	■	■
Flash ROM for easy BIOS upgrades	■	■	■	■	■	■
80-key keyboard	■	■	■	■	■	■
Embedded numeric keypad	■	■	■	■	■	■
Easy-to-use built-in trackball	■	■	■	■	■	■
One serial & one parallel port	■	■	■	■	■	■
Ports for optional internal modem, external floppy, SVGA color monitor	■	■	■	■	■	■
External 3.5" floppy drive		■	■		■	■
DOS 6.0 with Enhanced Tools		■	■		■	■
Windows 3.1		■	■		■	■
Lotus Organizer		■	■		■	■
Carrying case			■			■
Extra battery			■			■
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	■	■	■	■	■	■
UL Listed	■	■	■	■	■	■

Pack Size Subnotebook 386 or 486

**THE ZEOS CONTENDA.
LESS THAN FOUR
POUNDS—YET RUNS
WINDOWS!**

"...if you're looking for a subnotebook and want to make next to no compromises, then the \$1495 ZEOS Contenda is your best bet."

—PC Week,
February 1, 1993

"Introduced only months after Gateway 2000's popular Hand-book, the Contenda is a generation ahead!"



—PC/Computing, May 1993

PC Week calls the ZEOS Contenda "the best yet of the new crop of lightweight, full-featured machines." We weren't satisfied with "best yet"—so we've made it even better. Because now you get your choice of 386SL or 486SL CPU!

FEATURES THAT PULL NO PUNCHES.

It's impossible to find a notebook on the market today that's this light, this small, this affordable—and still gives you *so much power*. But with the ZEOS Contenda, it's all here.



We start with a smart Intel SL processor. The Contenda's CPU extends your battery life significantly—because it's intelligent enough to power-down the memory, disks, modem and more when they're not in use.

What's more, the Contenda's features make it a pleasure to use. Features such as a VGA backlit screen that's crisp and vibrant. A built-in trackball so you won't have to tote a mouse around. Enough power and memory to easily run Windows. And at less than four pounds in weight, it's probably lighter than your briefcase!

386SL OR 486SL: PLENTY OF POWER & ROOM FOR WINDOWS!

The 486SL Contenda gives you everything the 386SL version does, plus a few choice enhancements: 3.3 volt technology for added battery life, extra video RAM, and PI local bus video for Windows acceleration.

Take your pick! You'll find all the Contenda packages give you the power and room for practically everything you'd use in a desktop system. You can easily run DOS, Windows, and Windows applications. And you can get all three in an affordable package—including the new Lotus Organizer—the personal information manager that's so easy to use, it could make your Day Timer obsolete. Check out the packages on the left for details. Then give us a call: 800-554-5220!

Power! or Notebook 86 CPU!

THE ZEOS FREESTYLE

Choose from three money-saving packages for each CPU.
Or, we can custom-build a system to your exact specifications. Just give us a call!



THE ZEOS FREESTYLE. THE ULTIMATE IN PORTABLE POWER.

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 386SL or 486SL CPU, it would seem the ZEOS Freestyle is the best of all worlds. It is!

THE BEST DISPLAY. GREAT VIDEO TOO.

Not only is the ZEOS Freestyle Notebook's screen big and easy to read, but the video is high-contrast and fast. Plus, there's the incredible tilt and swivel display—an industry first. You can swivel the screen left and right as well as tilt it up and down for the perfect viewing angle!

For video control, we chose an amazing new 3.3 volt VGA controller. It not only consumes less power, it also produces the fast, crisp images you're looking for. And with a business machine like this you'll also appreciate our dual display capabilities. You can connect an external VGA color monitor for simultaneous display! And that's not all.

POWERFUL. AND INCREDIBLY PORTABLE.

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!

GREAT NOTEBOOKS. GREAT CUSTOMER SUPPORT.

Our relationship with you doesn't end once we ship your new Notebook. You can call us with your questions 24 hours a day, 365 days a year, and always toll-free.

What's more, if you're not convinced your new ZEOS Notebook is everything we say it is and more, you have a full 30 days to return it to us for a complete refund—no questions asked. Plus, you're covered by our One Year Limited Warranty and much more. You're going to be very satisfied. We guarantee it!

ORDER NOW TOLL FREE
800-554-5220

Fax Orders: 612-633-1325. Government: 800-245-2449. TDD Orders: 800-228-5389. Outside U.S. and Canada: 612-633-6131. MasterCard, VISA, Discover, Am Exp, Z-Card,™ COD and Leasing programs. Open 24 Hours a Day, 365 Days a Year!

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386SL			486SL		
#1	#2	#3	#1	#2	#3

	#1	#2	#3	#1	#2	#3
Intel 386SL CPU	\$1295	\$1795	\$2295	\$1695	\$1995	\$2495
Intel 486SL CPU	■	■	■	■	■	■
25MHz Processor Speed	■	■	■	■	■	■
Memory (expandable to 20MB)	2MB	6MB	10MB	4MB	4MB	8MB
Hard drive (MB) (expandable to 180MB)	60MB	120MB	180MB	60MB	120MB	180MB
Uses 3.3v technology	■	■	■	■	■	■
3.5" 1.44MB floppy drive	■	■	■	■	■	■
VGA 10" 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	■	■	■	■	■	■



HAVE SOME QUESTIONS ABOUT BUYING A COMPUTER? JUST ASK ZEOS!

Q. How can I make sure I'm getting a computer that won't be obsolete next year?

A. Make sure you're getting more than just an Over-Drive socket for your CPU. You want a computer that you can *upgrade to Pentium-level technology*. With ZEOS upgradables, you're ready for the future...a Pentium future! And our Zero Insertion Force (ZIF) socket makes upgrading easy.



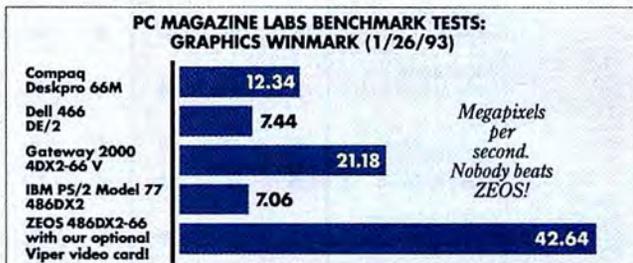
CPU upgradability is only part of the story. Check out the number of drive bays and open slots on the PC you want to buy. ZEOS gives you *six bays and eight slots*—two of which are local bus!

Q. I want incredible speed. What should I look for?

A. For high-speed video that's upgradable with industry-standard graphic adapters, *you want a system that has VESA-standard local bus slots*. As we mentioned above, ZEOS gives you two of them. Our standard super-fast local bus SVGA card includes Windows acceleration, and if you want the video performance that PC Magazine said "blew all competitors away," choose our optional Viper video card. And, because you're getting the VESA standard, you won't get stuck with some proprietary architecture that's obsolete in 6 months. Demand VESA standard with your system!

And for data transfer that's over twice as fast, get *local bus IDE*. It's the same fast local bus technology applied to the built-in IDE drive controller. ZEOS gives you performance *up to 225% that of ordinary IDE systems!*

Demand Demand



Q. What other things should I look for when I buy a system?

A. *Check out the software.* Most ZEOS packages come with *everything you need* to get started: your choice between *two spreadsheet programs* (Lotus 1-2-3 for Windows or the exciting new Lotus Improv), a word processing program (Ami Pro) or a presentation program



(Freelance Graphics for Windows). That's in addition to Lotus Organizer, Windows, and DOS 6.0 with Enhanced Tools (the latest and greatest!). With all the free software you get with your ZEOS, you save hundreds of dollars!

Q. What happens if something goes wrong with my system—or I have a question?

A. It never fails—the biggest questions come up when you're working late on something important. It's comforting to know that you can call ZEOS technical support, *toll-free, 24 hours a day, 365 days a year*. And better yet, it won't take six days to get past a busy signal.

Not that you'll probably need to call at all. ZEOS was recently named *PC Magazine Readers' Choice for Service and Reliability*. For both desktops and notebooks. So you can buy with confidence!



More. ZEOS!®

Q. What other kinds of after-the-sale support will you give me?

A. If you're not absolutely convinced your new ZEOS PC is everything we say it is and more, you have a full 30 days to return it to us for a complete refund. No questions asked. Plus, you're covered by our One Year Limited Warranty, Express Parts Replacement Policy and a complete ZEOS Customer Satisfaction Package.



FAVORITE OPTIONS

- 15-inch monitor upgrade (pkgs. 2, 3 & 4 only)
SVGA non-interlaced, 1024x768, flat screen\$95
 - Vertical case upgrade
Includes ten bays\$95
 - Diamond Viper video card
Get the speed that PC Magazine said "blew all competitors away!"
Includes 1 MB VRAM\$149
with 2 MB VRAM\$249
 - NEC CD-ROM
Internal drive\$449
 - Adaptor 6260 SCSI
controller chip\$49
 - Archive 51250A
internal tape backup
80 to 250MB (with compression),
includes EZ Tape for DOS\$249
- Hundreds of other affordable upgrades and options available. Call for details!*

Q. All of this must cost a lot...right?

A. No way. Check out our prices. Shop around and compare systems. We think you'll agree: *Feature for feature, no one gives you as much as ZEOS. At any price!*

Q. So—how do I get a ZEOS system?

A. Just give us a call—toll free! We're open 24 hours a day, 365 days a year. A friendly and knowledgeable ZEOS Systems Consultant will be glad to answer your questions, help you pick a package, or tailor a system to your exact specifications. We know you'll agree: ZEOS is absolutely your best choice. And we don't just say it. We guarantee it!

ORDER NOW TOLL FREE
800-554-5220

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TDD Orders: 800-228-5389
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Z-Card™ COD and Leasing programs.
Open 24 Hours a Day, 365 Days a Year!



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CHOOSE FROM THESE FOUR MONEY-SAVING PACKAGES.

Or we can custom-build a system to your exact specifications. Just call us!

	#1	#2	#3	#4
486SX-25	\$1295	\$1795	\$2195	\$2495
486SX-33	1395	1895	2295	2595
486DX-33	1595	2095	2495	2795
486DX2-50	1695	2195	2595	2895
486DX2-66	1795	2295	2695	2995
Intel 486 CPU	■	■	■	■
ZIF upgrade socket	■	■	■	■
MB of RAM expandable to 64MB on motherboard	2	4	8	16
High-speed IDE hard drive (MB)	107	214	340	452
Built-in hard drive cache	32K	128K	128K	256K
Local bus IDE hard drive interface	■	■	■	■
Seek time (ms)	16	16	12	12
1.2MB floppy drive	■	■	■	■
1.44MB floppy drive	■	■	■	■
ZEOS 14" high-resolution mono VGA monitor	■	■	■	■
ZEOS 14" high-resolution 1024x768 non-interlaced SVGA monitor	■	■	■	■
Monitor dot pitch (mm)	.28	.28	.28	.28
1MB high-speed VESA local bus card with Windows accelerator	■	■	■	■
Eight expansion slots including two VESA local bus	■	■	■	■
Two serial ports, one parallel port	■	■	■	■
Shadow RAM/EMS support	■	■	■	■
Socket for optional on-board SCSI	■	■	■	■
Flash BIOS	■	■	■	■
High-capacity 200W power supply and built-in surge suppression	■	■	■	■
ZEOS SpaceSaver case with six drive bays	■	■	■	■
Two cooling fans	■	■	■	■
ZEOS 101-key tactile/click keyboard	■	■	■	■
Microsoft DOS 6.0 (plus Enhanced Tools)	■	■	■	■
Microsoft Windows	■	■	■	■
Microsoft Mouse	■	■	■	■
Choice of Lotus Improv, 1-2-3, Ami Pro or Freelance	■	■	■	■
Lotus Organizer	■	■	■	■
24-Hour-A-Day Toll-Free Technical Support	■	■	■	■
30-Day Money-Back Guarantee	■	■	■	■
One Year Limited Warranty	■	■	■	■

PC WORLD

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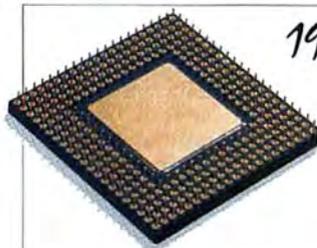
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Item #58836-16		
<input type="checkbox"/> Lotus 1-2-3 Windows 1.1	F3	\$ 325
Item #61837-16		
<input type="checkbox"/> Lotus 1-2-3 Windows 1.1	F3	\$ 99
Upgrade		
Item #54832-16		
<input type="checkbox"/> Microsoft Excel for	F3	\$ 289
Windows 4.0		
Item #53253-16 (5.25 available)		
<input type="checkbox"/> Microsoft Excel for	F3	\$ 119
Windows 4.0-Upgrade		
Item #44625-16 (5.25 available)		
<input type="checkbox"/> Lotus 1-2-3 2.4	F3	\$ 339
Item #67606-16		
<input type="checkbox"/> Lotus 1-2-3 2.4	F5	\$ 339
Item #69601-16		



\$99 Lotus 1-2-3 Upgrade

Product	Media	Price
Word Processing		
<input type="checkbox"/> WordPerfect 5.2 for	F3	\$ 275
Windows		
Item #77919-19 (5.25 available)		
<input type="checkbox"/> WordPerfect 5.2 for	F3	\$ 87
Windows-Upgrade		
Item #11090-19 (5.25 available)		
<input type="checkbox"/> Microsoft Word for	F3	\$ 299
Windows 2.0b		
Item #64932-19 (5.25 available)		

Product	Media	Price
Word Processing Con't		
<input type="checkbox"/> Microsoft Word for	F3	\$ 115
Windows 2.0b-Upgrade		
Item #62910-02 (5.25 available)		
<input type="checkbox"/> Lotus Ami Pro 3.0	Dual	\$ 249
Item #55236-19		
<input type="checkbox"/> Lotus Ami Pro 3.0	Dual	\$ 99
Upgrade		
Item #32259-19		
Database		
<input type="checkbox"/> Borland Paradox 4.0	F3	\$ 529
Item #63329-08		
<input type="checkbox"/> Borland Paradox 4.0	F5	\$ 529
Item #63325-08		
<input type="checkbox"/> Borland Paradox 4.0	F3	\$ 179
Upgrade		
Item #89829-08		
<input type="checkbox"/> Borland Paradox 4.0	F5	\$ 179
Upgrade		
Item #91828-08		
<input type="checkbox"/> DataEase Express	F3	\$ 260
for Windows		
Item #85902-08		
<input type="checkbox"/> Symantec Q&A 4.0	F3	\$ 249
Item #95743-13		
<input type="checkbox"/> Symantec Q&A 4.0	F5	\$ 249
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for Windows		
Item #14344-10 (5.25 available)		
<input type="checkbox"/> Lotus Freelance Graphics	F3	\$ 99
for Windows-Upgrade		
Item #00802-10 (5.25 available)		
<input type="checkbox"/> Harvard Graphics	F3	\$ 359
for Windows 1.01		
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<input type="checkbox"/> Harvard Graphics	F5	\$ 359
for Windows 1.01		
Item #89734-10		
<input type="checkbox"/> Microsoft PowerPoint 3.0	F3	\$ 289
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Item #82528-03		
<input type="checkbox"/> Aldus Persuasion 2.1	F3	\$ 315
Item #77993-10		

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Item #83997-03		
<input type="checkbox"/> Spinnaker PFS:	F3	\$ 45
Publisher for Windows		
Item #21434-09		
Integrated		
<input type="checkbox"/> Lotus SmartSuite	F3	\$ 459
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<input type="checkbox"/> Lotus SmartSuite	F5	\$ 459
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<input type="checkbox"/> Microsoft Office 3.0	F3	\$ 449
Item #36837-13		
<input type="checkbox"/> Microsoft Office 3.0	F5	\$ 449
Item #49836-13		
<input type="checkbox"/> Spinnaker PFS:	F3	\$ 45
WindowWorks 2.0		
Item #40941-13		

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General		
<input type="checkbox"/> Intuit Quicken 6.0	Dual	\$ 45
Item #79785-02		
<input type="checkbox"/> Intuit Quicken for	Dual	\$ 45
Windows 2.0		
Item #45870-02		
<input type="checkbox"/> Intuit Quickbooks	Dual	\$ 89
Item #38392-02		
<input type="checkbox"/> IBM OS/2 2.0	F5	\$ 134
Item #23449-17		
<input type="checkbox"/> IBM OS/2 2.0	F3	\$ 134
Item #26442-17		

Product	Media	Price
General Con't		
<input type="checkbox"/> Symantec Norton Desktop	F3	\$ 115
for Windows 2.0		
Item #26705-11		
<input type="checkbox"/> Symantec Norton	F5	\$ 115
Desktop for		
Windows 2.0		
Item #26718-11		
<input type="checkbox"/> Quarterdeck QEMM 386	F3	\$ 59
Item #45010-17		
<input type="checkbox"/> Quarterdeck QEMM 386	F5	\$ 59
Item #42019-17		

PERIPHERALS AND ACCESSORIES

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Multimedia		
<input type="checkbox"/> Creative Labs	Int	\$ 549
Multimedia Upgrade Kit		
Item #30738-25		
<input type="checkbox"/> Creative Labs	Int	\$ 189
Sound Blaster Pro		
Item #61991-54		
<input type="checkbox"/> MediaVision Pro 16	Int	\$ 909
Multimedia System		
Item #23507-54		
<input type="checkbox"/> MediaVision Fusion 16	Int	\$ 559
Multimedia Upgrade Kit		
Item #88934-25		
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<input type="checkbox"/> Practical Peripherals 2400 SA 9600Fax Item #55492-41	Ext	\$ 109
<input type="checkbox"/> Practical Peripherals 9600 SA w/QuickLink II Item #17710-41	Ext	\$ 305
<input type="checkbox"/> Hayes Optima 96/Smartcard EZ .32/.42BIS Item #60063-41	Ext	\$ 349
<input type="checkbox"/> Cardinal MB14400 V.32 w/Turbofax V.42 Item #40355-41	Ext	\$ 259



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<input type="checkbox"/> Logitech Mouseman Serial PS/2 RH Item #75010-35		\$ 67
<input type="checkbox"/> Microsoft Mouse-Bus Item #81453-35		\$ 82
<input type="checkbox"/> Microsoft BallPoint Mouse w/Windows 3.1 Item #55034-35	F3	\$ 145
<input type="checkbox"/> Logitech Scanman Model 256 Item #46485-53		\$ 235
<input type="checkbox"/> The Complete PC Complete Page Scanner w/OCR Item #41725-53		\$ 549



\$189 Sound Blaster Pro

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Monitors	
<input type="checkbox"/> NEC Multisync 3FGX Item #55195-23	\$ 659
<input type="checkbox"/> NEC Multisync 4FG Item #75319-23	\$ 799
<input type="checkbox"/> Radius PrecisionColor Display 19 Item #89497-23	\$ 2,229
<input type="checkbox"/> Dell UltraScan 14C Item #320-3364	\$ 339
<input type="checkbox"/> Dell UltraScan 15FS Item #320-3369	\$ 499

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Printers	
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<input type="checkbox"/> IBM/Lexmark Personal Printer II 24Pin 80Col Item #87025-27	\$ 339
<input type="checkbox"/> Epson AP-3250 Item #330-1482	\$ 209
<input type="checkbox"/> Canon BJ-10 Ink Jet Item #72069-28	\$ 275
<input type="checkbox"/> IBM/Lexmark Color Jetprinter 4079 IJ Item #12993-28	\$ 2,749
<input type="checkbox"/> IBM/Lexmark 4070 LJ Item #79832-28	\$ 359
<input type="checkbox"/> Epson EPL-8000 Item #330-3347	\$ 1,159

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<input type="checkbox"/> Okidata OL400P LED Page Printer Item #70695-37	\$ 575
<input type="checkbox"/> Texas Instruments Microlaser Basic Item #13399-37	\$ 899
<input type="checkbox"/> Texas Instruments Microlaser PS17 Item #12814-37	\$1,037

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<input type="checkbox"/> Quantum Prodrive ELS 127MB SCSI Item #09734-34	Int \$ 225
<input type="checkbox"/> Quantum Prodrive ELS 170MB SCSI Item #20738-34	Int \$ 255
<input type="checkbox"/> Conner Sof-Star 3170 Item #76828-34	Int \$ 329
<input type="checkbox"/> Colorado Jumbo 250 DJ-20 Item #88977-26	Int \$ 215

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Storage Con't		
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Networking		
<input type="checkbox"/> Artisoft Lantastic 2000/C Windows Starter Kit 5.0 Dual Item #89634-36		\$ 509
<input type="checkbox"/> Novell Netware Lite 1.1 F5 Item #17200-17	F5	\$ 69
<input type="checkbox"/> Novell Netware Lite 1.1 F3 Item #17214-17	F3	\$ 69
<input type="checkbox"/> Windows for Workgroups Item #13151-17	F5	\$ 155
<input type="checkbox"/> Windows for Workgroups Item #13166-17	F3	\$ 155
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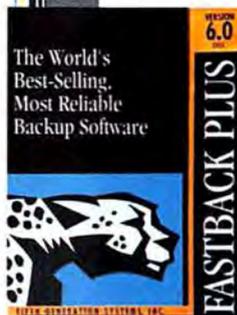
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it, and people who swear they've never seen it — to visit our offices and work with us personally.

During 30 days of interface design and usability testing, we ran up some hefty hotel bills. And learned some valuable lessons.

We learned, for example, that our installed base is nostalgic for the simple, straightforward, everything-available-at-a-glance interface we used way back in Version 2.0.

We learned that while some prefer to select files by typing in specs and others prefer to point and click, everyone wanted a choice.

What's more, they wanted immediate access to every option upon loading — the way it's done in Direct Access, our best-selling menuing software.

They wanted an Express menu with improved screens, simplified file selection and a Compare function. With separate menus for Backup and Restore.

And while they were on the subject, our subjects insisted that restoring should be as simple and as effortless as possible.

They weren't kidding, either.

After they'd selected the file they wanted, they figured Fastback ought to tell them when it was backed up, what type of media it was backed up to and what type of backup it was.

"Anything else?" we asked.

"Sure," they said,

and asked if Version 6.0 could do dishes and take out the trash.

We said it couldn't, but when we told them it could do all the things listed in the box on the left, they were delighted.

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Pentium PCs: Here at Last

Until now, stories of Pentiums have been about phantom chips, and talk about Pentium performance has been rumor rather than reality. We think we've succeeded in timing the appearance of our cover story with the availability of the first Pentium PCs from such industry heavyweights as Compaq and Hewlett-Packard. Although Pentium PCs are still scarce, we tell you about them now because, with guile and luck and money, you can own the first one on your block.

Should you enter the fray for the first Pentium PCs? Their performance out of the blocks is excellent, and price/performance is good despite high initial prices caused by the current drought in Pentium chips. If you often find yourself tapping your foot while waiting for your machine to carry out your orders, Pentiums are worth fighting for. Besides, Pentium PCs, including the ones you can buy today, will reach greater heights in the months ahead. Useful, application-based tests to date show Pentium PCs running programs compiled for the 486. When those same applications are recompiled with a Pentium compiler that takes full advantage of the chip's internal architecture, your work will fly even faster. We can also expect a second round of Pentium PC designs that nudge system performance higher.

While PCs based on Intel's new CPUs can do your work faster than machines based on competitive processors from Cyrix, TI, and AMD, Intel has left an opening for its rivals to gain your affections. If any of the rivals can top Pentium performance while running plain old 486 code, ignoring the Pentium extensions, then the competition to supply the brains of your next PC will be more intense than ever. However, this *if* is a big one. Intel extended the Pentium architecture for a reason: to fight off the performance

challenge of RISC alternatives from Digital and MIPS, which Windows NT allows into the starting gates of the PC race for the first time.

Power Notebooks for Every Setting

Those rumors about Pentiums running hot and drawing lots of power are true, which rules out Pentium notebooks for the foreseeable future. And that means the latest crop of 486 notebooks will remain competitive for an unusually long time. Review editors Bryan Hastings and Dan Miller examine 16 power notebooks not only as traveling companions but also as main desktop systems. All 16 notes have color displays, most have 100MB to 200MB hard disks, and half will drive an external monitor at 1024 by 768 resolution.

As portables, these notebooks are dream machines. As desktops, they can't rival Pentiums, but they do provide genuine 486-class performance, according to the findings of Dean Andrews, senior performance analyst at our Test Center. For the first time, many PC users will find a notebook computer a better buy than a 486 desktop plus a 386 notebook. True, there's a small sacrifice of power on the desktop—but the terrific road performance more than compensates if you spend half your time away from home.

For the ultimate compact, silent, and powerful home office, pair one of our 486 notebook Best Buys with the new HP LaserJet 4L. While the 4L failed to win our Best Buy because it lags in speed and paper handling, its silence and compactness will win the heart of many a home decorator. If domestic



PC World
editor in chief
Phil Lemmons

peace is assured, personal lasers from Epson and TI offer better business solutions. Dan Miller and Dean Andrews sifted through the evidence to help you find the printer that's your personal best.

Tips to See You Through

The odds are heavy you'll run DOS and Windows, whether on a Pentium PC or a 486 power notebook. The odds are even heavier you'll chafe against the rough edges preserved in these operating environments through more than a decade's evolution. Yet there are ways to make that powerful but stubborn PC do your bidding. A <Shift> here, an <Alt> there, a double-click behind the back—you'll find the right trick in "75 Tips for Windows and DOS." Christina Wood, Michael Desmond, and Steve Fox gathered these productivity boosters from coast to coast.

Phil Lemmons

Phil Lemmons, Editor in Chief

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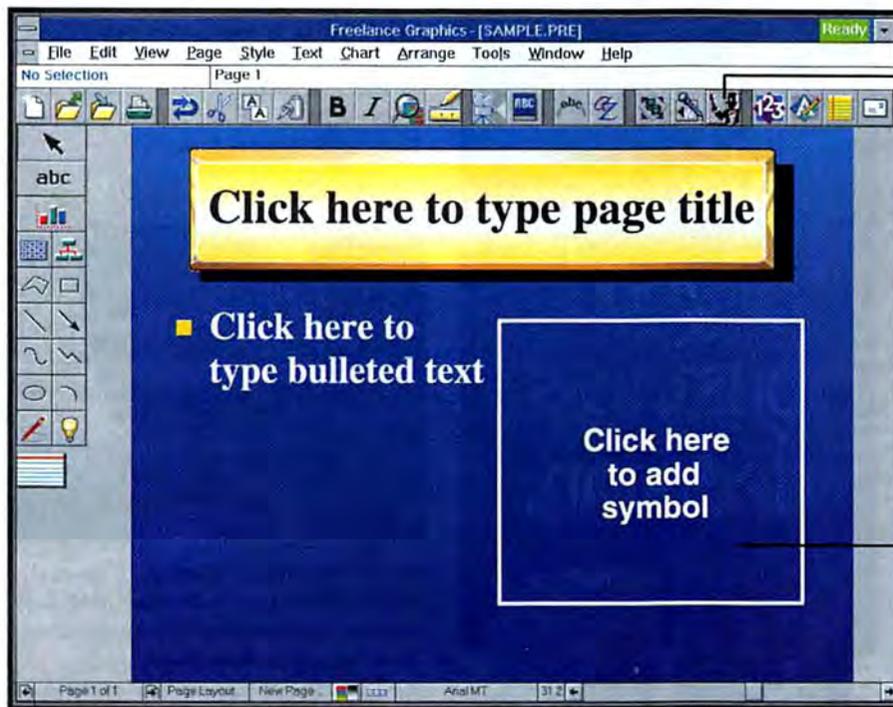
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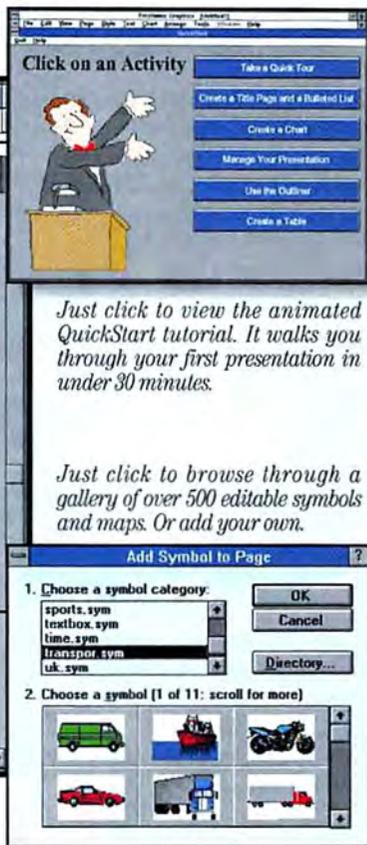
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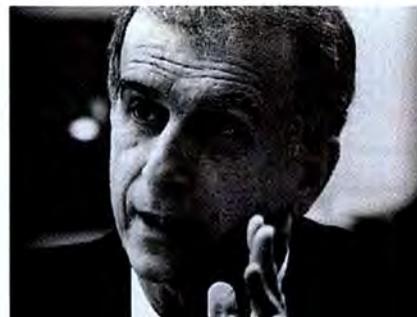


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For Your Information.

Software Anyone Can Afford, Artistic Integrity, Electronic Hotels

Software for the Rest of Us

Your April article "Great Software Under \$50" was excellent. Make it a regular column! Some first-rate shareware and hidden software programs are out there, but without articles like this few people will have the pleasure of finding them. Not everyone has the financial backing, desire, or hardware capacity to handle the more bloated, feature-laden, overpriced wonders on the market. I've purchased more useless software in my life than I care to think about.

Ken Cavaliere-Klick, Astoria, New York

More Great Software

The article "Great Software Under \$50" was a pleasure to read. I own several of these packages and agree that they're all good. One package that you didn't review is a free (not shareware) scaled-down version of DeskTop Set, a commercial, personal information manager from Okna Corporation. Okna hopes you'll upgrade to the full package, but the scaled-down version is so full featured, I'm not sure what they could have left out. It is available from the Windows file library on PC World Online as the files DTBOOK.ZIP, DTCAL.ZIP, DTOKNA.ZIP, and DTHELP.ZIP. Give this software a try, and you'll delete all other PIMs from your hard drive.

Frank Levine via CompuServe

In Love With a Cheap CAD

Thank you very much for "Great Software Under \$50." I noticed, however, that the author neglected to include any CAD software. I like Key CAD Complete 5.0a from SoftKey Software Products. The software lists for \$39.95, and I find this price more appropriate to my situation than \$3000-plus for AutoCAD or even \$100-plus for AutoSketch. Some of Key CAD Complete's best features are its user-definable drawing libraries, area fills, and the

small amount of disk space that's used by stored drawings.

J. Scott Williams via Internet

A Disservice to Artists

Your review "Draw Programs for the Rest of Us" [April] was thorough and precise. But Instant Artist 1.0 for Windows should not have been included. Instant Artist is a graphic design program for creating business cards, letterhead, and signs. It does not include drawing tools, but it does come with a library of professionally designed illustrations and document templates that you can edit and reshape as necessary. To include it in a review of draw packages does the program a disservice.

Lois Abbe, Charlotte, North Carolina

Editor's response: Since the primary focus of our April review was low-cost graphics programs for nonartists, we thought that we should include Instant Artist. The package was less effective for general-purpose business illustrations than some of the others that we tested, but we gave Instant Artist full credit as a fine choice for novice users who produce simple graphics for letterheads, signs, fliers, and newsletters.

—Richard Jantz

Better Business Service in Hotels

I enjoyed the sidebar "Hotels Offer PC Services in Battle for Guests" in April's *Top of the News* section, but I think most hotels are still missing the point. Business travelers need to be able to use electronic equipment 24 hours a day. The majority of hotels allow you to use their electronic services only between 9 a.m. and 5 p.m.

If more hotels allowed 24-hour access

to their well-equipped business centers, I could work during the evening on a notebook in my room, then use the business center at 7 a.m. to print and copy documents for a 9 a.m. meeting.

Mary E. Calhoun,
Watertown, Massachusetts



Getting the Best of Taxes

My thanks to Naomi Wise and Richard Melville for "Deep in the Art of Taxes" [March]. It was the best of the four tax software articles that I read this season.

J. M. Painter, Corpus Christi, Texas

What About My Keyboard?

I have read *PC World* with great pleasure for more than a year. However, there seems to be one item of computer hardware you overlook: the keyboard. I use several different computers regularly, and the difference in comfort among their keyboards is striking. Could you do an evaluation of keyboards produced by specialized companies? Furthermore, can keyboards be exchanged? For instance, can I buy a new AST or Dell and replace the keyboard with one from a different company?

Michel Hermans,
Newtown, Pennsylvania

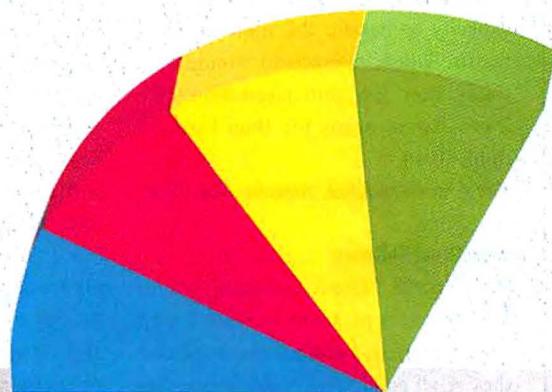
Editor's response: We looked at alternative keyboards in the May *Top of the News* article "Weird Keyboards: Rx for

Wake up and smell

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 **HEWLETT
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Hands?" We are also planning a buyers' guide on input devices for the September issue. This piece will also include unusual keyboards.

Yes, you can exchange your keyboard. As long as the keyboard is designed for a PC (rather than, say, a Mac), you'll be fine. For more information, consult our upcoming October article on buying a clone. It will examine the multitudinous components of a computer and offer advice on how to

select them at your local computer store. We hope these articles will address your concerns about keyboards.

Results Don't Match

I often turn to *PC World* for dependable advice when making purchasing decisions. Since I'm in the market for a new computer, I read your recent reviews carefully. I am disappointed to find inconsistent results in your benchmark scores.

In January you reviewed \$2500 Windows machines ["The World's Best \$2500 Windows PCs"], including the AcerPower 486e DX2/66 Model 5657. In the Excel, Word for Windows, and Paradox 3.5 tests it posted scores of 88, 103, and 138 seconds, respectively. In the March issue, this same machine was run through the same tests against other DX2/66s. However, this time its scores were 102, 132, and 159 seconds! I double-checked the testing methodology for each program, and it reads almost identically in each issue.

Before I reject the validity of your reviews, please explain the discrepancy.

Jason Kelly, Boulder, Colorado

Editor's response: At first glance, these two systems appear to be identical, but they're actually not. The system reviewed in January had a 170MB hard drive; the one in March had a 202MB hard drive. Both are made by the same manufacturer, but the different specifications of these two hard disks could easily have resulted in different performance characteristics.

The discrepancies between the scores could also result from other differences between the systems. The versions of the ATI video drivers used in the tests were different, and video drivers can affect system performance dramatically. One likely possibility is that when Acer added functionality to the ATI driver, some performance was lost. An even newer version of the driver would probably retain the new functions and bring performance back up to its original level.

On Line From Remote Locations

A few months ago I wrote a letter bemoaning the lack of an on-line service accessible from an 800 number for rural PC users. Since you published my letter, I've had many sympathetic responses from others who are similarly long-distance bound when it comes to using PC World Online, CompuServe, and other services. All agree that it just doesn't seem fair to pay a use fee as well as a long-distance charge every time you log on.

Take heart. I've discovered that the Small Business Administration provides on-line 800 service free. Set your communications program to 2400, N, 8, 1, and dial 800/859-4636 (for 9600-bps modems, dial 800/692-4636). You'll find all kinds of shareware and information. For a complete list of all the

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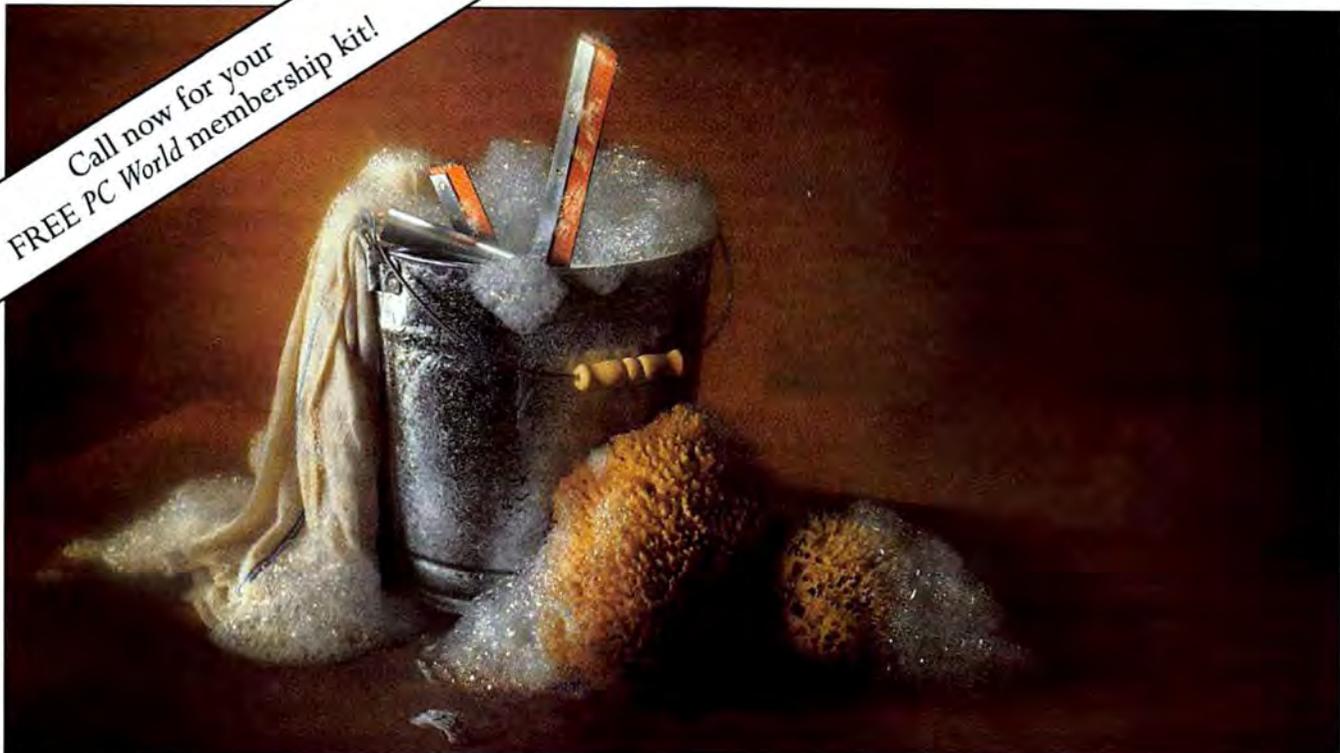
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files you can download, go to the file menu by pressing **1** at the Main menu and then **F** at the General Information menu. Then type **1** at the Files menu and **25** for file area 25 (SBAFILES.TXT). In addition, the SBA provides a free E-mail service (though it's restricted to mail relating to small businesses), and the SYSOP is great.

Henry D. Wise, Lucedale, Missouri

Editor's response: Here are a couple of additional strategies to keep costs down for anyone going on line long-distance.

If you're a BBS user, get an off-line reader. It will let you download mail in a compressed packet and read it off line, without the phone charges ticking away. A couple of good off-line readers are Mustang Software's OLX and SLMR. Both can be found in PC World Online's Shareware Picks file library. I'd also recommend a program called Robocomm, which automates many on-line tasks, such as navigating through the BBS, and shortens your on-line time. Look for it in the Featured in March folder in PC World Online.

If you use CompuServe, OZCIS or TAP-

CIS are a lot like Robocomm and can get you on and off line much more quickly. You can find these in the Communications and BBS file library on PC World Online.

I'd also recommend getting a high-speed modem: 9600-bps v.32 modems are under \$200 now. If you're calling long distance, they can pay for themselves rapidly. For even higher speed, v.32bis (14,400-bps) modems are well worth the extra money. If you're permanently stuck at 2400 bps, Sprint has a service called PC Pursuit (voice line for information: 800/736-1130) that lets you call other cities (at night) through their network at a very low rate.

Bundy Chanock,

Manager, PC World Online Services

More Boots Than a Colorado Cobbler

I have rebooted more times than an old Colorado cobbler, using different CONFIG.SYS and AUTOEXEC.BAT files. The Steve Bass article in the March *Home Office* is instructive for any readers who have not already discovered this timesaving approach to giving a computer multiple personalities.

One minor thought: The first thing intrepid booters should do is rename the REBOOT.BAT file as <R.BAT to save some typing. Typing REBOOT wears out the skin on your fingers. Typing R is much easier.

Forrest Rhoads via MCI

Corrections

The correct price for the DEC DECpc 466d2 LP reviewed in "486DX2-66s: Fastest PCs in the Universe" in March is \$2484 for the configuration listed.

Contrary to what we said in "Search and Destroy: Antivirus Software" in May, Detect Plus does prevent viruses from writing to the boot sector and partition table.

• 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 10 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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Beleaguered FastMicro Closes Its Doors

FastMicro, the troubled Phoenix mail-order PC firm, closed its doors on April 4 following a dispute with the firm that handled its credit card transactions.

FastMicro attorney Brian Weinberger says that in late March, Card Establishment Services (CES), which handled FastMicro's credit card transactions, withheld \$450,000 that it owed the company in order to set up a reserve account to cover charge-backs for returned, damaged, or defective products. In doing so, CES effectively wiped out FastMicro's cash reserve, says Weinberger, causing the firm to bounce checks to key suppliers. "There was a domino effect," states the attorney. "One creditor hears that another creditor got a bounced check, and it spreads like wildfire. Things become impossible to manage.

"It was simply a matter of pluses and minuses," Weinberger explains, adding that company president Joseph Lackey had evaluated the situation and "determined that he had no choice but to close up."

Weinberger charges that the reserve account was unnecessary, since charge-back totals had never exceeded the amount that CES owed to FastMicro. But CES contends that the move was a legitimate response to what it considered "excessive risk exposure."

"FastMicro was creating significant cardholder dissatisfaction, which caused us to take a closer look at the business," says Robert Schimenz, CES senior vice president of risk management. "When we investigated further, we found that certain operating issues relating to how the company was doing business generated a sizable risk for CES," says Schimenz. In particular, he cites poor customer service, including delays in processing refunds and in shipping products—complaints voiced frequently by

FastMicro customers in calls and letters to *Consumer Watch* in late 1992 and early 1993.

Schimenz says that CES offered to work with FastMicro to improve its customer service record and reduce the likelihood of charge-backs on credit card orders, but FastMicro declined the offer. "The company made the unilateral decision to go out of business and in doing so caused us significant damage," he says.

Weinberger disputes that contention, however, and FastMicro has filed a lawsuit charging CES with breach of contract. The complaint states, among other things, that the reserve account was improperly established and placed "an impossible burden" on FastMicro's cash flow.

The Final Chapter

FastMicro president Lackey filed for Chapter 11 bankruptcy protection on April 12. The company, which operated a large superstore in Phoenix in addition to its mail-order business, has laid off all but 20 of its 209 employees. The remaining staff, says Weinberger, will handle the warranty repairs. The company plans to maintain hours from 3 p.m. to 5 p.m. (central time) on Tuesdays and Thursdays. Local customers can bring items in for repair; mail-order customers can contact FastMicro via fax (602/431-0511) to inquire about repairs. Weinberger emphasizes that the repair and support procedures may change once the bankruptcy proceedings have been finalized.

Like many PC companies, FastMicro contracted with GE for on-site repair of its computers. As of press time, how-



ever, we were unable to determine whether FastMicro customers would still be eligible to receive this service through GE.

According to Weinberger, "there was no backlog" on repairs when the firm closed on April 4. "Anyone who had previously sent in their stuff to get serviced should have gotten it back," he adds. But the same cannot necessarily be said for buyers who placed orders with FastMicro during its last weeks of doing business. Several customers we spoke with report being charged for items that they had not received.

John Manning, a FastMicro customer from Chicago, ordered a copy each of Borland's Paradox for Windows and Quattro Pro for Windows at the end of March. He received Quattro Pro but was shipped a copy of one of Quarterdeck's expanded memory managers instead of Paradox. "I called customer service, and they told me to ship the Quarterdeck package back and that they would ship Paradox when they received the returned item," says Man-

PC World Consumer
Watch editor
Roberta Furger

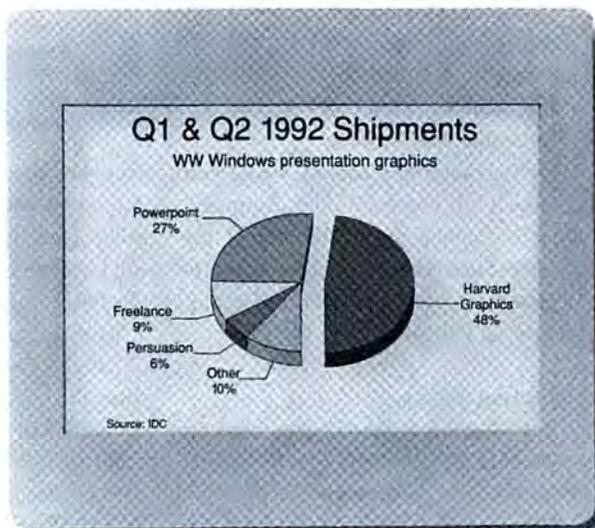
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ning. Although he did as directed, he said he never got the copy of Paradox for Windows and is now disputing the charge with his credit card company.

The software snafu wasn't Manning's first go-around with FastMicro. He ordered a 486SX minitower from the firm last October but received a desktop model instead. After several phone calls and "a lot of run-around," he decided it would be easier to keep the desktop model than to try to exchange it for the product he ordered.

"It was always difficult to get through to customer service or technical support," Manning says. "They always answered their order line, but after that you could never get through."

Customers who have been charged by FastMicro for products that they didn't receive should contact their credit card company to dispute the charge. Those customers who paid by check qualify as creditors under bankruptcy law, and they should file form B-10 with the court. You can obtain copies of this form from your local bankruptcy court, or you can contact the ►



BUG WATCH

MS-DOS 6.0

A bug in MS-DOS 6.0 can interfere with the installation of optional programs included with the operating system.

The problem occurs when users who first load DOS without some or all of these options (such as Anti-Virus, Backup, or Undelete) later add them using the suggested Setup/E command. If the directory that contains MS-DOS is listed on your path in lowercase letters, Setup will be unable to find it, causing it to display an error message and terminate installation.

To correct the problem, users should quit Setup and then use the PATH command to change the directory name to all uppercase letters.

Microsoft MS-DOS Installation Support (available for 90 days after purchase), 206/646-5104

SpeedCache Plus 4.03

SpeedCache Plus 4.03, the disk caching utility Iomega uses to speed access on its Bernoulli drives, is incompatible with MS-DOS 6.0. Iomega is aware of the problem and is working on a new version of SpeedCache Plus. Until it's available, Iomega recommends users who upgrade to DOS 6.0 remove SpeedCache from the AUTOEXEC.BAT file, using the cache included with DOS in its place.

Iomega, 800/456-5522

—Richard Melville

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

Richard Melville is an editorial intern for PC World.

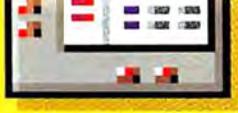
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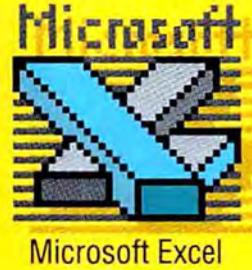
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U.S. Bankruptcy Court, 230 N. First Ave., Phoenix, AZ 85025; 602/514-7321. When you write the court, reference file 93-03607-PHX-GBN.

According to FastMicro attorney Weinberger, bankruptcy laws prevented the company from refunding money to customers for unfulfilled orders before it went out of business. "You're not allowed to do anything just before filing for bankruptcy that would give one creditor a benefit over another," notes Weinberger.

Creditors who receive funds within 90 days of a bankruptcy filing, he adds, can be asked by the court to return those funds. "It would be disastrous if we sent all these people their money and then they got a letter from the bankruptcy court saying they have to send it back," he adds.

FastMicro president Lackey could not be reached for comment, but in an interview with the *Arizona Republic*, a Phoenix-area newspaper, Lackey said that he has no plans to revive the company, which was started in 1987.

Shop Talk

Where's My Special Deal?

When Borland came out with the Quattro Pro 4.0 upgrade, it offered a special deal for current users: By purchasing version 4.0, we would have the right to purchase the Windows version for a reduced price. Just recently I received a mailing from Borland offering Quattro Pro for Windows for \$99. What is wrong with this? Well, anyone can purchase it for \$99, even if he or she isn't a registered user. Where is the special deal for current users who were teased by the company's propaganda last year? I have sent several faxes to Borland, but it hasn't answered.

Rene R. Rodriguez, Puerto Rico

Editor's note: According to Borland spokesperson Steve Grady, as part of its Passport Program last fall, Borland offered registered users incentives for upgrading to the latest versions of its DOS applications, including the option to purchase the Windows versions of Paradox and Quattro Pro

for a reduced price. While these low prices initially were going to be available only to registered users, Borland's marketing and pricing plans changed considerably after Microsoft released Access, its own Windows database, last November for a low \$99, Grady explains.

"After the release of Access, we felt we had to adopt a very aggressive pricing strategy ourselves," he notes. "We realized that just because Quattro Pro and Paradox had substantial market share under DOS, we weren't guaranteed that same market share under Windows."

As a result, Borland established low entry-level pricing for both Quattro Pro for Windows (\$99.95) and Paradox for Windows (\$139.95). According to Grady, members of the Passport Program were still able to get the new products for the incentive price, but under the new pricing scheme, such members no longer got a better deal than everyone else.

"In retrospect, we should have paid more attention to how current users would ►

INFOWORLD MAGAZINE NAMED
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SYSTEMS PRODUCT OF THE YEAR.

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 QEMM, version 7, pioneers new ways of using the critical area between 640K and 1024K. 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 applications, TSRs and utilities to use.

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 will have. QEMM 7 lets you have it all without fear of 'out of memory' messages or crashes.



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 MemMaker, you could easily lose—not gain—available 'conventional' memory in DOS 6.

New QEMM 7 takes the best of the new DOS 6 features into account, finding ways to



How to Look a Gift Horse in the Mouth



We tested DOS 6 with and without MemMaker and QEMM6 and our new QEMM 7 runs away from all of them. See details of test conditions listed below.

cut memory demands for these utilities by up to 80%, ensuring that the all-important memory below 640K is free for your programs. And QEMM 7's seemingly small feature of supporting DOS 6's multiple configurations

gives you the flexibility and ease of setup that you expect. (MemMaker doesn't work well with this important DOS 6 feature.)

Page Frame: the Key to Your Future

There's been a lot of jealous talk about our patent-pending Stealth technology. Nobody else can duplicate its 48-115K gains.

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 lets Lotus 1-2-3 r2.x run larger spreadsheets and WordPerfect 5.x larger documents. It's also used by DESQview for multitasking, Novell Netware, IBM LAN Server and DECnet for reducing the network driver memory footprint, plus games for fast action. You sacrifice all this when other memory managers turn off the page frame.

Stealth saves you room to set up your PC with a mouse, CD ROM, sound board, a network such as Novell NetWare, create 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 to run applications smoothly and safely.

Put Your Money on a Winner QEMM 7

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 most vital utility you can own.

Our seventh-generation memory manager is a thoroughbred that helps you get the most out of your PC today and tomorrow.



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

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How we got the chart numbers: CPU—486/33 ALR Power/business VESA machine equipped with 16 megs of RAM and running MS-DOS 6. Comparisons were done using the following memory managers: QEMM 7, QEMM 6.02, MS-DOS 6 MemMaker. In addition to the driver (or drivers) required by each memory manager, the following drivers, DOS resources and programs were loaded for all comparisons in the CONFIG.SYS file: SETVER.EXE, DOS=HIGH FILES=20 BUFFERS=10 STACKS=01 MYSOUND.SYS, SNDERR12.SYS, SLCD.SYS, DOS=SHELL=statement, is the AUTOEXEC.BAT file: VSAFE, MCDXEX, UNDELETE, ISL.COM, NE2000.COM, IPX001.COM, NETX OR FANETX, MOUSE.COM, SMARTDRV.COM, FRIS+ CAP.COM. ©1992 Quarterdeck Office Systems. Trademarks are property of their respective owners.

Circle 189 on reader service card

react to our new pricing," says Grady. "We should have realized that people would be concerned about not getting a special price." He adds, though, that the special promotional pricing was available only from February 1 through April. "And registered owners of DOS products will get the special deal any time they decide to move to the Windows products."

Lack of Callback Policy Can Be Costly

I recently spent more than 32 minutes on the telephone waiting for technical support from Polaris Software, the developer of the program PackRat, a personal information manager. Eventually, I hung up the phone in frustration.

The next time I called, I waited 7 minutes on hold, then the phone rang for nearly 5 minutes without an answer. I thought there must be something wrong with my phone, so I hung up and tried again. This time I waited 10 minutes on hold. I tried to leave a message with the operator, but she told me that tech support does not return phone calls. All I could do was wait on

hold—a toll call—until my spot in the queue came up. I waited awhile, then hung up again in frustration.

I don't mind paying for phone calls to technical support. I don't mind busy signals. I do mind when companies won't support their products properly. Most companies take your phone number after just a few minutes on hold, and then a tech support person calls you back by the end of the next day, which, in a nonemergency situation, represents good service. I suspect the reason Polaris doesn't take outgoing messages is because it doesn't want to pay the phone bill. Someone should tell Polaris that the phone bill may be cheaper than the cost of losing customers.

Jeff Weld, Minotola, New Jersey

Polaris responds: *Consumer Watch* forwarded Weld's letter to Polaris and received the following response:

Technical support does not return calls for a number of reasons. First, we do expect the end user to incur the cost of the phone call. Yes, it is a toll call, but we do not charge for technical support. Second, users who are

on hold for technical support deserve top priority. Also, since we cannot guarantee how long it will take us to call users back, we feel it is better not to commit to returning calls. Polaris Software does, however, incur the cost of technical support in a number of areas, including fax and BBS support.

Andy Surber, Chief Operating Officer

That's Service!

Nearly two years ago I purchased The Complete Communicator from The Complete PC. This board integrates an answering machine, a fax machine, a scanner, and a modem into one card. It worked quite well for six months, but then when I tried to access its on-board modem, it did not function reliably. When I called The Complete PC, it immediately issued a return merchandise authorization number and offered to repair or replace the board at no charge.

I removed the card and packed it for shipment. Then, while moving to a new office, I lost track of the box and forgot about it. Fourteen months later I moved again. ►

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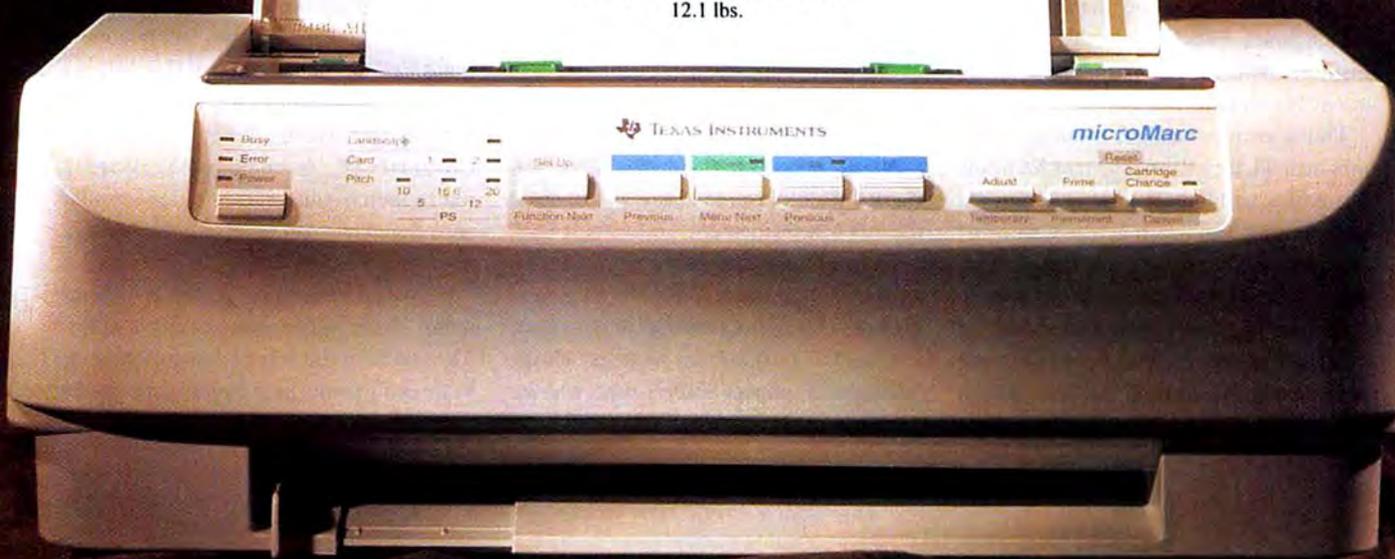
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Circle 220 on reader service card

and in the move I found the card—ready to ship. I sent it out with a note that it had been misplaced for about a year. Within a week I received a new replacement card.

That's customer service!

Robert M. Simon, Columbus, Ohio

Always Glad to Help

After reading *PC World's* January 1993 review "The World's Best \$2500 Windows PCs," I decided to purchase a 486 computer from Micro Express. Last month, two months after the guarantee expired, one of the floppy drives went out.

I called the folks at Micro Express on its toll-free line and told them about the problem. They told me to send the drive back, and they would see what they could do. Within a week they sent me a new drive free of charge, even though they had no obligation to do so.

This kind of service is exceptional in any sort of business, but at Micro Express it appears to be the norm. I have called the company a number of times to ask questions about my computer, and its represen-

tatives are always ready and willing to help.
Walter Browne, Tulsa, Oklahoma

Used, or Just "Environmentally Correct"?

I recently upgraded to version 6.0 of DesignCAD from American Small Business Computers. When I opened the package the company sent me, I was disturbed to find that the box wasn't shrink-wrapped (the contents, including the disks, had been haphazardly packed) and that the installation and tutorial manuals were missing. Is this software used, or did someone in the company's order department really foul up?

John E. Turner, Chicago

Editor's note: We had the same question, particularly after hearing from so many people who bought used software that had been rewrapped and sold as new (see "Is Your New Software Secondhand?" March 1993). But the software Turner received from American Small Business Computers was neither used nor poorly packed. Instead, it was an example of the company's ongoing effort to sell software with more

environmentally friendly packaging.

As part of this effort, the company is using plain brown cardboard boxes made from recycled post-consumer papers, with minimal inks and shrink-wrapping materials. To save paper, the company also has chosen to delete the installation and tutorial manuals from upgrade packages. (It is, however, honoring all customer requests for these books and has sent Turner his copy.)

According to a company spokesperson, the packaging redesign and other conservation efforts have resulted in a 20 percent reduction in materials used.

Editorial intern Gordon Ung contributed to this column.

• *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; MCI Mail, PC World Editorial (see page 10 for more information); or 415/442-1891 (fax). We'll investigate complaints and publish letters with the broadest interest.* ■

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Circle 47 on reader service card

When running DOS applications in Windows, is there something you're running out of?



Introducing 386MAX Version 7.

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Married to Microsoft

This month's report from the computing trenches comes from Richard Day, president of PED Manufacturing of Oregon City, Oregon. His 23-year-old, 140-person company makes very specialized metal castings for the aerospace and medical industries. Here, Day explains how his company has grappled with the issue of standardizing on software applications. —Ed.

A Vision of Consistency

When you're in a manufacturing business, it's important for your entire organization to work in a consistent manner. If you have 30 people involved in a process, you can't have each one doing things her or his own way, because it would threaten the quality of the product you're selling. So it's crucial to standardize your software.

We first faced the problem of software standardization back in 1989, when we purchased an additional UNIX-based RISC minicomputer from IBM and placed all our back-end, mission-critical applications—payroll, inventory, sales histories, production scheduling, accounting, and so forth—on that system.

But UNIX is pretty user-unfriendly, and we soon needed another approach for front-end applications like word processors and spreadsheets. Our information systems manager, Dave Howell, convinced me that linking PCs in a LAN Manager 1.0 local area network would cost less than buying another minicomputer and would give us the ease of use and consistency we needed.

Why did we gamble on Microsoft's then-fledgling LAN Manager? Because, as Dave explained to me, Windows, another Microsoft product, would give us the consistency across applications we were looking for. And LAN Manager was compatible with Windows. NetWare was not only more expensive, but getting Windows to work with it at that time was a nightmare.

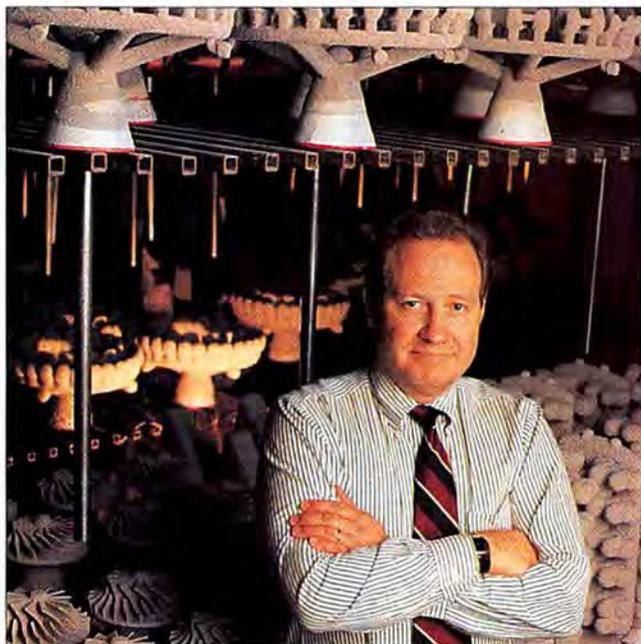
I had complete faith in Dave, so we purchased our first PCs in 1990. Initially, we installed four 25-MHz 386s in our quality-assurance department and linked them to a Compaq 386-33 server running LAN Manager. Almost immediately, we found fewer errors in our quality-control system, and we weren't wasting time duplicating work. Next, we purchased more 386s and linked the sales and administration departments to the network. Today the company has 60 PCs, linked to three different 486-33 network servers, and all are connected via ethernet.

Training Trials

Once we got our network up and running, the next issue we had to grapple with was standardizing PC applications. Different people used different packages: Some used WordPerfect, others Microsoft Word; some were running Lotus's 1-2-3, others Microsoft Excel.

If someone produced a document in WordPerfect and needed to give it to someone who was using Word, we had to export it to ASCII, import it into Word, then reformat the entire thing. It took weeks to pull together a simple report from one of our databases, and as a result of not getting timely information, small technical errors were creeping into our processes—errors that took money and time to fix.

We clearly had a choice: Go for consistency with all Microsoft applications, or for quality with the "best of breed" applications from different vendors. In 1991, we decided to standardize on Microsoft applications for all the pre-



Richard Day,
president of PED
Manufacturing

dictable reasons: Microsoft invented Windows; all the applications had a consistent interface that made training easier; and the Microsoft versions of everyday applications like word processors and spreadsheets worked just fine. So we began weaning our WordPerfect users from their beloved DOS and warming them up to Windows.

We had the mistaken impression that Windows was so easy it would require no training at all. However, turned loose on Windows, people had to figure things out for themselves, and they weren't working as productively as they needed to. In 1990, we began teaming up power users with beginners, but we found that this system took time away from the power user. It wasn't until early 1992 that we solved the problem by sending people to training classes on individual applications.

By then, I realized that Dave's vision was prophetic. With Windows 3.0 on all our PCs, our Windows applications installed, and a sufficient number of people trained, we were infinitely more

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productive. People could learn a program in one department and easily switch to another department without having to learn a new system. And the graphical user interface made everything simpler. We finally got the consistency we'd been looking for.

The SQL Solution

But, as we soon found, going with all Microsoft applications solved only part of our problem. Our most important data was

still in the flat-file, character-based databases residing on our UNIX-based mini-computer and were impossible for most users to get at. And there was no easy way to bring the information from the UNIX systems into the Windows environment.

We decided to set up a SQL relational database on our network server and gradually convert all our back-end systems to SQL databases so users could access data more easily. We were on the verge of pur-

chasing a Sybase relational DBMS when, as luck would have it, Microsoft announced that it would be selling Sybase's SQL Server. So in 1991, we purchased SQL Server.

When Microsoft's Access came to market in late 1992, we were excited: We hoped that Microsoft would finally give us a way to get better connectivity to our back-end databases. Unfortunately, Access doesn't do *exactly* what we need it to do: get the back-end applications to "talk" to the front-end applications, so users can work with them.

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Buying Best of Breed

To solve our data access problem, we've been forced into a patchwork solution. Our programmers have to write scripts to pull the information from UNIX files into the tables in SQL Server. And we've also been forced to use non-Microsoft products for SQL application development tools and for ad hoc data queries.

Because we needed a high-end SQL development tool for Windows, we went with a package called PowerBuilder from PowerSoft Corp. For an ad hoc tool to query the SQL database, we chose another non-Microsoft application, Q&E 5.0. Meanwhile, we're investigating other third-party products that may be able to convert our flat files to SQL automatically.

The upshot is, being married to Microsoft keeps us happy *most* of the time. But even a Goliath like Microsoft can't be all things to all people, and when we need a product for a particular application, we can't afford to wait for the folks in Redmond to create one. There are times when best-of-breed products do more than any Microsoft application can. And, in that case, it's easy to decide to stray from the single vendor.

• 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 (see page 10 for more information); 415/442-1891 (fax); or call us at 415/978-3212. We pay \$300 per published column. Sorry, we cannot acknowledge unpublished materials.

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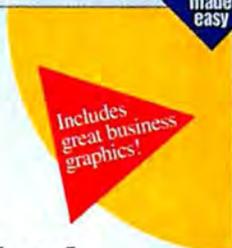
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June, 1992



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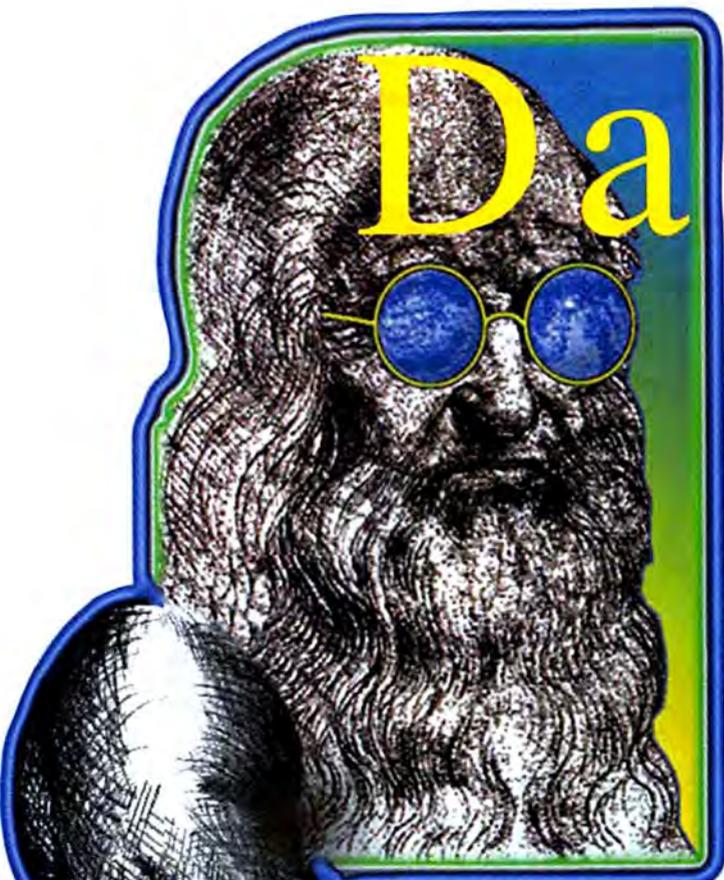
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Leonardo DaVinci (1452-1519)

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Sure could've used a good CAD program!

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As a CAD program, DesignCAD has all of the capabilities to make your projects fly as well. As a low-cost CAD program, DesignCAD has more operations and is easier to use than similar programs costing ten times more! We won't mention any names but one company "AUTO-matically" comes to mind.

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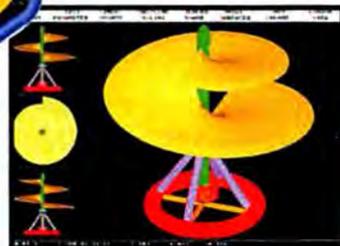
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DaVinci Rendering (c.1500)



DesignCAD Rendering (1993)

Circle 1 on reader service card

Of Small Offices and Productivity

Nobody likes voice mail, but let's face it: It's cheaper than paying for a receptionist. You don't have to pony up for taxes or fringe benefits, and voice mail works 24 hours a day. Throw in a tool that faxes product information automatically to customers who call your company, and you have the \$495 PhoneOffice voice mail system from Edens Technology Corporation.

If you don't need voice mail but you do need a reliable, rugged fax-modem, the Hayes Smartmodem Optima 2400 Fax96 is a natural. Use the bundled SmartCom software, and you'll be sending your first fax via computer within minutes of installation.

But how can you print the faxes you receive without tying up an expensive laser printer? That quest may lead to a market leader: the Hewlett-Packard DeskJet 500, an easy choice if you want high-quality output at half the cost of most laser printers.

PhoneOffice

This powerful product combines a voice/fax/modem card with well-designed software for Windows 3.1, turning a computer into a full-time receptionist that routes messages, sends faxes, manages 999 voice mailboxes, and pages you, too. You can select greetings from several pleasant-sounding male voice samples that come with the product, or you can record your own salutation. (The card also includes an auxiliary input for recording sound from an audio amplifier.)

PhoneOffice will forward a message to a preset destination phone or notify your pocket beeper that messages are waiting. The product can page you by first answering an incoming call, then switching to a speaker (included) and telling you to pick up the phone.

Using the bundled WinFax Lite soft-

ware, PhoneOffice can receive a fax, transmit one or more faxes on the existing connection (on the caller's dime), or transmit the documents to a selected phone number (on your dime).

Setting up this kind of automated receptionist may sound easy, but PhoneOffice isn't exactly a plug-and-play tool. Edens Technology ships four sample applications with PhoneOffice, but you'll need to customize your own application before plugging in a phone line. And it will take some careful planning to figure out how you want callers to interact with the system.

For example, you will have to set the "hierarchical structure" of your application by laying out the number of voice menu levels callers will navigate and the number of choices they'll have at each level. Your structure will resemble a hard drive's directory-subdirectory layout. The road map of decisions that you set for callers to follow to a particular piece of information represents a "decision tree." When callers hear, "Please press one for product information, or two for technical support," they are on a branch of the decision tree. If they press two, they may have a choice of hardware or software support, and so on.

But branching can be tricky: A voice-mail system that is poorly laid out can leave customers hanging from branches, so be careful to direct the customer's call properly. When I tried to build my own branching decision tree, I had to summon my dormant programming powers and call tech support to learn how to save the application I built.

Once it's set up, though, PhoneOffice is a particularly useful product for a home office or small business where everybody plays receptionist. It's also a

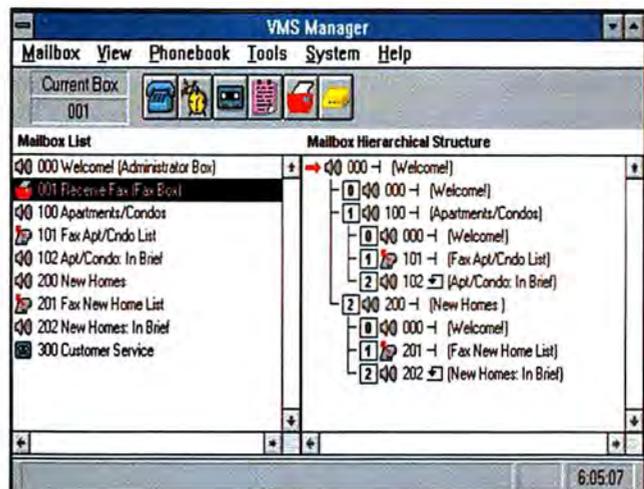
Foulks Favorite. But you will probably want to have a programmer help you. Decision trees are heady stuff.

Hayes Smartmodem Optima 2400 Fax96

Optima is Hayes's name for a line of modems, ranging from a 2400-bps data/9600-bps fax model to the 14,400-bps data/14,400-bps fax speedster. The speed you need depends on the application you're using, but you can count on the 24 + Fax96 model for general use. It supports the V.42 error control standard and the

V.42bis compression standard for data, providing throughput capabilities up to 38,400 bps. If you're sending faxes, this model supports the Group 3 standards, sending at 9600 bps and slower speeds. Fortunately, you don't need to know about all these standards, because today's modems can negotiate their own connections.

I especially appreciated the bundled software Smartcom EZ and Smartcom Fax. Both install and operate easily, and either DOS program works just a cou-



FOULK'S FAVORITE:

PhoneOffice handles most phone needs.

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MONTH: HP DeskJet

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Smartmodem Optima

2400 Fax96 • Mitsumi

CRMC-LU0055 CD

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Encyclopedia

By Thom Foulks

ple of minutes after installation. (It took me less than 5 minutes to send my first fax: a one-page note created with Smartcom Fax's built-in text editor.)

Prices have been dropping in the fax-modem market, so look for the Optima 24 + Fax96 on the street for around \$150.

HP DeskJet 500

Even though my wife's secretarial services firm and my computer consulting office

have a LANtastic network that lets us use the same Panasonic KX-P4420 laser printer, sharing the printer is not always a virtue. Every time I need a plain-bond printout of a fax I received over my modem, she's printing letters and envelopes on client stationery. And whenever I start a time-consuming graphics print, my wife invariably needs a rush reprint of a letter with a one-word revision. Buying a second printer seemed the obvious solution, but we

weren't prepared to plunk down the cash.

I tried some dot matrix units that printed legibly but were noisy. And I'm capable of wearing out a ribbon in no time flat. Enter the HP DeskJet 500. When I spotted it for \$349 at a business products store, the DeskJet rode back to the office with me, and it's here to stay. I love its unobtrusiveness; it's the quietest printer I've used.

I confess that when the DeskJet was introduced nearly three years ago, I was underwhelmed: Its built-in print font variety was limited, the original ink cartridge prices were high, and it simply didn't look like the kind of printer that proud professionals would own.

But I've changed my ways. Today, I use the DeskJet to print faxes I receive from my fax-modem. The output is crisp, clean, and infinitely better than the 200-dpi images printed by standard fax machines. I've also tested the DeskJet with gray-scale graphics produced by Micrografx Designer and CorelDraw and with page layouts from QuarkXPress for Windows. The result? I get excellent drafts for client perusal.

For the past month I've been printing my correspondence on the DeskJet, too. Although I haven't made a scientific study using a magnifying glass or a spectrometer, the type seems distinctly blacker than some of the laser-produced correspondence that I receive.

International Data Corporation, a market research company, reported earlier this year that Hewlett-Packard sold more than 2 million ink jet printers worldwide in 1992. Obviously, other people haven't shared my previously jaundiced view of the DeskJet's functionality. You shouldn't either. IDC also expects ink jet prices to come down and new models are ready for the market. An ink jet is an ideal backup—or even a satisfactory alternative—to a laser printer.

Quick Fixtures

With the prices of CD ROM drives dropping like stones, it hardly makes sense *not* to buy one. Mitsumi's new CD ROM drive, the CRMC-LU005S, is the least expensive of the 43 drives listed in "The Time Is Right" in *PC World's* May issue. The street price then was estimated at \$249, but I found it for \$209 through a mail-order shop, and I've seen it listed elsewhere for just under \$200. The Mitsumi drive lacks some

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And the WinBook comes with the power and speed needed to run Windows effectively. You get 4MB of memory, the new ultrafast 486 SLC/E 25-MHz 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

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Eight Power-Saving Features

Including sleep mode for all I/O ports, HDD, and FDD to increase battery life.



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With the available docking station, your WinBook instantly becomes a full function desktop computer. Its two expansion slots allow you to add peripherals such as monitors, hard drives, CD-ROMs or an extended keyboard. And it's just \$399!

Specifications

- Size/Weight**
- 11" x 8 3/4" x 1 3/4"
 - 5.4 lbs with battery
- Pointing Device**
- 16mm Alps dual-action, Microsoft compatible internal trackball
- Battery**
- 4 hours under normal usage
 - Sanyo NiMH (no memory effect) 2300 MA with gold-plated contacts
 - Worldwide auto-sensing AC adapter
 - Quick 2-hour recharge
- Power Management**
- 8 power-saving features

- Processor & Memory**
- 486 SLC/E-25 CPU
 - 4 MB RAM (8 MB optional)
 - 1 MB ROM for Ami BIOS
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 - 1k Internal Cache
- Drives**
- One built-in 1.44 MB 3.5" floppy drive
 - Internal 120 MB (15ms) hard drive
 - 250 MB (12ms) hard drive optional
- Software**
- Comes loaded with MS-DOS 6.0 and Microsoft Windows 3.1

- Display**
- Super-twisted 64 gray scale, 10" LCD with CCFT-backlit
 - 640 x 480 VGA resolution for LCD and 1024 x 768 for external monitor with 512k simultaneous 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, 3.0 mm keyboard spacing

- Modem**
- Fax-9600 baud send/4800 baud receive/2400 baud modem
- I/O Ports**
- PCMCIA 2.0 slot
 - Serial: 9-pin connector
 - Parallel port
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 - 160-pin docking station
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- Options**
- 250 MB (12ms) hard drive
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The WinBook for only

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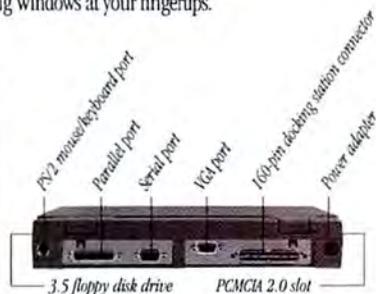
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- 45 day unconditional money-back warranty.
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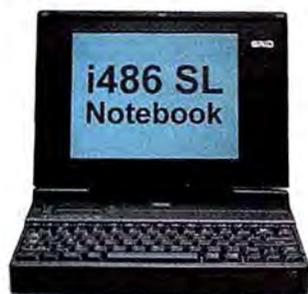
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PCW 7/93

of the frills of its higher-priced brethren—there's no eject button or automatic lens cleaner—but it's done everything I've asked it to do. It's Kodak CD-capable and comes ready to install, complete with interface card, cables, and software.

The New Grolier Multimedia Encyclopedia gave me another reason to install a CD ROM drive. This Windows-based multimedia CD ROM puts full text, digital audio, and video images of 21 volumes of information at your fingertips. You can view President John F. Kennedy's inaugural speech or Neil Armstrong and the Apollo 11 crew's lunar landing. If you or the kids want immediate access to worlds of information, this disk is invaluable. It's list priced at \$395 with upgrades at \$97, but look for it bundled with other CD ROM products.

Instant Rolodex, the latest component of DacEasy's Instant series, is a mundane personal information manager by itself, but when used in conjunction with DacEasy's other Windows products, it becomes a very useful tool. It particularly shines when you integrate the data that you may already have stored in DacEasy's Instant Accounting or Instant Payroll. Look for Instant Rolodex for \$49.95.

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Thom Foulks is a contributing editor for PC World.

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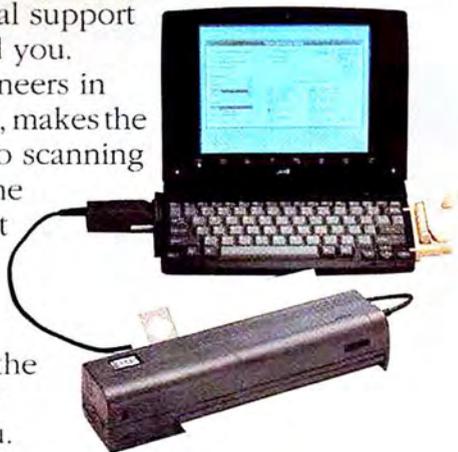


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"Ami Pro 3.0... ups the ante in the fight among the Big Three: Ami Pro, Microsoft Word 2.0 and WordPerfect for Windows. It's full of clever features that make your work easier and faster."

BYTE 9/92

"In the Windows word processing world, Ami Pro 3.0 comes close to being perfect ...It stands above Word and WordPerfect both in its function and in its speed."

Home Office Computing 1/93

Advanced Word Processors for Windows	
	Overall Evaluation
1ST Ami Pro 3.0 for Windows	8.7
2 ND Word for Windows 2.0	8.1
3 RD WordPerfect 5.1 for Windows	6.1

"Ami Pro 3.0 takes the lead as the Windows word processor"

If you're still under the impression that Microsoft® Word and WordPerfect® are the top dogs in the word processing arena, we've got news for you.

According to the top reviewers, and people who've tried it, Lotus® Ami Pro® 3.0 is far and away the Windows™ word processor of choice. In fact, it's becoming increasingly clear with each new release, that Lotus is the developer of choice for

Windows applications.

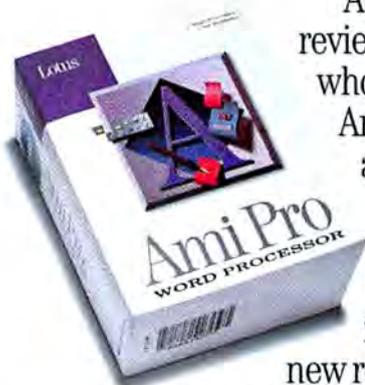
Ami Pro wins the war of the words.

Simply put, Ami Pro is a faster, easier,

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Ami Pro has won every major award in its category.

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PC/Computing 12/92

"Ami Pro 3.0 provides a host of new and enhanced features... that save time and make your work easier."

Windows Magazine 2/93

"Ami Pro Version 3.0... is the most graphical, colorful and in many ways the most powerful word processor on the market... no other package can match its ambition, its range of functions or the sheer pleasure of using it."

PC Magazine 1/93

"You can learn to use Ami Pro... in about a day. Put the manual in a drawer as a first step. There are no required control codes, no deeply nested menus, no command words. This friendliness greatly expands and sharply changes the market."

Forbes 2/93

ad over Microsoft Word rd processor to beat."

InfoWorld 9/28/92

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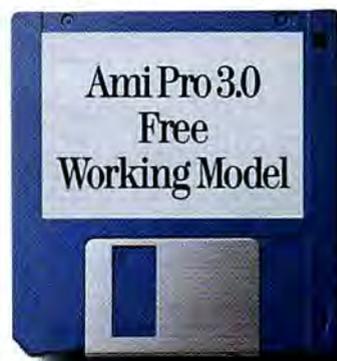
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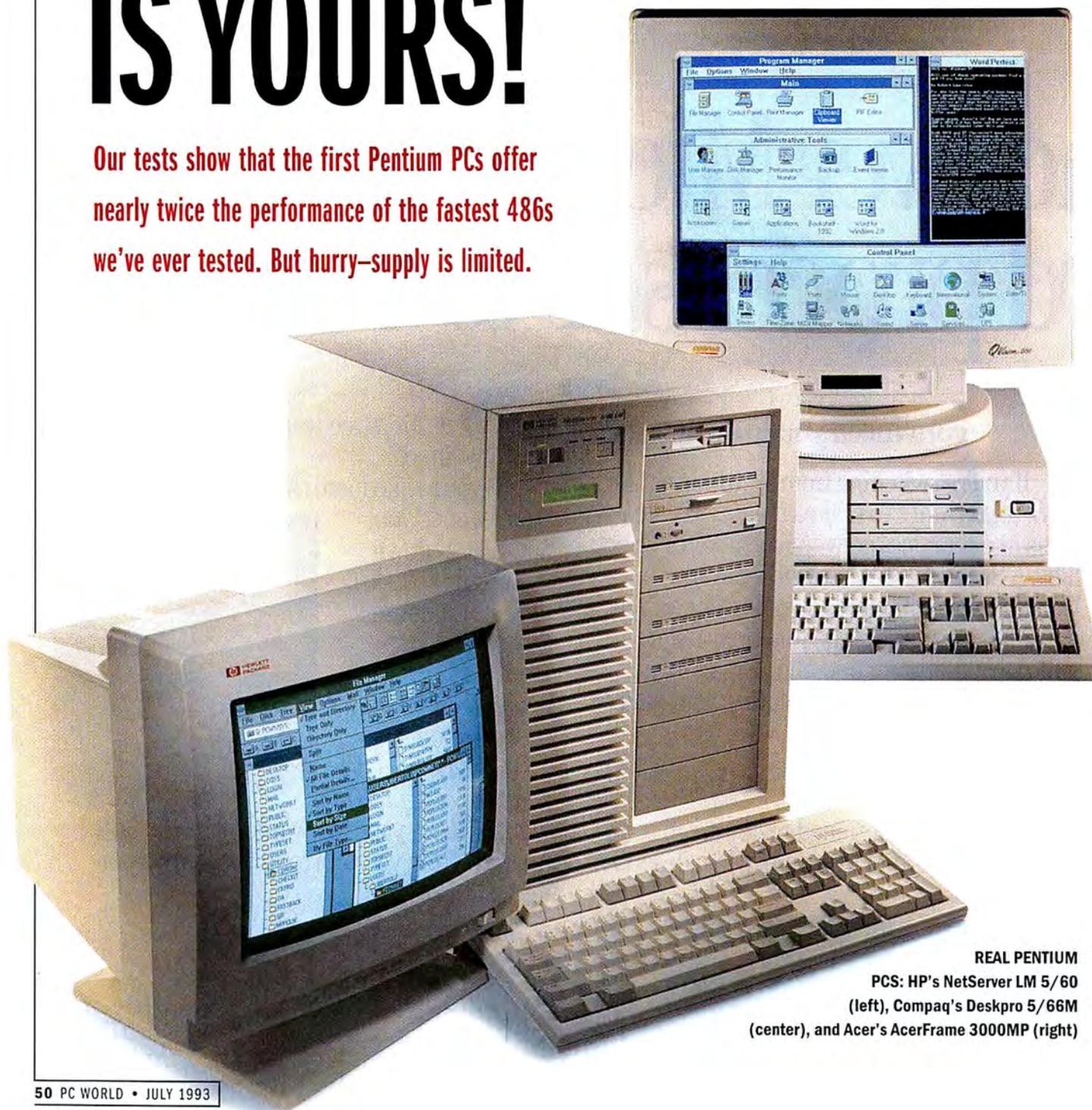
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Ami Pro 3.0
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Top of the **News**

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Our tests show that the first Pentium PCs offer nearly twice the performance of the fastest 486s we've ever tested. But hurry—supply is limited.



REAL PENTIUM

PCS: HP's NetServer LM 5/60
(left), Compaq's Deskpro 5/66M
(center), and Acer's AcerFrame 3000MP (right)

Edited by Russell Glitman

TEST DRIVE ▶ Now you can have twice the power of a 66-MHz 486DX2. In our tests of prototype Pentium systems from Acer, ALR, Compaq, and Hewlett-Packard, several of our application benchmarks took about half as long to run on these supercharged boxes as on one of the fastest 66-MHz DX2 systems we've seen, the Compaq Deskpro 4/66i.

Now imagine paying double the price. At this writing, most of the companies we spoke with will provide only rough price ranges, but expect to pay at least \$4500 for a base-model 60-MHz Pentium, with fully loaded 66-MHz versions running \$8000 or more. Why so expensive when a 66-MHz DX2 with all the trimmings can cost \$3000 or less? First there's the Pentium chip itself, which analysts estimate will cost between \$1000 and \$1200, twice the price of a 486DX2 chip. Factor in a very fast memory subsystem, state-of-the-art I/O, cooling for a CPU that runs at 160 degrees Fahrenheit, and the R&D costs of new system design, and you have a premium-priced box.

Tuning Up for Pentium Performance

The four Pentium systems we tested show there's more than one way to exploit Intel's fastest CPU. The Compaq ran at 66 MHz, the current top speed for Pentium chips, while the Acer, ALR, and HP used less-

expensive 60-MHz CPUs. All but the Compaq are towers; the HP and Acer in particular have huge add-in-board and hard-drive capacities suitable for mission-critical apps.

Pricing for these systems is all over the map. Compaq expects its Deskpro 5/66M with a 256K secondary cache, 16MB of RAM, a 510MB hard disk, a fast QVision graphics board, and business audio to cost less than \$7000 without a monitor; a stripped-down 60-MHz version with a 240MB hard drive should sell for no more than \$5000. HP projects that its NetServer LM 5/60 will cost around \$7099 in a configuration similar to that of the 5/66M. For current ProVEISA owners, ALR will offer a \$2395 Pentium upgrade board that includes a 512K secondary cache; by the time you read this, the company should be offering a new line of Pentium-based Evolution V-Q systems featuring a 128-bit memory bus and a starting price of \$4495 for a bare-

(continued on page 52)



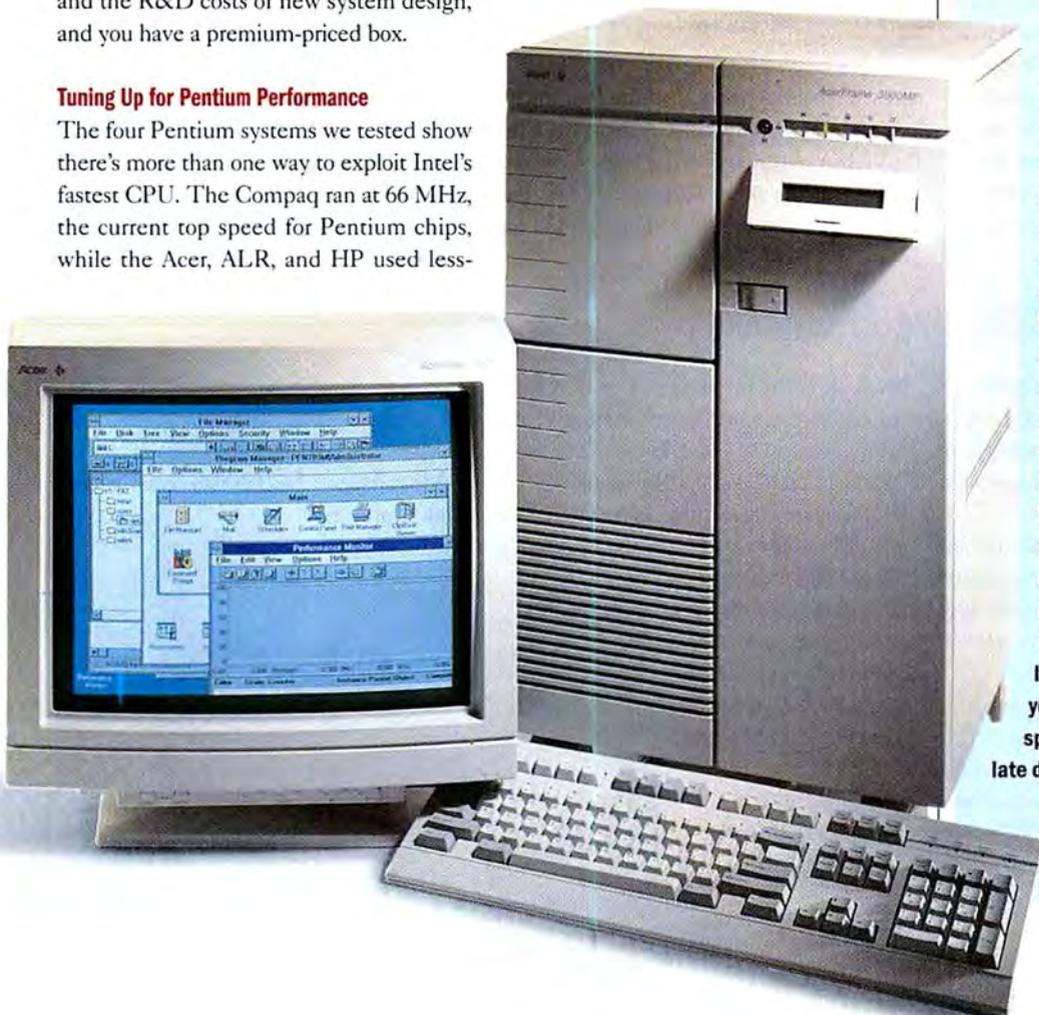
News Monitor

DOS 6.0 CONTROVERSY: Many DOS 6.0 users report installation and operational problems with Microsoft's new DOS 6.0 operating system. User beefs include slower performance, system crashes, and even lost data. Most of the problems involve DoubleSpace, a file compression utility that increases hard drives' storage capacity. Microsoft officials deny any major bugs in DOS 6.0 but say that older hard drives and buggy application software could be causing some of the trouble. DOS experts seem to agree.

"If you add [file compression] to a hard disk that's been running six to eight years, and the outside of the disk is a little thin, lots of things can happen," says Van Wolverton, author of *Running MS-DOS, Sixth Edition*. According to Dan Gookin, author of *DOS for Dummies* and other DOS self-help books, compressing files on hard drives that have bad sectors can exacerbate existing problems—and result in data loss.

BORLAND'S LATEST QUATTRO PRO: Borland's upcoming Quattro Pro 2.0 for Windows is expected to provide significant new features such as data modeling, according to industry analysts. A data modeling utility lets you view different perspectives of spreadsheet data and cross-tabulate data from multiple worksheets.

In addition, Quattro Pro 2.0 will likely be as user-friendly as
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PHOTOS: LEFT & RIGHT, KIRK AMYX; CENTER, ROBERT CARDIN; ILLUSTRATION: TIM CARROLL

Top of the News

bones 60-MHz unit. At the high end, the AcerFrame 3000MP will cost in the vicinity of \$15,000 with a 256K secondary cache, 16MB of minicomputer-style error-correcting memory, and no hard disk.

In addition to our usual Windows application tests, we also ran these systems through a new benchmark suite based on a prerelease version of Windows NT. Not surprisingly, as the only 66-MHz machine, Compaq's Deskpro 5/66M was the overall fastest on our Windows tests, clocking in a few percentage points ahead of the 60-MHz HP NetServer LM 5/60 (because these were preproduction systems, we didn't count the Deskpro's anomalously slow scores on the Freelance Graphics test). Part of the Deskpro's performance is probably due to its Tri-Flex architecture that provides both CPU and peripherals with concurrent access to a wide 128-bit memory bus at speeds up to 267MB per second.

In the 60-MHz heat, the HP won hands down. This may be a sign that Intel's 82496 external cache controller, which the NetServer alone included, offers significant performance advantages. Next in line, the ALR ProVEISA V beat the AcerFrame 3000 in all four Windows tests. This result was surprising, since the ProVEISA was the only system that failed to provide a 64-bit (or wider) memory bus, offering only 32-bit

How Fast Is Pentium?

Prototype Pentium systems are almost twice as fast as one of the fastest DX2-66s we've tested.

	Freelance for Windows 1.0	Paradox 3.5 in DOS window	Word for Windows 2.0	Excel 4.0
Compaq Deskpro 5/66M (Pentium 66 MHz)	1	84	86	65
Acer AcerFrame 3000MP ² (Pentium 60 MHz)	115	143	131	95
ALR ProVEISA V ² (Pentium 60 MHz)	103	110	123	83
HP NetServer LM 5/60 ² (Pentium 60 MHz)	92	88	103	70
Compaq Deskpro 4/66i (486DX2-66)	134	160	153	109

Time in seconds.

Methodology

We ran the tests using DOS 5.0 with Windows. We set the resolution to 640 by 480 pixels with 16 colors. Finally, we loaded the test applications, test files, scripts, and Microsoft Test automation software.

Freelance for Windows 1.0

We load a single-page file containing a United States map. Then we enter preformatted text on the page in preset headings, add a second page, and enter text as bulleted items. We add three more pages, each containing a single 3-D bar chart, and import data from a WK1 file. Next we add a page containing four 3-D pie charts and preview a slide show. We apply various views to the presentation and preview the slide show four more times, applying a different fade effect between slides each time.

Paradox 3.5 in DOS window

Running the program in a DOS window, we perform a variety of data entry, record searching, and updating tasks. Then we generate reports using a simple customer list.

Word for Windows 2.0

We use the spelling checker and scroll through a 27-page document; create, format, print, and save a single-page business letter; and open a business proposal, add a paragraph, and preview and print the proposal.

Excel 4.0

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

Data based on tests designed and conducted by the PC World Test Center. Testing performed by Dean Andrews.

¹Not reported; test results inconclusive. ²Pentium server; optimal performance tests would include LAN benchmarks.

access to main memory (half the Pentium's external data bandwidth). Apparently the ProVEISA's 512K secondary cache—twice the size of the other systems²—kept the CPU so satiated that it seldom needed to

access main memory. Unfortunately, the ProVEISA was also the only system unable to complete any of the NT benchmarks, a reminder that these boxes are prototypes and that our test results are preliminary.

Alpha and MIPS: Intriguing Alternatives

Every Windows user knows that upgrading to NT is inevitable—who wouldn't want a more stable, efficient Windows? Switching to NT will present you with intriguing new hardware options.

We looked at two PCs with CPUs that will never run DOS but already run prerelease versions of Windows NT: DEC's Alpha DECpc AXP 150, and Acer's AcerFormula, which is based on the MIPS R4400 processor.

The Alpha is built around DEC's own 150-MHz Alpha 21064 processor. According to the company, with current Windows applications running under NT, this system performs roughly at parity with a 33-MHz 486DX. However, just as software recompiled for Pen-

tium promises to run faster on that chip, applications recompiled for the Alpha 21064 will receive a big boost. In fact, DEC avers that a 32-bit NT application recompiled for Alpha will run up to twice as fast on a 150-MHz 21064 than that same app recompiled for Pentium would run on a 66-MHz Pentium chip.

DEC says that more than 300 applications are being recompiled for the Alpha 21064 and

that by the time you read this, a prerelease, recompiled Alpha version of Excel for NT should be up and running.

The 21064's 3.3-volt design keeps its heat sink warm to the touch rather

WINDOWS NT SANS
INTEL: DEC's Alpha
DECpc AXP 150



All four systems mount their CPUs on removable processor cards, making the systems fully upgradable. The HP NetServer LM also lets you add a second Pentium processor, while the AcerFrame 3000MP allows you to add up to four, offering a tremendous boost to applications that run on such operating systems as NT or UNIX.

With a processor as fast as Pentium, you need I/O performance and memory capacity to match. All these systems include EISA expansion buses, which support intelligent 32-bit peripherals and data transfer rates several times the speed of ISA systems. With the exception of the ProVEISA, you can't even buy these systems with less than 16MB of memory. All the systems we tested hold at least 256MB of RAM, except the Deskpro, which tops out at 144MB.

The Software Situation

Much has been made of the speed that future recompiled Pentium applications will have: 20 to 30 percent faster than current versions of the same applications. However, David Thatcher, NT Group product manager for Microsoft, views recompilation as icing on the cake. "You get good performance on a Pentium, regardless," he says. Where Pentium will really shine is in the future crop of 32-bit NT applications and in high-bandwidth server applications such as

document imaging and video conferencing. "With NT, we can take advantage of the wider data path," says Thatcher. "And because Pentium-optimized software will run on a 386 or a 486 without a performance penalty, when faster, recompiled applications arrive, it will be a win-win situation."

Unfortunately, if you want to be one of

the first to get a Pentium PC, you'll need both luck and guile. Intel is expected to make fewer than 200,000 Pentium chips this year. Even Bob Bauer, Compaq's director of North American Desktop Marketing and a big Pentium proponent, finishes his sales pitch with, "If you can, get one."

—Eric Knorr

Acer AcerFrame 3000MP

Key Features: 60-MHz Pentium CPU with 256K secondary cache • 16MB ECC memory expandable to 256MB

- Four-CPU option • Large tower case
- LCD display panel

Pricing: Approximately \$15,000 as above

Availability: Immediate but limited

Acer America, 800/733-2237, 408/432-6200

Reader service no. 718

ALR ProVEISA V Upgrade Card

Key Features: 60-MHz Pentium CPU

- 256MB memory capacity

Pricing: Pentium upgrade card \$2395

Availability: August

Advanced Logic Research, 800/444-4257, 714/581-6770

Reader service no. 719

Compaq Deskpro 5/66M

Key Features: 66-MHz Pentium CPU

- 16MB memory expandable to 144MB
- 510MB hard disk • Desktop case

Pricing: Approximately \$7000 as above

Availability: Immediate but limited

Compaq Computer, 800/345-1518

Reader service no. 720

Hewlett-Packard NetServer LM 5/60

Key Features: 60-MHz Pentium CPU with

- 256K secondary cache • 16MB memory expandable to 384MB • Dual-CPU option

- 535MB hard disk • Large tower case

Pricing: Approximately \$7099 as above

Availability: Immediate but limited

Hewlett-Packard Co., 800/752-0900, 415/857-1501

Reader service

no. 721

er than hot. The system is well ventilated by two fans, and the interior resembles that of any other EISA system—the cabinet is identical to that of DEC's Intel-based 400STs. The CPU, which has 512K of secondary cache, sits on a removable processor board next to six EISA slots, and end-users will be able to load the system with up to 256MB of RAM. End-user pricing was not set by press time, but DEC says it's currently offering a special \$6995 configuration to developers only that includes 32MB of RAM expandable to 128MB, a 426MB SCSI hard disk, a CD ROM drive, and a 16-inch color monitor.

Acer touts many of the same performance characteristics for its AcerFormula that DEC

promises for the Alpha. When running current Windows apps under NT, Acer claims, the 66-MHz AcerFormula delivers 486DX-33-class performance—an assertion that we confirmed with our own preliminary NT benchmarks. And when apps are recompiled for the R4000 series of chips, Acer also believes that they'll be able to beat 66-MHz Pentium systems and their compiled apps by a factor of two.

A key part of AcerFormula's design is the Performance-enhanced I/O and CPU Architecture (PICA) chip set, which includes logic for a 64-bit local bus—a good bet for fast graphics performance. Like the Alpha and every Pentium system we've seen, the Acer-

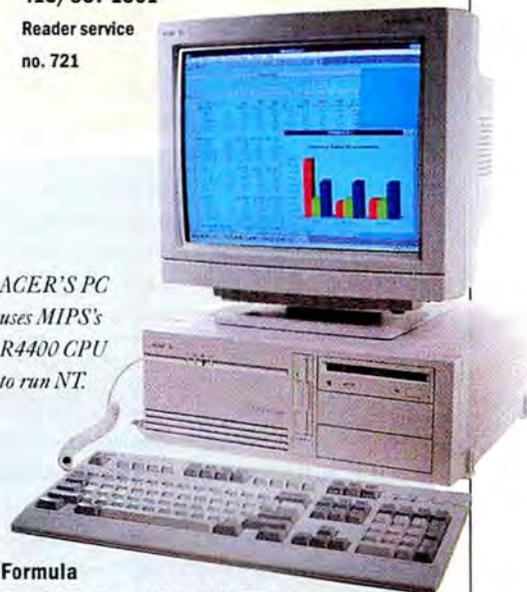
ACER'S PC uses MIPS's R4000 CPU to run NT.

Formula

has EISA slots. With a 128K secondary cache, 16MB of RAM, a CD ROM drive, a 240MB SCSI hard disk, and a 3½-inch floppy drive, it should sell for \$4499.

Acer, 800/733-2237, Reader service no. 722

DEC, 800/344-4825, Reader service no. 723



Top of the News

The Real Trick to Reengineering

Do you wonder why your hefty investment in technology hasn't yielded equally hefty improvement on your bottom line? You're not alone. In fact, researchers seeking relationships between office technology and productivity have uncovered some nasty surprises. For example, a study by Lester C. Thurow, dean of MIT's Sloan School of Management, showed that white-collar productivity declined during the 1980s despite the proliferation of PCs in the workplace.

The reason technology has failed to produce is now painfully obvious: Technology alone doesn't improve productivity. Using a PC to type letters, crunch numbers, or lay out pages certainly saves time. Using a mainframe to record billing transactions certainly saves money. But automating a single task in a business process does just that—automates one small piece of a process that may include dozens of inefficient steps.

Businesses are beginning to recognize this shortsightedness. And many are realizing gains in productivity by redesigning critical business processes, and when applicable, using technology to support that new design. For instance, instead of using PageMaker just to design a brochure, a company might reinvent the entire production process with an eye on ways to reduce the number of steps and employees and the



INCREASED PRODUCTIVITY, CUSTOMER SATISFACTION ARE THEIR GOALS: William Puckett of the National City Bank of Minneapolis, flanked by Scott Coady, left, and Stephen Edelstein.

amount of time involved. To improve production, it might hold frequent virtual staff meetings via E-mail to open communication and prevent duplicated effort. Or it might use work-flow management software to coordinate and track production.

This strategy for radically redesigning business processes is called reengineering. Companies such as Xerox, Ford, and Hallmark Cards have used the technique to achieve stunning productivity gains in common business processes.

PC World Opens CompuServe Forum:

PC World now has a forum on CompuServe: PC World Online. The forum makes *PC World* articles and services available electronically to an additional million PC users around the world.

The PC World Online forum gives CompuServe subscribers access to the current issue of *PC World* magazine, to a database of previous issues, and to a large library of freeware and shareware files, including all files mentioned in *PC World*. Subscribers can also communicate with editors and one another via forums devoted to the magazine's features and departments.

CompuServe subscribers can download the Windows version of the CompuServe interface by typing **Go WinCIM**. If you would like the

PC World customized version, you can obtain a copy by calling customer assistance at 800/848-8990.

If you would like to join CompuServe to access PC World Online, set your communications software to 7 data bits, even parity, and 1 stop bit. Call 800/346-3247 and type **Phones** at the User ID prompt. Fill in the requested information. Then call your local access number, and once connected, hit **<Enter>**. Fill out the screen as follows:



Host Name: **CIS**
User ID: **177000,5605**
Password: **COMPUERVE**
Agreement: **PCWORLD**
Serial Number: **<Enter>**



News Monitor

(continued from page 51)

Microsoft's Excel and have some features found in 1-2-3 4.0 for Windows, such as a scenario manager for what-if analyses, said Wayne Kernochan, director of commercial systems research at the Aberdeen Group.

PC PHONE HOME: Plan on hearing more from your friends and co-workers starting in 1994. A proposed standard for adding voice telephony to Windows was announced by Microsoft and Intel.

Expect telephony features to appear in word processors, spreadsheets, and communications and fax software. For example, Delrina may add features such as voice cover sheets and turbocharged answering machine functions to its WinFax fax software. At the same conference, Novell and AT&T announced a joint effort to integrate the telephone network into Novell local area networks, with their own standard programming interfaces. Stay tuned.

WINDOWS APPS ON UNIX: UNIX users will soon run shrink-wrapped Windows programs without having to install DOS or Windows, according to SunSelect, the PC business division of workstation manufacturer Sun Microsystems. SunSelect's new Wabi emulation software lets Windows apps run on UNIX-based PCs and workstations and lets you cut and paste text between Windows and UNIX programs. SunSelect is licensing Wabi to UNIX operating system vendors, including UNIX System Laboratories and The Santa Cruz Operation.

—Edited by Randy Ross

Contributors: Joe Abernathy, Jeff Bertolucci, Laurianne McLaughlin

Reengineering seeks dramatic improvement in productivity by zeroing in on processes that are central to any business, says Constantine Kazakos, business process manager at Xerox. Core processes common to most firms include product development, customer service, and order fulfillment.

A typical product development process involves a marketing team that identifies a market niche, a creative or engineering team that designs the product, and a production team charged with manufacturing the product. These three teams reside in different departments, often located on separate floors or even in different buildings or states. As a result, the product development process is often executed sequentially; one team doesn't begin work until another finishes.

Customer service also involves tracking information through disparate departments, such as finance, shipping, and sales. The processes can suffer from miscommunication, duplicated effort, and rework.

The order fulfillment process begins at the point of customer contact, generally with a salesperson, and ends when the order is filled and paid for. The numerous procedures in this process mean numerous opportunities for reducing time and rearranging steps so they can be performed either by a single person or concurrently instead of sequentially.

Reengineering Strategies

One common strategy for cutting costs and compressing a core business process involves empowering the staff closest to the customer with the authority and the tools to make more decisions. The goal is to let one person perform the work of several. This eliminates hand-offs between employees, speeds decision making, and decreases mistakes. Empowerment is commonly used to improve customer service and order fulfillment processes, where making one person

responsible for resolving problems leads to faster decisions and happier customers.

A second strategy is to create cross-functional teams of disparate employees who work together concurrently and are in constant contact, so each is aware of changes that may affect his or her job. This scheme is particularly useful in product development. In a typical scenario, engineering designs a product that is expensive to manufacture. As a result, the product doesn't

Reengineering seeks dramatic improvement in productivity by zeroing in on processes that are central to any business.

meet the needs of the marketing department, who saw an opportunity for a low-cost product. If this information is relayed and shared early in the process, manufacturing might intervene before the product is completely designed and suggest alternatives, saving redesign time. Hallmark Cards used this technique to reduce by 50 percent the time it took to develop certain lines of greeting cards.

Technology: The Supporting Cast

In reengineering, technology is a tool, a support structure that lets companies automate business processes that involve information. And PCs are the technology tool of choice. "The ease of use and [functionality] of PCs are driving forces behind reengineering," says Thomas Davenport, author of *Process Innovation: Reengineering Work Through Information Technology*. That usability is due largely to intuitive graphical user interfaces that enable inexperienced staff to use technology critical to reengineering efforts. Graphics also let users manipulate more types of data, including sketches, charts, and scanned images. The PC's multitasking and windowing features provide employees with quick access to multiple tools and databases. Portable PCs and networks also let

Continued from page 55

you place computing power, tools, and communications closer to the front-line employees who need them, says Herb Edelstein, a reengineering consultant.

E-mail and work-flow applications, such as Keyfile Corporation's Keyfile, Quality Decision Management's Quality at Work, and Beyond's BeyondMail, are among other PC-based tools that are generating interest among reengineers.

E-mail lets you manage ad hoc processes such as product development, where one step affects another. When those steps change, the people involved need timely notification. E-mail also provides front-line employees with fast electronic access to experts around the company or databases of projects in progress. Lotus Notes goes beyond E-mail, letting users easily share databases of information and engage in BBS-like conference sessions.

Work-flow software excels at automating more structured processes in which the same steps are repeated. The software can be as simple as intelligent E-mail that automatically routes messages to specific people in a specific order, or as sophisticated as custom-built UNIX-based products that route documents and load the application needed to process them.

Other features can provide status reports

Steps to Reengineering: The Pilot Project

Step 1: Assemble team

- Include business and technical staff and affected employees
- Identify managers who have authority to approve or reject project

Step 2: Select pilot project

- Identify core business process to reengineer
- Match scope of project to team's ability to deliver
- Identify criteria and specific measures of success

Step 3: Redesign process

- Identify technical and staff resources needed to complete project
- Use reengineering strategies, such as empowering staff and creating cross-functional teams
- Prepare for impact on existing procedures, policies, and culture

Step 4: Implement project

- Allot time and money for unforeseen problems
- Train affected staff during transition
- Ensure training includes changes to existing policies or culture
- Measure results and make necessary adjustments

Source: CoAction Systems and WorkGroup Resources

of work in progress and notification of missed deadlines. Work-flow software is suited for redesigned order fulfillment processes, where you've defined new steps and now want them set in place.

Of course, tools are only as good as the people who implement them. While the IS department is crucial to any reengineering

effort, it's the mainstream managers who make the difference. "Businesspeople are closest to the problem," says Mark LaRow, senior manager at Ernst & Young's Center for Information Technology and Strategy. Being closest to the problem means that you're also closest to the solution.

—Randy Ross

Harness the People Power

Pushing decision-making authority down through an organization's hierarchy can make a tremendous difference in productivity and customer satisfaction. That's what William Puckett, executive vice president and manager of business banking for the National City Bank of Minneapolis, expects to achieve by reengineering the bank's commercial loan underwriting process—analogue to an order fulfillment process.

Traditionally, loan approval required supervisor sign-off for loans of more than \$50,000. Loan officers did not know the schedules and work loads of their superiors, so they couldn't estimate how long the process would take.

Puckett increased the officers' sign-off

authority to \$300,000, and with the help of two reengineering consultants—Stephen Edelstein of CoAction Systems in Matawan, New Jersey, and Scott Coody of WorkGroup Resources in Westlake Village, California—

Employees spend less time tracking other people's work—that's Skippy's job.

he installed a custom work-flow application, dubbed Skippy, based on Beyond's BeyondMail.

Running on a 66-MHz 486DX2, Skippy helps to schedule work loads by determining which individuals need to be involved in the loan process. The program also keeps track of the deadlines and the status of

each loan and makes all of that information available to loan officers.

Skippy also provides loan officers and managers with a list of what needs to be done next and which deadlines are approaching and notifies all parties if a deadline is missed. This lets loan officers track the loan process and, if a hiccup occurs, contact customers before a deadline.

By empowering loan officers with the tools and authority to make more and better decisions, Puckett expects a 15 percent improvement in productivity, fewer loan losses, and greater customer satisfaction. Loan officers can also spend more time with customers and less time tracking other people's work—that's Skippy's job.

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could sound like an empty advertising promise if we didn't back it up. So we do.

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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.

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Circle 88 on reader service card

Subnote Packs Pop-Out Mouse and Excel in ROM



TEST DRIVE

Hewlett-Packard's OmniBook 300 exudes innovation. An infrared port gives you wireless file transfer between OmniBooks and HP's new Vectra desktops and its 95LX and 100LX palmtops. A collection of popular Windows and DOS applications in ROM, a power-saving diskless model that uses PCMCIA flash RAM cards to

store your data, and a unique mini mouse round out the inventive features. Unfortunately, this innovation is somewhat hobbled by an eye-irritating reflective display, and the mouse does not always prove a friendly companion.

The HP OmniBook meets the size and weight requirements for today's subnote. It measures a scant 6½ inches

deep, 11 inches long, and 1½ inches thick. And its travel weight of under 4 pounds (including AC adapter and assorted cables) won't slow you down if you're racing to catch a plane.

The OmniBook 300 offers two storage options. For \$2375, you get two available PCMCIA Type II slots (out of a total of

four slots), a 10MB flash RAM card for storing data, and a 10MB ROM card with Windows, DOS 5.0, Word for Windows, Excel, LapLink Remote Access, a PIM, a phone book, and a calculator. For \$1950, you get one available PCMCIA slot, the same ROM card with Windows and DOS apps, and a 40MB PCMCIA Type III hard drive, which takes two PCMCIA Type II slots. AMD's energy-conserving 386SXLV processor and a fast-charging nickel-metal-hydrate battery provide the flash card model with up to 9 hours on a charge.

The system has 2MB of RAM expandable to 8MB, and a proprietary slot for a fax-modem. The hard drive model runs about 5 hours.

Wireless File Transfer

The OmniBook 300's infrared port, located in the back next to the serial and parallel ports, can

HP OmniBook 300

A compact subnotebook packed with features.

Key Features: Infrared file transfer • Windows and DOS software in ROM • Under-4-pound traveling weight • Pop-out mouse

Pricing: \$1950 to \$2375

Availability: Immediate

Hewlett-Packard Co.,
800/752-0900

Reader service no. 713

transmit files up to 3 feet.

The OmniBook 300 houses a miniature mouse that pops out of the right side of the unit. It's attached to the machine and controlled through a plastic tether. I found the mouse ideal on the desktop but clumsy to maneuver when held.

Another personal peeve: OmniBook's nonbacklit LCD screen. Forced to choose between long battery life and reduced eyestrain, I opt for the latter. Despite its shortcomings, however, the OmniBook 300 is a roadworthy companion.

—Jeff Bertolucci

Nanao's Energy-Saving Monitors: Nanao USA is among the first manufacturers to offer power-saving monitors that comply with the U.S. Environmental Protection Agency's new Energy Star program. The Energy Star logo will soon appear on computers, monitors, and printers that automatically power down after a period of disuse and use 30 watts or less in standby mode.

Nanao's new power savers include the 17-inch FlexScan F550iW (\$1599) and the 21-inch FlexScan F760iW (\$2999). In normal mode, the F550iW consumes 120 watts, while the F760iW uses 160 watts. Power Save mode, in which the monitors draw only 10 percent of normal wattage, is automatically activated when a screen saver's blank screen appears. If there's still no mouse or keyboard activity an hour later, the monitors draw even less power.

An Energy Star monitor can yield huge savings on electricity bills, reports Bristol Stickney, research associate for E source, an energy

research group in Boulder, Colorado. "The newer color monitors are really good candidates [for power conservation] because they're very energy intensive," Stickney says. Nanao USA Corp., 800/800-5202, 310/325-5202, 310/530-1679 (fax). Reader service no. 714

Nanao F550iW Cuts Power Bills

Annual utility bill savings


1 monitor =
\$63 saved



50 monitors = \$3150 saved

Source: E source

“ACT! WILL MAKE YOU MORE SUCCESSFUL IN 30 DAYS OR YOU DON'T PAY.”

PATRICK SULLIVAN
PRESIDENT, CONTACT SOFTWARE INTERNATIONAL

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With ACT! in control of the details, you're free to concentrate on profitable, business-building activities. Users report doubling or tripling their business volume with ACT!

Need to change an appointment? ACT! is your comprehensive activity planner, too. Just “drag and drop” the meeting into its new time slot. Then print your revised daily, weekly or monthly calendar. *You'll never forget another call, meeting or to-do!*

You can also track and analyze your progress with a variety of reports, including prospect reports, activity reports, customer history reports and more.

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Jim Seymour
PC Sources Magazine

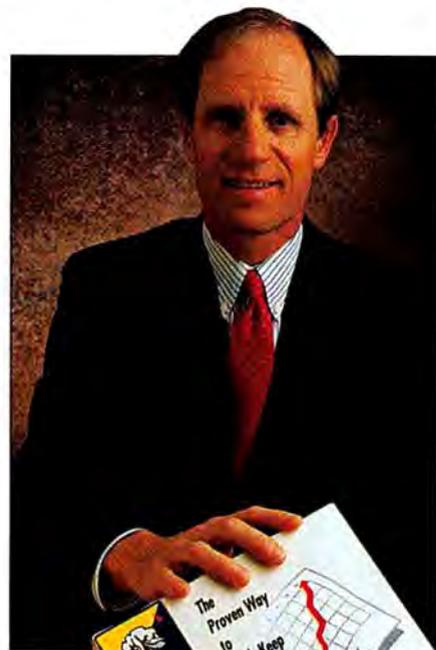
“ACT! for Windows and my notebook computer are the ultimate sales combination.”

Lon Orenstein
Computer Support Network



December 25, 1990
Act!, Version 2.0

November 1992



All over America, people are joining the ACT! revolution. Piling up prospects. Doing two, even *three times* as much business as before. And astonishing their customers with a level of personal service they've never experienced.

For over *half a million* success-driven people, ACT! has already become a way of life!

THE PROVEN WAY TO FIND, KEEP AND SATISFY YOUR CUSTOMERS.

In the race for new customers, your competition is breathing down your neck. With ACT!, you'll leave them in the dust.

Pop-up reminders let you know exactly who you need to call, when, and what about. You can easily stay on top of *hundreds* of leads, prospects and customers!

Want to send a thank-you note, or a bunch of prospect letters? Just use the built-in word processor with spell-checker, or select one of your pre-written form letters.

ACT! runs on PCs under both DOS and Windows, as well as MACs, PowerBooks and HP 95LX palmtop PCs. It's ideal for mobile professionals.



“I've tripled my business since I started using ACT! It's a miracle.”

John Rizzuti
Rizzuti Marketing and Media

“Really shines in the ease-of-learning-and-use department.”

Mark McIntire
PC Laptop Magazine

“A first-class way to keep everything on the table, not down in the cracks.”

Greg Keizer
PC Magazine

You're successful now. But you won't believe how much *more* you can achieve with ACT! at your side. *Take advantage of this limited-time offer and call today!*

FREE 30-DAY TRIAL!

Try ACT! free for 30 days. Simply pay the \$9.75 shipping & handling charge with a major credit card. If you don't see *bottom-line results* within 30 days, just return it and you'll owe nothing more. But if ACT! boosts your success like we say it will, keep it – and pay a limited-time price of only \$199 (*that's half the \$395 suggested retail price*). Don't let this extraordinary offer pass you by!

Call now for your free trial copy!
1-800-370-8997

OR SEE YOUR SOFTWARE DEALER... For a limited time, you can get a great deal through your software dealer, too. **Just call the number above to request your \$100 rebate certificate** (free trial not available through dealers).

ACT!

The Best-Selling Contact Manager





TO DESIGN OUR NEW MOUSE, WE STARTED BY READING PALMS.

In relentless detail, we studied hands of all dimensions.

We consulted professors of kinesiology, engineers, ergonomists and computer users. We used digital fiber optics to analyze the human hand. We followed it in motion.

The result is a new Microsoft® Mouse that is, well, anatomically correct. Uncommonly comfortable.

The palm is perfectly supported. Left or right handed, the grip is comfortable. Fingertips fall naturally into place. A click feels just right.

This mouse even looks good. Intriguingly asymmetrical. Yet it somehow reminds you of the gentle curves of a human form.

Did we mention that it also has some innovative new software features? They allow you to customize the mouse, so it works the way you like to work.

Try the new Microsoft Mouse. If you're not comfortable, we'll refund your money. Guaranteed. Details are on the box, which you can quickly get your hands on at a computer store near you.



Microsoft
Making it easier

CorelDraw 4.0 Is Your One-Stop Graphics Shop

TEST DRIVE CorelDraw 4.0's array of brilliant new tools, accessible through an improved interface, is sure to please desktop publishers, professional illustrators, and business users alike.

Key improvements include the capability to create multiple-page documents. While past versions were criticized for poky text redraw, Corel has optimized speed for text-intensive layouts. Also, desktop publishers can now import formatted text from popular DOS and Windows word processors, including Word, WordPerfect, and Ami Pro—a real time-saver.

You can create 1.2 million different textured fills with Corel's innovative implementation of fractal technology. Choose from 42 textures to produce marble, flame, or cloudlike effects.

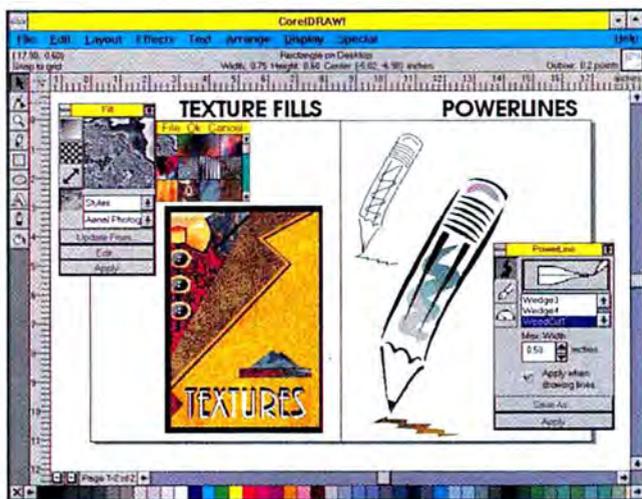
them, however. Clip art has been boosted by 4000 pieces to a total of 18,000, one-third of them accessible on disk.

A new tool, PowerLines, simulates a digitizing tablet. You can select from a series of looks, including teardrop, wedge, and woodcut. A cloning feature applies any changes made to the master object to its clones automatically—particularly helpful in multiple-page documents where not all objects are readily visible. A dimension-line feature helps technical illustrators apply measurements to drawings, floor plans, and drafting. And Corel now offers up to 99 levels of undo.

Inventory management is also practical, thanks to the capability to catalog elements in your drawings by assigning data to objects. Just click your secondary mouse button, select the Data Roll-up command, and a small spreadsheet appears in which you can define fields, enter data, and perform simple mathematical calculations. You can import and export data from Windows spreadsheets by using Windows' Clipboard, or use the spreadsheet with CorelChart to create charts and graphs.

The prepress controls now give professionals command over output options, monitor calibration, color separations, and color matching, according to Corel—much-needed improvements, which Illustrator already has in place.

The CorelMove module lets



CREATE DAZZLING SPECIAL EFFECTS with CorelDraw's unique textured fills and PowerLines tool, even if you're not an artist.

you create and add animation to presentations. You can design your own actors and props, record WAV sound files, or import FLI or FLC animation files and full-motion video AVI and Apple QuickTime files.

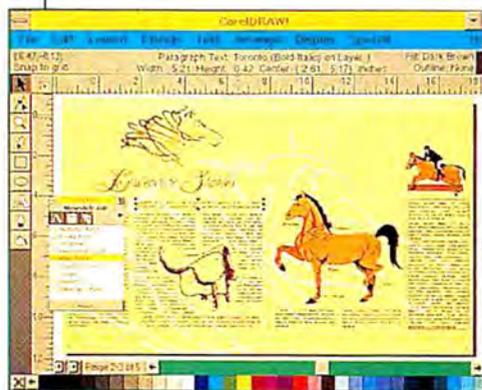
CorelDraw does not yet fully implement OLE 2.0's in-place editing, although users are able to take advantage of its improved dialog boxes when creating links with other OLE 2.0 applications. PhotoPaint, Corel's image editing module, provides TWAIN scanner support and gives you access to prepress controls and color separations. Improved masking, artistic filters, and image correction are welcome additions.

While the draw application is full featured, other CorelDraw modules more closely resemble their entry-level, stand-alone competitors. Business users should be satisfied, but frequent presenters and professional artists may need more. For instance, CorelShow, the presentations module, can't create outlines or print speaker

notes as most presentation packages can. And, while CorelTrace now does OCR, it can't maintain the formatting of multiple-column pages.

Still, CorelDraw 4.0 is a steal. Its improved artistic and technical features compete with those of other high-end packages such as Micrografx Designer, Aldus FreeHand, and Adobe Illustrator without leaving the business illustrator behind.

—Anita Hamilton



DESKTOP PUBLISHING IS PRACTICAL with CorelDraw 4.0's new text-wrap tools.

Even the persnickery should be satisfied with the 750 TrueType and Type 1 fonts included in the package (650 of which come from Bitstream). This is 3 times the number found in 3.0 and nearly 15 times more than competitor Adobe Illustrator provides. You need a CD ROM drive to access all but 50 of

CorelDraw 4.0

Corel outdoes itself with a feature-laden upgrade.

Key Features: Multiple-page documents • Object database • Enhanced prepress controls • Animation • TWAIN scanning support • OCR

Pricing: \$595, upgrade \$249

Availability: Immediate

Corel Corp., 800/772-6735, 613/728-3733, 613/761-9176 (fax)

Reader service no. 715

"It's a quality desktop replacement...
most powerful portable we've seen.
One of the lightest units in the entire test group."

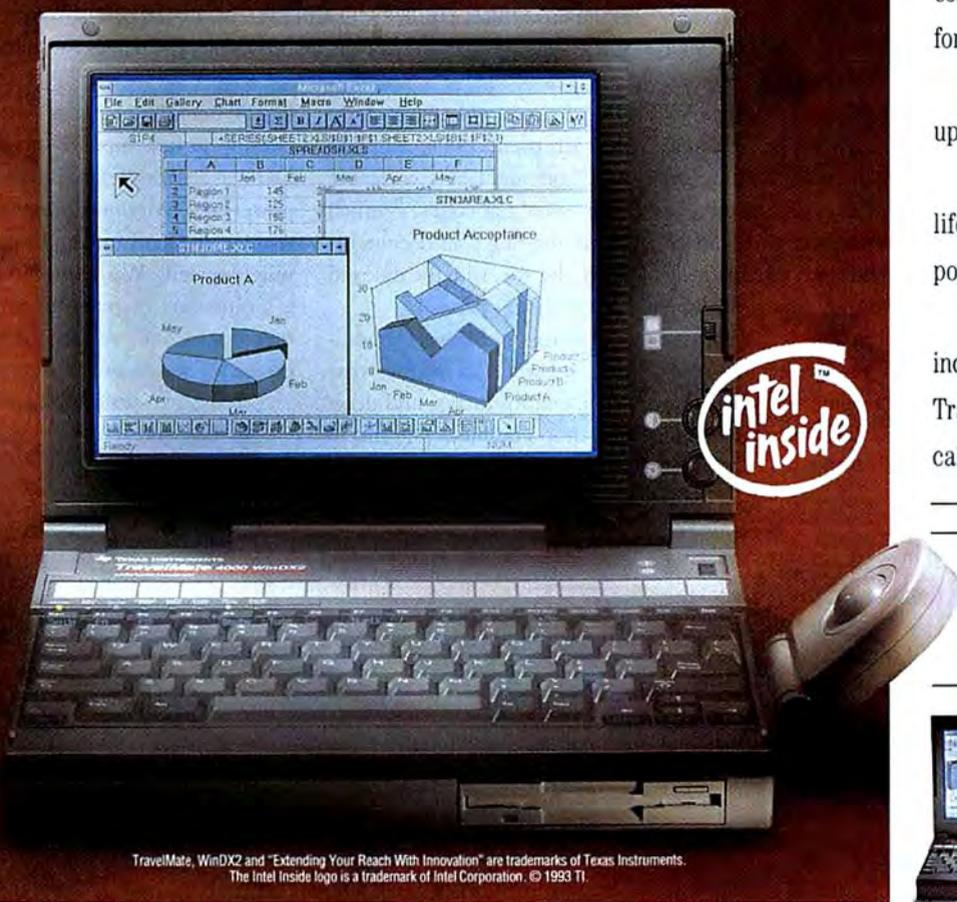
— PC Magazine, Mar. '93

"...in our battery tests, the TI 4000 WinDX2/50
achieved a magnificent 6 hours and 24 minutes."

— Portable Computing, Apr./May '93

"TI has done more to customize and optimize
Windows than the other notebook vendors."

— Windows Magazine, Feb. '93



TravelMate, WinDX2 and "Extending Your Reach With Innovation" are trademarks of Texas Instruments.
The Intel Inside logo is a trademark of Intel Corporation. © 1993 TI.

TI TravelMate 4000
WinDX2/50

**OUR
PERFORMANCE
IS GETTING
RAVE REVIEWS.**

As well it should.

For starters, the TravelMate™
4000 WinDX2™/50 notebook computer
comes with a 486 DX2 50MHz processor
for increased speed and performance.

It's specifically designed to power up
into built-in Windows in 15 seconds.

And its amazingly long battery
life is made possible by TI's superior
power management system.

For more information about the
incredible, lightweight, award-winning
TravelMate 4000 notebooks, simply
call 1-800-527-3500.

TravelMate 4000

486 WinDX2/50	486 WinDX2/40 COLOR
4 or 8MB RAM std. (20MB max.)	8MB RAM std. (20MB max.)
120 or 200MB HDD	200MB HDD
5.6 pounds	6.3 pounds

Battery life varies according to model and use.



EXTENDING YOUR REACH
WITH INNOVATION™



Circle 244 on reader service card

WordPerfect 6.0 for DOS: A Graphical Change

TEST DRIVE

WordPerfect 5.1 for DOS has remained unchanged for more than three years. And why not? It's the best-selling word processor on the planet. WordPerfect Corporation took its time issuing version 6.0, but what a job it's done! A late beta version reveals hundreds of improvements.

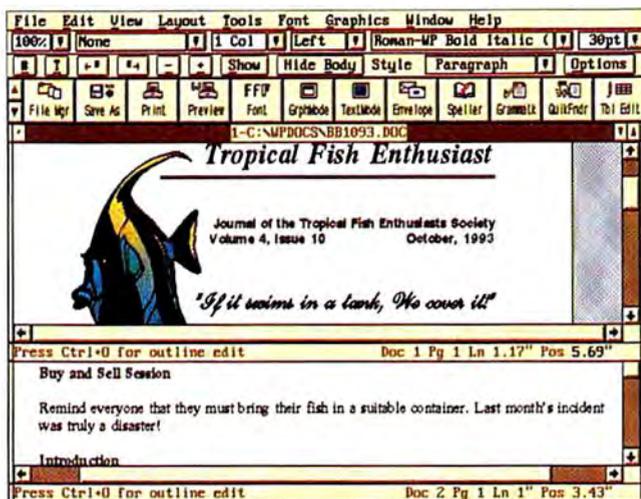
This release is far more than a face-lift: It offers two scalable graphical editing modes. You

can still work in the basic character mode, or just press <Ctrl>-<F3> to edit your text as it will appear on the page. Press the same combination again to move to an editable page layout display, then again to return to character mode. You can display nine documents at once.

Fonts? Pick from TrueType, PostScript Type 1, Agfa Intellifonts, and Bitstream Speedo. A preview mode helps you select them, and a utility simplifies their installation.

A customizable button bar offers instant command access, while a ribbon bar helps you set fonts, tabs, and text alignment. Most options are available in all views but can be hidden. Learning this complex program is easier than with 5.1, too. An interactive tutorial and a Coach feature guide you through most commands. A drag-and-drop feature simplifies text editing.

A grammar checker and a collapsible outliner are welcome additions, and improved mail merge tools let you preselect merge records. A full-scale style



WordPerfect 6.0

A dramatic improvement of the champion word processor.

Key Features: Graphical user interface • Scalable fonts • Better macros • Grammar checker • QuickFinder file management

Pricing: \$495, WordPerfect upgrade \$129, competitive upgrade \$149

Availability: June 28, 1993
WordPerfect Corp., 800/451-5151, 801/228-5077 (fax)

Reader service no. 716

FROM GRAPHICAL EDITING AND MULTIPLE DOCUMENT DISPLAY to text wrap and button and ribbon bars, WordPerfect 6.0 adds flexibility.

sheet feature replaces its clum- sioner 5.1 predecessor. Printing envelopes and labels, complete with postal bar codes, is much easier. Finding your documents is simpler, too, with the indexed QuickFinder system.

Desktop publishing amenities include automatic text wrap, color printing, and drag-and-drop graphics. The macro language now includes 99 commands, and you can fax or send

E-mail from the program.

This superb update gives DOS users the flexibility and power of a Windows program without the hardware and software demands. WordPerfect 6.0 is a must-buy upgrade for current users and an excellent choice for newcomers.

—George Campbell

Compudyne 4SL/25 Subnote:

Compudyne, the CompUSA house label, is laying down a challenge to the subnotebook market with a highly usable, feature-packed, 3.9-pound 486.

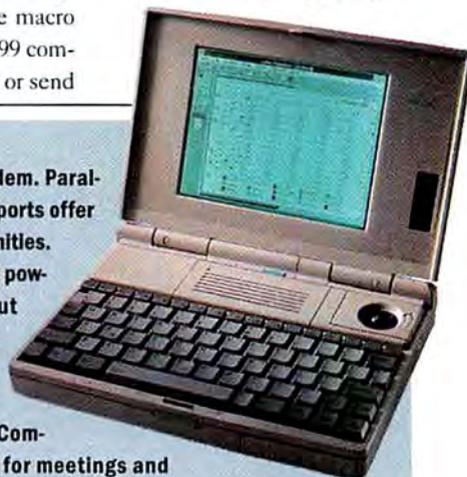
Through its Intel 486SL-25 processor, Compudyne's 4SL/25 offers configurable power management, a built-in math coprocessor, and performance that should match that of a desktop 486DX-25. A brilliant, backlit 6-by-4½-inch LCD VGA screen with 64 shades of gray makes the Compudyne a pleasure to use in any lighting. Even touch-typists will have no trouble with the keyboard, although we found the swapped <Up> and <Enter> keys initially confusing.

One weakness: The built-in 16mm trackball's side-mounted buttons are elusive and stiff to the touch. The system comes with DOS 6.0, Windows 3.1, and Lotus Organizer for Windows. It includes 4MB of RAM, an external 3½-inch drive, a PCMCIA 2.0 slot, and a 16ms 80MB removable hard drive (the bundled software takes up 35MB). There's room for up to 20MB of memory or an optional

9600/2400-bps fax-modem. Parallel, serial, and mini-DIN ports offer other expansion opportunities.

The machine's 3.3-volt power consumption ekes out more than 4 hours of battery life when you run Windows. At 10 by 7.1 by 1.57 inches, the Compudyne subnote is tops for meetings and travel and a credible bridge between home and office.

The 4SL/25 costs \$1999. Option pricing: 4MB memory upgrade \$279, 9600/2400-bps fax-modem \$139, second 80MB hard drive \$389, fast charger \$89, slow charger \$59, spare battery \$129, extra 3½-inch drive \$119. Compudyne Direct 800/862-3098, CompUSA superstore locator 800/451-7638. Reader service no. 717



You Party Animal!



Gateway 2000™

486

F e s t

Go Hog-Wild During Gateway 2000's

Need a reason to celebrate? We're making this the best summer ever to buy a Gateway PC! During our 486 Fest, you'll find better-than-ever buys on all the fabulous systems in our product line. You'll think you died and went to hog heaven! Buy some fiesta goodies, invite a few party animals over and call us. We'll give you lots of reasons to party!

Party Reason — Gateway's Pentium Technology Guarantee!

If you've been worried about keeping up with technology now that Intel's® Pentium™ processor has been announced, relax! Ask about our Pentium Technology Guarantee. It's a Gateway-exclusive offer that allows you to keep up with technology and save big bucks — guaranteed!

Party Reason — Choosing a 486 system shows you're a smart buyer!

A less astute buyer might go for a 386 or Pentium system, but you know where the real value is. Gateway 2000's desktop and Nomad PCs are now all 486 systems for good reason. With our great prices on 486 technology, 386 systems are no longer a smart buy. And first-generation Pentium systems are not a good value.

Even if you were willing to pay the steep premium other manufacturers are charging for Pentium systems, you'd have trouble getting one because availability is extremely limited. Our engineers say the Pentium systems in our lab run so hot, you could use one to heat a hog house. Besides, Pentium systems on the market today will be outperformed quickly

by improvements in Pentium technology.

That's why we're not selling Pentium systems yet. At Gateway, we won't sell anything unless it's a good value for you.

In today's market a 486 machine is the way to go, especially now that all our desktop ISA systems are *guaranteed* to be upgradeable to Pentium technology.

Gateway 2000™
486
F e s t

Party Reason — If you pick a mini desktop, you'll save enough to invite the whole barnyard to your party.

Gateway's mini-desktop systems — 4SX-25, 4SX-33 and 4DX-33 — are petite but powerful, based on an integrated



486 Fest!



design that incorporates many subsystems on the motherboard for the best price-performance ratio. All mini desktop systems include: 4 to 8MB RAM; a large and fast hard drive, operating on the local bus for even faster drive performance; a fast video chipset with 1MB; a brilliant, crisp display from the standard 14-inch CrystalScan® non-interlaced, .28mm dot pitch color monitor; and more available expansion slots than you find in most small-footprint PCs. The combination of these features makes a cool Windows™ machine for an unbeatable price. Now that's cause for celebration!

Party Reason — *You'll be wallowing in ecstasy if you buy a local bus system.*

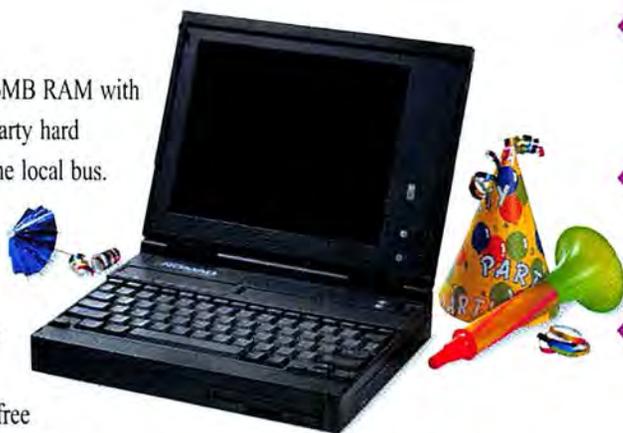
Go ahead and splurge on our 4DX2-50V or 4DX2-66V models. We put ATI's™ Graphics Ultra Pro video card with 1MB VRAM on our VESA® local bus for results that will be the hit of your party. Plus these systems

have a hefty 8 to 16MB RAM with cache, and party-hearty hard drives running on the local bus.

You get an extra VESA local bus expansion slot, a 15-inch flat, square CrystalScan color monitor, and more free choices of application software than you'll find anywhere else.

Party Reason — *Three cheers for 486 desktop performance in a lightweight portable!*

Why settle for a 386 notebook when you can get a powerful 486 Nomad in the same price range? All three Gateway 2000 Nomad models are 486 systems with snappy performance that's still rare in notebooks. Plus, they're smaller than many notebooks, weighing just 5.6 pounds and measuring 8.5" x 11" x 1.8". No other notebook this size can beat the Nomad 450DXL's combination of performance



In PC Magazine's Battery Run-down Test, Nomad systems operated up to 6 hours on a single battery with power management enabled.

and battery life! Nomad screens are big, brilliant and backlit for use in all lighting conditions. The 79-key touch-type keyboard is comfortable, quiet and fast. Nomad 450DXL models now also include Microsoft's® Ballpoint™ portable mouse with Quickport™ standard.



The Gateway 2000 4DX2-50V at \$2295 is a favorite with our three little pigs.



 **GATEWAY2000**

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

Party On! We Give You More Software

Keep counting the reasons to celebrate during Gateway's 486 Fest! You'll find plenty when you look at our selection of software and peripherals.

Software

We offer more free choices of application software with our systems than any other manufacturer. Plus, all software is pre-installed and ready to run the moment your system arrives. Hooray! No installation hassles!

With Nomad, mini desktop and our 4DX2-66 Best Buy systems, you get one of the best integrated software packages on the market.

Party Reason — *Microsoft Works for Windows.*[™]

With desktop and tower systems that include "choice of application software," you can select one of the following software packages. All applications are the latest versions.

Party Reason — *Microsoft Excel for Windows.*[™]

Party Reason — *Microsoft Word for Windows.*[™]

Party Reason — *Microsoft Word and Bookshelf 92.[®] CD-ROM Edition.*

Party Reason — *Microsoft PowerPoint for Windows.*[™]



Party Reason — *Microsoft Project for Windows.*[™]

Party Reason — *The MS Entrepreneur Pack (Works,[™] Publisher,[™] Money,[™] and games).*

Party Reason — *Borland Paradox[®] and Quattro[®] Pro for Windows.*

Party Reason — *The Windows Programmer Pack (MS Quick C,[™] Visual Basic[™] and more).*

Party Reason — *Upgrade to the CD-ROM Edition of Microsoft Office.*[™]

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

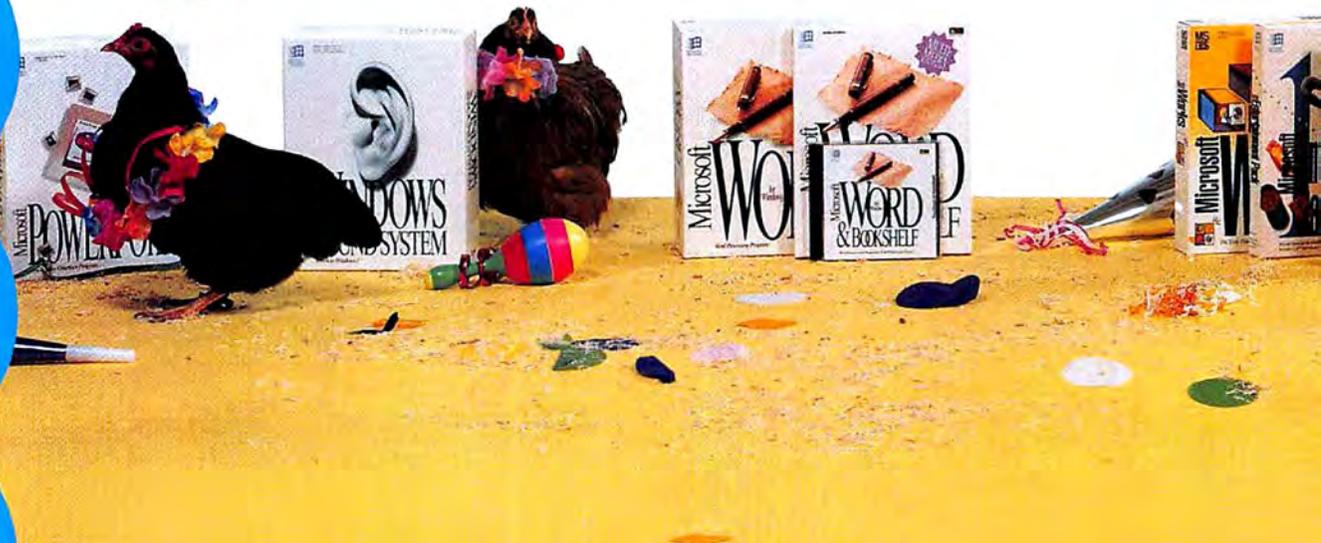
Party Reason — *Upgrade from Works to choice of application.*

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

Peripherals

Party Reason — *You'll save money on connectivity tools!*

TelePath[™] Fax/Modem. The Gateway 2000 TelePath is a 14,400bps modem, V.32bis, with 9,600bps fax capability. Package includes software — WinFax Pro,[®] Crosstalk[™] for Windows and Qmodem — plus a free CompuServe[®] trial membership. \$195



And Peripherals To Crow About!

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

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

Party Reason — You'll save money on multimedia software and peripherals!

CD-ROM Kit. You'll enter a whole new world of possibilities with your PC when you add a CD-ROM drive, giving you access to exciting new applications, databases and entertainment programs. Kit includes CD-ROM, interface card and everything you need to add MPC-compliant CD-ROM to your PC. **\$225**

Microsoft Windows Sound System.™ Here's the sound system designed for business, complete with a headset for private office use. With it you can "speak" commands to your PC for hands-free operation. Embed audio messages in Windows OLE applications. Play your Ad Lib® and Sound Blaster™ games — and more! Our special Gateway price includes soundboard, microphone, headset and software. **\$149**

Party Reason— You'll save money on all kinds of extras from Gateway!

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 DOS software, one tape and cable. **\$195**

Texas Instruments® MicroLaser™ Plus Laser Printer. The MicroLaser Plus is only 13.4" x 14.2", yet it prints 9 pages per minute at 300dpi. Call for 486 Fest price!

Panasonic® KXP2123 Color-Capable Printer. Add color to your documents with this 24-pin dot matrix printer. Includes Adobe Type Manager.® Call for 486 Fest price!

We offer many other system options and upgrades, including 17- and 20-inch monitors, tape backup units, bigger hard drives, other software and more! Call today!

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

Everyone's flocking to check out the life of the party. Gateway's 4DX2-66 Best Buy system shown with optional Labtec speakers.



GATEWAY2000

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



The Whole Herd Is Dedicated To

Yes, this is the whole gang at Gateway 2000. We now number in excess of 2,000 people. We gathered everyone together for this 486 Fest kick-off photo so you could see all the friends you have in the business, and so we could renew our commitment to your complete satisfaction.



Despite some blustery weather, Ted, our president and founder, gave us an inspiring pep talk about customer satisfaction and value. He reminded us that we will be the best in this industry only as long as we remember the guiding principles of our company, best described in our mission statement:

We are Gateway 2000.

We care about and respect you, our customers.

We pledge to you that we will be honest, courteous and friendly.

If we make a mistake, we will admit it.

If you're unhappy about something, we'll do everything in our power to make it right.

We'll treat you as an individual and take special care to see that your individual situation is handled fairly.

We have fun working together, striving to be the most knowledgeable, productive and successful team in the world. We blend our talents to continually offer higher quality, more innovative and useful products, at a value unmatched by competitors.

We will always be happy but we will never be satisfied. And we will continually improve everything we do.

We will succeed, together as a team.

We are Gateway 2000.

We are the only logical choice!

Gateway 2000™
486
F e s t



Providing The Best Service!



Party Reason — *You'll like doing business with people who care about you!*

Each and every person in this photo rededicated his or her efforts to achieving these goals. Like a married couple going through a second wedding ceremony after many years of marriage, our energies were refocused on what's important. And what's important to us is *you!*

Party Reason — *You get excellent after-the-sale support!*

Every Gateway 2000 system comes with a **30-day money-back guarantee**. If you don't like your system, send it back within 30 days for a refund. All systems come with a **one-year limited warranty** and telephone **technical support** for the life of the system from our award-winning tech department. You also get an **automated fax service** to supply you with detailed documentation on over 150 technical subjects, and a **lifetime BBS**

membership for additional technical support and online forums.

We offer **on-site service** to most locations in the country (factory service only for notebooks). **Replacement parts** leave our factory as quickly as possible; we pay overnight shipping. Plus we now have **interactive documentation** on desktop systems with pictures and text right on your hard drive (in addition to comprehensive hardware and software manuals).

Party Reason — *It's so easy! Just give us a call!*

We make it easy for you to buy a Gateway PC, with convenient payment options including major credit cards and C.O.D. terms. Net 30-day terms and leasing options are also available to qualified commercial customers.



For a truly celebrated value, the choice is black-and-white: Gateway's 4DX-33.



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

Gateway 2000's Party List

4SX-25

- 25MHz 486SX Intel® Processor
- 4MB RAM
- 3.5" Diskette Drive
- 170MB 13ms IDE Hard Drive
- Local Bus IDE Interface
- Intel Pentium™ Technology Ready
- Windows Accelerated Video w/1MB DRAM
- 14" Color CrystalScan® 1024NI
- Mini Desktop Case
- 5 16-Bit ISA Slots
- 124-Key AnyKey® Keyboard
- MS-DOS® 6, Diags, Windows™ & Mouse
- MS Works for Windows™ 2.0

\$1295

4SX-33

- 33MHz 486SX Intel Processor
- 4MB RAM
- 5.25" & 3.5" Diskette Drives
- 212MB 13ms IDE Hard Drive
- Local Bus IDE Interface
- Intel Pentium Technology Ready
- Windows Accelerated Video w/ 1MB DRAM
- 14" Color CrystalScan 1024NI
- Mini Desktop Case
- 5 16-Bit ISA Slots
- 124-Key AnyKey Keyboard
- MS-DOS 6, Diags, Windows & Mouse
- MS Works for Windows 2.0

\$1495

4DX-33

- 33MHz 486DX Intel Processor
- 8MB RAM, 64K Cache
- 5.25" & 3.5" Diskette Drives
- 212MB 13ms IDE Hard Drive
- Local Bus IDE Interface
- Intel Pentium Technology Ready
- Windows Accelerated Video w/ 1MB DRAM
- 14" Color CrystalScan 1024NI
- Mini Desktop Case
- 5 16-Bit ISA Slots
- 124-Key AnyKey Keyboard
- MS-DOS 6, Diags, Windows & Mouse
- MS Works for Windows 2.0

\$1895

4DX2-50V

- 50MHz 486DX2 Intel Processor
- 8MB RAM, 64K Cache
- 5.25" & 3.5" Diskette Drives
- 340MB 13ms IDE Hard Drive
- Local Bus IDE Interface
- Intel Pentium Technology Ready
- ATI™ Ultra Pro Video w/1MB VRAM on VL-Bus™
- 15" Color CrystalScan 1572FS
- Desktop Case (Tower Upgrade)
- 7 16-Bit ISA Slots, 2 on VL-Bus
- 124-Key AnyKey Keyboard
- MS-DOS 6, Diags, Windows & Mouse
- Choice of Application Software

\$2395

4DX2-66 BEST BUY

- 66MHz 486DX2 Intel Processor
- 8MB RAM, 64K Cache
- 3.5" Diskette Drive
- CD-ROM Drive
- 340MB 13ms IDE Hard Drive
- Local Bus IDE Interface
- Intel Pentium Technology Ready
- Windows Accelerator w/1MB DRAM on VL-Bus
- 14" Color CrystalScan 1024NI
- Desktop Case (Tower Upgrade)
- 7 16-Bit ISA Slots, 2 on VL-Bus
- 124-Key AnyKey Keyboard
- MS-DOS 6, Diags, Windows & Mouse
- MS Multimedia Works, CD-ROM Edition

\$2495

4DX2-66V

- 66MHz 486DX2 Intel Processor
- 16MB RAM, 256K Cache
- 3.5" Diskette Drive
- CD-ROM Drive
- 340MB 13ms IDE Hard Drive
- Local Bus IDE Interface
- Intel Pentium Technology Ready
- ATI Ultra Pro Video w/1MB VRAM on VL-Bus
- 15" Color CrystalScan 1572FS
- Desktop Case (Tower Upgrade)
- 7 16-Bit ISA Slots, 2 on VL-Bus
- 124-Key AnyKey Keyboard
- MS-DOS 6, Diags, Windows & Mouse
- Choice of Application Software

\$2995

4DX2-66E

- 66MHz 486DX2 Intel Processor
- 8MB RAM, 256K Cache
- 5.25" & 3.5" Diskette Drives
- 500MB 11ms SCSI Hard Drive
- 32-Bit EISA SCSI Controller
- Windows Accelerated Video w/ 1MB DRAM
- 14" Color CrystalScan 1024NI
- Tower Case
- 8 32-Bit EISA Slots
- 124-Key AnyKey Keyboard
- MS-DOS 6, Diags, Windows & Mouse
- Choice of Application Software

\$3495

NOMAD 425SXL

- 25MHz 486SX Intel Processor
- 4MB RAM
- 3.5" Diskette Drive
- 120MB IDE Hard Drive
- Backlit 10" VGA Screen, 64 Gray Scale
- Simultaneous Video with IMB
- Size 8.5" x 11" x 1.8," 5.6 Lbs.
- 6-Hr. NiCad Battery & AC Pack
- 1 Parallel / 1 Serial Port
- 79-Key Keyboard & FieldMouse™
- MS-DOS and Windows
- MS Works for Windows

\$1995

NOMAD 450DXL

- 50MHz 486DX2 Intel Processor
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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.

Two Ink Jets That Smear the Competition

Ink jets are taking over. Of the three major printer technologies—dot matrix, ink jet, and laser—ink jets are growing fastest in sales. Analysts expect them to surpass dot matrixes by the end of this year. One reason ink jets are so popular is that

matrix. For the money, you get a surprising amount of printer.

The microMarc uses a thermal mechanism to squirt quick-drying ink out of 128 nozzles (twice as many nozzles as available in Hewlett-Packard's popular DeskJet), producing 300-

ers has over dot matrixes. The feeder holds up to 100 sheets of letter-, legal-, or A4-size paper, as well as envelopes. The ink cartridge lasts up to 1100 pages, which means you'll be paying about 3.6 cents per page.

The microMarc is quieter than most lasers, weighs just over 12 pounds, and measures about 16 by 13 by less than 6 inches. Because the microMarc uses HP DeskJet PCL 3 emulation, it should be compatible with virtually any application. It also comes with three built-in font families (Letter Gothic, Courier, and Dutch SWC) and will accept downloaded TrueType fonts.

HP DeskJet 1200C

Ink jet printers make sense for business users who want to add spot color to presentations and reports, and they cost far less than alternative color technologies such as thermal transfer.

HP has already been successful with its low-end color ink jets, the DeskJet 500C and 550C, and the more expensive, networkable PaintJets, most recently the XL300. Now HP has an offering in the midrange, the DeskJet 1200C.

The capability to print on plain paper is one of the keys to bringing color printing into the business mainstream. The 1200C does so by using quick-drying inks and a heater element to prevent the smearing and bleeding that usually doom plain paper in ink jets. These inks also look good: The 104-nozzle printheads produce even coverage, and the dithered patterns used to create complex hues (HP claims more than 16

million colors are available) aren't too noticeable. Because the 1200C has a black ink cartridge (along with cyan, magenta, and yellow), you get true, instead of processed, blacks.

The built-in sheet feeder handles 180 sheets of letter- or legal-size paper, and there's a manual-feed tray. Print speeds vary according to the print mode. In normal mode, it produces six pages of 300-dpi text per minute and a page of 300-dpi color every 2 minutes.

The 1200C uses an enhanced version of PCL 5, so it's compatible with HP's LaserJet III series, which means you get the same 45 scalable typefaces that are available in the LaserJet 4. It comes with 2MB of memory upgradable to 26MB with standard SIMMs. You can also install an HP JetDirect card to connect directly to the network.

The DeskJet 1200C lists for \$1699. A PostScript model with 35 Adobe Type 1 typefaces is available for \$2399.

—Dan Miller

Texas Instruments microMarc, Hewlett-Packard DeskJet 1200C

Two new ink jet printers show why ink jets are becoming increasingly popular: They offer high-quality output for relatively low prices.

Texas Instruments Inc.
800/527-3500
List price: \$419
Reader service no. 686

Hewlett-Packard
800/752-0900
List price: \$1699
Reader service no. 687



TEXAS INSTRUMENTS' \$419 MICROMARC ink jet printer (top) and Hewlett-Packard's \$1699 DeskJet 1200C offer low-cost alternatives to laser and color printers.

monochrome models produce near-laser-quality output for near-dot-matrix prices. Two recent products exemplify the success of ink jet printers.

TI's microMarc

Texas Instruments' new microMarc ink jet lists for \$419—\$70 or so more than the average dot

dpi output comparable to that of most low-end lasers. It lays down the ink at approximately 300 characters per second—about the same rate as a fast dot matrix, but slower than a laser.

The automatic sheet feeder included with the microMarc and most other ink jets is another advantage this class of print-

Microsoft Builds a Better Mouse

While the world awaits a better mousetrap, Microsoft has developed a dramatically better mouse.

Gone is the familiar soap-bar shape of the Microsoft Mouse, replaced with a unique contoured design based on a mountain of ergonomic research and user feedback. A new Windows-based Mouse Manager utility gives you control over an expanded range of features that make this mouse more functional than its predecessor and a pleasure to use.

The \$109 mouse accommodates both right and left hands

in a natural position. It's longer than the prior version, with a low front end rising to a high, rounded back. This design encourages your hand to rest on the mouse at a slight angle in a more natural position for your wrist. The back end also bulges to the left to support the thumb of your right hand or the smaller fingers of your left hand.

The Mouse Manager software control panel offers a wide range of customizable features. You can adjust the size and color of the cursor and have it leave a mouse trail as it

moves.

The Extra Points menu offers more powerful ways to manipulate the pointer on screen. For instance, the Snap-to feature makes the pointer appear automatically on the default button of a dialog box—a great time-saver that may also reduce the risk of re-



**THE NEW
MICROSOFT MOUSE**
is ergonomically designed,
with a low front end and a
rounded back, so that your hand is
in a more natural position.

petitive strain injuries. And the helpful Locate feature enables you to find your mouse pointer by calling it to the middle of the screen.

Looking at it, you know it's different. Holding it in your hand, it feels different. And one trip into the control panel tells you that this is a completely different animal. With its ergonomically designed body and expanded list of features, the new Microsoft Mouse makes an impressive debut.

—Melissa R. Riofrio

NEC CD ROMs: Multimedia Presentations to Go

NEC MultiSpin 38, MultiSpin 74, MultiSpin 84

This new line of CD ROM drives, led by a 2.2-pound portable model, sports data transfer rates fast enough to handle multimedia presentations that include video.

NEC Technologies Inc.

800/388-8888,

508/264-8000

Price: MultiSpin 38 \$465,
MultiSpin 74 \$615, MultiSpin
84 \$550

Reader service no. 688

The MultiSpin 38, NEC's portable 2.2-pound CD ROM drive, lets you take your multimedia act on the road. Boasting a data transfer rate of 300 kilobytes per second (K/sec), the MultiSpin 38 is one of the first portable CD ROM drives fast enough to handle full-motion video. Such a fast data transfer rate is crucial

because a slower rate makes video jerk on screen. The 38 is joined by two other models, the MultiSpin 74 and 84, which are external and internal desktop units, respectively.

The MultiSpin products include a RAM cache: The portable has 64K; the other models have 256K. Cache can improve access time, particularly when searching databases.

All the MultiSpin drives work with the new multisession CD ROM, which can be appended with data. Traditional CD ROMs can accept data only once. One of the first CD ROM products to take advantage of multisession is Kodak's Photo CD. This medium lets you use your PC to view digitized 35mm images on a CD ROM. With multisession, you can add up to 100 images until the disk is full. The MultiSpins will work with Photo CD and other multisession CD ROM applications as they become available.

The \$465 MultiSpin 38 has an optional battery pack (\$85) that powers the unit for up to 50 minutes, according to NEC. The device connects to a notebook through a parallel-to-SCSI interface kit (\$95) and an included SCSI cable.

The portable unit's housing has a metal bottom and a heavy plastic top to ensure durability. The drive head locks when power is off.

As always, portability has its trade-offs. In this case, the compromise is the unit's 400ms access time.

The other two drives in the line, the external MultiSpin 74 and the internal MultiSpin 84, offer a much better average access time—280ms. The \$615 MultiSpin 74 measures about 9 by 10 inches, is 3 inches high, and weighs 7.7 pounds. The \$550 MultiSpin 84 requires the same amount of space as a half-height disk drive.

—Laurianne McLaughlin

Microsoft Mouse

Microsoft gives its best-selling mouse a face-lift and a host of new features to make mousing around easier.

Microsoft Corp.

206/882-8080

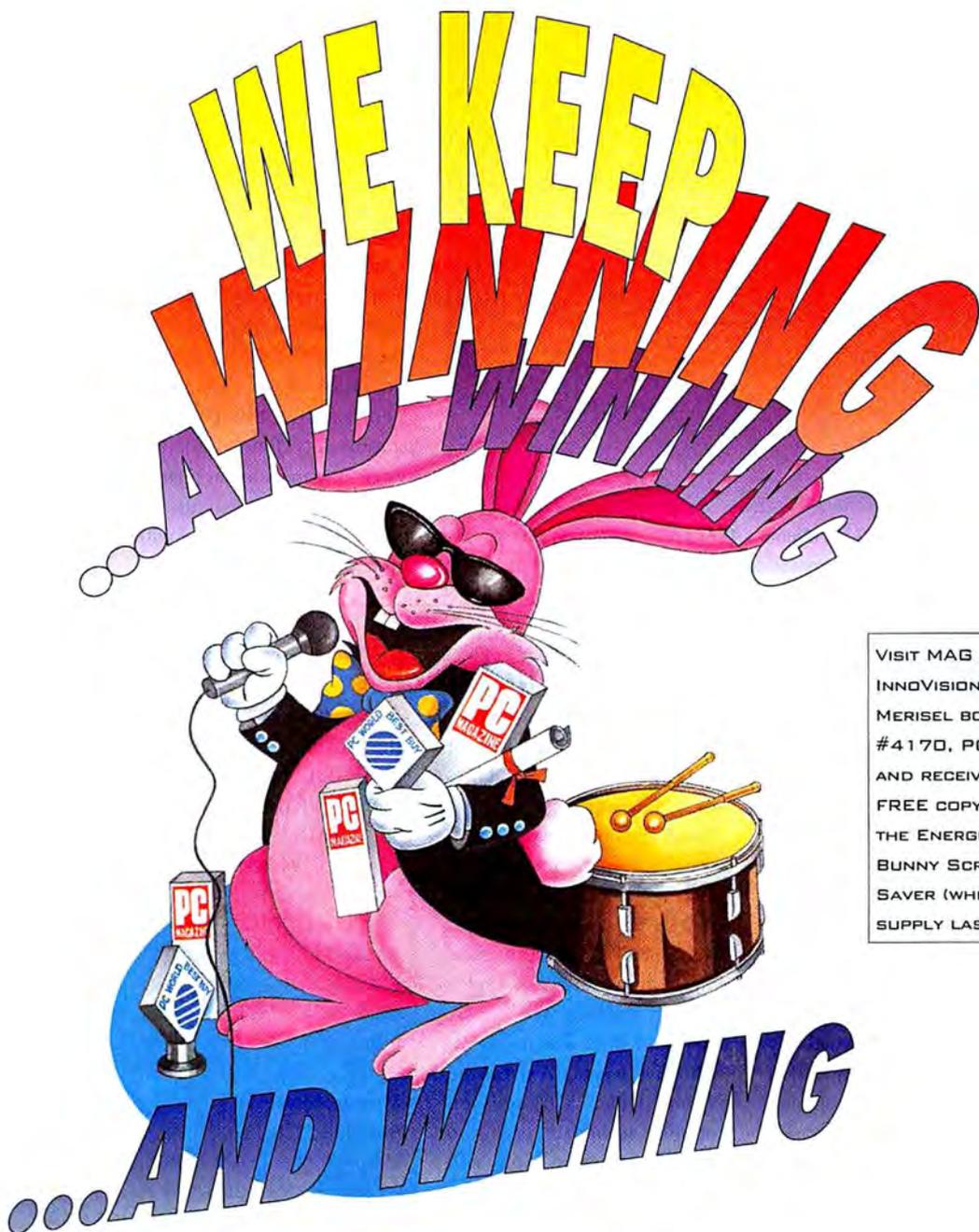
List price: \$109 for serial or PS/2, \$125 for bus or combination (serial and PS/2 adapters), combination with Windows \$225, combination five-pack (serial and PS/2 adapters and five mice) or bus five-pack (five mice, five expansion boards) \$499

Reader service no. 689

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Circle 169 on reader service card

Micron 486VL WinStation: Speed Through Windows

If speed is your game, this PC will put you ahead of the pack. With 16MB of RAM, a 256K secondary RAM cache, and local bus video, Micron

Computer's 486VL WinStation races by most systems. It gives you the graphics power for desktop publishing and CAD and enough RAM for the up-

coming Windows NT. The WinStation base model uses Intel's 486SX-33 processor; DX-33, DX2-50, and DX2-66 processors are optional.

In PC World Test Center trials, a \$3399 Micron WinStation with a 486DX2-66 processor, 16MB of RAM, and an optional 4MB IDE caching controller sped through software tests, scoring 19 to 36 percent above the average DX2-66 scores on our Freelance, Paradox, WinWord, and Excel tests.

The WinStation has a 238-pin zero insertion force (ZIF) socket for Intel OverDrive and Pentium (OverDrive for DX2) upgrades. The system also accepts up to 64MB of RAM. You get two VESA local bus slots (one open) and five 16-bit ISA expansion slots (four open). The system also includes an upgradable flash BIOS, so you can easily maintain compatibility with future processors.



READY FOR WINDOWS NT: Micron's 486VL WinStation will please users with its powerful standard configuration.

Swan Cygnet PCs: Low-Cost 486 Power

Building on its reputation for low prices, Swan Technologies has introduced the Cygnet series of no-frills 486-based desktops starting at \$1099 with monitor.

The three Cygnets are a base-model \$1099 486SX-25, a \$1349 486SX-25, and a \$1649 486DX-33.

Swan cut costs in several ways to drop prices. First, it unbundled service features standard on its other PCs, such as remote diagnostics. For Cygnets, Swan charges \$79 for the service and a modem, plus \$25 for modem installation. (If you already have a modem, the price is \$39.) The

Cygnets include one year (not two) of on-site service and lifetime phone support.

Swan also cut costs by providing no-frills configurations with basic upgradability. All have 1.44MB floppy drives and an 80MB or 170MB hard drive. The systems do not accept a Pentium upgrade. You get six expansion slots and three 5¼-inch drive bays. RAM can be expanded to 32MB, and you can add secondary cache to 256K. The Cygnets come with a VGA card, and two of the three models are upgradable to super VGA (1024 by 768).

The base-model 486SX-25

offers 2MB of RAM and an 80MB IDE hard drive. The other units have 4MB of RAM and a 170MB IDE hard drive.

—Laurianne McLaughlin

Swan Cygnet Series

These no-frills 486 desktop PCs offer Swan's lowest prices yet and room to upgrade.

Swan Technologies
814/238-1820

List price: base-model 486SX-25 \$1099, 486SX-25 \$1349, 486DX-33 \$1649

Reader service no. 691

Micron 486VL WinStation

This speedy Windows PC offers 16MB of RAM, a 256K secondary cache of fast static RAM, and VESA local bus, along with upgrades to Intel OverDrive and Pentium.

Micron Computer Inc.
800/438-3343,
208/465-3434

List price: 486SX-33 with 14-inch super-VGA noninterlaced monitor \$2249, 486DX2-66 with 14-inch super-VGA noninterlaced monitor \$2849

Reader service no. 690

Three main design features give the WinStation its power. First, it employs a 256K secondary cache of fast, 15-nano-second static RAM. This large, fast cache helped the system score well in our software tests.

The WinStation's Diamond Viper VLB graphics accelerator, which has a Weitek Power 9000 graphics controller and 2MB of video RAM, makes quick work of graphics. The accelerator supports noninterlaced resolutions of up to 1280 by 1024.

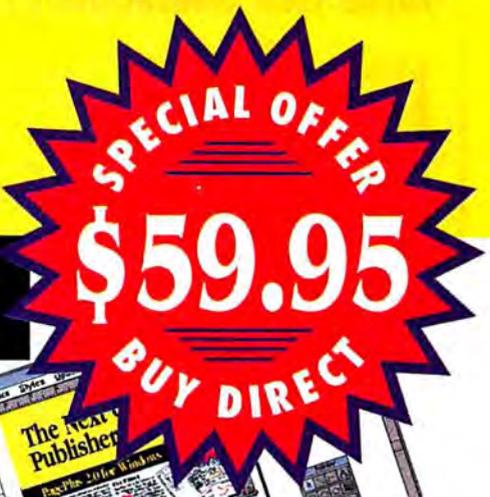
The standard system uses a VL bus IDE controller coupled with a 245MB Maxtor hard drive. It's at least 10 percent faster than standard IDE controllers, the vendor claims. Micron also offers an optional VL bus IDE caching controller (\$199) on the system board, which was present on the model we tested. A Teac dual-media floppy drive packs 1.2MB and 1.44MB drives in one bay.

With its speed, expandability, and large amount of RAM, the Micron 486VL WinStation could help speed your work.

—Laurianne McLaughlin

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Multiple Zoom Levels	○	○	○
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Process Color Seps.	○	○	○
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Three New Shareware Products That Enhance PKZip 2

If you're creating or receiving compressed files that have the ZIP extension, you may have noticed some compatibility problems lately. That's because the newer, 2.x versions of PKZip aren't entirely compatible with older, 1.x versions. Nor are they entirely compatible with the many utilities that are designed to work with PKZip-created files. But shareware vendors can get updates out the door fast, and three try-before-you-buy PKZip enhancement

programs already support the new version.

Canyon Software's Drag and Zip puts a pretty Windows face over the PKZip command line. You drag files from File Manager over to the Drag and Zip icon, and up comes a dialog box of options. An included companion program lists and decompresses the files within a ZIP file.

Drag and Zip 2.15 supports all of PKZip's new options. You can disable memory tricks and choose from a selection of compression options. The new Drag and Zip also supports one of PKZip's best new features: creating and retrieving a large archive that spans multiple floppy disks. Drag and Zip 2.15 is available as DRAGZIP.ZIP on PC World Online.

A similar product is available from Nico Mak. Called WinZip, it offers much the same capabilities as Drag and Zip. You drag files to zip them, and bring up existing ZIP files for viewing and decompression.

WinZip 4.0a can read and restore from multiple-floppy archives, but it can't create such archives. There are other new features, including a better-looking button bar and the capability to drag and drop an archived file to another application. WinZip handles compression standards other than ZIP, and version 4.0a supports Robert Jung's ARJ program. WinZip is available as WINZIP4A.ZIP on PC World Online.

Jibben Software's Zip Chunker is no longer limited to ZIP files. You can take any file, run it through Zip Chunker, and have a collection of smaller files with Zip Chunker's own AS extension. And if you hit a bad

floppy while archiving with PKZip, it's back to square one; not so with Zip Chunker.

Unlike PKZip, Zip Chunker allows you to break up an existing ZIP file. Also, archives that are created with Zip Chunker are independent ZIP files; if

you have compressed multiple floppies with PKZip, you may need all the floppies to get a file compressed on just one of them. This shareware utility is available as ZCKR201.ZIP on PC World Online.

—Lincoln Spector

Drag and Zip 2.15

☐ WINDOWS

☑ SHAREWARE A Windows interface for PKZip is friendlier and supports PKZip 2.

Canyon Software
415/382-7999,
415/382-7998 (fax)
List price: \$20
Reader service no. 692

WinZip 4.0a

☐ WINDOWS

☑ SHAREWARE This drag-and-drop utility supports PKZip 2 and ARJ compression.

Nico Mak
800/242-4775,
713/524-6394
List price: \$29
Reader service no. 693

Zip Chunker 2.01

☑ SHAREWARE You can split large ZIP files or any other kind of large file with this simple command-line utility.

Jibben Software
800/242-4775, 713/524-6394, 713/524-6398 (fax)
List price: \$15
Reader service no. 694

Complex Drawing Made Easy

Designworks, the newest contender in the Windows draw software market, provides a palette of professional drawing tools at a fairly reasonable price.

At \$299.95, Designworks 1.20 falls between low- and high-end draw packages in both price and features. The product's simple user interface, modest 600-piece clip art selection, and basic drawing tools should please novice and professional illustrators alike. Some of Designworks' more advanced features include freehand and Bézier tools, object blending, the capability to create drawings with up to 200 layers, and 50 levels of redo/undo.

The program has some limitations. For instance, while you

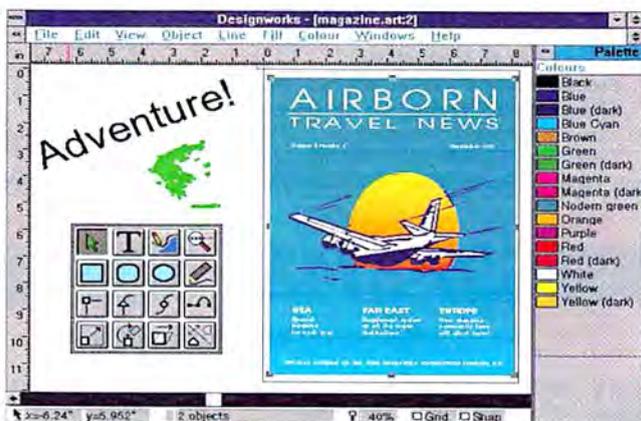
Designworks 1.20

☐ WINDOWS If you want high-end drawing tools at a reasonable price, Designworks is a fair deal.

Computer West
805/546-9036,
805/541-1623 (fax)
List price: \$299.95, special introductory \$239.95 price lasts indefinitely
Reader service no. 695

can wind text along any path, you can't perform text wrapping, nor can you create multiple-page documents. Designworks comes standard with 63 ATM fonts and is compatible with TrueType fonts.

—Anita Hamilton



DESIGNWORKS lets you align text along any curve. The product's simple interface and basic drawing tools should please business users.

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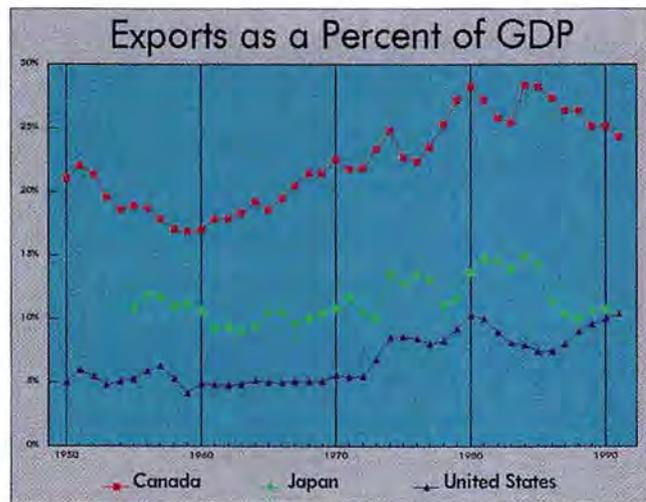
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Circle 105 on reader service card

Business Information: Where to Get It, How to Use It



HERE, THERE, AND EVERYWHERE: CoWorks' Time Series Library puts a comprehensive statistical history of the world at your fingertips—very useful for creating business charts and graphs.

CoWorks' Time Series Library is an easy-to-use warehouse of information designed to produce graphs and charts that make quick sense of historical and current demo-

graphic information. This macro-driven spreadsheet provides data ranging from median age and birth and death rates to interest rates and national debts, all culled from a variety of gov-

ernment and private research sources. You can combine data sources in graphs to depict, for example, "Annual Spending, Construction, U.S.A., Adjusted for Inflation" or "Prime Interest Rates, Germany Versus Japan." The information available is remarkably varied and detailed.

As more business decisions become time sensitive and subject to fluctuations in the global economy, such data can be critical. The importance of this information may explain why it doesn't come cheap: The program costs \$249 with one year of quarterly updates. But with comparable on-line data services costing thousands of dollars, Time Series Library offers small to midsize businesses information once affordable only to bigger companies.

DATA from TreeAge Software is decision-support soft-

Time Series Library

A world of information that's never out-of-date.

CoWorks

816/421-1548

List price: \$249 with one year of quarterly updates

Reader service no. 696

DATA

Software that helps you make up your mind.

TreeAge Software

617/536-2128

List price: \$297, evaluation copy \$15

Reader service no. 697

ware that helps you weigh risks and opportunities, determining how unforeseen factors might affect a company's future. An example would be a firm trying to decide whether to fund a new R&D project. Unknowns abound in such a case: How long should the project take? What if another company produces a competing product first? What kind of price will the market accept? You set up the decision tree using DATA, indicating your best guess at each probability, and DATA uses the information to produce an evaluation of every possible outcome. Use the output to make intelligent choices between factors you can control before you commit any funds. Strategic planning and even litigation settlement decisions are just two of DATA's possible uses.

DATA costs \$297. A full-featured limited-life evaluation version with tutorial and documentation is \$15, an investment almost certainly worth the risk.

Bootcon: A Traffic Cop for Errant Drivers

Bootcon 2.0

Bringing order to CONFIG.SYS chaos and AUTOEXEC.BAT anarchy.

Modular Software Systems

800/438-3930,

206/631-5779 (fax)

List price: \$79, upgrade \$28

Reader service no. 698

Creating and managing different AUTOEXEC.BAT and CONFIG.SYS files to keep your system's drivers, TSRs, DEVICES, and LOAD-HIGHs working smoothly is one of the most unpleasant tasks in computing.

Modular Software's Bootcon

2.0 lets you prepare and select up to 100 different system configurations. Switching between these specially crafted boot files is an orderly affair. A simple menu system guides you through the various boot-up options you've constructed, complete with short descriptions you've attached, so there's never any confusion about which files to use. Just pick the configuration you need and reboot—no file renaming or REMing out lines.

With Bootcon you can also search your root directory for preexisting pairs of AUTOEXEC.BAT and CONFIG.SYS files. Need a setup for special hardware? Running software

with a unique memory management requirement? Bootcon keeps track of each variation, storing every setup in its own directory. To run, just select the setup of your choice and Bootcon does the work.

You can also modify and catalog other initialization files, such as the often-edited WIN.INI and other Windows setup files. An Include feature lets users write specific sections of code, name them, and then include them as subroutines in other boot configurations.

Bootcon is compatible with DOS 6.0 and can serve as a front end for DOS's configuration manager. It costs \$79.

—Richard Melville

—Richard Melville

Hotwin: Low-Cost, Full-Featured Windows Utilities

Hotwin 3.0 offers something most desktop managers don't: all-around Windows utilities for less than \$100.

Hotwin installs (and uninstalls) quickly and easily, plac-

ing itself in Windows' Startup group for automatic loading. The \$79.95 package produces a customizable ten-button option bar that borders the top of your active window. Set the buttons

to perform any Windows tasks you like; the default buttons allow point-and-click operation of such standard tools as a file viewer, a file finder, a program launcher, and a magnifier. A

graphical task manager lets you arrange windows using icons and call on print and copy options.

Hotwin also lets you access Windows' hot keys from within your applications. Unlike Windows' hot keys, those you create in Hotwin will work in DOS applications as well. The software distinguishes between keys on the right- and left-hand sides of your keyboard, so you can program more key combinations using

Hotwin 3.0

WINDOWS Inexpensive alternative to Windows utilities packages.

TMA Software

800/497-3617

List price: \$79.95

Reader service no. 699



HOTWIN, A \$79.95 WINDOWS DESKTOP MANAGER, makes it easier to navigate Windows. You can keep track of hot keys and available system memory.

—Richard Melville

Netroom 3.0 Includes Free BIOS Upgrade

It sounds like a networking program, but don't let the name fool you. Version 3.0 of Helix Software's memory manager Netroom leapfrogs the rest of the industry by providing more memory for resident soft-

ware than ever before. The hottest feature is Helix's "cloaking" technology, which can move system and video BIOS and several utilities (including a RAM disk, a screen saver, a screen accelerator, and a disk cache) into extended memory. The program's cloaked BIOS freed up as much as 64K of additional upper memory in *PC World* tests and was more reliable than the "stealth" technique used in the best-selling QEMM386.

Netroom works on 286- and 386-based systems as well as with Chips and Technologies system board chip sets and machines with EMS 4.0 hardware. It adds support for the DOS

Protected Mode Interface (DPMI) and DOS 6.0.

The Customize utility, which optimizes high-memory usage, bears an uncanny resemblance to DOS 6.0's MemMaker (both were written by Helix) but takes advantage of Netroom's advanced features.

The Stretch utility enables text-mode DOS programs—which are normally restricted to 640K—to stretch out into as much as 720K of available memory.

Discover, Netroom's system analysis utility, has been completely redesigned to compete with (and resemble) Quarterdeck's award-winning Manifest program; the utility is now

mousable and sports a graphical user interface.

A virtual machine feature, also found in previous versions of Netroom, still allows a staggering 576K of TSRs to be loaded, but unfortunately it isn't compatible with Windows 3.1. Cloaking, however, should provide enough memory for nearly all users' needs.

Once a relatively obscure product, Netroom now sets a new standard for high-performance memory management. This powerful new package, which consistently delivers more memory than any other, is sure to give all of its competitors a run for their money.

—Brett Glass

Netroom 3.0

Memory management software with a "cloaking" technology that moves your BIOS and several utilities to extended memory.

Helix Software Co. Inc.

800/451-0551,

718/392-3100

List price: \$99

Reader service no. 700

TO WIN
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Okidata has brought the paper chase to a resounding and refreshing halt, with the invention of DOC•IT, the revolutionary desktop document processor that combines a multitude of talents.

With DOC•IT, Okidata has integrated faxing, printing, copying, scanning, cutting and pasting in one unit with a footprint so compact, it takes up just a corner of your desk. Incorporating graphics capability compatible with Windows™ and most major software, DOC•IT lets you create and communicate finished presentation-quality documents—complete with visuals—without having to get out of your chair.

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Find Yourself With GPS MapKit SV

GPS MapKit SV, a mapping program that reads information from a Global Positioning System (GPS) satellite receiver, can help. It displays your exact location anywhere in the United States, including Alaska and Hawaii.

The \$795 GPS MapKit SV is designed for business travelers who spend much of their time on the road. To use the package, you'll need a notebook, a GPS satellite receiver (generally priced from \$1000 to \$10,000), and a portable CD ROM drive. GPS MapKit SV's map database is on one CD.

The GPS relies on 24 satellites launched under the direction of the United States Department of Defense. A GPS receiver records satellite signals and translates them into latitudinal and longitudinal measurements. GPS MapKit SV takes information from the receiver and displays your location as a blinking dot on a map. You can bring up a window if you want to see your velocity, direction, and altitude as well.

GPS MapKit SV's CD ROM database includes maps of every U.S. city, town, rural area, and most highways and roads, with detailed street address information for major metropolitan areas. Prominent buildings and monuments are also identified.

GPS MapKit SV

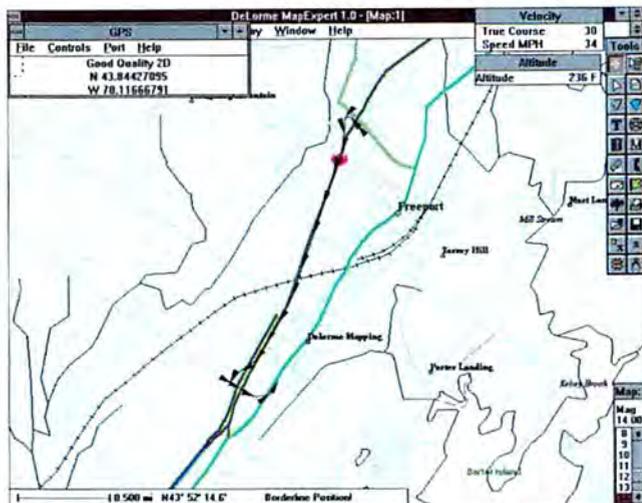
Find your way across the country with this satellite mapping software package.

DeLorme Mapping
207/865-1234,
207/865-9291 (fax)
List price: \$795
Reader service no. 701

But getting there's only half the battle—you've still got to find your way home. GPS MapKit SV's "bread crumb" feature displays a trail of markers that indicates your route. You can use this feature to keep a log of your business travels.

While the expense of GPS MapKit SV and a GPS receiver may scare off folks who keep a stack of AAA maps in the glove compartment, this satellite mapping system can help business travelers whose success depends on being in the right place at the right time.

—Jeff Bertolucci



GPS MAPKIT SV interprets data from a GPS satellite receiver to display your exact location on a computer map.

Business to Business With MarketPlace Business 2.0

For business-to-business marketing, accurate and accessible information about your targets is crucial. MarketPlace Business, an \$845 CD ROM-based software product, can make it easier to find the bull's-eye. It offers a database of 7 million U.S. businesses to help you create prospecting, telemarketing, and direct-mail lists.

MarketPlace Business's company profiles are collected by Dun & Bradstreet Information Services. This easy-to-navigate Windows product offers three key benefits: quick access to extensive information, flexibility in creating prospect lists, and cost-effectiveness.

Each listing has these searchable fields: location, metropolitan area, business type, standard industrial classification code, annual sales in ranges, number of employees, years in business, public/private ownership, and site type (branch, headquarters, or single location). A contact

name and number are provided.

If you want to show the data geographically, the software exports lists in dBASE or ASCII format for use with mapping programs. It also creates and prints preformatted prospect reports and mailing labels.

But you don't get unlimited access to the database. The product keeps track of how much information you access, using a pulldown meter. It deducts a credit each time you export or print information; each name on a list equals a credit. The product comes with 3000 credits, and MarketPlace Information sells additional credits at \$500 for 5000, with quantity discounts available if you buy 50,000 credits.

However, once you've created a list, you have unlimited use of it for a year. Many traditional mailing services, on the other hand, rent lists on a one-time-use basis. While those lists typically give more specific in-

MarketPlace Business 2.0

WINDOWS CD ROM-based business-to-business marketing tool provides Dun & Bradstreet database on 7 million U.S. companies.

MarketPlace Information Corp.

800/999-9497,
617/894-1661
List price: \$845

Reader service no. 702

formation, like a company's purchases in your product category for the past year, they also cost between 15 and 25 cents per name. The vendor claims MarketPlace's cost is about 10 cents per name.

Dun & Bradstreet updates the listings yearly. To obtain the most current information, MarketPlace Information offers quarterly CD ROM updates (\$195 for four).

—Laurianne McLaughlin

Get Organized Get Curtisized



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Too much work? Not enough time? Curtis organizers help you work more efficiently and be more productive. Use a Top Shelf to organize paperwork. Free up more space with a Monitor Arm, System Stand and Printer Stand. Slide your keyboard out of the way with a Keyboard Spacesaver. Keep disks within reach with a Disk Box and supplies handy in a Mouse Pad Organizer. The Curtis Clip will hold copy where

you can see it and the Curtis Command Center provides fingertip control for your entire system.

Save time, work and space —
get Curtisized today!



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CURTIS

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For more information, call Curtis at 1-800-955-5544, Ext. 240.

Office Design Made Easy for the CAD-Phobic



DESIGNWARE'S 3-D OFFICE lets you design an office without doing any drawing. Just choose from among more than 350 objects and drag and drop them.

Now you can design an office without doing any drawing or white-knuckling your way through some complex CAD program. Designware's 3-D Office makes it easy for anyone not only to create an office layout but also to virtually walk through it.

To create designs with 3-D Office, you pick out objects after selecting Insert•Symbol from a drop-down menu. From there, you pick from libraries of furniture and equipment. To design a room of cubicles filled with desks, computers, and chairs, for instance, choose either entire cubes preconfigured with furniture or empty cubes and each of the elements. All of the objects are scalable, so you can adjust the size of cubes

3-D Office

A DOS-based office-layout and virtual walk-through program that takes the drawing out of CAD.

Designware

617/924-6715,
617/924-1699 (fax)
List price: \$129.95
Reader service no. 703

and furniture, but you can't change their shape.

Make your selection from more than 350 objects in the libraries, and they appear in your layout. Drag them into place, group them together, set where they hang in space (how far from the floors and walls), and

you have a layout. Since there are no drawing tools in 3-D Office, you can't create your own objects. Designware plans to supply inexpensive (less than \$20) libraries of 50 to 100 additional furniture and office elements that imitate the real components you buy. The same cut-and-paste, drag-and-drop technique works for basic elements such as walls, doors, and windows. Select Insert•Wall or Insert•Windows from the drop-down menu and place them in your drawing. You can even set the level of transparency—clear, opaque, or smoked—for doors and windows. While you can

change the colors, you can't assign textures. Once you've created your office, ask the program to render it for a preview of what it will look like.

As you move through your layout, you'll be able to see through the glass windows and doors to the elements on the other side. So when you look out a manager's office window, for example, you can see the same maze of cubes that she would see.

To keep track of furniture and costs, you can attach labels to equipment and print an inventory list with the location, user, manufacturer, price, or any other information for each article. You can export this information to your spreadsheet to create bills of materials or to calculate costs for sites.

—Christina Wood

ClarisWorks Takes Integration to New Heights

ClarisWorks, the leading integrated Macintosh package, is now available for Windows. It offers a set of tightly woven office tools, including a word processor, a graphics package, a spreadsheet, and a database, that all work together so you can create documents with multiple elements in a breeze.

When you open ClarisWorks, you select one of the four modules. All the tools from the other modules are available from within your current document.

For instance, if you want to add a drawing or chart to a newsletter you're creating in the word processor, just select the appropriate button from a tool bar on the left side of the

document, and the menu bar at the top of the screen will switch to provide the drawing functions. When you're ready to resume typing, click on the text where you left off, and the menu bar will revert to its word processing orientation.

The \$249 package, available for \$99 through mid-August, enables you to perform basic desktop publishing functions. You can create multiple columns, but there's no automatic text wrapping or print preview. You can view margins, footnotes, headers, footers, and page numbers on your document as you enter them.

You can also use the drawing tools in the product's flat-file database to tailor the customiz-

ClarisWorks for Windows

WINDOWS Excellent integration among modules lets you access a variety of tools from within a single document.

Claris Corp.

408/727-8227
List price: \$249, \$99 through mid-August
Reader service no. 704

able interface by resizing and arranging fields or changing colors. You can also call on the spreadsheet tools to define fields as formulas. The product does not support Object Linking and Embedding (OLE).

—Anita Hamilton

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!



■ **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



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
Back-UPS 900	Multiple systems, longer runtime applications		\$599
Back-UPS 1250	Multiple systems, LAN hubs, small minis, telecom equipment		\$799

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(800)800-4APC, Dpt. P3

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Two Low-Cost Document and Image Management Solutions

Two new software products make it cheaper and easier to convert paper documents into electronic images that you can distribute via E-mail or PC fax programs. Watermark Software's Discovery Edition and Simplify Development's MailRoom for Windows are essentially add-ons that provide basic image management features that were previously available only as part of more complex, more expensive work-group applications.

Discovery Edition and MailRoom offer the basics. The products can compress scanned images to up to 1/10 their original size and include fast display technology, which speeds scrolling through images of multi-page documents. (Simplify Development claims its product displays images two to three times faster than other low-priced image viewers common on PC fax software products.)

Both products also have advanced image processing features, including scale-to-gray

technology, which improves the quality of the images that are displayed on screen.

Two Approaches

Discovery and MailRoom take different approaches to image management. Discovery, which costs \$1295 for a ten-user version, relies on Windows 3.1's Object Linking and Embedding (OLE) technology to embed pointers that tell an application where to find the compressed image of a document. The advantages of this technique are twofold. First, the product lets you attach images to any application that supports OLE. You can, for example, add scanned invoices or vendor correspondences to your accounts payable database or send the images to accounting via E-mail.

In addition, the pointers require only about 3K of storage per page of document, which further saves disk space. The savings add up on a network. For example, you could store a compressed document, say, a scanned magazine article about a prospective client, on the network server and send copies to associates over E-mail. This technique dramatically reduces network traffic and storage requirements because each copy contains only pointers to the document on the server.

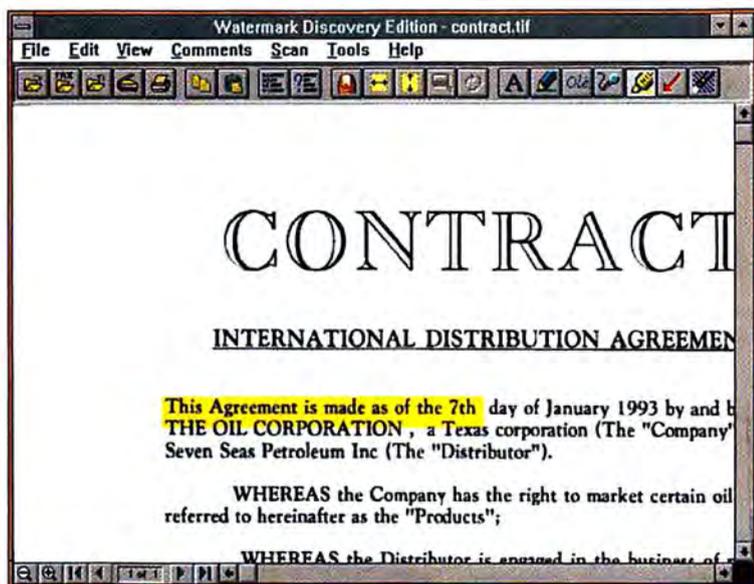
Discovery offers a variety of annotation features that let you add comments and highlight

portions of a scanned document. The product also includes some basic database features, such as ten searchable fields, which let you label and track your scanned documents.

The product's reliance on OLE has a darker side. Not all Windows products, such as the current version of cc:Mail, sup-

port scanned or faxed documents. The product costs \$995 for a ten-user license. MailRoom works with existing versions of popular E-mail packages, such as Da Vinci eMail, cc:Mail, and BeyondMail, and is expected to support WordPerfect Office 4.0.

One unique feature is the capability to convert docu-



WATERMARK DISCOVERY EDITION is an inexpensive way to convert paper documents into electronic images. The program lets you highlight portions of a scanned document and offers searchable fields for labeling and tracking documents.

port this technology. (The product works with Microsoft Mail and Beyond's BeyondMail.) In addition, OLE can be kludgy to use. To insert an image into an application, you must go several menus deep into that application, where you then fire up Discovery and locate the image.

You'll need to purchase a copy for each person on the network that you want to exchange information with.

E-Mail Add-On

Simplify Development's MailRoom for Windows is an E-mail add-on designed for those who simply need to circulate images

of scanned or faxed documents. The product costs \$995 for a ten-user license. MailRoom works with existing versions of popular E-mail packages, such as Da Vinci eMail, cc:Mail, and BeyondMail, and is expected to support WordPerfect Office 4.0. One unique feature is the capability to convert documents, whether images or files created with Windows applications, into MailRoom's Unidoc format. For example, a document containing a letter created with Ami Pro, a spreadsheet created with Excel, and a scanned image becomes an image that can be read by anyone with MailRoom. (With Discovery, the recipient would need a copy of each application to read the document.)

On the downside, MailRoom does not offer an annotation feature and can only be used to add images to electronic-mail and PC fax applications.

—Randy Ross

Watermark Discovery Edition, MailRoom for Windows

WINDOWS These two low-cost products bring document imaging to the masses.

Watermark Software Inc.
617/229-2600,
617/229-2989 (fax)
List price: \$1295 for a ten-user pack
Reader service no. 705

Simplify Development Corp.
603/881-4450,
603/595-0387 (fax)
List price: \$995 for a ten-user pack
Reader service no. 706

GET READY FOR

COLOR!

BY ERIC J. ADAMS



EVERY FEW YEARS the corporate world ups the ante. It redefines what it considers "acceptable" output for written communications.

At the dawn of the personal computer age, dot-matrix output was considered adequate. Several years passed before laser-printer output became mandatory. More recently, only documents with multiple fonts have passed the corporate test.

Today, there's a new document standard emerging, perhaps the most dramatic of all. It's color — provocative, bold, and persuasive color.

If you know the corporate world, you know standards aren't whimsically set. And there's good reason why color will succeed where other standards have failed.

Innovators in corporate departments (and not just graphics departments) have discovered that color makes their proposals more convincing, reports more memorable, and sales presentations far more compelling than ever. In short, they're finding that color makes people pay attention.

None of this is new, however. Brochure and magazine designers have long relied on the power of color to enhance their message.

DESKTOP COLOR

What *is* new is the technology that finally makes it easy and affordable to add *professional-quality* color to your communications without leaving your office and without becoming a color expert.

It's called desktop color, and it's poised to revolutionize the way we communicate on paper, transparencies, and slides.

Color emerges as the new corporate standard

Until recently, you needed a separate color copier, printer, and scanner to include color in your documents. But few workgroups could afford all these devices, and fewer still had the expertise to use them correctly.

Now there's a solution for those who want great color at an affordable price with little or no learning curve. It's the truly revolutionary CJ10 from Canon — the only complete, one-stop color solution designed and priced for the non-graphics professional, yet sophisticated enough for the graphics world as well.

MEET THE CJ10

The compact CJ10 lets you easily add color to your reports, proposals, handouts, transparencies, signs, maps, diagrams, schematics, illustrations, menus, layouts — you name it.

For starters, the CJ10 is a high-quality *digital* 400-dpi copier that utilizes state-of-the-art Bubble-Jet technology. The CJ10 gives you 16.7 million colors that leap off the page (check out the reviews). It pumps out a full-page color copy in about 90 seconds for about one-third the price you'd pay at a color copy shop. As a stand-alone copier, we think the CJ10 is the best low-volume color copier you can buy.

But the CJ10 is far more than a copier. When used with an optional Intelligent Processing Unit (IPU) and your computer, the CJ10 becomes a color scanner and printer as well.

Now you can scan in photos and illustrations for computer enhancement and manipulation. As a color printer, the CJ10 is virtually maintenance-free, and provides better colors than any comparable color printer we've seen.

Scan, print, manipulate, copy, all on the same desktop device — color has never been so easy. Plus you can make color copies from slides and film negatives, make transparencies, and even capture video using the CJ10 and optional equipment.

At a suggested list price of \$6,995 (\$9,695 with optional SCSI-interface IPU), the CJ10 is the first affordable, high-quality color solution for the office.

Please take a look at the benefits of the CJ10 and see how spectacular — and easy — color can be.

WHY COLOR?

Want to add punch to your message? Color helps you:

- Attract Attention
- Add Impact
- Highlight Critical Facts
- Clarify Complex Information
- Increase Retention and Recall
- Evoke an Emotional Response

The multifunction Canon CJ10 lets you easily copy, scan and print color documents from your desktop with professional results.

C O L O R Y O U R W O R L D

Putting color
and the Canon CJ10 to
work for you

IF YOU THINK you can benefit from desktop color, you're not alone. Already thousands of companies, workgroups, and individuals have put the multifunction CJ10 to work for them.

Law firms, for instance, are using the CJ10 to create and distribute evidentiary information in criminal and civil cases. And since the CJ10 is user friendly, attorneys and their assistants don't need special training to create color documents immediately.

Architectural and engineering firms are making heavy use of the CJ10 for job proposals and bid specifications. Since the CJ10 can scan as well as copy and print, these proposals include color photos, renderings, and sketches designed off-line, as well as illustrations created on a computer with a CAD or drawing program.

Banks and financial institutions are using the CJ10 to create highly-stylized financial reports and presentations for senior management, board members, and share holders. Presenters don't have to worry about using dated information, since charts, illustrations, and graphics can be updated and reprinted using the CJ10 and an Intelligent Processing Unit.

Contractors and developers have discovered that the CJ10 is a great way to put together winning bids, preliminary estimates, prequalification papers, and project management schedules. Color makes the complex look simple, and gives bids an award-winning look.

Developers also like the CJ10's ability to quickly reproduce photos for pre-development packets and post-presentation handouts.

Education departments, schools, and universities are putting the CJ10 to work in the classroom with color transparencies and hand-outs for class lectures. And the CJ10 is at work throughout campuses providing distinctive signs and posters for bulletin boards and student and faculty centers.

Insurance companies are speeding up the claims process by including CJ10-generated color photos and collision diagrams in adjuster reports. Meanwhile, sales agents are using the CJ10 to incorporate color flowcharts and diagrams in their presentation materials used to win over customers.

GRAPHIC PROOF

Graphic artists and designers have discovered the CJ10 as an inexpensive and easy way to output highly accurate color composites as a proofing device on four-color marketing and promotional materials.

Manufacturers are finding the CJ10 an accurate and reliable manufacturing tool. Many are using the CJ10 to create and duplicate technical documentation, workbooks, assembly instructions, and manuals for internal staff members and off-site contractors. The highresolution (400-dpi) output of the CJ10 ensures that important details are reproduced crisply and clearly.

Real estate brokers and agencies have increased sales by adding color photos and floor plans to property fliers, property fact sheets, and pitch books. High-impact color documents help attract potential buyers and convey a strong message of success and commitment to potential sellers. Best of all, the cost of reproducing color in-house is often far less than contracting the job to an outside printer.

Training firms are among the most enthusiastic about the CJ10. It allows trainers to develop, print, and duplicate training schedules, certificates, workbooks, instructor guides, transparencies, study reports, and course catalogs.

WHAT'S YOUR LINE?

Whatever you do, chances are there's a way to make it more exciting, expressive, persuasive, and compelling with color. To find out more about the versatile multifunction CJ10, contact your local Canon authorized CJ10 dealer or call 1-800-OK-CANON.

Whatever
you business,
color can
help you get
your message
across
with drama
and style.



Architectural



Manufacturing

VEHICLE DAMAGE REPORT

To be filled out by the driver of the damaged vehicle. Report the date, time, location, and circumstances of the accident. Attach photos if available.

Name of Insured: _____
 Policy Number: _____
 Is this being reported under your policy? Yes No

Call of Accident: _____
 Date of Accident: _____
 Driver's Name: _____
 Driver's License Number: _____
 Driver's Address: _____
 Driver's Telephone: _____
 Driver's Insurance Company: _____
 Driver's Insurance Policy Number: _____
 Driver's Insurance Agent: _____

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Insurance

NEW LISTINGS

Broker Information Sheet

Property Address: _____
 City: _____
 State: _____
 Zip: _____
 Phone: _____

Property Description: _____
 Price: _____
 Features: _____
 Remarks: _____

400 North Hayden Drive
 Redmond, Washington 98073

Real Estate

SHOW-STOPPING COLOR

WHEN DESIGNERS SET OUT to create the CJ10 they had two guiding principles: It should be easy to use, and it should deliver vibrant professional-quality color unlike anything else available at the price.

We at Canon believe the CJ10 has succeeded on both counts.

EASY AS PIE

The CJ10 is as easy to set up and use as a conventional copier or printer, and just as compact. The only replacement items are four Bubble-Jet cartridges, which contain all the important replacement components and are designed to be individually replaceable to keep the cost of consumables low.

All controls for the CJ10 are located on a front control panel that provides fingertip access to a full range of color functions, such as 50% to 200% Zoom in 1% increments, independent X/Y Axis Zoom, Photo and Color Balance, and multiple copies of 1 to 19.

The 90-sheet paper tray slides out for easy paper loading, and the CJ10 comes with a manual feed system for optional transparencies, label paper, or card stock. Warm-up time is only 10 seconds, so you don't have to keep the CJ10 running between jobs.

The CJ10 platen cover is double-hinged so you can copy directly from thick or bound materials, such as books and technical documentation. And the CJ10 is compact, just nine inches high, 21 inches long, and 19 inches deep.

The CJ10 automatically adjusts color balance for you, but if you want or need special control, you can easily lighten or darken each color and set contrast yourself, again with controls accessible from the front panel.

As a scanner, the CJ10 lets you choose scan resolutions from 72 to 400-dpi, and color depth from 8-bit gray

**Easy, affordable,
superb color from a multifunction
copier, printer, scanner**



The Canon CJ10 is designed to be virtually maintenance free, with Bubble-Jet cartridges that contain all the important components.

scale to 24-bit color. Printing is as easy, too. The CJ10 allows for automatic or manual color control from your computer's Color Control dialog box, and you can select up to 999 copies when printing.

All the optional equipment is designed with the same ease-of-use in mind.

VIBRANT COLOR

Whether copying, printing, or scanning, you'll find the color from the CJ10 simply outstanding. With 16.7 million *smudgeless* colors at 400-dpi, the CJ10 offers 33% greater resolution and twice the number of colors as comparable devices. In fact, the CJ10 meets many of the specifications for Canon's high-end Color Laser Copiers.

The secret of the CJ10 is the Bubble-Jet technology and design. Each Bubble-Jet cartridge (cyan, magenta, yellow, and black) contains 128 self-cleaning print nozzles.

The precise print heads and ink nozzles fire approximately 4,000 times *per second*, and are automatically cleaned each time you turn on the CJ10. These "intelligent" cartridges are designed to self-adjust when a nozzle temporarily clogs or misfires.

The CJ10 produces one full-color copy in approximately 90 seconds. To produce the best possible image, Canon supplies a family of coated papers, such as 8.5-inch-by-11-inch card stock, transparency film, label sheets and 5.5-inch-by-8.5-inch statement paper.

The CJ10 automatically detects text and overprints with black ink, giving you the best of both worlds — rich, vibrant colors and crisp, clean text.

For more information, or to test drive the versatile CJ10, contact your local Canon authorized CJ10 dealer or call 1-800-OK-CANON today.



With precise 400-dpi resolution and 16.7 million brilliant colors, the Canon CJ10 creates bold and realistic output.

EXPAND YOUR COLOR HORIZONS

With optional equipment, you can turn your Canon CJ10 into a professional color workstation. Clockwise from left to right: Canon CJ10 with an Intelligent Processing Unit, CJ10 Film Projector, CJ10 Intelligent Editor, and Video Adapter 10.

YOU CAN TRANSFORM your CJ10 into a full-fledged multimedia workstation with available optional equipment. Here are the major equipment options available for the CJ10. Look for more options from Canon in the near future.



■ **Intelligent Processing Unit (IPU) & IPU Kits** To use the CJ10 as a scanner and printer, you'll need an optional Intelligent Processing Unit (IPU) and an IPU Kit to match your computer's bus (Windows/AT® Bus or Windows/MCA Bus).

There are two IPUs available. The IPU SS connects via a SCSI port and includes 2Mb of memory for buffering data.

The IPU DG connects to a General Purpose Interface Board (GPIB) and includes 16Mb of memory.

The IPU and IPU kit include all you need to scan and print in full, high-quality color, and comes with a specially adapted copy of Aldus® PhotoStyler™, a Windows™ printer driver with advanced color adjustment controls, a SCSI Interface Card, SCSI Cable, and software for easy installation and testing.

Additional kits are available for Macintosh® computers.

■ **CJ10 Intelligent Editor** This remarkable device literally turns the CJ10 into an image-editing station. Its revolutionary pen-based interface lets you manipulate and enhance images in any number of ways before printing.

You can, for example, select a precise image area to be selected or deleted, reduced or enlarged. You can use the Intelligent Editor to change colors, or add or reduce color gradations.

The Intelligent Editor lets you combine two or more separate images onto the same page or divide a large original for printing in sections on 8.5-by-11-inch paper.

■ **CJ10 Film Projector** The film projector is designed for presenters who need a quick and easy way to produce hard copy from 35mm slides or negatives, or those who want to reduce turnaround time and costs associated with producing hard copy.

You can use the Film Projector in conjunction with the CJ10 Intelligent Editor to further manipulate or enhance images. The Film Projector's auto exposure and auto color adjustment ensures high-quality reproductions.

Optional equipment transforms the Canon CJ10 into a multimedia maestro

■ **Video Adapter 10** The Video Adapter lets you capture NTSC video images from a number of sources including VCRs, television monitors, video cameras, and still video products. By hooking the adapter to the CJ10 via the Intelligent Processing Unit, you can capture images to your computer's memory for later image retrieval and manipulation.

Discover the world of desktop color

WHEN IT COMES TO improving your presentations and written communications, nothing comes close to the power of color. The CJ10 is an easy-to-use desktop solution designed to deliver high-quality color at an affordable price.



A copier, printer, and scanner, the Canon CJ10 is the clear choice for all your color needs.

With the CJ10 and optional Intelligent Processing Unit you can copy, scan, and print color documents and transparencies, making it possible for the first time to bring the power of color to everything you do.

To learn more about the power of color and the multi-function CJ10, call your local Canon authorized CJ10 dealer or 1-800-OK-CANON.

Canon
CJ10
COLOR BUBBLE-JET COPIER

Windows is a trademark of Microsoft Corporation. AT is a registered trademark of International Business Machines, Inc. Aldus is a registered trademark and PhotoStyler is a trademark of Aldus Corporation. Macintosh is a registered trademark of Apple Computer, Inc.

©1993 Canon U.S.A., Inc.

Einstein E-Mail Lets You Delegate Your Messages

While heavy hitters like Lotus's cc:Mail and Microsoft Mail control the lion's share of the Windows E-mail market, they don't have a monopoly on innovation. Take Devont Software's Einstein Electronic Mail, for instance. The new Windows version of the program offers the same impressive features as its DOS counterpart, including the capability to route and send copies of incoming messages automatically, a chat mode so you can exchange text messages with your colleagues, a spelling checker, and more.

One particularly useful innovation is Einstein's message delegation feature. If you're out of town and want to forward your incoming E-mail to an assistant, for example, you simply select the Delegate field from your Einstein user profile and choose the recipient's name, and your messages will be routed to that person.

Einstein's auto-mirroring capability lets you copy another user on all your incoming messages—a nice feature if you're working closely with a colleague on an important project

and want to share information quickly. Like other E-mail programs, Einstein lets you attach files to messages, import text, and create public and private folders for your mail records.

Einstein's telephone message feature can help customer support supervisors and sales managers track phone activity by logging incoming messages to a special file. To do this, the recipient uses Einstein's phone message feature to route incoming messages so Einstein can simultaneously write them to the log file for viewing by a designated supervisor.

Einstein also has a chat feature that lets users exchange text messages in real time. When somebody calls you, Einstein signals you through a Windows dialog box that pops up over your application.



SMARTER E-MAIL: You can use Einstein Electronic Mail for Windows to route incoming phone messages. Einstein simultaneously writes these messages to a log file that you can review later.

Einstein Electronic Mail for Windows costs the same as its DOS sibling: \$499 for a site license, \$299 for 20 users, and \$249 for 10 users. Einstein has a

remote version for DOS, but the Windows remote version isn't scheduled to ship before the end of the year.

—Jeff Bertolucci

The Intelligent Answering Machine

The computer may never replace the company operator, but WenEver promises to be a good fill-in. This hardware and software combo turns your PC into a fax, E-mail, and voice messaging center that monitors the phone line around the clock. And it's as tight-lipped as the loyalest assistant.

While you're out of the office, callers send faxes to your office PC and leave E-mail and voice messages. If the incoming traffic is E-mail, WenEver screens it for viruses. Even though your office computer is turned on, WenEver's plug-in security card keeps local unauthorized people from accessing it.

You can call your WenEver-equipped PC to retrieve these

messages. To get voice messages, you call in on the telephone, using the touch-tone keys for retrieval. Using WenEver's communications program on a remote PC such as a laptop, you can call in and retrieve fax and E-mail messages. Forgot a spreadsheet or a half-finished memo? WenEver lets you download files from your office PC. In all cases, WenEver prompts you for a password.

The WenEver kit has a virus checker that screens all incoming data messages, a 16-bit expansion card that provides local security, a standard internal 9600/2400-bps fax-modem for the office PC, a pocket 9600/2400-bps fax-modem for your remote PC, communications

WenEver

Fax/E-mail/voice messaging center with remote file retrieval.

Wen Technology Corp.

914/347-4100,

914/347-4128 (fax)

List price: \$688, without

voice mail \$599

Reader service no. 708

software, and a modem-activated power supply that turns the PC on when an incoming call is detected and shuts it down when the call is done.

WenEver is available for \$688. Without the voice-mail option, the package lists for \$599.

—Bryan Hastings

Einstein Electronic Mail for Windows

WINDOWS Einstein enables you to automatically route incoming messages as well as send copies to other users.

Devont Software Inc.

409/321-3220,

409/321-3109 (fax)

List price: for unlimited users

\$499, for 20 users \$299, for

10 users \$249

Reader service no. 707

(EXCEPT PERSONAL CLOTHING).
supply packs, tents, and cooking gear, but not
ar. See enclosed packet for full details.
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See enclosed packet for full details.
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Drag-and-drop editing

You may join the tour at any time (cost is broken down by cou
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For example, we supply packs, tents, and cooking gear, b
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- ❖ ALL CLIMBING GEAR.
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We've includ
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casual travel. We hope you can join us - *it will be an adventur*

AUGUST

SUNDAY	MONDAY	TUESDAY	WEDNESDAY
		1 Leave New York for Paris	2 Rest one day at L'Hotel du Roi
6 Preparation	Lines and borders		9 Climb
13	14	15	16

Enclosed is the information you requested
Our specialty is *adventurous travel by foot*
will include climbs in France, Switzerland
planned itinerary for the trip.

You may join the tour at any time (cost is
However, we recommend that *to get the mos*
you should sign up for the entire excursi
care of **One-step formatting**

ALL OUTDOOR GEAR (EXCEPT PERSONAL CLOTHING)
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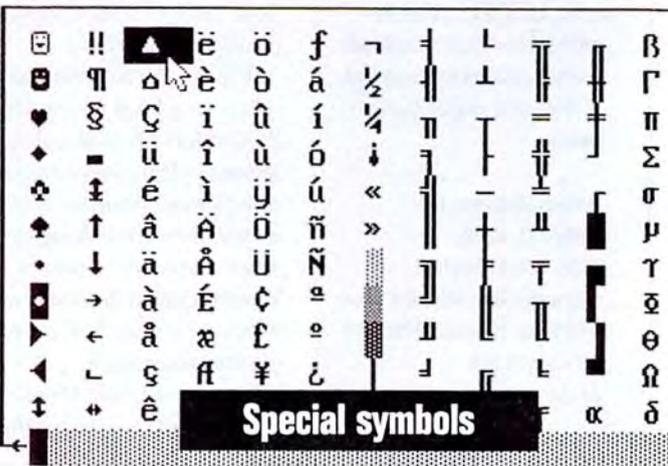
information you requested about EuroClimb!
adventurous travel by foot and this year's
y. Here is the planned itinerary for t

DATES	COST (U.S.)
AUGUST 1-14	2953
AUGUST 15-SEPTEMBER 3	2126
SEPTEMBER 4-13	1873
SEPTEMBER 24	473

Automatic tables

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Special symbols



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Microsoft®
Making it easier

SuperMac Spectrum/24

Folks yearning for high resolution, rich color, and low cost will like SuperMac's new line of Spectrum/24 graphics accelerator boards. Available in ISA, EISA, and VL bus versions, the Spectrum line accelerates 24-bit images at 1152 by 910 resolution—enough pixels to view two standard pages while using just 3MB of fast video RAM. The Spectrum/24 has a high 75-Hz refresh rate for flicker-free comfort, while SuperMac's proprietary graphics chip set is optimized for 24-bit operations to deliver rapid-fire performance. The boards cost \$999 each. SuperMac Technology, 800/334-3005, 800/541-7680 (fax).

Reader service no. 634

DisplayMate

When your monitor isn't adjusted right, your eyes hurt and your head aches. Something's wrong, but how can you fix it? DisplayMate is a software utility designed to pinpoint display problems and help you correct them. The program contains 100 diagnostic tests and 200 test patterns to uncover problems that lead to eyestrain, such as errors in color registration. When you attach a new monitor to your system, DisplayMate's setup test will adjust it properly and show if it suffers from poor screen quality. You can run the program's master test pattern each time you turn on your PC—useful for keeping your monitor properly tuned. DisplayMate's diagnostic tests probe further to uncover problems with video system performance and will even suggest repairs. The program comes with a manual that explains video technology. DisplayMate works with standard VGA (640

by 480 resolution) monitors and costs \$149. DisplayMate Professional works with super-VGA (1024 by 768) monitors and costs \$249. Sonera Technologies, 800/932-6323, 908/747-6886.

Reader service no. 629

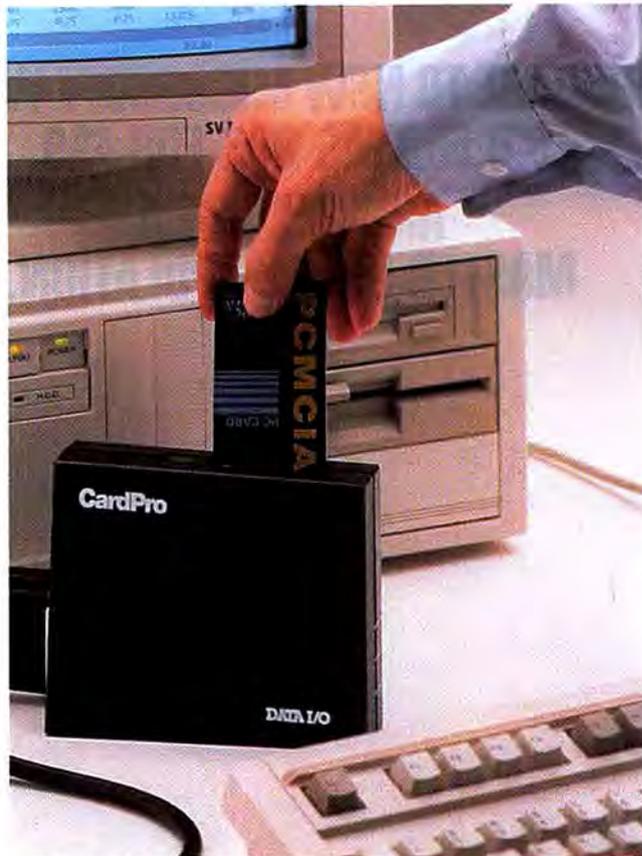
Data I/O CardPro

PCMCIA card slots are quickly becoming a standard component of notebook, subnote, and hand-held computers. If you use PC memory cards to store data, the Data I/O CardPro provides a faster way to transfer files between your portable and desktop PCs. It also acts as a universal data translator so you can read data stored on PCMCIA cards from a variety of notebook vendors. The CardPro comes in internal desktop and external versions. The internal unit fits in a standard 3½-inch drive bay, while the external connects to the parallel port and includes a pass-through connector for PCs linked to a printer. In addition to PCMCIA 1.0 and 2.0 standards, the CardPro supports Hewlett-Packard 95LX, Poquet PC, and Sharp 3000 card formats. The Data I/O CardPro external model costs \$450; pricing for the internal unit wasn't set at press time. Data I/O Corp., 800/332-8246.

Reader service no. 642

Fax Miracle

Sofnet offers a complete fax/data communications package for the astonishingly low price of \$129. The Fax Miracle bundle includes a fax-modem, fax software with optical character recognition, data communications software, a fax cover sheet program, and a personal information manager. The core of this package is Sofnet's own



THE DATA I/O CARDPRO offers a fast way to transfer files on PCMCIA cards between your portable and desktop PCs.

FaxWorks fax program, a Windows and DOS application that comes with optical character recognition for converting faxes into editable text. Smith Micro offers its QuickLink II data communications program, and Practical Peripherals provides its Mini desktop modem, a Class I fax-modem that sends faxes at 9600 bps, receives them at 4800 bps, and exchanges data at 2400 bps. T/Maker chips in with its FaxMania fax cover sheet software, and Futurus provides the same personal information manager found in its Team program. Sofnet, 404/984-8088.

Reader service no. 635

Micro Express ME 486VE/66

With VESA local bus, EISA, and ISA slots, the ME 486VE/66 is a high-end PC designed to

be an affordable graphics or engineering workstation. Powered by Intel's 66-MHz 486DX2 processor, this multibus machine comes with 8MB of RAM expandable to 128MB, a 256K secondary RAM cache, and a 300MB hard drive with a SCSI caching controller. It has one available VESA (VL) local bus slot; the second VL slot contains a Tseng Labs ET4000-based graphics card. The system also has two EISA and four ISA slots, as well as five drive bays. The small-footprint case is 14½ inches wide, 16½ inches deep, and 6½ inches tall—compact enough for any desktop. Need a LAN server? The 486VE/66 tower model has eight drive bays. Micro Express provides a 14-inch color monitor with a maximum 1024 by 768 resolution, 3½-inch and 5¼-inch

The Way All Other Works Software Forces You To Work.

Introducing ClarisWorks for Windows.

All works software claims to be integrated. But just try working with one. You'll find yourself switching back and forth from module to module. Cutting and pasting as you go. Back and forth. Back and forth. Endlessly.



"Instead of opening separate applications to create a worksheet and write a letter, ClarisWorks puts a single document on the screen."
PC Computing—March 1993

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Stewart Alsop's *P.C. Letter* said "If you want a glimpse of what the future holds look no further than ClarisWorks for Windows...the seamlessness with which a user can move from task to task suggests a new class of 'multifunctional' software."

PC Computing advised "If you're considering an integrated Windows program this is it...all the features of other integrated packages such as Microsoft Works for Windows...built around the best and most advanced user interface we've seen in this class of program." High praise indeed.

ClarisWorks requires a mere 2MB of RAM and 5MB of hard disk. Call today for a demo disk. Or take advantage of our \$99 introductory offer. And put the best integrated works software for Windows to work for you.

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In Canada, call 1-800-668-8948 ext 48. Available in Canada for \$119 CDN. *Offer valid only until 8/15/93. May not be used with any other special offer. ©1993 Claris Corporation. All rights reserved. Claris is a registered trademark and ClarisWorks and ClarisWorks 1.0 design and Simply powerful software are trademarks of Claris Corporation. All other trademarks or brand names are the property of their respective holders.

floppy drives, a mouse, DOS, and Windows. The ME 486VE/66 is \$2999. Micro Express, 800/989-9900, 714/852-1400.

Reader service no. 630

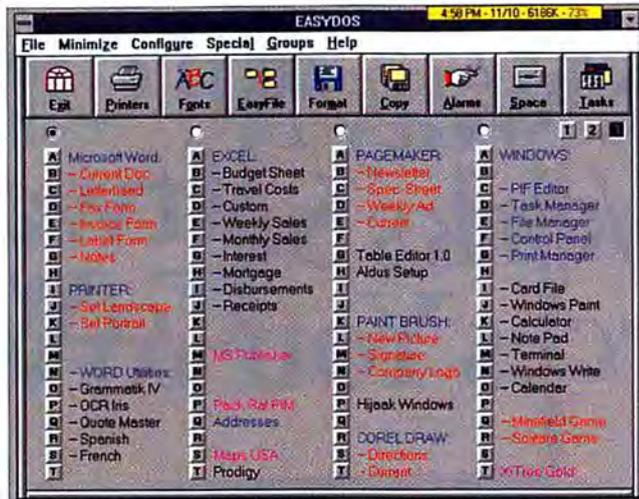
EZ-Drive

Simple name, simple mission. Micro House's EZ-Drive is an installation utility for anyone who frequently upgrades or replaces PC hard drives. Designed for the average user, EZ-Drive will perform all the tasks required to get an IDE drive up and running, according to the company. All you do is plug in the drive and load the program; EZ-Drive then sets the system's CMOS, partitions the disk (the program supports partitions of up to 2 gigabytes), formats for DOS, and transfers the operating system if you choose. EZ-Drive retails for \$39.95. Micro House, 800/926-8299.

Reader service no. 627

EasyDOS Menu for Windows 4.0

WINDOWS At some point in every revolution, counterrevolutionary forces rise up to defend the old order. The Windows revolution is no exception. Launching a direct assault against icons and all they stand for, MicroSeconds Int'l has introduced EasyDOS Menu for Windows 4.0, an upgrade to its Windows program and file manager. EasyDOS Menu replaces Windows' icon-based interface by converting Program Manager icons to menu choices. EasyDOS Menu's text-based interface lists up to 240 menu items on three screens. You scroll through the screens to locate applications and files; a mouse click or keystroke launches an application. Also included is EasyFile, a text-based file man-



EASYDOS MENU FOR WINDOWS 4.0 replaces Windows' Program and File Manager with a text-based interface.

ager. EasyDOS Menu for Windows 4.0 lists for \$49.95, inexpensive in military terms. MicroSeconds Int'l, 619/756-0765.

Reader service no. 626

Radius XGA-2 Color Graphics Card

OS/2 users who have been jealously watching the parade of Windows accelerator cards now have reason to celebrate, thanks to Radius's new OS/2 accelerator board. Built around IBM's XGA-2 chip, the XGA-2 Color Graphics Card has 1MB of video RAM, uses an ISA slot, and displays up to 65,000 colors at 800 by 600 resolution at a flicker-free 75-Hz screen refresh rate. The card displays a maximum 1024 by 768 resolution with 256 colors at 75 Hz. It costs \$499. Radius Inc., 800/227-2795, 800/966-7360 (fax).

Reader service no. 632

SLC/Now Upgrade Cards

Don't discard that 286-based PS/2! Kingston Technologies offers a series of IBM 386SLC and 486SLC2 processor upgrade cards that inject new life into PS/2 Models 50, 50C, and

60 Micro Channel PCs. The entry-level SLC/Now boards come in 20-MHz 386SLC and 25-MHz 386SLC versions. The top-of-the-line Kingston board sports the clock doubler 50-MHz 486SLC2 CPU. The 386SLC processor has 8K of internal cache; the 486SLC2 has 16K. Each board comes with an external math coprocessor on a daughterboard. By the time you read this, Kingston should also have an SLC/Now upgrade card for the AT-based PS/2 Model 30. The 20-MHz 386SLC board costs \$129, the 25-MHz 386SLC board \$235, and the 50-MHz 486SLC2 board \$425. Kingston Technologies, 714/435-2600.

Reader service no. 636

Speech Commander Power Users Kit for Windows

While low-end speech recognition products recognize single-word commands, Verbex Voice Systems' new Speech Commander Power Users Kit for Windows understands phrases—a more natural speech interface. It consists of Verbex's Listen for Windows software, a DSP-based coprocessor board, a

microphone, and a headset. After installing the board and software, you train Listen for Windows to recognize your voice by reading a list of words and phrases. Since each user must train the system before using it, Listen for Windows recognizes speech regardless of dialect or accent. Speech Commander's software and microphone are both optimized to ensure accurate recognition even in noisy business environments, according to company officials. Speech Commander retails for \$695. Verbex Voice Systems, 908/225-5225, 908/225-7764 (fax).

Reader service no. 641

Images Incorporated III

WINDOWS Images Incorporated III is an image compression and resolution enhancement product for Windows that uses fractal mathematics to compress images at an incredible 40- or 50-to-1 ratio. At this ratio, you should expect some loss of image quality but not enough to cause a problem for most business applications, according to the vendor, Iterated Systems. In addition, Images Incorporated III can increase the resolution of an image by using fractal mathematics to predict where pixels should be added. (Although this is a slow process, the alternative is to buy an expensive compression board.) The product uses OLE to perform compression and decompression in the background. Images Incorporated III lists for \$295; upgrades are available for \$95. Iterated Systems Inc., 404/840-0633, 404/840-0806 (fax).

Reader service no. 628

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

**RECENTLY,
SOME HAVE REFERRED
TO LOTUS 1-2-3
AS SOMETHING OF
A SLEEPING GIANT.**

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, and the new ways of working they demand, 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. It's much more powerful and productive. And it's the first spreadsheet that's actually designed to help people work together in impressive new ways.



sheet, it's a significant advance over Microsoft® Excel in usability.

THE FIRST CONTEXT-SENSITIVE USER INTERFACE.

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.

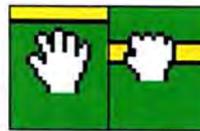
Since the features you need are always easy to find and remember, you won't spend time clicking

FEE. FI. F

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.



The open-handed mouse pointer closes when you grab the cell.

through menus looking for them. They're where you want them when you need them.

IMMEDIATE ON-SCREEN MANIPULATION.

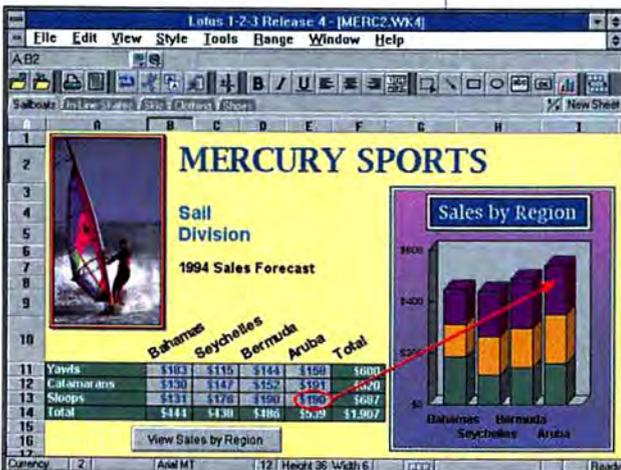
A **Live Status Bar** on screen shows the attributes of any highlighted element.



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

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 spread-



literally work *in* your spreadsheet. There's no need to go to the control panel. You can enter and edit any information right **in the cell.**

And you can go directly to any named range on any page simply by clicking on the name in the exclusive **Navigator** menu.

ONE-STEP CHARTING.

With **One-Step Charting**, you can pick up all titles, data, legends and axis labels right from the

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.

Sailboats / In-Line Skates / Skis / Clothing / Shoes

And Worksheet Tab names are then incorporated into formulas. All of which helps to keep 1-2-3's

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.

With DataLens® drivers for dBase IV®, SQL Server, Informix, OS/2® Data Manager, Paradox® and more (including ODBC support), 1-2-3 is the first spreadsheet that

O. FUM.

worksheet to create a great looking chart the first time, automatically. No need to launch into



some five step, semi-connected charting wizardry with its own

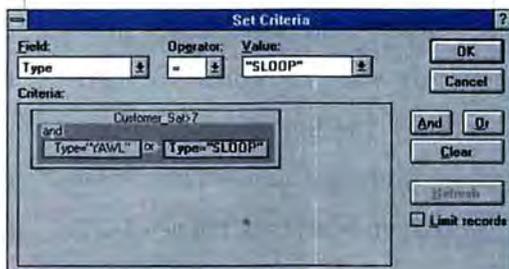
12 Height 14 Width 9

set of commands just to edit a simple chart. And you can edit the chart right in your worksheet because all elements can easily be selected and manipulated directly. And you can even choose from 256 colors.

unique 3D technology simple and easy to use.

DATABASE FUNCTIONS MADE EASY.

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



provides a completely integrated model for directly querying both on-sheet and external databases.

THE SMOOTHEST PATH FROM DOS TO WINDOWS.

If you're ready to make the move from DOS to Windows,™ 1-2-3 Release 4 is the way. It includes the traditional 1-2-3 ("V") **Classic® Menu** as well as complete file, style and macro compatibility with your DOS version.

And if you're networked, just turn the page and you'll see why the best spreadsheet for you is the only spreadsheet for your workgroup.

THE FIRST SPREADSHEET FOR WORKGROUPS.



With 1-2-3 Release 4, Lotus transforms the spreadsheet into the powerful workgroup tool people have needed.

integrate it into your work?

You use our innovative Version Manager,

that's how. Version Manager 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 in



take on even greater proportions. Besides utilizing the impressive workgroup power of Notes, there are specific Release 4 features that synergize to offer significant

IT'S NOT JUST A NEW VE

Combining the analytical power of 1-2-3 with workgroup features, users can now share spreadsheet insights and information and collaborate in ways never before possible.

VERSION MANAGER MAKES WORKGROUPS MAKE SENSE.

Ever forgotten why you used a particular number? Or wanted to track more than one value in a cell or range? Or suppose you've sent a spreadsheet to a co-worker who develops a whole new version and sends it back. How do you

ways that make sense to you. And it does it all without overwriting existing data.

In fact, whenever a new version is created, 1-2-3 automatically "stamps" the version with the user's name and the date and time it was created.

1-2-3 MEETS LOTUS NOTES. TOGETHER, THEY CHANGE EVERYTHING.

This is the way people ultimately want to work. Not just together. Concurrently.

If you have Lotus Notes,® the workgroup benefits of the new 1-2-3

business advantages. Here are just a few.

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.

Notes also features replication. This means that even if you're disconnected from the network while you travel, you can stay up-to-date and still participate fully in the spreadsheet sharing process



when you reconnect.

To maintain security and integrity, users can create access lists and grant varying privilege levels on a per-user basis.

And all this comes standard as part of the new 1-2-3 Release 4. No add-ons, customizations or new application development is necessary.

**WORKING TOGETHER
IN SUPPORT OF
INDUSTRY STANDARDS.**

1-2-3 R 4 supports object-linking

**A FEW OF
THE SPREADSHEET
ENHANCEMENTS
REQUESTED BY
OUR USERS.**

120 new @ functions (engineering, statistical, financial, calendar, informational, mathematical)
16 Designer Frames
256 color choices
64 fill pattern choices
250 new macro commands
Animated tutorial
AutoSave option
Center text over a range
Charting of 23 data points
Clean screen elements
Column, row and worksheet selection
Cross Tab
Customizable data fill
Define column aliases for database queries
Discontiguous range selection and charting

Pre-built dialog boxes for application development
Print range stored in print settings
Print to fit columns
Print to fit rows
Print to fit page
Print to fit chart
Print charts directly
QuickMenus
(context-sensitive right mouse-button menus)
Reads XLS spreadsheet files
Rotate cell contents up to 90 degrees (Send-SQL) macro command
Shared dictionaries (across Lotus apps.)
Shows file links in dialog box
SmartIcon bitmap editor
Spell checker
Style gallery containing predefined style templates
Text wrap in edit line
True on-sheet draw layer
Vertically centers text within a cell
Windows-common dialog boxes
Wraps multiline text in a cell
"+" or "=" sign to start a

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and embedding technology for both clients and servers. This enables users to display data from a 1-2-3 spreadsheet into any OLE client application such as a word processor or presentation software. 1-2-3 also complies with VIM and MAPI standards so it works with cc:Mail,[™] Lotus Notes or any other VIM- or MAPI-compliant mail system installed on your computer. So you can send a worksheet, a range or an entire file as an e-mail message to another user.

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Easier computed columns and rows
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Escape from Help
External connections stored with query
Fill down, fill right
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Group draw items
Help icon in dialog boxes
Icons in page setup
Interactive print preview
Justify labels and values left, right, center
Keyboard shortcuts
Long prompt text feedback in title bar
Lotus shared dialog box editor
Macro buttons on sheet
Named SmartIcon sets
New chart types
Numeric format WYSBYGI dialog box
Numeric up/down "clicker" on number fields
Partial insert/delete of rows and columns
Post selection from all range controls

formula automatically
Converts to "@" formula
@ function arguments supplied
(A more detailed list available on request.)

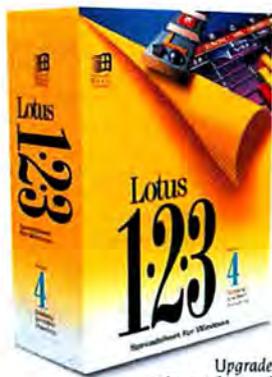
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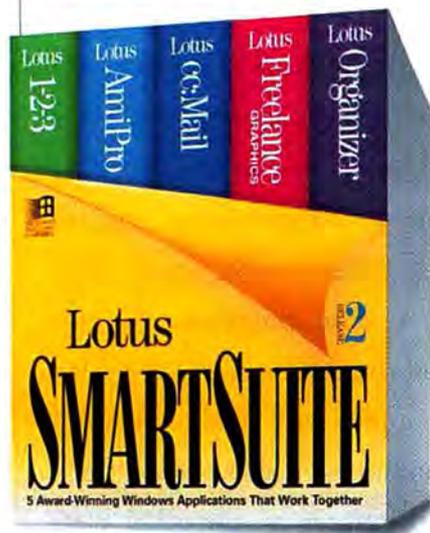
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Over the Counter

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

n/a = not applicable

386-class desktop PCs

	Configuration			National	
	CPU/speed (MHz)	RAM (MB)	Hard disk (MB)	List price	Average street price
ALR Flyer SC 3/33s	i386SX-33	2	170	\$1268	\$1134
AST Bravo 3/33s	AMD386SX-33	4	120	\$1495	\$1381
AST Power Premium 3/33 ¹	i386DX-33	4	210	\$3360	\$2891
DECpc 333sx LP	i386SX-33	4	52	\$1399	\$1399
HP Vectra 386/33N	i386SX-33	4	80	\$1898	\$1685
IBM PS/ValuePoint 325T	IBM386SLC-25	2	80	\$1339	\$1339

486SX-class desktop PCs

ALR Flyer SC 4/33s	i486SX-33	2	240	\$1568	\$1431
AST Bravo 4/33s	i486SX-33	8	213	\$2360	\$2183
Compaq ProLinea 4/25s	i486SX-25	4	240	²	\$1765
CompuAdd 433S	i486SX-33	4	200	\$2285	\$2285
Epson America Progression 486SX/25	i486SX-25	4	240	\$2538	\$2250
Gateway 2000 4SX-33	i486SX-33	4	170	\$1495	\$1495
IBM PS/2 Model 85 XP 486 ³	i486SX-33	8	212	\$4739	\$4327
NEC Image 425	i486SX-25	4	170	\$2468	\$2260
ZDS Z-Station 433Sh	i486SX-33	4	200	\$2203	\$2203

486DX-class desktop PCs

AST Bravo 4/66d	i486DX2-66	8	210	\$2660	\$2422
Compaq ProLinea 4/33	i486DX-33	4	340	²	\$2271
DECpc 466d2 LP	i486DX2-66	8	245	\$2949	\$2949
Dell 466/M	i486DX2-66	8	320	\$3249	\$3249
Gateway 2000 4DX2-66V	i486DX2-66	8	340	\$2895	\$2895
Hyundai 466D2	i486DX2-66	8	360	\$2995	\$2995
IBM PS/ValuePoint 433DX	i486DX-33	8	120	\$1989	\$1989
Insight 486DX2-66	i486DX2-66	4	210	\$2199	\$2199
NEC Image 466	i486DX2-66	4	340	\$3448	\$3007
Zeos 486DX-33	i486DX-33	8	245	\$2095	\$2095

Portable PCs

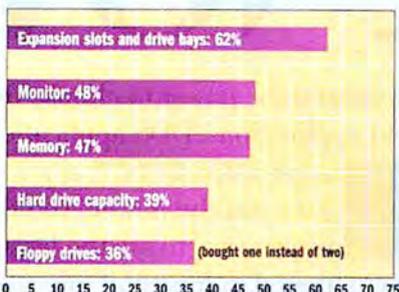
AST PowerExec 3/25SL	i386SL-25	4	60	\$2099	\$1916
Compaq Contura 3/25	i386SL-25	4	120	²	\$1675
Compudyne 386SL/25 Notebook	i386SL-25	2	80	\$1499	\$1499
Dell 320SLI	i386SL-20	2	80	\$1699	\$1699
Gateway 2000 Nomad 450DXL	i486DX2-50	8	200	\$2995	\$2995
HP 95LX	NEC V20-5	1	n/a	\$799	\$574
Hyundai Courier Spectra	Cx486SLC-25	4	120	\$2699	\$2699
IBM ThinkPad 700	IBM486SLC-25	4	80	\$2750	\$2628
NEC UltraLite SL/20	i386SL-20	2	80	\$1699	\$1439
Swan 486SLC/25 Notebook	Cx486SLC-25	2	80	\$1699	\$1699
Ti TravelMate 4000WinDX	i486DX-25	4	120	\$3299	\$2836
Toshiba T3300SL	i386SL-25	2	80	\$2299	\$2057
Toshiba T4400C	i486SX-25	4	120	\$3999	\$3637
ZDS Z-Note 325Lc	i386SL-25	4	120	\$3368	\$3368

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.

¹Uses EISA bus. ²No price available. ³Uses MCA bus.

PC Buyers' Lament

The components buyers most regret skipping on



Within six months of purchase, more than 60 percent of PC buyers wish their systems were more upgradable, according to a study by Channel Marketing, a Dallas research and consulting firm. Buyers wary of bottom-line costs are skipping on expansion space and memory when they purchase PCs and kicking themselves later, says Channel president David Goldstein. He recommends buying as much RAM and hard drive space as you can afford. Thanks to price wars among disk drive manufacturers, storage space may be more affordable than you think.

Source: Survey of PC buyers by Channel Marketing Corp.

Hard Drive Prices Plunge

What PC vendors pay per hard drive in quantities of 10,000 or more



In a battle for market share, the five largest drive makers, including Conner and Seagate, have slashed their prices for PC vendors. As a result, PC vendors can offer large hard drives to consumers without raising prices. Smart shoppers should insist on a PC with a 200MB or bigger hard drive, says Seth Traub, a storage market analyst at market research company International Data Corporation. Traub expects the wars to continue until first quarter 1994, so even more PC vendors may be able to increase hard drive capacity without hiking prices.

*Projected Source: International Data Corp.

Now's

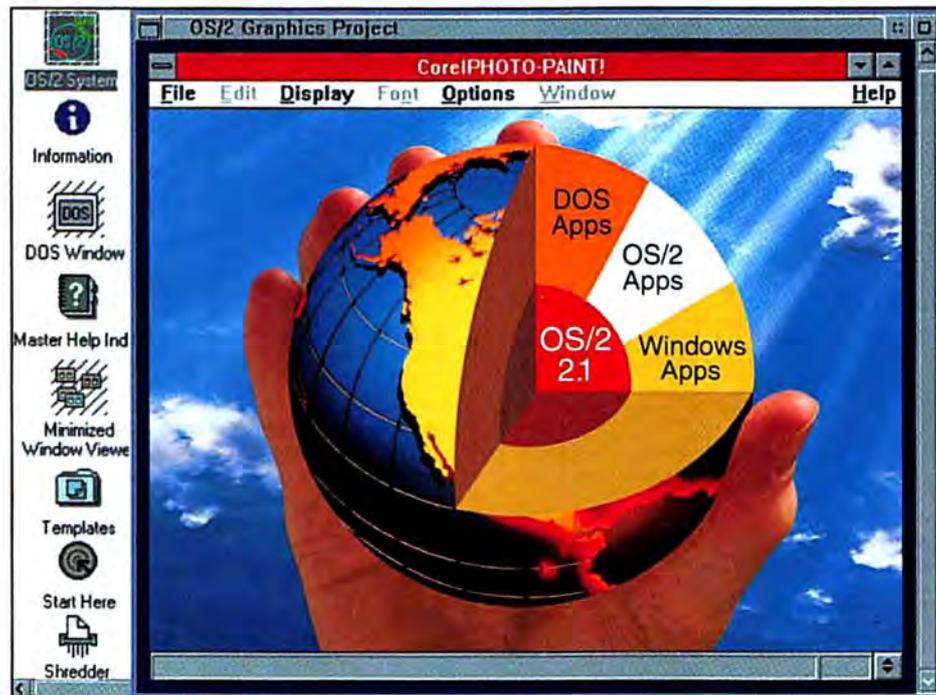
your

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.

Portable users will be glad to know that OS/2 2.1 provides industry-standard Advanced Power

▼ *With OS/2 2.1 at the heart of your PC, you can run a world of DOS, Windows and OS/2 applications.*



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

Management (APM) support, to help extend battery life. We've made the cursor larger so it's easier to find your place on the screen. And

OS/2 2.1 continues to exploit the very latest in technology. You'll find improved support for multi-media applications and pen-based capabilities, along with built-in CD-ROM support and AS/400® terminal emulation.

Of course, OS/2 2.1 still gives you true pre-emptive multitasking, superior OS/2 Crash Protection™ and the easy-to-use object-oriented Workplace Shell™ interface. All the features that made Version 2.0 an award-winner. But now, you also get a whole new world of possibilities.



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Demand OS/2 2.1 preloaded on your next PC.

to run

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OS/2 2.1 Advantages

Improves productivity

- Now runs OS/2, DOS and new Windows 3.1 applications.
- New TrueType fonts, Windows applets, File Manager.
- Advanced Power Management (APM) support extends battery life for portables.
- OS/2 Crash Protection and pre-emptive multitasking.

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- Now also available on CD-ROM.
- Object-oriented Workplace Shell interface.

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- Supports CD-ROM, PCMCIA and pen technologies.

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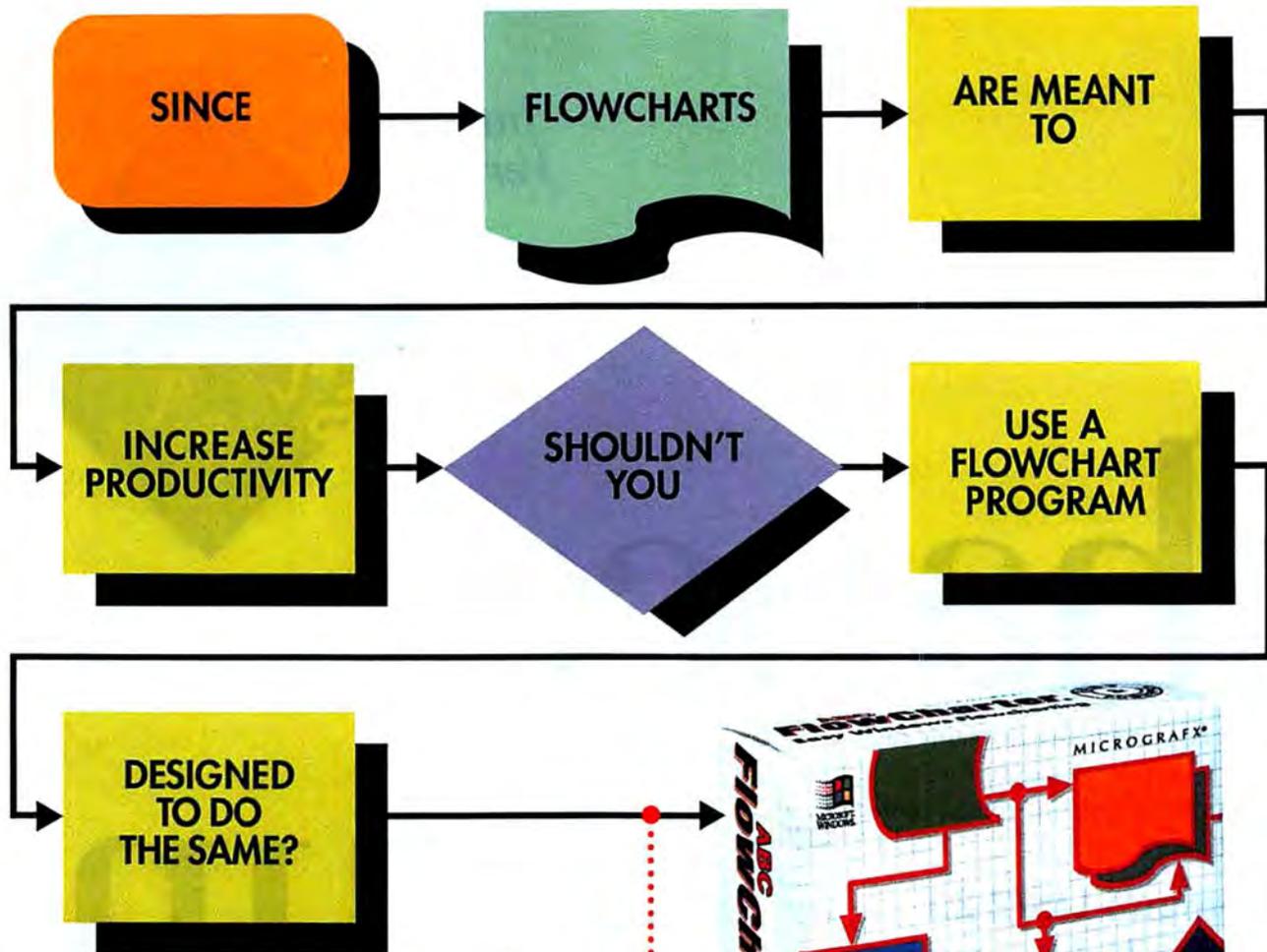
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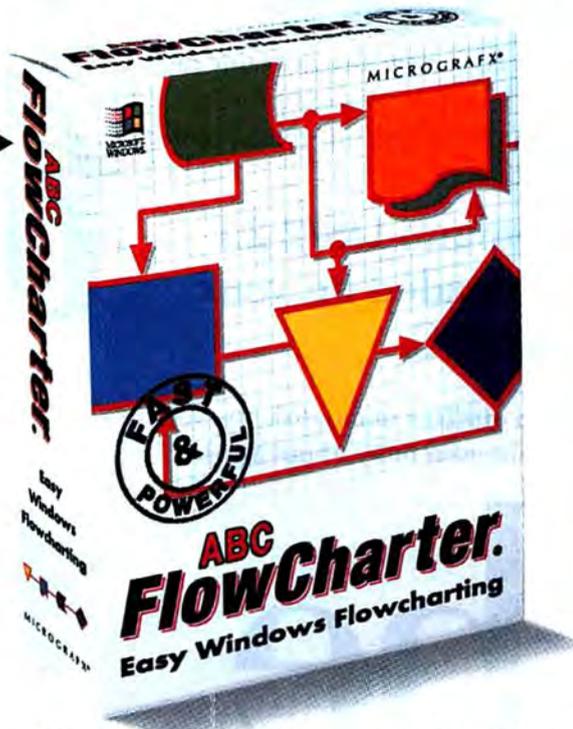


Circle 127 on reader service card



Fast and efficient. That's the best way for work to flow through your company. It's also the way ABC FlowCharter® for Windows® helps you create dramatic process charts and work flow diagrams.

ABC FlowCharter equips you with specialized tools that other drawing and business graphics programs lack. Like multiple application-specific



manual linking of shapes. Text can be edited right on the charts, in a variety of fonts and sizes. All this laid out in a format that's simple to learn and quick to use. Even if you run across any questions, our friendly telephone support line is available 24 hours a day, every weekday (U.S. only).

If you want the only program designed specifically to make flowcharting fast and easy, what's the next step? Simply call and find out more about ABC FlowCharter at 1-800-326-3573 or see your local software dealer.

FEATURE	ABC FLOWCHARTER® 2.0	VISIO™ 1.0	HARVARD GRAPHICS® FOR WINDOWS 1.0
Steps necessary to connect 2 shapes	2 clicks & 1 drag	4 clicks & 4 drags	Not available
Adding connect point to a shape	Click on shape picture in dialogue box	Calculate coordinates, enter in spreadsheet	No
Automatic line routing	Yes	No	No
Line snaps to either other lines or shapes	Yes	No (shapes only)	No
Time to link 20 rectangles	30 seconds	119 seconds	Not available
Customer support	Unlimited	90 days	Unlimited
Multipage Charts	Yes	No	No

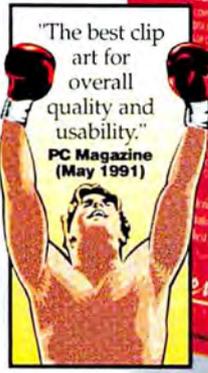
palettes of shapes as well as the option to incorporate clip art or scanned images into charts. Our automatic shape linking feature saves considerable time over other "intelligent" programs, which require

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FOR DOS & WINDOWS APPLICATIONS!



PRESENTATION TASK FORCE CLIP ART KNOCKS OUT THE COMPETITION!

For quality and value, there are **NO** contenders!

If you're looking for a comprehensive collection of high quality clip art that can be used with over 60 DOS, Windows and OS/2 business applications (see sidebar) ... consider Presentation TASK FORCE 4.0.

PTF 4.0 is the **ONLY** clip art library to give you 3,500 full-color CGM images in a MASSIVE, all-in-one collection. At only \$199.00, PTF 4.0 is widely recognized as today's best clip art value. Smaller collections, with far fewer images can cost you hundreds (often thousands) of dollars more!

And that's not all! PTF 4.0 includes a **FREE "Color to B&W" Conversion Utility** (\$59.00 value) that allows you to optimize PTF color files for dynamite-looking output on b&w printers.

Short on hard disk space? No problem. PTF images are uncompressed, and can be accessed directly from floppy

disks. Install the complete collection, or any combination of individual image categories to your hard disk. You decide!

It's unanimous! Presentation Task Force 4.0 delivers a powerful one-two combination of both quality and value, making it the undisputed heavyweight champion of the clip art world.



"Outstanding value & excellent art to boot! ...by far the best value of all the clip art libraries we reviewed."

PC Computing (May 1992)



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- HARVARD GRAPHICS FOR WINDOWS
- HJAAK
- HJAAK FOR WINDOWS
- HOLLYWOOD
- LOTUS 1-2-3
- MICROSOFT EXCEL 4.0
- MICROSOFT PUBLISHER
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- WINDOWS DRAW
- WORDPERFECT 5.0, 5.1, 6.0
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Circle 177 on reader service card

Edited by
Christina
Wood,
Michael
Desmond,
and
Steve Fox

The PC is a stubborn creature.

It demands you adapt to its idiosyncrasies. But with the right tools, you can make the PC bend to your will. To help you master the machine, we've assembled a collection of tricks for working in Windows and DOS. We scoured the on-line services, polled our readers, and bribed our contributing editors and authors to reveal state secrets. The results follow—a compendium of essential handy hints. We've even included a passel of hot-off-the-press tips for the shiny new DOS 6.0.

FOR WINDOWS AND DOS

TIPS



Keep
pace
with the
non-stop
demands of
business—
work smarter
with
Windows
and DOS.



WINDOWS TIPS

1 Saving That ProgMan Look

To keep Program Manager window size and placement and the arrangement of its open and closed groups consistent from session to session, it's a good idea to leave **Options**•**Save Settings on Exit** unchecked. But what do you do when installing a new program creates a new program group and spoils your setup, or you want to make other changes—resizing, repositioning, minimizing, or maximizing groups, for example? Just hold down the **<Shift>** key and close Program Manager. It won't actually close; instead it saves its current setup. This tip works for File Manager, too. —Van Wolverton

2 Skip Around the Window

Tired of clicking your mouse to select program icons? Windows has keyboard equivalents for *everything*, and using them is often faster. In a Program Manager group, for example, select a program by typing the first letter of the icon's name. Want to jump to the Cardfile icon in your Accessories group? Just move to the Accessories group (see Tips 4 and 5) and press **C** until Cardfile's

selected. (Each press moves you to the next most recently selected icon whose description begins with *C*.) Press **<Enter>**, and the program launches. Easy, quick, and mnemonic. —Robert Luhn

3 Launch Applications Minimized

Save time by loading a bunch of applications all at once, but minimized. In Program Manager, hold down **<Shift>** and double-click each application icon. All your programs will load as minimized icons. Some applications ignore this trick, but most will cooperate. To get to one of the minimized apps, hold down **<Alt>** and press **<Tab>** until it's highlighted. —Daniel Tynan

4 Cycle Through the Program Groups

If you're a fan of the keyboard or just hate to use a mouse with your laptop, here's a tip for moving around the Windows desktop. In Program Manager, you can jump back through the most recently used program groups by holding down **<Ctrl>** and pressing **<Tab>** until the desired group is highlighted. If you jump past the group you want, hold down **<Shift>**•**<Ctrl>** and then press **<Tab>**. Press **<Enter>** to open a minimized group. —Steve Fox

5 Keep the Program Groups Down

I find the easiest way to move from group window to group window in Program Manager is to select **Window** and click on the name of your program group in the dropdown menu. This works if you keep the number of groups down to nine or fewer. If you have more than nine groups, you have to choose **More Windows** to bring up a second menu, which makes using this method a hassle. When a newly installed application creates its own program group, drag its icons into an appropriately named existing group and delete the one the app's installation created. —Lincoln Spector

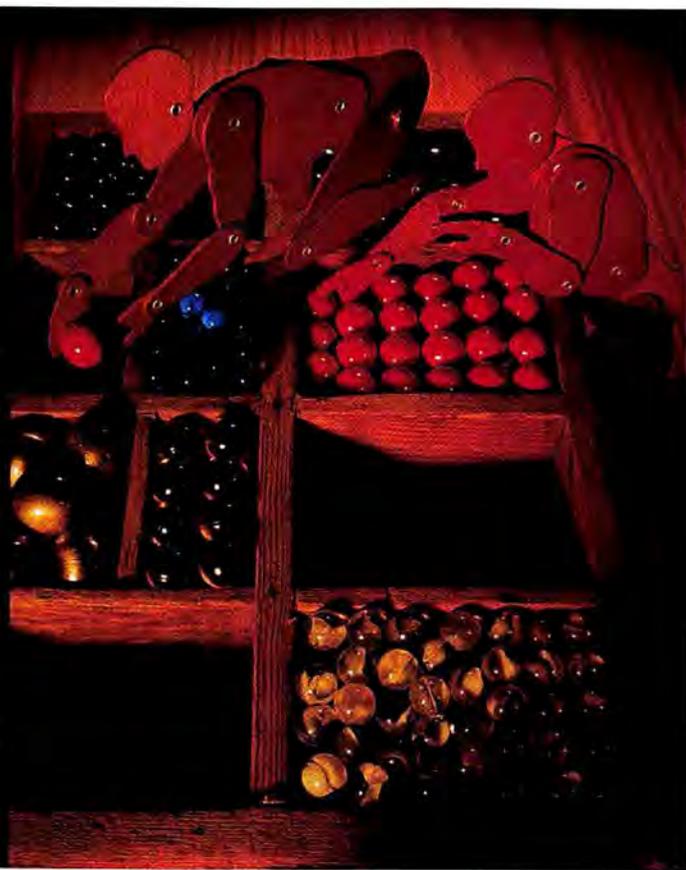
6 Stuffing Icons Into Program Manager

To jam more icons in Program Manager's groups, choose **File**•**Run** and type **WIN.INI** in the Command Line box. Under the [Desktop] section of the WIN.INI file, enter the line **IconVerticalSpacing=** followed by a number, for example, **44**. The number after the equal sign is the number of pixels Windows places vertically between icons. A value of 44 will jam icons up against the titles above them, while a value of 66 leaves room for wrapped titles. While you're there, you can also adjust the value in the **IconSpacing** line, which controls the icons' horizontal spacing. Then save the file. To keep an icon's name from bumping into the icon below it, click it once, press **<Alt>**•**<Enter>**, and shorten its description. (You can do the same for minimized groups.) For example, 'MS DOS Prompt' shortens nicely to 'DOS'. To apply your icon spacing to program icons, make sure **Options**•**Auto Arrange** is checked, then exit and restart Windows. To apply that spacing to group icons, too, select a minimized group and select **Window**•**Arrange Icons**. If you don't have **Options**•**Save Settings on Exit** checked, use Tip 1 to save the placement of your group icons. —S. F.

7 Consistent Control Panel Exits

If you're used to exiting programs with a quick **<Alt>**•**F**•**X**, Control Panel's **<Alt>**•**S**•**X** probably drives you nuts. Here's how to make Control Panel conform. First, make a backup copy of **CONTROL.EXE** in your **WINDOWS** directory. Then, in Write (not Notepad), open **CONTROL.EXE** and click **No Conversion**. Select **Find**•**Replace**, type **Settings** in the Find What text box, tab to the Replace With box, and type **&Filesets**

Orderly and accessible resources help you get the most from your PC, without complications or compromise.



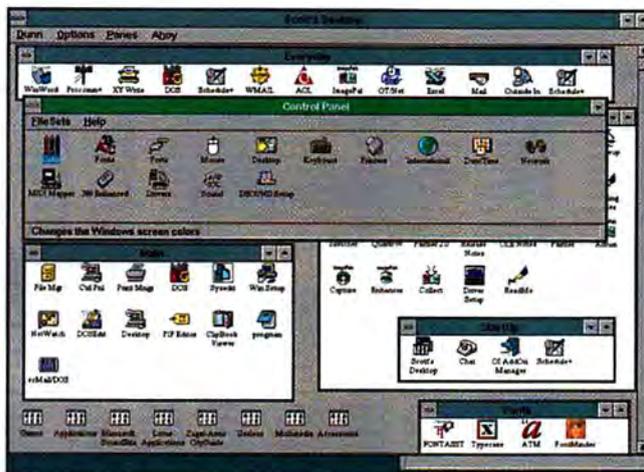


FIGURE 1: PERSONALIZE WINDOWS TO THE MAX—rename Program Manager and alter its and Control Panel's menus and menu keys.



FIGURE 2: WINDOWS' SCREEN SAVER CAN LOCK YOUR COMPUTER and tell your associates where you are when you're not at your desk.

or any eight-letter word beginning with *F*. And don't forget the ampersand: It tells Windows that the next letter is to be used to select that menu (as in **<Alt>F**) and is to be underlined. Click *Replace All*, save the file, and exit. The next time you're in Control Panel, you'll be able to exit it with a conventional **<Alt>FX**. —Scott Dunn

8 Personalized Program Manager

Altering Control Panel is all well and good (see Tip 7), but if you really want to feel comfortable in Windows, put your personal touch on Program Manager. First, from File Manager, select *Program.exe* in your WINDOWS directory and drag it into your StartUp group in Program Manager to create an icon. Click once on the icon, press **<Alt><Enter>**, and in the Description text box, type something like *Scott's Desktop*. Now make a backup copy of PROGMAN.EXE, open the original file in Write, and click *No Conversion*. Select *Find•Replace*, and in the Find What text box, type **&File**. Tab to the Replace With text box and type any four characters (which can include spaces anywhere in the string) plus an ampersand (&) before one letter (the letter for menu activation). Click *Replace All* and repeat the process, if you'd like, for **&Options**, **&Window**, and **&Help**, making sure all your replacements have the same number of letters as the original. Save the file and exit. When you restart Windows, you'll have a Program Manager like no one else's. —S. D.

9 Direct Line to Control Panel

Many people prefer **<Alt><Tab>** to **<Ctrl><Esc>**'s Task List for switching between programs. If you're a member of this camp, why not put **<Ctrl><Esc>** to use for something else—such as launching Control Panel. In Program

Manager, select *File•Run*, type **SYSTEM.INI**, and press **<Enter>**. Add the line **TASKMAN.EXE=CONTROL** below the [boot] section. Save the file, exit Windows, and restart. Now press **<Ctrl><Esc>** or double-click the desktop background, and Control Panel comes right up. —Anne Desmond

10 Instant Screen Saver

Here's how to launch a supplemental screen saver from a hot key that password-protects your computer and tells your co-workers where you are. In Program Manager, choose *File•Run* and type **WIN.INI** to load your WIN.INI file into Notepad. In the [windows] section, add a space and **scr** to the list of file extensions following 'Programs='. Save the file, then quit and restart Windows. From a program group, choose *File•New* and click *OK* to create a new program item. In the Description text box, type **Lunch Screen Saver**. In the Command Line text box, enter **SSMARQUE.SCR /S**. Pick a shortcut key combination, say, **<Alt><Shift>-S**, and click *OK*. Now you need to create a second icon to edit the text of your screen saver. Hold down **<Ctrl>** and drag your newly created icon elsewhere in the program group to create a copy. Press **<Alt><Enter>** and type **Edit Screensaver** in the Description box. Delete the **/S** from the Command Line text box, change or delete the shortcut key, and click *OK*.

Now double-click your Edit Screensaver icon. In the Text box, type your message. Check the Password check box and click *Set Password*. Type a password as prompted and click *OK*. Click *Format Text*, increase the font size, and choose a color. Click *OK* twice to get back to Program Manager.

From now on, when you want to edit your message, all you have to do is launch Edit Screensaver and type a new message in the Text box. To activate your screen saver, hit your screen saver hot key. This screen saver will run only when you type its hot key; your regular screen saver will work as usual. —Rodney Bayron

11 Slash Through File Manager

If you want to clean house from File Manager, a humble pair of keys can save time and effort. To select all or some of the files in a directory (to delete them, save them, or back them up), click on the desired directory, select *View•By File Type*, type an appropriate mask (***.DOC**, ***.BAK**, or ***.***, for example) and/or check or uncheck the File Type boxes, press **<Tab>** to get to the file pane, and then press **/**. If necessary, you can click a selected file to deselect it or press **** to deselect all of them. —Michael Desmond

12 Put a Gag on File Manager

If you do a lot of file maintenance—deleting, moving, and copying—you're probably sick of File Manager insulting you with those condescending 'Confirm File Delete' messages even after you've looked at the file name and clicked *OK*. Here's a way to squeal File Manager's nervous whining. From File Manager, select *Options•Confirmation*. Uncheck the File Delete, Directory Delete, and File Replace check boxes (or any combination of these that suits you). Click *OK*. If you don't want to be harassed every time you drag a file between directories, uncheck the Mouse Action box. Now

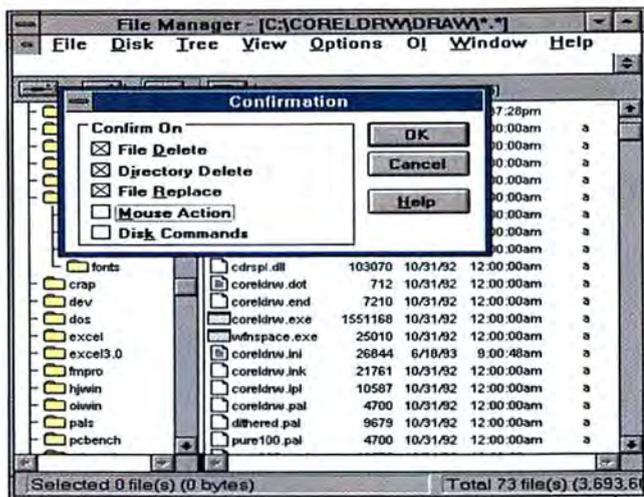


FIGURE 3: TURN OFF THOSE ANNOYING CONFIRMATION PROMPTS from File Manager's Options menu.

when you delete or move files and directories, File Manager will just do it. —D.T.

13 Setting the Stage for Drag and Drop

It's handy to drag files—whether data or executables—from File Manager into Program Manager to create a program icon. It can be tricky, though, to get both File Manager and Program Manager properly arranged on the screen. To make it easy, click (in File Manager) on the file you want to drag; press **<Ctrl>-<Esc>** to bring up the Task List dialog box; and click the *Tile* button, which will arrange all your open, unminimized applications in nonoverlapping windows. Now it's easy to drag the file into any Program Manager group. —R. L.

14 Copying Without Icons in File Manager

Dragging and dropping in File Manager is a great way to copy or move files—if you can see them. But if you're currently looking at the destination directory, then opening a new directory window, scrolling through it to find your file, and dragging it is the slow route. The solution: Highlight the destination directory and press **<F8>** to copy or **<F7>** to move a file. In the resulting dialog box, press **<Shift>-<Tab>** to move to the From box, and type in the path and name of the file you want to copy or move. Leave the To box blank and press **<Enter>**. —L. S.

15 Control Freaks' Guide to Windows

Mice are nice on a desktop, but on a laptop they can be maddening. Here are a few tips to mouseless Windowing: Usually, **<Ctrl>-C** copies selected text and other items to the

Clipboard, **<Ctrl>-X** deletes the selection and copies it to the Clipboard, **<Ctrl>-V** pastes in the contents of the Clipboard, and **<Ctrl>-Z** undoes the last action. **<Ctrl>-<F4>** closes a file, **<Alt>-<F4>** exits a program, and **<Ctrl>-<F12>** brings up the File•Open menu. For more mouse-free morsels, see *Instant Reference Card*, January 1993. —John Goddard

16 Do-It-Yourself StartUp Groups

Different tasks require different programs. Wouldn't it be nice if Windows automatically loaded only the programs you needed each day? It can.

Say your work falls into two main categories: finance and presentations. First, make an archive of your regular StartUp group: In File Manager, highlight *startup.grp* in the WINDOWS directory, and select *File•Copy*. Type ***.PRM** in the To text box and click *OK*, and you've created a permanent version of your normal StartUp group.

Now, in Program Manager, hold down the **<Ctrl>** key (to move instead of copy) while dragging the icons of all the applications associated with finance—for instance, a spreadsheet, a statistics package, and an accounting application—into the StartUp group. Then delete the StartUp group icons of apps you don't need started for finance. Return to File Manager, highlight *startup.grp*, press **<F8>**, and type ***.FIN** in the To text box. Click *OK*, and your finance StartUp group is ready.

To build the presentations StartUp group, delete all the icons in the finance StartUp



FIGURE 4: CALL UP THE TASK LIST FROM WITHIN FILE MANAGER and click *Tile* before trying to drag a file into Program Manager.

group and copy all the icons associated with presentations into it. In File Manager, select *startup.grp*, press **<F8>**, type ***.PRS** in the To text box, and click *OK*.

Type the batch file in **FIGURE 5** into Notepad or any text editor. Save the file as **W.BAT** in a directory in your PATH statement. Now, whenever you type **W** and press **<Enter>** at the DOS prompt, you'll launch Windows. Type **W FIN** and press **<Enter>** to launch Windows and auto-load your finance StartUp group; type **W PRS** for presentations. To make this tip work for your own scenario, substitute the file extension of your choice for PRS and FIN and replace the occurrences of PRS and FIN with the command you want to type to launch Windows. Also, if you make changes to a group, be sure to copy its GRP file to its respective (PRS or FIN, for example) STARTUP file. —M. D.

17 Active Program Manager

When you auto-start programs by putting their icons in Program Manager's StartUp group, the last program to start is the active window. If you'd rather have Program Manager be the active window after start-up, don't put your applications in the StartUp group. (If you have a ProgMan icon so you can jump to Program Manager using the

@ECHO OFF

```
IF '%1==' COPY C:\WINDOWS\STARTUP.PRM C:\WINDOWS\*.GRP
COPY C:\WINDOWS\STARTUP.%1 C:\WINDOWS\*.GRP
C:\WINDOWS\WIN
```

FIGURE 5: LOAD WINDOWS WITH AN ALTERNATE STARTUP GROUP using this DOS batch file.

icon's shortcut key, leave that one icon in StartUp.) Instead, select **File•Run** and type **WIN.INI**. To the right of the 'run=' line, add the path and executable file name of any programs you'd like to have load at start-up. Separate each file name with a single space and make sure the last program you list is **PROGMAN.EXE**. Save the file. The next time you start Windows, Program Manager will return to the top after your other applications launch. —Robert J. Lauriston

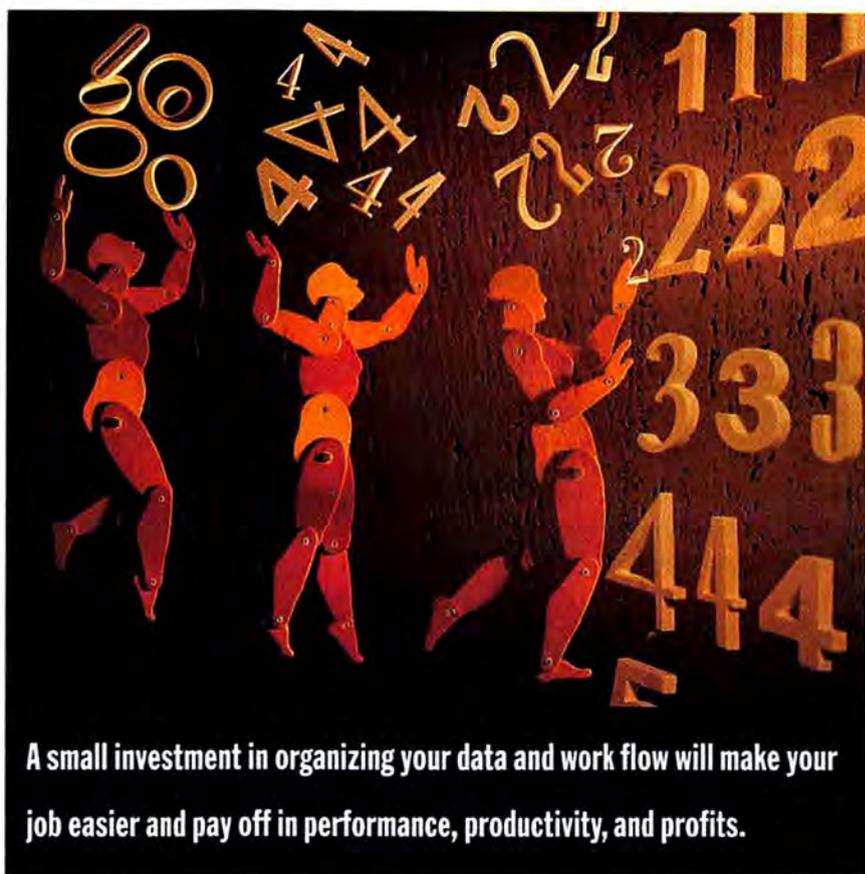
18 Playing the Recorder

You probably know that Windows' Recorder lets you build macros to perform repetitive tasks. But did you know that you can assign these macros to an icon and run them from Program Manager?

For example, I have a macro that loads Excel, opens three files I use every day, and tiles them. Here's how you'd set up this macro and assign an icon to it. First, fire up Recorder (in the Accessories program group) and select **Macro•Record**. In the Record Macro Name text box, type something like **Load expenses**, and in the Description box, type an appropriate description. Make sure Playback To is set to Same Application, and assign a shortcut key combo—say, **<Ctrl><Shift><F12>** (you have to type **F12** or pick it from the drop-down list). Now click **Start**. Load Excel, and load each worksheet by pressing **<Ctrl><F12>**, typing its name, and pressing **<Enter>**. Arrange them as you want. Press **<Ctrl><Break>** when you're through, then click the Save Macro radio button and click **OK**. Switch to the Recorder window, save the macro in a file called **EXCELOAD.REC**, then close Recorder.

Now, in Program Manager, hold down **<Ctrl>** and drag the Recorder icon to copy it to an appropriate program group. Click the new copy once, press **<Alt><Enter>**, type a name in the Description box, then change the Command Line text box to **RECORDER.EXE -H ^+F12 C:\WINDOWS\EXCELOAD.REC**, give the icon a shortcut key, say **<Ctrl><Shift><F12>**, and click **OK**.

The **-H** tells Recorder to run the macro named by the shortcut key combination that follows. The character **^** signals **<Ctrl>**; **+** means **<Shift>**; **%** indicates **<Alt>**. The path and file name that end the command tell Recorder what file the macro is in. From now on, you'll be able to run the macro simply by double-clicking on the icon or pressing its



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shortcut key combination. One small warning: Make sure Recorder isn't already running when you use the icon, or you'll have to double-click on the macro name or press its shortcut key combination to get it to run. —D. T.

19 Off-Center Wallpaper

Windows lets you spruce up your screen with customized wallpaper. Nice idea, but can you ever see the stuff behind your open Program Manager? You can if you change the position of centered wallpaper so it's in a corner or at the top of the screen.

Select **File•Run**, type **WIN.INI**, and press **<Enter>**. Enter the lines **WallpaperOriginX=1** and **WallpaperOriginY=1** in the [Desktop] section. The default coordinates, 0 and 0, center your wallpaper on the screen. Other coordinates specify how many pixels from the upper left corner

of the screen to begin the upper left corner of the wallpaper bit-map image. Negative values are allowed. —M. D.

20 Mo' Better Icons

While it's handy to assign icons to DOS apps so you can launch them from Program Manager, **PROGMAN.EXE**'s paltry selection of generic icons makes it hard to tell one DOS program from another. But there are more icons in Windows 3.1 than you

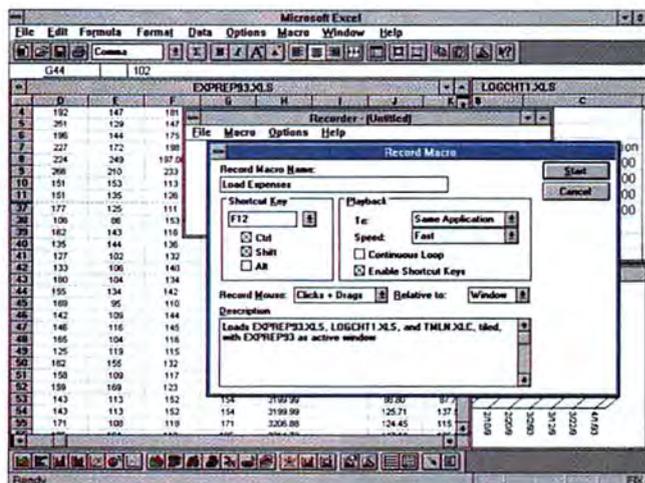


FIGURE 6: RECORDER LETS YOU AUTOMATE common Windows tasks. And even better, you can then assign your macro to an icon.

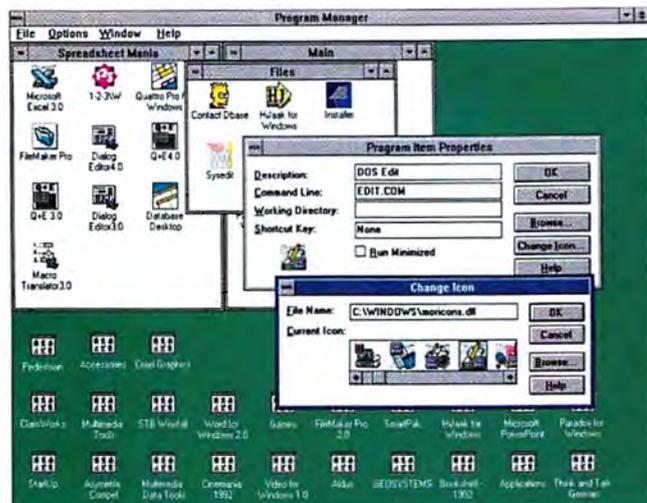


FIGURE 7: WINDOWS 3.1 PROVIDES A RAFT OF EXTRA ICONS for both DOS and Windows applications in the MORICONS.DLL file.

might know about—more than 100—many designed specifically for DOS apps. And your applications may have additional icons hiding in their directories.

To find them, highlight the program item that needs a new icon in Program Manager and press **<Alt>-<Enter>**. Click the *Change Icon* button (if the 'no icons available' dialog box appears, select *OK*), click *Browse*, and double-click the *moricons.dll* file from your

To find even more icons, look in the `\\WINDOWS\FONTS\ICONS\BMP` folder on PC World Online. —D. T.

21 Finding All Fonts

The Fonts section of Control Panel shows only the TrueType and system fonts you have installed. If you want to know all the fonts currently loaded on your system, load Paintbrush and select *Text • Fonts*. You can

scroll through the list to see all the fonts you have loaded, whether they're Adobe Type Manager's PostScript fonts, TrueType fonts, or anything else. —Bronwyn Fryer

22 Quick Reference

Do you have certain text that you refer to often? Save it, in whatever word processor or spreadsheet program you use, as an ASCII text file with a `.TXT` extension. Put that file in your `WINDOWS` directory or a directory in your `PATH` statement. That way you can bring up the file by selecting *File • Run* in File Manager or Program Manager or by going to the command prompt in any Windows utility with such a prompt, and typing the file name. —L. S.

23 Auto-Backup System Files

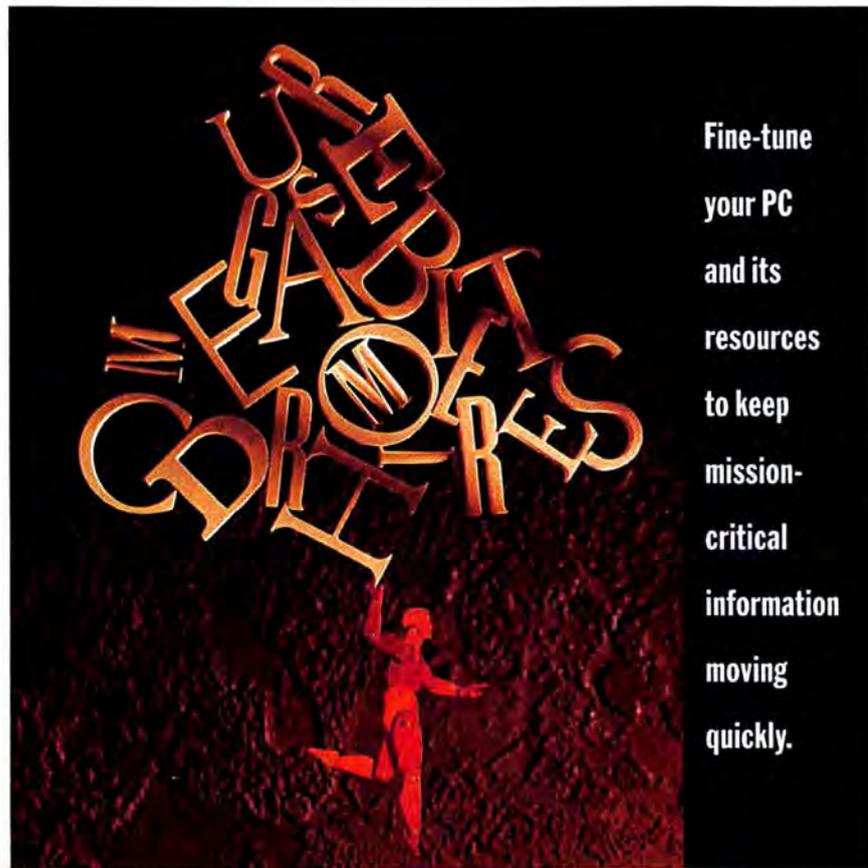
Windows can run roughshod over `AUTOEXEC.BAT` and `CONFIG.SYS`, altering them beyond recognition. But by attaching a short batch file to an icon in your StartUp group, you can make sure you always have the most recent copy of both files that allowed your system—and Windows—to boot successfully. First, if you don't already have one, create a directory named `BACKUP`. Then enter the lines `COPY C:\AUTOEXEC.BAT C:\BACKUP` and `COPY C:\CONFIG.SYS C:\BACKUP` in Notepad or any text editor.

Save the file as `SYSDAK.BAT` in any directory in your `PATH` statement. In File Manager, drag the `SYSDAK.BAT` file into Program Manager's StartUp group to create an icon. Whenever Windows starts, your `AUTOEXEC.BAT` and `CONFIG.SYS` files will be backed up to `C:\BACKUP`. —S. F.

24 Group Therapy

If a program group file gets corrupted, you could find yourself looking at a cryptic message such as 'Program-group file `C:\WINDOWS\ACCESSOR.GRP` is invalid or damaged. Re-create the group'. To save yourself from the headache of re-creating the group, make a backup directory called `WINBAK`. Then type the batch file command `FOR %A IN (INI GRP DAT) DO XCOPY C:\WINDOWS*.*%A C:\WINBAK` in any text editor and save it as `WINBAK.BAT` in a directory that's in your `PATH` statement.

In File Manager, drag `WINBAK.BAT` into a Program Manager group to create an icon. Double-click this icon whenever you've added icons, rearranged groups, or made a high score in some Windows game

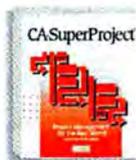


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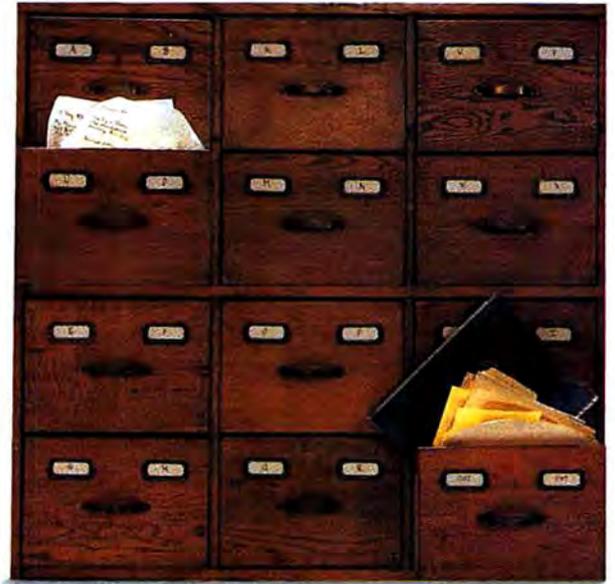
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that keeps a DAT file; it will copy all your INI, GRP, and DAT files from the C:\WINDOWS directory to C:\WINBAK. If you get a corrupted group, it's easy to fix it: Just copy the backup file from WINBAK to WINDOWS. —Karl Koessel

25 Pauper's Diagnostic

If you lack the bucks for QA Plus, CheckIt, The Norton Utilities, or a similar full-featured diagnostic tool, there's a solution hiding in Windows and DOS 5.0 and 6.0. Quit Windows, and in the WINDOWS or DOS directory, enter MSD. This command launches Microsoft Diagnostics, a useful utility that will dig out BIOS information, system and video RAM use, disk stats, interrupt use, and much more. MSD was designed to aid Microsoft technical support in diagnosing customer problems, but there's no reason you can't use it too. —R. L.

26 Keep the Clock on Top

You can set Windows 3.1's Clock so it always appears in a tiny window in the corner of your screen, even when you've maximized an application. First, drag the Clock icon into the StartUp group. Then double-click on the Clock icon to start it, press <Alt><Space>, and select *Always on Top*. Use the *Settings* menu to set up the clock's font and other options. Then choose *Settings*•*No Title* to get rid of the title bar, drag the clock's border until it's the size you want, and drag the clock to where you want it. Finally, in Program Manager, press <Alt><Shift><F4> to save your settings (see Tip 1). From now on, every time you start Windows, the clock will reappear, same size,

same place. If you ever want to change its options, just double-click its face. —R. J. L.

27 Beyond the Keyboard

Windows lets you use hundreds of accented characters, special symbols, and punctuation characters to polish your documents. To access these characters, you can go to Character Map, but that's cumbersome. Especially when all you have to do is hold down <Alt> while typing a four-digit code on the numeric keypad. **FIGURE 9** shows the codes for some characters in the TrueType fonts Arial, Times Roman, and New Courier. If the character you need isn't there, run Character Map, select your font in the Font drop-down box, and click or cursor to the character you need. A message in the lower right of the dialog box will tell you its key code. —M. D.

28 Custom Cardfile

If you always use the same Cardfile file, you can make Windows load it when you run Cardfile. Highlight the Cardfile icon and press <Alt><Enter>. In the Command Line text box, append CARDFILE.EXE with a space and the path and name of your Cardfile file. Click *OK*. If you use more than one Cardfile file, create an icon with an appropriate description for each. —Shane Rau

Symbol	Code
½	0189
¼	0188
©	0169
¥	0165
"	0147
"	0148
—	0151
è	0232
é	0233

FIGURE 9: SPECIAL CHARACTER codes.

29 Speed Dialing

If you have a Hayes-compatible modem connected to your phone line, you can use Cardfile to dial frequently used numbers. Launch Cardfile and choose *Card*•*Add* to create a new card. Enter the name of the person you want to call, and click *OK*. Enter the phone number on the first line of the card, including a 1 and an area code for long-distance numbers. Leave out other prefixes. If you wish, you can add an address or other information.

To place a call, select *Card*•*Autodial* or press <F5>. If you haven't set up Cardfile to dial before, click the *Setup* button and click the appropriate radio button to tell Cardfile the speed of your modem, where it's hooked up, and whether to use tone or pulse to dial. If you need to use a prefix (such as 9), enter it in the Prefix text box and check the Use Prefix check box. Click *OK* or press <Enter> to dial. Wait for the prompt that tells you to pick up the receiver, click *OK*, and get ready to gab. Save your cards with an appropriate file name before exiting Cardfile. If you use this feature a lot, create an icon for this file (see Tip 28) and put it in your StartUp group so it's always handy. —D. T.

30 Control Beyond Your Wildest Dreams

If you share your PC with other users, you can protect your Program Manager configurations from meddling co-workers. Select *File*•*Run*, type *PROGMAN.INI*, and press <Enter>. Then at the bottom of the file, enter the following lines:

```
[Restrictions]
EditLevel=4
NoSaveSettings=1
```



FIGURE 8: MICROSOFT DIAGNOSTICS COMES WITH WINDOWS. It was designed to help Microsoft technical support, but you can use it too.

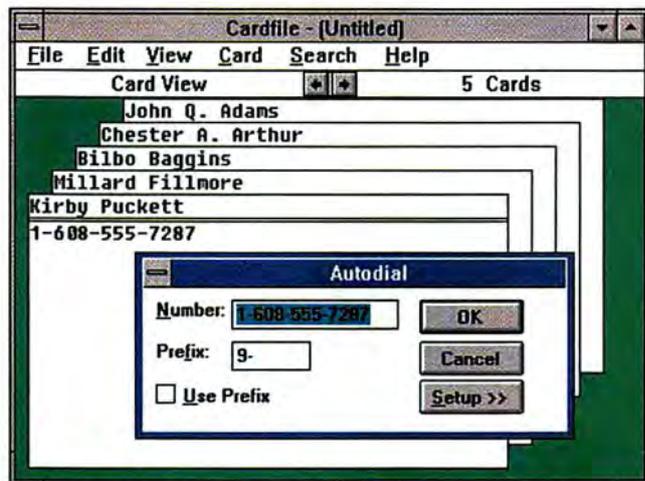


FIGURE 10: DIAL FREQUENTLY CALLED PHONE NUMBERS FROM CARDFILE—it's like giving your phone its own speed-dial buttons.

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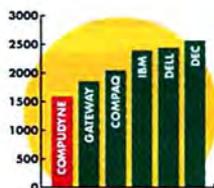
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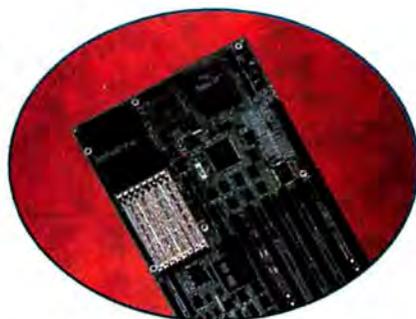
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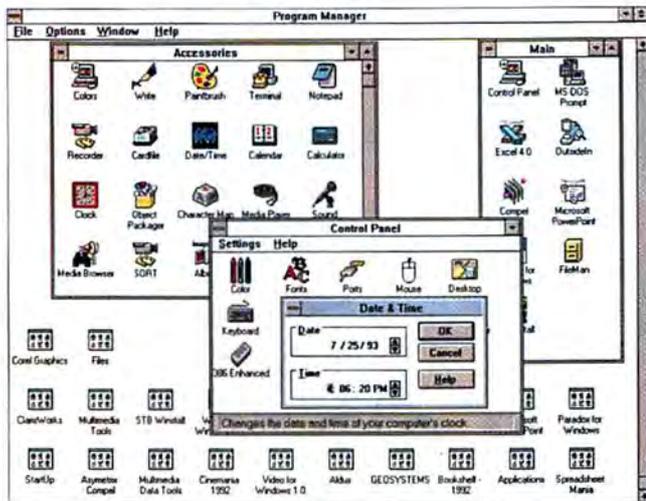


FIGURE 11: IF YOU'RE ON THE ROAD A LOT, create an icon to launch directly into Control Panel's Date/Time utility.

Save the file and restart Windows. The `EditLevel=4` line prevents anyone from being able to create, delete, or alter the properties of program groups or items. `NoSaveSettings=1` disables the `Options • Save Settings on Exit` command in Program Manager. If you decide you want even greater levels of protection, here are a few other restrictions you can add: `NoRun=1` prohibits anyone from selecting `File • Run`, `NoClose=1` makes it impossible to close Windows—short of rebooting, and `NoFileMenu=1` removes `File` from Program Manager's menu bar and disables the hot keys associated with its options. —M. D.

31 Happy Trails

Mouse trails on a laptop computer screen make it easier to see the mouse pointer. And if you use Windows' standard EGA, VGA, or super-VGA display driver (set via Program Manager's Windows Setup icon), you can have mouse trails on a desktop computer. Launch Control Panel and double-click on the Mouse icon. Then click the Mouse Trails check box and click *OK*. But sometimes just a hint of trail would be nicer. To get a mouse trail with fewer track marks, open the WIN.INI file in a text editor and look for the line in the [windows] section that says `MouseTrails=7`. Replace the 7 with a 3 or

Windows' File Manager is smarter than DOS's DIR: A single File Manager search can find multiple sets of files.

4. Save the file and restart Windows. You'll find your mouse leaves fewer prints. —D. T.

32 Bypassing Control Panel

If you do a lot of traveling, it's a good idea to keep the time on your laptop in sync with your location so you won't confuse the home office with strange time stamps on your E-mail. Why not create an icon that takes you straight to Control Panel's Date/Time module?

In Program Manager, select `File • New • OK` to create a new program item. Type `Date/Time` in the Description text box, type `CONTROL.EXE DATE/TIME` in the Command Line text box, and click *OK*.

This technique is also handy if you change printers frequently, in which case you would enter the line `CONTROL.EXE PRINTERS` in the Command Line text box. —M. D.

33 Make Windows Roadworthy

If you do a lot of work on the road, you know it's tough to manipulate windows with a trackball. Get ahold of Windows by making its application and document windows' borders wide enough to grasp easily.

Run Control Panel and launch Desktop. Click the up arrow on the right side of the Border Width box until you reach 6 or perhaps 8. Click *OK*. You'll see that your window borders have thickened considerably, allowing for easier mouse control. —K. K.

34 DOS Clipboard Tricks

Do you think the Clipboard is just for Windows applications? Think again. You can use the Clipboard to cut and paste text between Windows and DOS apps—or even between two DOS programs. The key is run-

ning the DOS apps inside a window.

Switch to the DOS app you want to copy text from, and press `<Alt>-<Space>` to put it in a window and bring up the window's Control menu. Select `Edit • Mark` and use the mouse or hold down `<Shift>` and use the cursor keys to mark a block of text, then press `<Enter>` to copy it to the Clipboard. Move to the second DOS app and place your cursor where you want to add the new text. Press `<Alt>-<Space>` and select `Edit • Paste`. Then sit back and watch the text pour into the file. To toggle back to full-screen mode, press `<Alt>-<Enter>` (you can do so at any time and Windows will paste faster).

If nothing happens (or only a few characters appear) when you try to paste text, call up the destination DOS app's PIF file in the PIF Editor, click on *Advanced*, and in the Advanced Options dialog box, the uncheck the Allow Fast Paste box. —D. T.

35 DOSKEY in Windows

DOS 5.0's command-line-history TSR, DOSKEY, is handy if you want a record of the commands you've executed in DOS. Although you probably don't want to waste memory by loading it before you load Windows, it would be nice to have DOSKEY's benefits when you shell out to DOS. To have DOSKEY your way, type the lines `@DOSKEY` and `@COMMAND` in any text editor and name the file `DOS.BAT`. From File Manager, drag `DOS.BAT` into a group in Program Manager. In Program Manager, click on the icon you just created whenever you want to start a DOS session. When you exit DOS, the TSR will be uninstalled. —L. S.

36 DOS in the Right Place

If you're in File Manager and want to run a DOS session in your current directory, don't waste time toggling back to Program Manager's MS-DOS prompt. Just select `File • Run`, type `COMMAND`, and press `<Enter>`. —L. S.

37 Tap Into Windows' Command-Line Interface

File Manager can use wild-card characters (`?` and `*`) just as DOS can, but in some ways it's smarter: It lets you search for a series of wild-card file name masks in one fell swoop. Let's say you want to copy all your spreadsheet files—with `XLS`, `XLW`, `WK1`, `WK3`, and `WKS` extensions—to a floppy. In File Manager, click on your spreadsheet data directory and choose `File • Select Files`. Type

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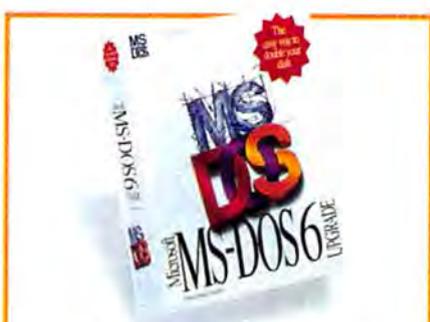
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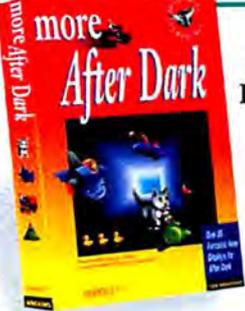
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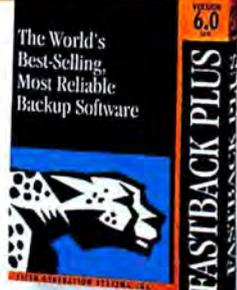
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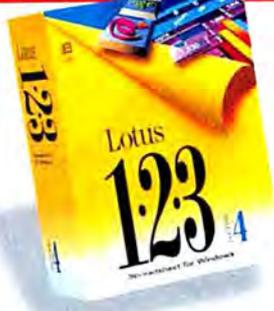
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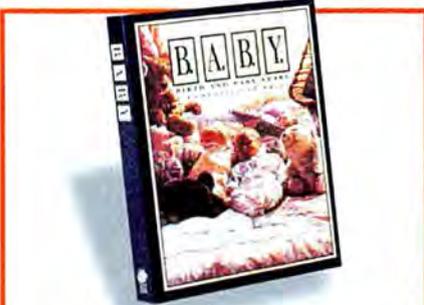
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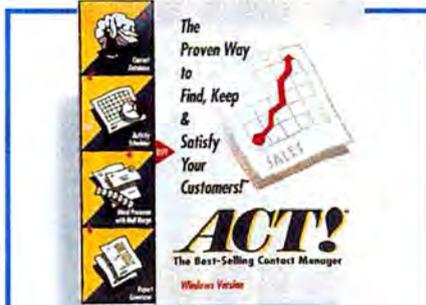
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| 8480 Tape250 Insider Tape Backup | | 199. |
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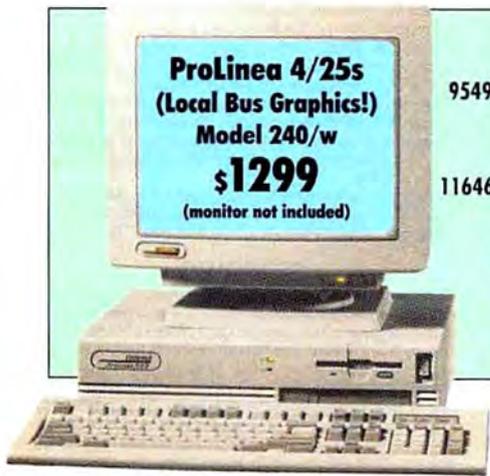
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8326 MS Access for Windows	\$89.	2756 1-2-3/ Windows	309.
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.XL *.WK* (with a space between each set of masks). Click on *Select* and *Close*, and File Manager highlights all the files that meet your criteria. —M. D.

38 DOS Commands From Windows

You probably know you can run external DOS commands (those that have an executable file—like XCOPY, FORMAT, and EDIT—in the DOS directory) using Program Manager's File•Run command. But did you know you can also run DOS's *internal* commands—like DIR, DEL, TIME, CD (change directory), COPY, MD (make directory), RD (remove directory), and REN (rename)—from within Program Manager? Well, you can—if you use COMMAND.COM's /C switch. Just choose File•Run, then type **COMMAND.COM /C** followed by the command, and press <Enter>. In either case, when the command has finished, you return immediately to Program Manager, meaning you won't be able to peruse any screen output, like from a simple TREE or DIR command. But for resetting the time, making a directory, or redirecting a DIR listing into a text file, this technique can be quite handy. If you plan to run a few consecutive internal DOS commands, the first time you type COMMAND.COM /C, highlight it and press <Ctrl>C to copy it. For subsequent commands, press <Ctrl>V to paste the phrase into the command line. —S. F.

39 Checking on SmartDrive

Windows' SmartDrive enhances performance by caching your disk drive. But how well is SmartDrive working? To quiz the utility on its performance, shell out to DOS and enter **SMARTDRV /S** at the prompt. You'll see the number of cache hits and misses the program has recorded. Divide the number of cache hits by the number of misses. If you get 7.5 or more, SmartDrive is doing a pretty good job. If the cache is scoring 7 or less consistently, consider increasing the Windows minimum cache size. —Charles Lowe

A TRIO OF WINDOWS FOR WORKGROUPS TIPS

40 Customize the File Manager Tool Bar

Windows for Workgroups' File Manager has an icon bar with tools that streamline network functions as well as ease the more mundane task of sorting file name lists. Even better, you can customize this tool bar to include icons for just about everything File Manager does. Just double-click the tool bar without clicking an icon to bring up the Customize Toolbar dialog box. Scroll through the Available Buttons list box on the left, and drag the icons you want to the Toolbar Buttons list box on the right. To

remove an icon from the tool bar, highlight it in the Toolbar Buttons list box and click *Remove*. To reposition an icon on File Manager's tool bar, hold down <Shift> and drag it into place. —S. F.

41 Bypassing the Logon Password

If you'd rather not type in your password every time you start Windows for Workgroups, you can bypass this annoying prompt. In Control Panel, double-click the Network icon and click the *Password* button to bring up the Change Logon Password dialog box. Type your current password in the Old Password text box. Leave the other two text boxes (New Password and Confirm New Password) blank and click *OK*. The next time you start Windows for Workgroups, you won't be asked for your password. —Christina Wood

42 Bypassing the Mail Password

If you're not particularly security conscious, it's easy to bypass the passwords in Microsoft Schedule+ and Microsoft Mail, which come bundled with Windows for Workgroups. In Program Manager, highlight the Schedule+ icon and press <Alt><Enter> to bring up the Program Item Properties box. In the Command Line text box, add a space, your name, another space, and your password to the right of SCHEDPLUS.EXE. (If you're not sure what Windows

Everything You Always Wanted to Know About Windows*

You probably know the following 10 tips already, but just to be on the safe side, glance over them. They could save you a lot of time.

1. Hold down the <Alt> key and press <Tab> to cycle through your open applications. Use <Alt><Shift><Tab> to cycle backward.
2. Double-click on the title bar (rather than the Maximized or Restore buttons) to toggle an app between full screen and windowed. It's bigger and easier to select.
3. Double-click on your wallpaper or desktop background (or press <Ctrl><Esc>) to bring up Task Manager.
4. Drag a file from File Manager into a Program Manager group to instantly create an icon for it.
5. You can assign a keyboard hot key to any icon. Click once on the Program Manager icon and press <Alt><Enter> to bring up the Properties dialog box, click in the Shortcut Key text box, and type the letter, number, or function key you want to use.
6. It's easy to use the mouse to select menus and menu options in

Windows, but using the keyboard is faster. Use <Alt> to activate the menu bar, press the underlined letter in the menu's name, then press the underlined letter of the option you want (for instance, <Alt>FX selects File • Exit to exit an application).

7. You can print a file from File Manager by dragging a file into Print Manager, even if Print Manager is minimized. The only catch is that the file has to have a TXT extension or another extension associated with a program on your system.
8. You can move Program Manager icons from group to group by dragging and dropping them with the mouse, even if the destination group is minimized.
9. You can copy Program Manager icons (instead of moving them) by holding down the <Ctrl> key while you drag and drop.
10. When selecting files in File Manager, hold down the <Shift> key to select a contiguous list of files or <Ctrl>-click to select files that are not next to each other.

***But were afraid to ask because people might think you were stupid.**



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for Workgroups considers to be your name, look in the Mail Sign In prompt box, which comes up when you double-click the Mail icon.) Follow the same procedure for the Microsoft Mail icon. Next time you double-click either icon, you'll launch directly into the app. —C. W.

DOS TIPS

43 Put It in Virtual Drive

To access files in frequently used directories easily, create a virtual drive. Say you constantly refer to files in C:\WP51\DOCS\MAILIST. In your AUTOEXEC.BAT file, add the line **SUBST F: C:\WP51\DOCS\MAILIST** (if F: is already used by another device, use a different letter). Now you can refer to a file in that directory simply by typing **F:filename**. —Kirk Steers

44 Replace Files

Have a set of project files that you shuttle between work and home? Instead of just copying the files, use the REPLACE command to make sure you don't leave anything behind. For example, type **REPLACE C:\PROJECTS*. * A:/U** to replace each file on the floppy in drive A: with the file in the PROJECTS directory on C: that has the same name. The /U switch ensures that only older files are overwritten. —TJ Byers

45 A Star No More

You can save time and keystrokes by using DOS's . (period or dot) directory name alias, which represents the current directory. For

example, instead of typing **DEL *.*** to delete every file in the current directory, try **DEL .**—you'll like it. Just don't hit <Period> twice (see Tip 46). —T. J. B.

46 Dot's Mom

It's easy to move up and down a directory path using the CD command. You probably know you can use the command **CD..** to move up one directory level (. represents the current directory's parent). And, if you know you want to go up several levels, you can use a series of double dots to take you there. Let's say you're in C:\DATA\SALES\JULY\US\MIDWEST. Typing **CD ..\..** will jump you straight to C:\DATA\SALES\JULY; **CD..\..\..** will leapfrog to C:\DATA. You can also use **CD..** to step you up, over, and even down another branch in the directory tree. For example, to go from the C:\DATA\EXPENSES directory to, say, the directory C:\DATA\MEMOS\BOSS, use the command **CD..\MEMOS\BOSS**. —T. J. B.

47 In Search of the Lost File

Accidentally erase an important program file? Most people think a mistake like that means revisiting the program's installation utility. Actually, all you usually have to do is decompress the original file from the floppy using EXPAND, which you'll find in your DOS or WINDOWS directory. Compressed files almost always end with an underline (_). To expand the compressed VIDEO.DLL file into your WINDOWS directory, for example, type **EXPAND A:VIDEO.DL_ C:\WINDOWS\VIDEO.DLL**. —T. J. B.

variables and values, add the line **SHELL=C:\COMMAND.COM C:\ /E:512 /P** to your CONFIG.SYS file.

If you're running DOS 5.0 or 6.0, you'll get twice the default amount of environment space; if you're using an earlier DOS, you'll get almost three times. You can add more by entering a larger value after the /E:, but remember that every byte you add takes precious conventional memory away from other applications. The /P switch tells DOS you're permanently replacing your original (default) shell (COMMAND.COM), so DOS should go ahead and run AUTOEXEC.BAT. —S. R.

49 Protect Your PC From Yourself

It's easy to accidentally delete the files in the root directory of drive C: by typing **DEL *.*** when you think you're in a subdirectory. If you don't restore the files before rebooting, you have to find a bootable floppy to restart your PC. Save yourself the headache by using DOS's ATTRIB (attribute) command to shield your precious COMMAND.COM file. At the DOS prompt, type **ATTRIB +R C:\COMMAND.COM**. The +R switch turns COMMAND.COM into a read-only file, so you can't delete or overwrite it. Don't get carried away with ATTRIB, though. You'll want to leave AUTOEXEC.BAT and CONFIG.SYS writable because they're constantly updated. —Richard Melville

50 Insulating AUTOEXEC.BAT

Want to protect AUTOEXEC.BAT from installation programs that insist on rewriting it? Rename its START.BAT and create a new AUTOEXEC.BAT containing one line: **@START**. When installation programs rewrite this AUTOEXEC.BAT, only a short inconsequential file is affected, while the file with the important data remains untouched. Of course, if the new program won't run, you'll need to move any necessary commands from AUTOEXEC.BAT to START.BAT. —Jeffrey Libby

51 Automated Work Environment

If you start the day with cc:Mail, work a little in Paradox for DOS, then load Windows, why not use the nifty CALL command to step you through the process? The following batch file commands load cc:Mail from a batch file called CC.BAT; then when you quit cc:Mail, load Paradox for DOS from a

48 The Long and Winding PATH

If your PATH command has gotten overly long or you've excessively customized your DOS prompt, you may be getting an annoying 'Out of environment space' message. To increase the amount of memory reserved for the environment, in which is stored your PATH and PROMPT commands and SET

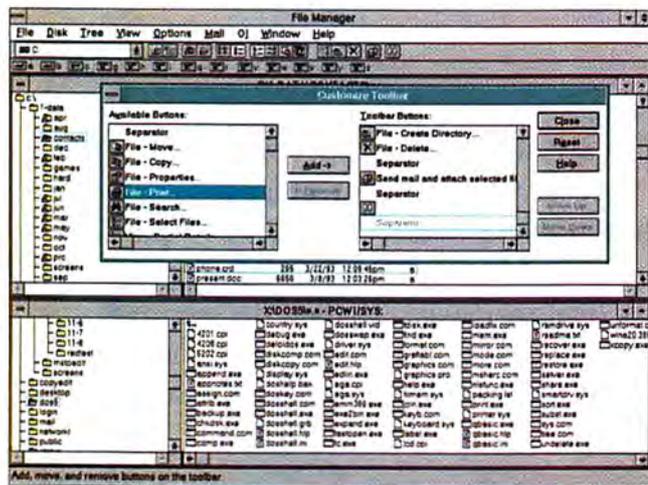
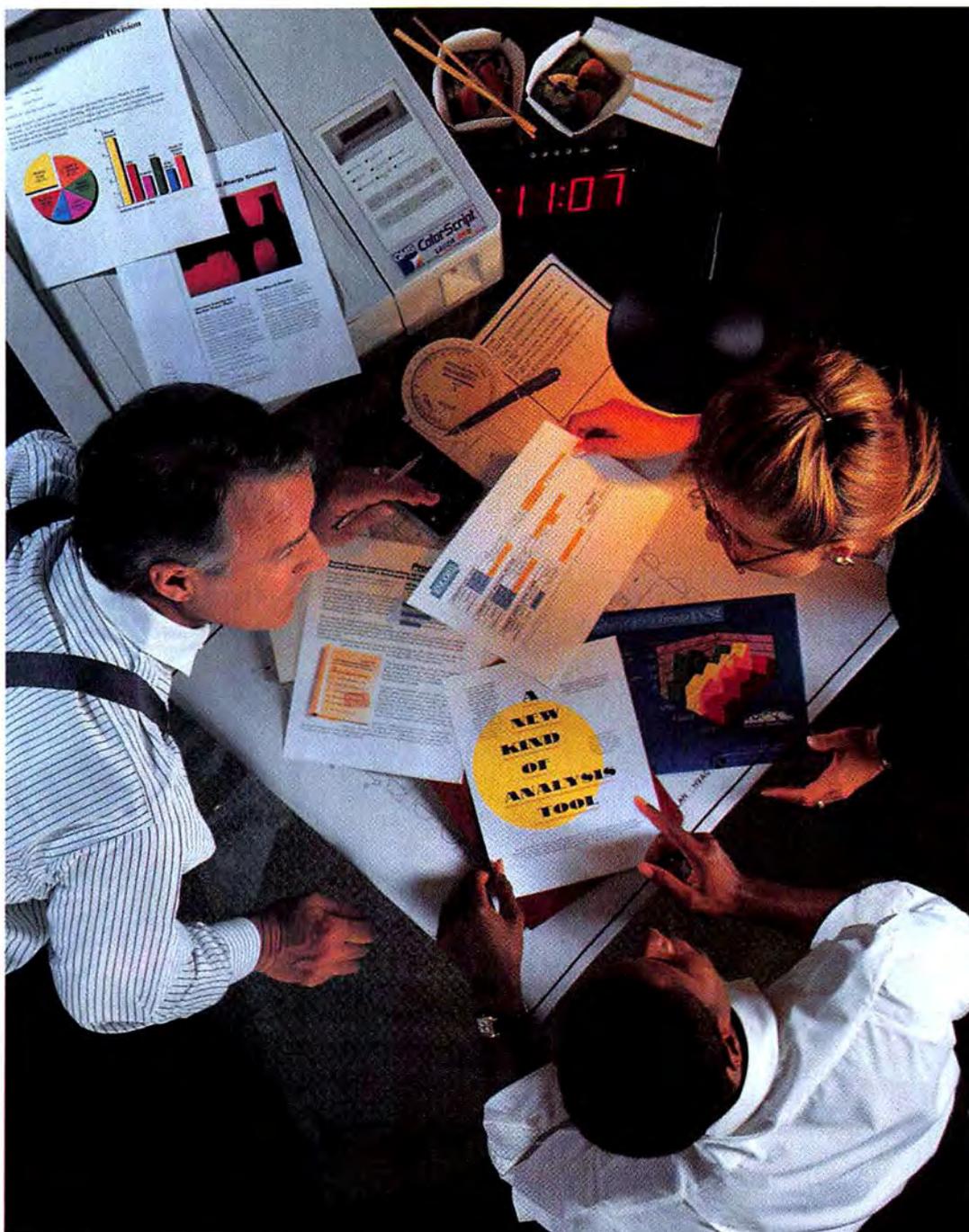


FIGURE 12: WANT TO PICK JUST THE RIGHT ICONS in Windows for Workgroups' File Manager? Double-click the tool bar without clicking an icon to bring up the Customize Toolbar dialog box.



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FIGURE 13: CUSTOMIZE THE COLORS OF THE DOS SHELL in graphics mode by editing the color assignments in the DOSSHELL.INI file.

batch file called PD.BAT; and when you quit Paradox, load Windows:

CALL CC
CALL PD
WIN

Store these commands in a batch file with a BAT extension in a directory listed in your PATH statement or add them to your AUTOEXEC.BAT file. —Eric Knorr

52 Dancing Disk to Disk

If you have plenty of applications on 5¼-inch floppies and have a notebook PC that takes only 3½-inch disks, don't hassle with the vendor for new disks or pay for a transfer utility. Use DOS's XCOPY command to translate one floppy format to another using your desktop PC if it has both sizes of floppy drives. To move the entire contents of a disk in the 5¼-inch A: drive to a disk in the 3½-inch B: drive, first write-protect the original, then issue the command **XCOPY A: B: /S /E**. You'll also need to give each copy the same label as its original. To duplicate an original's label, insert both floppies in their respective drives, type **LABEL A:**, press **<Enter>** once, wait a second, and press **<Ctrl>-<Break>**. Note the label and type **LABEL B:**, then type the label name from the A: drive at the prompt, and press **<Enter>**. —T. J. B.

53 Out Rooted Directories

Ever do a little hard drive weeding and run across a directory that just won't let go? If the command **RD** *directory* gives you the cryptic 'Invalid path, not directory, or directory not empty' message even after you've removed

its files with **DEL *.***, make sure you're not still in the directory; DOS will not let you remove the directory you're in. If that's not the problem, it's likely there are some hidden or read-only files lurking in the directory. Use **ATTRIB** to find the obstructing files and change them so they can be moved or deleted. Go to the directory in question and type **ATTRIB *.*** to get a list

of files and their attributes.

You'll see a listing of file names with letters on the left. An *H* indicates a hidden file; an *R* means read only. To make these files deletable, type **ATTRIB -H -R** and press **<Enter>**. Now type **DEL *.*** and they'll be gone. —R. M.

54 A Prettier Shell

DOSSHELL is a handy tool for viewing and sorting the contents of your hard drive, but it's short on looks. To spruce it up, type **DOSSHELL** at the DOS prompt. When the shell appears, choose **Options • Display**, pick one of the graphics modes, and click **OK**. If

you don't like the screen color, choose **Options • Colors**; pick a color scheme you prefer, say *Emerald City*; and click **OK**. If you're still unsatisfied with the colors, you can edit them in your DOSSHELL.INI file, which is stored in your DOS directory. In any text editor that will handle lines longer than 256 characters, open DOSSHELL.INI and search for *Emerald City*. You'll see a list of screen parts and the colors that correspond to them. Change the colors to suit your taste. The color names that DOS accepts are red, brightred, white, brightwhite, blue, brightblue, black, brightblack, green, brightgreen, brown, brightyellow, cyan, brightcyan, magenta, and brightmagenta. —C. W.

55 Jog DOS's Memory

A couple shortcut keys can cut out lots of typing at the DOS prompt. **<F3>** repeats the last thing you entered. For instance, if you've just entered **DIR C:\MAY\FINANCE\REPORTS\FINAL** to get a file listing, press **<F3>** and DOS will retype the entire line. Press **<F2>** instead, followed by a character, say *Y*, and DOS will retype the command up to but not including that character. You can then type an *R* over the *Y*'s position, press **<Insert>**, type **CH**, and press the **<Right>** cursor key to retype the previous command one character at a time or **<F3>** to retype the rest of the line. —M. D.

56 Make Your Own DOS Menu

To make launching DOS applications easier, you can create a custom menu that shows you (or others who use your PC) what to type to launch a program. To make it work, you'll also need to create batch files that launch their respective programs and redisplay the menu when you exit the program. In any text editor, create a file that looks something like this:

MENU	
Enter	To launch
WP5	WordPerfect 5.1
L123	1-2-3
CS	CompuServe
Flight	Flight Simulator

Entries on the left must be eight characters or less with no spaces. Name the file **MENU.TXT**

You don't have to be a programmer or system administrator to give your PC a menu that makes running an app as easy as ordering an appetizer.

and save it (and all the files you create for this tip) in a directory listed in your PATH statement and listed before any program directories (for this example, we'll use **C:\BATCH**). Next, save the commands **@CLS** and **@TYPE C:\BATCH\MENU.TXT** in a file called **MENU.BAT**. This menu will appear on screen whenever you—or a batch file—enters the command **MENU** at the DOS prompt.

Now create a batch file for each program. Each batch file should log on to the appropriate drive, change to the appropriate directory, launch the program, and redisplay the menu. Each must be named using its respective entry in the left-hand column. For example, the following batch file—

called L123.BAT—launches 1-2-3 and re-displays the menu after you exit 1-2-3.

```
C:
CD \123
123
```

```
C:\BATCH\MENU
```

Finally, add the line `C:\BATCH\MENU` to the end of your `AUTOEXEC.BAT` file to bring your menu up when you start your system. —K. S.

57 Laborsaving Device

DOSKEY is handy for quickly and easily reducing anything you type frequently at the DOS prompt to one or two characters. For instance, if you frequently type `DIR /P /O:GN`, save your fingers a little work by reducing it to `D` with DOSKEY. At the DOS prompt, type `DOSKEY D=DIR $1 $2 /O:GN`. Now whenever you type `D`, you'll get a directory of your files one screen at a time with subdirectories listed first, ordered by name. The `$1` and `$2` let you include two parameters, so you can issue a command like `D *.EXE /S`. —K. K.

58 DIR Before DEL

Using wild-card characters to delete files is fast but dangerous. But you can easily protect yourself: Use `DIR` to look at the files you will delete before you delete them.

Type `DIR` followed by a wild-card mask, say `*.BAK`, and press `<Enter>`. Look at the resulting list of files. If it looks good, type `DEL` and press `<F3>`. This will copy the same wild-card mask you used with `DIR`. Press `<Enter>` to delete the files. If you're using DOS 5.0 or 6.0, protection is even easier and you can choose whether to delete a given file. There's no need for the `DIR`

step. Just type `DEL *.BAK /P`, and DOS will prompt you to confirm each file's deletion. —Mark Stewart

59 The Fast Format

Need a floppy formatted fast? In DOS 5.0 and 6.0, you can pop a used disk into your drive and use the command `FORMAT A:/Q/U` for an instant format. The only hitch is that you won't be able to unformat the floppy if you discover you need some of those old files back. —R. M.

60 The Old Switcheroo

Differing uses of your PC may require different commands in `CONFIG.SYS` and `AUTOEXEC.BAT`. For example, you may want a memory manager to load several TSRs and device drivers into high memory before running Windows, but need a stripped-down configuration for AutoCAD or other DOS-based memory hounds. The batch file `SWITCH2.BAT` (FIGURE 14, on the left) makes changing configurations a one-command affair by replacing `CONFIG.SYS` and `AUTOEXEC.BAT` with versions for AutoCAD or for Windows and rebooting your system.

To set it up, first put the `CONFIG.SYS` and `AUTOEXEC.BAT` commands for your AutoCAD configuration in, respectively, files called `CONFIG.CAD` and `AUTOEXEC.CAD`. Do the same for your Windows configuration, calling the files `CONFIG.WIN` and `AUTOEXEC.WIN`. Store

If a DOS command's output scrolls faster than you are able to read it, send it to a text file and use EDIT to peruse it.

the files, along with `CONFIG.SYS` and `AUTOEXEC.BAT`, in the root directory of drive `C:`. Next, use any text editor to create `SWITCH2.BAT` and save it in a directory listed in the `PATH` statement of each `AUTOEXEC` file. At the DOS prompt, enter `DEBUG`. Type the commands to create `WARMBOOT.COM` (FIGURE 14, on the right), pressing `<Enter>` at the end of each line and for the blank line before `RCX`. `WARMBOOT.COM` is saved in the DOS directory of drive `C:`.

To use `SWITCH2.BAT`, type `SWITCH2 CAD` or `SWITCH2 WIN` at the DOS prompt. —M. D.

61 Smart DIR

The DOS command `TREE path` displays a map of all the directories under `path` (or under the default directory if no path is specified). And when you specify the root directory (`TREE\`), the map scrolls by so fast you can't read it. The command `TREE\`

`[MORE]` shows you one screenful at a time, but you can't scroll back to look at previous screens. Instead, use `TREE\>TREE.TXT` to create a text file of `TREE`'s output and then view it with `EDIT TREE.TXT`. —C. W.

DOS 6.0 TIPS

62 Improved MEMORY

The `MEM` command shows you how much conventional, extended, and expanded memory your system has and what's available. For even more information, you can use `MEM /C` to find where your programs are in memory. If you've ever used the `/C` switch in DOS 5.0, you know how incomprehensible the result is. DOS 6.0's `MEM` is much easier to understand and has added the `/P` switch to pause the output one page at a time. Try typing `MEM /C /P` at the DOS 6.0 prompt. You'll like the result. —V. W.

63 PATH in DOS 6.0

In previous versions of DOS, the longest `PATH` you could assign was 122 characters long (127-character command-line limit minus 5 for `PATH` and the space or equal sign). In DOS 6.0, you can extend your

SWITCH2.BAT

```
IF "%1==" GOTO NOENTRY
IF NOT "WINDIR==" GO TO END
COPY C:\CONFIG.%1 C:\*.SYS
COPY C:\AUTOEXEC.%1 C:\*.BAT
C:\DOS\WARMBOOT
:NOENTRY
ECHO Use %0 CAD or %0 WIN
ECHO to switch configurations.
:END
ECHO %0 does not run in Windows.
```

WARMBOOT.COM

```
MOV DX,40
MOV DS,DX
MOV BX,72
MOV WORD PTR [BX],1234
JMP FFFF:0

RCX
11
NC:\DOS\WARMBOOT.COM
W
Q
```

FIGURE 14: CHANGE `CONFIG.SYS` AND `AUTOEXEC.BAT` CONFIGURATION using `SWITCH2.BAT`, which uses `WARMBOOT.COM` to automatically reboot your PC.

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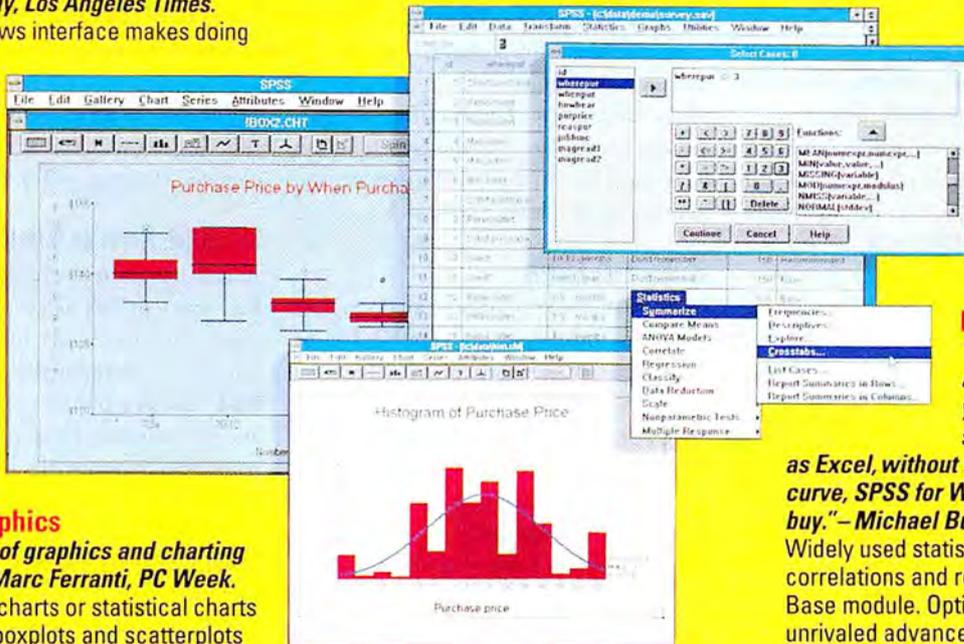
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PATH if you put it in CONFIG.SYS using the command `SET PATH=dir1;dir2;...` If you do, however, be aware that neither you nor a batch file should use the PATH statement (unless you want to replace the current PATH) or the %PATH% DOS variable, which yields unpredictable results. You'll also want to watch out for installation programs that add PATH to AUTOEXEC.BAT; that PATH's directory list will replace, instead of add to, CONFIG.SYS's. —T. J. B.

64 Solving System Lockups

If you've ever installed a new program or peripheral and found that suddenly your computer won't boot, you'll like DOS 6.0's capability to step through CONFIG.SYS one line at a time. Just press <F8> when you see the 'Starting MS-DOS' message (see Tip 72). DOS will ask you whether to run a command or skip it. If you think a particular DEVICE command is causing a problem, simply press N to tell DOS to ignore it when DOS prompts you to confirm that command. When CONFIG.SYS is finished, DOS will ask you whether or not to run AUTOEXEC.BAT. —T. J. B.

65 Floppy Compression

DOS 6.0's DoubleSpace data compression utility lets you store twice as much (or more, depending on the data) on a hard disk than you can without it. And that benefit extends to floppies as well (except 360K disks) when used in systems that have DoubleSpace installed. To create a compressed floppy, first make sure the disk is freshly formatted. Otherwise, a portion of the floppy will be reserved for directory use—a waste of space. With the floppy in the drive and the drive door closed, type `DBLSPACE` at the DOS prompt. Press <Alt>C, choose *Existing Drive*, and follow the prompts.

DOS doesn't automatically recognize a compressed floppy disk, however, when you put it in the drive. You have to type `DBLSPACE /MOUNT` from the DOS prompt first or put that line in AUTOEXEC.BAT.

For the most part, you can use a compressed disk just like an uncompressed one. You can save, copy, and delete files as if the disk were uncompressed. But there are some tasks that are DoubleSpace specific. For example, if you wish to format a compressed disk, you have to use the command `DBLSPACE /FORMAT`. —T. J. B.

66 Doin' DEFRAG

DEFRAG, a handy disk optimizer utility licensed from Symantec, is a welcome addition to DOS 6.0. To get top speed from this simple utility, use the DOS command `DEFRAG /SS- /SD-`. The utility's /SS- and /SD- switches sort files by size and date/time, with the most recently modified files nearest the front and those of the same date/time sorted largest first. This way, files that are seldom used migrate to the back, and the ones most often used move toward the front for slightly faster access. —T. J. B.

67 Pick Your Backup

DOS 6.0's backup utility supports just about any drive you can copy files to or from, including network drives and removable disks such as floppies and Bernoulli drives. Each time you do a backup, DOS asks what type of backup you wish to do: full, incremental, or differential. Here's how to decide what you need.

A *full backup* copies all the files you select. Use this method to back up specific types of files, such as all your data and configuration files. You should do this kind of backup whenever you feel the information on your hard drive is correct and vital. It's easy to restore data from a full backup, but the backup itself can be time-consuming.

An *incremental backup* copies only files that have changed since the last full or incremental backup. If you work with lots of different files and want a record of changes that have been made along the way, this is the option you want. The drawback is that you need to use fresh disks for each backup—that can be a lot of disks—and restoring files can take a lot of time.

A *differential backup* copies files that have changed since the last full backup. If you always work with the same files—such as database files—this is the way to go. It doesn't require as much time as a full backup or as much storage media as an incremental backup. You won't have different

versions of your files—only the latest—but restoring lost data is faster than with an incremental backup. —T. J. B.

68 Put the Moves on Directories

In your delight at finally being able to move files with a single DOS command (`MOVE filename directory`), don't overlook MOVE's other trick: renaming directories. Just type `MOVE` followed by the old directory name and the new one. Despite the command's name, you don't actually move the directory; you've simply renamed it. —V. W.

69 Boot Disks for a Rainy Day

DOS 6.0 lets you start a troubled system without a boot disk in drive A:, but don't let this feature keep you from making an emergency start-up disk of essential files.

S o m e t h i n g could happen to your hard disk, and then where would you be? Slip a blank disk in drive A: and enter each command in **FIGURE 16**, and you'll be ready for any emergency. (If your A: drive is only 360K, you'll need a second disk, formatted without the /S parameter, for the last six files.)

```
C:
CD \DOS
FORMAT A:/S/Q/U
COPY CHKDSK.EXE A:
COPY DEBUG.EXE A:
COPY FORMAT.COM A:
COPY FDISK.EXE A:
COPY MOVE.EXE A:
COPY QBASIC.EXE A:
COPY RESTORE.EXE A:
COPY EDIT.COM A:
COPY SYS.COM A:
COPY UNDELETE.COM A:
COPY UNFORMAT.COM A:
```

FIGURE 16: CREATE AN EMERGENCY boot disk using these commands.

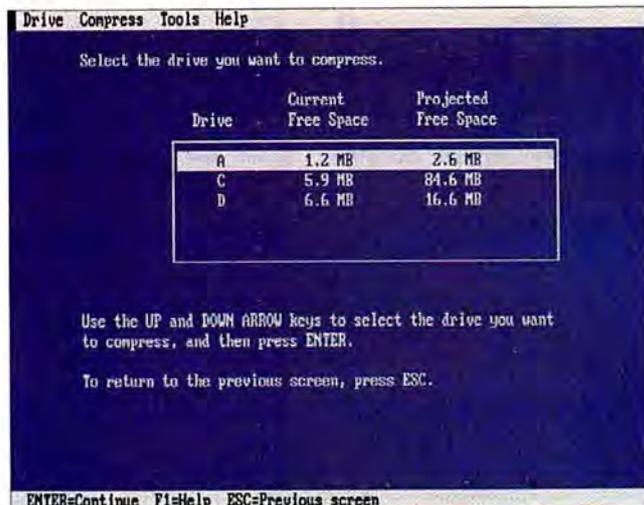
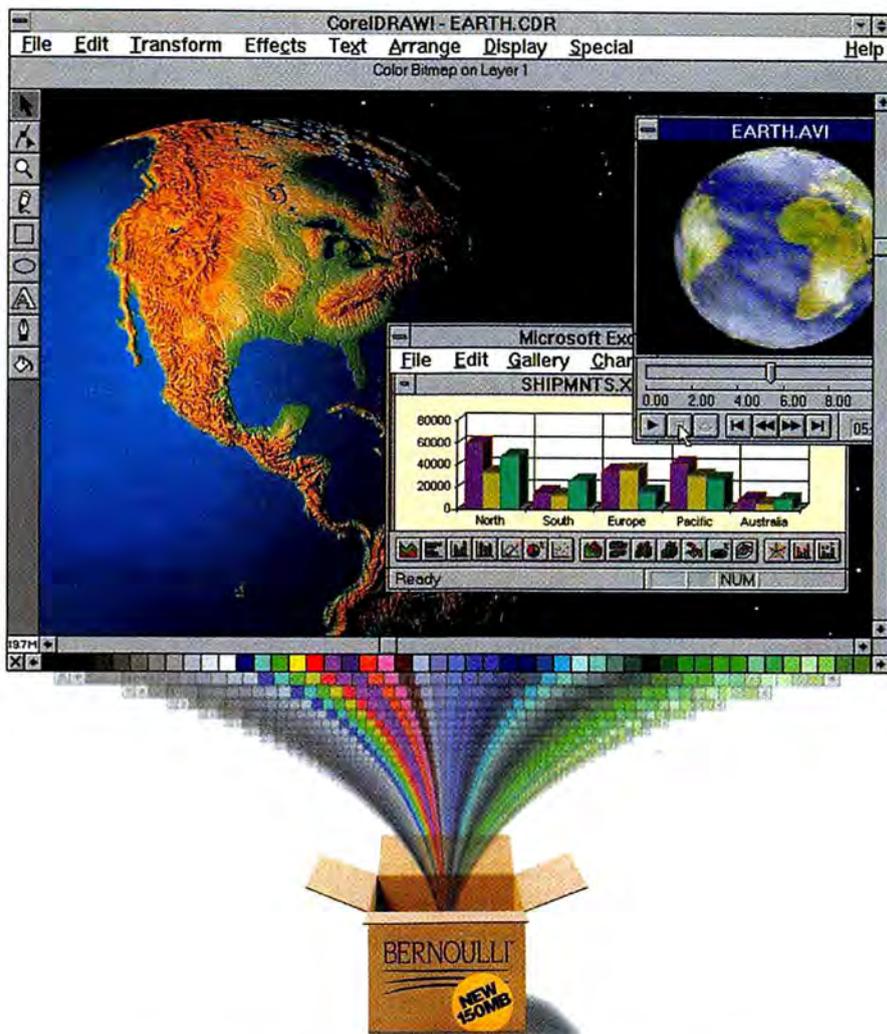


FIGURE 15: MICROSOFT'S DOUBLESPEACE UTILITY CAN STRETCH the storage capacity of floppy disks as well as hard disks.



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```
[menu]
menuitem=john John's Configuration
menuitem=jane Jane's Configuration
menudefault=jane,30
[common]
device=c:\dos\himem.sys
dos=high
[john]
files=35
device=c:\dos\ansi.sys
set path=c:\windows;c:\dos
numlock=on
[jane]
files=25
set path=c:\dos;c:\quicken
numlock=off
```

FIGURE 17: DOS 6.0 MAKES MULTIPLE BOOT CONFIGURATIONS a matter of course.

Label your disk 'DOS 6.0 Startup', put it somewhere safe, and hope you never need it. If you do, though, you will also need your system settings. Load your system's Setup program and write down the hard drive type (if it's a definable hard drive, make note of the number of cylinders, heads, and other stats). You'll also need to restore the contents of your hard drive, so be sure you have a backup of your data and your backup's restore program on floppies. —V. W.

70 Making DOS Backward Compatible

If your system came with DOS 6.0 preinstalled, you may have noticed that certain old DOS commands—ASSIGN, COMP, EDLIN, EXE2BIN, GRAFTABL, JOIN, and others—were not included. Also missing are the sample Qbasic programs and PRINTER.SYS. If you or your batch files use these commands or files, don't despair. You can use EXPAND to load them if you have DOS 5.0 disks (see Tip 47), or you can order the DOS 6.0 Supplemental Disk from Microsoft (800/426-9400). —V. W.

71 Buffered Pain Reliever for DOS 6.0

SmartDrive in 6.0 is actually a two-faceted program. In addition to disk caching, it's a double-buffer utility. Double buffering may be needed if your system has a SCSI, ESDI, or Micro Channel architecture (MCA) drive or other device and you use EMM386 or run Windows in 386-enhanced mode. During installation, DOS 6.0 automatically adds the double-buffer option to your CONFIG.SYS file as a memory-resi-

dent device driver if DOS thinks your system *may* need double buffering. To find out for sure, run SMARTDRV at the DOS prompt and check the 'buffering' column. If all its entries are 'no', you can save memory by deleting the DEVICE=SMARTDRV.EXE /DOUBLE_BUFFER line from CONFIG.SYS and rebooting. —T. J. B.

72 Regain Control of Boot

Ever wish you could bypass both CONFIG.SYS and AUTOEXEC.BAT and go straight to the DOS prompt? As your PC starts to boot, DOS 6.0 displays 'Starting MS-DOS'. When you see that message, press <F5> or hold down <Shift>. —T. J. B.

73 There's a Virus Born Every Minute

One of the most important features DOS 6.0 delivers is built-in virus protection. But new viruses are born every minute, so don't think you're safe if you install DOS 6.0 and VSafe. Make sure you get the updates to VSafe as they come out. Update disks can be ordered from Microsoft using the coupon in the back of the DOS 6.0 manual. But for even speedier protection, download the monthly updates from a bulletin board dedicated to the purpose: Set your communications program's settings to any baud rate up to 9600, 8 data bits, no parity, and 1 stop bit. Dial 503/531-8100 and type NEW when

ANSI.SYS's color codes, type HELP ANSI.SYS at the DOS 6.0 prompt and search for the section beginning 'Set Graphics Mode'. Reboot your system and bid good-bye to that tired old screen. —T. J. B.

75 Multiple Boot Configurations

People using the same PC may need vastly different system configurations, but until now, DOS allowed you only one. DOS 6.0 lets you define multiple configurations in one CONFIG.SYS file and even creates a menu from which to pick your configuration. For example, FIGURE 17 shows a CONFIG.SYS that creates two configurations, one for John and one for Jane.

In the menuitem lines under the [menu] heading, the first word in each line, *john* and *jane*, tell DOS to look elsewhere in the CONFIG.SYS file for the heading with that name if it's the chosen configuration. The rest of the text on those lines is displayed on screen as menu choices 1 and 2 when you boot your computer. The menudefault line tells DOS which configuration to use if one isn't chosen in a certain number of seconds, in this case, 30. The [common] section holds CONFIG.SYS commands to be used in either case. Under the headings [john] and [jane] are the specifics for the two system configurations (you can, of course, have more than two). —T. J. B.

New viruses are born every minute, so don't think you're safe just because you installed VSafe—get the monthly updates via modem.

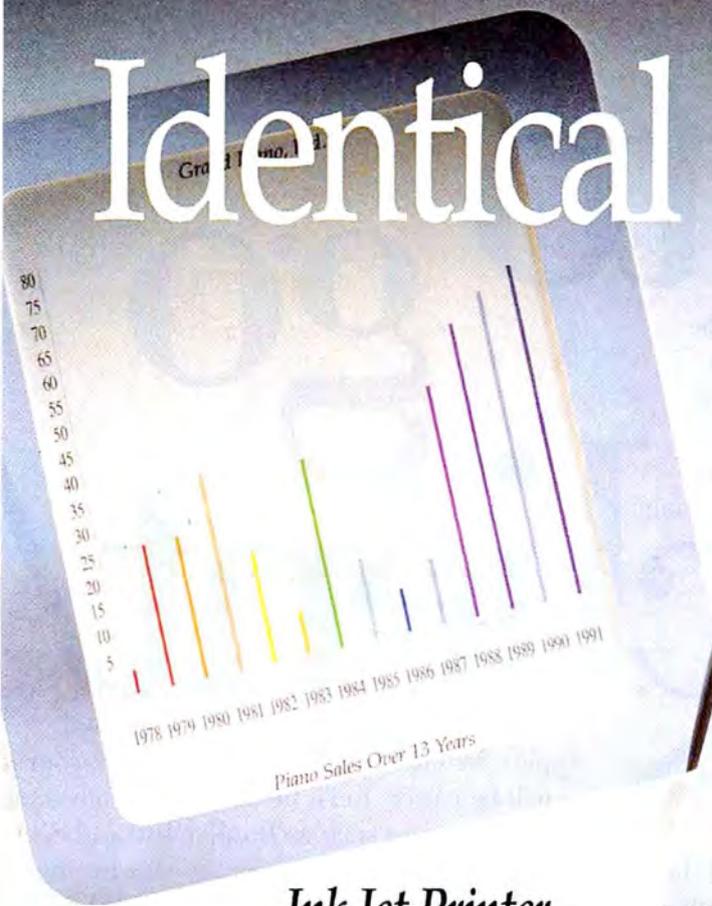
the BBS prompts you for a user identification code. Then just follow the instructions. These monthly updates only identify new viruses, they don't remove them. To sterilize your computer, you'll need the full VSafe updates you get through the coupon in the back of the manual. —T. J. B.

74 Colorize Your DOS Screen

Nothing enlivens a dull screen like a splash of color. To change your DOS 6.0 screen colors to bold white text on a blue background, make sure the line DEVICE=C:\DOS\ANSI.SYS appears in your CONFIG.SYS file, then add the line PROMPT \$E[1;37;44m\$PSG to your AUTOEXEC.BAT file. If you prefer black text on white, use PROMPT \$E[0;30;47m\$PSG. To get a list of

TJ Byers, Scott Dunn, Eric Knorr, Robert Luhn, and Daniel Tynan are contributing editors for PC World; Van Wolkerton is a freelance writer and the author of Running MS-DOS, Sixth Edition (Microsoft Press, Redmond, WA, 1992); Robert J. Lauriston is a freelance writer in San Francisco; Michael Desmond, Steve Fox, Bronwyn Fryer, John Goddard, Karl Koessel, Richard Melville, Shane Rau, Lincoln Spector, and Christina Wood are editors for PC World; Rodney Byron is a software systems engineer in Richardson, Texas; Kirk Steers is a business consultant in Carmel, California; Anne Desmond is a PC World reader in Santa Clara, California; Jeffrey Libby is a reader in Fort Worth, Texas; Charles Lowe is a reader in Miami, Florida; and Mark Stewart is a reader in Allen, Texas.

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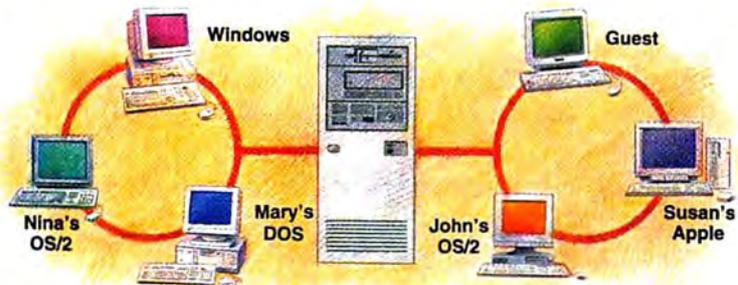
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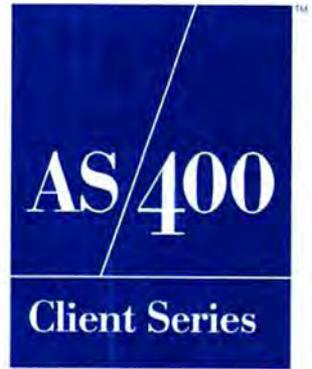
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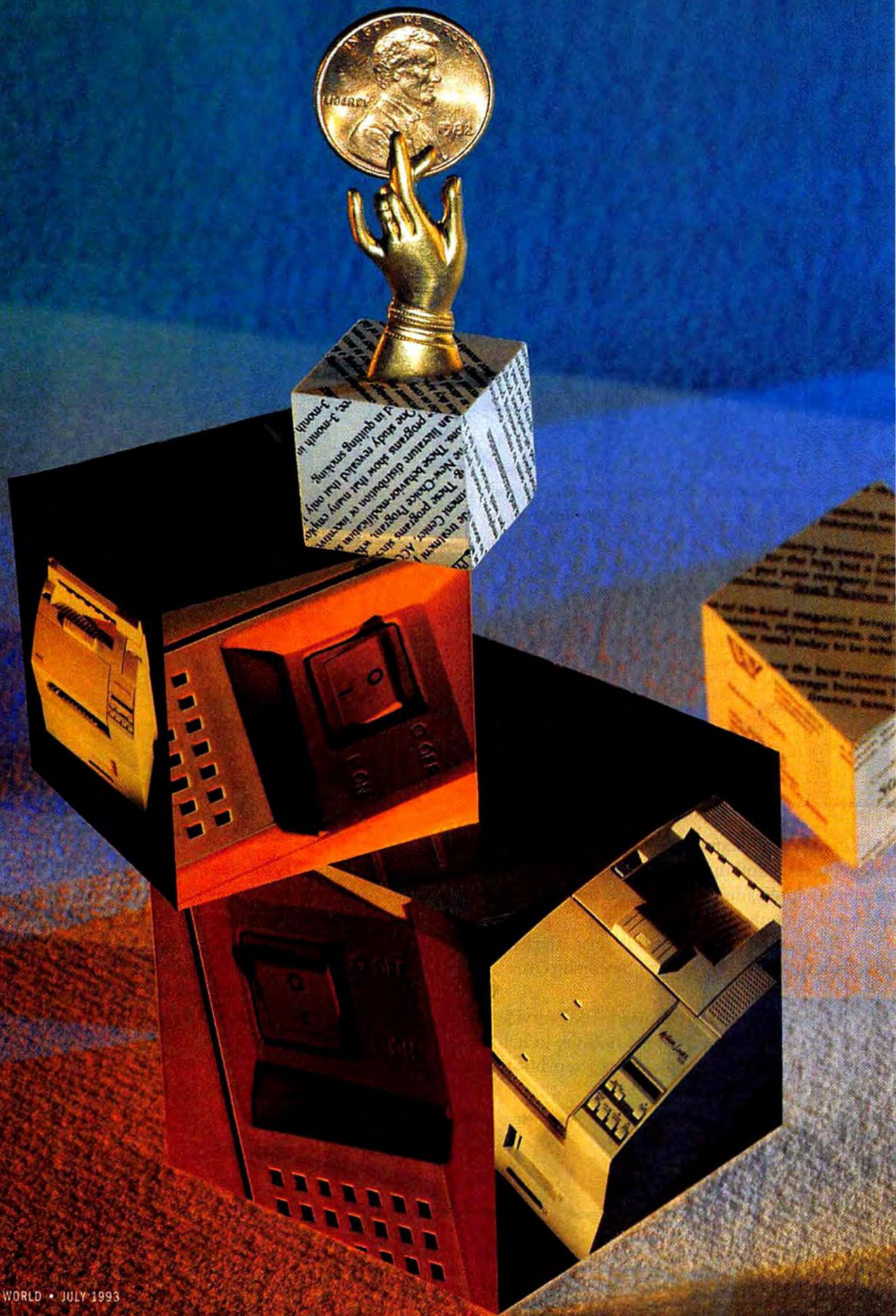
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Laser Printers From \$700

SO THERE YOU ARE, STANDING BY THE OFFICE LASER PRINTER, waiting for it to spit out that two-page memorandum the boss wants on her desk by 5 p.m. But stacked up in the print queue ahead of you are 30 pages of charts and graphs from Bob in accounting, three months' worth of Chad's E-mail, and what looks to be the last six chapters of Darlene's unpublished novel.

It doesn't have to be this way. If you had a personal laser, you'd be back to work by now. Wishful thinking? Not really. Recent offerings from big-name vendors have made personal laser printers more affordable than ever for single users and small work groups.

How big is the change in the laser landscape? The last time we looked at personal lasers (April 1992), just three out of the nine printers we reviewed cost less than \$1000 on the street.

This time we've rounded up nine models that cost under a grand. These lasers didn't just fall off the back of a truck, either. One comes standard with PostScript. Another is rated at a speedy eight pages per minute (ppm). Most give you scalable fonts, resolution enhancement, and other

technical niceties to produce high-quality output—all at street prices starting under \$700.

By Dan Miller

With lasers priced like these, you can afford to print what you want, when you want. Choose a winning combination of quality, speed, and price with one of these nine low-cost models.

Of course, at this price point you can't expect everything. While a more expensive model might give you PostScript output *and* an 8-ppm engine, with personal printers you have to pick and choose—none of them can do it all. Shopping for a low-end laser means deciding which features matter the most to you. That's just one more reason they're called *personal* printers.

So why do you need a personal laser? We can think of at least three good reasons. One: The LAN printer is overloaded, but your department doesn't have enough left in the budget for a second, full-fledged network printer. Two: You need to print confidential materials. Three: You take your job home with you—or you work at home full time—and still need professional-looking output.

Why not buy a dot matrix or ink jet printer and save yourself a couple hundred bucks? Dot matrixes are great for churning out drafts, but are you willing to entrust one with your memo to the boss? Ink jets can produce output that's nearly as good as a laser's, but they're dead slow. If you want good-looking output fast, a laser is your only option.

Personal Printers, Personal Prices

So which personal laser printer is right for you? To help you find out, we collected nine low-cost lasers—four of which weren't yet shipping at press time, plus a couple (from Lexmark and Panasonic) that have been around a while—and rated them on a variety of criteria, the most important being price.

Our rules were simple: We asked vendors to send us the newest printer they had available in the United States for \$1000 or less. For printers sold through traditional retail channels, we collected prices from dealers and mail-order sources around the country. For

those selling direct from the vendor, we used the vendor's quoted price. And for

models that aren't available yet, we used vendor estimates and historic pricing patterns to calculate a projected street price.

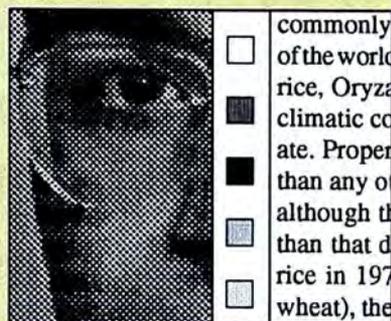
The result was a surprisingly wide range of prices. Generally, the older the printer, the more you'll pay. The newest personal printers, from Epson, Hewlett-Packard, and Texas Instruments, should prove the least expensive, starting somewhere around \$700. If your primary concern is your wallet, these three are your best buys.

Of course, your investment doesn't end with the printer. You still have to buy consumables, such as paper and toner, and upgrades, such as memory. For more information, see "Keeping Your Laser Happy: Tips for Buying Consumables."

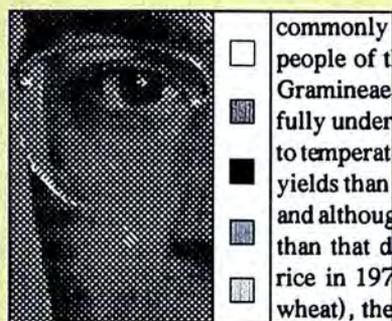
No matter how low its price, a printer still has to get the job done. So after checking these printers for price, we compared them on performance and output quality. The PC World Test Center ran a series of tests including a simple one-page Excel spreadsheet file, a three-page WordPerfect text file, and a one-page PageMaker file incorporating graphics and a variety of fonts. We then combined the results to come up with an overall speed rating.

The newest personal printers should prove the least expensive, starting somewhere around \$700.

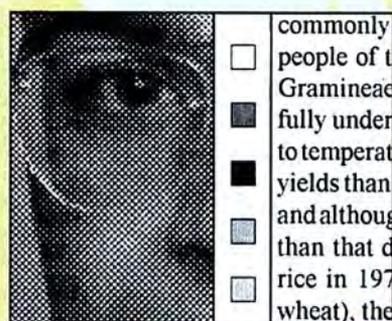
Personal Laser Output: How Good Is Good Enough?



Apple LaserWriter Select 310

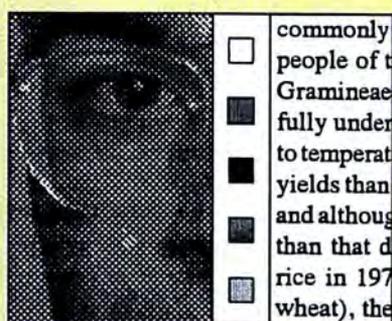


Canon LBP-4sx

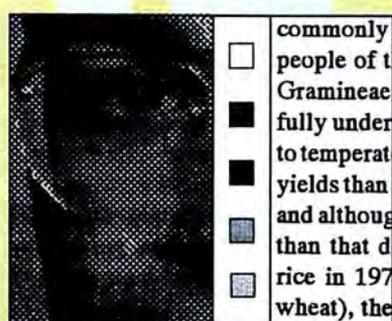


Epson ActionLaser 1000

ALL THESE PERSONAL LASERS produced good text. Surprisingly, while resolution enhancement technology (RET) should make for smoother lettering, our judges liked the crisp look of the Epson's and TI's unenhanced output. For graphics output, our judges liked the PostScript rendering of the Apple LaserWriter Select 310. But emulation isn't everything. The speedy Sharp JX-9600, for example, used the same PCL 5 emulation as several others, but its graphics output was muddier.



Panasonic KX-P4430



Sharp JX-9600

Most discussions of printer performance begin and end with the speed of the printer's engine (measured in pages per minute). However, engine speed gauges only how fast the printer can deliver pages once all the data has been downloaded and processed. Because of the time required to move all the data, the first page of a document takes longer to print than each subsequent page. Several other elements will also affect speed:

- **Type of print job:** Graphics-intensive print jobs take longer to download to the printer than text jobs (just ask anyone who's printed from CorelDraw lately).

- **Processor:** While most of the printers in this review use the aging but still reliable Motorola 68000 processor, a few use RISC-based (Reduced Instruction Set Computer) CPUs, which help to speed up graphics.

- **Fonts:** Your choice of fonts can directly affect print speeds. If you use a font that's already resident in the printer, it will print faster than if all the fonts have to be processed by your system's CPU or downloaded at print time.

Best Buys



Picking the Best Buy from this bunch is like asking Snow White to choose her favorite dwarf. Almost every printer here has some feature that warrants serious consideration. If forced to pick Best Buys, however, we'd recommend the Epson ActionLaser 1000 and the Texas Instruments microWriter. Both are inexpensive, both produce good output with reasonable dispatch, and they won't take up too much desktop real estate.



EPSON'S ACTIONLASER 1000 masters solo printing.

For all these reasons there's a big difference between the rated engine speed of a printer and its actual throughput. The Sharp JX-9600, for example, which uses an 8-ppm engine, actually averaged around 2.2 ppm in our short one- to three-page tests. The 5-ppm and 6-ppm printers were closer to 1.5 ppm, while the two 4-ppm models clocked in at just over 1 ppm. The longer the text document, the closer the printer will get to its rated engine speed. Our conclusions: If you crave speed, check out the 8-ppm Sharp and the 6-ppm Epson.

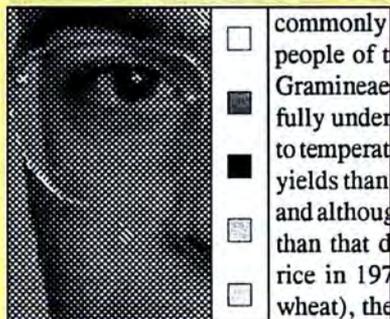
Looking Good on Paper

Speed is great, but output quality is just as important. To find out which of our personal printers produced the best-looking output, we asked a panel of experts, from everyday users to graphic artists, to eyeball samples from each. Print samples included a PageMaker document, an Excel spreadsheet with a bar chart, and a gray-scale test page from CorelDraw.

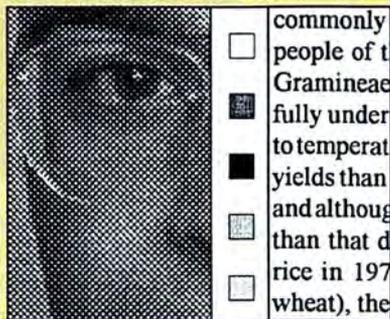
We weren't too surprised by our panel's overall conclusion: While all these printers produce attractive text at the usual point sizes, they have trouble rendering more complicated graphics, such as halftones, solid areas of black, white-on-black lettering, and fine lines on dark backgrounds.

We were more surprised to find that the panel wasn't impressed by resolution enhancement technology (or RET, which alters individual dots to make diagonal and curved lines smoother). While only the Epson and Texas Instruments models do not use RET, the output from these printers was judged among the best in the review. Our advice: Don't dismiss a printer just because it doesn't have RET.

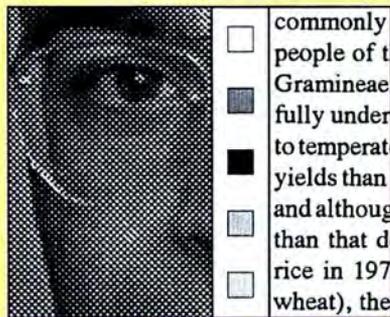
We successfully predicted one result of the output judging: The printer rated best for output quality is the only one in the review that



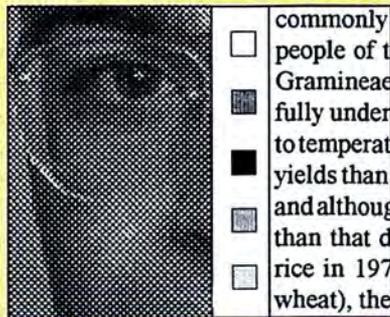
Hewlett-Packard LaserJet 4L



IBM LaserPrinter 4029 5E



Star Micronics LS-5EX



Texas Instruments microWriter

comes with PostScript built in—the Apple LaserWriter Select 310. If output quality is your main concern, you should also consider the Epson, Star, and TI printers.

Getting Personal

Besides being cheap, fast, and producing great output, a personal laser should also be small, quiet, and easy to manage.

Ideally, the printer should be small enough to fit discreetly on your desk—with a footprint of less than 250 square inches, and under a foot tall. But small doesn't mean flimsy. Short of whacking it with a rubber mallet, the best way to gauge a printer's sturdiness is by looking at the length of its warranty, its monthly duty cycle (the number of pages per month the printer can safely be expected to print), and the product life span (measured in pages). These numbers are also a good clue as to whether the printer can handle the demands of more than one user.

Noise is another thing to consider. Lasers can be whiny little bug-gers. If you treasure peace and quiet when you're working, listen closely to HP's LaserJet 4L. It's the first laser printer we've seen that's actually silent when not in use.

A personal printer should also be easy to work with; changing settings for ports, emulations, and the like should not require a degree in astrophysics.

If you use Windows, you already control some printer settings (such as page orientation, number of copies, and paper tray) via the printer and page setup boxes. HP's bidirectional parallel port, along with its Windows-based Explorer utility, gives you even more control by sending messages (such as 'Load Letter') directly to your computer screen.

In the absence of this kind of bidirectional communication, most printers rely on LCD screens and control panels to relay error messages and change printer settings. Controls range from none (the Apple) to many (the IBM's elaborate panel looks like it could be used to launch weather satellites). If you need to switch emulations or ports manually, or if you print from DOS apps that don't give you the same degree of control as you have under Windows, you'll want an easy-to-use control panel.

All these printers come with a parallel port, and most also have serial ports, which are slower but handy if you're connecting a second user to the printer. If you're connecting more than one port at a time, look for a printer with "hot ports," which means the printer can detect which interface a new print job is coming through and switch to that port automatically. Otherwise, you've got to make the switch manually using the control panel.

Reducing Paperwork

Another key ergonomic issue is paper handling. The less often you have to stop to load paper or swap trays, the happier you'll be. Most of the printers in this review come with cassette trays that hold 200 or more sheets of letter-size paper. For envelopes and legal-size paper, you have to use the smaller manual-feed trays, which have adjustable tracks to guide papers of different sizes through the printer.

The Canon and Epson printers don't have cassettes; they use adjustable paper trays instead. These trays hold less than most cas-

ettes but more than a manual-feed tray and can accommodate anything from an envelope to a legal-size sheet. The Panasonic offers a combination: A paper cassette holds letter-size sheets, while its cover doubles as a manual-feed tray.

Most printers also give you the option of adding a second paper cassette, which means you can fill one with letter-size paper and the second with envelopes, or one with letterhead and the other with

Recent offerings from big-name vendors have made personal laser printers a lot more affordable for single users and small work groups.

second sheets. These second cassettes also boost your overall paper capacity, which means you have to add paper less often—a real boon when sharing the printer with others. When it comes to paper handling, the IBM, Panasonic, and Texas Instruments are best.

You also need to be sure the printer speaks your language. Last year the language the printer used—PCL 4, PCL 5, PostScript, or others—could determine the fonts you had access to, as well as the complexity of the graphics you could produce. For example, PCL 5 and PostScript both support scalable typefaces; PCL4 doesn't. That meant PCL 5 and PostScript users could create fonts of all sizes,

Apple LaserWriter Select 310



VITAL STATISTICS

Estimated street price: \$897

PROS: Excellent graphics output, built-in PostScript

CONS: Slower than some, bare-bones control panel

Contact: Apple Computer, 800/776-2333

Reader service no. 600

If you're looking for a low-cost laser with artistic flair, Apple's new LaserWriter Select 310 paints a pretty picture. It received consistently high marks from our judges for its work with graphics, producing solid blacks, smooth grays, and sharp lines. Also, it did better than any other printer with white-on-black letters.

One reason is that the Apple comes standard with PostScript (Level 1). The printer's 1.5MB of memory (expandable to 5.5MB) is just enough to print a full page of PostScript graphics, and its 13 scalable Adobe Type 1 typefaces make for eminently readable text. While its \$897 street price is only middle of the road for most personal lasers, for a PostScript machine it's a steal—making the 310 a bargain for cash-poor desktop publishers.

In addition to top-notch graphics output, the 310 gives you a 250-sheet standard paper tray, expandable to a whopping 800 sheets with the optional second cassette. While this kind of paper capacity might entice you to share the printer, think twice.

For one thing, the Apple is on the slow side. While it features a 5-ppm Fuji-Xerox engine and an AMD RISC processor, crunching the PostScript code bogs down actual throughput speed to an

while PCL 4 users were stuck with a handful of fixed-size fonts.

This year, printer language support is less important. Why the change? With Windows 3.1's built-in TrueType technology, Adobe Type Manager, and numerous DOS type-scaling utilities, most users no longer need a PCL 5 or PostScript printer to get scalable type; they can scale fonts in their own PC.

As a result, a printer's number of resident fonts is also less crucial than it once was. (The exception, of course, is for DOS users who lack a type-scaling utility.) Except for the Epson, Sharp, and TI, all the printers here come with 8 to 26 scalable typefaces in either the Intellifont, Adobe, or Bitstream formats. Just remember that even if the printer has 14 scalable typefaces, it's likely those 14 are just bold, italic, and normal variations on a couple of basic faces.

Of course, there are other emulations available beyond PCL and PostScript. The IBM LaserPrinter 4029 5E from Lexmark's proprietary page description language, PPDS, also gives users access to scalable fonts. Other printers support HPGL/2, which is handy for engineering and CAD drawings, or IBM and Epson dot matrix emulations, which are useful if you're using particularly antiquated software that lacks drivers for PCL 4 or PCL 5.

One final consideration: Check out the warranty and service agreement. Most of these printers come with a one-year warranty

and toll-free tech support; the Epson and Star printers, however, offer two-year warranties.

Personal Best

If you want good output at a bargain-basement price, you can't go wrong with the Epson, HP, or TI printers. For speed, it's the Sharp and the Epson. The HP is easily the smallest, quietest desktop companion, while for top-quality output, you should be more than satisfied with the Apple, Epson, Star, or TI models.

Still, if we had to pick one printer, it would be the Epson, followed by the TI. While neither can match high-end lasers, both offer low price, acceptable speed, and good-looking output.

And, like the other lasers noted here, both will let you print what you want, whenever you want—and that's a big improvement over waiting at the network printer for Bob and Chad and Darlene.

Dan Miller and Anita Hamilton are assistant editors for PC World. They can be reached on PC World Online (see page 10 for more information).

For more information about all products in this article, circle reader service no. 902.

average of 1.3 ppm on short print jobs. The 310 offers no other emulations—so if your software lacks a PostScript driver, you're out of luck.

Our only other complaint about the 310 concerns its bare-bones control panel: There are four LEDs to indicate the printer's status, but no LCD screen or front-panel buttons. You control most printer functions, such as paper size, orientation, and number of copies, through the Windows driver.

An art critic might call this design minimalistic; an average user might say it's taken minimalism a little *too* far. Spare design aside, if you can live with the average speed, this Apple is an excellent printer for graphics.

Canon LBP-4sx



VITAL STATISTICS

Street price: \$939
PROS: Small, quiet
CONS: Relatively expensive, middling output quality
Contact: Canon, 800/848-4123
Reader service no. 601

The Canon LBP-4sx is like one of those guys at cocktail parties who hovers in the corner near the potted plants. It's nice enough, but not particularly memorable.

In some ways, the LBP-4sx's unobtrusive nature works in its favor. At 1896 cubic inches it's the second smallest printer in the review and it's quiet, producing 46 decibels when printing. One rea-

son it's so compact is that paper feeds from a fold-down tray instead of a cassette. However, that tray holds just 70 pages at a time; you can increase total paper capacity to 320 by adding an optional 250-sheet cassette.

Unfortunately, the Canon's performance and output are also unremarkable. The LBP-4sx averaged only 1.2 ppm in actual throughput on one- to three-page print jobs. Our panelists gave it middling scores for output quality, commenting that solid blacks were streaky and small type not that crisp. Finally, the Canon's \$939 street price is more than you'd pay for most of the other printers in this review.

If you're looking for a small printer, the Canon LBP-4sx is worth considering. If you'd prefer speed, high-quality output, or low price, you should probably look elsewhere.

Epson ActionLaser 1000



VITAL STATISTICS

Street price: \$689
PROS: Fast, excellent output quality, lowest price
CONS: Limited fonts
Contact: Epson America, 800/922-8911
Reader service no. 602

When it comes to personal lasers, Epson is clearly on a roll. Last year we liked its ActionLaser II; this year, it's the ActionLaser 1000, which packs exceptional features and performance into a personal-size box—exceptional enough, in fact, to earn our Best Buy recommendation.

For starters, the ActionLaser 1000 is fast. On our performance tests, only the Sharp JX-9600 was faster. The Epson's 6-ppm Minolta engine and Motorola 68000 CPU combine to produce overall throughput of just under 2 ppm.

The ActionLaser isn't just rushing slipshod through its work, either. Its output garnered the second-highest marks in this review, just a hair below the best. It was the *only* printer we found that could render black and dark gray columns in an Excel bar chart without making them look exactly the same. Text of all sizes came out crisp and readable, even down to 4-point type.

The ActionLaser is also a snap to use. The 150-sheet paper tray can handle any kind of paper, from letter-size and legal-size to envelopes. Despite the printer's diminutive stature, it's rated for a burly 11,000-sheet duty cycle. Best of all, it's cheap—you can easily find this printer for under \$700 on the street.

In fact, we have only two complaints about the ActionLaser. First, it comes with an underwhelming 14 bit-mapped fonts, most of which are variations on 10-point and 12-point Courier. To amend this lack of fonts, the 1000 has two cartridge slots—one for standard HP cartridges, the other to hold proprietary emulation cards—that are easily accessible on the front panel.

Second, the printer comes standard with just 512K of memory; fortunately, you can upgrade that with standard DRAM to a maximum of 6.5MB.

The kicker—the Epson has the lowest estimated street price in

the review. Except for its deficiency of fonts and standard memory, the ActionLaser 1000 has everything you could want. Its combination of low price, high speed, and excellent output earns Epson its second Best Buy in a row.

Hewlett-Packard LaserJet 4L



VITAL STATISTICS

Estimated street price: \$700

PROS: Low price, extremely compact, quiet

CONS: Limited upgradability, slow

Contact: Hewlett-Packard, 800/752-0900

Reader service no. 603

HP invented the category of personal laser printers when it introduced the LaserJet IIP in 1989. The IIP upped the ante with font scaling and other technical enhancements. Now the company that put the *P* in personal lasers gives us the LaserJet 4L, which raises the question: What does the *L* stand for?

Well, it might stand for Low-priced. Selling for an estimated \$700

Keeping Your Laser Happy: Tips for Buying Consumables

A printer needs toner and paper the way a car needs oil and gas—it can't run without them. And just as a new carburetor will get that old jalopy ready for racing in the streets, your printer may need memory upgrades if it's going to handle the added strain of graphics or PostScript printing.

Buying consumables for your printer is no small matter. Assume you'll use a printer for five years and that you'll produce 500 sheets

Toner

Most printers use toner cartridges that combine a container of toner powder with a drum that actually applies the toner to the paper. Some printers (such as the Sharp and Panasonic in this review) use separate toner and drum assemblies, which makes them a little harder to replace. Because drums last longer than toner cartridges, however, separate units can save you money in the long run.

Individual toner cartridges cost \$40 to

expensive, at just \$.005 to \$.015 per page.

The least-expensive place to buy new toner is a local computer superstore or an office-supply store. Be sure to call before you stop by, however, to make sure the cartridge you want is in stock; some stores raise their prices for items they must order specially.

While advertised mail-order prices for toner are competitive with those of superstores and office-supply stores, be sure to ask about shipping costs and sales tax before placing your order.

A few printer manufacturers, including Canon and Epson, also sell toner directly, with minimal shipping charges. Epson's direct price is the same as that of the superstores, but Canon's is more expensive—\$95 as opposed to around \$75 when buying from a superstore.

If the cost of new toner cartridges is getting you down, you have another option: remanufactured cartridges, which can save up to 40 percent off the street price of brand-new ones. Unfortunately, remanufactured cartridges suffer from an image problem, thanks to reports of poor print quality, short life span,

If the cost of new toner cartridges is getting you down, you have another option: remanufactured cartridges, which can save up to 40 percent off the street price of new ones.

per month. Adding together paper and toner costs, you can plan to spend at least \$20 a month, or \$1200 over the lifetime of the printer—more than some of these printers cost.

So where's the best place to buy the supplies you need to maintain and improve your printer? Here are a few tips to get the best deal on price, quality, and reliability.

\$200 each, depending on which printer you own, and can last anywhere from 2500 to 15,000 sheets. On average, toner will cost you somewhere between \$.02 and \$.025 per page. By comparison, the ink cartridges used in ink jets typically cost from \$.025 to \$.04 per page, depending on how much of the page you're covering; dot matrix ribbons are less



on the street, this little cousin to the LaserJet 4 is one of the most affordable lasers around.

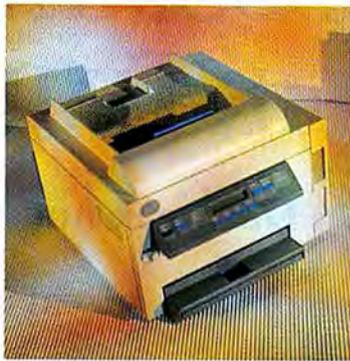
And it almost certainly stands for Little. At 6½ inches high and 14½ inches square, the 17½-pound 4L is astonishingly wee, easily the smallest printer of the bunch. The 4L is also quiet: The unit immediately powers down after it's done printing, so you hear nothing, not even a fan.

Despite its small size, the 4L is a technology Leader, with intriguing, cutting-edge features. Some of these are hand-me-downs from the LaserJet 4, such as the Bitronics parallel port, which is not only faster than standard parallel ports but also supports bidirectional communications, letting you control the printer from your keyboard. The 4L also uses memory compression, effectively doubling the capacity of the standard 1MB of RAM.

Unfortunately, the *L* also stands for Limited. The 4L is one of three printers here without the option of upgrading to PostScript. You can't improve on the 100-sheet input capacity. And while the 4L produces acceptable if unexceptional output, its 4-ppm Canon engine and Motorola 68000 CPU managed to ooze out pages at just over 1 ppm, making the 4L a bit of a Laggard.

Despite these limitations, however, the 4L is a letter-perfect choice for buyers seeking a laser that takes the smallest possible bite out of their budget and their desktop. But anyone looking for faster printing at a similarly low price should check out the Epson or Texas Instruments.

IBM LaserPrinter 4029 5E



VITAL STATISTICS

Street price: \$960

PROS: Sturdy construction, good for shared use

CONS: Large, comparatively expensive

Contact: Lexmark International, 800/358-5835, 606/232-2000

Reader service no. 604

The IBM LaserPrinter 4029 5E is a solid, reliable machine that's probably best suited for small work groups. The 5E's work group-readiness starts with a hefty 12,000-sheet monthly duty cycle. It's also the only printer here to offer an optional ethernet or token-ring interface for faster LAN printing. The 200-sheet standard tray should suffice for several users. The final argument in favor of shared use: Packing more than 33 pounds into its 14-by-21-by-12-inch frame, this printer is too big to squat on anybody's desk.

The 5E's \$960 street price is on the high side for this crowd. Lexmark offers a less expensive laser, the 4019, but it is even older than the 5E. Also, as the printer market continues to evolve, Lexmark

and even messy toner leakage. Look for remanufacturers who clean the used cartridges, replace worn-out parts, and reseal the case.

While it is fairly easy to find remanufactured Apple, Canon, HP, and IBM cartridges, you may have a tough time finding other brands. Make sure that the vendor will refund your money should the cartridge fail to perform to your satisfaction. This point is important, because printer manufacturers will not cover remanufactured cartridges under their warranties. Some office-supply stores sell remanufactured cartridges as well, but specialty cartridge stores tend to have a wider selection.

Paper

Paper is easier to buy than toner, because the prices don't vary that much from vendor to vendor. If you buy paper by the case from an office-supply or specialty paper store, expect to pay about \$3.00 a ream (500 pages) for 20-pound bond (the best weight for laser printers). Mail-order stationers charge approximately the same, but be sure to ask

them about possible shipping charges.

If you opt for environmentally friendly recycled paper, you'll pay about 25 percent more. Although recycled paper is not as bright or purely white as the regular stuff, it should work fine in your printer, according to most printer manufacturers (check with yours just to be sure). Recycled paper comes in two varieties: 50 percent recycled and 100 percent recycled. The 50 percent recycled paper is smoother and less likely to jam.

Before buying a large quantity of any kind of paper, however, we recommend that you test it to ensure your printer handles it smoothly. Most vendors will supply you with a handful of sheets gratis if you're buying in bulk.

Memory

While every printer owner needs to replace paper and toner, many will never have to worry about adding memory. However, if you're upgrading to PostScript, more memory is mandatory. And if you're printing lots of graphics and want to be sure your printer has the resources it needs to handle the work, a little extra RAM could be just what you need.

Once you've decided you want to add more memory, you have to decide where you want to buy it. For some printers you'll have to buy brand-name memory modules from the printer manufacturer or the dealer; they won't be available anywhere else. For some popular models, however, you have the additional choice of buying third-party compatibles.

Both brand-name and third-party memory products are available for purchase from dealers, superstores, and mail-order houses. Unless you ask, though, salespeople probably won't tell you whether you're getting brand-name or third-party memory. List prices range from \$100 to \$300 per megabyte, depending on the source and the printer (street prices will be less). Third-party products can cost up to 50 percent less than their brand-name counterparts.

Brand-name memory generally comes with a warranty from the manufacturer. Third-party memory *sometimes* has a money-back guarantee should any compatibility problem arise, but check with your dealer, mail-order house, or superstore before buying.

—Anita Hamilton

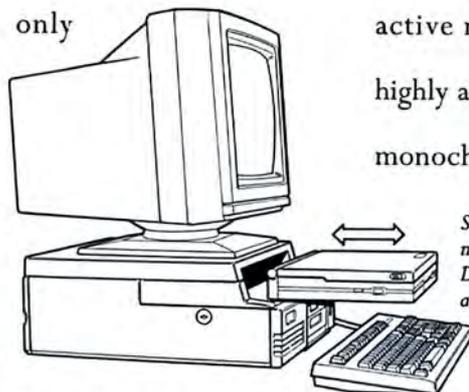
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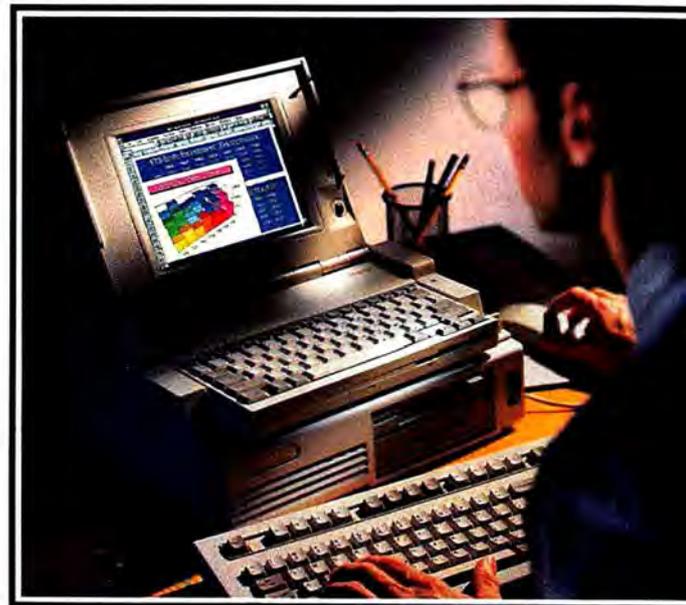
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can be expected to keep up with it by introducing a next-generation personal laser. The 4029 5E is worth considering if you're looking for a reliable (if slow), work-group printer from a proven vendor. If, on the other hand, you want a laser that's more personal in size or price, you should check out the 4019 or look at one of the newer printers in this review.

Panasonic KX-P4430



VITAL STATISTICS

Street price: \$880
PROS: Convenient all-in-one paper tray
CONS: Slowest in review, bulky
Contact: Panasonic Communications and Systems, 800/742-8086
Reader service no. 605

Like the IBM LaserPrinter 4029 5E, Panasonic's KX-P4430 is one of the senior citizens of the personal printer market, and it's beginning to show its age.

The P4430 still has smart paper-handling. The standard cassette tray holds up to 200 sheets of letter-size paper, and you can use its cover to feed in legal-size paper and envelopes by hand. Adding an optional second tray lets you load up to 400 sheets at a time.

Unfortunately, the paper cassette adds to the 4430's bulk; the 4430's paper tray sticks out awkwardly from one end. If you use the fold-down faceup output tray, you'll need still more room. Despite its 5-ppm Matsushita engine, the KX-P4430 is also the slowest printer we tested: Its average throughput was just over 1 ppm.

Panasonic also offers the KX-P4410, a less expensive alternative to the 4430 that has the same large footprint but uses PCL 4 and has less standard memory. As it stands now, the KX-P4430 is a good choice if you print on lots of different papers and if you have the room for its considerable girth. If not, you'd be better off with one of the younger players in the field.

Sharp JX-9600



VITAL STATISTICS

Street price: \$999
PROS: Fastest printer here, large paper capacity
CONS: Lowest-quality output, most expensive
Contact: Sharp Electronics, 800/237-4277
Reader service no. 606

Although we were really looking for personal laser printers this time around, the Sharp JX-9600's surprisingly low price and powerful features make it an attractive work-group printer. The main reason is

that with its 8-ppm Sharp engine and AMD RISC processor (the same CPU that handles PostScript processing in the Apple Select 310), the JX-9600 is far and away the fastest printer here, churning out pages at an average actual rate of 2.2 per minute.

Like the printers from Lexmark and Panasonic, the \$999 Sharp longs to be shared. It features the highest standard paper capacity in the group—500 sheets in the two standard input cassettes and 250 sheets in the output tray. Having two input trays is a real plus: You can use the second tray for letterhead or replace it with an optional envelope feeder for high-volume correspondence.

The JX-9600 comes with 14 bit-mapped fonts and 13 scalable typefaces (variations on the LaserJet III's Univers and CG Times), plus two proprietary cartridge slots for further font flexibility. (A PostScript model, the JX-9600PS, lists for \$1745, \$350 more than the JX-9600.) Finally, the JX-9600 is sturdy enough to have a duty cycle of 10,000 sheets per month.

Our biggest criticism of the 9600 is its output; it received the worst marks in the review from our panel of experts. Granted, we weren't looking for typeset-quality graphics here, but we did find that the 9600 had a tendency to over-ink, which obliterated fine lines and made for muddy halftones.

Still, if you want a printer to share among two or three users, and if your output is primarily text, the JX-9600 is a fast, inexpensive option. For higher-quality output, look to the Apple, Epson, or Texas Instruments printers.

Star Micronics LS-5EX



VITAL STATISTICS

Estimated street price: \$899
PROS: Excellent output, small, quiet
CONS: Expensive
Contact: Star Micronics America, 800/447-4700
Reader service no. 607

Distracted by some of the flashier contestants in our low-end laser lalalooza, we didn't notice the Star at first. It just sat there in the corner next to the Canon, quietly going about its business. It wasn't until we took a closer look that this Star began to shine.

One reason it's easy to ignore the Star is its unobtrusive, 14-by-15½-by-10-inch frame. The 5-ppm Fuji-Xerox engine produces just 45 decibels at full operation, less than any other printer here. The standard paper cassette holds 300 sheets of paper; with the optional second cassette, the printer handles an impressive 800 sheets.

The Star really called attention to itself when we took a look at its output. While most of the printers had a rough time handling our halftone sample, the Star rendered details and gray shades with fine lines and even gradations in tone. The 14 bit-mapped fonts and 8 scalable Intellifont typefaces printed out crisply and clearly, and the Star finished third in our speed trials at an average of 1.5 ppm.

Of course, at a street price of just under \$900, the Star isn't the cheapest printer in this review, and the 3000-sheet duty cycle is

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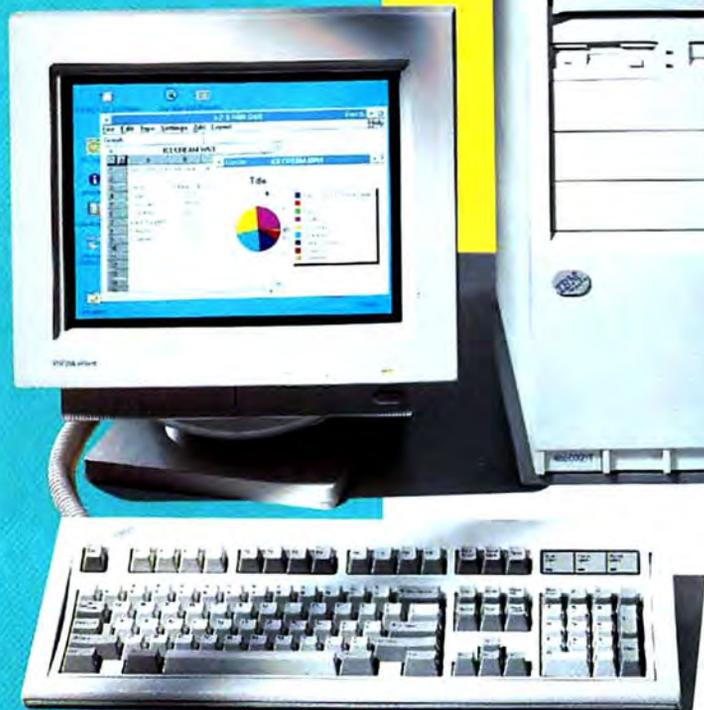
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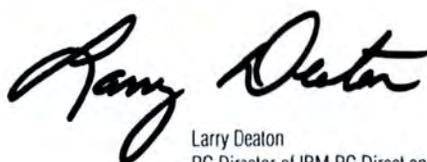
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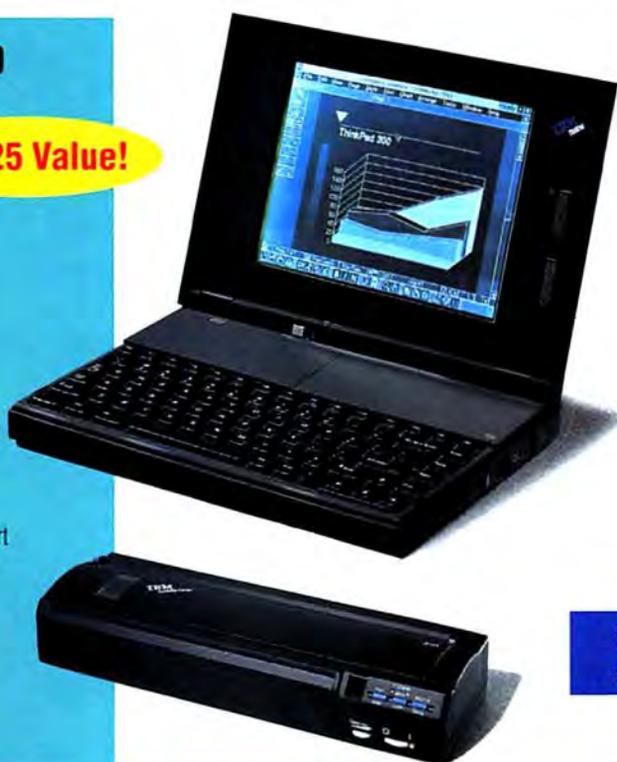
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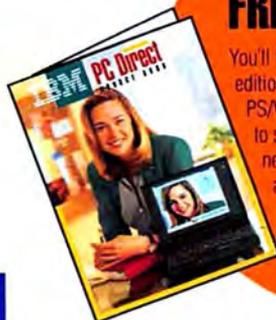
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lighter than most. Still, while it can't match some of the other more affordable printers here in price, the Star is a great buy if you need to have lots of paper capacity or the capability to produce high-quality graphics output.

Texas Instruments microWriter



VITAL STATISTICS

Estimated street price: \$730

PROS: Lowest price in review, high-quality output

CONS: No scalable fonts

Contact: Texas Instruments, 800/527-3500

Reader service no. 608



Looking for the lowest price around on a quality laser printer? Then make a point of hunting down TI's new microWriter. Its combination of low price and high quality put it up there with the Epson as Best Buy.

Since the TI wasn't in stores at press time, we had to estimate the street price based on the microWriter's list price and TI's discount structure. The upshot: You should be able to bag one in its standard

configuration, with 512K of RAM, for a cool \$650; with the RAM upgrade to 1MB included in our test model, expect the price to be somewhere closer to \$730.

But just because it's inexpensive doesn't mean you have to sacrifice print quality. The microWriter's output scored some of the highest marks in the review. It was a particularly deft with graphics, producing fine lines and solid blacks. The 5-ppm Samsung LED engine pumped out a competitive 1.4 ppm in actual throughput, good for fourth overall.

The microWriter also boasts some of the best paper handling we encountered. The 250-sheet standard cassette tray hides underneath the printer; a second feeder holds another 250 sheets. The microWriter also has the second-smallest footprint in the pack, but its 10-inch height means you'll have to give it some head room.

Where the microWriter misfires is with fonts: Like the Epson, it comes with just 14 fixed-size fonts and no scalable outlines. (TI promises a PCL 5 microWriter later this year; PostScript models are already available, starting at \$999 list.) It has no resolution enhancement, although that didn't seem to hurt its output quality. While it comes standard with just 512K of on-board memory, that can be expanded to 4.5MB with a proprietary board (we tested and priced it with 1.5MB installed).

While this memory question makes the TI perhaps a shade less attractive overall than the Epson, its combination of low cost, reasonable speed, and fine output still make it an enviable trophy in the low-end laser jungle and an excellent alternative as Best Buy.

PC WORLD TEST CENTER REPORT

Faster Engines Equal Faster Output

	Rated engine speed (ppm)	Excel 4.0	WordPerfect 5.1	PageMaker 4.0
Sharp JX-9600	8	22	37	28
Epson ActionLaser 1000*	6	26	43	31
Star Micronics LS-5EX	5	32	56	37
IBM LaserPrinter 4029 5E	5	30	53	55
Texas Instruments microWriter*	5	34	56	40
Apple LaserWriter Select 310	5	37	59	46
Canon LBP-4sx	4	40	69	45
Hewlett-Packard LaserJet 4L	4	45	73	57
Panasonic KX-P4430	5	44	71	64

***Best Buy**

The printers in this report are arranged in order of overall speed, from fastest at top to slowest at bottom. All test results are in seconds, measured from the time we issued the Print command to the time the completed page ejected from the printer.

Methodology

All printers were tested as configured by the vendor. We used standard LaserJet II or III drivers as recommended by the vendors, with the exception of the Apple, which used standard PostScript drivers, and the IBM, which used PPDS drivers that shipped with the printer.

Each test was run twice on each printer. The first test was run right after the printer was turned on, before anything else was printed. The same test was then repeated to allow any benefits from font or other types of caching to come into play. Scores are the average of both tests.

Excel 4.0

We printed a simple one-page spreadsheet file.

WordPerfect 5.1

We printed a three-page text document. The score given is the total for all three pages.

PageMaker 4.0

We printed a text page in landscape orientation, with three columns of text, a strong ruler bar with white-on-black text, and a halftone image.

All data based on tests designed and conducted by the PC World Test Center. Testing performed by PC World senior performance analyst Dean Andrews. All rights reserved.

FEATURES COMPARISON

Prices for Personal Printers Plummet

	Apple LaserWriter Select 310	Canon LBP-4sx	BEST BUY Epson ActionLaser 100	Hewlett-Packard LaserJet 4L	IBM LaserPrinter 4025 SE	Panasonic KX-P430	Sharp JX-9600	BEST BUY Star Micronics LS-5EX	Texas Instruments MicroWriter
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● Yes
○ No
n/a = not available

Standard features

List price	\$1099	\$1595	\$799	\$849	\$1099	\$1495	\$1395	\$989	\$828
Street/direct price	\$897 ¹	\$939	\$689	\$700 ¹	\$960	\$880	\$999	\$899 ¹	\$730 ^{1,2}
CPU	AMD Am29205 RISC	Motorola 68000	Motorola 68000	Motorola 68000	Motorola 68000	National Semiconductor 32CG16	AMD Am-29205 RISC	Intel i80960SA RISC	Motorola 68000
Engine	Fuji-Xerox	Canon	Minolta	Canon	Lexmark	Matsushita	Sharp	Fuji-Xerox	Samsung
Rated engine speed (ppm)	5	4	6	4	5	5	8	5	5
Footprint (square inches)	275	223	261	210	293	226	187	215	204
Volume (cubic inches)	2196	1896	2349	1367	3452	2105	2396	2155	2124
Weight (pounds)	26	26.5	22	15.5	33.6	30.9	33.5	29.8	33
Maximum resolution (dpi)	300 x 300	300 x 300	300 x 300	300 x 300	300 x 300	300 x 300	300 x 300	300 x 300	300 x 300
Resolution enhancement	●	●	optional	●	●	●	●	●	○
RAM installed/maximum (MB)	1.5/5.5	1/2	.5/6.5	1/2	1/9	1/5	1/9	1/7	.5/4.5 ²

Fonts and emulations

PCL 4	○	●	●	○	●	○	○	●	●
PCL 5	○	●	○	●	optional	●	●	●	○
PostScript	●	○	optional	○	optional	○	optional	optional	optional
Automatic emulation switching	○	●	●	○	optional	○	optional	●	●
Internal bit-mapped fonts	0	3	14	0	16	14	14	14	14
Internal scalable typefaces	13 ³	13 ⁴	0	26 ⁴	16 ³	8 ⁴	13 ⁵	8 ⁴	0
Font cartridge slots	0	0	1 HP-compatible, 1 proprietary	1 proprietary	1 proprietary	1 proprietary	2 proprietary	1 HP-compatible	1 HP-compatible

Design and construction

Serial/parallel ports	1/1	1/1	optional/1	0/1	1/1	1/1	optional/1	1/1	optional/1
Automatic switching to active port	○	●	●	○	○	●	●	○	○
LCD screen	○	●	●	○	●	●	●	●	●
Noise (db)	40-50	34-46	35-47	0-48 ⁵	38-50	40-50	40-48	37-45	40-50
Sleep mode	○	●	○	●	●	●	●	○	○
Duty cycle (pages/month)	4000	4000	11,000	8000	12,000	3000	10,000	3000	5000
Product life (pages)	150,000	240,000	180,000	n/a ⁷	180,000	180,000	180,000	150,000	n/a ⁷
Life span of toner cartridge (sheets) ⁸	4000	3500	6000	3000	7000	3000	15,000	4500	2500

Paper handling

Standard/max. input capacity (sheets)	250/800	70/320	150/400	100/100	200/300	200/400	500/500	300/800	250/500
Standard/optional paper cassettes	1/1	1/1	1/1	1/0	1/1	1/1	2/0	1/1	1/1
Min./max. paper weight (pounds)	16/28	16/28	16/42	16/36	16/35	16/35	16/21	16/28	16/36
Max. facedown output capacity (sheets)	150	50	100	50	100	100	250	150	200
Max. faceup output capacity (sheets)	0	20	20	50	20	20	0	0	30
Straight paper path	○	○	○	●	●	●	○	○	●

Service and support

Warranty (years)	1	1	2	1	1	1	1	2	1 ⁹
Toll-free tech support	●	●	●	○	○	●	●	○	●
Daily support (hours)	12	11	12	11	10	9.5	10	8	12
On-site service	optional	○	optional	○ ¹⁰	optional	○	○	○	○

¹ Estimated street price; product not shipping at press time. ² Tested and priced with 1.5MB of RAM. ³ Adobe Type 1. ⁴ Intellifont. ⁵ Bitstream. ⁶ Virtually silent when idle. ⁷ Vendor does not estimate product life span. ⁸ At 5 percent coverage. ⁹ Five years on printhead. ¹⁰ Depends on dealer.

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The Complete Hard Disk Toolkit

Put together a suite of
PC applications without
disk utilities, and you're
asking for disaster.
Keep your hard drive
humming and your data
safe with the best of
these 13 disk utilities.

By TJ Byers, Rex Farrance, and Karl Koessel

Imagine buying a car and never lubing it, changing the oil, or even insuring it. If that idea is as soothing as the sound of squealing brakes, try to figure out why so few PC users pay any attention to their hard disks. Unless you've had work totaled by the loss of a crucial file, you may not think much about disk maintenance or data protection. That kind of nonchalance can cost you. If you don't have a reliable data recovery utility and a disk optimizer to keep file segments in sequence and to boost your chances of recovering them, you're already in trouble—whether you know it or not.

Thanks to continually improving manufacturing standards, hard disk failures are rare these days. But the most reliable hardware can't prevent accidental file deletions. Furthermore, software glitches and hung systems occur frequently, jeopardizing data, causing disk problems, and emphasizing your need for disk care tools.

You'll be relieved to know it won't cost a mint to stock your toolbox. Buying the right tools up front will ensure that you pay the right price—in license fees—rather than a much costlier penalty in lost data. The most expensive of the 13 disk care utilities reviewed here list for \$179: You shouldn't have to pay more than \$125 or so if you buy from a local or mail discounter. But do you buy a full data recovery library, such as PC Tools, Norton Utilities, or Ontrack's DOSUtils 2.1, or stir up your own blend of stand-alone





GLENN MITSUI

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packages? And what about DOS 6.0, with its new complement of disk care utilities? Should you satisfy yourself with this operating system upgrade, or is there still more power available from the competition? We took a hard look at 13 disk care packages—stand-alone and bundled. Let our evaluations guide you to the right choice.

Data Recovery: Your First Defense

The first law of data recovery is not to allow a single write to the hard disk until after you have recovered your lost file. If you don't have a data recovery program installed on your hard disk or the disk is too scrambled to run that program, you'll need to run your recovery program from an emergency floppy. Seven of the nine packages with data recovery capabilities provide emergency help.

Hard disk space is comprised of chunks called *clusters*, much as a book is assembled from pages. DOS uses directories to organize and track files, and each directory entry stores a file's name, date, size, and the location of the file's first cluster. To track clusters that are in use, DOS keeps a list called the file allocation table (FAT). If a file occupies more than one cluster, the FAT indicates the next clusters' locations—and for the last cluster, an indication that DOS should read no further.

When you erase a file, DOS deletes the first letter of the file's name from the directory entry, and the file's cluster allocations in the FAT are marked as available for use. The data itself remains intact until overwritten by another file, so if the deleted file occupies just one cluster, all you have to do to recover it is provide the recovery utility with the file name's missing first character. Every data recovery program here provides this level of file "undeleting."

If the file occupies more than one cluster, your recovery job gets

tougher, because the entries in the FAT that identify and order the file's clusters are lost. Then you must use your recovery program to find and rejoin the clusters in the correct order. It's much easier to reassemble a file if you keep your disk optimized, with all of a file's clusters following in sequential order. Otherwise, your sole option is to search the disk for used but available clusters and see if they contain the information you need. The undelete utilities in the Central Point, Ontrack, and Symantec packages prompt you with likely possibilities of appropriate clusters. To do reassembly using some of the other products, you have to know which clusters are the right ones—a dicey proposition at best.

Sector Tracking

Fortunately, there are ways to record which clusters a file was stored in before it was deleted and in what order it occupied those clusters. Called *sector tracking* (clusters are made from sectors), the most common method involves saving a snapshot of the FAT to a file when the PC is first booted. This method doesn't take any system RAM, but the sector-tracking file becomes outdated as you work. Consequently, files created and deleted after the last boot are unrecoverable by this method. This snapshot sector tracking (sometimes called image saving) is most often used to recover accidentally formatted hard disk drives. The Central Point products and DOS 6.0 offer an additional option: TSR sector-tracking programs record which sectors a file occupies when it's deleted.

File Mirroring

But knowing which clusters a file was in doesn't help when those clusters have been overwritten. For ultimate protection, some utili-

Data Recovery, Optimizer

BeckerTools 4

PROS: Good data recovery usability, Windows application **CONS:** Mediocre disk care utilities

Abacus' BeckerTools 4 is known for Windows disk and file management utilities. But this \$130 collection does provide basic undelete utilities and an optimizer. It even lets you undelete files without renaming them—useful if you have a directory full of accidentally erased files and you're trying to figure out which you need. The point-and-shoot installation is automated, and Abacus provides a nice file management shell, a file-search utility, an archival utility, screen savers, a file viewer, a backup program (to logical drives only), and more.

But BeckerTools' data recovery and disk optimizing fall short. For example, BeckerTools doesn't use file mirroring or sector tracking. Like most Windows optimizers, BeckerTools shells to DOS to run. But it won't run in the presence of any other Windows or TSR app—even BeckerTools' own launcher. Worse, the optimizer flunked our

power-interrupt test, doing major damage to the file structure.

Abacus has a security-defrag option that removes all traces of data from erased sectors. But the optimizer puts a 1024-file limit—including erased files—on each directory. Moving over-limit files to another subdirectory didn't work; the files remained listed as recoverable. Despite efforts to wipe our test subdirectory, BeckerTools wouldn't optimize it.

BeckerTools 4 has something to offer as a low-cost Windows toolbox, and we also liked its ability to unerase files by the dozens automatically. But we can't recommend it for overall disk care. *Abacus, 800/451-4319 Reader service no. 613*

Optimizer, Antivirus

Disk Technician Gold

PROS: Real-time disk scanning **CONS:** Slow optimizer

Disk Technician Gold is unique in its ability to provide real-time surface monitoring. The memory-resident disk scanner runs in

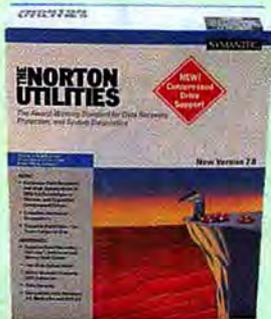


DISK TECHNICIAN GOLD'S memory-resident scanner loads and runs through a comprehensive disk-error checklist at boot-up.

Best Buy



FOR TOP-FLIGHT DISK CARE, including data recovery, disk optimization, and more, you can't beat our Best Buys: Central Point's PC Tools 8.0, Symantec's Norton Utilities 7.0, and Central Point's PC Tools for Windows.



ties use file mirroring, which creates a hidden directory to store deleted files in their entirety. If you need to undelete a file, the utility has a complete copy to restore. The size of the mirror directory is limited to save working disk space, and if a deleted file exceeds the ability of the mirror directory to hold it, the utility will make room by purging files, starting with the oldest.

The drawback is that these TSRs use a chunk of system RAM plus a hefty helping of hard disk space. You can usually reduce the size of the mirror directory and increase your working disk space—

by sector, either reading each repeatedly or reading and writing back the same data. A deeper analysis, called *pattern recognition* or *scrubbing*, writes a pattern to the sector, reads it back, and compares the two. If data or patterns don't match, most scanners mark the sector as bad and move the recoverable data.

The trouble underlying many chronic problems is often not with the disk at all. Dirty or loose cable connections and defective controllers are at least as frequent culprits as failing hard disks. Only Disk Technician Gold has the talents (continues on page 164)

the background, always on the watch for disk errors whether you're in DOS or Windows. No disk activity goes without scrutiny. For example, if a program has to access a sector more than once to get a valid read, Disk Technician Gold marks the sector as suspicious. If the same sector continually turns up, the program moves the data and marks the sector as bad.

Actual hard disk problems are increasingly rare. Glitches more commonly arise as a result of a dirty or loose connections or overloaded power supplies. Disk Technician identifies these problems by keeping a running chart of these abnormalities. The program analyzes the data to create a profile of the failure mode and predict a probable cause. Furthermore, the manual is chock full of diagnostic and care tips. Seagate has selected a subset of this program to recertify hard disks in the field, which lends Disk Technician further credibility.

Disk Technician includes a capable disk optimizer. You run it manually from the DOS prompt, in either a quick mode or the safe mode, which coasted right through our

power-failure test. Defragging speed was the slowest by far, however. Company reps assured us that they have identified the source of the sluggish performance and plan to correct it. Disk Technician Gold is alone in its ability to monitor your disk and prevent data loss due to hardware failure. However, it won't help you recover from operator error. Still, although this program is not for everyone, it will be a boon to users who need to keep up a constant guard against hardware failures. *Disk Technician*, 619/274-5000 Reader service no. 614

Data Recovery, Optimizer, Antivirus

DOS 6.0

PROS: Full complement of DOS and disk care utilities **CONS:** Power-failure problems with defrag

With the introduction of DOS 6.0, you may get the impression that Microsoft is trying to be all things to all people. Of course, veteran users might say DOS 6.0 is just finally providing most of the utilities any operating system should have. Whatever your point of

view, it's gratifying to see DOS covering the bases. DOS 6.0 provides the three top forms of data recovery, a fast disk optimizer, and solid antivirus protection. Best of all, you may already have DOS 6.0 installed—if you've just bought a new PC. If not, the upgrade's list price is a modest \$130.

Microsoft went to the masters to assemble its utility collection. The data recovery and antivirus utilities are licensed from Central Point, so it's not surprising that its file mirroring, sector tracker, and emergency data recovery options have the look and feel of PC Tools. The disk optimizer comes from Symantec, publishers of Norton Utilities. The optimizer is a slimmed-down version of SpeedDisk with some of the bells and whistles missing. The number of defrag options and sort routines is reduced too. Nonetheless, it retains SpeedDisk's speed and can defrag its own compressed drives. The optimizer also retains a flaw found in Norton Utilities 6.01, achieving some of its speed by not *quite* fully defragmenting all files. Fortunately, we couldn't detect a post-optimization speed penalty in applications.

but at the cost of shrinking your space for storing deleted files.

Dealing With Disk Errors

Occasionally, data loss results from disk errors, which present themselves in the form of heart-stopping messages such as 'HARD DISK FAILURE' or 'UNABLE TO READ SECTOR.' You can often recover from these problems—if you have the right tools.

Frequently with floppies—and more rarely with modern hard disks—the problem is a sector that's failing or has gone bad. You identify these problems using surface scan testing, which examines the disk sector



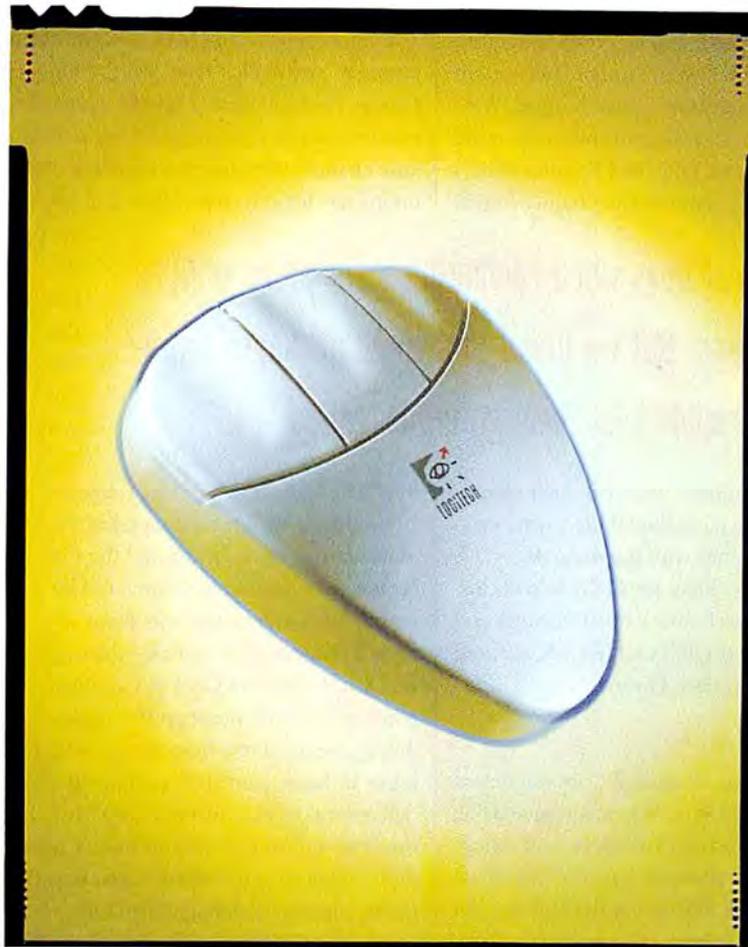
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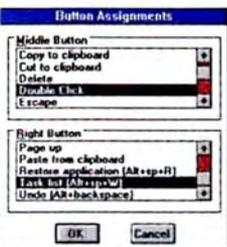
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required for identifying these latter problems.

Some disk problems don't produce error messages. Lost, or orphaned, clusters are the most common of disk errors, and often you find out about them when a program won't run or your system hangs inexplicably. They usually result from power failures, Windows crashes, or other software glitches. A chain of clusters is in the FAT marked as used, but its clusters are orphaned because there's no directory entry claiming the first cluster of the chain. Normal

optimizer moves the file data into sequential clusters, increasing the chance of recovering a file if it's deleted later.

If you optimize your hard disk, your apparent system speed will increase, as the disk head will no longer have to jump back and forth to read and write a file. As a rule, you should run the optimizer once a week to keep your disk performance in tune and better your chances of recovering erased or damaged files. Nearly all disk optimizers let you choose between a full defrag, where all the files

are packed tightly together, or a files-only defrag that leaves patches of free space between the defragmented files. The files-only method is faster and gives your system the same speedup as a full defrag, but either way, files will begin to

We questioned awarding Best Buys when comparing stand-alone utilities with utility-laden powerhouses. But we found that three packages represent such terrific buys we couldn't let them go unrecognized.

DOS operations can't read, copy, delete, or reuse such chains. Another messageless error arises from cross-linked files, which you may notice when more than one file ends with the same data. This happens when an erroneous FAT entry links one file's chain of clusters with another file's. You can detach and fix lost clusters and crosslinked files using utilities such as DOS's CHKDSK, Central Point's DiskFix, or Symantec's Norton Disk Doctor.

Keeping Your Disk Optimized

Fragmentation is normal and happens on every PC as you delete and create files and change and move them. When you save a file, DOS uses the first available cluster, then the next, and so on. Because available clusters are often scattered across the disk, a file can be fragmented—that is, stored in nonsequential clusters. An

optimizer moves the file data into sequential clusters, increasing the chance of recovering a file if it's deleted later.

fragment again as you delete, create, save, and copy them. Your first disk optimization takes the longest. To give you an idea of just how long, we measured the time it took for each program to optimize a moderately fragmented 80MB hard disk. Average time for the first optimization was about 10 minutes, running from as little as 5 minutes for Gazelle's—the quickest—to almost half an hour for Disk Technician Gold. A files-only initial defrag averaged about 6 minutes. Subsequent optimizations simulating a typical weekly defrag averaged less than 35 seconds, indicating how little time it takes to keep your disk optimized. Gazelle's was fastest at full defrags and weekly maintenance, and DOS 6.0's defrag completed the fastest files-only optimization. Control tests indicate that hard disks' application execution speed benefits equally no matter which utility you use for defragmentation.

We weren't so lucky when pulling the plug, however. Timing proved critical. If we cut power early, files became scattered; if we waited, the data remained intact.

DOS 6.0 also provides a subset of the Norton Backup for DOS, which will be welcomed by users who do backups to logical devices or floppies—but not to most tape drives. Microsoft also includes a real-time compression utility capable of approximately doubling hard disk capacity. There's no question that Microsoft is giving us a brand-new, improved DOS. While we doubt this package will satisfy power users with its new utilities, for most, it will be all they need. *Microsoft, 206/882-8080* **Reader service no. 615**

Data Recovery

DOSUtils 2.1

PROS: Excellent fragmented file recovery

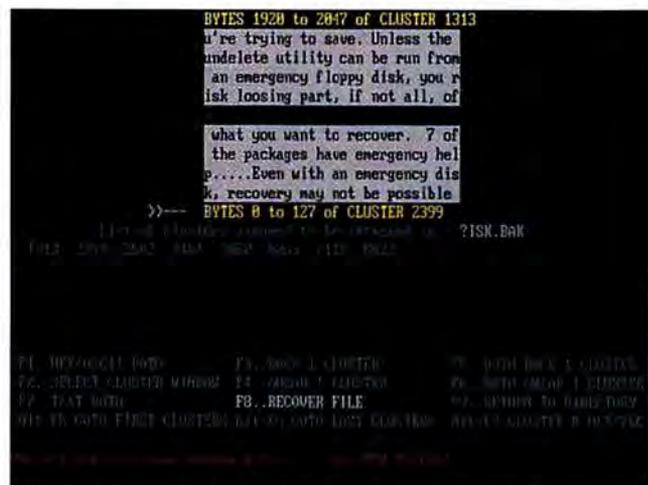
CONS: No sector tracking or file mirroring

You may already know Ontrack from its presence in the security and antivirus arena. The \$100 DOSUtils 2.1 is Ontrack's data

recovery package, and it's a credible product at a reasonable price, providing erased file recovery, surface scanning, and low-level format capabilities. While it doesn't support file mirroring or sector tracking, its emergency and fragmented file recovery are as powerful as the more costly undelete utilities from Central Point and Symantec.

Ontrack's DOSUtils 2.1 recovers recently erased files automatically and unerringly, and the excellent menu-driven file viewer makes it easy to find the scattered bits of a fragmented file. But unlike Best Buy Norton Utilities 7.0, whose viewer and editor utilities are interactive, DOS-

Utils 2.1 makes you view and find the pieces with one utility and then paste them together with another. The surface scanner has a full complement of read/write and pattern recognition testing for hard disks. Unfortunately, this collection lacks an optimizer, but



DOSUTILS 2.1's MENU-DRIVEN file viewer makes finding the scattered bits of a fragmented file easy, but you must paste the pieces together with another utility.

Optimum Safety

With the number of data rewrites an optimization requires, you need to know your disk is safe if the power fails. So, we pulled the plug while each optimizer was in action. Most passed this test: But Gazelle Q-DOS's OPTune, DOS 6.0's defrag, and BeckerTools' optimizer caused varying problems. See their reviews for details.

Remember our first law of data recovery? Don't allow *any* writes to your disk if you need to recover a file. That means you should *never* optimize a disk that contains data you need to recover. Several disk optimizers have schedulers that run them periodically. It's up to you to balance the trade-off of convenience against the security of optimizing only when you're sure you don't have lost data.

A Bonus in Productivity Utilities

Many packages give you a bonus in productivity extras, such as screen savers, memory managers, keyboard and screen accelerators, and print spoolers. For example, the Central Point, Gazelle, PC-Kwik, and Symantec products, along with DOS 6.0, provide a disk cache. (See last month's "Caches Pay Off" for more details on disk caching products.) PC Tools 8.0 even adds a remote computing package. And DOS 6.0 has a real-time disk compression utility to stretch hard disk capacity.

Both Central Point packages, the Gazelle product, the two Symantec desktop collections, and DOS 6.0 provide varying levels of backup capability. All the included backup packages, with the exception of BeckerTools' and DOS 6.0's, can handle tape drives. It's worth noting that earlier versions of Central Point and Symantec backup programs and Symantec's antivirus utility have earned prior *PC World* Best Buys.

Making Your Choice

We actually questioned the fairness of awarding Best Buys when comparing fine stand-alone utilities with utility-laden powerhouses. When we screened every package's talents, however, we found that three of these packages represent such terrific buys they couldn't go unrecognized. Central Point's PC Tools 8.0 is a great collection of data recovery and productivity utilities. For our money, it's not just a Best Buy—it's a must for buyers seeking industrial-strength data recovery. PC Tools for Windows is an impressive newcomer—combining most of PC Tools 8.0's data recovery utilities with the only true Windows disk optimizer now available. It provides the most useful Windows desktop interface we've seen, and both Central Point products throw in an excellent backup program. Another Best Buy for Central Point? We couldn't help ourselves!

Our third Best Buy goes to Symantec's Norton Utilities 7.0. Always a must for professional consultants, this freshly spruced-up version is as indispensable—although it doesn't provide the terrific backup and antivirus programs that come with Symantec's two Desktop products. When dealing with almost limitless combinations of data recovery problems, having more than one program can mean the difference between successful repair and failure. So data pros commonly stock up on more than one package. But for most of us, any of our three Best Buys will provide a buoyant life jacket.

TJ Byers is a contributing editor, Rex Farrance an associate editor, and Karl Koessel the technical editor for PC World. They can be reached on PC World Online (see page 10 for more information).

For more information about all products in this article, circle reader service no. 900.

it's a dependable, affordable package. It doesn't provide the range of capabilities of our Best Buys or of DOS 6.0. In their absence, if we accidentally erased a file, we'd take comfort in having DOSutils 2.1.

Ontrack, 800/752-1333 Reader service no. 616

Optimizer

FastTrax 4.05

PROS: Excellent file sorting **CONS:** May require EMS memory

If all you're looking for is a solid optimizer,

the \$70 FastTrax provides very good speed and excellent file organization. The program reads the desired disk organization from a special MakeTrax file that contains a list of the disk's files and directories and their placement order. You can create the MakeTrax file by using a simple point-and-shoot menu: Designate a directory as top priority, and it moves

to the front of the disk along with its files.

Like BeckerTools, FastTrax has a security defrag option that overwrites erased sectors to remove all traces of data. And FastTrax passed our power-failure test with flying colors. In fact, the only drawback we could find is that we needed to install 800K of EMS memory to optimize drives larger than 200MB. If a good optimizer is the only disk tool you're lacking, FastTrax is a top product. *FastTrax, 510/525-3510 Reader service no. 617*

Data Recovery, Optimizer, Antivirus

Norton Desktop for DOS 1.0 Norton Desktop for Windows 2.2

PROS: Great disk utilities, good file managers, great backup program **CONS:** None

Norton Desktop for DOS 1.0 and Norton Desktop for Windows 2.2 belie their names



CREATE THE MAKETRAX optimization organization file using a simple menu: Designate a directory as the top priority, and it moves to the front of the disk along with its files.

Make Windows Roar With Tiger Memory!

Get More Done In Less Time — And Feel Better Doing It.

Does the idea of using your word processor while having your name and address list instantly available appeal to you? How about file transfers and faxes over your modem, running silently in the background while you continue to work? The bottom line is — do you want to easily run multiple applications in Windows at the same time? Multi-tasking. That's the number one productivity boost that Windows offers.

But perhaps you've already tried this just to discover your PC is unbearably slow. Switching from one application to another with the Alt+Tab hotkey can take up to 60 seconds! That's an awful long time when you're just staring at the screen. It even has a tendency to lower your morale, because your production slows to a standstill.

These are all indicators of NOT ENOUGH MEMORY. If Windows doesn't instantly switch from one application to another — get more memory. Four MegaBytes is minimum, but I highly recommend 8MB.

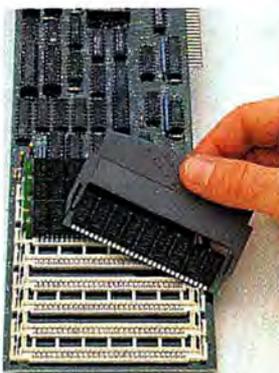
How Much Do I Need? As a rule of thumb, Windows itself uses 1MB of memory. The average Windows application uses an additional 1MB, plus the file itself — for example another 1MB if it's a graphic image screen capture. So running just 2 or 3 applications at the same time (don't forget to leave room for the Print Manager) will use all of 4MB. If you work with 3 or more applications, or you load large files, definitely upgrade to 8MB of total memory. You'll get more done in less time, and feel better doing it!

How Do I Do It? You only need 2 pieces of information:

What type of SIMM (Single Inline Memory Module)? There are generally only two types: a 3 1/2" long, 72-pin SIMM (The ? could be 1, 2, 4, or 8MB depending on the capacity you want), or a 4 1/4" long, 72-pin SIMM. Your manual will say which type you need, but you can just as easily take a ruler to the empty slots.

Exceptions include special laptop memory and some PCs. We've listed the most common special types, but if you're not sure, just call Tiger and ask for help. We have all the latest specs.

Patented SIMM Remover! Sometimes you have to remove existing SIMMs to make room for larger capacity SIMMs. For example, if you only have 4 slots that are filled with 1MB



FREE! Patented SIMM Remover! Removing old SIMMs was never easier with this Tiger Exclusive! Simply slip on the SIMM Remover Tool, tilt and remove. It's that easy! The patented SIMM Remover Tool ships free with every Tiger memory order.

SIMMs, and you need to upgrade to 8MB or more, the 4 existing SIMMs have to go. Caution! SIMMs are tricky to remove — unless you have our patented SIMM Remover Tool. Tiger ships one of the special tools with every order, free of charge, so you'll be able to easily remove existing SIMMs without risk or hassle.

Call Tiger's Memory Specialists for everything you need to make not only Windows, but all your PC's applications roar with new excitement!

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CO1-323D	DeskPro 386N, 386S/20	2MB SIMM	\$99.00
CO1-323E	4/25i, 33i, 486/x, 50M	4MB SIMM	\$169.00
CO1-323F	SystemPro 386, 486	8MB SIMM	\$339.00
CO1-323G	Portable 486/33, 486/66c	16MB SIMM	\$729.00
CO1-323H	Contura 3/25, 3/35c	2MB Module	\$99.00
CO1-323I		4MB Module	\$189.00
CO1-323J		8MB Module	\$359.00
CO1-323L	Compaq LTE Lite 486	4MB Module	\$219.00
CO1-323M		8MB Module	\$419.00
IBM			
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CO1-323O	35 x, 55 x, 65 x, 70 x	2MB Module	\$99.00
CO1-323P		4MB Module	\$169.00
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CO1-323S		16MB KITT	\$659.00
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CO1-323V	PS/1 Pro386SX-M2123	8MB SIMM	\$339.00
CO1-323X	Ps/1, PS/1SX	2MB SIMM	\$109.00
CO1-323Y		4MB SIMM	\$169.00
CO1-323K	Standard 1 x 9 x 80ns	1MB SIMM	\$49.00
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CO1-333Z	Standard 4 x 9 x 60ns	4MB SIMM	\$219.00
CO1-333A	Standard 72 PIN 70ns	2MB SIMM	\$94.00
CO1-333B	Standard 72 PIN 70ns	4MB SIMM	\$169.00
CO1-333C	Standard 72 PIN 70ns	8MB SIMM	\$339.00

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CAPABILITIES	CEI PRODUCTS	VIDEO™ SPIGOT	PROMOVIE™ SPECTRUM
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On board amplified audio	✓	No	No

All other product names or trademarks are property of respective owners.

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NEW LOTUS 1-2-3 RELEASE 4!

Here's the all new Lotus 1-2-3 Release 4 for Windows. After a long awaited debut, it's finally here.

I'm in awe! I first saw the newest version of 1-2-3 in March during a Lotus Executive briefing. I knew then that this was one of the most important events of the last four or five years! That's a big statement, but I believe that. When we received a beta copy just a few days before this catalog went to press, the roof almost flew off this place. Release 4 is brilliant, and I feel sorry for anyone else in the spreadsheet business. If you're using one of those other also-rans, try Release 4 and I guarantee (with a cash money-back guarantee) you'll never look at anything else again.

Lotus has gone in and completely re-designed 1-2-3 Release 4 for Windows, whatever shortcomings the previous version may have contained, the programmers and designers have made improvements — and this release shines! You simply must see it for yourself.

Here's a taste: Release 4 prints column headers on an angle so your spreadsheets don't get ridiculously wide. There are more than 120 all new @ functions, Excel compatibility, 250 new macro commands and more.

We're a Lotus direct account which means we buy directly from Lotus — there's no middleman. We already have our order in and will be in the First Customer Ship (FCS) line-up. So reserve yours now for shipment in mid June.

For more than a decade, Lotus 1-2-3 for Windows has been the world's spreadsheet standard.

Now Lotus brings you a new standard. A phenomenal new spreadsheet, the product of the most extensive user testing program Lotus has ever undertaken. People who have tried it say it's a vast leap forward in simplicity, usability and power. And as part of their *Working Together* strategy, Lotus 1-2-3 Release 4 for Windows looks and works like other Lotus applications so you can be more productive in everything you do.

What makes 1-2-3 Release 4 for Windows so different? First, they've improved performance and refined spreadsheet choreography to optimize the efficiency of your hand and eye motions. Edit, move and copy any worksheet element — including charts — right in place. Build formulas and format data in seconds.

Use the Version Manager to track worksheet changes fast — on your own or in a workgroup setting. Next, powerful analytics provide more than 200 @ functions, including 120 new ones, all accessible from a pull-down menu. There are more than 250 new macro commands you can drive from graphical on-sheet Macro Buttons, menus and SmartIcons.

Most importantly, 1-2-3 Release 4 protects your company's investment in existing data and applications with the best 1-2-3 compatibility you'll find anywhere. There's also Excel compatibility so you can transition to 1-2-3 with confidence.

Fly Through Every Spreadsheet Task. One-step charting. Think about how you build a chart in your current spreadsheet. In 1-2-3 Release 4 you just select a range to chart and decide where on the worksheet you want the chart to appear. It's that simple. 1-2-3 automatically creates titles, labels and legends based on worksheet information. Then make changes right on the chart itself.

A better way to work. Unlike other spreadsheets, 1-2-3 Release 4 lets you manipulate worksheet elements directly with your mouse. Enter and edit information right in a cell with In-Cell editing. Double-click on a column or row heading to automatically expand them. Change your range selection from inside a dialog box. Name and organize 3D worksheets with Worksheet Tabs and flip through them as easily as folders in a file.

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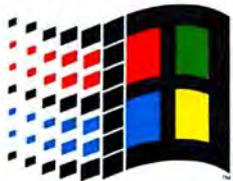
The Best Spreadsheet For You. And You. And You. If you're like most spreadsheet users, you test assumptions, share information and keep track of data as it changes over time. Up until now, this hasn't been easy.

Enter the revolutionary Version Manager. It gives both individual and workgroup users a way to explore possibilities by saving multiple sets of data to a named range. Assign a meaningful name to each version, such as best case or optimistic forecast. Add explanatory notes. As you work, 1-2-3 automatically stamps versions of data with your name, date and time. If you work on your own, track the changes to your what-if analyses. If you work in a group, you'll see who made changes, when and why at a glance.

Plus, you can install 1-2-3 on a network server, right out of the box. No special editions required.

More Powerful Business Tools Put You In Control. To help you build formulas in seconds, get direct access to more than 120 new @ functions in the @ Function Pull-Down Menu. Promote the @ functions you use most often to the menu. There are also 250 new macro commands which you can run from SmartIcons, customized menus or on-sheet Macro Buttons.

The Best 1-2-3 Compatibility To Safeguard Your Investment. When you standardize on 1-2-3, you can reduce the cost of retraining and application redevelopment. The new WK4 file format provides one file type for worksheets, charting, formatting and version information. Of course, 1-2-3 Release 4 reads and writes WK1 and WK3 files, styles, macros and keystrokes. Plus, you can just hit the slash key for the 1-2-3 Classic menu of familiar 1-2-3 commands.



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 Please specify 5¼" or 3½" diskettes when ordering.

by providing much more than mere desktop interfaces. While both \$179 products are marketed on their file and application-management capabilities, both contain an extensive collection of disk care utilities. The disk tools in Norton Desktop for DOS 1.0 all come from Norton Utilities 6.02, which means that although they're not up to Best Buy Norton Utilities 7.0's state of the art, they're solid as a rock. And Norton Desktop for DOS will be getting an upgrade to the more advanced utilities soon after this article appears. Norton Desktop for Windows 2.2 has the more current version 7.0 utilities, although not as many of them as Norton Utilities 7.0.

As expected, both Desktop packages retain the famous Norton Emergency Disk. Symantec does realize that Norton Desktop users buy this program to avoid working at

mind, however, that the program shells out to DOS to run the optimizer and other disk utilities. Both desktop products offer plenty of capability and are very good buys for the average user. *Symantec, 800/441-7234 Reader service no. 618*

Data Recovery, Optimizer

Norton Utilities 7.0

PROS: Excellent emergency recovery, most expansive disk care package **CONS:** None

 Norton Utilities has been synonymous with data recovery for years. And why not? Peter Norton gave us our first PC data recovery package. Symantec's new Norton Utilities 7.0 lives up to its proud heritage. And despite its power-user's reputation, even a novice ought to feel comfortable with this product's easy installation as well as its menu-driven interface.

Norton Utilities 7.0's bread and butter is its terrific emergency disk. You can't find a better recovery utility anywhere (although to be fair, Central Point's emergency utilities compare quite well). You can recover erased files with ease, using either just the FAT map or the sector-tracking file—depending on the options you install.

You can also piece damaged files together using the manual undelete option. Version 7.0 provides a new SmartCan utility, which gives you true file mirroring while conserving disk space by releasing the mirrored files after about five days. Unlike prior versions, Norton Utilities 7.0 is fully compatible with DOS 6.0, Stacker, and SuperStor compressed drives.

The new Speed Disk disk optimizer gives you five optimizing strategies and several sorting options. It's reasonably quick, and unlike the prior version (and DOS 6.0's), it doesn't cut corners by leaving partially fragmented files. Symantec warns against interruptions, but try as we might, we couldn't cause damage.

Norton's surface scan techniques are surpassed only by those of Disk Technician Gold. They include read/write and three pattern-recognition tests. You can run the tests continuously over a weekend, with Norton Utilities automatically moving the data in questionable areas to new sectors and marking the old ones as bad. Adding to its professional stature, Norton Utilities 7.0 has added enough diagnostic capabilities to warm any MIS director's heart.

Just as prime competitors PC Tools 8.0 and PC Tools for Windows were walking away with all the marbles, Symantec sent us Norton Utilities 7.0. The new compressed drive support, diagnostics program, improved disk cache, and better surface scanning made space for this program at the top of the line—and that means an undisputed Best Buy. *Symantec, 800/441-7234 Reader service no. 619*

Data Recovery, Optimizer, Antivirus

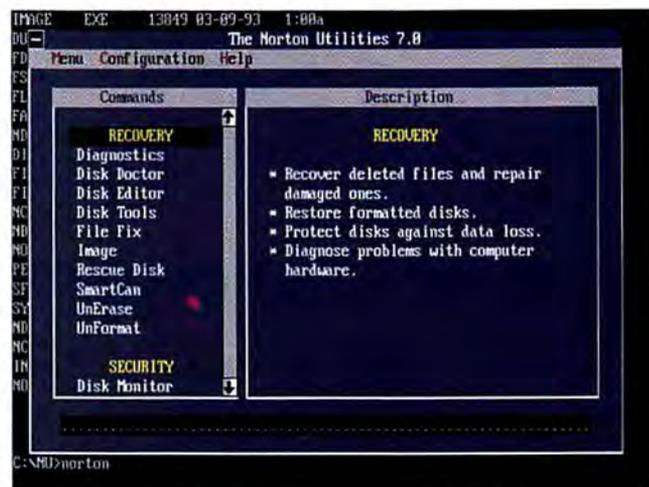
PC Tools 8.0

PROS: Emergency disk, desktop and productivity utilities, great backup program **CONS:** None

 Imagine your worst data nightmare: Your most important files are unreadable and scattered in pieces across your hard disk—and you don't have a current backup. Now picture yourself reaching for your copy of PC Tools 8.0. Are you feeling better yet? You should be. PC Tools has always ranked as one of the top data recovery programs, and the current version is better than ever. Its three flavors of data recovery relief, the life-saving emergency disk, file mirroring, and sector tracking, can turn a bearish recovery into a cakewalk. Installing the program is a snap, and the menu-driven interface is easily accessible.

The optimizer is excellent: You can choose among six optimization strategies, including a security file wipe that removes any trace of deleted files. And unlike the prior version of PC Tools, it caused no data loss when we pulled the plug during optimization. If you choose to use it, the scheduler will automate optimization on off hours or weekends. The surface scanner is excellent as well and offers three levels of pattern recognition that work with either hard disks or floppies.

This \$179 DOS version of PC Tools also gives Windows users access to its world-class utilities via toolbox icons. However, when



YOU GET TO NORTON UTILITIES' data recovery options from a single menu, including the new SmartCan, which even lets you protect deleted files by type.

the DOS level, so emphasis is placed on protecting your work through the use of file mirroring and scheduled backups rather than trying to recover from a crisis. Both products provide the fine Norton Backup program, Speed Disk disk optimizer, and Norton Antivirus. It's worth noting that the excellent backup programs provide tape support for popular QIC-40/80 drives and that Norton Antivirus 2.10 was a Best Buy in our May review of antivirus software.

While neither Norton Desktop program is the intensive disk care package Norton Utilities is, their combination of data protection tools and emergency disk is more than adequate for most purposes. Norton Desktop for Windows 2.2 buyers should keep in

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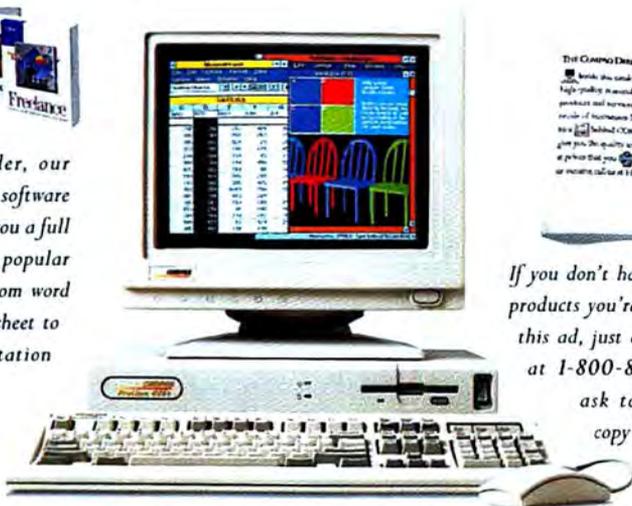


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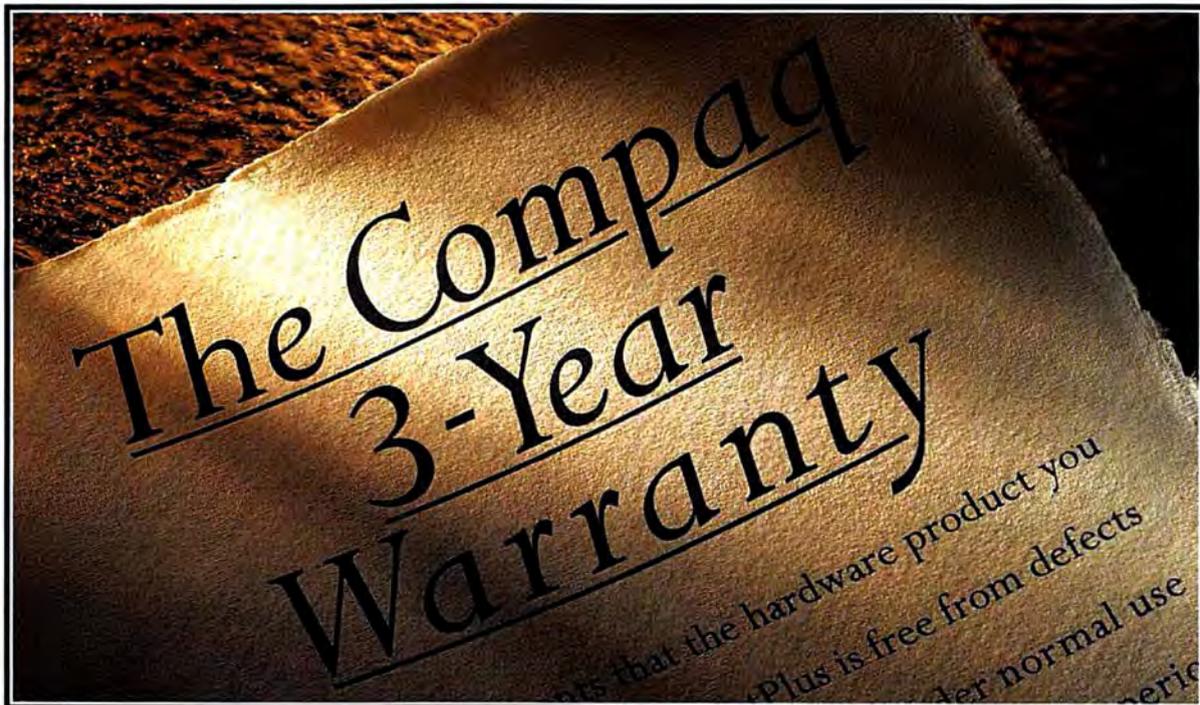
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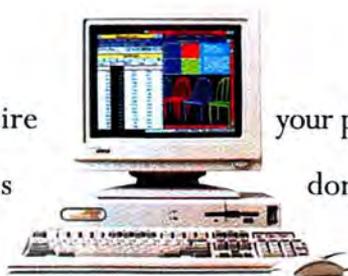
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Circle 83 on reader service card



PC TOOLS 8.0 makes a range of optimizing options—including security defrag—accessible from one screen.

you click on a PC Tools icon, Windows shells to DOS to run the programs. DOS users will like the desktop, and Central Point throws in a disk cache, a memory optimizer, a remote computing package, benchmarking utilities, screen savers, a fine antivirus program, and one of the best DOS backup programs you can buy. When we find all these utilities *and* one of the most secure disk care collections available in one package, we have to give it a Best Buy. *Central Point*, 800/445-2110 Reader service no. 620

Data Recovery, Optimizer, Antivirus

PC Tools for Windows 1.0

PROS: Excellent Windows usability, bundled desktop utilities **CONS:** Full installation takes 14MB of disk space

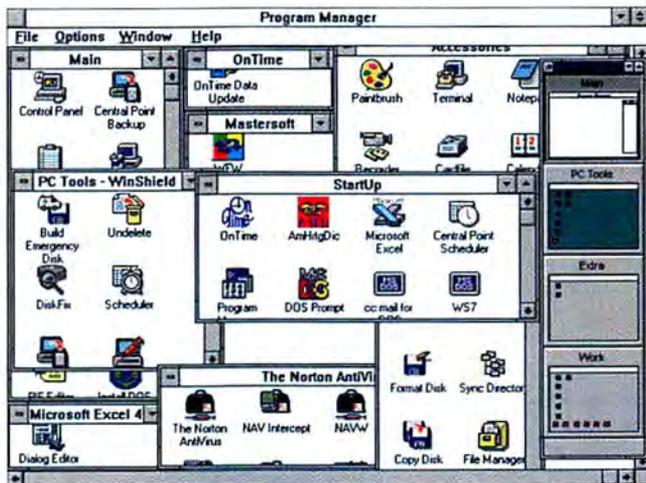
Windows users take note: For top usability and flawless performance, Central Point's PC Tools for Windows is the hands-down winner. This \$179 package matches its DOS sibling's complement of disk utilities, except for surface scan and low-level formats, which you must run from included DOS utilities. Installation couldn't be simpler, although it takes a while to write 14MB of files on your hard disk. PC Tools for Windows gives you the option of replacing the Windows 3.1 Program Manager with its own stylish, intuitive interface. Try the new interface; it's more accessible, and you can modify desktops to fit your working style. The MultiDesk option leaves any of the desktops just a double-click away.

As with its DOS counterpart, erased data

recovery is nothing short of fantastic, with support for file mirroring, sector tracking, and emergency data recovery. Its usability, however, goes Best Buy PC Tools 8.0 one better. For example, you can use its drive-scan utility to search your entire hard disk for erased files and get a list of directory locations and recovery probabilities.

The optimizer is the only one we know that gives you the convenience of running from Windows without shelling to DOS or rebooting the system. And imagine this trick: Central Point put its optimizer together in a bullet-proof package that lost nary a byte in our power-failure test. While you can run background optimizations, if your application accesses the hard disk, PC Tools for Windows halts the optimization for safety's sake. The optimization options match those of the DOS version.

It's hard not to be impressed when you launch a backup with its terrific backup utility and the program checks disk integrity, alerting you to disk problems before backing up. What else do you get? File finders and viewers, a text search program, a macro language, antivirus protection, and a file manager that can give you a peek into



WITH PC TOOLS FOR WINDOWS, you can organize Program Manager clutter into separate, easily accessible desktops (right)—each of which is just a double-click away.

zipped files. You can even encrypt files if you need to, or go to the system consultant for helpful hints on fine-tuning your system. What else can we say? PC Tools for Windows is a class act, a Best Buy, and a must for Windows buffs. *Central Point*, 800/964-6896 Reader Service no. 621

Optimizer

Power Pak 3.0

PROS: Fast disk optimizer, bundled utilities

CONS: None

PC-Kwik built its reputation with its excellent and flexible Super PC-Kwik disk cache, but the \$130 PC-Kwik Power Pak 3.0 adds a terrific optimizer. It's right near the top in speed of optimization, and unlike DOS 6.0, it achieves its performance while fully defragmenting all the files. Power Pak's installation program is extremely thorough and easy to use, as is the Power Disk disk optimizer's main menu. You can organize files by activity and move unfragmented program files to the front for quicker loading. Actually, you can write an ASCII file and specify placement of files anywhere you choose. And the program passed *PC World's* power-failure test with ease. Power Pak 3.0 also includes a scheduler for automating defrags.

PC-Kwik offers a Windows product as well—WinMaster 1.50—with similar capabilities. Its optimizer is virtually identical to Power Disk's, so it has to shell out to DOS to run; every Windows product except PC Tools for Windows 1.0 must defrag in DOS. WinMaster tends to require a reboot after every

operation. To be fair, the focus of WinMaster is efficient program launching and management, file search and organization, and interface and toolbox customization.

PC-Kwik Power Pak 3.0 includes a read-only surface tester, although it's not as efficient as Norton Utilities 7.0 or PC Tools 8.0's. When the scan finds a bad sector, it prompts you to re-

cate the sector rather than attempting the task itself, and it doesn't scan floppies. But these are small points. The disk cache and optimizer that people buy the program for are both very good, and PC-Kwik throws in some nice extras, including screen and keyboard accelerators, a print spooler, and a screen buffer that lets you scroll back through the output of your last series of DOS commands. *PC-Kwik*, 503/644-5644
Reader service no. 622

Data Recovery, Optimizer, Antivirus

Q-DOS Collection 2.2

PROS: Good disk optimizer, excellent file manager **CONS:** Rudimentary undelete

Q-DOS Collection is a marriage of convenience joining Gazelle's popular Q-DOS utilities and OPTune disk optimizer. The two packages sell for \$100 each, the Q-DOS Collection for \$179. By uniting the two, Gazelle gives you easy access to all the functions and saves you a few bucks.

The data recovery program is a simple

undelete utility that uses a copy of your FAT to recover erased files. At boot-up, Q-DOS Collection makes a snapshot sector-tracking file. So should you accidentally format your hard disk, it can be unformatted. Only freshly erased files can be salvaged, however, and Q-DOS Collection doesn't provide a utility for rejoining broken files.

The OPTune disk optimizer has been considerably improved over its prior version. Not only is it among the fastest here, it has more defrag options than it used to. There are four optimization strategies, including full and file-only, and a dozen ways to sort. The collection also contains a decent surface tester and low-level format capabilities. Pulling the plug scrambled the disk somewhat, but OPTune's Check-Disk utility quickly restored order—except for the one time that several files ended up cross-linked. Unfortunately, Q-DOS's undelete utility couldn't cope with the situation, so those files were lost. A more sophisticated data recovery utility would have brought back the data.

The quick OPTune disk optimizer could complement a stronger data recovery package, and the Q-DOS interface is top drawer. What's more, Gazelle includes a capable backup utility that can handle a range of tape backup drives. As a collection, this package is not without its charms. For the same price, however, either of the Central Point Best Buys offers more capabilities. *Gazelle*, 800/786-3278 **Reader service no. 623**

Optimizer

Vopt 3.05

PROS: Optimizes compressed drives **CONS:** No strategy options, no file sorting

Golden Bow may have just what bargain hunters are looking for—as long as they already have a satisfactory data recovery program: The inexpensive Vopt 3.05 disk optimizer will set you back a mere \$60. The program does full defragmentations only, however, and can't sort files. It's comparatively fast—taking just 7½ minutes to defrag an 80MB hard disk—and very safe.

Pulling the plug during optimization lost no files, although it did litter the disk with duplicate files we had to remove with DOS's CHKDSK/F command.

You'll probably want to make some changes in installation, as the program puts Vopt in your AUTOEXEC.BAT file and schedules it to run daily. That's a little too frequently for our taste. To change the schedule, you must manually edit the parameters. The surface scan utility is read only, with limited sector relocation ability; it won't move data from damaged sectors occupied by COM, EXE, BAT, or SYS file segments. To its credit, it's one of only two products here that can defrag DOS 6.0, Stackcr, and SuperStor compressed drives. If price is your first consideration, Vopt is an affordable bare-bones product. *Golden Bow*, 800/284-3269 **Reader service no. 624**

PC WORLD TEST CENTER REPORT

Q-DOS Fastest at Full and Weekly Defrag

	Full defrag	Files only	Weekly
Q-DOS Collection 2.2	307	191	11
Power Pak 3.0	335	102	20
PC Tools 8.0*	414	412	16
Norton Utilities 7.0*	420	123	38
Norton Desktop for Windows 2.2	420	123	38
Norton Desktop for DOS 1.0	420	123	38
Vopt 3.05	447	447	57
DOS 6.0	498	61	22
PC Tools for Windows 1.0*	793	443	21
FastTrax 4.05	862	252	16
Disk Technician Gold 1.14	1772	1887	100
BeckerTools 4.0	n/a ¹	n/a ¹	n/a ¹

*Best Buy

Time in seconds.
 n/a = not available

¹BeckerTools 4.0 couldn't run these tests, which used a disk with more files (including deleted files) than the 1024 BeckerTools could handle.

Methodology

We measured the time it took for each program to fully optimize a

moderately fragmented 80MB hard disk on a Dell 386DX PC running at 33 MHz. We then restored the disk to an identically fragmented state and did a files-only optimization. Finally, we fragmented the disk slightly to represent a typical week's fragmentation and defragged again. The results are sorted in order of fastest full defrag.

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

Best Buy Utilities and DOS 6.0 Do It All

● Yes
○ No

	BeckerTools 4	Disk Technician Gold 1.14	DOS 6.0	DOSutils 2.1	FastTrax 4.05	Norton Desktop for DOS 1.0	Norton Desktop for Windows 2.2	BEST BUY Norton Utilities 7.0	BEST BUY PC Tools 8.0	BEST BUY PC Tools for Windows 1.0	Power Pak 3.0	Q-DOS Collection 2.2	Vopt 3.05
Standard features													
Price	\$130	\$150	\$130	\$100	\$70	\$179	\$179	\$179	\$179	\$179	\$130	\$179	\$60
Windows application	●	●	○	○	○	○	●	○	● ¹	●	○	○	○
Installation program	●	●	●	○	●	●	●	●	●	●	●	●	●
Menu-driven	●	●	●	●	●	●	●	●	●	●	●	●	●
Data recovery	●	○	●	●	○	●	●	●	●	●	○	●	○
Disk optimizer	● ²	● ³	●	○	●	●	● ²	●	●	●	●	●	●
Surface scan	●	●	○	●	○	●	● ²	●	●	○ ⁴	●	●	●
Antivirus	○	●	○	○	○	●	●	○	○	○	○	○	○
Low-level format	○	● ³	○	●	○	○	○	○	○	○ ⁴	○	○	○
Backup utility	●	○	●	○	○	○	●	○	○	○	○	○	○

Data recovery

Emergency deleted file recovery disk included	●	○	●	●	○	●	●	●	●	●	○	○	○
Deleted files	●	○	●	●	○	●	●	●	●	●	○	●	○
Fragmented data recovery	●	○	○	●	○	●	●	●	●	●	○	○	○
File mirroring	○	○	●	○	○	○	●	●	●	●	○	○	○
RAM used for delete tracking	○	○	13.5K	○	○	5K	10K	10K	17K	17K	○	●	○
Purge data by date	○	○	●	○	○	●	●	●	●	●	○	○	○
Sector tracking	○	○	●	○	○	●	●	●	●	●	○	●	○
RAM used for sector tracking	○	○	13.5K	○	○	none	none	none	13K	13K	○	none	○

Disk optimizer

Files only	●	●	●	○	●	●	●	●	●	●	●	●	○
Full defrag	●	●	●	○	●	●	●	●	●	●	●	●	●
Sorts files by size	○	●	●	○	○	●	●	●	●	●	○ ⁵	●	○
Sorts files by date	○	●	●	○	○	●	●	●	●	●	○ ⁵	●	○
Automatic file wipe	●	●	○	○	●	○	○	○	○	○	○	○	○
Optimizes compressed drives	●	○	●	○	○	○	●	●	○	○	○	○	●
Scheduled	○	●	○	○	○	●	○	○	○	○	●	○	●

Surface scan

Read only	●	○	○	●	○	●	●	●	○	○	●	●	●
Read/write	●	●	○	●	○	○	●	●	●	○ ⁴	○	●	○
Pattern recognition	○	●	○	●	○	○	○	○	○	○ ⁴	○	●	○
Auto cluster relocate	○	●	○	○	○	○	●	●	●	○ ⁴	○	●	●
Manual cluster relocate	○	○	○	●	○	●	●	●	○	○	○	●	●
Runs in background	○	●	○	○	○	○	○	○	○	○	○	○	○

¹ Has PC Tools icons but shells to DOS to run the program.

³ Can't have Windows loaded to run.

⁵ Tagged files can be moved to front or back of disk.

² Shells to DOS to run.

⁴ Not available from Windows program but is included with DOS emergency disk.

Double-Duty: 486 Notebooks

Notebooks as desktop replacements? With 486-class CPUs, vivid color screens, and roomy hard disks, today's notebooks stand up to the challenge. We test 16 powerhouses fit for the desktop and the road.

Until recently, the quest for the ultimate notebook computer—one that can do the work of a desktop but still slip into your briefcase—has been like searching for the Holy Grail. Many

times notebook manufacturers and even notebook reviewers have claimed that these totables have attained the prize. Just as often, such claims have evaporated in the harsh light of everyday use.

Unlike the mythical Grail, however, desktop-replacing notebooks are here to stay. The latest wave of these portable wonders comes replete with 486-level chips, rich color displays, and roomy hard drives, and they can match or exceed the power of many of today's desktops.

Over half of these high-end notebooks feature active-matrix color screens so vivid and snappy

that many users would prefer them to their desktop monitors if they were as large. Most come with a standard or optional 200MB hard disk, which provides plenty of room for most Windows users in or out of the office.

Although notebook screens and keyboards remain small and cramped, nearly all notebooks now have connectors for desktop monitors and full-size keyboards. Twelve out of

By Bryan Hastings and Dan Miller

ROBERT CARDIN

the sixteen vendors also offer expansion stations—some of which are essentially desktop computers sans CPU—that you can slide the notebook into. Using a notebook and an expansion station instead of separate desktop and portable computers means you don't have to worry about remembering to copy important files to the portable before you head out, and it reduces the risk of overwriting a recent file with an earlier version.

Choosing the Right System

Who needs a notebook that will replace a desktop? If you need to use Windows and all your apps at home or on the road, consider using a notebook as your only PC. If your job requires you to make presentations to clients or customers frequently, look for an active-matrix notebook that will give you a bright and colorful screen to make slide shows sparkle and has a CPU powerful enough to run graphics-intensive presentation software smoothly.

If you work regularly in only two places (at the office and at home, for example), you may prefer to use two desktops. If you work in more than two places, your alternative to a powerful note-

If you need to use Windows and all your applications at home and on the road, consider using a notebook as your only computer.

book is a good desktop for your base location and an inexpensive portable for travel. The price of either alternative is about the same as the price of one power notebook—\$3500 to \$4000.

To make the change to a single notebook worthwhile, the notebook has to deliver desktop power with optimal portability. That means light weight and small size, a comfortable keyboard and pointing device, and intelligent power management to minimize frantic searches for the nearest AC outlet.

To find out whether the new generation of notebooks is up to this challenge, we asked leading vendors to send us their best candidates for the job of desktop replacement. Our minimum requirements: a 486-level processor and a color screen. After that, the vendors were free to configure their systems with whatever RAM, secondary cache, and other components they chose to use. Our goal: to

find out how well these portables stack up against their desktop counterparts for performance, price, and usability.

The Proof Is in the Performance

The notebooks we received use many of the same CPUs you'd find in midpriced desktops—including Intel's midrange 486s (SXs and DXs); Cyrix's 486SLC, which straddles the range of 386 and 486 performance; and IBM's clock-doubling 486SLC2-50. One chip included here appears only in notebooks: the Intel 486SL, a special version of the 486DX processor that uses less electricity and has special circuitry to help manage the power consumption of the entire system.

To gauge their performance, the PC World Test Center put these systems through a suite of Windows tests and the BAPCo SYSmark suite. The Texas Instruments notebook using Intel's DX2-40 processor was fastest, followed by the Twinhead DX-33 and the IBM ThinkPad, which uses IBM's SLC2-50. Systems using the SX-25, SL-25, DX-25, and SX-20 jostled around in the middle of the pack, while the notebooks using Cyrix's SLC-25 came in last.

You may notice that performance is lower on notebooks than on desktops based on the same processor. The average 486SX-25 notebook in this review, for example, is roughly 30 percent slower than the average

desktop SX-25 we've tested in the last six months. These notebooks lack some of the performance-enhancing system components you find in desktops. Also, many notebooks use power management schemes that periodically shut off the CPU. While you'd probably never notice these power-downs in actual use, their cumulative effect is slower overall performance.

Portability: Still Pricey for Now

The other downside of notebooks is, they're much more expensive than similarly configured desktops. We quote direct prices for notebooks whose vendors sell directly to the public and street prices for notebooks sold through dealers. For systems that haven't hit the street yet, we estimate street price based on information supplied by the vendor. In this review, we estimated prices

Best Performance



Here, the chip's the thing. The speediest notebooks we tested for this review use either a clock-doubling chip or Intel's DX-33. None of them are as fast as their desktop counterparts, however, primarily because they don't have secondary RAM caches or accelerated graphics circuitry.

1. TI TravelMate 4000 WinDX2/40 (page 192)
2. Twinhead Slimnote 486DX/33T (page 198)
3. IBM ThinkPad 720C (page 191)
4. Aspen Professional 486CT (page 185)
5. PC Brand 486/DX-33 LeaderBook Pro (page 191)

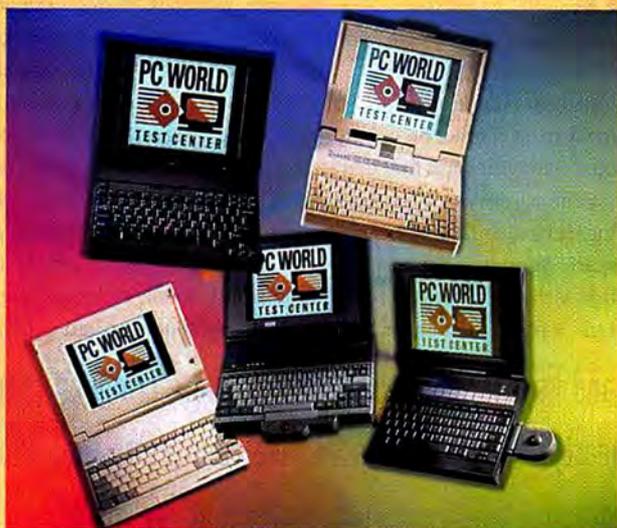
Best Price



Inexpensive is a relative term: In this roundup anything under \$3000 was great. Keep these prices in perspective: In addition to speed and sharp screens you're getting portability, which could make one of these notebooks worth two desktop systems or one desktop and a low-end portable.

1. Wen Technology WenNote 25C (page 198)
2. CompuAdd Express 425Color (page 188)
3. Polywell Poly NB425 (page 192)
4. Hyundai Courier Spectra (page 190)
5. Aspen Professional 486CT (page 185)

Best Buys



What makes a Best Buy in the desktop replacement game? Speed counts, but screen quality, price, and overall usability play important parts as well. Our five Best Buys should serve you in good stead on the desktop or on the road.

1. **AST PowerExec 486SL/25 ColorPlus** (page 186)
2. **TI TravelMate 4000 WinDX2/40** (page 192)
3. **IBM ThinkPad 720C** (page 191)
4. **Compaq LTE Lite 4/25c** (page 188)
5. **Aspen Professional 486CT** (page 185)

CLOCKWISE FROM TOP LEFT; IBM ThinkPad 720C, Aspen Professional 486CT, TI TravelMate 4000 WinDX2/40, AST PowerExec 486SL/25 ColorPlus, and Compaq LTE Lite 4/25c.

for the AST, CAF, IBM, TI, and Wen Technology notebooks.

As press time, street or direct prices for the notebooks reviewed here ranged from \$2795 for the CompuAdd Express 425Color to \$5609 for the IBM ThinkPad. The 486DX-33s reviewed average just over \$4000, while the average price of desktop DX-33s we've reviewed lately is just under \$2300.

The main culprit behind the high cost of notebooks is the display. For years while everything else in the computer industry followed the "better and cheaper" rule, LCD panels—especially active matrix types—held steady in both quality and cost. That's changing, as Japan's investment in new flat-panel manufacturing techniques has finally begun to pay off.

You're still going to pay more for an active display though. If you compare the active-matrix ZDS Z-Note 425Lnc with the passive Z-Note 425Lnp, for instance, you'll see that ZDS charges a \$700 premium for the active-matrix display and larger hard drive.

Because notebook screens range from 8½ to 10½ inches diagonally instead of the 14 or more inches available on desktop monitors, standard 640 by 480 VGA resolution is as much as most users will want, and none of these flat-panel displays offers more. All but two of the notebooks we looked at can display super-VGA (800 by 600 or higher) on an external monitor while displaying standard VGA on their own screens.

Getting the Most From Your Battery

If you're considering a notebook as a desktop replacement, you shouldn't have to think about its power consumption any more than you would a desktop's. Notebooks should be designed to run as long as possible on batteries. One way to prolong battery life is to use nickel metal-hydride (NiMH) batteries, which offer more power for the size than nickel-cadmium (NiCd) batteries. But they offer only a modest increase in computing time.

Best Service and Support



Service is a whole new ball game when it comes to notebooks. While on-site service is rare, you should look for on-the-road replacement policies, so if your notebook goes south the vendor will ship you a new one. Warranties, turn-around policies, and long tech support hours are crucial.

1. **Compaq LTE Lite 4/25c** (page 188)
2. **IBM ThinkPad 720C** (page 191)
3. **ZDS Z-Note 425Lnc** (page 199)
4. **ZDS Z-Note 425Lnp** (page 199)
5. **Aspen Professional 486CT** (page 185)

Best Battery Life



Battery life is a fickle thing. Each of the notebooks reviewed here has a different system for managing power consumption, and they vary widely in how long their batteries will last. The more options you have for managing power, the longer your batteries will last.

1. **AST PowerExec 486SL/25 ColorPlus** (page 186)
2. **IBM ThinkPad 720C** (page 191)
3. **Compaq LTE Lite 4/25c** (page 188)
4. **TI TravelMate 4000 WinDX2/40** (page 192)
5. **Wen Technology WenNote 25C** (page 198)

Enter power management. The simplest way to extend battery life is to let users turn off infrequently used components, such as the modem, I/O ports, and floppy drives. Another way is to let users set timeouts for some components.

Notebook users can also set timeouts for the entire system, including the CPU. Some vendors call these "suspend" or "sleep" modes. While a suspended or sleeping notebook still draws some power to keep the contents of RAM intact, it uses a fraction of the power of a fully operative one. Most notebooks in this review have a special switch on the keyboard panel that suspends the unit when you close the cover. Some are designed to resume operations whenever the modem rings, so you can receive incoming faxes and E-mail without leaving your notebook on all the time.

Some notebooks can monitor themselves for opportunities to power down components. This self-regulation requires cooperation between the CPU, the BIOS, and the operating system. The most common monitoring scheme is Advanced Power Management (APM), jointly developed by Intel, Microsoft, and Phoenix. Most of the notebooks we tested for this review come with APM-compliant versions of DOS and Windows.

So how well did these various power management techniques work in real life? To find out, our test lab hired some people to type away at each notebook until its battery went kaput.

The results were surprising: We knew that color notebooks chew up more power than monochrome models; that the faster the CPU, the more juice it uses; and that more RAM uses more power. Indeed, many batteries ran out of juice pretty quickly; more than half of the units we tested lasted less than 2 hours. A number of the machines amazed us, however, with their staying power. The AST PowerExec took nearly 6 hours to run out of steam (it was set at its maximum power savings since we couldn't adjust it to match our standard setting), and the Compaq kept running for over 3 hours.

Portable Pointing and Clicking

A do-it-all notebook should be as easy to use as your desktop. That means a good keyboard. In our view—and the results of the PC World Test Center usability test confirm this—the best notebook keyboards are laid out as much like the desktop versions as possible. That's why we look for cursor keys in the standard inverted-T configuration, standard <Alt> and <Ctrl> key layout (next to each other on either side of the <Space> bar), and dedicated page-control and function keys.

Pointing devices are also crucial. The advantage of built-in pointing devices is that you can't misplace them and they require less space. Vendors are putting their trackballs everywhere—above and below the keyboard, to the right, left, and center, and even on the screen panel. The most unusual device we encountered is IBM's

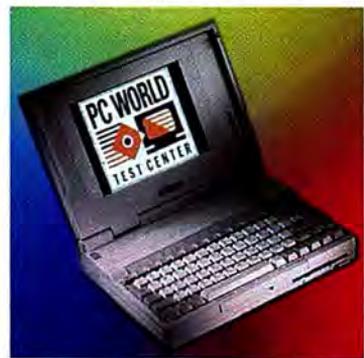
Although notebook monitors and keyboards are smaller and more cramped than their desktop counterparts, nearly all notebooks now have connectors that allow you to plug in desktop monitors and full-size keyboards back at the office.

TrackPoint, which resembles a pencil eraser stuck between the H and J keys of the keyboard. However, external trackballs are larger than the built-in variety, tend to have better tactile response, and can usually be positioned on the right or left depending on whether you are right- or left-handed.

Which design is best? That's what our intrepid test lab staff set out to learn by going to Dallas and trying out American Airlines' flight simulator. The testers performed usability tests on a variety of keyboard, trackball, and screen designs (for more details see "What's the Easiest Notebook to Use at 30,000 Feet?" in this month's Mobile Computing section). The results confirmed what we suspected: Personal preference wins out, with some general guidelines mentioned above.

Your portable's hard disk should also be as much like its desktop counterpart's as possible. The notebooks in this review all sport

ALR Ranger MCT486DX/25



VITAL STATISTICS

Street price: \$4668

PROS: Good keyboard, mass storage options

CONS: Heavy, relatively expensive

Contact: Advanced Logic Research, 800/444-4257, 714/581-6770

Reader service no. 670

The ALR Ranger reminds us, in name and spirit, of a heavy-duty off-road vehicle—it may be a bit lumbering compared to its domesticated desktop counterparts, but it could be the right choice if you need something rugged and roomy on the road.

Equipped with a 486DX-25 CPU (the only one in this review), a

203MB Toshiba hard drive, and 8MB of RAM (expandable to 16MB), the ALR Ranger has as much muscle as many desktops. In our performance tests, the Ranger was faster than all but one of the SL-25s in this review; compared to desktop PCs we've tested lately, however, it's a bit slower than the average desktop SX-25.

The Ranger's keyboard is responsive, with all the right keys in *almost* all the right places (the <Ctrl> and <Alt> keys aren't in their standard locations). The QuickSnap Microsoft trackball, which attaches to the side of the notebook through a special port, has a smoother, surer feel than most built-in trackballs do (although some users complain that it detaches too easily). In addition, the Ranger has room to expand, in the form of an optional SCSI port, which enables you to attach CD ROM drives or other storage devices. You can also get an expansion chassis for parking the Ranger when you're at home.

The Ranger's power management gives you some excellent options for extending your battery's mileage on the road. The system shuts down the CPU during periods of inactivity. You can also set a timeout to put the system into suspension, which means all

81MB drives or larger, and most can be upgraded to 200MB, which meets the needs of nearly all Windows users. You can use a disk compression utility if you can't afford the larger hard drive; DOS 6.0, Stacker, and other programs will nearly double your hard disk space for about \$100.

The notebooks we looked at ranged from 7.4 to 10.8 pounds. While that might seem like a small range, you'll feel any extra weight when you have to trudge a quarter-mile through O'Hare to get to your connecting flight. Our advice: Go as light and as small as you can.

When you get your notebook back to the office, you'll want an easy way to hook up to peripherals or the office LAN. An expansion station that you can plug your notebook into is a great option: With one simple hookup you connect to all your peripherals at once. You can also use a LAN connection, either through a PCMCIA LAN card or an external LAN adapter that hooks up to your printer port. PCMCIA slots, featured on three of the review units, will let you slide in a fax-modem, more RAM, or extra mass storage (in the form of a hard drive or flash memory). A SCSI port, which allows you to plug into a CD ROM drive, a scanner, or even more mass storage, is another useful option. You might also want the capability to use easy-to-find alkaline batteries in case your regular battery fails. Alkaline batteries have their drawbacks—they aren't always rechargeable and their voltages sometimes fluctuate after prolonged use—but they work nicely in a pinch.

Service and Support

Good service may be even more crucial on the road than in the office. If you're on the other side of the country with an important presentation to give in the morning and your notebook breathes its last, a good service contract is essential.

Warranties for notebooks are comparable to those for desktops. Compaq and IBM include three-year contracts, while most others include one-year deals. On-site service contracts, which are common for desktops, are rarer among portables. Look for a fast turnaround policy—or better yet, a company that will deliver a unit to

you while the old one gets fixed. Another option: Two of these notes (the AST and the IBM) have removable hard drives, which means you could just take the drive out of the defective unit, put it in the replacement, and be back in business with your data and applications intact.

Other details of service and support are similar to those that apply to desktops. You want a centralized, toll-free tech support line. Ideally, tech support lines should be open long hours during the week and at least some time on weekends. If the vendor sells only through dealers, check to see whether dealers are required to have a dedicated support staff for the vendor's products and whether the vendor requires that staff to be trained.

And the Winner Is...

After exhaustively evaluating these notebooks, we found that three—the AST PowerExec, TI TravelMate, and the IBM ThinkPad—were better than the rest and easily got the nod for Best Buy. Close behind them and leading the rest of the pack were the Best Buy Compaq LTE Lite and Aspen Professional 486CT.

Perhaps the biggest drawback of these power notebooks is their high price—but prices may have fallen enough by the time you read this to make them even better deals. Any one of our Best Buys will serve you well both in and out of the office. Then you'll be able to sell off that old deskbound 286 and take flight with your new portable—or is it a desktop?

Note: Some of the notebooks in this review also appear in this month's Mobile Computing special section. Discrepancies in price and weight are due to differences in configuration. —E.d.

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

Bryan Hastings is an associate editor and Dan Miller an assistant editor for PC World. They can be reached on PC World Online (see page 10 for more information).

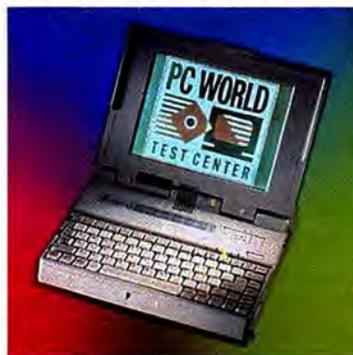
subsystems are turned off except for the memory and the keyboard controller. Unfortunately, despite these power management options, the Ranger's NiCd battery lasted just over 1¼ hours in our tests.

The Ranger's sturdiness translates into a little extra bulk. It weighs almost 10 pounds—which may not seem like much, but it's a good 2 pounds more than some of the others we examined. Another shortcoming: The active-matrix screen is limited to 64 colors in standard VGA resolution.

ALR's customer support has been consistently excellent in the past, but this time we encountered some glitches. ALR tech support lines still open early (6 a.m. PST), and the staff answered our questions as quickly as ever. But this time, they didn't always answer them correctly. More serious, if the Ranger breaks down on the road, ALR won't guarantee you'll get a replacement.

For a street price of \$4668, you might expect a bit more. If you want a sturdy portable for the road, with reasonable speed and excellent expansion options for the desktop, the ALR Ranger could be fine; on the other hand, if you want the lowest possible price or weight, you'll need to look elsewhere.

Aspen Professional 486CT



VITAL STATISTICS

Direct price: \$3170
PROS: Fourth-fastest in review, low price
CONS: Heavy
Contact: Aspen Computer, 800/472-3273, 716/626-0315
Reader service no. 671



In its second *PC World* review, Aspen Computer has made an extremely impressive showing. The Aspen Professional 486CT is one of the fastest notebooks we reviewed, and it will cost you less than most of the other systems. The upshot is that the rookie

from Buffalo has scored a Best Buy its second time out.

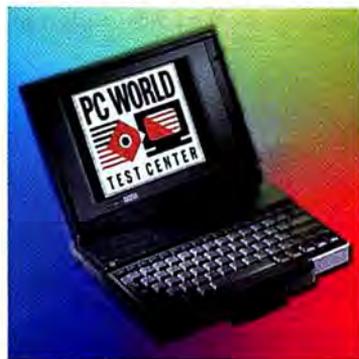
Based on a DX-33, the Aspen is the fourth-fastest Windows machine here; of the three DX-33s in the review, this one finishes second for performance. With 8MB of RAM (out of a possible 16MB) and a 234MB hard drive (the biggest drive in the review), if you closed your eyes you could almost imagine this really is a full-fledged desktop PC.

Though no better-looking than other screens of its ilk, the Aspen's passive display is one of the largest here—over 43 square inches. Aspen also provides an optional expansion chassis with two 16-bit slots. The unit's power management options are adequate: You can set timeouts for the hard drive and display, but there's no timed suspension, and the notebook doesn't resume operations when the modem rings. In our battery tests it lasted an hour and 46 minutes—not great, but better than several other notebooks equipped with slower CPUs.

When we called Aspen's tech support lines, we received immediate and perfect answers to all of our questions. Though the company has no set policy about replacing broken units in the field, its technicians will consider replacement on a case-by-case basis.

We have only three complaints: One, the trackball is too small and unresponsive for our tastes. Two, the <Ctrl> and <Alt> keys aren't in the standard positions. Finally, with a traveling weight of over 10 pounds, some nitpickers would argue that the Aspen Pro 486CT is a laptop, not a notebook. Who cares? Whatever you call it, it's fast, well-priced, and backed up by some very nice tech support—which tip the scales in favor of giving it our Best Buy nod.

AST PowerExec 486SL/25 ColorPlus



VITAL STATISTICS

Estimated street price: \$4583

PROS: Long battery life, removable hard drive

CONS: Hard-to-reach service and support

Contact: AST Research, 800/876-4278, 714/727-4141

Reader service no. 672



If Eddie Rickenbacker were to return as a portable computer, he would be AST's latest PowerExec—it's the Flying Ace of this review. AST earned its wings here by crafting a high-quality notebook that scores the most hits in portable usability with a minimal sacrifice of desktop power.

Most Windows users will find the PowerExec more than enough machine for their work in or out of the office. The system is based on Intel's 25-MHz 486SL and comes loaded with a 200MB hard drive and 8MB of RAM, expandable to 32MB. In our Windows and BAPCo tests, the PowerExec lagged behind an average 486SX desktop in overall performance by only 14 percent, a difference most users won't notice.

The PowerExec really shines when you get it in the air. Its NiMH battery ran for almost 5½ hours in our tests, making it the one color notebook in this review you can use coast-to-coast without

refueling. Its 9½-inch vivid active-matrix screen is one of the largest, which makes for easy viewing. While a tad on the heavy side, the PowerExec's solid feel inspires confidence, and its 11-by-8.5-by-2-inch size makes it as easy to stow as most notebooks.

Other features set this notebook above the crowd. AST made the hard disk removable, so you can pocket your data and keep what's dearest nearest to you at all times. The PowerExec also offers two PCMCIA slots and an optional SCSI port. One of the cooler innovations we've seen is AST's SmartKey. If you forget your password, this inch-long pencil-width stub plugs into a connector in the back of the notebook to give you access. AST also made sure not to neglect any of the features that are quickly becoming standard, such as a fax-modem, super-VGA output to an external monitor, and an optional expansion station.

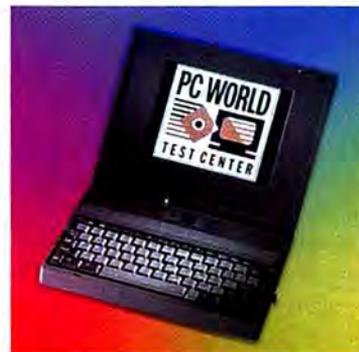
The PowerExec's pointing device clips below the keyboard's <Space> bar and has a small trackball with a mouse key on either side. It is located so you can use it easily while keeping your hands over the keyboard. You twirl the trackball with your right thumb while clicking the left mouse button.

Any drawbacks? Some users may not like the stiff action of the keyboard keys—typing on the PowerExec required the most pressure of any of the notebooks reviewed, and the mouse keys are almost as stiff. The biggest letdown is service and support. AST offers no on-site service, and while it has long tech support hours (14 per day) and Saturday support, accuracy and responsiveness could be improved—we got six busy signals over the course of three days.

The AST PowerExec costs about as much as you'd expect to pay for an active-matrix machine, but that price tag buys you one of the best color 486 notebooks available. The PowerExec had a solid showing in our performance tests and offers cross-country battery life. That, plus its excellent expandability, makes the PowerExec 486SL/25 ColorPlus our highest-flying Best Buy.

AST made the hard disk removable, so you can pocket your data and keep what's dearest nearest to you at all times.

CAF AquaLite-IV



VITAL STATISTICS

Estimated street price: \$3999

PROS: Good performance for its CPU, SCSI port

CONS: Toll call for tech support, awkward keyboard layout

Contact: CAF Technology, 818/369-3690

Reader service no. 673

At 7.9 pounds, the CAF is one of the lightest notebooks here. It's also one of the most compact, yet it still has room for a standard SCSI port—the only one in the review. The hard drive on the unit

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Circle 138 on reader service card

we looked at was a relatively small 116MB, but you can upgrade that to 200MB. Another way CAF saved some room: This is one of the few notebooks that has no built-in or attachable trackball; it was sent to us with a standard Microsoft mouse.

The little case hid some surprisingly speedy performance. Even with just 4MB of RAM, the AquaLite was faster than three of the four SL-25s (which we'd expect to be faster). It was roughly 40 percent slower, however, than the average SX-25 desktop.

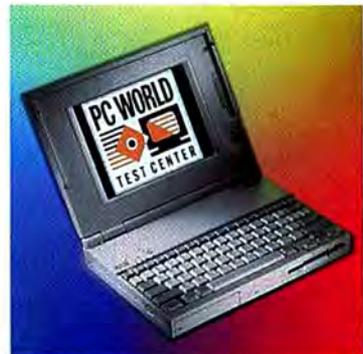
The active-matrix display is great for Windows—it shows even colors and no ghosting. The keyboard feels nice and solid, though its layout is hard to get used to if you're a touch typist—it's particularly hard to find the <Delete> and <Insert> keys and too easy to hit the cursor controls inadvertently.

The CAF comes with extensive power management, including suspend, standby, and timeout modes. In our battery tests, its NiCd lasted more than 2 hours.

CAF is the only company in the roundup whose tech support line requires a toll call; once we'd dropped our dime for the call, though, the support staff answered most of our questions perfectly. We were disappointed with the service contract. There's no on-site service; if your notebook dies on you, you'll have to return the unit yourself.

While \$3999 might seem a high price to pay for an SX-25, overall this is a good portable, one to consider if you want active-matrix color in a lightweight package.

Compaq LTE Lite 4/25c



VITAL STATISTICS

Street price: \$4222

PROS: Good battery life, great expandability and service and support

CONS: Lackluster performance, small hard drive

Contact: Compaq Computer, 800/345-1518, 713/378-8820

Reader service no. 674



Even as computer prices drop faster than airlines filing for Chapter 11, Compaq amazes us with how much computer it offers for the money these days. And how little space it takes.

The latest LTE Lite sports a brilliant active-matrix screen and 3½ hours of battery life for only \$500 more than a typical passive-color notebook. This 7.8-pounder is also one of the lightest power machines in this featherweight class, and it's only 16 percent larger than the smallest system here. All that comes with Compaq's traditionally thorough documentation and top-rated service and support.

One of the most pleasant surprises was the built-in trackball. Its placement looks goofy—the trackball is mounted on the lower-right corner of the screen with the mouse keys opposite it on the back of the screen lid—but it's surprisingly comfortable to use. A small amount of play in the ball slightly impaired movement accuracy, and we noted a small problem with the ball rolling backwards when released, but overall we were quite taken with it. The keyboard, however, is harder to love. There are no dedicated keys for <Page

Up> or <Page Down> or for the 12 function keys, and the layout for the <Ctrl> and <Alt> keys is nonstandard.

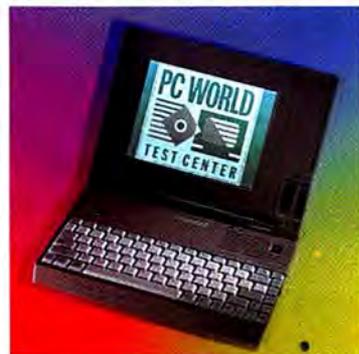
The LTE Lite is based on Intel's 486SL processor, and it comes with 4MB of RAM and a 120MB hard drive. Perhaps because of the smaller than average amount of RAM, the LTE Lite fared relatively poorly in our performance tests: It ranks 72 percent behind TI's TravelMate 4000 and beats out only the Hyundai, the CompuAdd Express, and the Polywell. You could opt to increase the RAM to 20MB and get a 209MB hard drive, but that would raise the price to \$4800.

Like all power notebooks worth their silicon, the LTE Lite comes with a 9600/2400-bps fax-modem, SVGA (800 by 600) output to an external monitor, and an expansion station option. Nice touches include a three-level battery power management icon for minimum, midrange, and maximum power conservation that you can reset with just a mouse-click, and an optional lock and chain system. What looks like a PCMCIA slot in the side of the LTE Lite, however, is a credit-card slot designed only for memory.

The Compaq LTE Lite's service and support soared to the top. The service package includes a three-year warranty (matched only by IBM), free on-site service, and 24-hour, toll-free tech support that includes weekends. All our calls were answered immediately, and our questions were answered accurately. Coupled with solid scores for design and expandability, the LTE Lite is a solid Best Buy. This notebook should be on your short list, especially if your Windows needs aren't too demanding.

Compaq amazes us with how much computer it offers for the money these days—and how little space it takes.

CompuAdd Express 425Color



VITAL STATISTICS

Direct price: \$2795

PROS: Low price

CONS: Short battery life, slow

Contact: CompuAdd Express, 800/374-8969,

512/219-2890 (fax)

Reader service no. 675



The CompuAdd Express 425Color is a bit like an inexpensive boom box: It may not be hi-fi, but it's cheap and it gets the job done.

The 425Color is the second-least expensive notebook here, and, in addition to the usual Windows and DOS, it comes preloaded with LotusWorks, BitFax fax software, and Close-Up 4.0 software for remote technical support. You even get built-in virus protection, a Cyrix math coprocessor, and a fax-modem. The keyboard is nicely laid out; right-handers might gripe about the trackball being stuck on the upper left of the keyboard panel, but we found it sur-

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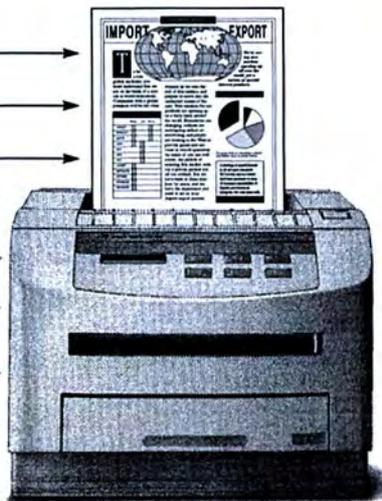
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Color 486 Notebooks: The Sky's No Longer the Limit

Imagine vivid color-screen briefcase computers that can run Windows painlessly from a battery for hours. The stuff of fantasy several years ago, they're now materializing on dealers' shelves—and landing on office desktops. So, looking ahead as we put this passel of portable power PCs through their paces, we pulled the best features from the top machines and pieced together a not-so-impossible dream notebook using today's technology.

AST'S LONG BATTERY LIFE. Take us from Los Angeles to New York—including a quick stop in St. Louis—without the weight of spare batteries or the dreaded flashing “battery low” indicator.

TI'S DX2-40 PERFORMANCE. Even better, soup up our system with a DX2-66.

STANDARD KEYBOARD. We won't really be satisfied until someone invents a 101-key keyboard for notebooks that expands to full size. Until then, make the notebook keyboard layout as close to it as possible, with dedicated <Page Up> and <Page Down> keys and the <Ctrl> and <Alt> keys in the right places. And

don't forget to include an external keyboard port so we can plug in the real thing. Familiarity breeds content.

IBM AND COMPAQ'S THREE-YEAR WARRANTY. Pique our interest with overnight replacement, one-day turnaround repairs, and IBM's and Compaq's three-year warranty. Wanna make us really smile? If our portable dies, tell us you'll pull the hard drive out of our old machine, put it in the new one, and return it to us overnight—wherever we are.

AST'S UPWARD MOBILITY. Give us total expandability with an optional expansion sta-

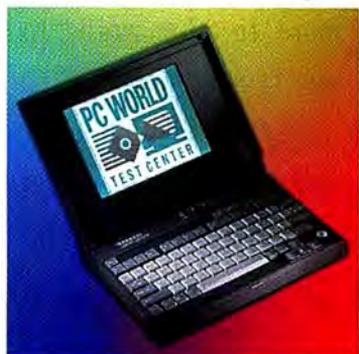
prisingly easy to use. CompuAdd backs this notebook with Express Exchange: It'll replace a defective unit within the first 30 days.

So what do you give up for the low price? Some battery life, for starters—the system lasted 1 hour and 52 minutes in our tests. You don't get every possible power management option, either; this is one of the systems that doesn't support APM, and it doesn't have suspend or standby modes; you can set timeouts to save power only for the hard drive and the LCD. You also have to live without some of the more expensive design options, such as an active-matrix screen. The 120MB hard drive can't be upgraded.

The biggest thing you'll sacrifice for price is performance. This is the second-slowest system reviewed. Not too surprisingly, it's based on the Cyrix 486SLC-25, which just isn't fast enough in this crowd.

If you're willing to settle for this less-than-lightning-fast CPU, however, there's much that recommends this notebook for no-frills, on-the-road functionality. And if you're in the market for a desktop replacement that won't cost you twice as much as the desktop system you're replacing, the CompuAdd Express 425Color notebook is worth considering.

Hyundai Courier Spectra



VITAL STATISTICS

Direct price: \$2949

PROS: Great price, excellent pointing device, light weight

CONS: Sluggish performance

Contact: Hyundai Electronics America, 800/933-3445

Reader service no. 676

Remember the Nike ad that urged us to “Just do it”? Hyundai's twist on this phrase is the strangely vague “Do something.” We wondered if this was Hyundai Product Design's modus operandi when management told them to rustle up a color

note. In some areas they struck out; in others, they struck pay dirt.

Take the Courier's built-in trackball. Even though Hyundai barely mentions it in promotional materials, this pointing device was the hands-down winner in our usability tests. What's funny is that you don't expect it to be so good, since the trackball sits in the lower right-hand corner of the keyboard and the mouse buttons—keys <M1> and <M2>—are located on the left between the <Ctrl> and <Alt> keys. As it turns out, it's incredibly easy to move your hands quickly from keyboard to trackball and back again.

Battery life is another issue. Despite the Courier Spectra's power-conserving 486SLC processor, flexible power management features, passive-matrix display, and NiMH battery pack, we got only an hour and 18 minutes of use on a charge.

This uneven quality turned up throughout our evaluation, from portability to service and support. The 7.6-pound Courier Spectra is one of the lightest notebooks in the review, and it's only 10 percent larger than the smallest machine we looked at. Unfortunately, the Courier Spectra is lightweight in more ways than one. This notebook bit the dust in our Windows and BAPCo tests, performing only about half as well as our comparison 486SX-25 desktop system. Expandability is also limited. The Courier Spectra comes with a respectable 8MB of RAM, but its 130MB hard disk is quickly becoming the minimum size for Windows users. Even the optional 170MB drive may not be enough for Windows diehards. Unfortunately, Hyundai offers no expansion station.

Hyundai cut tech support to a short 10 hours a day, but the company offers a substantial 18-month warranty and free on-site service. Hold times varied from a few moments to an irritating 19 minutes. Support didn't give the right answers to all our questions, either.

If low price and a great pointing device mean the most to you, start with this notebook. Due to its sluggish performance, short battery life, and limited expandability, however, we cannot recommend the Courier Spectra as a Best Buy.

The Courier Spectra's pointing device was the hands-down winner in our usability tests.

tion, a removable hard drive, PCMCIA slots, and SCSI ports.

IBM'S 10.5-INCH ACTIVE-MATRIX SCREEN—WITHOUT THE GLARE. This display was such a joy to look at, we could almost give up our desktop monitors. But make it low glare, so it looks great in any light.

POLYWELL'S 7.4-POUND WEIGHT. And while you're at it, sweat another couple of pounds off that lightweight.

TI'S 14,400 FAX-MODEM, ZDS'S ETHERNET CONNECTOR. If fax and E-mail are critical anywhere, it's on the road. Give us TI's 14,400

fax-modem, but remember that we want our E-mail just as fast. And throw in ZDS's ethernet connector for good measure.

HYUNDAI AND COMPAQ'S MOUSE. Different folks like different strokes, but take a cue from Hyundai and Compaq: Make the trackball and mouse keys accessible and don't put them too close together.

ASPEN'S 234MB HARD DRIVE. The more the merrier, on the road and off.

WEN'S PRICE TAG. Of course, we want it all for Wen's \$2700 price tag. But really grab our attention and drop it below \$2000.

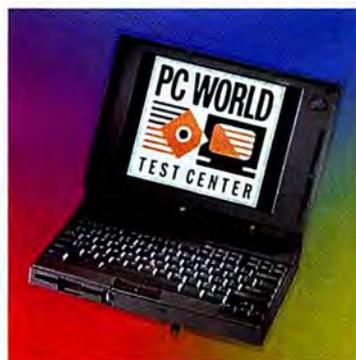
ing the source—and the TrackPoint pointer (nestled between the H and J keys) works wonderfully. The IBM is one of two notes here with a removable hard drive, handy for sharing the system or getting back to work with a replacement unit should your ThinkPad go down.

The final feather in the ThinkPad's cap: a service and support package that rivals Compaq's. You get a three-year warranty, a year of free on-site service (guaranteed to arrive within 4 hours of your call), and 24-hour, toll-free tech support. Technicians answered quickly when we called, but their answers weren't always right.

Ah, yes, money—the only off-note in the ThinkPad's otherwise flawless performance. At a direct price of \$5609 (including a BitFax-BitCom-Prodigy software

bundle), this is the most expensive machine in the review; you'd better want this notebook very, very badly. We do. If money were no object, this would be the best notebook here. Even given the high price, the ThinkPad 720C is still an easy pick as a Best Buy.

IBM ThinkPad 720C



VITAL STATISTICS

Direct price: \$5609

PROS: Third-fastest, great battery life, excellent active-matrix screen, three-year warranty

CONS: Highest price in the review

Contact: IBM, 800/772-2227



You like the good things in life? Nothing but first-class will do? We submit for your consideration the new IBM ThinkPad. In a review filled with notes that make you sacrifice one thing or another for portability, the IBM is in a class by itself. For performance, power management, and overall great design, it's a definite Best Buy.

To start with, it's fast, the third-fastest notebook in the review. While not quite as fast as the average desktop DX2-50 (its IBM 486SLC2-50 has similar clock-doubling technology), it's still plenty fast for Windows and other everyday applications. It's outfitted with a whopping 12MB of RAM, more than any other notebook here.

What's surprising is that the system can produce this speedy performance without ignoring power management. The ThinkPad's NiMH battery lasted an impressive 3 hours and 19 minutes in our tests—the second-best time in the review. The ThinkPad supports APM and will go into suspend mode either after a specified time or when you close the lid. When you resume, your applications will be right where you left them.

The active-matrix screen is particularly impressive, bright, and vivid, with excellent contrast; at 52 square inches, it's also the biggest display in the review. Its only drawback is the glare mentioned by our usability testers (see "What's the Easiest Notebook to Use at 30,000 Feet?" in this issue's Mobile Computing section). The keyboard is a pleasure to work with—not surprising, consider-

PC Brand 486/DX-33 LeaderBook Pro



VITAL STATISTICS

Direct price: \$3894

PROS: Low cost, solid performance

CONS: Heavy, short battery life

Contact: PC Brand, 800/722-7263, 805/378-7848
Reader service no. 677

The LeaderBook Pro roared out of the gate, showing every sign of taking off in this review. At \$3894, it's the cheapest color 486 notebook reviewed to come with an active-matrix screen. Though it was a third slower on our Windows and BAPCo tests than our comparison desktop with the same CPU, the 33-MHz 486DX-based LeaderBook cruised into the top five for performance among its portable peers.

But in a world where every ounce and fraction of an inch matters, the LeaderBook Pro soon started to lumber like the Spruce Goose. At 11.3 by 9.2 by 2 inches, the LeaderBook Pro is slightly wider and almost an inch deeper than most of its competitors, making it one of the larger units reviewed. Its 9-pound weight is exceeded only by the offerings from ALR and Aspen, and its bulky AC adapter adds further drag. Unfortunately, PC Brand didn't turn the large size of its notebook to its favor—set into the large frame is a standard 8.5-inch display.

The LeaderBook Pro's short battery range also kept it from reaching the Best Buy heights. Due in part to its power-chugging DX processor, we got only 1½ hours on a charge in a world where 2

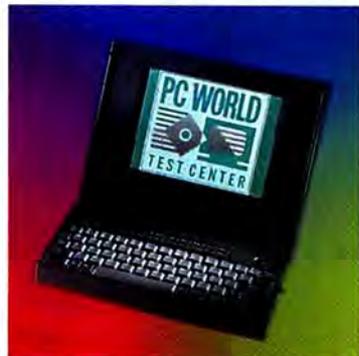
hours is becoming the acceptable minimum. And what's the use of all that power if you don't have the memory to match it? The LeaderBook Pro comes with only 4MB of RAM (expandable to 20MB). Also, the 120MB hard drive is the largest available, there's no expansion station option, and this is the only notebook here that doesn't come standard with a modem.

The LeaderBook Pro's built-in trackball received mixed reviews from our PC testers. The LeaderBook's centrally located trackball works well for both right- and left-handers, since you can use either thumb to spin the trackball while pressing the mouse key with the other thumb. The trackball itself is too small, though, and we found the keyboard a little uncomfortable to use. The keys are angled forward, which compels you to reach forward a little farther to type. Also, if you're accustomed to resting your hands on the table while typing you'll have to perch your hands on the notebook instead of the table.

Service and support is unremarkable. The company offers a 12-month warranty and three-day turnaround on repairs, and tech support is open only 9½ hours each day. Accuracy and especially responsiveness could use improvement—we were once left on hold for an exasperating 35 minutes.

Notwithstanding its solid performance and great price, the LeaderBook Pro's large bulk, short battery life, and limited expandability all severely restrict its ability to replace a desktop. Despite the system's alluring price, we recommend you spend a few hundred dollars more on one of our Best Buys instead.

Polywell Poly NB425



VITAL STATISTICS

Direct street price: \$2885
PROS: Light weight, low price
CONS: Slow performance
Contact: Polywell Computers,
 415/583-7222,
 415/583-1974 (fax)
Reader service no. 678

The Polywell Poly NB425 may not be as exciting as some of the other entries in the notebook spectrum, but it's easy on the shoulder *and* the wallet.

The Polywell's most appealing feature is that at just 7.4 pounds traveling weight, it weighs less than any other notebook here. It's also the most compact, just 1½ inches thick. Best of all, the Polywell is light on the pocketbook: At \$2885 (which includes a copy of Bit-Fax SR), it's the third-least expensive unit here.

Battery life isn't bad—the Polywell lasted 2 hours and 13 minutes in our use-'em-till-they-drop test. The system has a doze mode that reduces the CPU's speed automatically whenever it senses inactivity. You can set timeouts for a sleep mode, which reduces power to the hard disk and LCD and slows down the CPU. You can also set timeouts to power down the LCD and hard drive individually, and the serial ports can be turned off altogether.

Despite its small size, the Polywell's keyboard is laid out more

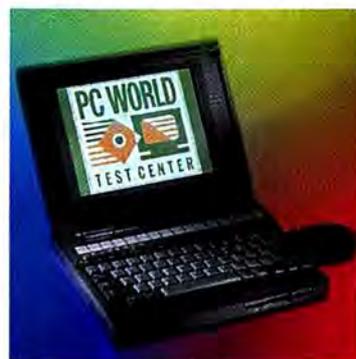
like a desktop's than most; the one thing that's wrong is that you have to press the <Fn> button to use the <Page Down>, <Page Up>, <Home>, and <End> keys; they are merged onto the cursor keys. The passive screen is adequate, but the 122MB drive might be too small for some users.

The real problem is that the Polywell's performance is as light-weight as the notebook itself. Like the other 486SLC-25s we tested, this is the slowest notebook in the roundup, taking more than twice as long to complete our test suite as the TI. While the Polywell should be just fine for Windows and other applications if your desktop system isn't too fast, it might feel slow if you're accustomed to a top-speed desktop.

Polywell's service and support could also use some beefing up. Now that PC vendors are trying harder than ever to please the customer, support lines that aren't completely accurate and make you wait on hold just don't measure up.

If this Polywell entry had a little more bite to its performance and customer service, it would be far more compelling. As it is, unless low prices and light bags are what you need, we'd recommend you look at one of our Best Buys.

Texas Instruments TravelMate 4000 WinDX2/40



VITAL STATISTICS

Estimated street price: \$3899
PROS: Top performer, big screen, good battery life
CONS: Pricey for passive matrix, so-so service and support
Contact: Texas Instruments,
 800/527-3500,
 817/771-5856
Reader service no. 679



Texas Instruments' contender managed to shake off all but AST's PowerExec in this notebook dogfight, coming in second overall. It missed the top spot by just a few percentage points.

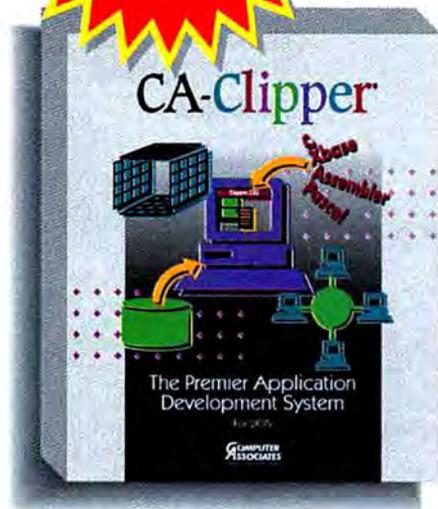
This portable rose through the ranks by focusing on the two areas that matter most for our review: desktop replacement and on-the-road usability. Due to its clock-doubled 40-MHz 486DX2 processor, 8MB of memory, and 200MB hard drive, the 4000 aced the Windows and BAPCo tests, achieving the same performance as an average 33-MHz 486DX desktop. For all its power, the 4000 weighs merely 7.8 pounds fully loaded, and it's one of the slimmest color notebooks available. Its efficiently managed power plant drew over 2½ hours out of its NiCd battery pack in our tests.

The TravelMate 4000 also scored well in on-screen maneuverability. TI picked the comfortable BallPoint clip-on trackball from Microsoft. The BallPoint clips into a recessed QuickPort slot located on the right side panel of the computer, so that your serial port is left free and there's no mouse cable flopping around. The only downside to this design, apart from favoring right-handers, is that your mouse pointer freezes if you knock the trackball from the slot.

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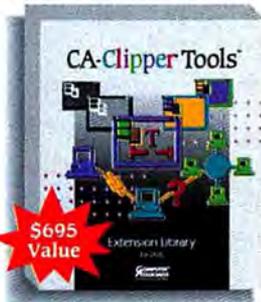
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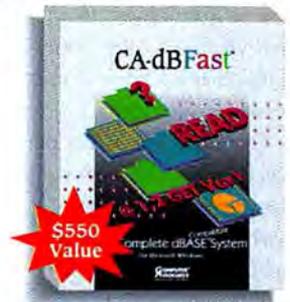
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Feature	CA-Clipper	FoxPro	dBASE IV
Lexical Variable Scoping	YES	NO	NO
User-defined Commands	YES	NO	NO
Code Blocks	YES	NO	NO
Nested Multidimensional Arrays	YES	NO	NO
Predefined Object Classes	YES	NO	NO
Variables Modifiable in Debugger	YES	NO	NO
Customizable Reactive Error Handling	YES	NO	NO
Reads and Writes FoxPro (.CX) Files	YES	YES	NO
Reads and Writes dBASE IV (.MDX) Files	YES	NO	YES
Reads and Writes Paradox (.DB/.PX) Files	YES	NO	NO

Comparison based on FoxPro Version 2.5 for DOS and dBASE IV Version 1.5.

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Circle 39 on reader service card

If you plan to do much computing in aisle seats on airplanes, where your mousing arm can get bumped, be prepared to know enough keyboard commands to back out to DOS and restart Windows.

The keyboard keys are quieter than most and have good travel and average feedback. The keyboard sits $\frac{1}{4}$ to $\frac{1}{2}$ inch higher than most keyboards, however, which could be uncomfortable for small-handed typists who rest their hands on the table, since you have to reach a little farther for the keys. We brushed the <Alt> key once in a while during the typing tests, highlighting a Windows application's menu bar before we knew what was happening. Also, a few users may chafe at not

having dedicated <Page Up> and <Page Down> keys.

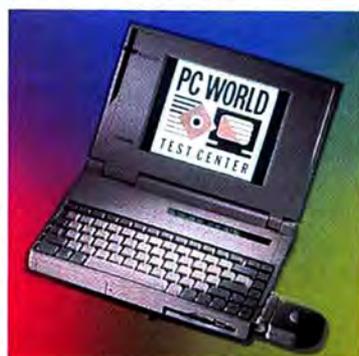
The 4000's street price is quite high for a passive-matrix notebook—over \$700 above the average. But its 9.6-inch display is larger than all the others' except the IBM ThinkPad's, and its colors are particularly rich given the technology, matched only by the passive-matrix display on the Z-Note 425 Lnp. And it's the only unit that comes with a modem that can send and receive faxes at 14,400 bps. An optional expansion station is available.

Service and support was unimpressive. TI's 12-month warranty and 12-hour weekday tech support are good, and the technical staff answered all questions accurately but took anywhere from 45 minutes to over 2 hours to return our calls. TI does not offer tech support via fax or BBS, even though most vendors now offer support through at least one of these. An annual charge of \$350 for on-site service is also steep.

The 4000 lost a few points on design. Though solid enough where it counts the most—around the screen—the case seems less sturdy than the norm. A plastic panel located on the left above the keyboard buckles down easily to expose the internal modem chamber below; spilled coffee here could spell disaster.

While the 4000's price may be high for a passive notebook, and its service and support won't knock your socks off, TI packed great performance into a notebook that's comfortable to tote and use.

Toshiba T4500C



VITAL STATISTICS

Street price: \$4182

PROS: Excellent power management options

CONS: Problems reaching customer service

Contact: Toshiba America Information Systems, 800/334-3445, 714/583-3437 (fax)
Reader service no. 680

Even though the Toshiba T4500C has been on the market for less than a year, that's enough to make it the old-timer in this roundup. With age comes wisdom, they say—and this is one smart notebook.

The T4500C clearly knows a thing or two about power manage-

ment. It uses a 3-volt CPU and supports APM. It gives you the choice of three predefined power settings, from low power (low CPU speed, 3-minute timeouts for the LCD and hard disk drive, sleep-mode enabled) to full power (high CPU speed and a 30-minute timeout for the display). You can also customize components individually, setting CPU speed and LCD and hard drive timeouts, and enabling or disabling the sleep mode.

Despite the fancy options, however, the T4500C's battery lasted less than 2 hours in our battery tests—not as bad as some, but not as good as others. Its times on our performance tests, on the other hand, were surprisingly good: Despite the fact that it's using a 486SX-20 and is equipped with just 4MB of RAM, the T4500C is actually faster on Windows than the lone SX-25, several SL-25s, and all of the SLC-25s we tested.

The one thing that didn't impress us this time was Toshiba's cus-

PC WORLD TEST CENTER REPORT

Power-Saving Battle Royale

	Battery life
AST PowerExec 486SL/25 ColorPlus*	6:42
IBM ThinkPad 720C*	3:19
Compaq LTE Lite 4/25c*	3:16
TI TravelMate 4000 WinDX2/40*	2:36
Wen Technology WenNote 25C	2:21
Polywell Poly NB425	2:13
CAF AquaLite-IV	2:08
Twinhead Slimnote 486DX/33T	1:56
Toshiba T4500C	1:53
CompuAdd Express 425Color	1:52
Aspen Professional 486CT*	1:46
PC Brand 486/DX-33 LeaderBook Pro	1:44
Hyundai Courier Spectra	1:18
ALR Ranger MCT486DX/25	1:16
ZDS Z-Note 425Lnp	1:09
ZDS Z-Note 425Lnc	1:00

*Best Buy

Systems are arranged in order of battery life, from longest at top to shortest at bottom.

Time in hours/minutes.

Methodology We drain the notebooks' batteries and then fully charge them. We set the power-saving options on each notebook, when possible, to best fit this profile: doze mode timeout, 1 minute; sleep mode timeout, 3 minutes; LCD timeout, 1 minute; CPU timeout, 1 minute; modem and serial ports disabled; low-battery alarm enabled. Ten office workers type documents for regular intervals in Word for Windows, saving files periodically. We rotate the notebooks among the pool of typists to drain the batteries evenly. We repeat the tests twice for accuracy and report the times elapsed between when we turned the notebooks on and when they shut themselves off.

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

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**DELL DIMENSION 486/335
i486 SX 33MHz SYSTEM**

\$1,749

FEATURES:

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**DELL DIMENSION 486/33
i486 DX 33MHz SYSTEM**

\$1,899

FEATURES:

- BUSINESS LEASE: \$70/MO.
- 4MB RAM (EXPANDABLE TO 64MB)
- 230MB (17ms) HARD DRIVE
- 8KB INTERNAL CACHE
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*Test results obtained by Dell Performance Measurement Lab by running BAPCO SYSmark92, and WINBENCH version 3.11 at 800 x 600, 256 colors. System tested: 486/50 configured with 4MB RAM, 170MB IDE HD. Promotions not available in Canada. †Leasing arranged by Leasing Group, Inc. *On-site service provided by BancTec Service Corporation. On-site service may not be available in certain remote locations. MS-DOS and Micros are trademarks of Intel Corporation. Dell disclaims proprietary interest in the marks and names of others. ©1993 Dell Computer Corporation. All rights reserved.

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**DELL DIMENSION 486/50
i486 DX2 50MHz SYSTEM**

\$2,599*

FEATURES:

- BUSINESS LEASE: \$96/MO.
 - 8MB RAM (EXPANDABLE TO 64MB)
 - 340MB (16ms) HARD DRIVE
 - 128KB EXTERNAL CACHE
 - **INTERNAL CD ROM**
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 - **1MB VIDEO RAM**
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 - 5 AVAILABLE 16-BIT EXPANSION SLOTS
 - 2 SERIAL PORTS, 1 PARALLEL PORT, 1 MOUSE PORT
 - 200-WATT POWER SUPPLY
 - PASSWORD PROTECTION
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**DELL DIMENSION 486/66
i486 DX2 66MHz SYSTEM**

\$2,899*

FEATURES:

- BUSINESS LEASE: \$107/MO.
 - 8MB RAM (EXPANDABLE TO 64MB)
 - 450MB (12ms) HARD DRIVE
 - 128KB EXTERNAL CACHE
 - **INTERNAL CD ROM**
 - **ACCELERATED LOCAL BUS VIDEO**
 - **1MB VIDEO RAM**
 - ULTRASCAN™ 15FS MONITOR (15", 1024 x 768, .28mm, NI)
 - DUAL DISKETTE DRIVES (3.5" AND 5.25")
 - 1 AVAILABLE EXTERNAL 5.25" HALF-HEIGHT DRIVE BAY
 - 5 AVAILABLE 16-BIT EXPANSION SLOTS
 - 2 SERIAL PORTS, 1 PARALLEL PORT, 1 MOUSE PORT
 - 200-WATT POWER SUPPLY
 - PASSWORD PROTECTION
 - MS-DOS 6.0/MICROSOFT WINDOWS 3.1/MOUSE
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**DELL DIMENSION 486/66
i486 DX2 66MHz SYSTEM**

\$3,199*

FEATURES:

- BUSINESS LEASE: \$118/MO.
 - 16MB RAM (EXPANDABLE TO 64MB)
 - 450MB (12ms) HARD DRIVE
 - 128KB EXTERNAL CACHE
 - **INTERNAL CD ROM**
 - **ACCELERATED LOCAL BUS VIDEO**
 - **1MB VIDEO RAM**
 - ULTRASCAN 15FS MONITOR (15", 1024 x 768, .28mm, NI)
 - DUAL DISKETTE DRIVES (3.5" AND 5.25")
 - 1 AVAILABLE EXTERNAL 5.25" HALF-HEIGHT DRIVE BAY
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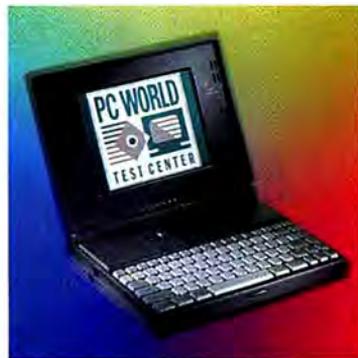
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IN CANADA: CALL 800-668-3021. #1108G

Local Bus Video with 1MB Video RAM and 128KB Cache. *Prices valid in the U.S. only. Some products and are registered trademarks of Microsoft Corporation. The Intel Inside logo is a registered trademark and i486 is a

tomter service, which is normally good. While its warranty and other policies are fine, the tech support lines were difficult to reach during the day. Once we did get through, half the answers missed the mark. Still, the T4500C is an extremely well-designed notebook. While not a Best Buy, it comes awfully close.

Twinhead Slimnote 486DX/33T



VITAL STATISTICS

Street price: \$4995
PROS: Great performer, good expandability
CONS: Pricy, poor service and support
Contact: Twinhead, 800/767-8946, 408/945-0808
Reader service no. 681

 Desktop power in a highly portable package—Twinhead's Slimnote is a splendid example of a lean, mean machine. It's so good, in fact, that the Slimnote almost warrants a Best Buy. It comes with a crisp active-matrix screen and full 33-MHz 486DX power, along with 8MB of RAM and a 203MB hard drive. All this horsepower is corralled into one of the smallest cases around.

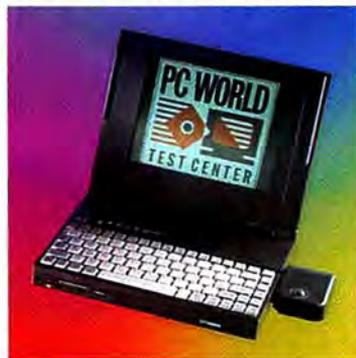
As expected, performance is a Slimnote highlight. It gets the silver medal for the Windows and BAPCo tests, checking in only 10 percent behind the fastest machine and just 13 percent behind the comparison desktop based on the 33-MHz 486DX processor.

And this is one notebook that favors the southpaw. The built-in trackball is mounted above the keyboard toward the left side, so right-handers must sweep their hand across a large portion of the keyboard to reach it, an awkward motion. The trackball is also small and close to the mouse keys below it; it's too cramped to allow one hand to use it comfortably. The keyboard layout doesn't offer any surprises. While the keys are a little noisy and jangly, they provide good tactile feedback. As with more and more notebook vendors these days, Twinhead offers an optional expansion station.

The big drawback is the Slimnote's steep \$4995 price tag—it's the second most expensive notebook in this review. Another drawback is that the NiMH battery yields slightly less than 2 hours of power in our tests. Oddly enough, this is the only machine that doesn't charge the battery while running on AC power—a real oversight. The screen case feels flimsy, which does not bode well for delicate active-matrix displays. Another area that took a real nose-dive was service and support. For a company that sells solely through dealers, vendor-to-dealer support is rather skimpy. Support answered calls quickly but didn't answer most questions accurately. For the price you pay, you'd expect better service.

High price and poor service and support notwithstanding, the Twinhead Slimnote's excellent performance and good overall design and expandability all help place it just short of the Best Buy ranks. Left-handers especially should give this notebook serious consideration. (Twinhead also offers a version of this color Slimnote based on Intel's 486DX2-66 processor. The Slimnote 4DX2/66T has a suggested retail price of \$5195.)

Wen Technology WenNote 25C



VITAL STATISTICS

Estimated street price: \$2700
PROS: Lowest cost, light weight, small
CONS: Flimsy case, slow performance
Contact: Wen Technology, 800/377-4936, 914/347-4100
Reader service no. 682

 The good news: The WenNote 25C is the least expensive 486 color notebook in our review. Its battery will let you compute for almost 2½ hours untethered from the wall. And with a traveling weight of 7.6 pounds, this slim notebook is only slightly heavier than our lightest review unit.

The bad news: It's clear Wen cut corners to achieve all this at such a low price. Based on the relatively lightweight Cyrix 486SLC-25 processor, and underendowed with 4MB of RAM and a skimpy 81MB drive, the WenNote is guaranteed to frustrate heavy-duty Windows users. While 486SLC-based machines are no slowpokes, they suffer by comparison in this very fast company—the WenNote's performance ranked fifth-last and was fully 55 percent slower than the 25-MHz 486SX desktop.

Unfortunately, the news gets worse. While the WenNote's 9-inch screen is larger than most, its colors appear relatively pale even for passive displays, and it's unevenly lit, making it the least appealing screen of the lot. While Wen offers an expansion chassis, the hard drive is expandable to only 120MB—hardly enough for serious Windows users.

This review's Bonehead Award for usability goes to the WenNote's trackball and fax-modem device. Combined in a case not much bigger than a standard mouse, the trackball and fax-modem plug into a special connector located on the notebook's right panel and fit snugly against it. While the idea seems clever, it suffers from a serious drawback: Both devices use the same COM port, so you can't use the modem and the trackball at the same time. You're forced to choose between Windows and communications—Windows fax and datacomm program users are out of luck. Also, larger hands may feel cramped with this trackball and its mouse keys. The keyboard itself feels cheap and is noisy to type on, with a short throw and weak tactile response.

Most alarming of all is the flimsiness of the case. When one test user gripped the screen on one side, the front-case piece of the screen popped off from the rear-case piece and exposed the passive screen and the delicate circuitry surrounding it.

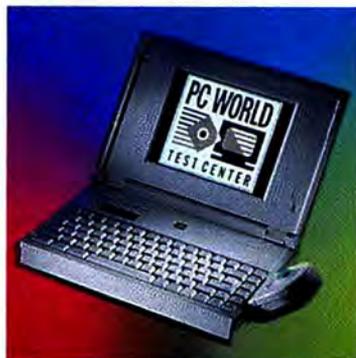
The service and support rating did little to bolster the Wen notebook's sagging scores. While technical support answered calls immediately, their accuracy was off on half the calls. Daily support is

The good news:
 The WenNote 25C
 is the least
 expensive 486
 color notebook
 we reviewed.

available a relatively short 9 hours per day, turnaround on repairs takes three days, and there is no on-site service available. Even the documentation is the worst of the bunch—it consists of one system “manual” that is really a booklet with diagrams that either aren’t clearly marked or aren’t marked at all.

Our advice? If it’s lightness and long battery life you crave in a notebook with a passive-matrix display, spend more money and get the Texas Instruments TravelMate 4000.

ZDS Z-Note 425Lnc



VITAL STATISTICS

Direct price: \$4457

PROS: Network connections, active-matrix screen

CONS: Worst battery life

Contact: Zenith Data Systems, 800/553-0331, 708/808-5000

Reader service no. 683

ZDS has made a name for itself by applying extremely high-quality design work to all of its products, and the 425Lnc is no exception. One of this Z-Note’s best features is an Ethernet-compatible communications port, complemented by a collection of preloaded network client shells (including Novell NetWare, Microsoft LAN Manager, and Banyan VINES; Microsoft Windows for Workgroups is also factory-installed). You get an extensive collection of network security features such as separate supervisor and user passwords.

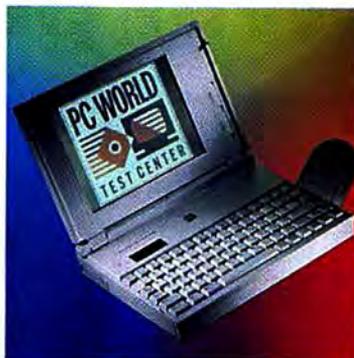
The Z-Note is equipped with a 486SL-25 CPU, which produces decent performance (it’s still slower than the average SX-25 desktop). The active-matrix display is nice and sharp, and this model sports a big 203MB hard drive. The unit we looked at had 8MB of RAM, but you can upgrade that all the way to 28MB. All this weighs in at a relatively light 8.3 pounds (though the case itself is larger than many others).

ZDS backs the Z-Note with 16-hour-a-day tech support. The tech support staff answered our questions quite well, but we sometimes had to wait for them on hold for up to 10 minutes. If you want to buy some insurance against breakdowns on the road, ZDS will enroll you in its Executive Hot Swap Program for \$100 per year, which means it’ll send you a replacement within 24 hours if your notebook malfunctions.

Despite the cool features, nice performance, and good service, this Z-Note’s price isn’t exorbitant. Although at \$4457 direct, the 425Lnc is one of the more expensive units we looked at, the price is actually not bad for an active-matrix screen.

So why isn’t this Z-Note a Best Buy? Because it managed to produce the lowest score on our battery test in this review—just 1 hour. We were surprised by the low times given the Z-Note’s abundance of power management options (which include a rest mode, standby mode, and individual timeouts for the hard drive), but a second test confirmed the first. If it weren’t for the short-lived battery, this might be one of the nicest notebooks here; as it is, it’s an also-ran.

ZDS Z-Note 425Lnp



VITAL STATISTICS

Direct price: \$3757

PROS: Good service and support, documentation, LAN adapter

CONS: Poor battery life

Contact: Zenith Data Systems, 800/553-0331, 708/808-5000

Reader service no. 684

In case you don’t need or don’t want to pay for the vividness of an active-matrix screen or the 200MB hard drive in the other Z-Note reviewed, ZDS offers a slightly slimmer passive display version of its color Z-Note with a smaller hard drive that sells for \$3757. The other features remain the same: the 486SL-25 processor, 8MB of RAM expandable to a hefty 28MB,

Late List Prices

Prices in the computer marketplace appear to be stabilizing: Only 6 of the 16 notebooks we reviewed this month fell in price during the two months between our first and last wave of pricing research calls. Four of the price drops we saw were minimal, ranging from 4 percent (in the case of the CAF AquaLite-IV) to 7 percent (for the TI TravelMate). The biggest changes: The list price of the Hyundai Courier Spectra fell 15 percent, to a remarkable \$2499, and the Toshiba T4500C fell 12 percent to \$4419. Unfortunately, few of these price drops affected the most expensive notebooks in the review.

Prices Level Off

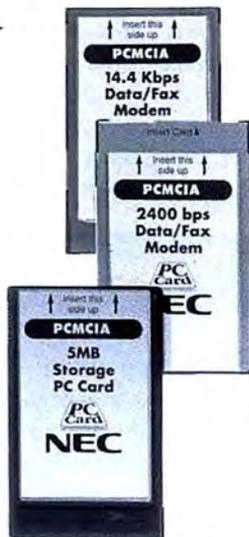
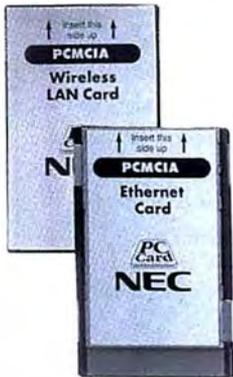
	List price as of May 1993	Price drop from March 1993
ALR Ranger MCT486DX/25	\$5003	none
Aspen Professional 486CT	\$2995	\$175
AST PowerExec 486SL/25 ColorPlus	\$5357	none
CAF AquaLite-IV	\$4395	\$180
Compaq LTE Lite 4/25c	n/a ¹	n/a ¹
CompuAdd Express 425Color	\$2595	\$200
Hyundai Courier Spectra	\$2499	\$450
IBM ThinkPad 720C	n/a ¹	n/a ¹
PC Brand 486/DX-33 LeaderBook Pro	\$3894	none
Polywell Poly NB425	\$2885	none
Texas Instruments TravelMate 4000 WinDX2/40	\$4199	\$300
Toshiba T4500C	\$4419	\$600
Twinhead Slimnote 486DX/33T	\$4995	none
Wen Technology WenNote 25C	\$3710	none
ZDS Z-Note 425Lnc	\$4457	none
ZDS Z-Note 425Lnp	\$3757	none

¹ Vendor is no longer offering list prices for this system

What will people make of Anything they want.

Versa's screen detaches easily, so you can quickly upgrade it, reverse the display or convert to pen.

For the ultimate in expansion and connectivity, Versa offers the latest PCMCIA Type III standard: plug in up to two cards—modems, LAN, storage or, in the future, wireless networking. What's more, our QuickSwap™ feature lets you change cards in mid-application without powering down.



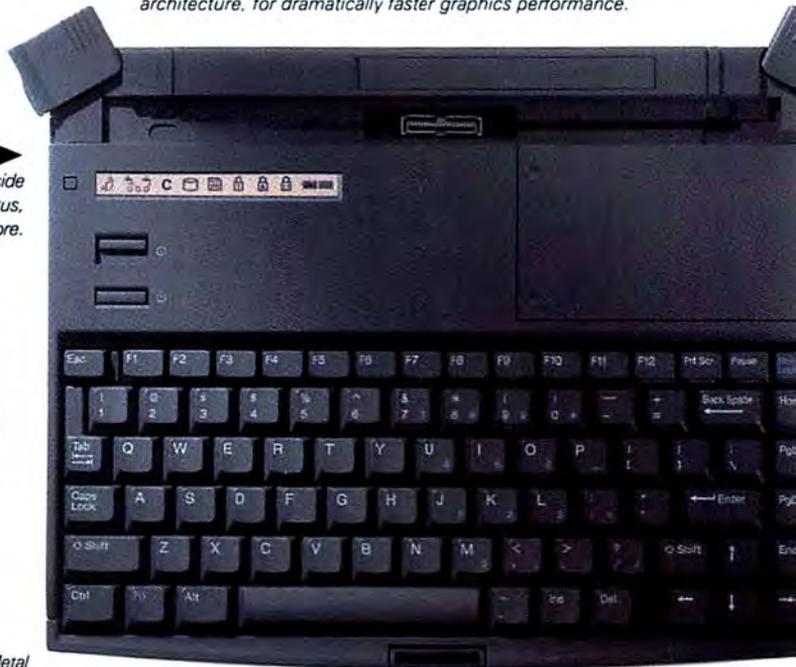
The LCD status panel gives a quick overview of what's going on inside your Versa—power management status, battery life and more.



Versa comes standard with a Nickel Metal Hydride (NiMH) battery, for longer life and quick recharging.



Choose Versa with 256 brilliant colors and the latest active-matrix screen technology, or with 64 crisp shades of gray. Either way, Versa is the first notebook to use local bus video architecture, for dramatically faster graphics performance.



our new UltraLite® Versa™?



▲ Versa's RAM can be easily upgraded from 4MB to as much as 20MB† simply by sliding in a memory card.



As with our award-winning monitors, printers, desktop PCs and CD-ROM readers, the new UltraLite Versa is a prime example of what NEC does best: integrating many new technologies into one seamless, highly functional package.



▲ Versa offers powerful, energy-efficient 3.3V i486SL™ processing. Start with your choice of 20, 25 or 33MHz‡ processor; upgrade as your computing needs increase.



▼ Versa offers innovative active-matrix color pen computing, as well as a monochrome pen model. Versa also converts to a tablet in seconds, for capturing signatures, taking notes or annotating presentations.



▶ To increase Versa's storage capacity, just choose from 80MB, 120MB or 180MB removable hard drives. And Versa comes pre-loaded with Windows™ 3.1 and DOS® 5.0.



▲ With our new DoubleTime™ technology, Versa's battery life can be doubled, instantly, by exchanging the floppy drive for a second battery. Result: an astounding 8-12 hours for monochrome, 5-10 hours for color, depending on usage.

The new UltraLite Versa is perhaps the one notebook computer you should want right now.

That's because Versa's exceptional upgradability and flexibility give you the power to choose the system you need today, and then enhance its features as your needs change.

Making it a notebook you'll still want years from now.

With Versa, you're protected from wasting money on a notebook you might soon outgrow. Protected, too, by a 3-year limited warranty and UltraCare™ enhanced service plan.*

The 6-lb.** Versa is a light, powerful i486SL™ notebook that's perfect for heavy computing, faxing and communicating while on the road.

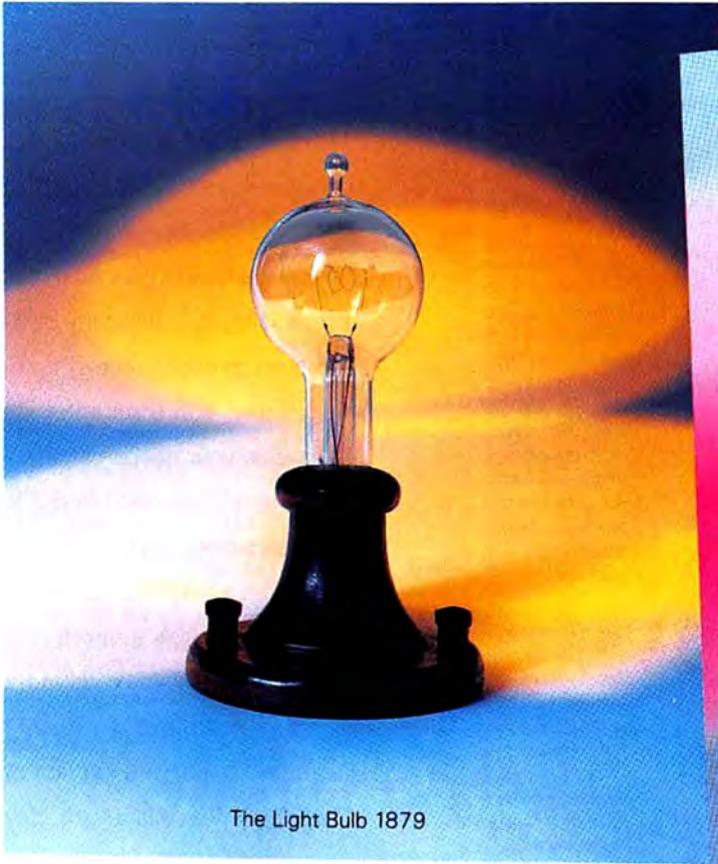
Giving you a real alternative to the mouse, Versa's optional pen models and pen upgrades† make it easy to take notes or enter data in the field.

Slipped into its optional Docking Station™ unit, Versa offers all the capabilities of a desktop computer. So what do you make of a notebook PC that does all that? Anything you want.

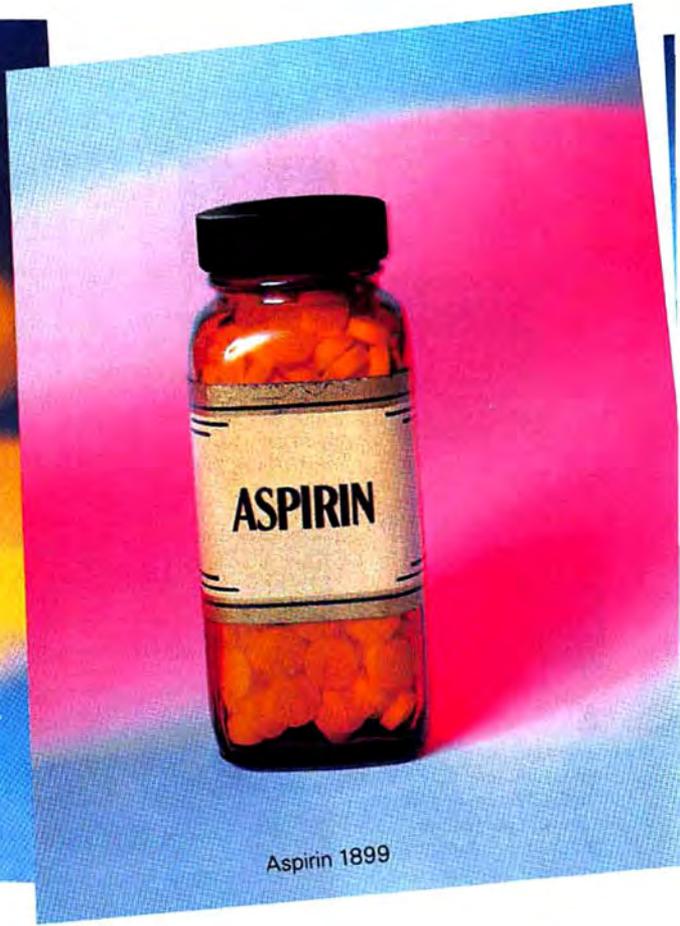
For details on the amazing UltraLite Versa, call 1-800-NEC-INFO (in Canada, 1-800-343-4418), or NEC FastFacts™ at 1-800-366-0476 (#ULVERSA).

Because ↑ is the way you want to go.

NEC



The Light Bulb 1879



Aspirin 1899

The best inventions make you work

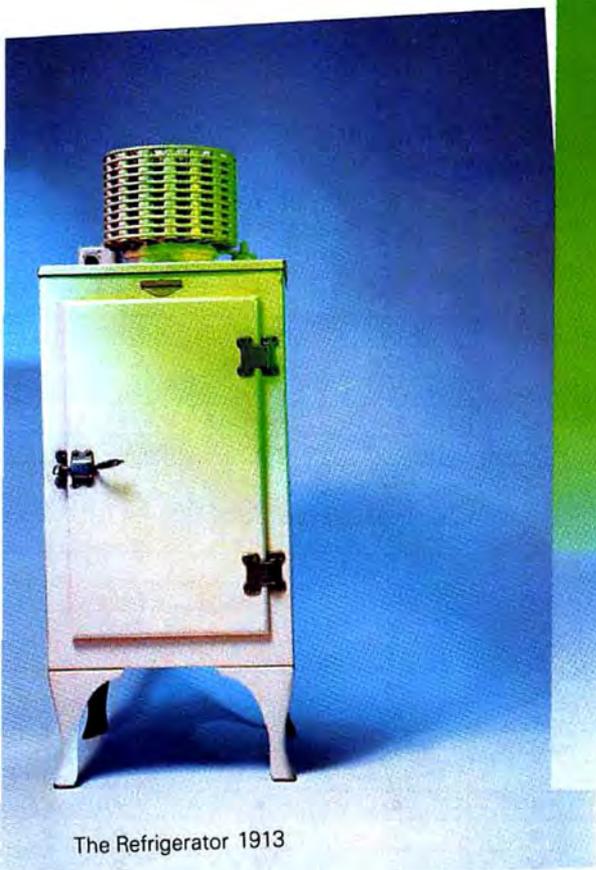
MultiSpin™ from NEC.

Thanks to pioneers like Thomas Edison, you don't remember what it was like to read by candlelight. And thanks to NEC's MultiSpin™ CD-ROM readers, you won't be able to remember a time when you couldn't transfer

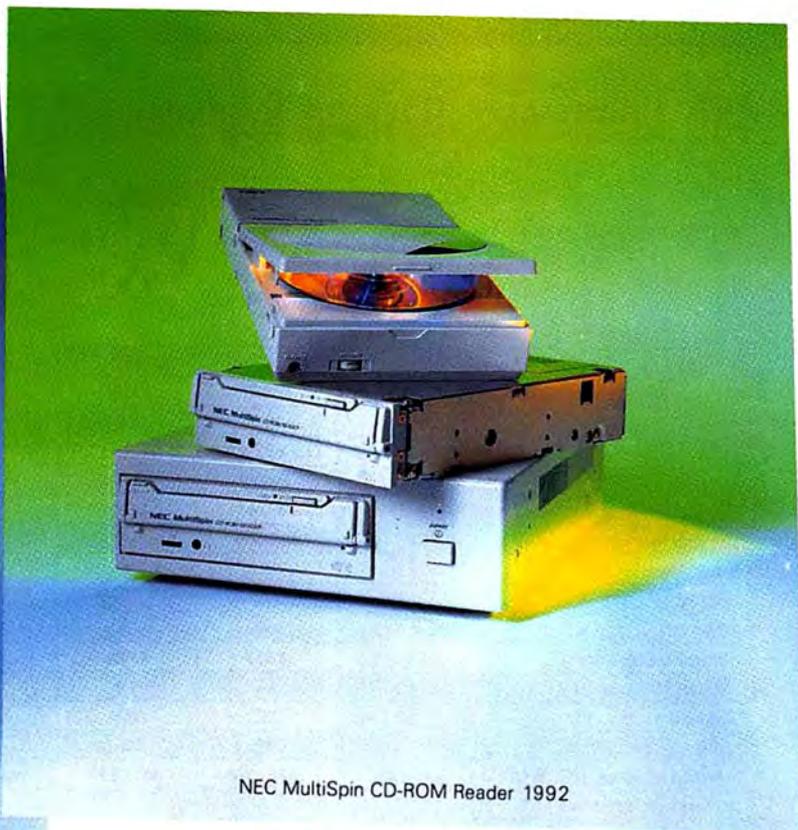
data at a rate of 300 KB/second.

We revolutionized CD-ROM.

NEC was the first company to successfully bring dual-speed technology to market, and now has a complete family of readers designed to fit your needs. From our external MultiSpin 74 and internal MultiSpin 84, to our lightweight, portable MultiSpin 38.



The Refrigerator 1913



NEC MultiSpin CD-ROM Reader 1992

Understand how you ever lived without them.

Built for the future.

All of our readers support Kodak's Multisession Photo CD™ technology, so you can view photographs on

CD and work with those images on your computer. All are SCSI 2 compatible, which increases compatibility across multiple platforms.

 In 1985 NEC redefined monitors with the invention of MultiSync® technology. Now there is MultiSpin. The technology that has redefined CD-ROM readers.

And both the MultiSpin 74 and 84 have a 256 KB continuous flow cache that allows them to transfer encyclopedias of

data at high speeds and play back video without any pauses in motion. And the MultiSpin 38 gives you the power of portability. Best of all, they all come with a two-year warranty. **Multimedia's never been so easy.**

What's more, all of them are QuickTime™ compatible and meet the Multimedia PC (MPC) standards for Multimedia computing. Once you



check out the high-performance CD-ROM readers from the pioneers of

MultiSpin technology, you'll find everything else about as primitive as traveling by horse and buggy. To find out more, call 1-800-NEC-INFO (in Canada 1-800-343-4418).



Or, via fax, call NEC FastFacts™ at 1-800-366-0476, request #23766.

Because  is the way you want to go.

NEC

Circle 182 on reader service card

FEATURES COMPARISON

486 Notebooks: Desktop Replacements?

● Yes
○ No
n/a = not available

	BEST BUY Ranger ALR MC1486DX/25	BEST BUY Aspen Professional 486CT	BEST BUY AST PowerExec 486SL/25 ColorPlus	BEST BUY CAF AquaLite-IV	BEST BUY Compaq LITE Lite 4/25c	Express CompuAdd 425Color	Hyundai Counter Spectra
Standard features							
Direct/street price as of 3/9/93 ¹	\$4668	\$3170	\$4583	\$3999	\$4222	\$2795	\$2949
List price as of 3/9/93 ¹	\$5018	\$3170	\$5357	\$4575	\$4361	\$2795	\$2949
Traveling weight (pounds)	9.9	10.8	8.4	7.9	7.8	8.0	7.6
Depth x width x height in inches	11.8 x 8.5 x 2.3	11.2 x 8.8 x 2.2	11.0 x 8.5 x 1.9	11.0 x 8.7 x 1.7	11.0 x 8.5 x 2.0	11.7 x 8.6 x 1.8	11.0 x 8.5 x 1.9
Processor	i486DX-25	i486DX-33	i486SL-25	i486SX-25	i486SL-25	Cx486SLC-25	Cx486SLC-25
Installed/maximum RAM (MB)	8/16	8/16	8/32	4/20	4/20	8/20	8/16
Installed/maximum hard disk (MB)	203/203	234/234	200/200	116/200	120/209	120/120	130/170
Removable hard drive	○	○	●	○	○	○	○
Color display							
Type	active	passive	active	active	active	passive	passive
Screen (square inches)	34.59	43.13	43.84	34.59	34.59	34.59	34.59
Screen (diagonal inches)	8.5	9.5	9.5	8.5	8.5	8.5	8.5
Maximum colors, LCD	64	256	256	256	256	256	256
Simultaneous LCD and CRT	○	●	●	●	●	●	●
Highest resolution, external CRT	640 x 480	1024 x 768	800 x 600	1024 x 768	800 x 600	800 x 600	800 x 600
Keyboard/pointing device							
Cursor keys in inverted-T	●	●	●	●	●	●	●
Dedicated page control keys	●	●	●	●	○	●	●
All 12 function keys dedicated	● ²	● ³	●	● ²	○	●	●
Standard <Ctrl> and <Alt> layout	○	○	○	●	○	●	●
Built-in pointing device	○	●	○	○	●	●	●
Modem	9600/2400-bps internal fax-modem	2400-bps external	9600/2400-bps internal fax-modem	9600/2400-bps internal fax-modem	9600/2400-bps internal fax-modem	9600/2400-bps internal fax-modem	9600/2400-bps internal fax-modem
Expansion chassis available	●	●	●	○	●	○	○
SCSI port	optional	○	optional	●	○	○	○
PCMCIA slot	○	○	● ⁴	○	○	○	○
Power management							
Type of battery	NiCd	NiCd	NiMH	NiCd	NiMH	NiCd	NiCd
Alkaline battery option	○	○	●	○	●	○	○
Supports APM	○	●	○	●	●	○	●
Set timeouts for:							
hard drive	●	●	○ ⁵	●	●	●	●
display	●	●	○ ⁵	●	●	●	●
floppy drive	○	○	○ ⁵	○	○	○	●
ports	○	○	○ ⁵	○	○	○	●
modem	○	○	●	○	○	○	●
Turns on or resumes on modem ring	●	○	●	●	●	○	●
Service and support							
Warranty (months)	12	12	12	12	36	12	18
On-site service price per year	n/a	n/a	n/a	n/a	free	n/a	free
24-hour replacement	● ⁷	● ⁷	●	● ⁷	○	● ⁷	○
Turnaround policy (days)	2	1	2	3	2	3	2
Toll-free tech support	●	●	●	○	●	●	●
Daily support (hours)	11	9	14	9	24	12	10
Weekend support	● ⁸	○	● ⁸	○	●	○	○

¹Except where noted, standard configuration includes a 1.44MB internal floppy drive, mouse or trackball, Windows, and DOS.

²<F11> shares <F1>, <F12> shares <F2>.

BEST BUY IBM Thinkpad 720C	PC Brand 486/DX-33 Leaderbook Pro	Polywell Poly NB425	BEST BUY Texas Instruments TravelMate 4000 WinDX2/40	Toshiba T4500C	Thinhead Slimnote 486DX-33T	Win Technology 25C Winnote	ZDS Z-Note 4251inc	ZDS Z-Note 4251hp
\$5609	\$3894	\$2885	\$3899	\$4182	\$4995	\$2700	\$4457	\$3757
n/a	\$3894	\$2885	\$4499	\$5478	\$4995	\$3710	\$4457	\$3757
8.9	9.0	7.4	7.8	8.9	8.4	7.6	8.3	8.3
11.7 x 8.3 x 2.2	11.3 x 9.2 x 2.0	11.0 x 8.5 x 1.7	11.0 x 8.5 x 1.8	11.7 x 8.3 x 2.0	11.0 x 8.7 x 1.8	11.0 x 8.5 x 1.7	11.9 x 8.5 x 2.1	11.9 x 8.5 x 1.9
IBM 486SLC2-50	i486DX-33	Cx486SLC-25	i486DX2-40	i486SX-20	i486DX-33	Cx486SLC-25	i486SL-25	i486SL-25
12/16	4/20	8/8	8/20	4/20	8/20	4/20	8/28	8/28
117/160	120/120	122/200	200/200	124/120	203/203	81/120	203/203	116/203
●	○	○	○	○	○	○	○	○
active	active	passive	passive	active	active	passive	active	passive
52.34	34.59	34.59	42.89	34.59	34.59	38.97	34.59	42.89
10.5	8.5	8.5	9.6	8.5	8.5	9	8.5	9.5
256	256	256	256	256	256	256	256	256
●	●	●	●	●	●	●	●	●
640 x 480	1024 x 768	800 x 600	1024 x 768	1024 x 768	1024 x 768	800 x 600	1024 x 768	1024 x 768
●	●	●	●	●	●	●	●	●
●	●	●	○	●	●	●	●	●
●	● ²	●	○	●	●	●	●	●
●	●	●	●	○	● ²	●	●	●
●	●	●	○	○	●	○	○	○
9600/2400-bps internal fax-modem	none	9600/2400-bps internal fax-modem	14,400/2400-bps internal fax-modem	2400-bps internal	9600/2400-bps internal fax-modem	9600/2400-bps internal fax-modem	2400-bps internal	2400-bps internal
●	○	●	●	●	●	●	●	●
○	○	○	○	○	○	○	○	○
● ⁴	○	○	○	● ⁴	○	○	○	○
NiMH	NiCd	NiCd	NiCd	NiMH	NiMH	NiCd	NiMH	NiMH
○	○	○	○	○	○	○	○	○
●	●	●	●	●	○	●	●	●
●	●	●	●	●	●	●	●	●
●	●	●	○	●	●	●	○	○
○	○	○	○	○	○	○	○	○
○ ⁶	○	○	○	○	○	○	○	○
○ ⁶	○	○	○	○	○	○	○ ⁶	○ ⁶
●	●	●	●	●	●	○	●	●
36	12	12	12	12	12	12	12	12
free	free	n/a	\$350	free	n/a	n/a	\$100	\$100
○	○	○	○	○	○	● ⁷	●	●
1	3	3	2	2	4	3	2	2
●	●	●	●	●	●	●	●	●
24	9.5	8	12	10	12	9	16	16
●	● ⁸	● ⁸	○	○	● ⁸	○	○	○

³<F8> doubles as <F11>, <F9> doubles as <F12>.

⁴Two.

⁵Timeouts set automatically.

⁶On/off only.

⁷Limited to certain cases; call dealer for details.

⁸Saturday only.

“So there I was, playing with my Nintendo® and Dad was all spazzed out. No one at his office thought they could handle one of those storage things. You know, the disks and tape deals. Well, Dad said these guys at Conner told him it’s so simple a kid could do it. So I did. Dad got a raise, I got a suit, and I’ll be home late. O.K. Mom?”



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Circle 49 on reader service card



and Ethernet port, all neatly tucked into the same 8½-pound case.

Like its pricier sibling, this Z-Note is a middle-of-the-road performer, falling well short of the typical 486SX-25 desktop. ZDS offers a device called a Port Replicator that allows you to hook up a host of external devices, such as a desktop monitor and full-size keyboard, printer, standard mouse, and AC power, just by plugging the Replicator into the back of the notebook. The Z-note's internal modem lacked fax capability, unlike those on most of the notebooks sent to us for review.

The pointing device is Logitech's TrackMan trackball, which clips easily to either side of the keyboard and provides comfortable point-and-click operation. The keyboard is also comfortable; it's

smooth and quiet to type on, though some may not like the short throw of the keys.

The 9.5-inch screen is sizable, but it's hampered by uneven lighting and a sensitive contrast control, and the screen frame feels a little flimsy. Despite good power management options, the battery in this Z-Note yields less than 1¼ hours of computing time, only 9 minutes more than its active-matrix counterpart.

Excellent service and support notwithstanding, in this Z-note you're getting an average-performance color 486 notebook for an average price. We could recommend the system were it not for its excessively low battery times. Unless you don't mind toting extra battery packs, give this one a pass.

PC WORLD TEST CENTER REPORT

Speed on the Road

	Excel 4.0	Freelance for Windows 1.0	Word for Windows 2.0	Paradox 3.5 in DOS window	BAPCo SYSmark92
TI TravelMate 4000 WinDX2/40*	163	193	231	139	93
Twinhead Slimnote 486DX/33T	171	203	205	225	88
IBM ThinkPad 720C*	160	197	195	264	89
Aspen Professional 486CT*	178	217	232	233	82
PC Brand 486/DX-33 LeaderBook Pro	203	204	240	356	74
AST PowerExec 486SL/25 ColorPlus*	225	255	248	315	75
ALR Ranger MCT486DX/25	228	280	279	317	69
CAF AquaLite-IV	262	287	256	353	74
ZDS Z-Note 425Lnp	255	298	318	315	73
ZDS Z-Note 425Lnc	256	297	303	319	67
Toshiba T4500C	228	283	276	356	60
Wen Technology WenNote 25C	285	302	292	399	67
Compaq LTE Lite 4/25c*	323	372	355	311	65
Hyundai Courier Spectra	306	362	359	399	49
CompuAdd Express 425Color	340	385	388	439	47
Polywell Poly NB425	348	386	405	417	44

*Best Buy

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

Methodology

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

Excel 4.0 We perform several data extracts; build and format a financial statement and print it; and open a

mortgage analysis, scroll, move blocks, change the interest rate, print-preview the statement, and save it.

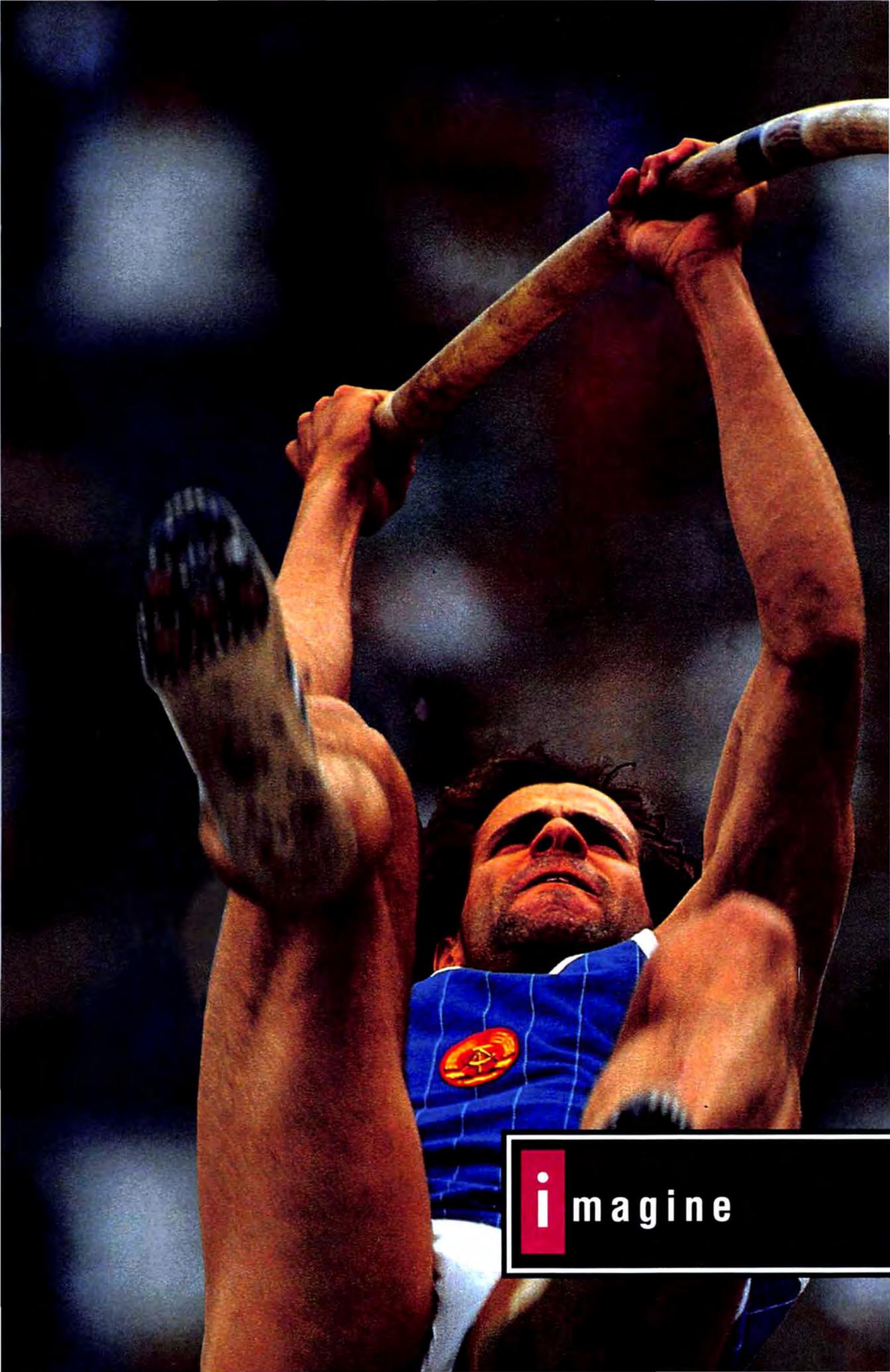
Freelance for Windows 1.0 We load a single-page starter file containing a United States map, with each state a separate object. Then we build a six-page presentation using charts and preview it five times with different effects. Finally, we save the presentation to disk.

Word for Windows 2.0 We use the spelling checker and scroll through a 27-page document; create, format, print, and save a single-page business letter; and open a business proposal, add a paragraph, and preview and print the proposal.

Paradox 3.5 in DOS window Running the program in a DOS window, we perform a variety of data entry, record searching, and updating tasks. Then we generate reports using a simple customer list.

BAPCo SYSmark92 We run a scripting program that loads common database, desktop publishing, presentation graphics, software development, spreadsheet, and word processing applications and executes a variety of typical tasks with each. The following software packages are used: Aldus PageMaker 4.0, dBASE IV 1.1, Harvard Graphics 3.0, 1-2-3 3.1, Microsoft C 6.0, Microsoft Excel 3.0, Microsoft Word for Windows 2.0, Paradox 3.5, Quattro Pro 3.0, and WordPerfect 5.1.

All data based on tests designed and conducted by the PC World Test Center with the exception of BAPCo SYSmark92, an industry standard test designed by the Business Application Performance Corporation. Testing performed by PC World performance analysts Uirike Diehlmann and Susan Silivius. All rights reserved.



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average AXP chip
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running at 150MHz

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2 asynchronous serial ports,
1 parallel port

101-key IBM® PS/2™
compatible keyboard and 3-
button mouse

Other options include sound
boards, network adapters,
modems and printers

Windows NT

What makes the DECpc
AXP/150 system the platform
of choice for Windows NT

Full 32-bit implementation
of Windows NT

Provides features such as:

Microkernel architecture

Multi-threading

High availability and quick
system recovery

Preemptive scheduling

Advanced networking

Built-in security

Windows user interface

Runs MS-DOS and Windows
(16 and future 32-bit)
applications

Leading applications and
development tools ported to
Windows NT on AXP systems

Hundreds of new applications
being developed to take
advantage of Windows NT on
Alpha AXP systems

Complementary Digital products
like eXcursion™ for Windows NT
and PATHWORKS™ for
Windows NT make it easy to
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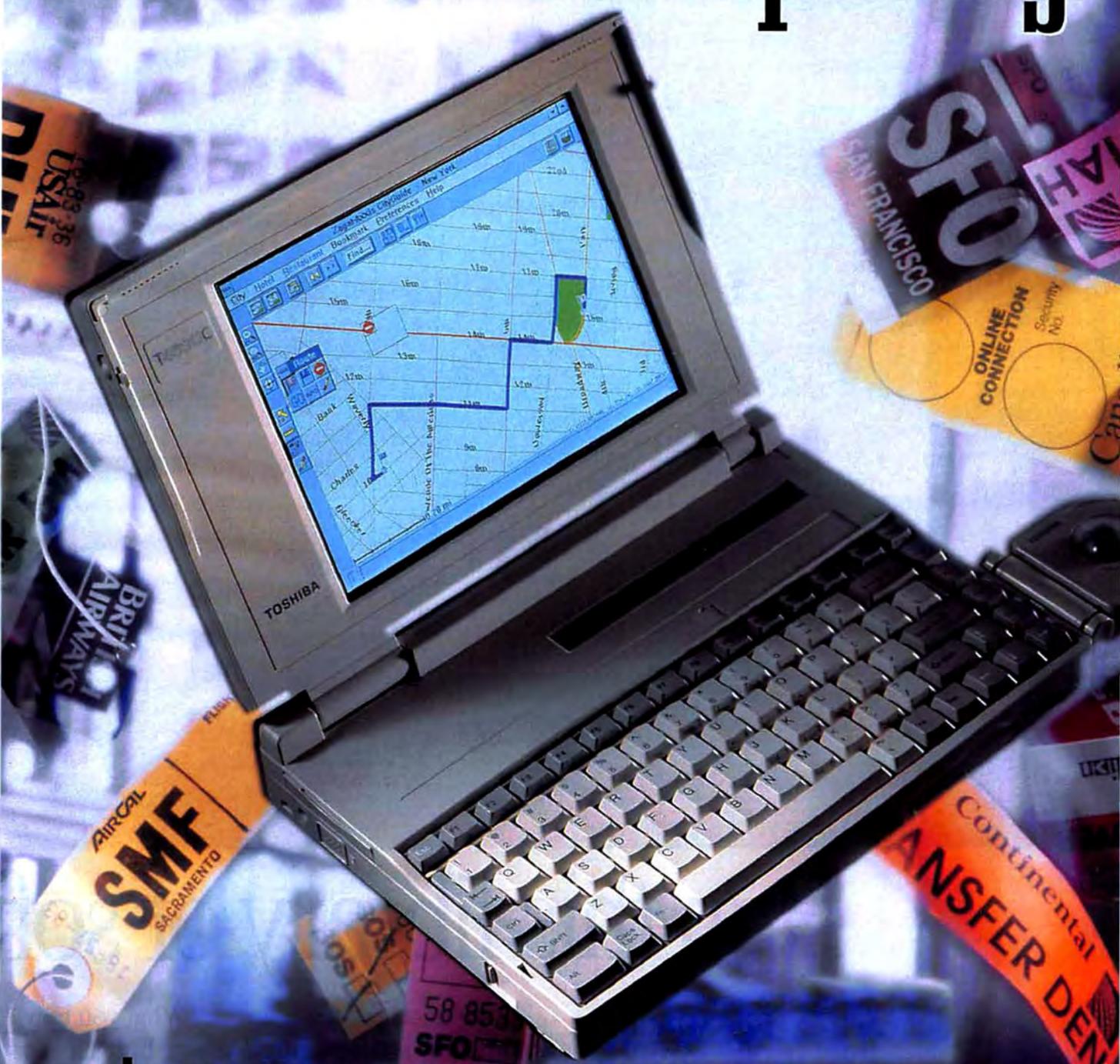
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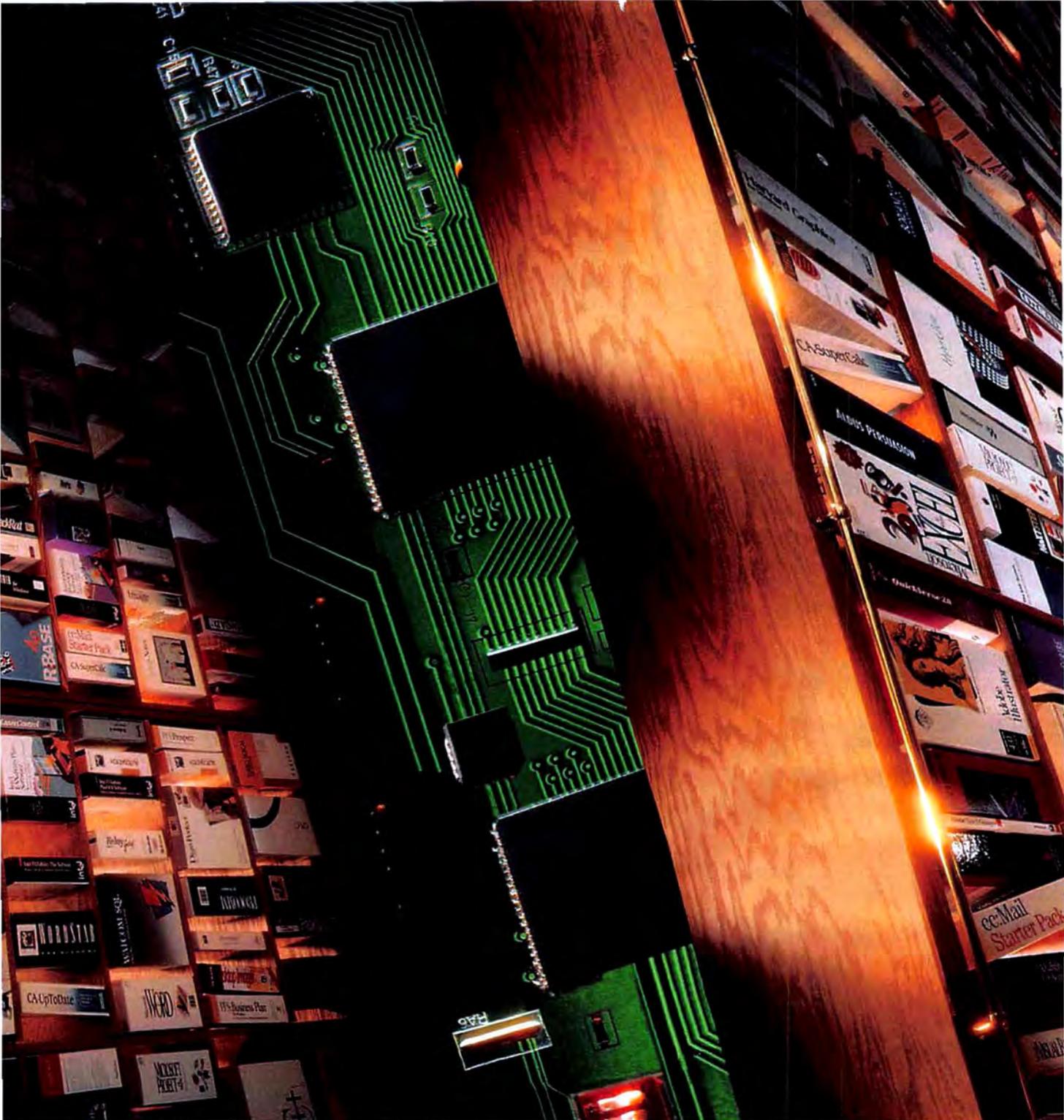
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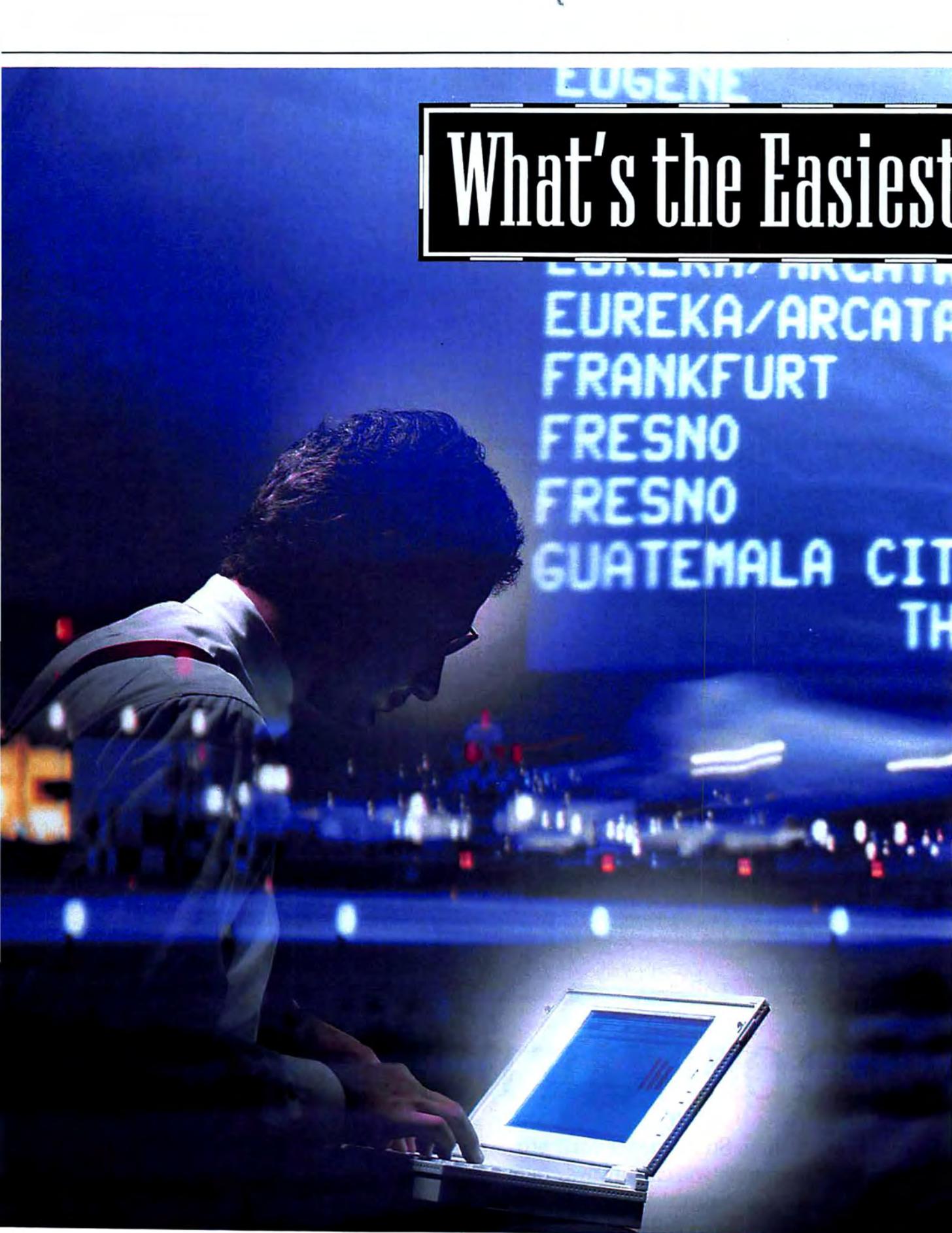
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What's the Easiest

Notebook to Use at 30,000 Feet?



PHOTOS, COVER AND THIS PAGE: ROBERT CARDIN

What's the friendliest notebook in the skies?

At 30,000 feet, the last things you want to bother with are design flaws. One poorly placed power switch or bad cable hookup can send you plummeting toward disaster—whether you're in the cockpit holding the throttle of a 757, or back in seat 15B pounding away on your notebook computer. Hit the reset button when you meant to hit the dimmer switch, and hours of hard work could go down in flames.

The essential ingredient is intelligent design. While you may use a notebook with your head in the clouds, you buy it with both feet on the ground.

And the sleek, black machine that looks so alluring in the computer store may turn out to be an albatross once you're in the air. After you've unbuckled your seat belt, folded down the tray table, and powered up the machine, you discover you can't reach the pointing device without elbowing the woman next to you. Or your screen snaps down on your fingers like a rattrap every time the guy in front of you reclines his seat. Or, when you try to stow your notebook to make way for dinner, the removable trackball flies off the side of your machine and lands in your neighbor's lasagna.

Real Tests, Real People

If high-altitude performance is crucial, why hasn't anyone tested these notebooks under real-life conditions? Well, someone has. Last spring we set out to discover how everyday business professionals use notebook computers in the cramped quarters of a coach-class cabin. The premise was simple: We'd hire typical users as our testers, load them and a bunch of notebooks

The Apple PowerBook?

The IBM ThinkPad or

Compaq LTE Lite? The

PC World Test Center

teamed up with Ameri-

can Airlines to test five

top-flight notebook

designs in the toughest

environment they could

think of—a coach-class

airplane cabin.

By Dean Andrews, Tom Grubb,

Greg Smith, and Daniel Tynan

The Ideal Flying Machine

It took Orville and Wilbur more than a few tries to build a flying machine with the Wright stuff, and the same is true for notebook manufacturers. After hundreds of hours of usability testing, no single notebook emerged on top in all three crucial categories: pointing device, keyboard, and screen. Our tests did provide clues, however, as to what makes for the perfect traveling companion.

The Hyundai Courier Spectra's pointing device, with the trackball on one side of the keyboard and mouse buttons on the other, got a big hand from our testers. The ideal notebook might well emulate

the keyboard layout and feel of IBM's ThinkPad, which produced the fewest typos and the most favorable reviews. And the dream machine would certainly sport an active-matrix screen, like those found on the Compaq and Toshiba models, for gorgeous color that's easy on the eyes.

Unfortunately, you can't just Krazy Glue separate components together to create a perfect system—the entire machine has to be designed as a single, integrated unit. Has the truly perfect notebook arrived? Not yet. But, thanks to usability testing, it may be on the horizon. —D. T.



Compaq's LTE Lite 4/25c offers the finest view in the skies.

onto a plane, and record their struggles on film.

Sadly, the number of cameras, microphones, and other hardware we'd need for the tests scuttled our dreams of jetting off to Paris. Instead, we contacted AMR, the parent company of American Airlines, and ar-

area, and all have at least three years of experience using desktop PCs but little experience with notebooks. (Because anonymity is a crucial part of usability testing, we've changed their names for the purposes of this article.) One tester had spent some time piloting a Macintosh, and all

tions designed to simulate real-world situations. We focused on areas where a poorly designed notebook is most likely to cause turbulence: the pointing device, keyboard, and screen. Not surprisingly, these are the areas in which designers have made the most compromises in their quest to shrink desktop-powered PCs.

The testers each sat at the controls of each notebook for 35 minutes to 1 hour, depending on how quickly they winged their way through our tasks. Over the course of 11 days, the PC World Test Center ob-



Compaq placed the LTE Lite 4/25c's trackball next to the screen. While most testers found the design quite comfortable, its accuracy was mixed, producing the fewest errors for some and the most for others.

erved 250 hours of tests and recorded nearly 5000 events (see "How the Tests Were Conducted"). We recorded all the testers' experiences and gathered their opinions about each machine. More important, we tabulated the number of errors each user experienced—for example, the number of times a tester pressed the wrong button—to figure out which designs were truly the easiest to use.

Passenger Check-In

After a lengthy screening process, we chose six *PC World* readers for our test flight. All are business professionals from the Dallas

were familiar with Word for Windows and Excel, which were used in our test suite.

Next, we chose the machines for our experiment. To keep the test manageable, we picked five models that we felt represented the state of the art in notebooks and gave us the broadest range of design options: Apple's PowerBook 165c, Compaq's LTE Lite 4/25c, Hyundai's Courier Spectra, a preproduction model of IBM's ThinkPad 720C, and Toshiba's T4500C. (For a full evaluation of 16 top-of-the-line color notebooks, see *PC World's* July 1993 review "Double-Duty: 486 Notebooks.")

At the same time, we set up a series of tasks based on common business applica-

tion. We focused on areas where a poorly designed notebook is most likely to cause turbulence: the pointing device, keyboard, and screen. Not surprisingly, these are the areas in which designers have made the most compromises in their quest to shrink desktop-powered PCs.

Points of Departure

Almost every top-flight software program features pulldown menus, command buttons, or other features that cry out for a pointing device. Unfortunately, computer

The IBM ThinkPad 720C's keyboard produced the fewest errors in our tests, making it a welcome addition to any coach-class tray table.



The Hyundai's unusual two-handed trackball design scored big points with our frequent flyers.

mice don't seem to travel well on airplanes.

That's why many notebooks pack built-in trackballs. A trackball is essentially a mouse flipped on its back; instead of moving the mouse over a flat surface, you roll a ball inside a socket to control the movement of the pointer on screen. Our five test machines run the gamut of pointing-device design, featuring trackballs placed near the screen, below the keyboard, and almost everywhere in between. IBM's ThinkPad nixed the trackball entirely, opting for a mini joystick in the middle of its keyboard.

In devising our pointer usability test, we sought to answer such questions as, How easy is it to select text and click the correct buttons? Is it better to use one hand or two to control the device? Will it force you to battle your fellow passengers for control of the armrest? The results caused us to rethink basic assumptions about pointer design.

The biggest surprise was the lackluster performance of Apple's highly touted PowerBook. The best-selling line of notebooks, PowerBooks feature an innovative design with a large trackball in front of the keyboard. Because the Apple uses a different operating system than the other notebooks, we went to great

lengths to create tests that minimized those differences. Even so, all but one tester tended to make lots of errors with this pointing device, and all took longer to complete our timed pointer task.

Compaq, on the other hand, placed the trackball for its LTE Lite 4/25c near the lower right corner of the screen, with the mouse buttons behind it on the back of the LTE's lid. Most of our testers reached out to hold the screen with both hands, as if it were a book. While this is probably not the way Compaq intended people to use it, our testers found the design quite comfortable. However, its accuracy was mixed: The LTE's trackball produced the fewest errors for some testers and the most for others.



The biggest surprise was the lackluster performance of Apple's highly touted PowerBook. All but one tester made lots of errors with its pointing device, and all took longer to complete our timed pointer task.

Unlike Compaq, Hyundai meant for people to operate the Courier Spectra's pointing device with two hands. The Spectra's unique integrated design—manufactured by Lexmark, an IBM spin-off involved in the development of the original IBM PC

keyboard—places the trackball near the lower right-hand corner and mouse buttons near the lower left-hand corner. At first it seemed this design would never fly, as several testers had trouble finding the mouse buttons. But once they got started, most testers soon discovered that the keys they needed to press most often, like Tab and Enter, were within easy reach of both hands. "I can do everything I need without moving my hands," said Frank, an MIS director for a large food manufacturing company, "[which lets me] concentrate on what I'm doing on screen." Overall, our testers performed the pointing-device task faster with the Spectra, and five out of six found the Spectra's device the most accurate.

Sprouting among the G, H, and B keys on the ThinkPad 720C's keyboard, IBM's unique TrackPoint II appeals to the computer geek in all of us. About the size and shape of a pencil eraser, this miniature joystick is meant to be nudged with your forefinger, though this was not entirely clear to all our testers. In fact, one tester tried to squeeze the TrackPoint between his thumb and forefinger like a joystick, but with less than joyous results. Two testers succeeded with this design, while the others ranked it near the middle of the pack.

Toshiba charts yet another course with its T4500C. This notebook uses a Microsoft-designed removable device that attaches to a port on the right side of the notebook, with the ball on top and buttons along the edge. But pushing the mouse button with your forefinger while rolling the trackball with your thumb proved a little like rubbing your tummy while patting your head. Our testers had no trouble controlling the pointer, but they had problems with push-button

operations like selecting text and dragging objects. Overall, Toshiba's design was one of the most error prone in the bunch, placing at the bottom for four out of six testers.

While our testers had good and bad things to say about all the devices they



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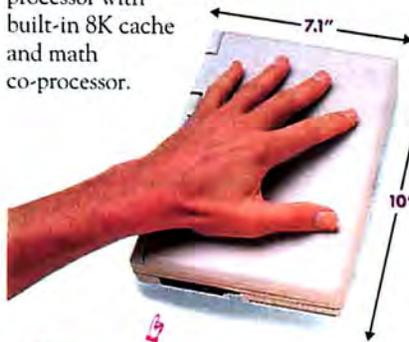
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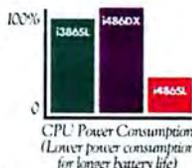


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Removable Hard Drive	Yes	No	No	No	No
RAM standard/and maximum	4/20	4/10	4/10	2/4	1/3
PCMCIA Type II Slot	Yes	Yes	No	Yes	No
Backlit VGA Display	Yes	No	Yes	Yes	No (CGA)
Battery Life	4	3	3	3.5	4
Integrated Trackball	Yes 16mm	No	Yes 12mm	No	No
Full-size, Full-Travel Keyboard	Yes	Yes	No	Yes	No
DOS/Windows/ Organizer	Yes	No	Yes	No	No
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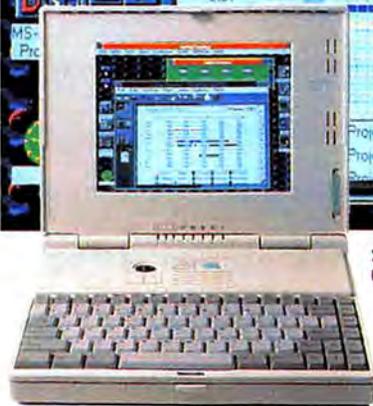
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IBM



Toshiba

Model name/number	PowerBook 165c	LTE Lite 4/25c	Courier Spectra	ThinkPad 720C	T4500C
Street price	\$3396	\$4529	\$2949	\$5640	\$4565
Processor	Motorola 68030-33	Intel 486SL-25	Cyrix 486SLC-25	IBM 486SLC2-50	Intel 486SX-20
Installed RAM (MB)	4	8	8	12	4
Hard disk size (MB)	120	120	130	160	124
Traveling weight (lbs.:oz.)	7:0	8:13	7:3	9:2	8:14
Dimensions (inches)*	11.3 x 9.3 x 2.3	11 x 8.5 x 2	11 x 8.5 x 1.9	11.7 x 8.3 x 2.2	11.7 x 8.3 x 2.0
Screen type	passive	active-matrix	passive	active-matrix	active-matrix
Screen (diagonal inches)	9	8.4	9.4	10.4	8.5

* Length by depth by height

piloted, the scores clearly point to the Hyundai, whose daring two-handed design proved the hands-down winner.

Key Destinations

Squeezing a 101-key keyboard into a notebook is like trying to cram a week's worth of vacation gear into an overnight bag. Things like the numeric keypad have to stay at home, while others—such as function and

While almost everyone said they liked the feel of the PowerBook's keyboard, Apple's unusual key layout caused some pilot error. Interestingly, three of our testers ranked the Mac best, while three ranked it worst. Hardly anyone managed to find the Esc key tucked beside the Space bar on the first try, and the cursor keys, which appear in a straight line instead of in the PC's typical inverted T, also caused problems. "It's like

testers made few enough errors to place the LTE second for accuracy. Two testers said the Compaq felt "solid," and several commented that it was quieter than the others—good news for people who like to work their way through red-eye flights, and for the passengers dozing next to them.

Unlike Hyundai's pointing device, which soared in our tests, the Spectra's Lexmark-designed keyboard proved a tad flighty. All

our testers were at first puzzled by the two mouse buttons labeled as M1 and M2 keys but were pleased once they discovered their purpose. "Having the mouse buttons on the far side of the keyboard makes a world of difference," said Bob, president

of a financial services company.

While the IBM ThinkPad's pointing device never got off the ground with our testers, the keyboard easily earned its wings. Four of our test pilots made the fewest typing mistakes on this keyboard, and the other two made only one error. "You [get] a positive response when you hit a letter," said Neil, assistant executive director of a medical services organization. "There's no doubt you could move on to the next [key]."

Judging from our error tallies, our jet-set-



For most testers, using the Toshiba's side-mounted trackball was a little like rubbing your tummy while patting your head. The T4500C's pointing device proved one of the most error prone in the bunch.

cursor keys—must do double-duty. Not surprisingly, our testers felt most comfortable with layouts that resembled their desktop keyboards.

How easily testers adapted to the keyboard had a big impact on how often they hit the wrong key. But objective measurements can't tell the whole story. Our testers also rated whether each keyboard felt loose, spongy, or stiff; whether the design seemed solid or flimsy; even whether the keys responded with a pleasing click. Naturally, such judgments are highly subjective.

a little bitty typewriter," exclaimed Bill, accounting director for a chain of food stores. "I feel like I've been cheated out of features that the others have."

More than any other notebook, the Compaq made our testers interrupt their typing and stare at the keyboard, as they struggled with its unfamiliar layout. "The little [Delete] key and his row of brothers never had a chance to grow up," said Chris, an MIS director for a national manufacturing company, referring to the quarter-size row of function keys across the top. Still, three

ters either loved or hated the T4500C's keyboard. Toshiba placed the Delete key at the bottom right-hand side of the keyboard, next to the cursor keys, forcing several testers to take a visual walk across the keys. The side-mounted trackball also proved a problem for one tester when he reached for the Page Down key. "The mouse is in the way," according to Pat, a tool and die designer. "You have to raise your hand over it." Bob, on the other hand, found it comfortable. "The keys feel good,"

he said. "They're nicely spaced."

Overall, IBM's ThinkPad landed first among our testers, with the Compaq LTE touching down close behind.

Flying Colors

If you're like most working travelers, the most important view from an airplane isn't outside the window, it's on your notebook screen. When the couple next to you slides open the shade to watch the sunset, your screen's deficiencies become glaringly ap-

parent. Your notebook should let you view the screen at different angles and with varying amounts of ambient light and provide easy access to brightness controls.

The notebooks we evaluated fell into two technological camps. The Apple and Hyundai employ *passive* color screens; the other three incorporate *active-matrix* color. Active-matrix screens offer more vibrant colors than passive screens and are crisper and less distorted than most desktop monitors. They also typically add \$1000 or more to a

How the Tests Were Conducted



An aspiring flight attendant steps through the door of our simulator, past the "Filming in Progress" signs, and asks, "Can I be in your movie?" We politely explain that while we may look like movie moguls, we're from *PC World*, not Hollywood.

Yet, in many ways, the process of testing notebook usability is like making a movie. In addition to the TV monitors, cameras, and cables, you need a set, a script, and actors to create a real-world environment.

Flights, Camera, Action

Our first job was scouting out the right location. We chose AMR's Learning Center, two miles outside Dallas/Fort Worth International Airport, and we used one of its cabin simulators, a full-scale reproduction of a plane's interior.

To capture the test on film, we needed sophisticated audiovisual equipment. So we turned to the Dallas-based Systems Integration Group, which supplied us with

three cameras that fed live video to a wall of monitors and recording equipment hidden behind a partition. For our script we created six scenarios representing tasks a typical computer user might perform in-flight. Finally, to find our six stars, we screened dozens of local *PC World* readers. To complete our cast—and make the in-flight experience more realistic—we hired an extra to sit next to each tester and play the part of a passenger.

Roll 'Em

Upon arrival at the set, each tester viewed a brief video demonstrating each step of the test script and rehearsed the script offstage on a desktop computer.

Testers then familiarized themselves with the power setting, screen adjusta-

bility, and keyboard layout of the notebook to be tested. So they'd get a feel for the pointing device, we asked them to practice our Pointing Device Exercise (PDE), which records time and accuracy when performing basic mouse functions.

Once the tester was strapped into seat 8D, he or she had to repeat the PDE, then type a brief letter using Microsoft Word for Windows. After formatting the letter, the tester modified an Excel spreadsheet. Then the tester had to put the notebook to sleep, stow it, and leave the seat for a short break. After our tester returned to

the seat and woke up the notebook, we eased seat 7D back to its fully reclined position, forcing the tester in 8D to adjust to cramped space. In the last scenario, the tester created an Excel chart, then took another shot at the PDE.

Once each notebook test was complete, the tester filled out a questionnaire rating each design feature. After all the notebooks had been tested, we interviewed each tester and asked each to choose a favorite keyboard, screen, and pointing device, as well as a favorite overall design.

After 11 days of testing, we called it a wrap. As we packed up, an instructor led a group of trainees on a tour of the cabin simulator. "What were you filming?" asked a student. "An HBO movie," we said as we slipped out the door. —T. G.

notebook's price, and some may drain your battery faster than passive models.

Since it wasn't possible to tabulate user errors with notebook screens, we asked our testers to shed some light on the subject. Their conclusion: The Compaq and Toshiba active-matrix models passed with flying colors. Thanks to the screens' bright hues and sharp contrasts, testers could view their work clearly no matter how the screen was tilted. "Because the [Compaq] screen is so great, I can look at this severe angle and still see what I want to see," said Frank, after the person in front of him reclined her seat. But when it came to finding the brightness controls, our testers needed radar to locate the Toshiba's, which double as function keys.

While the LTE's and T4500C's screens received glowing reviews, IBM's preproduction entry gave a less-than-brilliant performance. Four testers complained that the ThinkPad produced too much glare. "See the glare on that screen from my white shirt?" volunteered Bob. "When you go to use it, it's almost a mirror." While one user commended the ThinkPad for its large 10.4-inch screen, others complained that the brightness controls were wedged so tightly in the corner that they were difficult to reach. IBM claims the final shipping model will be of a higher quality.

While our users were wowed by two of the active-matrix screens, they still found passive-screen designs palatable. One even rated Hyundai's screen as best overall. For others, however, finding the cursor on the PowerBook and Spectra screens was like trying to find the runway in a thick fog. "The [Spectra's] screen isn't as bright and rosy," said Frank, "but I can live with it."

The conclusion is clear: If you have the cash, active-matrix will help keep you from flying blind. Here, the Compaq had a slight edge over the Toshiba, thanks to its more easily accessible controls.

Plane Speaking

Our usability tests highlight a fundamental difference between desktop and notebook computers. If you don't like the mouse, keyboard, or monitor on your desktop, you can always swap it for a better one. With notebooks, however, you're stuck—at least until you touch down. That's why it's important to find one that's comfortable.

Why User Testing Improves Products



audio equipment record the subject's interaction with the product, while the lab staff watches for errors or signs of frustration. Product architects then view the tapes and use this information to guide changes in product design.

After working with the product, the

These days hardware and software vendors face a dilemma: How do you create increasingly sophisticated products for a less sophisticated audience? For the answer, many are turning to usability testing.

Usability testing is the science of observing how people use products before they come to market—and it's now the hottest trend in hardware and software development. High-tech heavyweights such as IBM, Apple, and Microsoft are spending millions of dollars on usability testing to improve product design and reduce support costs.

"Anyone who knows enough to design a product knows too much to understand how users will react to it," says Tom Erickson of Apple Computer's human interface group. As a result, many new products are created using input from users.

Lab Cells

Usability lab tests are typically performed in two phases. In the first, users are given product prototypes and placed inside cells, which are separated by one-way mirrors from a monitor station. Cameras and

When it comes to developing new products, more and more companies are asking users to call the shots via usability testing.

users fill out a questionnaire about their experiences. Product designers then weigh the objective and subjective data carefully, with the objective information taking precedence in conflicts.

The key to successful usability testing often lies in finding the right testers. Test subjects are recruited from the product's intended audience, then screened to make sure they fit the right profile. "It's important to define your audience accurately," says Janice James, usability specialist for AMR's Usability Lab in Dallas, "so you can ensure that the results you get are reflective of real users."

Use It or Lose It

Usability testing is good news for both companies and consumers. Future products start out with a better design, resulting in shorter development cycles. And by bringing users into the process early, companies can create hardware and software that is more likely to meet their audience's needs. —D. A.

Is one single notebook design truly the most usable? No. However, our tests prove that advances have been made in several important areas: If an easy-to-use pointing device is high on your shopping list, the Hyundai Courier Spectra is a good choice. If keyboard comfort is important, the IBM ThinkPad gets a big thumbs-up. And for the best view from the air, you can't go wrong with either the Compaq LTE Lite 4/25c or the Toshiba T4500C.

Remember, you don't need to put up with

a difficult or confusing design. And even if you can't rent an airplane (or a close facsimile), you still can take your notebook for a trial run. If you use it for an hour and you're still not comfortable with it, take it back. After all, the last thing you want is a notebook that leaves you hanging in mid-air.

Dean Andrews and Tom Grubb are senior performance analysts and Greg Smith is director of the PC World Test Center. Daniel Tynan is a contributing editor for PC World.

THINGS THAT SCREAM.



A baby in the middle of the night.



Our new 486 color notebook.

From 0 to 66 MHz in no time flat.

Introducing Austin Computer's new 486 color and B&W notebook family. Featuring a 32-bit local bus video, serious Windows users will really appreciate tremendous speed — screaming along at 66 MHz. And PCMCIA type II & III slots.

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This lightning-fast machine is sure to keep you busy, so you'll want plenty of storage capacity. That's why we've equipped our notebooks with your choice of hard drive options from 120 MB to 340 MB — the largest on the market.

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There's a color or B&W notebook model that's right for you. Many configurations — Intel® SX-25, DX-33, DX2-50 and DX2-66 CPUs. All with lots of features and plenty of power. And Windows 3.1 and DOS 6.0 come preinstalled on all our notebooks.

Color models start at \$2,999.

A hot price for active TFT color. And our B&W models start at \$1,799. That's hundreds less than our competitors, which is sure to leave them crying. Call us and ask for your Austin Computer 486 notebook. Miss out on this and you'll want to scream.

Austin Notebooks

- Intel CPU's 25-66 MHz
- 8.5" x 11" x 1.75"
- 6.38 LBS (including battery)

\$1,799

- 486SX-25 Mono
- 4 MB RAM standard
- 120 MB Hard Drive

\$2,999

- 486DX-66 Mono
- 8 MB RAM standard
- 340 MB Hard Drive

\$2,999

- 486SX-25 Color
- 4 MB RAM standard
- 120 MB Hard Drive

\$4,499

- 486DX2-66 Color
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You can take any notebook on a plane. With ours, you can fly it.

Airlines allow you to carry two items; make one an AST PowerExec™ notebook. The 4/25SL, for instance, actually gives you enough power to autopilot a jumbo jet. But you may prefer to use it, instead, for up to 6¾ hours of non-stop computing, the longest battery life *PC Magazine* has seen from any 486-based portable. When you land, use the two PCMCIA slots to send or fax information anywhere. And while the 4/25SL delivers the best performance in every category *PC Magazine* tests for, there are five other



PowerExec models, starting at under \$1,300.** For more information, call 800-876-4AST. For flight reservations, call your travel agent.

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FLEXIBLE

Six basic models. Customize with docking stations, removable hard drives to 200MB, security features, upgradable processors and screens.

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Intel 486SL/25 microprocessor, optional active-matrix color display. 3.3-volt technology for longer battery life. Up to 32MB of RAM. "...top numbers in every test category." - PC Magazine

POWEREXEC 3/25SL

Intel 386SL/25 microprocessor, optional active-matrix color display. 64KB of external cache. Up to 20MB of RAM. Two PCMCIA slots. A Windows Magazine "Best Buy."

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*Intel 386SL/25 microprocessor with optional passive color display. AST Intelligent Power Management. One PCMCIA slot. Priced from under \$1,300.***

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Computers for the Mobile Executive



Today's executives can select from a variety of computing tools to make business travel productive. In the following pages we look at a cross section of what's available in the mobile market. These mobile computers come in a rainbow of sizes, power options, features, and prices. Finding the right one depends on what kind of work you want to do. With all these products to consider, it's important to take the time to test-drive them before you buy. **By Michael Desmond & Richard Melville**

MOBILE TIPS

Relative Processor Performance

Ranked best to worst

Intel
486DX2Intel
486DXIntel
486SLIBM
486SLC2IBM
486SLCIntel
486SXCyril
486SLCAT&T
HobbitAMD
386DXIntel
386DXIntel
386SLIntel
386SXNEC
V30h

Colors indicate processors with similar performance.

Under \$1000

Hand-held computers are the new frontier in mobile computing. Lightweight and small enough to fit in a jacket pocket or a purse, they serve as personal information managers (PIMs), communicators, and note takers. Most are as powerful as the PC XT, but more versatile and certainly easier to carry around.

1 Casio Executive B.O.S.S. SF-R20

The B.O.S.S. (Business Organizer Scheduling System) has 256K of memory—enough to store 2000 business cards or up to 1000 entries in its personal scheduler. Built-in software includes Lucid 3-D (a 1-2-3-compatible spreadsheet), a basic text editor, and a searchable electronic Rolodex. The B.O.S.S. weighs 10 ounces and costs \$449.95.

Casio 201/361-5400

Reader service no. 2001

2 HP 100LX

This 11-ounce device lets you send and receive electronic mail. The 100LX packs 1MB of RAM and an Intel 80C186 processor, which is compatible with the 8086 processor used in the PC XT. You also get an 80-character-wide display and a PCMCIA 2.0 slot, in which you can insert an optional credit card-size modem. Preloaded software includes a calendar, a Rolodex, a calculator, Lotus's cc:Mail Mobile and 1-2-3 2.4, and Microsoft's DOS 5.0. The \$749 HP runs on two AA batteries.

Hewlett-Packard 503/757-2000

Reader service no. 2002

3 Omron Toucan

The largest mobile computer in this category, the Toucan weighs 2 pounds. The processor is a Chips & Technologies 8086-compatible "PC on a chip." Features include a built-in 9600-bps fax-modem; 2MB of RAM, the equivalent of 1000 double-spaced typed pages (storage); and Novell

DR DOS 5.0, a version compatible with MS-DOS. You also get a database, a word processor, a fax-modem, and file-transfer software. The Toucan runs for 10 hours on four AA batteries and costs \$899.

Omron Office Automation Products, Inc. 408/727-1444
Reader service no. 2003

4 Psion Series 3

Equipped with a calculator, a spreadsheet, scheduling software, and a Microsoft Word-compatible word processor, the 9-ounce Series 3 is the lightest product in this category. Optional equipment includes 256K memory disks and serial or parallel links for connecting the Series 3 to a modem or printer. The Psion runs on two AA batteries and costs \$495.

Psion, Inc. 508/371-0310

Reader service no. 2004

5 Sharp Wizard OZ-9600

"If I only had a pen..." With the Wizard, you do. Scribblers will appreciate the Wizard's ability to accept handwritten notes or rudimentary diagrams right on screen. An infrared transmitter/receiver lets Wizard owners swap files such as business cards or notes wirelessly. The Wizard's to-do function tracks tasks until they're checked off as completed. Optional accessories allow hookups to printers, PCs, E-mail, and so on. The Wizard requires four AAA batteries, weighs less than a pound, and costs \$649.

Sharp Electronics Corp. 800/321-8877

Reader service no. 2005

\$1000 to \$2000

MOBILE TIPS

Top Five: Battery Life

**ZDS 625nl
Model 85**
6 hours,
3 minutes

**AST PowerExec
4/25SL
ColorPlus**
5 hours,
42 minutes

**Dell
NL25**
5 hours,
38 minutes

**MicroExpress
NP 925**
5 hours,
4 minutes

**Compudyne
SlimLine
386SL/25**
4 hours,
42 minutes

Systems costing less than \$2000 are plentiful and offer serious power. You'll notice some features found in entry-level desktops, such as 100MB hard disks; color displays; and PCMCIA slots for adding modems, LAN adapters, and extra memory. Many of these systems let you take your Windows applications with you.

1 Zeos Contenda

The \$1495 Zeos Contenda delivers full-function computing in a 3.9-pound package. Featuring the power-saving, 5.0-volt version of Intel's 25-MHz 386SL processor, the Contenda has 2MB of RAM and an 80MB hard disk—sufficient for most desktop applications. The system's well-designed keyboard and trackball allow for easy touch-typing. A removable floppy drive lets you keep travel weight down.

Zeos Int'l 800/554-5220

Reader service no. 2006

2 Micro Electronics WinBook SLC/E

The WinBook borrows from the Apple PowerBook's popular ergonomic design, while its PCMCIA slot provides access for the new breed of credit card-size connectivity and storage cards. Based on the 25-MHz 486SLC processor from Cyrix, the 5.4-pound WinBook comes with a built-in fax-modem, 4MB of RAM, and a 120MB hard disk. The \$1699 notebook also features a 10-inch monochrome screen that displays 64 shades of gray to handle graphical environments such as Windows.

Micro Electronics 800/468-0420

Reader service no. 2007

3 PC Brand LeaderBook Pro

A PowerBook-like trackball and a high-contrast 10-inch monochrome display make the LeaderBook worth considering for Windows applications. Based on Intel's 486SX processor running at 25 MHz and featuring 4MB of RAM, this \$1795 notebook can handle the most demanding business programs. While the standard 60MB hard disk may be cramped for some, options such as a 120MB drive (able to hold data from 80 floppy disks), a fax-modem, and a color screen give the LeaderBook the talent to equal a desktop.

PC Brand 800/722-7263

Reader service no. 2008

4 ZDS Z-Sport 325S Model 60

Based on Intel's 386SX processor, the \$1499 Z-Sport 325S notebook has a 10-inch screen that displays 64 shades of gray. The standard 2MB of RAM can be expanded to 8MB, and the 6-pound system comes with a 60MB hard disk. A docking station option converts the system into a desktop unit.

Zenith Data Systems 800/582-0524

Reader service no. 2009

5 Twinhead SubNote 4SLCG

Twinhead's \$1895 SubNote 4SLCG boasts a 4-pound traveling weight—including power supply and cords. Powered by a Cyrix 486SLC processor running at 25 MHz, the SubNote comes with 2MB of RAM and an 85MB hard disk. The 8-inch screen displays 64 shades of gray. Twinhead claims you'll get 4-hour battery life on a single charge.

Twinhead Corp. 800/995-8946

Reader service no. 2010

6 Gateway Nomad 425SXL

Gateway's \$1995 Nomad 425SXL packs the power of a 25-MHz Intel 486SX processor into a 5.8-pound notebook. The Nomad comes with a built-in fax-modem, 4MB of RAM, and an 80MB hard disk. An astounding 6-hour battery life gives you the power to compute during an entire transcontinental flight. The 10-inch screen displays 64 shades of gray and makes the Nomad suitable for Windows apps.

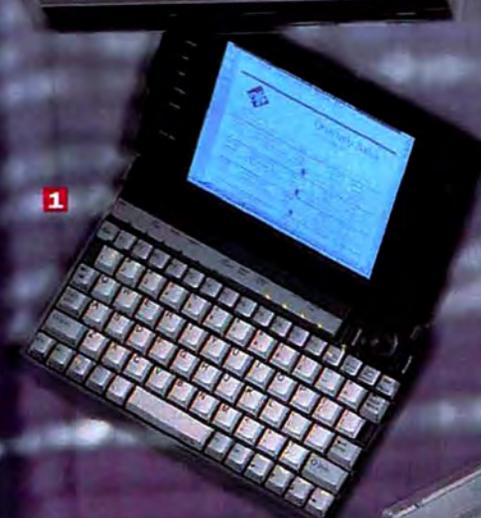
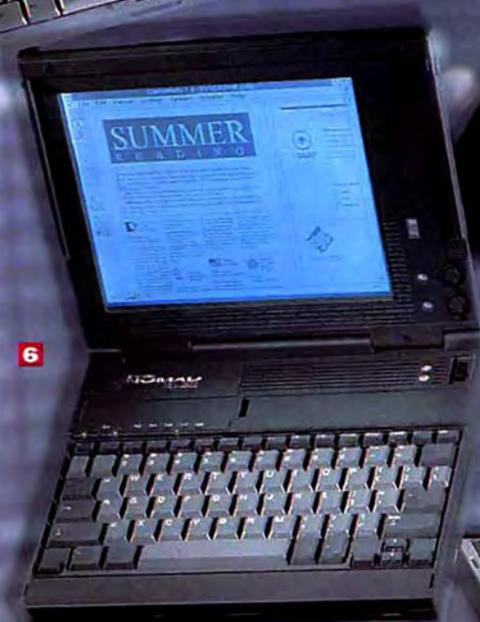
Gateway 2000 800/846-2000

Reader service no. 2011

MOBILE TIPS

Most for the Money: Least-expensive systems offering these features.

FEATURE	MODEL	LIST PRICE
486SLC	Compudyne 486SLC/25 Notebook	\$999
i486DX2	Expotech 486DX2/66 Notebook	\$1995
Active color	Wen Technology 486-STN SuperNote	\$2900
Passive color	Twinhead Slimnote 486SLC/33S	\$1895



14.5mm Type III Industry-Standard PCMCIA 2.0 Slot: Lets you slide in credit card sized data/fax modem, networking card, hard drive, or more.

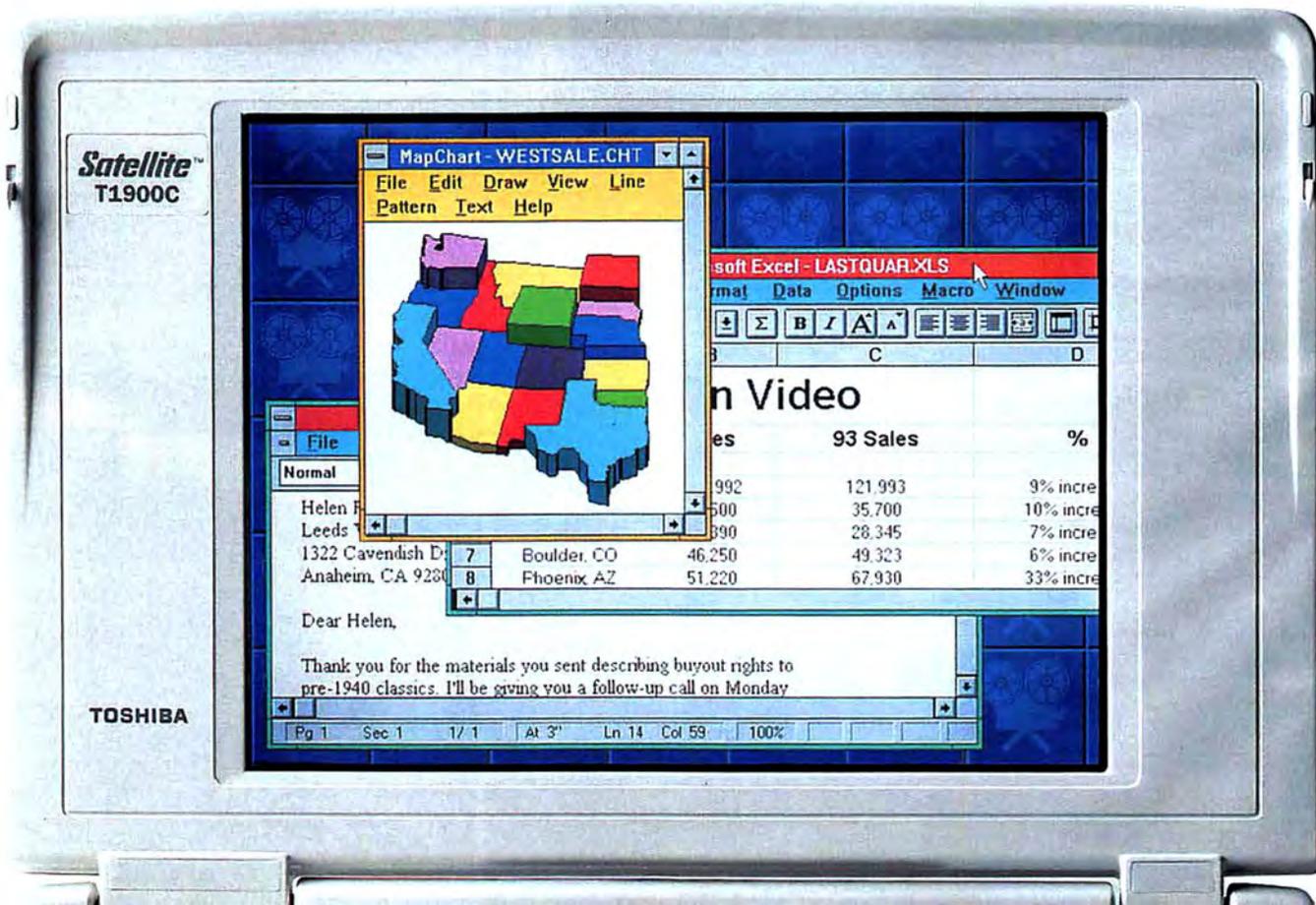


The BallPoint™ Mouse:
Connects directly to the computer through a unique "one-touch" QuickPort™ so there's no cord to get in your way.



THE NEW SATELLITE™ ADMISSION TO

9.5" Dynamic-STN Color: Faster, brighter VGA color that is ideal for Windows® and graphics applications.



Ergonomic Engineering: ABS casing with rounded edges for increased durability; sliding doors for port protection; and award-winning keyboard design with sculpted keys and tilt-up feature for faster, easier typing.



486 CUTS THE PRICE OF ALL THESE FEATURES.

Now you don't have to pay a premium in price to get the performance of a 486 notebook PC.

The T1900 Series from Toshiba combines advanced features and quality design at a great value.

Even the most basic Satellite 486 is a lot of computer. And the PCMCIA slot lets you add a whole new family of powerful peripherals, from hard drives to communications.

So it's obviously everything you need to work smart and fast. Not so obvious are the advantages of Toshiba design that make your work easier. Things like longer battery life.



Satellite 486

Better, more durable materials and construction. Ergonomic design that's easier on your body.

And service and support that eases

your mind. If you're ready for 486 computing, look into the Toshiba T1900

Series. It has a lot to show for itself, without being a big ticket item. **For a dealer near you call: 1 (800) 457-7777.**

UNDER \$1899*

T1900

- 9.5" STN monochrome LCD
- 80/120/200MB HDD
- 6.4 lbs.

T1900C

- 9.5" Dynamic-STN color
- 120/200MB HDD
- Under 7 lbs.

BOTH MODELS

- Intel 486SXA/20MHz, 3.3v
- 8 KB cache
- 4MB upgradable to 20MB RAM
- 14.5mm Type III PCMCIA 2.0 slot
- BallPoint™ mouse with QuickPort™
- NiMH battery with Toshiba MaxTime™ Power Management
- DOS 6.0, Windows® pre-installed



In Touch with Tomorrow
TOSHIBA

Circle 2037 on reader service card.

1



3



7



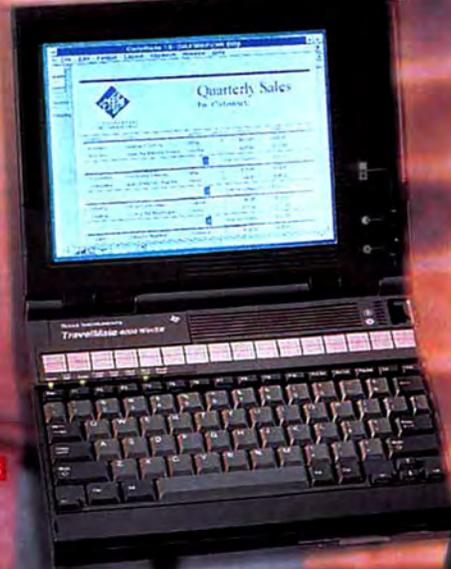
5



2



6



4



\$2000 to \$3000

A \$2000-to-\$3000 budget means you can purchase a notebook that runs with the desktops—one that uses a processor from the 486 family. However, competition in this price range is so fierce that power alone won't settle the issue; each notebook here does something extra, something you might not expect from a notebook, especially at these prices.

1 Canon NoteJet 486

Picture this: You're writing up an invoice or sprucing up a contract on your notebook PC, and you really need a signed copy. So you lift the keyboard, feed in a sheet of paper, and print a hard copy. Canon's NoteJet 486 merges BubbleJet printing technology with a 25-MHz 486SLC-based PC in a 7.7-pound package. Hard disk size is up to you: \$2499 buys 85MB; \$2999 buys 180MB.

Canon Computer Systems, Inc. 714/438-3000

Reader service no. 2012

2 Compaq Contura 4/25c

Compaq puts a 25-MHz 486SL processor, 4MB of RAM, and a 120MB hard drive into a 6.7-pound notebook and then spices the system with a passive-matrix display that supports 256 colors. The Contura 4/25c costs \$2699 and includes a three-year worldwide warranty and around-the-clock, toll-free lifetime support.

Compaq 800/345-1518

Reader service no. 2013

3 Dauphin DTR-1

The DTR-1 packs a Cyrix 25-MHz 486SLC processor, 2MB of RAM, a 20MB hard disk, and seven interface ports into a 2.5-pound, \$2500 unit that's 9 by 5.5 by 1.25 inches. Use the ports to transform your DTR into a desktop. There's an ethernet port; an IDE port for external hard drives; a video port for an external super-VGA monitor; and serial, parallel, keyboard, and modem ports.

Dauphin 800/782-7922

Reader service no. 2014

4 NEC UltraLite Versa 20

This system is designed to meet your future needs. The \$2659 base model offers an Intel 486SL-20 processor, monochrome VGA, an 80MB hard disk, and 4MB of RAM. You can swap the processor if you want to beef up this 6-pounder later. You can also upgrade the hard disk and add system memory. An active-matrix color display is another option. And the system can be converted into a pen-based unit.

NEC Technologies, Inc. 800/343-4418

Reader service no. 2015

5 Panasonic CF-1000

Still going strong... The Panasonic CF-1000 has a dual-purpose slot that houses either a floppy drive or a second battery for up to 11 hours of battery life. This bantamweight tips the scales at 5 pounds with one battery. With 8MB of RAM, monochrome VGA, a 110MB hard disk, an energy-saving 386SXLV processor from AMD, and an extra battery, the CF-1000 costs \$2237.

Panasonic 800/742-8086, 201/348-9090

Reader service no. 2016

6 TI TravelMate 4000 WinSX/25

The TravelMate is a powerful mobile choice. With its 486SX processor, 4MB of RAM, 120MB hard disk, and battery, the TI weighs just 5.6 pounds. The \$2199 system includes DOS; Windows; and power-management software, which can extend battery life to 5 hours. RAM is expandable to 8MB or 20MB.

Texas Instruments 800/527-3500

Reader service no. 2017

7 ZDS Z-Note 425Ln Model 120

The Z-Note's power-saving 486SL-25 processor and 120MB hard disk make this \$2599 unit a viable desktop machine, especially when you consider the ethernet-compatible LAN port and preinstalled Windows for Workgroups, DOS, and Windows 3.1. Options include a 2.88MB floppy drive and a 200MB hard disk. The optional ReadyDesk docking station lets you link your notebook and your monitor and printer.

Zenith Data Systems Corp. 800/582-0524

Reader service no. 2018

MOBILE TIPS

Pound for Pound: Lightest systems offering these features.

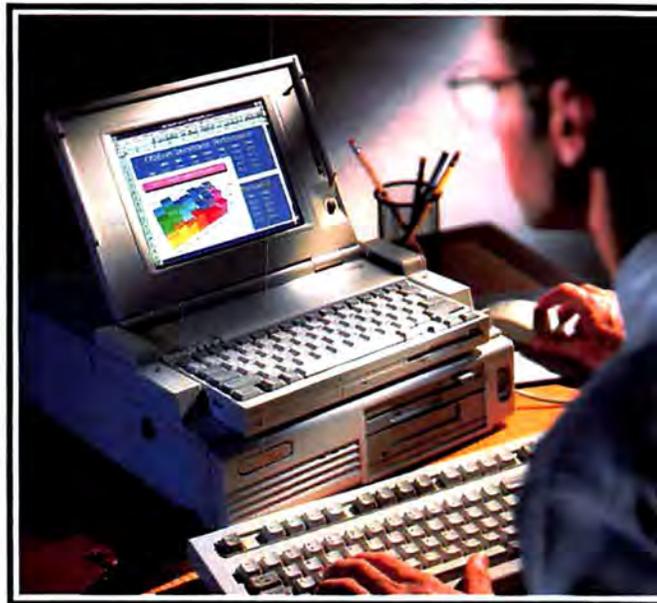
FEATURE	MODEL	WEIGHT
486 processor	Dauphin DTR-1	2.5 pounds
Pen	Sharp Wizard QZ-9600	15 ounces
PCMCIA slot	HP 100LX	11 ounces
Hard disk	Dauphin DTR-1	2.5 pounds
Fax-modem (9600 bps)	Omron Toucan	2 pounds

THE COMPAQ LTE LITE. FOR THEIR TIME WORKING. AND

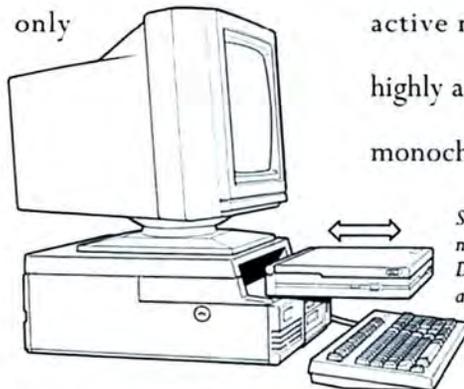
OK, we're not saying you live on three hours of sleep or that you eat Chinese takeout every night. And even if you do, we're not saying that a COMPAQ LTE Lite 486SL notebook is suddenly going to change all that.

What we will say is that it could make your life a lot simpler. Particularly if you travel.

You see, on one hand, these new computers are lightweight, compact notebooks (6.3 pounds, 8.5" x 11"). They're available with three different



screens: the COMPAQ UltraView – the world's only



black and white, active matrix VGA; a 256-color active matrix; and the highly acclaimed passive monochrome MaxLight.

Simply slide the LTE Lite notebook into the COMPAQ Desktop Expansion Base and you have a full-function, fully connected desktop computer.

There's the integrated EasyPoint trackball. And each has a range of innovative power-conservation features to help extend battery life.

But what also makes these notebooks unique is

PEOPLE WHO SPEND HALF THE OTHER HALF WORKING.

that they double as full-sized, full-featured 486 desktop PCs.

By simply sliding your LTE Lite notebook into

bays increase expansion capabilities. Best of all, you're using the same hard drive. So whether you're in the office or on

easy connection to your peripherals, choose the new Enhanced QuickConnect – a one-step system with integrated Ethernet and SCSI support.

And like all of our PCs, these notebooks are backed by CompaqCare. Which includes a free, three-year worldwide warranty, and a year of free on-site* service in the U.S. or Canada.

For information on the COMPAQ LTE Lite 486SL, call 1-800-345-1518. Because if you work out of the office on a regular basis, you really lead two lives. So they're perfect for you. And you.

COMPAQ



Unlike other 486 chips, the Intel 486SL, with an integrated numeric coprocessor, provides higher performance and extended battery life.



No wires, no interface boxes, no headaches. The optional fully integrated COMPAQ SpeedPAQ 144 Modem connects the LTE Lite directly to a cellular phone so you can send e-mail and faxes.



the COMPAQ Desktop Expansion Base, you're instantly connected to printers, peripherals and your network. No floppies, no fumbling with wires, no headaches. And the extra slots and drive

the road, your files are always with you. The expansion base also offers you a keylock to secure your notebook.

Of course, if you don't need all the functions of a full-sized PC, but want

*This service is provided by Contracted Service Providers and may not be available in certain geographic locations. Certain restrictions and exclusions apply. Monitors, battery packs and certain options are covered by a one-year warranty. For further details on our limited warranty, contact the Compaq Customer Support Center.



No-Compromise Computing

Portable computing no longer means you have to sacrifice graphics quality, storage capacity, and performance. New portable systems are based on the same state-of-the-art technology found in desktop PCs.

1 Dolch M.A.C.H.

The Dolch M.A.C.H. delivers desktop computing power with a 33-MHz Intel 486DX processor; a 500MB hard disk (able to hold about 150,000 single-spaced typed pages); and 4MB of RAM, expandable to 32MB. The \$15,000 unit has a modular design and accepts a CD ROM drive and other add-ons to the 15-pound base chassis. The liquid-cooled system is AC powered and features a sharp active-matrix display and a rugged coated alloy frame.

Dolch Computer Systems 408/957-6575

Reader service no. 2019

2 EO Personal Communicator 440

With an integrated cellular telephone, a convenient graphical pen interface, and a 14.4-kbps fax-modem, the 3.1-pound EO 440 may be the future of portable computing for executives. The \$3100 EO 440 uses AT&T's 20-MHz Hobbit RISC processor and features two PCMCIA slots and nine ROM-based applications. The base-model 440, without cellular phone but including fax and E-mail, is available for \$1999.

EO, Inc. 800/458-0880

Reader service no. 2020

3 Toshiba T4600C

Toshiba's latest active-matrix color notebook is based on Intel's power-saving 486SL processor running at 33 MHz. The 6.9-pound system includes 4MB of RAM (expandable to 20MB), a 120MB hard disk, and two PCMCIA slots for expandability. At \$4699, the T4600C features a 9.5-inch screen, 3-hour battery life, and an optional docking station for desktop use.

Toshiba America Information Systems 800/334-3445

Reader service no. 2021

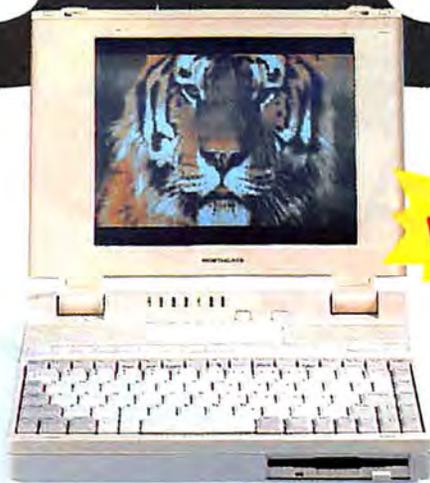
4 IBM ThinkPad 720C

With a 10.4-inch active-matrix LCD screen, the largest you can buy on a mobile computer, the ThinkPad 720C offers superior graphics. Based on IBM's 50-MHz 486SLC2, the 720C has a removable 160MB hard disk and a PCMCIA slot that accepts both Type II and the thicker Type III cards. The \$4695 system comes with 4MB of RAM and weighs 7.6 pounds with battery.

IBM 800/772-2227

Michael Desmond is an assistant editor and Richard Melville is an editorial intern for PC World.

Dual Scan Color!



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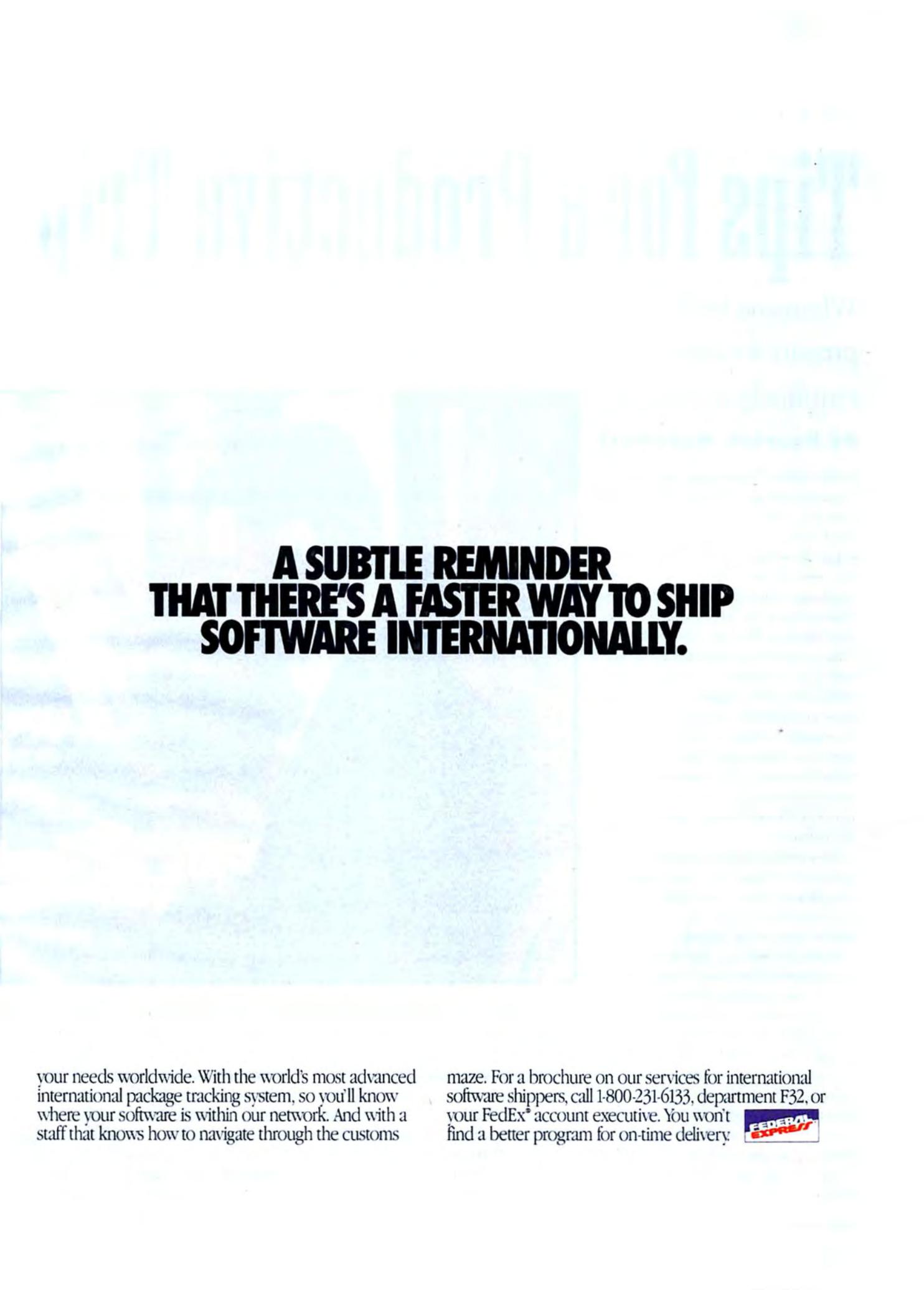


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Tips for a Productive Trip

When you hit the road, expect the unexpected. Here's how executives prepare for business travel and the strategies and tactics they use to circumnavigate trouble.

By Patrick Marshall

Debbi Fields was a reluctant laptop jockey. "I didn't grow up with a passion to sit in front of a computer," says Fields. "I was afraid of them, and I felt they were impersonal." Now Fields—cookie lovers know her better as Mrs. Fields—speaks with enthusiasm about her IBM ThinkPad. The 7-pound laptop has become essential to her work; she won't leave the office without it.

While today's best portables are as powerful as most desktop systems, they have limitations. Finite battery life and little room for expansion, as well as the vagaries of unfamiliar working environments, force users to be resourceful. This survival guide for road warriors provides strategies to keep you productive on your travels and to help you make the most of your mobile computer's resources.

Going mobile means being ready for the unexpected. Outside the cozy confines of your office, Murphy's Law holds sway. Prepare yourself by starting with the right system and setting it up properly.

Before you buy, take time to test-drive your prospective purchase. Unlike desktop PCs, key components of mobile computers, including the keyboard, pointing device, and screen, either can't be swapped or are very costly to switch if they prove difficult to use. Also, carry the notebook's entire traveling kit around for a while. Some manufacturers tout a product's light weight, but then burden you with a heavy transformer, cables, and an external floppy drive.

Here's a list of other, not-so-obvious features to look for.



Working smarter: Robert Kranz, manager of planning and analysis at Chiquita Brands, has devised a way to print any file, almost anywhere—he faxes it.

Power-saving processor. To increase the length of time between battery recharges, 386SL chips from Intel, 386SLC chips from Cyrix, and 386SXL chips from AMD, as well as Intel's 486SL and Cyrix's 486SLC processors, offer power-saving features.

APM-compatible BIOS. Check for a BIOS (basic input/output system) compliant with Advanced Power Management, which helps to minimize the power drain of your computer's devices.

Hard drives. Mobile computers generally come with smaller hard drives than

desktops do, so find out if a larger hard drive is available for the model you're interested in. Also consider removable drives; some service contracts let you move your hard drive into a loaner notebook when yours is being repaired.

Modems. Many portables come with an internal modem that runs at 2400 bits per second for data communications (equal to about 2400 words a minute) and 9600 bps for faxing. The higher the speed, the faster the transmission and the less phone



time you pay for. You may want to consider faster external modems that plug into the serial port of the computer.

PCMCIA slot. A growing number of notebooks offer PCMCIA slots (a standard set by the Personal Computer Memory Card International Association), which hold credit card-size modules that perform the same functions as add-in or expansion cards used inside desktop PCs.

Batteries. For longer battery life and less weight, you'll want to use nickel metal hydride rather than nickel cadmium batteries.

Recharge features. Check recharge times when the machine is running and when it's turned off; the differences can be dramatic. Also, look for a model with a built-in display of the battery's charge.

Video resolution. The standard notebook screen has a resolution of 640 by 480, which lets you display about 300 to 1000 words of text, depending on the font used. Before you use the notebook with a desktop monitor—say, to run a demonstration—you'll want to check the maximum external resolution it supports.

Built-in pointing device. You can always attach a mouse to your serial port, but built-in pointing devices save the serial port for other purposes and are more convenient in cramped quarters.

Easy-to-use display dials and viewing angle. Mobile computing means working in variable and often adverse lighting conditions. Therefore, check for external display controls that are easy to use. Also check the range of the display's viewing angle. The image on many monochrome and passive-matrix color notebooks disappears when the display is not viewed straight on.

Service and support. Don't overlook service. Some vendors offer 24-hour on-site service and/or replacement—a godsend when your machine takes a nose dive on the first leg of a three-week business trip. And carry your overnight delivery service account number with you for fast on-the-road service, advises Ann Winblad of Hummer Winblad Venture Partners, a firm that invests in software companies.

Software. Most portable computers run the same software you use on your desktop PC, but you'll need a few utilities to overcome limited disk space and display differences.

A data compression program can roughly double the capacity of your hard drive (see "Data Compression Programs: Squeezing More Into Less"). If you haven't yet

bought a compression program, however, you may want to consider installing DOS 6.0, which includes a disk compressor.

Finally, before you head out, you should assemble a survival kit to help deal with unexpected obstacles you may encounter on the road (see "Mobile Computing Survival Kit").

On the Road

Running out of battery power is the hazard that worries mobile professionals most. Even notebooks equipped with a nickel metal hydride battery and a power-saving processor can be expected to run on a fully charged battery for only 4 to 6 hours, or just about the length of a coast-to-coast flight.

But there are a number of things you can do to prolong battery life. The easiest is to bring along extra batteries, but that's a weighty option.

Alternatively, if you have enough memory, you can use some for a RAM disk and some for a disk cache. A RAM disk emulates hard

Take time to test-drive your prospective purchase. Unlike desktops, mobile computer components either can't be swapped or are costly to switch.

disk storage. You copy both programs and data into RAM and access them there instead of continually accessing the hard drive—a major battery drain; and you can save data to a RAM disk. Just remember to copy your data back to the hard drive before shutting off your notebook, since turning it off clears all RAM.

A disk cache is essentially a memory reservoir for disk data. When you or an application you're using call for more data from the hard drive, the program first checks the data cached in memory; if it finds what it's looking for, the program doesn't have to access the drive and saves battery power.

You can create a RAM disk using DOS alone, and several third-party caching programs are available, including those bundled with major utility packages such as The Norton Utilities and PC Tools. With Windows, caching is installed automatically.

For users traveling by car, at least two vendors—StatPower Technologies and

Traveling Software—sell power adapters for plugging notebooks into the cigarette lighter.

Most traveling pros are also careful to bring along a three-to-two-prong adapter, handy in hotels, airport lounges, and some emergency situations. "I always carry a three-to-two-prong adapter," says Randy Fields, who has used it to plug into airplane lavatory outlets for a burst of power to shut his machine down properly. Fields, Mrs. Fields' husband, chairs Fields' Software Group, a subsidiary of the cookie company.

There are a few other tips you should keep in mind if you're taking your notebook on an airplane:

- Don't check the notebook as baggage.
- Don't carry the notebook through metal detectors.
- Charge the batteries enough to boot the machine, because airport security may have you power it up.
- Save and back up often. Also, copy



Take your overnight delivery service account number with you for fast on-the-road service, advises Ann Winblad.

critical files to floppies, just in case your notebook breaks down.

Communications: Dialing Dilemmas

Once you reach your hotel, don't count on being able to get right to work. "The biggest problem in hotels is finding a plug convenient to the desk," cautions Randy Fields. "I carry a triple-tap plug, so I can plug the machine into an outlet that's

already got the TV and a lamp plugged in."

It's not just power connections that cause problems. During his travels, Joe DiMarzo, an NFL scout with National Football Scouting Inc., frequently encounters phones that are hard-wired into the wall instead of having removable jacks. "When you make your reservation, request a room with proper hookups," DiMarzo advises.

Even when the proper type of phone jack is available, it may be nowhere near the table you want to work on. An in-line connector and extra phone cables solve this problem by working as an extension cord between phone jack and notebook.

"Many of the nice hotels haven't thought about people plugging in a modem," says Winblad, and their employees may not understand the needs of the traveling business computer user. A common complaint is phone jacks located behind headboards.

To connect with the home office, you'll

Data Compression Programs: Squeezing More Into Less

Since most notebooks offer only 60MB to 120MB hard drives, many professionals use a data compression program.

There are two basic approaches to data compression: file compression programs and disk compression programs. A file compression program archives and extracts just those files you've tagged. By contrast, a disk compression program does all its work in the background, automatically decompressing and recompressing files.

Disk and file compressors work on the same principal: They eliminate redundancy by employing an algorithm to find patterns in the file's data. Where repetitive strings occur, the program inserts a token, which takes up much less space. The technique is generally more effective with spreadsheet and database files, which usually contain more repetitive data. Com-

pression rates above 70 percent are common with such files.

You can expect file and disk compression programs to roughly double the capacity of a hard drive. But even with the best disk compressors, you'll notice at least a small degradation in your system's performance, particularly when large files are accessed.

Some disk compression products can employ hardware help in the form of a coprocessor on an expansion board, but such boards are practical for notebook computers only when they're used in a docking station. Unless your files are quite large, you'll find hardware-assisted programs are not much faster than their software-only counterparts.

FILE COMPRESSION UTILITIES

ARC+Plus
SEA International Inc., 804/442-5865.

List price: \$89.95

ARJ
ARJ Software,
617/769-5999. List price: \$40
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PKZip
PKWare Inc., 414/354-8699.
List price: \$47

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need communications software, typically a remote version of your firm's E-mail package; a modem application such as Procomm Plus by Datastorm; and a fax program such as WinFax Pro by Delrina Technology. But what if you've forgotten a critical file or a client needs information that's stuck on the hard drive of your home computer? Then you'll need remote control software.

Robert Kranz, manager of planning and analysis at Chiquita Brands, finds remote software is the simplest way of getting data from his home or office when he's on the road. Installed on your desktop and notebook, these applications let you control your desktop PC from your notebook via your modem. You can change directories, access files, run applications, and even perform disk housekeeping. Kranz uses Close-Up, a \$199 package from Norton-Lambert. Other major packages are Triton Technologies' CO/Session, Symantec's Norton pcAnywhere, and Microcom's Carbon Copy, all priced between \$175 and \$180.

From Input to Output

Sharing information on the road requires a different set of tools. If you need to make a formal business presentation to prospective

Many hotels haven't thought about people plugging in. "When you make your reservations, request a room with proper hookups," advises NFL scout Joe DiMarzo.

clients, you need to be prepared for a variety of environments. That's no problem—as long as you've planned ahead.

Many notebooks won't recognize an external monitor unless it's plugged into the computer at boot-up. To avoid demonstrating your setup routine, you can attach a terminator plug to the VGA connector so the machine thinks it's connected to an external monitor. When you're ready to give your presentation, remove the terminator and plug in the monitor. One caveat: Some units require you to activate or deactivate ports manually through software.

Those who regularly require hard copy should consider spending \$500 to \$1000 for a portable ink jet or thermal-transfer printer. Most weigh less than 3 pounds with battery and print from 30 to 100 pages on a single battery charge.

Another tactic is to set up your notebook with a PostScript driver and a generic HP LaserJet driver. You can also bring printer driver disks. Windows users will find this method especially convenient because a single disk contains all the drivers they should need.

Kranz offers a fallback strategy using a fax-modem: "When I go to an office that may not be set up with a compatible printer, I can just fax my document to a nearby fax machine and get a decent-quality printout quickly." The same trick can be used in hotels that are equipped with plain-paper fax machines.

Bringing It Home

Back in your office, all that's left is to reconcile the new data on your notebook with your desktop files.

For a growing number of

road veterans, that's easier than it might seem. Many, like Tom Petty, PC and LAN coordinator for Chevron Chemical Co., rely exclusively on their mobile computers. Petty prefers a large-screen monitor and a full-size keyboard, and he needs to plug into his network and a 250MB tape drive when he's working in the office.

Petty's docking station eliminates the hassles of connecting and unplugging the equipment. When he returns to the office, he slips his Toshiba T4400SXC into Toshiba's Desk Station IV, which automatically connects the notebook to his peripherals.

The majority of notebook owners sit down at a separate desktop computer, which means they've got to get the data

from their notebook to the desktop unit.

There are a plethora of file-transfer programs available at prices ranging from free to about \$200. But none is as popular or as well suited to notebook users as LapLink V from Traveling Software.

Even armed with these tips, computing on the go can be tough. Says DiMarzo: "The real world has yet to catch up with the technology. Things aren't quite set up to take care of us vagabonds."

Patrick Marshall is a contributing editor for InfoWorld.

Mobile Computing Survival Kit



Before you head into the great unknown, assemble a survival kit to deal with the unexpected. Include the following:

- A** Dual Phillips/flat-head screwdriver
- B** Miniature flashlight
- C** System disk (bootable floppy with copies of your CONFIG.SYS, AUTOEXEC.BAT, and key DOS commands)
- D** Extra telephone cable
- E** In-line phone coupler
- F** Y-connector phone jack
- G** Portable phone jack with wires for clipping into phone lines (not pictured)
- H** Three-to-two-prong adapter
- I** List of modem commands
- J** Extra batteries for peripherals

Users traveling overseas will want to include:

- K** Phone-jack adapters
- L** Power-plug adapters
- M** Tone converter

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Sample	Did you read it?		Value to you?				
	All	Some	Least 1	2	3	4	Most 5
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Computers for the Mobile Executive (page 230)	<input type="radio"/>						
Traveler's Aid: Tips for a Productive Trip (page 244)	<input type="radio"/>						
Data Compression Programs: More Into Less (page 246)	<input type="radio"/>						
Mobile Computing Survival Kit (page 247)	<input type="radio"/>						

How interested are you in the following types of articles?

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	1	2	3	4	5		1	2	3	4	5		1	2	3	4	5			
New products	<input type="radio"/>																			
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 Desktop Laptop Notebook Hand-held

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	1	2	3	4	5	1	2	3	4	5
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Color screen	<input type="radio"/>									
Weight	<input type="radio"/>									
Battery life	<input type="radio"/>									
Keyboard size/design	<input type="radio"/>									
Communications capabilities	<input type="radio"/>									
Position or type of mouse or input device	<input type="radio"/>									
Price	<input type="radio"/>									
Overall size	<input type="radio"/>									
Upgradability	<input type="radio"/>									
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PCMCIA slot	<input type="radio"/>									
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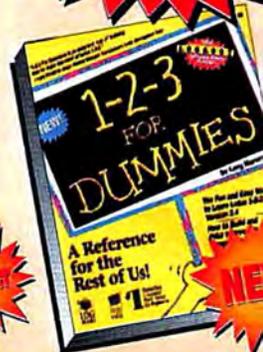
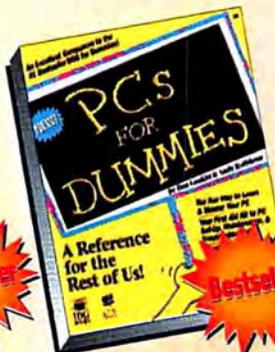
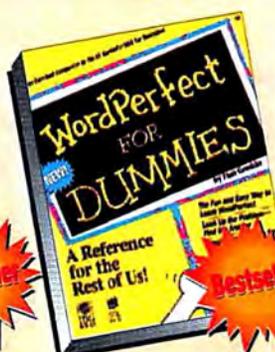
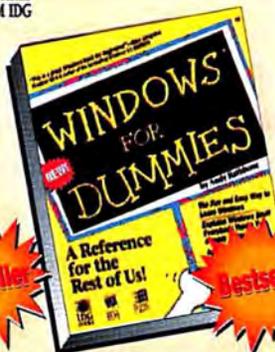
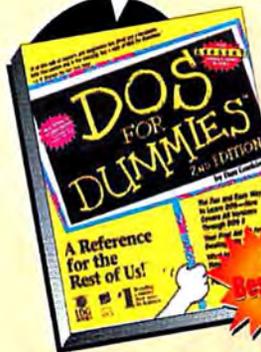


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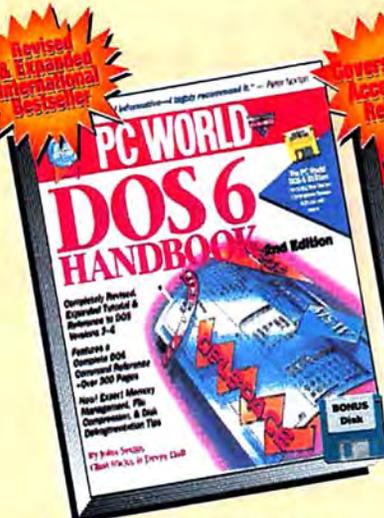
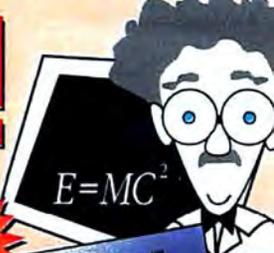
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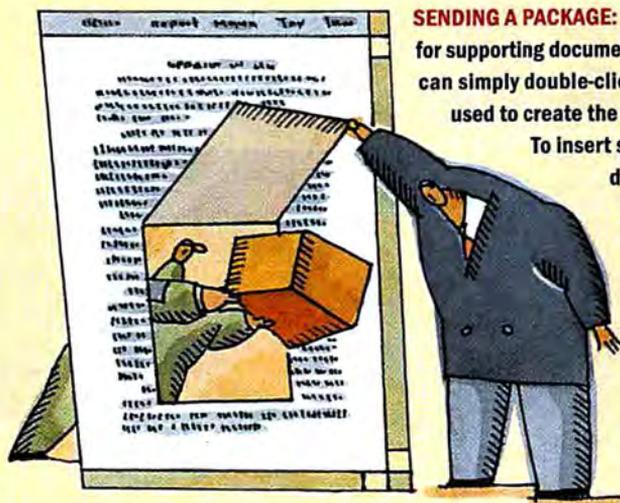
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HELP LINE Q & A

Tip of the Month



SENDING A PACKAGE: With apps that let you insert objects into documents, you can put icons for supporting documents, such as a related spreadsheet, in your reports. The report's recipient can simply double-click the icon to see its contents (assuming his or her PC has the app you used to create the supporting document and its extension is associated with that app).

To insert such icons, launch your app and load your report. Select the point in the document where you want to insert the icon. Then select the application's Insert Object command. For example, in WinWord, use **Insert • Object**; in Excel, use **Edit • Insert Object**. In the object list that appears, select **Package**, and Packager opens over the report. Select **File • Import** and select the supporting document in the Import dialog box. A phrase beginning 'Copy of' along with the file's name will appear in the Content side of Packager's window. If the file's extension is associated with its app, then that app's icon, labeled with the file's name, will appear in the Appearance side; otherwise, Packager's icon will appear. Select **File • Update**, exit Packager, and you're done.

Shane Rau, Assistant Technical Editor

Backing Up With XCOPY

Q I use a batch file to automatically back up files to another directory on my hard disk. It contains the command `XCOPY C:\DIRNAME C:\BKUP\DIRNAME /S /D:xx/xx/xx`, where `xx/xx/xx` is the date of the last backup. The `/D` date parameter tells XCOPY to copy only files that were modified or created on or after that date.

This method works, but I'm getting tired of changing the date by hand every week or so. Is there a way to back up all files at the current date minus two or three days?

Kevin Watters, Shoreview, Minnesota

A It wouldn't be hard to write a program to do what you ask, but there's a better approach, one that won't miss files changed between your last backup and three days before the next. Every time DOS creates or alters a file, it sets a bit, called the *archive* bit, in the attribute byte that's stored with the file's name. XCOPY has a switch, called `/M`, that causes it to copy a file only if it has its archive bit set and to clear that bit after the file has been copied. The

command `XCOPY C:\DIRNAME C:\BKUP\DIRNAME /S/M` will copy only the files in `DIRNAME` that are new or modified, then clear the files' archive bits so they won't be copied the next time unless they've changed.

Full of Floppies

Q Is it possible to install three floppy drives on a 33-MHz 486? If so, how? The MS-DOS user manual says that DOS can handle up to 128 floppy drives using `DRIVER.SYS`, but I can't find a way to connect more than two floppies to my system.

Said R. Nazemi,
Cambridge, Massachusetts

A In most PCs, the floppy disk controller is on the same card as the hard drive controller and can handle two drives at most. However, if you disable the floppy disk section of the card (which can usually be done by changing a jumper), you can add a separate, more capable floppy disk controller that can manage up to four drives. JDR Microdevices sells two cards that fill the bill: the MCT-FTC-HD4, which costs

\$59.95 and works with floppy drives up to 1.44MB in capacity, and the MCT-FDC-ED, which costs \$79.95 and can handle 2.88MB drives as well as drives up to 1.44MB.

There are a few floppy/hard disk controller cards that allow you to install three floppy drives. My controller, made by Ultrastor, comes with a special driver that runs the third floppy. All I had to do was clamp a third connector onto my floppy drive cable. Other brands may require you to buy additional software or make a special cable from scratch.

- **JDR Microdevices** 800/538-5000
Reader service no. 610
- **Ultrastor** 714/581-4100
Reader service no. 611

Facile Fax

Q How does *PC World* collect data from its fax surveys? I work in a hospital and would like to collect information from questionnaires the same way.
Glen Spino, Waterbury, Connecticut

A *PC World* uses a package called Teleform from Cardiff Software to process incoming faxes automatically.

Teleform, which runs under Windows, lets you design forms for user input. Using OCR (optical character recognition), handprint recognition, and optical mark recognition, it then identifies and interprets responses automatically, even if they're upside down, skewed, or filled out incorrectly. Teleform runs with a wide variety of fax boards.

• **Cardiff Software** 800/659-8755
Reader service no. 609

RAM Cram

Q In the February 1992 *Help Line*, Robert Lauriston said that the most memory-hogging DOS program he'd ever encountered uses about 500K of conventional memory. He might be interested in knowing that Disney Software's Mickey's A-B-C's requires 576K of conventional memory.

My Compaq Deskpro 286 has 2MB of system board memory, but because it's a 286, it cannot use a memory manager or load memory-resident programs (TSRs) and device drivers into upper memory blocks (UMBs) to free conventional memory. I therefore have to remove my mouse driver and SMARTDRV in order to run Mickey.

John A. Dobelman, Fort Worth, Texas

A Believe it or not, while the 386 and 486 dominate the headlines, the 286 is still the most common chip in desktop PCs today—so your woes are shared by tens of millions of other users. Here are some things you can do to eliminate "RAM cram" on your 286.

While your system can't run a 386 memory manager (such as NetRoom, QEMM, or DOS's EMM386), you can save some space on your Deskpro by loading DOS into the High Memory Area (HMA). To do this, place the line **DEVICE=C:\DOS\HIMEM.SYS** followed by the line **DOS=HIGH** at the beginning of your CONFIG.SYS file.

Your 286 can't load device drivers and TSRs into upper memory by itself, but you can give it this capability by adding a third-party memory board that conforms to the EMS 4.0 standard. Once

the board is installed, you can use Quarterdeck's QRAM or a similar utility to load device drivers and TSRs into upper memory. Another solution is the All Charge Card from All Computers. This device works its magic in a different way: It fits between your CPU and the system board and remaps memory so you can load utilities high. Finally, if you're running text mode programs, consider Quarterdeck's VIDRAM (sold with Quarterdeck's memory management utilities). This dandy program—described in more detail in this month's *Star-Dot-Star* column—can give any machine with a VGA controller up to 720K of "conventional" memory. Unfortunately, it won't work with graphics programs, so it won't help when you're trying to run Mickey.

• **All Computers** 416/960-0111
Reader service no. 612

Slow Tapes

Q We have two computers in the house, and we recently purchased the Colorado Memory Systems Jumbo Trakker 250 tape drive. The installation guide claimed that this drive, which connects to the computer via the parallel port, could transfer "up to 9.5MB per minute." However, the best rate that our machines (both 386DXs) have been able to achieve in the compressed mode is approximately 2MB per minute.

Rex Farrance's article ("Tape Backups You Set and Forget," December 1992) stated that with one of the "newer enhanced parallel ports," external tape drives could transfer data at 1 megabit per second (7.5MB per minute). But during setup, the software automatically tested our parallel ports and determined that they were unidirectional ports. We have spent quite a bit of time with numerous resellers of computer equipment trying to find a "fast" or "enhanced" parallel port, but no one has been able to help. When we upgrade to a 486DX-50 VESA local bus system board, we would like to add one of these ports to get faster backups.

USER GROUP OF THE MONTH

TUG-NET

This month's user group tips come from the Technical and User Groups Network, located in Southern California. TUG-NET holds trimonthly meetings—open to the public—in La Crescenta. The organization has special interest groups and technical forums on word processing, communications, DOS, OS/2, Windows, and other areas. Membership includes a monthly newsletter and an assistance hot line for software and hardware help. TUG-NET also offers a BBS and a library of over 40MB of shareware and public domain software.

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Reader service no. 712

SAVING KEYSTROKES IN DOS: I often have to delete the contents of a directory as well as the directory itself. Instead of first deleting the files and then the directory, I use a DOSKEY macro to do both. To create this macro, enter the command **DOSKEY DD=ECHO Y \$B DEL \$1 \$T RD \$1** at the DOS prompt, or put it in your AUTOEXEC.BAT file to make the macro part of your standard environment. You can then run it by typing **DD directory**, with *directory* being the name of the directory you wish to delete. This macro will not, however, delete a directory with another directory inside it. And of course, you can't delete a directory while you are in it or in a directory below it.

Ed Smith

Technical and User Groups Network



I was very disappointed that Colorado Memory Systems' product did not live up to its advertised specifications, that there was nothing on the box to indicate that a special parallel port was needed, and that the company was unable to help us find a faster port. Can you provide more information?

Barbara L. Becker,
Walnut Creek, California

A Colorado Memory Systems' technical support department admits that the 9.5MB-per-minute rating listed in your manual is marketing hype, not reality. While a very quick 486 machine might achieve this speed with highly compressible data under ideal conditions, the 2MB per second you're seeing is much more typical of what the company's technicians achieve. And unfortunately, there's no third-party board that's likely to make it any faster. While a bidirectional parallel port will make restores faster, it won't increase backup speed. And while the Enhanced Parallel Port (EPP) standard, which Farrance mentioned in his article, offers potential throughputs as high as 10MB per minute, your drive is not one that supports it.

The technician we consulted did give us a few tips that might help. First, he suggested making sure that the

Technical support admits that the 9.5MB-per-minute throughput rating listed in your manual is more marketing hype than reality.

BUFFERS= statement in your CONFIG.SYS file is optimized for maximum disk speed. Second, he said, it would be a good idea to unload TSRs (or make sure they're loaded high) to leave lots of room for the backup software. He also advised that you try turning off compression instead—which may reduce backup speeds on slower systems—and to make sure that if you use compression, it's set to "optimize space." Finally, he suggested that you configure the software for concurrent disk and tape I/O and set the hardware "port usage" setting to the highest possible number.

If you upgrade to a faster system board, you'll see some improvement—especially if the board has a parallel port built in—but you probably still won't reach backup speeds of 9.5MB a minute.

Since you have good reason to be dissatisfied with the drive, ask your dealer to let you exchange it. If you do, here are three ways to get faster backups with a transportable drive. The first is to buy a tape drive that uses a dedicated interface card (you can buy another interface card for the second computer).

The second is to get an EPP tape drive, then buy an EPP card for each machine. I know of only one EPP add-on card: the F/PORT card from FarPoint Communications (805/726-4420). The F/PORT lists for \$149 but may cost less at a dealer.

The third approach is to buy a SCSI tape drive and two compatible SCSI adapters. For instance, the T130 adapter from Trantor Systems Limited (510/770-1400) lists for only \$99, but it can transfer megabytes of data per second—more than any parallel port—from compatible tape drives. Besides raw speed, SCSI has another advantage: If one of your machines already has a SCSI hard drive, you won't need to add a SCSI adapter card to that system if the drive you get is compatible with the existing adapter.

Any way you go, tape backup software will probably be included with your tape drive. Note, however, that if you've got a third-party backup program that you want to use, you should make sure it supports the tape drive you're considering.

Num Lock On

Q A few issues back, *Help Line* featured a program that turns Num Lock off. Do you have another that turns Num Lock on?

Judy DiFrancesco, Sun Lakes, Arizona

A Some PCs allow you to use their System Setup utility to specify whether the system should turn Num Lock on at boot-up. However, many older sys-

tems can't. To create a program to turn it on for you, use a word processor or a text editor to create a plain ASCII text file called NLOCKOFF.SCR containing the lines in **FIGURE 1**. (If you use a word processor, be sure to save the file as text.) Remember to include the blank line after the RET; without it, the

```
A 100
MOV AX,40
MOV DS,AX
OR BYTE PTR [17],20
RET

RCX B
N NLOCKON.COM
W
Q
```

FIGURE 1: THESE DEBUG KEYSTROKES CREATE NLOCKON.COM, a program to turn on Num Lock.

DEBUG script won't work properly. Then enter the command **DEBUG <NLOCKON.SCR** at the DOS prompt to create NLOCKON.COM. You can also download NLOCKON.COM from PC World Online or upgrade to DOS 6.0 and add the line **NUMLOCK ON** to your CONFIG.SYS file.

Unfortunately, systems that can't turn Num Lock on at boot time usually toggle the Num Lock light off and on only when the <Num Lock> key is pressed. If yours is such a system, the Num Lock light will still be off after running NLOCKON.COM, and if you press <Num Lock> to turn Num Lock off, the light will turn on.

By Brett Glass

Brett Glass is a contributing editor for PC World.

• Mail your questions to Help Line, PC World, 501 Second St. #600, San Francisco, CA 94107; or send them electronically to the Help Line forum on PC World Online (see page 10 for more information); MCI Mail, 179-3813; Internet, 1793813@mcimail.com; or 415/442-1891 (fax). PC World pays \$50 for published questions. Sorry, we cannot acknowledge unpublished materials.

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SPREADSHEETS Q & A

Making a Spreadsheet Go Round

Q I have a number of worksheets in which all the calculations should be performed on values rounded to two decimal places. I know that I can use the @ROUND() function to round the results of a calculation, but I don't want to add that function to every calculation. Isn't there some way to simply force the whole worksheet to round all of its values?

Ben Starr, Boston

A If you're using anything but Excel 4.0, the answer is no. You can change the *format* throughout your worksheet so that all your formula results appear rounded to two decimal places, but the spreadsheet will still use full, 15-digit precision for calculations. In 1-2-3 you can change the format of the entire worksheet with the command */Worksheet • Global • Format • Fixed*, and enter 2 when prompted for the number of decimal places. In Quat-

	A	B	C	D	E	F	G
1	\D	{recalc \D_1}					
2		{open com1,w}					
3	\D_1	++){writeln ""ATDT"&@CELLPOINTER("contents")&""}					
4		{indicate "Lift receiver and press any key"}					
5		{get \D_KEY}{break}					
6		{writeln "ATH"}					
7		{indicate}					
8		{close}					
9							
10	\D_KEY						

FIGURE 1: DIAL PHONE NUMBERS automatically with this 1-2-3 macro.

tro Pro or Excel you can get the same effect by redefining the Normal formatting style to show two decimals.

But in Excel you can do more: Select *Options • Calculation*, check the Precision As Displayed box, and click *OK*. You'll be warned that data will lose accuracy—that's okay; that's what you want. Now all numeric entries and calculations are based on rounded values.

Phone Dialer for 1-2-3 and Symphony

Q I have a Symphony database that contains an address list, and I would like to use my modem to dial the phone numbers automatically. Can you show me a way to create a macro that will do this for me?

Gordon Hessler, Los Angeles

A Let me start with a 1-2-3 macro, and then I'll show you how to modify it to work with a Symphony database. (My solution is adapted from a 1-2-3 macro suggested by Rob McCormack of Thunder Bay, Ontario.)

The 1-2-3 version is shown in **FIGURE 1**. To set it up, enter the labels and formula in an out-of-the-way place in your worksheet. When you enter a label that begins with a slash or a backslash (/ or \), remember to precede it with an apostrophe (in other words, to enter \D, type '\D'). When you enter the formula shown here in cell B3, don't be upset if 1-2-3 returns an ERR; it will correct itself when you use the macro.

Once you've entered the macro, put the cell pointer in the cell with the '\D' label (A1 in our figure), select */Range • Name • Labels • Right*, paint the left-column range (A1..A10 here), and press <Enter>. To execute the macro, place the cell pointer on a cell containing a phone number (with numbers, if needed, for an outside line; a one; and the area code) and press <Alt>-D. After the modem has dialed the number, pick up the

Spreadsheet Toolbox

If your Excel macro skills aren't on a par with your vision of how you want your applications to work, you may be able to shortcut the development cycle with Open EIS Pak, a new add-in from Microsoft.

In Microsoft-speak, EIS stands for enterprise information system. That's a system to give users a custom push-button Windows interface for accessing database tables, spreadsheets, charts, and documents from multiple Windows applications. For instance, an EIS built around Excel might present a control screen with buttons labeled *World View, Charts, and Orders*. Clicking these leads to dialog boxes and from there to screens that display Excel worksheets and charts with data at various levels of detail. Then you might request data from an external database, or insert a chart in a WinWord document.

Microsoft touts Open EIS Pak as the first step toward this grand vision. In addition to

the Excel add-in, the \$99 package contains documents, case studies, and a videotape that describes how Windows-based multiapplication EIS's can work. The add-in, dubbed the Excel EIS Builder, offers a point-and-shoot alternative to heavy-duty macro programming. As you make selections in dialog boxes, you create views (worksheet ranges and charts), scripts, and buttons and custom menus to launch scripts. You can also integrate Open EIS Pak elements with your own Excel macros. Interapplication links are handled by Dynamic Data Exchange (DDE) commands embedded into your scripts.

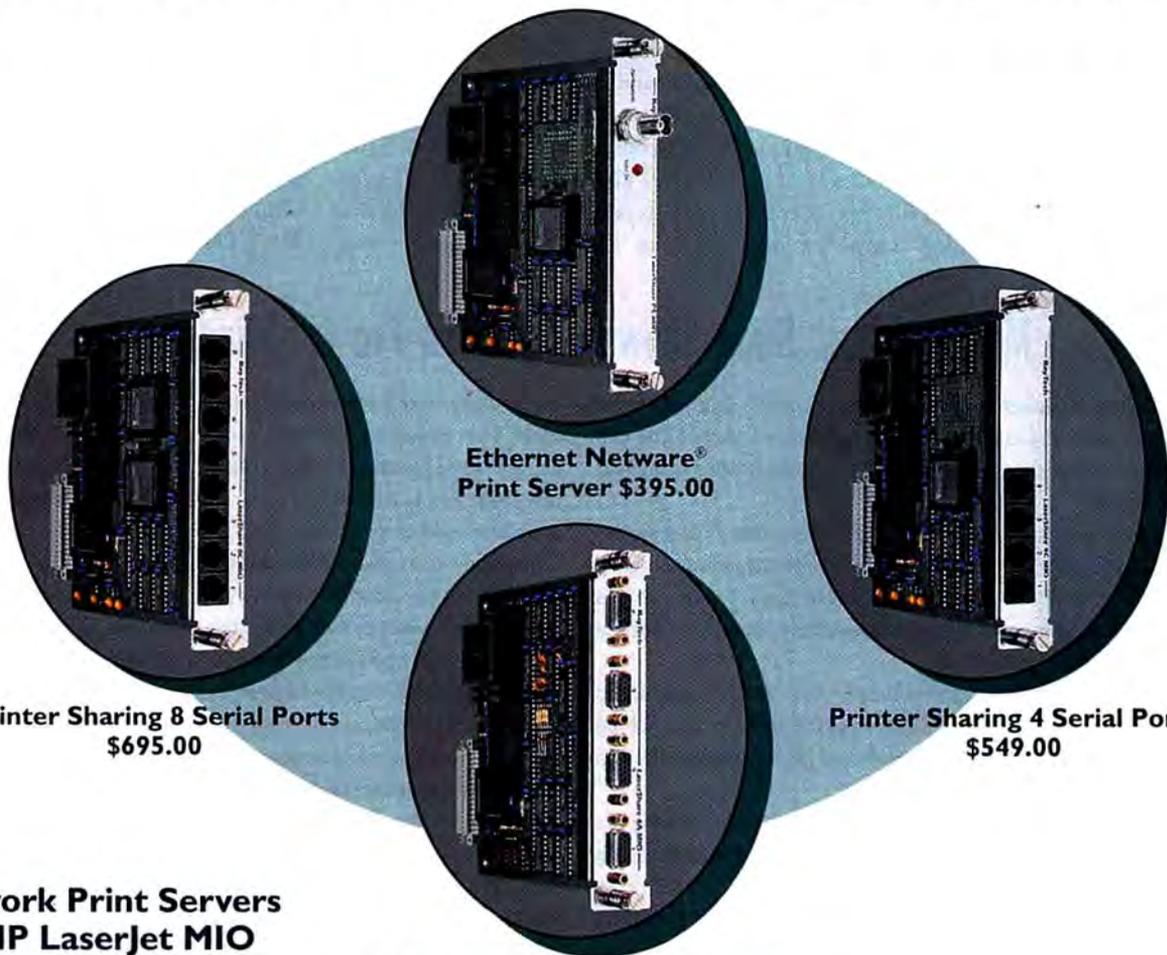
Open EIS Pak is the most concrete example I've seen of just what Bill Gates is getting at when he talks about "information at your fingertips." And it's a pretty cool Excel accessory, too.

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receiver and press a keyboard key to disconnect the modem.

Following is a detailed explanation of how the macro works. It assumes that you're using a Hayes-compatible modem connected to COM1.

{recalc \D_1}. Recalculates the string formula in cell B3 to reflect the phone number found in the current cell.

{open com1,w}. The {open} command is usually used to write text into

a file. Here it establishes a channel between your worksheet and the communications port COM1. If your modem is linked to a different port, change this statement accordingly. The *w* stands for *write* and indicates that subsequent statements can send text to the port.

+ "{writeln ""ATDT""&@CELL-POINTER("contents")&"""}". This formula creates a macro statement that actually dials the phone number.

{writeln} sends text to an open file or port. The ATDT sequence is the modem instruction to begin dialing, and the @CELL.POINTER function puts the phone number from the current cell into the dialing string. The double quotation marks are necessary to produce the quotes that appear as part of the macro statement.

{indicate "Lift receiver and press any key"}. Displays the quoted message in

Master Class: Slide Shows in Quattro Pro for Windows

Like its DOS predecessor, Borland International's Quattro Pro for Windows is a real pro when it comes to graphics. In fact, you can prepare and present a complete business presentation using just this program.

You create text slides and organize your slide shows on the graphs page, the last page of a Quattro Pro for Windows notebook (QPW's term for one of its data files). To move to this graphs page, click the SpeedTab button at the bottom of the screen.



To create a single slide, select *Graph • New*. Because text slides have no data, you don't have to set any of the series ranges; all you have to do is click *OK* or press <Enter> and you'll find yourself in an empty graph window.

All your formatting options are available by right-clicking the mouse. For example, to change the background color and shading pattern of a slide, right-click in the empty graph frame and try the options under *Fill Color*, *Bkg Color*, and *Fill Style*. To get the effect shown in FIGURE 1, use *Fill Style • Wash*.

To put text on the chart, click the *Text* tool, drag a box, then type text inside it. To center a title on the slide, extend the box horizontally from one edge of the graph to the other, right-click on the text box on a spot away from the text, choose *Alignment*, and click the *Center* icon. The *Box Type*, *Fill Style*, and *color* options let you control how the text box will look against the slide's background; for text with no visible box, select the box with no lines around it and *Fill Style • None*. To format the text, right-click on it and play with the options.



To create bulleted items, type \b10\ at the beginning of a line for a hollow square bullet; \b11\ yields a solid square. For a full list of such codes, bring up *Help* and search for 'Bulleted Lists'. To position the text after the bullets, use <Tab>.

You can import pictures from a variety of sources into your slides, and in fact, Quattro Pro for Windows provides a sizable library of clip art files (if you elect to install them with Quattro Pro, you can find them in the CLIPART directory just beneath the QPW program directory). To place an image, click the *Import* button and select your file. When the image appears, size it by dragging its selector handles.

Most slide shows consist of similar text charts interspersed with a few graphs. So that you don't have to set up each chart separate-

ly, you can create a prototype and then copy it to begin each new chart. Start by making one chart, complete with a title, bullets, clip art, and other standard elements. Click the *Close* button at the bottom of the graph, click on the icon, and use standard Windows cut and paste commands to make new, editable copies.

Once you've created a series of slides, you're ready to organize them into a slide show. Hold down <Shift> and click on each chart to select them, then click the *Create Slide Show* icon, type a name for your show in the name field of the dialog box, and click *OK*. Double-click on the new icon, and you'll see all the slides on a "light table" like the one shown in the figure. You can reorder the images by rearranging the charts, or select transition effects in the *Effect* drop-down list box.



You can flexibly control the sequence of slides in your show by placing push buttons on your charts: Make a small text box, then right-click on it. *Graph Button* is selected by default; check the *Select Graph* box, and choose the slide you want to branch to. To make a button invisible, set its *Fill Style* to *None*, select the *unbordered Box Type*, and don't put any text in it. When you click the button during the show, Quattro Pro branches to that slide.



To run the show, click on the *Run Slide Show* button. Freelance Graphics for Windows it's not. But if you need a quick, simple slide presentation based on your spreadsheet data, Quattro Pro for Windows handles the challenge with aplomb.

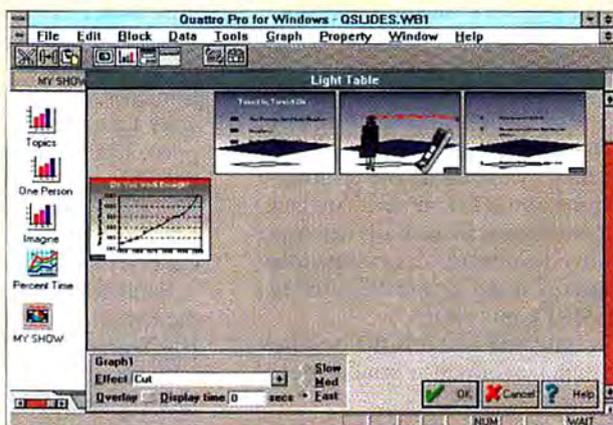
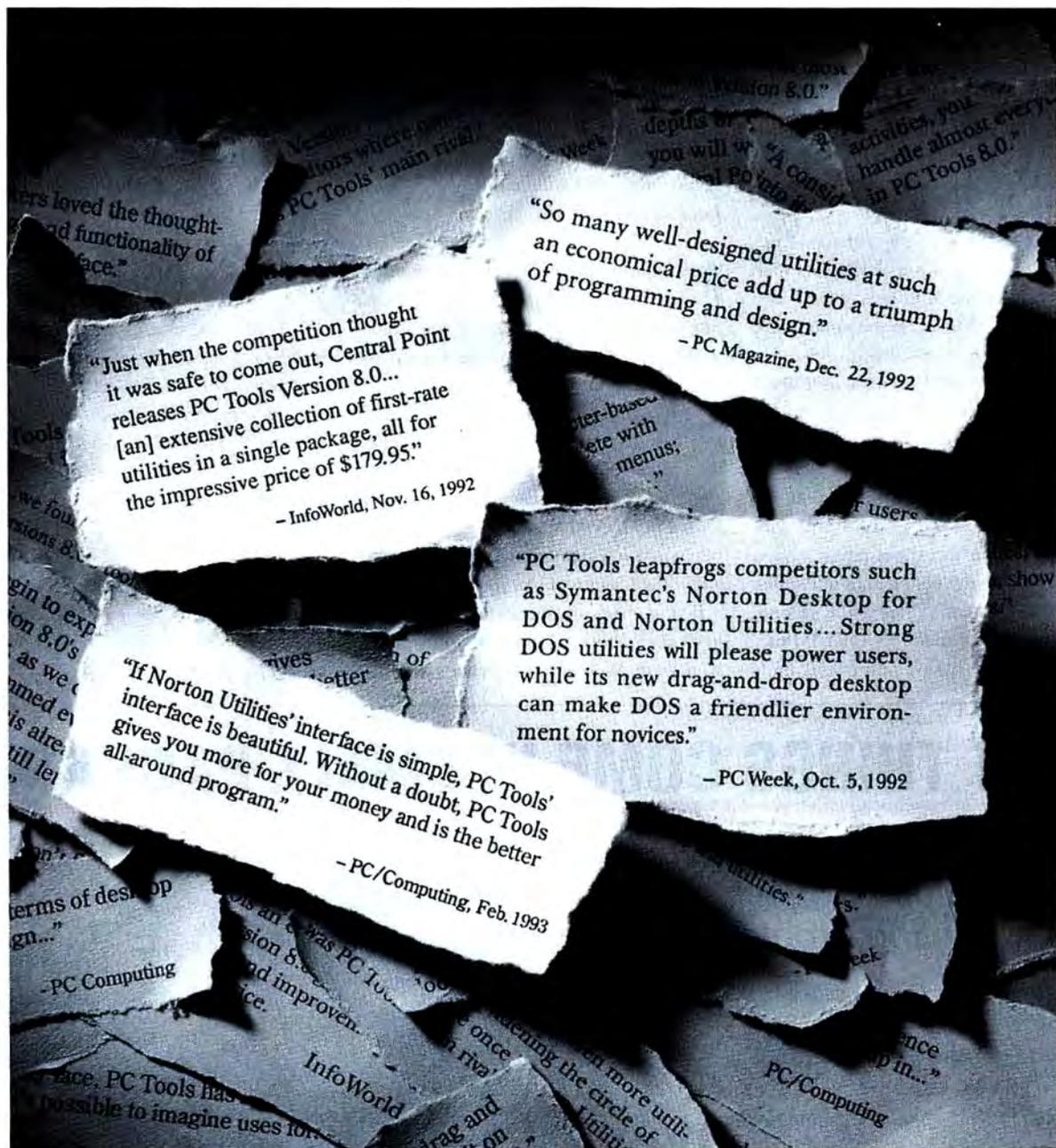


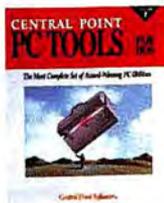
FIGURE 1: THE LIGHT TABLE in Quattro Pro for Windows lets you see how your slides relate to each other in a show.

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the mode indicator at the upper left corner of the screen.

{get VD_KEY}{break}. Waits for the user to press a key and puts the keystroke into an out-of-the-way place—the one-cell named range VD_KEY.

{writeln "ATH"}. Disconnects the modem after the user has picked up the receiver.

{indicate}. Clears the mode indicator.

{close}. Closes the communications channel to COM1.

Now for the Symphony version. Let's suppose you've set up a database called MAIN with phone numbers stored in a field named PHONE. Use the same macro shown previously, but substitute the formula `+{writeln ""ATDT"&@VLOOKUP("PHONE", MAIN_DF,1)&"")}` in cell B3. Pressing <Alt>-D will then dial the current record's phone number, even if you're in Form mode.

In a Symphony database, the current record (the one displayed in the Form window) is stored in the sheet range named MAIN_DF with the field names in the first column and the data values in the second. This formula uses an @VLOOKUP function to locate the phone number: It finds

the field name PHONE in the farthest left column of MAIN_DF and picks up the phone number from the second column (the first column is number 0).

Two Excel Graphs in One

Q I need to print two Excel 4.0 charts on the same piece of paper. However, when I have a chart up in its window, I can't find a menu choice that will do this.

Lex Redfern, Rock Hill, Arizona

A If you can't print two charts on the same page, you've probably got them in separate files. You'll find it easier if you arrange two chart objects side by side on a worksheet, then print that page.

In Excel, a chart can exist either in its own file, distinct from the worksheet where its data resides, or as a chart object within the worksheet. When you create a graph with File•New•Chart, you get a separate file; when you create it with the Chart Wizard or the Chart tool bar, you get an object.

If your charts are already in separate files, load them both, along with the original worksheet. With one of the charts as the ac-

tive window, select Chart•Select Chart and press <Ctrl>-C. Then go to your worksheet and press <Ctrl>-V to paste the chart there. It will appear as a box, which you can drag and resize with your mouse within the sheet. Repeat the process for the other chart, then use Options•Set Print Area to select a range of cells that includes both objects, and print the page.

To edit a chart object, double-click on it to bring it up in the same chart window you use to work with a chart file.

By Richard Scoville

PC World contributing editor Richard Scoville is a software training consultant based in Chapel Hill, North Carolina.

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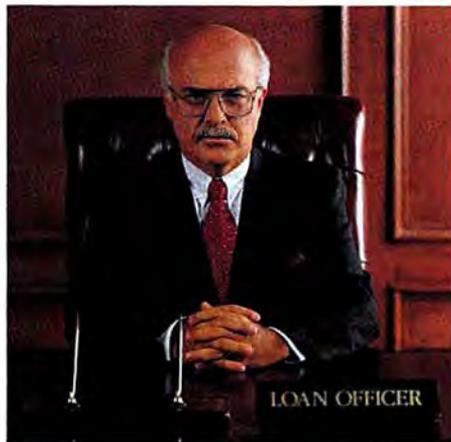
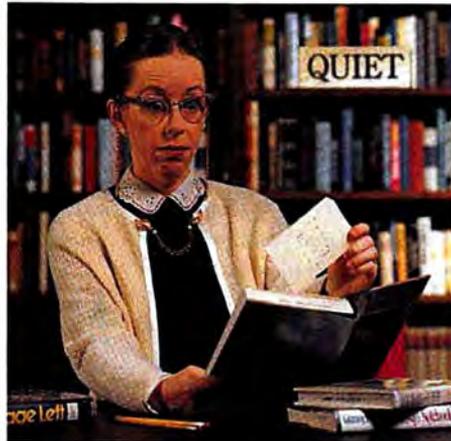
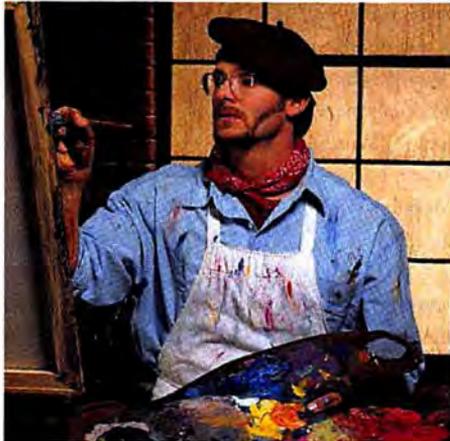
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WORD PROCESSING Q & A

Antihyphens in WordPerfect for DOS

Q I publish a small journal in WordPerfect 5.1 for DOS, and I prefer to use WP character 4, 34—an em-dash—instead of a standard hyphen character. But when the program needs to hyphenate words separated by this character it treats each word as a single word, hyphenating arbitrarily and destroying the look of my document. Is there a way I can force WordPerfect to break the word only at the em-dash?

*William Ross Woofenden,
Sharon, Massachusetts*

A WordPerfect will always consider words on either side of a hyphen or an em-dash as a single nonbreakable word, but you can work around this condition: After inserting your em-dash or other character, press **<Home><Enter>**. This command inserts an Invisible Soft Return code, which you can see in the Reveal Codes (**<Alt><F3>**) window. When WordPerfect sees this code in what it considers to be a word, it will always break the word at the code and nowhere else. If no hyphenation is needed, WordPerfect ignores the code. You can also force WordPerfect to hyphenate any word at a specific point by pressing **<Ctrl><Hyphen>** at the point where you want the word to break.

WordPerfect for Windows Character Actors

Q In "75 Hot Word Processing Tips" [February 1993], you said that pressing **<Ctrl><V>** and then typing OR would insert a registered trademark character in a WordPerfect for DOS document. I tried doing the same thing using WordPerfect for Windows, but it didn't work. How can I access this character in WordPerfect for Windows?

George Gallup, Los Angeles

A Instead of pressing **<Ctrl><V>** as you do in the DOS version, press **<Ctrl><W>**. You'll see the WordPerfect Characters window, which displays all the special characters WordPerfect can create. When the window opens, the cursor is in the Number field. If you type OR as you did in the DOS version, you'll select the Registered Trademark symbol. If you want to insert the character into your document, select *Insert*, and then press **<Enter>**.

There's good news and bad news about this feature. The good news is that since most users can't remember the codes for all the special characters, the Windows version shows you the characters. To select any character, just click on it. If you want to use another of WordPerfect's character sets, click and hold on *Typographic Symbols* to drop

down a list of character sets. Once you've selected the set and character you want to use, click *Insert* or *Insert and Close* to insert the character into your document, or just double-click on the character you want to insert.

Here's the bad news: As in the DOS version of WordPerfect, many of these special characters are inserted into your document as graphic images, rather than as actual characters from the current font.

USER GROUP TIP

Importing ASCII Into WordPerfect

I often have to import large ASCII files into WordPerfect. Unfortunately, using Text In/Out (<Ctrl><F5>) for this job is clumsy, since you have to remember the file name. It's easier to go to WordPerfect's List Files screen (<F5>), select the file, and retrieve it by pressing R or 1. But WordPerfect takes an extra long time retrieving a text file with that command. The solution? Combine the two techniques: Press <F5> to go to the List Files screen, select the file, then press <Ctrl><F5>. The file will come up quickly and easily.

**Marian Orem
Technical and User Groups Network**

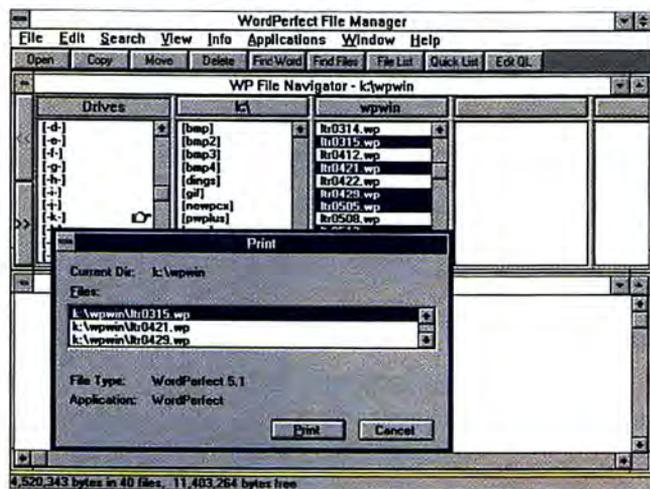
These characters often lack the high quality of normal characters. To get higher quality, use the Character Map miniapplication (usually found in the Accessories group of Program Manager). In Character Map, double-click on the character you want, and click *Copy* to copy it to the Windows Clipboard and then paste it in your document.

Batch Printing in WordPerfect for Windows

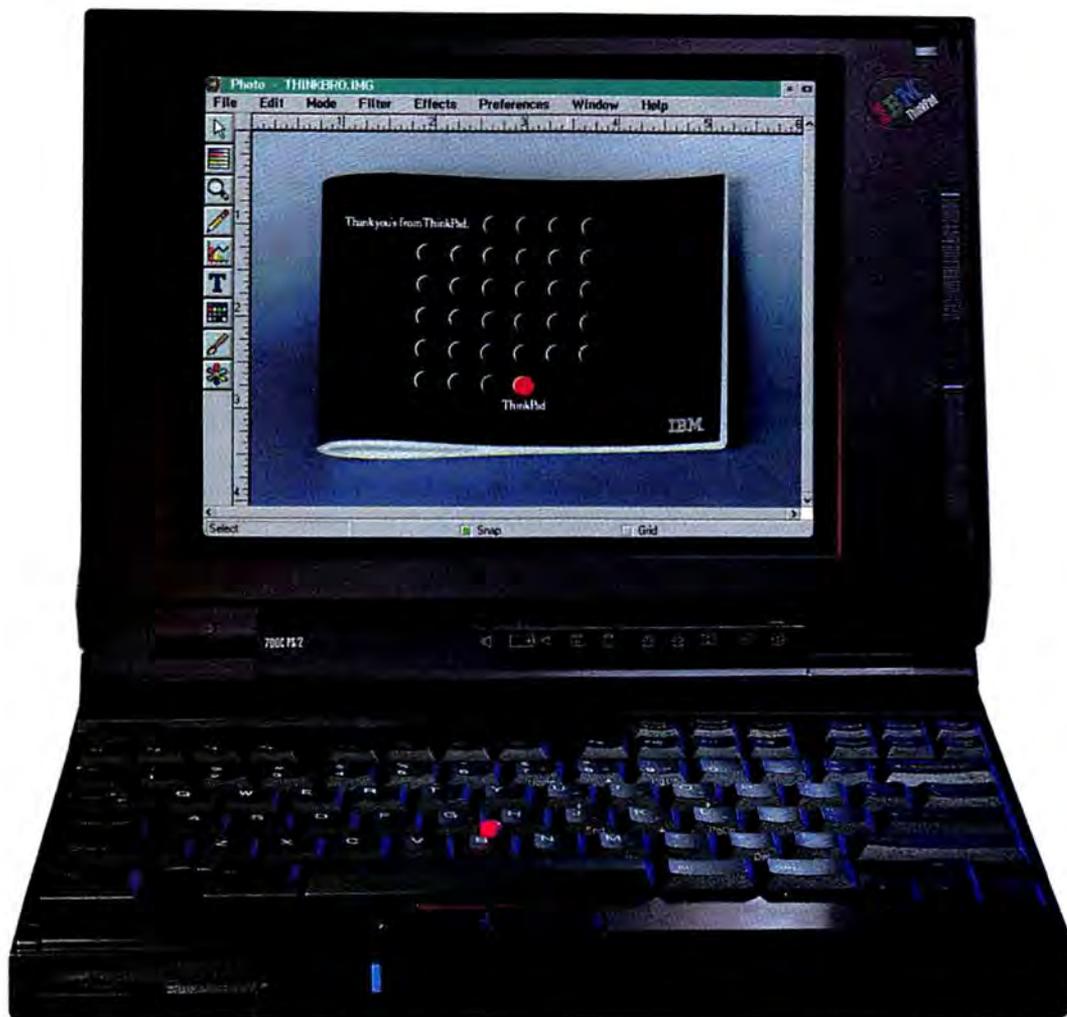
Q I've just switched to WordPerfect for Windows from the DOS version, and there's one thing I miss from the latter program. WordPerfect for DOS let me print all marked files in a batch mode by pressing **<F5>** and putting an asterisk before individual files in the list. Is there a way to batch print files in the Windows version?

Michael Grealy, Mexico City

A Switching to Windows doesn't mean giving up WordPerfect's batch printing tools. It just means changing the



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way you do things. Fire up WordPerfect for Windows, then select *File•File Manager*. In the window that appears, select the drive and directory where your files are located, then choose all the files you want to print.

To select consecutive files in the list, hold down the left mouse button and drag over the file names. If you need to select nonconsecutive files, hold down **<Ctrl>** as you click on individual files or drag over groups of files. As you click on files, you'll see their text in the Viewer window.

Once you have all your files highlighted, select *File•Print*. You'll see a new dialog box showing a list of selected files. Just click the *Print* button to proceed with your batch printing job. One note, though: To avoid an error message, make sure the files you select are formatted for your current printer and are WordPerfect files.

Getting the Jump on WinWord

Q I often write very long documents in Word for Windows. When I load the document, it takes a long time to scroll to the end so I can continue working. Is there a way to make this job easier?
Zhun Wha Yung, Brooklyn

A There are two solutions for your problem. First, anytime you want to jump to the end of a document in Word for Windows, just press **<Ctrl><End>**. That will solve your scrolling problem. If you want to return to the place you last edited, press **<Shift><F5>**. Word for Windows stores the location of your last edit of a document, even when you completely exit the program. You can use this command when you load any document to return to work right where you left off.

Multipage Tables in WinWord

Q I like using the table feature in Word for Windows when I'm working on a columnar document such as a résumé, where a heading such as Experience is on the left-hand side and the body text is on the right. However, if the contents of a cell extend past one page, Word for Windows doesn't print the text correctly, ignoring all text past the end of the

page. I can't insert page breaks inside a table. Is there a way to get around this?
*Vinita Mohan,
Sherman Oaks, California*

A As you've discovered, tables are the ideal way to create pages with uneven columns, since Word for Windows increases the height of the cell to allow for more text. But it's also true that the program doesn't continue the cell onto the next page. If you're editing in Normal View, you'll see the text, but it won't print. There's no instant solution for this problem, which Microsoft acknowledges in the manual. But there's a way out.

Start in a new document by selecting *View•Page Layout*. This switches Word for Windows into a mode that shows your actual page breaks on screen. Select *Table•Insert Table* to create the table for use in your résumé, then begin entering text as usual in the right-hand column.

As you near the end of the page, you'll see that you can continue typing, but the text doesn't display. So when you reach the end of one page, stop typing and press **<Tab>** to add a new row, which will appear on the next page. Press **<Tab>** again to jump back to the column in which you were typing, then continue to type. Since you've inserted a new row, Word for Windows can break the page properly.

Note that this trick won't work if you're printing borderlines for your table, but that's not usually the case when creating résumés and similar documents.

Spaced-Out Numbered Lines in Ami Pro

Q I write research papers in Ami Professional 3.0 and need to number certain lines in these documents. I've tried using the *Page•Line Numbering* command, but I don't like the way the numbers appear in the margin area. Besides, the numbers are too close to the text, and I can't number just the lines I want. Is there a way to make my line numbers behave?

Gertrud Dubach, St. Paul

A While it's natural to try to use Ami Pro's Line Numbering option to number lines in part of a document, that's not the best approach. You'll get better results using the Number List style. Since it's a style, you can modify the way your numbered lines will look.

Start by selecting *Style•Select a Style* or pressing **<Ctrl>4**, then choose *Number List* in the floating style box. You can also choose this built-in style by clicking on the style box in the status line on the bottom of your screen, then choosing *Number List* in the pop-up list box.

You can change almost any aspect of this style, including the spacing between numbers and text. Select *Style•Modify Style* or press **<Ctrl>A**, then

Tables are the ideal way to create pages with uneven columns, since Word for Windows increases the height of the cell.

choose *Number List* in the Style list. Choose a face and size for your text, then select other options to modify it.

To set your spacing, select *Bullets & Numbers* in the Modify box. In the window, use the scroll arrows to set the spacing—a preview at the bottom of the window shows you how close the number is to the text.

When you're satisfied, select *OK* to return to your document. To make your new style permanent, select *Style•Save as a Style Sheet*. Make sure the *With Contents* box is unchecked, select *OK*, then confirm that you want to overwrite the existing style sheet.

By George Campbell

George Campbell is a contributing editor for PC World.

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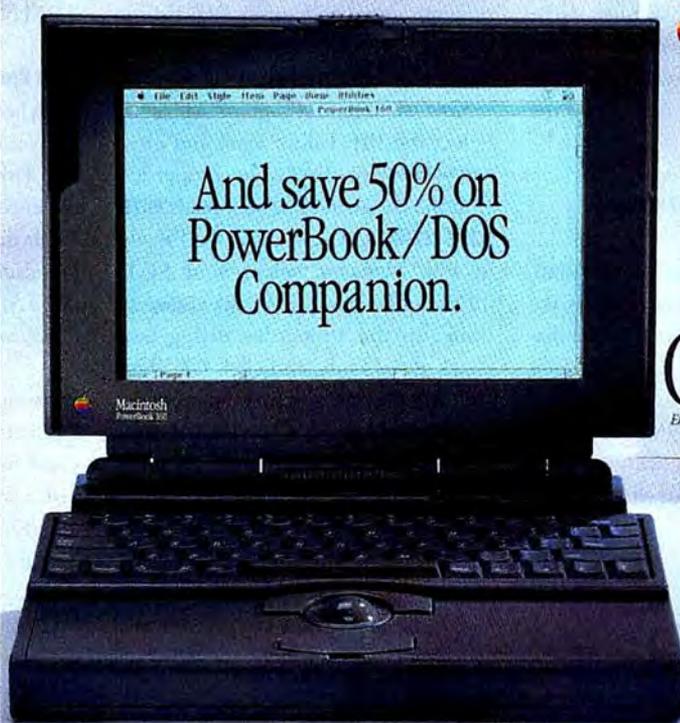
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Apple 

WINDOWS Q & A

PIF of the Litter

Every time I create a program information file (PIF) for a new DOS app, I change the same settings in the PIF Editor text boxes. Isn't there a way to make my favorite settings appear in the PIF Editor when I open it for the first time?

Mimi Ogden,
North Sioux City, South Dakota

All you need is a little work-around. Launch the PIF Editor. Then make any changes you want, so that the dialog boxes reflect your most common settings. Since Program Filename, Window Title, and Optional Parameters will be unique to each application, leave these boxes blank. Next, choose *File* •

Save. Give the file a name like SETTINGS.PIF, and save it in the same directory as Windows. The lack of a program name will annoy PIF Editor, causing a few error messages. Just click *OK* in each error message to ignore it.

Now switch to Program Manager. Select the PIF Editor icon, and press <Alt><Enter> to display its properties. Edit the command line so it reads **PIFEDIT.EXE SETTINGS.PIF**, and click *OK*. Finally, in File Manager, select your SETTINGS.PIF file, press <Alt><Enter> to bring up the Properties dialog box, check Read Only, and click *OK*. This step will prevent you from accidentally overwriting your SETTINGS.PIF file.

The next time you double-click the PIF Editor icon, you'll open the SETTINGS.PIF file. Make any changes you want, and select *File* • *Save As* to save your file under a new file.

uncheck the Show Scroll Bars check box and save your TRM file. You'll have to repeat these steps for each TRM file you want to modify.

Good-Bye MS Draw

When I double-click a picture in Word for Windows, up pops Microsoft Draw to let me edit it. But I'd rather edit all my pictures in CorelDraw 3.0. Is there any way I can get WinWord to default to CorelDraw?

Anna Neubauer,
Londonderry, New Hampshire

Because CorelDraw supports Object Linking and Embedding (OLE), you'll be able to make the switch with just a small change in your WIN.INI file. From File Manager or Program Manager, select *File* • *Run*, type **WIN.INI**, and press <Enter> to load WIN.INI in a text editor. Under the Microsoft Word 2.0 section, add the line **PicEditClass=CDRAW** and save the file. You don't need to restart Windows, but you will have to restart Word for Windows if it's running.

Terminal Problems

I use Windows 3.1's Terminal program for most of my telecommunications. Is there any way to turn off the right scroll bar or use a smaller font to prevent characters from being hidden when a line is 80 characters long?

V. Young,
Independence, Missouri

First open the TRM file that has the characteristics that you want to change. Then from the *Settings* menu, select *Terminal Preferences*. The Terminal Font scroll box allows you to change fonts, some of which have a number of size options. Experiment until you find the one you want. Then

This solution works with most but not all images. If a double-click launches CorelDraw without loading your picture, exit Corel, select the picture in your document, and press <Ctrl><Insert> to copy it. Now double-click the drawing to launch CorelDraw, click *OK* if an error message appears, and press <Shift><Insert> to paste the picture into Corel.

If you are unable to ungroup your image's pieces for editing once it's loaded into Corel, try choosing *Edit* • *Paste Special* (instead of pressing <Shift><Insert>), select *Picture*, and click the Paste button. Naturally, you won't be able to ungroup bit-map formats (from paint programs like Paintbrush), only vector formats such as those created by Microsoft Draw.

If you double-click a picture and it still opens in Microsoft Draw, that means it was embedded (from Draw) into your Word for Windows document. You will have to copy it, select *Insert* • *Object* • *CorelDraw Graphic*, and click

Windows Toolbox



Managing a large number of picture files can be a decided chore, but ImagePals 2.0 from U-Lead Systems can help to ease the pain. The key module of the program, Album, is a file database that displays your image files as thumbnails (or as icons if you're using it to manage text or spreadsheet files). You can add descriptions for each file and search on these or other attributes; copy, move, rename, or delete files; convert among a variety of file formats; or give a slide show. The program also comes with a capable image editor and screen capture utility. The list price is \$249; a \$99 price is good through the end of June. U-Lead Systems, 970 W. 190th St. #520, Torrance, CA 90502; 800/858-5323, 310/523-9399 (fax).

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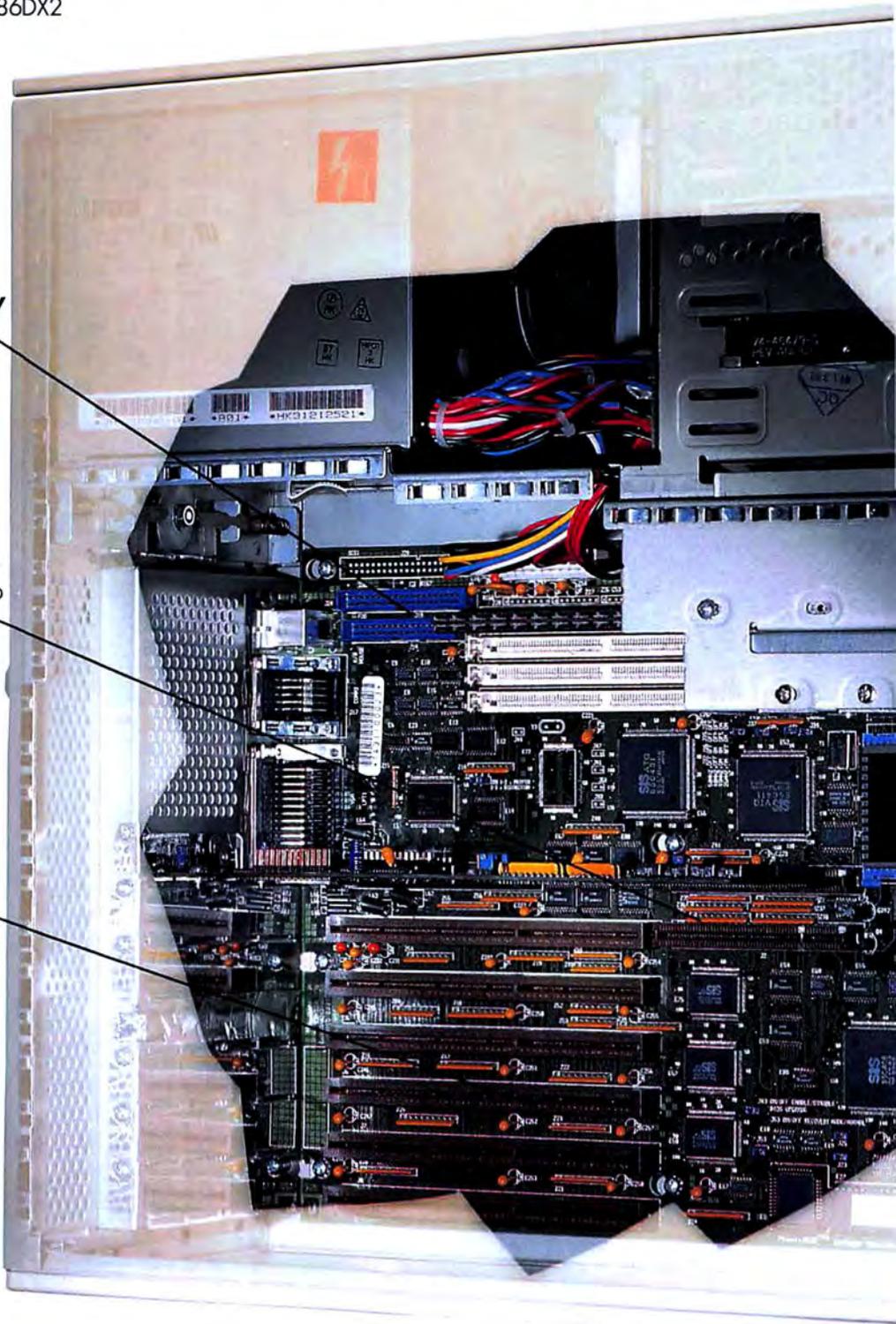
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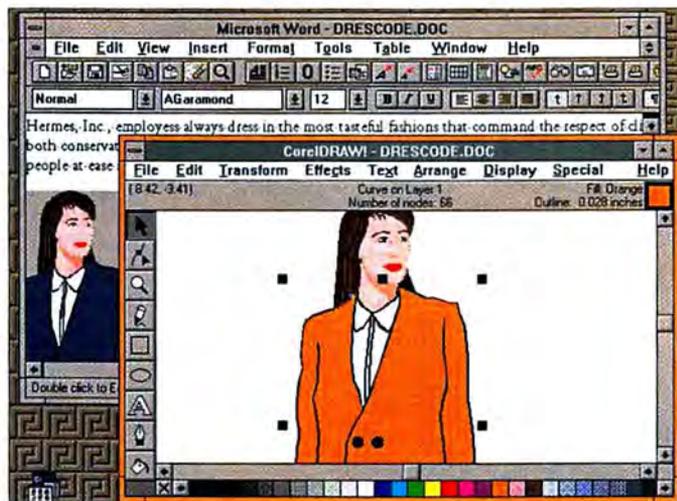
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YOU CAN REPLACE WORD FOR WINDOWS' DEFAULT DRAWING PROGRAM with CorelDraw or any other OLE-aware drawing program.

OK to launch CorelDraw. Insert the picture into Corel using the *Paste* command. When you exit Corel, your drawing will be embedded anew, and you can delete the MS Draw picture.

Finally, if you'd like to change your default image editor to another OLE-aware drawing or paint program, you can change your WIN.INI file again. The correct reference for Micrografx Designer, for example, is `PicEditClass=Designer`, and for Windows' Paintbrush, it's `PicEditClass=PBrush`.

Customizing File Manager Menus

Q A while back I got the Windows Resource Kit from Microsoft; its File Size Information utility adds the Info menu to File Manager. Later I purchased Outside In, which adds the OI menu to File Manager. However, the keyboard shortcut (<Alt>I) is the same for both menus, so to invoke Outside In's View command, I have to type <Alt>II<Down>V—not much of a shortcut. Any suggestions?

Rudy Ulmer,
Germantown, Pennsylvania

A Sure thing. As you've noticed, if the same character is underlined in more than one menu, the <Alt>-key sequence highlights the first matching menu it finds; if it's not the one you want, you'll have to keep pressing the underlined key to get the right menu. The solution is to change the underlined character.

File Manager obtains its shortcut-key information on Outside In from the AD3FM.DLL file in the OI\ADDON directory; the Windows Resource Kit data comes from FILESIZE.DLL in the Windows directory. There are only two possible characters to underline in the OI menu, and because underlining the *O* would conflict with File Manager's Options menu, let's

change the shortcut for the Info directory. We've already ruled out *I* and *o*, and *f* is the shortcut for the File menu, so we'll have to underline the *n* in Info.

First, make a backup copy of FILESIZE.DLL, just in case something goes wrong. Next open the file in Windows Write and click the No Conversion button. Select *Find*•*Replace*, and in the Find What text box, type `&Info` (note each letter's case). The ampersand (&) signifies the underscore for the following character. <Tab> to the Replace With text box, type `I&nfo`, and click the *Replace All* button and then the *Close* button. Save the file, exit Write, and restart File Manager. From now on, <Alt>N will bring up the Info menu.

If you prefer, you could simply change the entire name of the Info menu. When you search for `&Info` in Write, you can replace it with any name you want, as long as you use exactly the same number of characters—for example, `D&ata`.

Now if, like me, you use Norton Desktop for Windows' File Manager, you'll find making alterations is even easier. Just select *Configure*•*Edit Menus*, and in the Menu list box, click on *Info*, then click the *Edit* button. In the Edit Menu Item Text dialog box, type `I&nfo`, click *OK* twice, and you're finished. And as in the Windows File Manager, you can change the name of the menu altogether, although in Norton Desktop for Windows, the new menu name is

not required to have the same number of characters as the original.

File Manager Old and New

Q In "75 Windows and DOS Speedup Tips" in the January issue, you show a picture of the File Manager indicating free space on the drive in megabytes, instead of kilobytes. How can I get my File Manager to do this?
Shawn Kevin Doyle, Fresno, California

A You can't—at least not with the File Manager that ships with Windows 3.1. What you're looking at is actually a picture of Windows for Workgroups, which added this nifty feature to its version of the File Manager. Even handier, the Windows for Workgroups File Manager also allows you to display a customizable icon bar.

Although this new File Manager is capable of running under Windows 3.1 (you would simply back up your Windows 3.1 WINFILE.EXE file and copy the Windows for Workgroups WINFILE.EXE to your Windows directory and the file COMMCTRL.DLL to Windows' \SYSTEM subdirectory), it's illegal to install it in Windows 3.1 unless you own Windows for Workgroups.

Of course, if you really want the new File Manager, you can always buy Windows for Workgroups (a \$99.95 upgrade). But if you're not on a network, it's probably not worth your making the investment. Rest assured, though, that the File Manager in your next Windows upgrade will look very similar to the one that's now included with Windows for Workgroups.

By Scott Dunn

Scott Dunn is coauthor of 101 Windows Tips (Peachpit Press, Berkeley, California, 1992) and a contributing editor for PC World.

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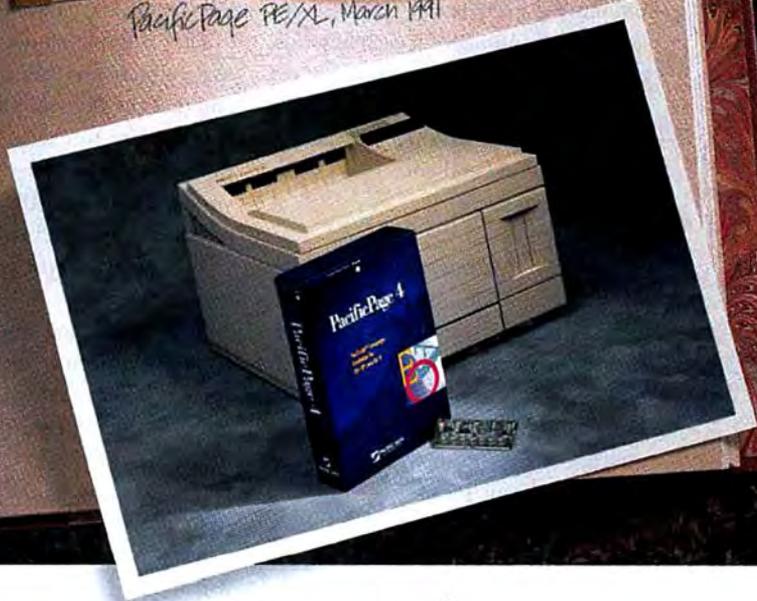
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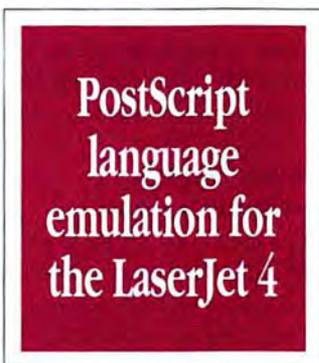
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DATA MANAGEMENT Q & A

Automatic ID Numbers in Paradox for Windows

Q I'm using Paradox for Windows to manage sales information for my business. My CUSTOMER table has a numeric ID field which needs to be unique for each entry. Can Paradox assign a new number for each new customer record automatically? Also, my customer numbers, all integers, show up with two needless decimal places. How do I get rid of them?

Mike Green, Chicago

A Paradox for Windows doesn't have a convenient auto-numbering feature, but that needn't stop you. The trick is to design a form for your CUSTOMER table (or use an existing one) and add a button for creating a new record. Then attach a *method* to the button so that when you click it, Paradox will calculate the next number and enter it into a new record. Here's how:

Open a new form for your CUSTOMER table (or go to an existing one and press <F8>) to enter design mode. Make sure you have an open spot where you can place the button. Then use the Button tool to place a new button on your form. With the new button

selected, right-click to bring up its Properties menu and choose  *Methods*. In the resulting box's Built-in Methods section, double-click on *pushButton*. This command will open an Editor window, where you should enter the commands in **FIGURE 1**.

The example shown here assumes that your table is called CUSTOMER and that the field in question is called ID. Be sure to change the names to those appropriate for your table when you type the code. If your field name contains spaces, substitute an underscore (_) for each space on the 'value = newnum' line.

Once the method is entered, click the *Check Syntax* icon or select *Language • Check Syntax*. If any  errors are found, Paradox will display a message in the lower left corner of the Editor window below the scroll bar. Assuming there are no errors, close the window to return to the Form Design window.

Before you test the new button, don't forget to change its label. Just double-click on the default, LABEL, and edit it. You may want to adjust the button's size when you're finished.

While you're still in the Design window, you can change the way your ID numbers are displayed. Select the ID field object, right-click on it, and choose *Format • Number • Format • General*. When you're ready to test your work, press <F8> to leave design mode, then click the button to add a new record.

Floating Dollar Signs and Commas in Paradox

Q I used your tip for printing dollar signs and currency values together in Paradox for DOS reports ["Floating Dollar Signs in Paradox," February 1993]. It worked as described, but it had a side effect: The commas that were there before disappeared when I used your calculated field. Can I have both commas and floating dollar signs?

Warren F. Ponemon, Brooklyn, New York

A You're right—I overlooked the comma separators last time. To add commas, while you are designing your report select *Field • CalcEdit* to edit an existing calculated field or *Field • Place • Calculated* to create a new one. Enter the expression `FORMAT("ESC,W10.2", [amount])`, using the name of your currency or number field for *amount*. You can adjust the numbers after the *W*, if needed, to show larger numbers.

Counting Records in dBASE IV

Q To assist in course-load scheduling for my university department, I create a dBASE IV file in which each record has a student ID and a course number. After entering the data, I sort the file according to course number and print the resulting list, then count the number of times each course number is repeated to determine how many students are enrolled in it.

Right now, I input the student ID for each course a student takes; I'd prefer to enter each ID just once, then type that student's course numbers. Also, is there a better way to count students in each course?

William F. Girouard, South Pasadena, California

A To speed data entry, select *Tools • Settings • Carry* from the dBASE IV main menu, then press <Enter> to turn the setting ON. Every time you create a new record, the values will carry over from the last one. You will need to enter a new student ID only when you change students.

If you change your report layout you can get dBASE IV to do the counting for you. First, open the report layout and select *Bands • Add a group band • Field value* and your course-number field. You will see group band lines appear above and below the detail band (where your data fields are) in the layout. Next, move the cursor to the line below the bottom group line and choose *Fields • Add field*. In the resulting dialog box's SUMMARY section,

```
method pushButton(var eventInfo Event)
var
    newnum Number
    tbl Table
endvar

action(DataBeginEdit)
action(DataInsertRecord)
doDefault

tbl.attach("Customer")
newnum = tbl.cMax("ID") + 1
ID.value = newnum
action(DataPostRecord)

endmethod
```

FIGURE 1: INCREMENT A FIELD VALUE with this Paradox for Windows method.

highlight *Count* and press <Enter>. dBASE IV will open a dialog box that you can use to customize the summary field. At this point, press <Ctrl>-<End> to place the new count field in the report layout. To add a description, type something appropriate next to the new field.

But before you print the report, make sure your data is indexed by course number just as you have been doing. Otherwise, you won't always get correct totals.

Trimming dBASE IV

Q dBASE IV 1.1 occupies almost 4MB of my 40MB hard disk, cramping my space. I use dBASE only as a card file for maintaining addresses, telephone numbers, and other information related to personal and business contacts. I never do any sophisticated data management, nor do I touch the dot prompt. Under these circumstances, can I delete some of the files in my dBASE directory and regain some disk space? Or, if this isn't possible, is there a smaller database program I could use?

S. Shapiro, Zurich, Switzerland

A If your dBASE directory has subdirectories called DBTUTOR, SAMPLES, and SQLHOME, go ahead and erase them. That will free close to a megabyte. You can also erase the files DBCACHE.EXE, DBCINT.EXE, DBLINK.EXE, DBSETUP.EXE, DOCUMENT.GEN, DRIVERS.EXE, EXPOVL, EXT.OVL, INSTALL.EXE, MENU.GEN, PROTECT.OVL, and QUICKAPP.GEN to free more space. If you don't use ChartMaster to convert dBASE II files, erase CHRMTSTR.DBO and DCONVERT.EXE. Also, if you never use Help, you can get rid of all the files with the HLP file extension (although you might regret it if you get stuck later on). Deleting all this will free another megabyte.

There are many smaller, simpler data managers that would probably meet your needs. The cheapest I've seen is MySoftware's MyDataBase, which takes less than half a megabyte of disk space and lists for \$24.95. MyDataBase doesn't read dBASE files directly, so you'll have to translate.

RKS Software's Data Master is slightly larger, but will read your dBASE files direct-

ly. It's shareware, costs \$39, and takes less than 750K of disk space, including documentation and a sample file. Data Master is available as DMASTE.ZIP on PC World Online and other on-line services.

• **Data Master** \$39, RKS Software Inc.; 703/534-1726.

Reader service no. 643

• **MyDataBase** \$24.95, MySoftware Co.; 415/325-9383, 415/325-3106 (fax).

Reader service no. 644

By Celeste Robinson

Celeste Robinson is a contributing editor for PC World and the author of 'The Paradox 4.0 Handbook (Bantam Computer Books, New York, 1992).

• *Mail your questions to Data Management, PC World, 501 Second St. #600, San Francisco, CA 94107; or send them electronically to the Data Management forum on PC World Online (see page 10 for more information); MCI Mail, 179-3813; or 415/442-1891 (fax). PC World pays \$50 for published questions. Sorry, we cannot acknowledge unpublished materials.* ■

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Circle 191 on reader service card

PUBLISHING & PRESENTATIONS MAKEOVER

Fliers on the Fly

Fliers are an inexpensive and handy way to let customers and prospects know about products or services. However, it's easy to cram so much into a flier that the message gets lost.

This month we selected a flier produced by Jackson Insurance Agency of Birmingham, Alabama, an independent firm specializing in property and casualty insurance. The company sends 2700 such pieces annually in correspondence to prospects and clients.

The original flier shown here, produced in PageMaker for the Macintosh 1.0 and copied on a standard copier on pink 24-pound bond, is a three-panel brochure and includes a list of benefits and a tear-off return card. The Times Roman font is easy to read and the tri-fold fits into a standard envelope, but the flier's purpose is not at all clear. The blind headline ("Give This To A Friend") doesn't set out what is being offered. And while the pink paper makes the flier easier to notice in a stack of white paper, it also connotes a low-budget product. The elements on the front panel—the title, the subhead in hard-to-read ragged-left italic, and the shaded box surrounded by a border—are crowded against one another, and the bullet list on the second panel contains too much information.

Rethinking the Pitch

We sought to make the piece more effective without adding cost by changing it from a brochure into an advertisement that includes a call to respond.

We began by reorganizing the information and creating a bolder headline that clearly announces what the flier is selling: home owner's insurance. While we retained the easy-to-read Times Roman font throughout as well as the three-panel format of the original, we switched to a horizontal design to make more room for a new headline. Set at 84 points, the new headline occupies the entire top panel; the original headline becomes a subhead set in 18-point

italic, set off with a hairline rule.

The original graphic lends a feeling of homeyness. We made it prominent by placing it in the center of the flier and increasing its size. We enhanced it by stretching it vertically by 10 percent and enlarging the entire image 20 percent, being careful not to change its proportions during enlargement. We also eliminated the background screen for greater contrast.

While the bullet list's 11-point type in the original is easy to read, the copy contains nonspecific material. By retaining only the important material and putting it in paragraph form, we were able to make space for the company's logo, which we took from its business card. We also put the logo and the company address on both panels.

The Call to Respond

To encourage prospects to respond, we added a half-point cut line setting off the bottom panel from the rest of the flier. A 14-point heading tells the prospect to return the form, and the new design allows more room for comments.

Finally, we copied the flier on white paper—which usually costs less than colored paper.

By David Brickley and Bronwyn Fryer

The redesign was performed by David Brickley, a designer based in Moss Beach, California. Bronwyn Fryer is an associate editor for PC World.

• Mail your business document and presentation make-over candidates (slides from presentations are welcomed), preferably clean and unfolded, to Publishing & Presentations, PC World, 501 Second St. #600, San Francisco, CA 94107. Got questions on a tough publishing or presentations problem? Mail them to us at the above address, or send them electronically to the Publishing & Presentations forum on PC World Online (see page 10 for more information); or 415/442-1891 (fax). We pay \$200 for each accepted redesign submission. Sorry, we cannot acknowledge unpublished materials.

1 We changed the layout of the original to three horizontal panels rather than three vertical ones, using the entire top third for a new headline.

2 We replaced the original's unclear "Give This To A Friend" with a strong, provocative headline set in 84-point Times Roman, retaining the original headline as a subhead set in 18-point italic and eliminating the difficult-to-read ragged-left subhead from the original.

3 The graphic of the house in the original document, taken from Volume V of the MacMatbook clip art collection, communicates warmth. To give the house more prominence, we eliminated the 10 percent background screen and the three-line border and placed the graphic in the center panel. We also stretched the image to make it 10 percent taller, then enlarged the repositioned image by 20 percent.

4 The original document lacks any clear identifier that explains who sponsors it. We scanned in the logo from the company's business card, reduced it 15 percent, and placed it beneath the body copy. On the reply coupon, the firm's address appears in the business card size. The logo appears here as black only because the flier is a one-color piece.

5 The half-point dashed line is a signal to the customer to fill out the form, detach it, and return it to the agency. We also added clearer instructions, set here in 14-point roman and justified, telling the customer what to do with the coupon. We reorganized the fill-in-the-blank vertical format of the original to place items in the lower left and upper right corners, giving more prominence to the instructions and the company logo.

AFTER

1

2

Someone you know needs better home owner's insurance.



3

4

5

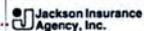
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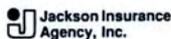


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 Address: _____
 City and zip: _____
 Telephone: _____
 Home owner's renewal date: _____
 Amount of coverage: _____

Year home was built: _____
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 Any security alarms? _____
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COMMUNICATIONS Q & A

Zen and the Art of COM Ports

Q I recently bought a 9600-bps internal modem. Since my mouse is connected to COM port 1, I set my modem to be at COM4 at the suggestion of the modem installation manual. But the Terminal in Windows reports the modem at COM3. Some of my communications programs think the modem's at COM3, and others report it at COM4. I don't have any hardware set to COM3. What's going on?

Hao-yung Chen, Ridgewood, New York

A Many users have trouble getting certain communications packages to work under Windows, because Windows and the communications software have conflicting notions about where communications ports 3 and 4 are located. The software assumes that COM3 and COM4 are at different spots in memory and use different interrupts (IRQs) than Windows does. This confu-

sion may not happen when you set up your modem and software for COM1 or COM2; these ports are standardized in PCs, while COM3 and COM4 are left open to interpretation by vendors.

The case of mistaken identity may have any of a number of causes. Your internal modem may be configured incorrectly, or your communications software may be configured incorrectly for the ports. And heaven only knows why your vendor recommended that you install the modem on COM4.

You can send messages to the Clinton administration at the White House via MCI Mail, CompuServe, and Internet.

You can reestablish order in your system by first reinstalling your internal modem to occupy either COM2 or COM3. Use COM3 only if you have something else installed on COM2. Also, you need to make sure that there are no gaps in your communications port sequence; for example, if you have

devices installed on COM2 and COM4 but leave COM3 empty, you'll run into difficulties. Here's why: When you boot up the PC, its BIOS searches the system for communications ports. If there are zeros in the spot where COM3's address should be, but there is no COM3, the BIOS may very well fill COM3's slot with COM4's address.

If you put the modem on COM3 or COM4, you'll probably need to set the jumpers on the modem to use the proper IRQs. Your modem's manual should tell you how.

COM1 is standardized to use IRQ 4, and COM2 to use IRQ 3. Though COM3 typically shares IRQ4 with COM1, and COM4 typically shares IRQ3 with COM2, you can set COM3 or COM4 to IRQ3, IRQ4, or—if your PC lacks a second printer port or a network card, either of which may already be using that interrupt—IRQ5. Most modem cards cannot be installed to use an IRQ higher than 5.

To find out which IRQs are currently being used by your communications ports, you can use a handy shareware program called CKCOMIRQ. It's \$10 from Belkin Components; 310/898-1100. Or look for CKCOMIRQ.ZIP featured in the July folder on PC World Online.

Once you've accomplished the repairs, you need to check to make sure that Windows has its communications port settings straight. Head to the Control Panel in Windows' Main Program Group. Double-click on Ports, then on the appropriate COM port. Under the Advanced settings, you'll find the address and interrupt settings. Type in the ones your modem is using or select them from the drop-down lists. You will find the address in your modem's manual.

Next, go to the appropriate setup screens in each of your communications programs and make sure each program is using the same address and interrupt

for the COM port. Ideally, all Windows communications programs should take their COM port settings from Windows, but not all programs are so well behaved. Be sure to check the settings in all your DOS communications programs, too.

E-Mailing the White House

Q Is there a way to send E-mail to President Clinton?

Gerry Marino, North Reading, Massachusetts

A Yes, but if you get any reply, it will probably come via U.S. mail rather than E-mail because the White House communications staff is still orienting itself to the technology. You can contact the Clinton administration on CompuServe at 75300,3115. You can also send messages to the White House on MCI Mail by addressing them to White House. To send mail to the White House over Internet, address it to 75300,3115@compuserve.com or 589-5485@mcimail.com.

Additionally, MCI Mail offers bulletin boards on which the White House posts news releases about economic, foreign, and social issues, plus copies of speeches. Type **VIEW WHITE HOUSE** at the main prompt. The service costs \$18 per hour, in addition to the \$45 yearly fee.

By Judy Heim

Judy Heim is a contributing editor for PC World and the editor of Online Investor, a newsletter about using on-line services to track and manage investments.

• Mail your communications questions to Communications Q&A, PC World, 501 Second St. #600, San Francisco, CA 94107; or send them electronically to the Communications forum on PC World Online (see page 10 for more information); CompuServe, 75300,713; MCI Mail, 312-7737; GENIE, JUDY.HEIM; Internet, 3127737@mcimail.com; or 415/442-1891 (fax). PC World pays \$50 for published questions. Sorry, we cannot acknowledge unpublished materials.

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HARDWARE Q & A

Bumping Up RAM

Q When I bought my 486 clone, the vendor told me it would hold 32MB of RAM. It came with 2MB standard. Now that I want to add some memory, the company says I need to get rid of my eight current memory modules before I can add any more. This sounds to me like an expensive waste, or even worse, a scam.

Lorraine Mantos, Hopland, California

A It may be a waste, but no one's trying to pull the wool over your eyes. Very likely your system uses 9-bit single in-line memory modules (SIMMs), minimemory boards, about the size of a stick of chewing gum, that plug into sockets on the system board. The 9-bit variety comes in three densities: 256K, 1MB, and 4MB. Most machines have no more than eight SIMM sockets, so if your system came with 2MB in eight 256K SIMMs, you have no room left to add any more.

Instead, you have to chuck the original 256K SIMMs and add at least four 1MB or four 4MB SIMMs. Why four? A 32-bit chip such as a 486 must address a complete 32-bit memory bank, and it takes four 9-bit SIMMs to make up one bank (the extra bit in each SIMM is for parity checking, an automatic test PCs perform to catch memory errors). Your next step up, then, is 4MB in 1MB SIMMs. Some systems let you keep four of the 256K SIMMs

for a 5MB configuration. Your next increment above that would be 8MB in 1MB SIMMs. Go beyond that, and you'll need to get rid of the 1MB SIMMs in favor of 4MB ones. As you can see, buying the system with 4MB would have been less wasteful—you would have had room for up to 8MB without getting rid of anything.

Another option would be to buy the machine with no system RAM at all; if you buy by mail or through a superstore, 9-bit SIMMs generally cost only \$35 to \$45 per megabyte. Be sure to check your system manual or call your manufacturer's tech support line to find out the proper speed rating for your system's memory. The three most common speeds are 60, 70, and 80 nanoseconds (ns); although you get no additional benefit, you can use faster SIMMs—just don't pay any more for them.

Power to Spare

Q I plan to add a second hard disk and interface board to my 386. If I do, I'll have filled every slot and drive bay in my system. Will this put a strain on my power supply?

Steve Applegate, St. Paul

A The majority of today's full-size desktop systems come with power supplies rated at 190 watts or more—plenty of juice for almost anything. Smaller systems generally have smaller power supplies, but they also have less

room for boards and drives, so you seldom have to worry. There are exceptions, however, such as the original IBM PC and the PS/2 Model 50, both of which are notoriously underpowered. Inexpensive tower systems with a huge capacity for peripherals can also pose a problem: They may have room for gigabytes of storage and a full deck of cards, but the power supply will shut itself

down before you ever get that far.

If you think you might be stuck with a wimpy power supply, here's how to get a reasonable idea of what it can take. First you need to understand that every PC's power supply is effectively two power supplies in one: a 12-volt supply for the drives only, and a 5-volt supply for the system board, memory, expansion boards, and drives (nearly all desktop drives draw both 5-volt and 12-volt power).

To take a classic example, the 192-watt power supply for the IBM AT delivers 7.3 amps at 12 volts and 19.8 amps at 5 volts. Check your system manual to find your own power supply's 5-volt and 12-volt capacities in amps (the specs are usually found in an appendix). Write those numbers down.

Now let's start with the conspicuous consumers—hard disks. When you turn on your system, the hard disk spins up for 10 seconds and consumes much more power than it draws continuously. I've seen full-height drives that jump from 25 to 65 watts. That's one reason most power supplies are designed to deliver 50 percent more current than their rated capacity for at least 20 seconds. Whether that's enough to feed your hungry hard disk at startup is the key power question.

In the table at left, you'll find rough power consumption estimates for various size hard disks, along with estimates for the system board, memory, expansion boards, and a floppy drive (remember only one floppy drive operates at a time). These averages tend toward the high side. For a more accurate rating, call the manufacturers of your own components or check their specs in the manuals. I've included the IBM AT's power specs for reference; remember to multiply your own supply's specs by 1.5 to figure the peak power capacity.

As you can see, stuffing more than two 5¼-inch hard disks into a system with an AT-size power supply is a bad idea—you'd be way over the limit on 12-volt power at startup. However, even

Power Consumption

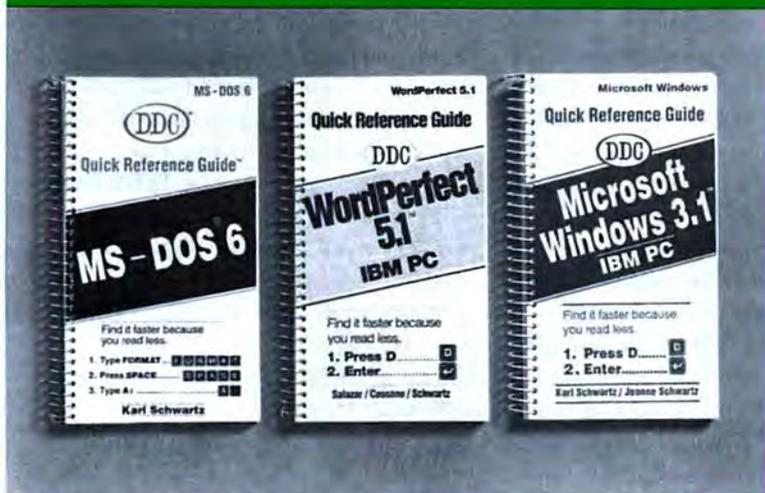
Components	Amps used	
	12V*	5V**
System board	n/a	4.5
Average expansion board	n/a	0.8
1MB RAM	n/a	0.3
Full-height 5¼-inch hard disk	4.5 (peak)	1.9 (peak)
Half-height 5¼-inch hard disk	4.5 (peak)	1 (peak)
Half-height 3½-inch hard disk	2.5 (peak)	0.75 (peak)
Floppy drive	0.6 (peak)	0.35 (peak)

*IBM AT power supply capacity: 7.3 amps continuous, 11 amps peak

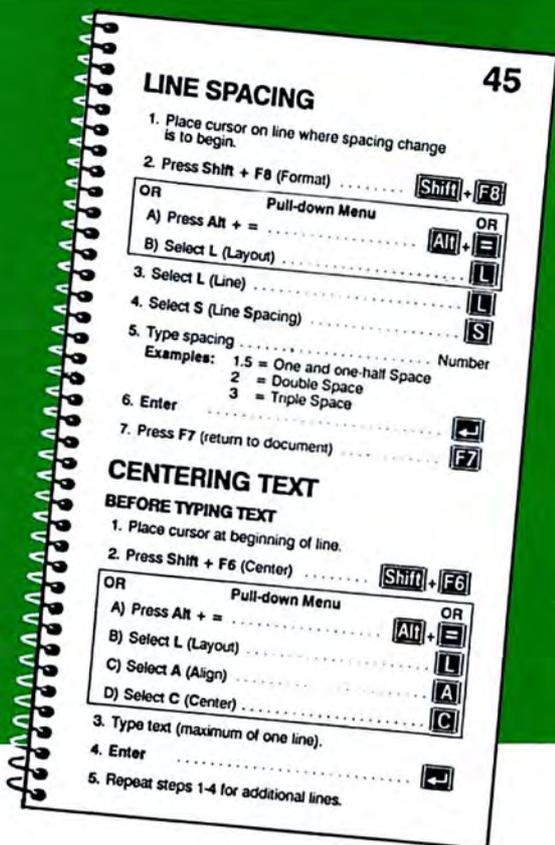
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_____ DOS 6R-18	_____ Quicken for WindowsC-18	_____ UNIX.....U-17
_____ Harvard Graphics for Windows..HG-17	_____ Word for Windows.....WN-17	_____ WordPerfect 5.0W-5.0
_____ Lotus 1-2-3 (Ver. 2.3)L-18	_____ WordPerfect 5.1W-5.1	_____ WordPerfect for WindowsZ-17
_____ Lotus 1-2-3 (Ver. 2.4)K-18		
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with 16MB of RAM (4.8 amps), eight expansion boards (6.4 amps), three half-height 5¼-inch hard disks (3.0 amps), and a floppy drive (.35 amps), you'd still be slightly under the 5-volt-continuous power ceiling.

Many power supplies can continue to function even when you push them over 50 percent at startup every day. But just like the dray horse with too heavy a load, a maxed-out power supply won't last very long. If your calculations indicate possible trouble, check out the question below.

Quiet Please

Q The noisy fan in my system is driving me crazy. Can I get a quiet replacement?
Richard Prime, San Francisco

A Most fans are part and parcel of the power supply, so in order to get a new fan, you'll likely need a new power supply. Quiet power supplies have variable-speed, thermostatically controlled fans. Unless the supply approaches its capacity, it runs cool and the fan spins down to a barely perceptible whir. PC Power & Cooling (800/722-

6555) sells a wide selection of quality replacement power supplies, which you can barely hear under most circumstances. The \$129 Silencer 220 is a particularly popular model, offering 220 watts of power for AT-size systems.

Changing a power supply is almost as easy as changing a tire. The key is keeping track of where your current power supply's connectors plug in, particularly the ones that hook up to the system board (usually labeled P8 and P9). Reverse these and you can kiss your system board goodbye. The other power connectors fuel your drives, and although it doesn't really matter which connector goes to which drive, you may want to write down the original locations anyway, so things don't get in a tangle.

In most AT-type systems, the power supply is an unpainted metal box the size of half a loaf of bread. Unplug your system before you do anything, and heed those ominous warnings about opening up the power supply—even without current, the charged capacitor inside can kill you. On the back of your system you'll see four

screws a few inches around the fan. Remove them. (In systems where the power supply overhangs the system board, hold on to the power supply as you unscrew so it doesn't come crashing down.) Slide the power supply away from the back of the chassis and lift it out. Slip in the new one, replace the screws, and carefully plug those power connectors in the right places. Some power supplies, particularly those in small-footprint systems, are shaped and attached differently. But as long as you have the right replacement unit, you'll figure it out.

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 10 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. ■

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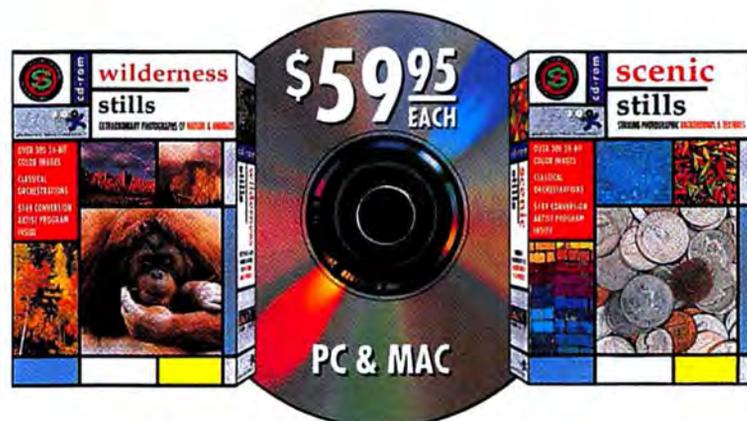
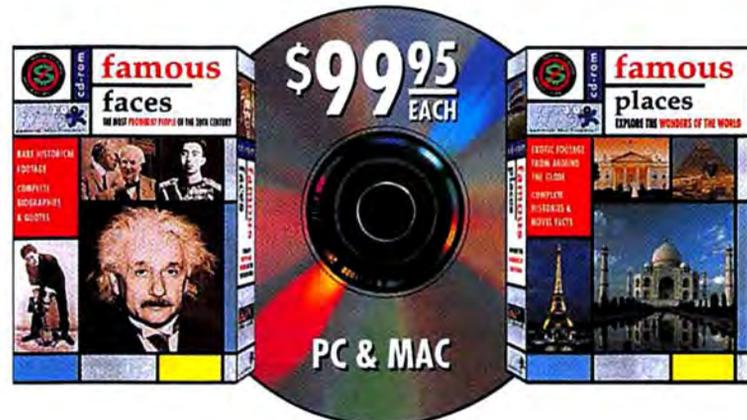
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STAR-DOT-STAR TIPS

A File by Any Other Name

Have you ever forgotten whether a drive letter referred to something on your local hard disk or on the network server? Or whether your print jobs would go to your local printer or to one on the network? There's a useful, undocumented DOS command that will remind you. DOS's TRUENAME command, when given a directory, file specification, or device as a command-line argument, tells you the item's true location. For instance, if your AUTOEXEC.BAT file uses the command SUBST D: C:\DOS to let your DOS directory masquerade as drive D:, entering TRUENAME D: at the DOS prompt will return the original location: C:\DOS.

Even better is the way TRUENAME treats network devices. On my IBM LAN workstation, if I issue the command TRUENAME Z:, I get \\BS813SRV\IBMLAN\$, which is the server name and path assigned to that letter. This command also works for network printers: If I need to know the name of the print server, queue, and printer I've redirected LPT1 output to, I can use TRUENAME LPT1, and DOS responds with D:\PRTBSPR4\RMT107\LPT1.

Allen Jackson, Kennesaw, Georgia

```
ALL.BAT
@ECHO OFF
IF "%DRLIST%"=="*" SET DRLIST=CDEFGHIJKLMNOPQRSTUVWXYZ
FOR %D IN (%DRLIST%) DO ALL2 %D
```

```
ALL2.BAT
@ECHO OFF
ECHO Drive %1:
COMMAND /F /C TRUENAME %1: | FIND "\*"
IF "%DRLIST%"=="Z" GOTO DONE
FOR %C IN (%DRLIST%) DO SET DRLIST=%C
ALL
:DONE
SET DRLIST=
```

FIGURE 1: TO SEE THE REAL NAMES OF YOUR DRIVES, run ALL.BAT. ALL2.BAT must be present for ALL.BAT to work.

Editor's note: The TRUENAME command was present in DOS 4.01 and remains in all later versions through DOS 6.0, but it's a reserved command, meaning its function and use may change. Besides helping you determine where files are actually stored, TRUENAME is also much quicker than most network utilities at telling you where drives and devices are mapped, and it's ideal if you're exploring an unfamiliar system.

Only two caveats: Though TRUENAME will always detect a networked drive or printer if you're using IBM PC LAN Program, LANtastic, or most other NETBIOS-based networks, it won't detect a redirected drive letter in Windows for Workgroups. And if you're using Novell NetWare's CAPTURE program to redirect printer output to the server, TRUENAME won't identify the printer's true name.

FIGURE 1 contains two batch files, ALL.BAT and ALL2.BAT, that work together and use TRUENAME to list the mappings and current directories of drive letters C: through Z: (if a drive letter isn't being used, you'll simply be told it's invalid). To see how the batch files work, save them as ASCII text files and type ALL at the DOS prompt. You'll find both of these files in the Featured in July folder on PC World Online.

These batch files use several tricks worth noting: The FOR command in ALL.BAT gets the first letter from the list of drive letters, while the FOR in ALL2.BAT strips the first letter and leaves the rest. In ALL2.BAT, TRUENAME is invoked using COMMAND with the /F switch. This undocumented switch causes an automatic 'Fail' on any critical error that

```
@ECHO OFF
IF %PROMPT%==SPSG GOTO NOWIN
ECHO YOU ARE IN WINDOWS
GOTO END

:NOWIN
ECHO YOU ARE IN DOS
GOTO END

:END
```

FIGURE 2: THIS SAMPLE BATCH FILE runs different commands if you're in Windows than if you're in DOS.

occurs while the subsidiary shell is running. Its use prevents the system from waiting for a response if you get an 'Abort, Retry, Fail?' message (perhaps because you've accessed a drive with an absent removable disk). Finally, the FIND in ALL2.BAT eliminates the extraneous blank lines that TRUENAME generates before and after its output.

Prompt Windows

Brian Deschene's letter [*Star-Dot-Star*, February 1993] showed how batch files can tell if they're running in a DOS shell under Windows. But if you want to know if Windows is running, without typing a special command, there's an even easier way. Create an environment variable called WINPMT that contains a distinctive prompt that tells you you're in Windows. This prompt will automatically replace your regular one when you are. For instance, if you add the command 'SET WINPMT=Running under Windows\$_P\$G' to AUTOEXEC.BAT, your prompt will be normal when running outside of Windows, but will look like this when running in a DOS box:

```
Running under Windows
C:\WP51>
```

Ryan M. Allen, Macon, Georgia

Editor's note: Not only does this trick remind you that you're in Windows, but it can also clue in your batch files. How?

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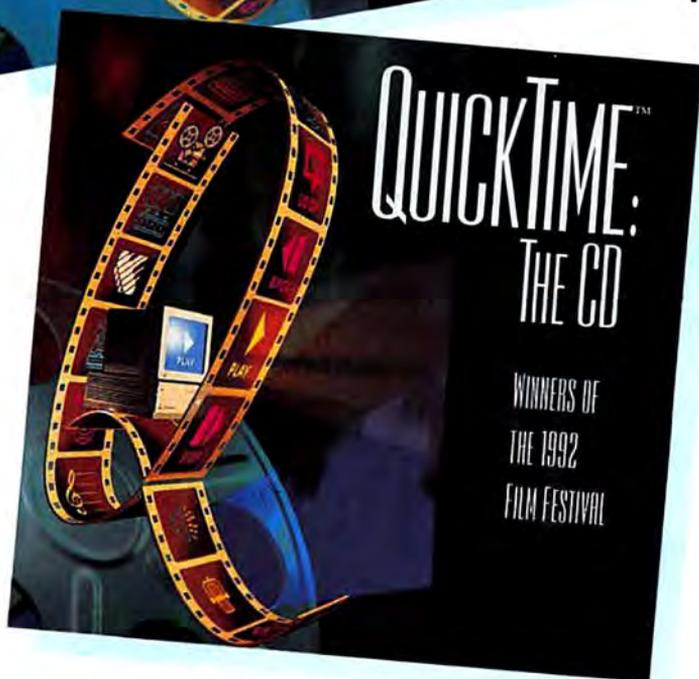


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If you have a WINPMT variable defined when you start a DOS box, Windows temporarily swaps the PROMPT and WINPMT variables. Thus, you can create a batch file that tests the contents of PROMPT, like the example in **FIGURE 2**.

Remember, however, the IF command is case sensitive. If your AUTOEXEC.BAT contains a lowercase \$p\$g as in the command PROMPT=\$p\$g, the \$p\$g in your IF statement must also be lowercase. You'll find this sample batch file as INWIN.BAT in the Featured in July folder on PC World Online.

Ingenious Icons for WinWord

Word for Windows 2.0 lets you customize its tool bar, but—unlike Ami Pro—it doesn't provide you with an obvious way to use any icons other than the 104 that come with the program. Fortunately, a little-known WIN.INI option lets you replace these icons with your own.

First, you must create the new set of icons in strips of 26 each. To replace all the original icons, create four bit-map files named V1TBAR.BMP, V2TBAR.BMP, V3TBAR.BMP, and V4TBAR.BMP in your WINWORD directory. Each file must be a strip 468 pixels wide and 16 pixels high, holding 26 icons of 18 by 16 pixels each.

You can create the BMP files with any bit-map editor. To use Paintbrush, launch the program and select *Options • Image Attributes*. Click the Pels radio button, then set the width and height of the bit map to **468** and **16**, respectively. Click the Colors radio

button and close the dialog box. Select *View • Zoom In* to enlarge the strip of pixels for easy editing. The hardest part is making sure that each icon is exactly 18 pixels wide and that there's no space between the icons—just go slowly and count pixels.

Once you've drawn a few tool bar icons, you're ready to tell WinWord to use them. Make a backup copy of your WIN.INI file (in your WINDOWS directory), then launch WIN.INI to bring it up in Notepad. Go to the '[Microsoft Word 2.0]' section and add the line **LoadToolbarBitmaps=1**.

WinWord will now use the new icons, to which you can assign commands via the *Tools • Options* dialog box. To revert to the original icons, replace the 1 on the WIN.INI line with a 0 (or delete the line altogether). Note that you'll need to restart WinWord before a change to WIN.INI or the icons will take effect.

A. N. Dolbilin, Champaign, Illinois

Editor's note: This is a great way to add icons to WinWord's tool bar, and more colorful icons than those that come with WinWord. However, it'd be a lot of work to create new drawings for every button—and many of the default WinWord buttons are fine as is. Therefore, you may not want to replace all four groups of 26 bit maps.

When I tried this tip, I added the WIN.INI line as instructed, but I created only one file, V4TBAR.BMP. This bit map replaced only the last 26 tool bar icons, which are the least interesting of the lot (they're just capital letters and aren't used by any of the default WinWord tool bar commands).

```
{DISPLAY OFF}
{TEXT}vname-Type variable name: -
Variable {VARIABLE}vname- = "{VARIABLE}{VARIABLE}vname--".{Enter}
```

FIGURE 3: A WORDPERFECT DEBUGGING MACRO, VPEEK.WPM writes a variable's name and value at the current cursor position, letting you see its contents.

```
{DISPLAY OFF}
{TEXT}vname-Enter name of variable: -
{PROMPT}The variable {VARIABLE}vname- contains "
{VARIABLE}{VARIABLE}vname--"
{WAIT}20-
{QUIT}
```

FIGURE 4: VPROMPT.WPM, ANOTHER WORDPERFECT DEBUGGING MACRO, displays a variable's name and value at the bottom of the screen.

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QUATTRO PRO FOR WINDOWS 1.0

Each Quattro Pro for Windows (QPW) file, called a *notebook*, has 256 worksheet pages and one graphs page. QPW's status bar displays the current mode. A *block* is a rectangular group of one or more cells. Notebooks, pages, blocks, graphs, macro buttons (SpeedButtons), and QPW itself are *objects*. Right-click on a selected object to view or modify its properties.

Note: Keys to press are shown here in **boldface**. Keys to press simultaneously are joined by a hyphen. A bullet (•) links menu, option, and button names in a series. *Italic* indicates an entry you must provide.

USING THE SPEEDBAR

SpeedBar buttons expedite common tasks. The standard SpeedBar has Macro and @Functions buttons in Edit and Label modes and special buttons for the graph page. Use **<Alt>-<F12>** • Display/SpeedBar to show or hide SpeedBars.

Button or list box	Task	Keyboard or mouse
	Cut selected block(s) to Clipboard	<Shift>-<Delete> or Edit • Cut
	Copy selected block(s) to Clipboard	<Ctrl>-<Insert> or Edit • Copy
	Paste block(s) from Clipboard	<Shift>-<Insert> or Edit • Paste
	Create macro SpeedButton	Run [FLOATCREATE Button] macro

	Create floating graph (on worksheet page)	Graph • New • OK • Graph • Insert • OK
	Left-align entries in selected block(s)	Right-click block, Alignment • Left, OK
	Center entries in selected block(s)	Right-click block, Alignment • Center, OK
	Right-align entries in selected block(s)	Right-click block, Alignment • Right, OK
	Boldface entries in selected block(s)	Right-click block, Font • Bold, OK
	Italicize entries in selected block(s)	Right-click block, Font • Italics, OK
	Increase/decrease point size of selected block(s)	Right-click block, Font • Point Size, set size, OK
	Show active cell's style or set style of selected block(s)	<Ctrl>-<Shift>-S
	Begin insertion of block(s), rows, columns, or pages	Block • Insert
	Begin deletion of block(s), rows, columns, or pages	Block • Delete
	Set width of each column in selected block to column's widest entry if block is only one row high or to column's widest selected entry	Right-click block, Column Width, Auto Width
	Sort selected block's rows in ascending (upper half)/descending (lower half) order	Data • Sort, set sort key(s), optionally uncheck Ascending box
	Sum contiguous entries left of or above selected cells	Enter @SUM formulas one at a time
	Fill block with series based on seed values in first cell(s) of block's first row/column	Block • Fill (can't concurrently fill column and row or fill with labels)
	Set block to predefined format	<Ctrl>-<Shift>-F

ENTERING AND EDITING CELL DATA

A cell entry is a *label* (text) or a *value* (a number or formula). Values must begin with a number, +, -, \$, %, #, or decimal point. To begin a label with one of these characters, type an alignment character first. To begin a formula with a cell address, block name, or notebook reference, type + first. As you type an entry, it appears on the *input line*. To put the entry into the active cell, press **<Enter>**, click the input line's Check button, or select another cell.

Align label left/center/right	Begin with '/^/'
Fill cell with repeating label	Begin with \
Enter relative cell address	Type it or select cell to reference
Make cell address absolute	<F4> until variation reached
Select @function (status bar displays argument types)	<Alt>-<F3> or @Functions button. Double-click function; or select function, OK
Enter existing block name	<F3> . Double-click name; or select name, OK
Enter date/time value	<Ctrl>-<Shift>-D , type date/time
Add comment after value (not shown in cell)	<Semicolon> comment
Edit active cell (Edit mode)	<F2> or click inactive input line
Go to start/end of input line	<Home>/<End> in Edit mode
Toggle insert/overtyping mode	<Insert>

Erase characters in input line	Select characters, <Delete> or <Backspace> , <Esc> or <Ctrl>-<Backspace> to erase line
Abandon Edit or Label mode	<Ctrl>-<Break> or input line's X button

WORKING WITH BLOCKS

Select block smaller than entire row or column	Select corner, hold <Shift> or <Shift>-<F7> , select opposite corner; or drag from one corner to opposite corner
Select row/column	Click row number/column letter
Select rows/columns	Select first row/column, hold <Shift> or <Shift>-<F7> , select last row/column; or drag from first to last row number/column letter
Select noncontiguous blocks	Select block, hold <Ctrl> , select next block(s)
Select all cells on page	Click intersection of row and column borders
Cut selection to Clipboard	Cut button or <Shift>-<Delete> or Edit • Cut
Copy selection to Clipboard	Copy button or <Ctrl>-<Insert> or Edit • Copy
Paste from Clipboard	Paste button or <Shift>-<Insert> or Edit • Paste
Move selected block	Drag (if more than one cell); or Block • Move, type or select new location, OK; or cut, select new location, paste
Copy selected block	<Ctrl> -drag (if more than one cell); or Block • Copy, type or select new location, OK; or copy, select new location, paste
Copy single entry to block	Copy entry, select target block, paste entry
Fill block(s) with formula(s) in first row(s)/column(s)	Select block(s), SpeedFill button
Erase selected block(s)	<Delete> or Edit • Clear Contents
Erase selected block(s) and reset default properties	Edit • Clear
Insert/delete block shorter than entire column (cells selected/below move down/up)	Select block, Insert/Delete button or Block • Insert/Delete • Rows, Partial • OK

Fold Here

Fold Here

QUATTRO PRO FOR WINDOWS 1.0

WORKING WITH BLOCKS (continued)

Insert/delete block narrower than entire row (unselected cells to right move right/left)	Select block, Insert/Delete button or Block • Insert/Delete, Columns • Partial • OK
Insert/delete row(s)	Select row(s) or cell(s) in row(s), Insert/Delete button or Block • Insert/Delete • Rows, OK
Insert/delete column(s)	Select column(s) or cell(s) in column(s), Insert/Delete button or Block • Insert/Delete, Columns • OK
Name selected block	<Ctrl>-<F3> or Block • Names • Create, type name, OK
Name cell(s) with label(s) in adjacent cell(s)	Select label(s), Block • Names • Labels, select direction from label(s) of cell(s) to name, OK
Go to cell or named block	<F5> or Edit • GoTo . Double-click block name; or type cell address or select block, OK
Set height/width of selected row(s)/column(s)	Drag border below/to right of row number/column letter; or right-click block, Row Height/Column Width, set units, type height/width, OK
Hide/unhide selected row(s)/column(s)	Right-click block, Hide/Reveal • Rows/Columns • Hide/Reveal • OK
Reformat text in left column of selected block to fit block	Block • Reformat

WORKING WITH PAGES (continued)

Insert/delete page(s)	Click tab of page to insert before/delete, <Shift> -click tab of lower page if inserting/deleting more than one, Insert/Delete button or Block • Insert/Delete, Pages • OK
Split page	Drag horizontal/vertical pane splitter
Unsplit page	Drag pane splitter off page or Windows • Panes • Clear

SETTING PAGE PROPERTIES

First select page and open its properties menu by right-clicking its tab or selecting **Property • Active Page**.

Rename page (letter on page tab is default name)	Name, type name, OK
Protect/unprotect page	Protection • Enable/Disable • OK
Set default color for borders	Line Color, select color, OK
Color-code values	Conditional Color • Enable, type values, select colors for Options, OK
Set default label alignment	Label alignment • Left/Right/Center • OK
Display/hide zero values	Display Zeros • Yes/No • OK
Set default column width	Default Width, select units, type width, OK

Fold Here

Replace same string in each entry in selected block	Edit • Search and Replace, type Find and Replace strings, Formula/Value, move dialog box away from selected block, Next • Replace
Fill block(s) with series (Jan, Feb, etc.: see QPW Help Topic "Using SpeedFill")	Select block with label(s) or value(s) in first cell(s), SpeedFill button (using nonseries labels fills block with same labels)
Fill first row and column of block(s) with distinct series	Select block(s) with blank first cell and labels or values in next cell(s) of first row/column, SpeedFill button
Fill selected block with value series	Block • Fill, set Start, Step, Stop, Order, and Series type, OK

WORKING WITH PAGE GROUPS

Consecutive pages can be bound together in one or more named groups. Except for data entered from the input line or erased with <Delete>, changes made to one page in a group in Group mode affect all pages in that group.

Create group	Tools • Define Group, type group name, type first page's name, type last page's name, OK
Delete group	Tools • Define Group, select group, Delete • OK
Turn group mode on/off (blue line appears/disappears under page tabs)	Group button or <Alt>-<F5>
Enter data in same cell in each page in a group	Activate Group mode, type entry in any page in group, <Ctrl>-<Enter>
Delete entries in same block in each page in a group	Select block in any page in group, <Ctrl>-<Delete> or Edit • Clear Contents

WORKING WITH NOTEBOOKS

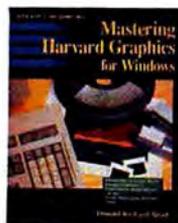
Save positions of open notebooks (graph windows are not saved)	File • Workspace • Save
Open saved workspace	File • Workspace • Restore
Password-protect selected notebook	File • Save As • Protection Password, type password, OK

SETTING NOTEBOOK PROPERTIES

First open a notebook's properties menu by right-clicking its title bar or pressing **<Shift>-<F12>** or selecting **Property • Active Notebook**.

Set zoom percentage	Zoom Factor, type or select percentage, OK
Edit palette color	Palette, select color to change, Edit Color, click new color, OK
Show/hide vertical/horizontal scroll bars and/or page tabs	Display • Vertical Scroll Bar/Horizontal Scroll Bar/Page Tabs • OK
Save as macro library	Macro Library • Yes • OK • File • Save

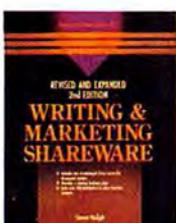
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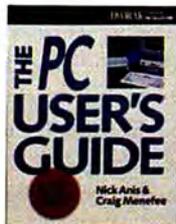
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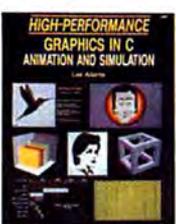
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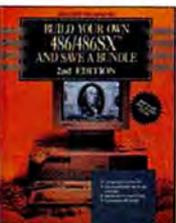
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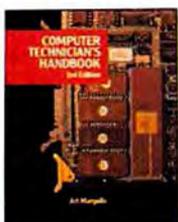
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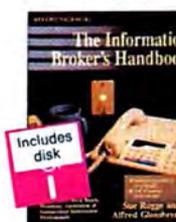
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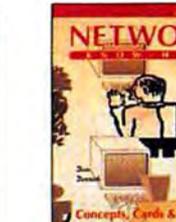
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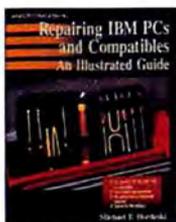
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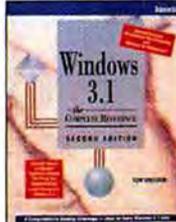
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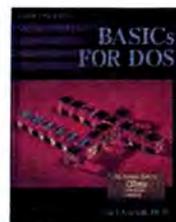
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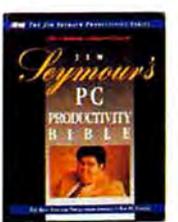
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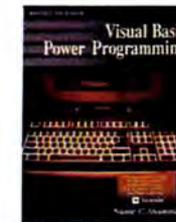
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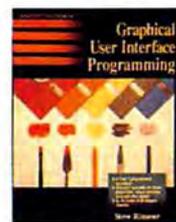
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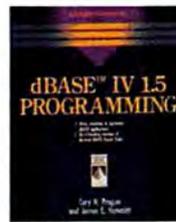
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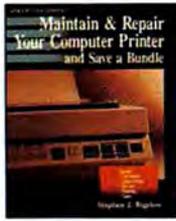
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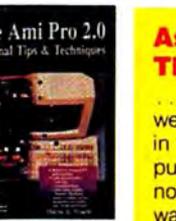
881836P-XX \$29.95
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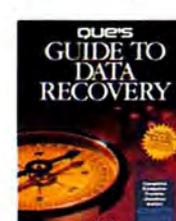
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Twenty-six user-defined icons were plenty for me, and WinWord, unable to find files to replace the other three groups, left them with their original icons.

Watching WordPerfect

WordPerfect 5.1 has a powerful macro language, but the program is short on debugging tools. Among other things, I've always missed the capability to see the contents of memory variables. I therefore wrote two macros that let me do just that.

VPEEK.WPM [shown in **FIGURE 3**] and VPROMPT.WPM [**FIGURE 4**] let you examine the contents of variables after you've run another macro. Both of my macros start out by prompting you for the variable you want displayed. VPEEK then writes the variable's name and contents in the current document. When you use VPROMPT, the macro displays the variable's contents in a prompt at the bottom of the screen.

Brian D. Rogers, Grand Junction, Colorado

Editor's note: When I first tried these macros, I preferred VPROMPT.WPM to VPEEK.WPM, since it didn't actually change the document I was working in. But after I used VPEEK a bit, I found I liked it better—it helped me remember the values I'd obtained in different runs of the macro, so I could see when problems were fixed.

Note that these macros must be created using the WordPerfect macro editor, which



POWER TIP no. 290

Delete Blocks Quickly in WordStar

When you're editing in WordStar, it's a pain to have to block out a deletion when you want to remove, say, the end of a sentence. Get the job done quicker with this power user's trick: Press **<Ctrl>-Q** and tap **<Period>** (or whatever character you want to delete to). Presto! The end of the sentence is gone. But be careful: If you mistakenly specify a character five pages away, you'll delete the five pages. And if you exceed the capacity of your undelete buffer, you'll have to kiss the excessive text good-bye. So save your work frequently while editing.

Rex Farrance
Associate Editor

is invoked by pressing <Home><Ctrl><F10>. In the macro editor, you must insert different types of commands in different ways. To insert a command shown here in boldface, press <Ctrl><Page Up>, select the command from the pop-up list in the upper right corner of the screen, and press <Enter>. For commands that are boldface and underlined, press <Ctrl><V>, then the appropriate key (for example, <Ctrl><V>, then <Enter> for Inter). Type plainly printed text as it appears.

Launch either macro by pressing <Alt><F10>, typing the macro's name, and pressing <Enter>. For easier access, name the macros ALTV and ALTP instead of VPEEK and VPROMPT. That way you'll be able to skip <Alt><F10> and launch the macros by pressing <Alt><V> and <Alt><P>.

Stretching Memory

Big DOS applications run much better when they have more memory. Loading DOS into the High Memory Area with the DOS=HIGH command in CONFIG.SYS helps, but I wanted more.

I found it in a little-known, poorly documented utility that comes with Quarterdeck's QEMM386 and QRAM memory managers. VIDRAM is mentioned only briefly—and confusingly to mere mortals—in a dark corner of the QEMM386 manual and is not installed by QEMM's OPTIMIZE utility.

VIDRAM turns the memory reserved for graphics hardware over to DOS; it miraculously boosts my total conventional memory to 720K—as long as I don't run any programs requiring graphics. VIDRAM can give you extra room too, say for handling big databases, and it will work just as well on a 286 as on a more modern machine. To turn on VIDRAM, use the command **VIDRAM ON** at the DOS prompt or in a batch file. When you want to run a graphics program, enter **VIDRAM OFF** first to bring back your graphics capabilities.

Irving Patel, San Francisco

Editor's note: Quarterdeck's VIDRAM is a marvelous utility. It gives you more conventional memory by letting DOS use up to 96K of otherwise unused RAM reserved for your video display adapter. You don't need to be running QEMM386 or QRAM to use it, and—as Mr. Patel noted—it works on nearly any machine, including one with an

USER GROUP TIP Tighter Screens, More Quicken Data

I like to see a lot of transactions on screen when I'm in Quicken's Register. But because each transaction listed takes up three lines, you can't see very many. Here's how to improve the situation: From the main menu, select **Set Preferences • Screen Settings • Register View** and press **2** to change the default to **Compressed, 1 line per transaction**. Press <Esc> twice to return to the main menu. From now on, the Register will display only the first line of each transaction, except for the transaction you have highlighted, for which it will display all three.

Dwight Randall
Technical and User Groups Network

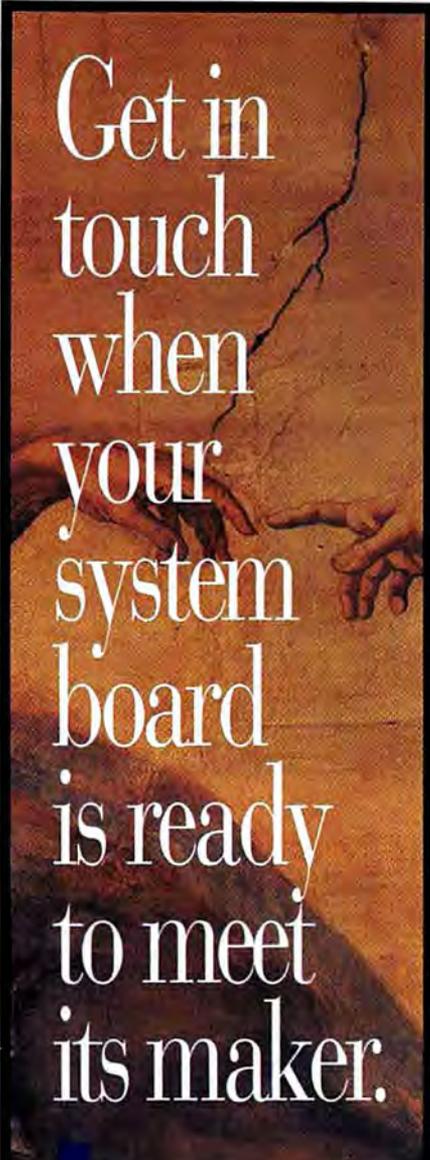
8088. (It works best, however, if you use it with QEMM386's VIDRAMEMS option, which overlays the video card's RAM with faster system board RAM.)

Quarterdeck isn't the only company that provides such a utility, by the way. Helix Software's Netroom memory manager comes with a similar program called STRETCH. And one memory manager, V Communications' Memory Commander, pulls even more tricks to give you up to 920K of conventional RAM—but only on a 386, and only if you don't load much resident software into upper memory.

By Brett Glass

Brett Glass is a contributing editor for PC World.

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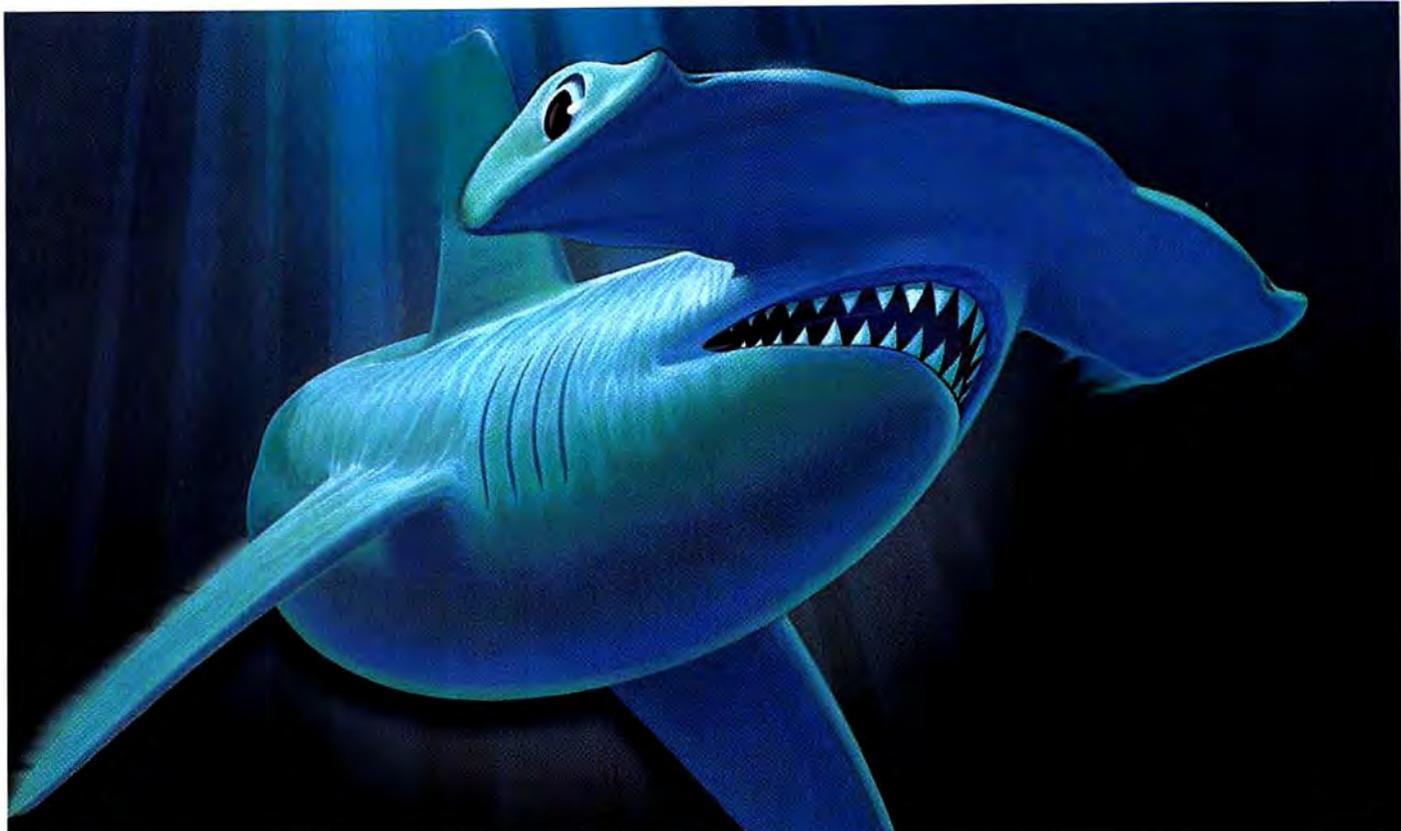
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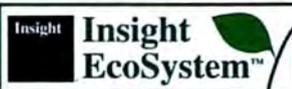


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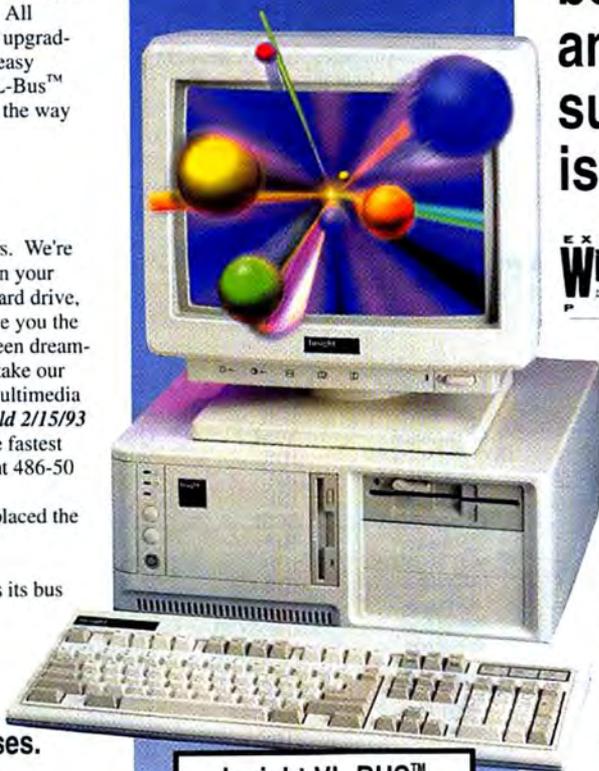
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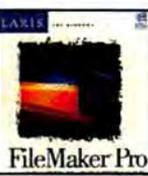
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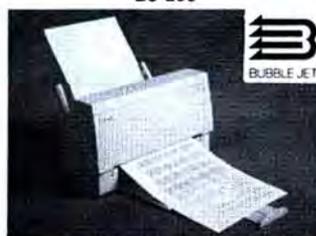
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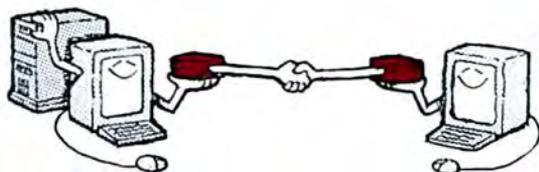
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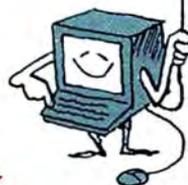
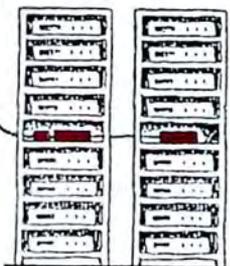
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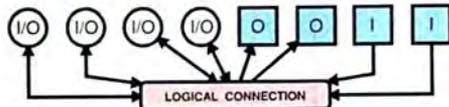
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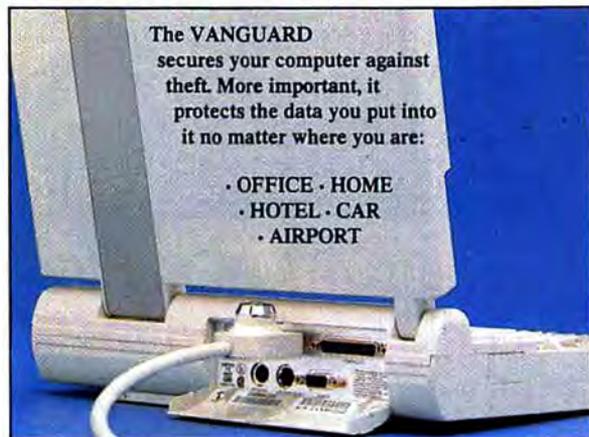
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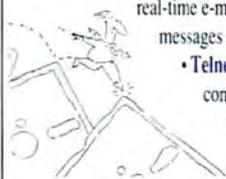
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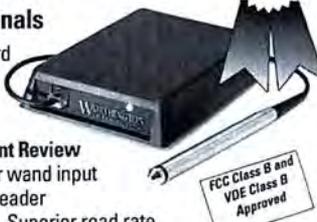
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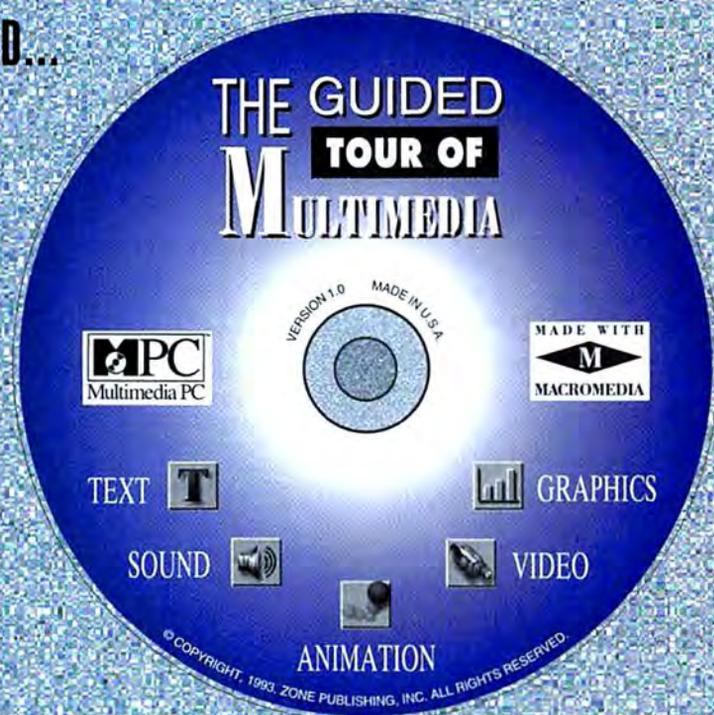
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Sherlock Holmes Whodunits and Rube Goldberg Contraptions

Sherlock Holmes personifies the irresistible power of logic, which may be why computer users find him appealing. If you're intrigued by the notion of using your intelligence (as opposed to your fists or a gun) to fight crime in the foggy streets of nineteenth-century London, the game's afoot, as Holmes liked to say. Two games, in fact—both designed to permit would-be sleuths to match their wits and powers of observation against those of Sir Arthur Conan Doyle's beloved fictional detective.

You'll need a CD ROM drive and a sound board to play Icom's Sherlock Holmes, Consulting Detective Volumes I and II. The reason for the CD media is obvious once you start the game: The clues and background info are found in lengthy full-motion audio-video scenes where Holmes interviews witnesses and experts. If you tried to install all that multimedia data from floppies, you'd be swapping disks for days.

The scenes are professionally acted, and watching them unreel on your PC screen is a painless way to soak up the clues. Unfortunately, playing this game is pretty mechanical, since all you can do is look up a name in Holmes's address book, click on it, and watch passively as Holmes and Watson visit the suspect and ask questions. You can't add any questions, and you can't look for clues on your own.

In fact, unless the scene happens to reveal another name to check up on, you may be reduced to looking up every name in Holmes's little black book, hoping to run across someone who knows something. Moreover, the game isn't smart enough to remember previous interviews; no matter how much you've learned, clicking on a name simply repeats the original scene.

When you think you know who did the dirty deed, you take your case be-

fore a judge, who asks questions about suspects, motives, and opportunities. If you answer correctly, your final score is based on how long it took you to solve the case. There are six cases in all: three in Volume I and three in Volume II.

"Perhaps" Won't Feed the Bulldog

The Lost Files of Sherlock Holmes from Electronic Arts is limited to a single case—a murder that may have been committed by Jack the Ripper. But solving it is a lot more fun than playing Consulting Detective and seems much more like conducting an actual criminal investigation. The Victorian atmosphere of the game is quite convincing, and dialogue is authentically Holmesian, with lines like, "Perhaps" won't feed the bulldog, Doctor—I need facts."

Best of all, Lost Files encourages you to take charge of the investigation, using a well-designed, mouse-driven interface to examine objects and question the people you meet in the course of your inquiries. With a map of London for reference, you travel from your Baker Street digs to various key locations: the apartment of an actress who's been brutally murdered, a perfume shop, the morgue, even a pub (where you can play an exciting game of darts with the locals if you feel like a break from the rigors of your investigation).

You can call upon the services of the Baker Street Irregulars—a bunch of resourceful (if mercenary) street urchins—to conduct background investigations while you pursue your primary researches. You also have a small but well-equipped chemical laboratory at your disposal if you care to analyze the odd flower petal or mysterious white



powder. And if the pressures of the case overwhelm you, you can relax by playing your violin.

Solving the case requires considerable mental agility as well as legwork. In the process, Sherlock Holmes fans get to meet many of their favorite characters, including Sherlock's smarter brother, Mycroft, and the infamous Moriarty. In fact, my only complaint is that the mouse doesn't work on the first screen. Some things, I guess, are meant to remain a mystery.

Cat on a Treadmill

Quick, what do you think of when I say "a cat on a treadmill"?

If the name Rube Goldberg pops into your mind and a big grin crosses your face, do I have a great software toy for you—Sierra's Incredible Machine, inspired by the oddball contraptions in Goldberg's classic cartoons. A typical Goldberg invention might start with a bowling ball falling on a teeter-totter, which would fling a mouse in front of a cat, which would run on a treadmill to catch the mouse, which would reel up a...well, you get the idea.

Of course, Goldberg's fanciful mechanisms never actually worked, except in

Holmes's Baker Street digs in The Lost Files of Sherlock Holmes include a violin and a well-equipped lab.

By Michael Goodwin



INCREDIBLE MACHINE'S ALTERNATE UNIVERSE: Gears turn and balloons rise, but how do you use the bike-riding monkeys?

his imagination. There was no way they could work. Until now.

Incredible Machine lets you choose from among 45 animated parts to create stupendously ridiculous machines—and if you build 'em right, they will actually work! I recently spent an entertaining evening in front of my PC working out which parts did what. Some of them were easy to figure

parts work, you're ready to try the first of 75 challenging puzzles designed to teach you the wacky rules of mechanics in this unlikely universe. Or you can enter a free-form arena, assemble random parts, and see if you can make them do something amusing. Of course, if things should happen to become too dull, you can always try reversing gravity or decreasing air pressure.

out: Obviously, the bowling balls fall and the balloons rise. But it took me a while to figure out that cats could be blown up using 'TNT' and come back to life (at least nine times), or that the plunger to set off the dynamite could also be activated by dropping a basketball on it.

Once you get the hang of how all the

A superb mouse-based, drag-and-drop interface will be familiar to anyone who's used Windows, and super-VGA graphics mean that you're able to see every single one of the little yellow stars that materialize when you hit a bike-riding monkey over the head with a goldfish bowl. You'll even find cool music and zany sound effects. It's a shame that Rube Goldberg isn't around to see Incredible Machine; I hope he's laughing somewhere nearby.

- **Incredible Machine** \$49.95; Sierra On-Line; 800/326-6654
Reader service no. 645
- **The Lost Files of Sherlock Holmes** \$69.95; Electronic Arts; 800/245-4525
Reader service no. 646
- **Sherlock Holmes, Consulting Detective Volumes I and II** \$69.95 per volume; Icom Simulations; 800/877-4266
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Michael Goodwin is a contributing editor for PC World. He can be reached on PC World Online (see page 10 for more information). ■

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The Economics of Ergonomics

I switched to Windows last month and it was a painful transition—figuratively and literally. Not only did I have to learn a bunch of new programs, but I developed a soreness in my right shoulder and hand. My doctor, a DOS diehard, called it *Mousinitis* and recommended cold, rest, and keyboards. So even though I think of myself as an ergonomically correct kinda guy, I realized it was time to take a close look at my office—chairs, desk, keyboards—the works.

I first talked with every professional I knew—the DOS-diehard doctor, a physical therapist, and a chiropractor—and began trying some of the latest ergonomically designed equipment. Being self-employed, I had no trouble convincing my boss the problem was serious. Unfortunately, he can be tight with money. Like many people working at home, I find it easier to shell out a large sum for a bigger hard disk than for intelligent furnishings.

Nevertheless, I resolved to spend some money on my own well-being. With my shoulder and arm throbbing, my highest priority was to resolve the mouse problem. Because my keyboard sits on an articulating arm that doesn't have room for a mouse, my rodent must live on the desk about a foot from the keyboard's spacebar, and four inches higher as well. Every time I reached for the mouse—and with Windows, it's every few minutes—my right arm was unsupported and at a strange angle.

Closer to Thee

My job was to get the mouse nearer to my hands. I tried MicroComputer's Underdesk Mouse Tray, a 10-inch platform that brought the mouse closer to my keyboard. It worked reasonably well, but it still left my mousing wrist and forearm unsupported.

The main problem with mice and

trackballs is arm support, and the best tool I've found for that job is BodyBilt Seating's Linear Tracking Arms, armrests that cradle your arm, moving along with you wherever you go. It's a spectacular design because it doesn't matter if you're typing, mousing, or writing—you're supported. It's an incredible solution, but an expensive one at \$750. My boss, cheap-skate that he is, suggested I use the Underdesk Mouse Tray supported by my existing armrests. I agreed.

Even if you can't afford the tracking arms, do think about a better chair. It's pretty common for a company to keep the office environment up-to-snuff. But at home, most of us sit in whatever's around. I used to plant myself in a dining room chair, which I eventually replaced with an old wooden clunker that wasn't much better. Three years ago, I decided not to scrimp and settled myself in a BodyBilt K-2000, which is designed especially for computer users. It comes with lumbar support, adjustable back height and angle, and adjustable seat height and tilt. It's not cheap—\$700 to \$1200—but I felt a difference within a day.

Sure, I know what you're thinking: \$700 will buy a *really* big hard disk. But when that hard disk is long obsolete, you'll still have the same body. Besides, you can probably find an acceptable chair at a local discounter for about \$200. Just make sure it reclines, is fully adjustable, has good lower back support, and has a seat pan that supports your thighs and keeps them horizontal. Check to see if you can adjust the chair height so that the monitor is about 20 degrees below eye level. And if you have to raise your chair to reach a fixed desk height, consider a footrest to help you sit in the correct position.

One way to avoid repetitive strain injuries is to keep your wrists straight while you type and use the mouse. You



can pick up a rubber pad at any computer store for about \$15. Or, as my physical therapist pointed out, you can simply put a rolled-up towel in front of the keyboard. It's cheap, easy to adjust, and recyclable.

One clever device that solves a multitude of problems is the KB-Pillow, a \$40 wrist support and platform. You place the keyboard on the platform and rest the entire gizmo on your lap, guaranteeing the correct height for you no matter how your chair is adjusted.

If you work in an office, it's usually the company's responsibility to keep your working environment healthy. But at home, the job's up to you.

Contributing Editor Steve Bass is president of the Pasadena IBM Users Group. He can be reached on CompuServe, 71333.310; and on PC World Online (see page 10 for more information).

WHERE TO BUY

BodyBilt \$700–\$1200, Linear Tracking Arms \$750; BodyBilt Seating; 409/693-7000, 409/764-1935 (fax).

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KB-Pillow \$40; Custom Comfort Computing; 800/488-3746, 310/438-8951.

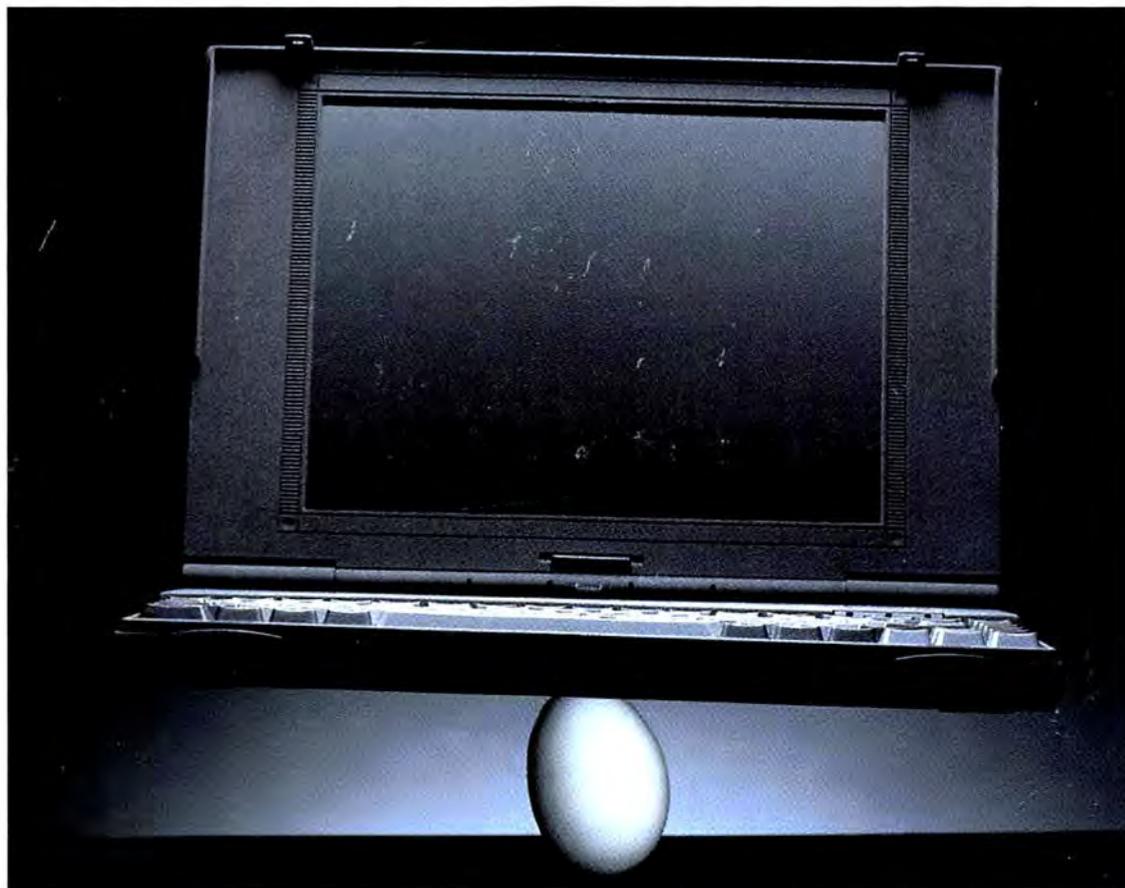
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Underdesk Mouse Tray \$39.95; MicroComputer Accessories; 800/521-8270, 310/645-9400, 310/645-9403 (fax).

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By Steve Bass

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