

# PC WORLD

APRIL 1989 \$2.95 CANADA \$3.95

## 386 POWER AT 286 PRICES

NINE 16-MHz SYSTEMS WITH THE MUSCLE FOR OS/2

### INTEGRATED SOFTWARE

4 Top Packages for  
Under \$300

### LAPTOP ACCESSORIES

Everything You Need  
for the Road

### SPECIAL REPORT: LANGUAGES

- CLARION PERSONAL DEVELOPER
- QUICKBASIC 4.5
- TURBO ASSEMBLER/DEBUGGER
- OBJECT-ORIENTED LANGUAGES





## DOT MATRIX PRINTERS.

Printer System 800: \$699.95  
Our highest resolution text and graphics, 24-pin dot matrix printer. Draft quality at 200 cps. Letter quality at 66 cps. Parallel and serial interfaces. Wide carriage.

Printer System 600: \$499.95  
9-pin dot matrix. Draft quality at 240 cps. Near-letter quality at 60 cps. Parallel interface. Wide carriage.

Printer System 300: \$199.95  
9-pin dot matrix. Draft quality at 144 cps. Near-letter quality at 36 cps. Four standard fonts. Parallel interface. Narrow carriage.

## LASER PRINTERS.



# SO HOW COME YOU NEVER CALL?

## THE DELL SYSTEM 325 25 MHz 386



"The new top-of-the-line Dell System 325 is a flagship worth putting out in front of the fleet."  
February 14, 1989

### STANDARD FEATURES:

- Intel 80386 microprocessor running at 25 MHz.
- Choice of 1 MB or 4 MB of RAM\* expandable to 16 MB using a dedicated high speed 32-bit memory slot.
- Advanced Intel 82385 Cache Memory Controller with 32 KB of high speed static RAM cache.
- Page mode interleaved memory architecture.
- VGA systems include a high performance 16-bit video adapter.
- Socket for 25 MHz Intel 80387 or 25 MHz WEITEK 3167 math coprocessor.
- 5.25" 1.2 MB or 3.5" 1.44 MB diskette drive.
- Dual diskette and hard disk drive controller.
- Enhanced 101-key keyboard.
- 1 parallel and 2 serial ports.
- 200-watt power supply.
- 8 industry standard expansion slots.

### OPTIONS:

- 25 MHz Intel 80387 math coprocessor.
- 25 MHz WEITEK 3167 math coprocessor
- 1 MB or 4 MB RAM upgrade kit.
- 2 MB or 8 MB memory expansion board kit.

\*\*Lease for as low as \$228/Month.

System 325	With Monitor & Adapter			
	VGA Mono		VGA Color Plus	
Hard Disk Drives	1MB	4MB	1MB	4MB
	RAM	RAM	RAM	RAM
90 MB-18 ms ESDI	\$6,299	\$ 7,599	\$6,599	\$ 7,899
150 MB-18 ms ESDI	\$6,799	\$ 8,099	\$7,099	\$ 8,399
322 MB-18 ms ESDI	\$8,799	\$10,099	\$9,099	\$10,399

Disclaimer: All systems are photographed with optional extras, which some computer retailers won't even recognize.

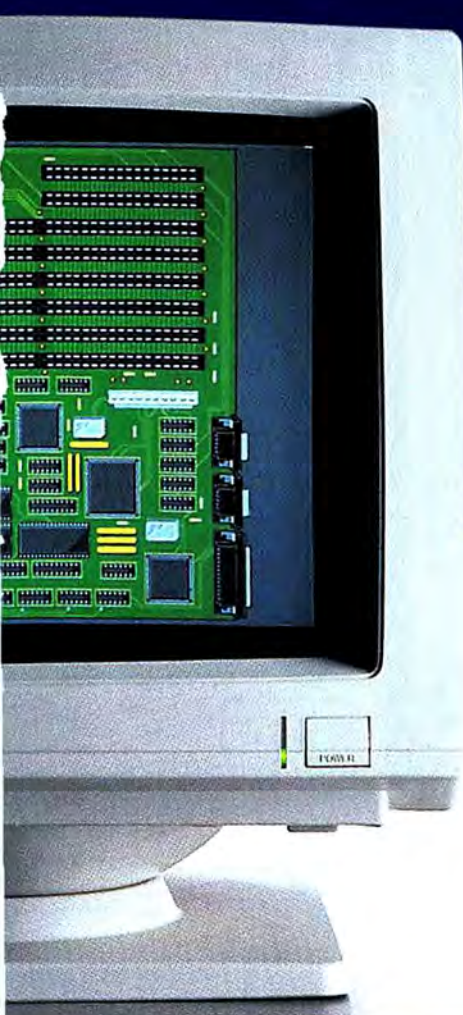




Laser System 150, 15 pages per minute: \$5,995.  
 Laser System 80, 8 pages per minute: \$3,295.  
 Laser System 60, 6 pages per minute: \$2,195.

All Dell laser printers come with 1.5 MBRAM, full-page 300 DPI graphics, and have 31 standard fonts (7 resident and 24 downloadable from diskette).

Dell laser printers also provide Hewlett-Packard LaserJet Plus, Epson/FX, IBM Proprinter and Diablo 630 emulations.



THE DELL SYSTEM 310  
20 MHz 386.

The best combination of performance and value available.

#### STANDARD FEATURES:

- Intel 80386 microprocessor running at 20 MHz.
- Choice of 1 MB or 4 MB of RAM\* expandable to 16 MB using a dedicated high speed 32-bit memory slot.
- Advanced Intel 82385 Cache Memory Controller with 32 KB of high speed static RAM cache.
- Page mode interleaved memory architecture.
- VGA systems include a high performance 16-bit video adapter.
- Socket for 20 MHz Intel 80387 or 20 MHz WEITEK 3167 math coprocessor.
- 5.25" 1.2 MB or 3.5" 1.44 MB diskette drive.
- Dual diskette and hard disk drive controller.
- Enhanced 101-key keyboard.
- 1 parallel and 2 serial ports.
- 200-watt power supply.
- 8 industry standard expansion slots.

#### OPTIONS:

- 20 MHz Intel 80387 math coprocessor.
- 20 MHz WEITEK 3167 math coprocessor.
- 1 MB or 4 MB RAM upgrade kit.
- 2 MB or 8 MB memory expansion board kit.

\*\*Lease for as low as \$141/Month.

System 310	With Monitor & Adapter			
Hard Disk Drives	VGA Mono		VGA Color Plus	
	1MB RAM	4MB RAM	1MB RAM	4MB RAM
40 MB-28 ms	\$3,899	\$5,199	\$4,199	\$5,499
90 MB-18 ms ESDI	\$4,699	\$5,999	\$4,999	\$6,299
150 MB-18 ms ESDI	\$5,199	\$6,499	\$5,499	\$6,799
322 MB-18 ms ESDI	\$7,199	\$8,499	\$7,499	\$8,799



THE DELL SYSTEM 220  
20 MHz 286.

It's fast as most 386 computers. But at less than half the price. The footprint is small, too.

#### STANDARD FEATURES:

- 80286 microprocessor running at 20 MHz.
- 1 MB of RAM\* expandable to 16 MB (8 MB on system board).
- Page mode interleaved memory architecture.
- LIM 4.0 support for memory over 1 MB.
- Integrated diskette and VGA video controller on system board.
- Socket for Intel 80287 math coprocessor.
- One 3.5" 1.44 MB diskette drive.
- Integrated high performance hard disk interface on system board.
- Enhanced 101-key keyboard.
- 1 parallel and 2 serial ports (integrated on system board).
- 3 full-sized industry standard expansion slots available.

#### OPTIONS:

- External 5.25" 1.2 MB diskette drive.
- 3.5" 1.44 MB diskette drive.
- Intel 80287 math coprocessor.
- 1 MB or 4 MB RAM upgrade kit.

\*\*Lease for as low as \$86/Month.

System 220	With Monitor		
Hard Disk Drives	VGA Mono	VGA Color Plus	VGA Color Plus
	One Diskette Drive	One Diskette Drive	One Diskette Drive
40 MB-29 ms	\$2,299	\$2,599	\$2,599
100 MB-29 ms	\$2,999	\$3,299	\$3,299
322 MB-29 ms	\$3,799	\$4,099	\$4,099



THE DELL SYSTEM 200  
12.5 MHz 286.

This full-featured 286 computer runs at 12.5 MHz, and is completely Microsoft MS-DOS and MS OS/2 compatible.

#### STANDARD FEATURES:

- 80286 microprocessor running at 12.5 MHz.
- 640 KB of RAM expandable to 16 MB (4.6 MB on system board).
- Socket for Intel 80287 math coprocessor.
- 5.25" 1.2 MB or 3.5" 1.44 MB diskette drive.
- Dual diskette and hard disk drive controller.
- Enhanced 101-key keyboard.
- 1 parallel and 2 serial ports.
- 200-watt power supply.
- 6 industry standard expansion slots.

#### OPTIONS:

- Intel 80287 math coprocessor.
- 512 KB RAM upgrade kit.
- 2 MB RAM upgrade kit.

\*\*Lease for as low as \$93/Month.

System 200	With Monitor & Adapter		
Hard Disk Drive	VGA Mono	VGA Color Plus	VGA Color Plus
	One Diskette Drive	One Diskette Drive	One Diskette Drive
40 MB-40 ms	\$2,499	\$2,799	\$2,799
40 MB-28 ms	\$2,699	\$2,999	\$2,999
90 MB-18 ms ESDI	\$3,499	\$3,799	\$3,799
150 MB-18 ms ESDI	\$3,999	\$4,299	\$4,299
322 MB-18 ms ESDI	\$5,999	\$6,299	\$6,299

\*Performance enhancements (Systems 325, 310 and 220): Within the first megabyte of memory, 384 KB of memory is reserved for use by the system to enhance performance.



## APPLICATION SOFTWARE.

We offer a complete line of software. Everything from complex CAD/CAM applications to fun flight simulator programs. All at extremely competitive prices.

## OPERATING SYSTEM SOFTWARE.

- Dell Enhanced Microsoft® MS-DOS® 3.3: \$99.95
- Dell Enhanced Microsoft MS-DOS 4.0: \$119.95
- (Both MS-DOS versions with disk cache and other utilities.)
- Dell Enhanced MS® OS/2 Standard Edition 1.0: \$324.95
- Dell UNIX® System V/386, Release 3.2:

Available 3/31/89. Call for details.

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Technically speaking, the System 325 is the most advanced 386™ computer we've ever built. And, according to PC Magazine, it's one of the most advanced 386 computers they've ever tested.

In benchmark after benchmark, the Dell System 325 25 MHz ran circles around a field

### **A PERSONAL COMPUTER THAT'S REALLY PERSONAL.**

Of the more than 150,000 personal computers we've sold to date, each one's been individually configured to fit the needs of its owner.

The System 325 takes that idea

to its logical extreme.

For example, it runs either MS-DOS®, OS/2, or our own Dell UNIX® System V. Which is compatible with AT&T's System V Interface Definition. And the world of XENIX® applications.

If speed is of the essence, we can include an optional Intel®

**THE DELL 386 SYSTEM 325  
HAS A 25 MHz CLOCK RATE,  
CACHE MEMORY CONTROLLER,  
90 MB 18ms ESDI DRIVE,  
PAGE MODE INTERLEAVED MEMORY,  
AND 100% COMPATIBILITY WITH  
MS-DOS, OS/2 AND UNIX SYSTEM V.**

of 386-based systems. A field that included the Compaq® 386/25.

A show of prowess that earned the System 325 PC Magazine's Editor's Choice award.

It was a goal we set for ourselves from the very beginning. And an objective anyone with a penchant for power and performance can appreciate.



80387 or WEITEK 3167 math coprocessor. And since nothing about this system is lightweight, the standard mass storage is a 90 MB ESDI disk drive. Or we can configure it with a 150 or 322 MB unit.

As you might expect, the output is just as intense. You can choose between VGA mono with paperwhite screen, or VGA Color



Plus, for high resolution colors displayed on a larger screen.

Even though the 325 gives you all this performance, it still leaves you six open slots for whatever else you might want to add.

And once you've told us what you want, we'll make sure what you want works—by burning-in the entire system unit.

### **COMPUTER RETAILERS ARE NO KNOWS.**

In all probability, the average computer retailer won't have any understanding what makes the System 325 go.

He will, however, be quite aware of the fact that he could add a 35% markup if he could sell it in his store.

Which he can't.

Because we sell direct.

Meaning you now have the unique opportunity to talk directly with a computer expert. And ask things like, "What's the difference between IDE and ESDI?" Or, "How much SIMM RAM should I add?"

In other words, the kinds of questions you should be able to ask a retailer, but usually can't.

So as you might suspect, dealing direct not only saves you the 35% markup, but 100% of the aggravation.

**DELL**  
COMPUTER  
CORPORATION

Martin Brendel  
Assistant Regional Manager



### **WE COME WHEN WE'RE CALLED.**

One of the things that very clearly sets a Dell system apart

from other computers is not just how they're sold, but how they're supported.

Overkill was one description used in a recent PC Week article. Perhaps.

But then, we think you'll agree, when something goes wrong, you want as much help as

possible, right?

Which is why every Dell system comes with a toll-free technical support line and self-diagnostic software. We're able to solve 90% of all problems right over the phone. The other 10% receive next-day, desk-side service.

And you get all this help for a full year—whenever you need it—at no extra charge.△

As you've probably guessed, one of the things that drives us most is customer satisfaction.

So we'd like to give you the ultimate guarantee: Try a System 325 in your office for a month. Run your toughest applications. Put it through its paces, at your pace. If you're not completely satisfied, send it back anytime within 30 days. And we'll refund your money.

No questions asked.

### **MAYBE YOU SHOULDN'T BUY ONE AFTER ALL.**

No matter how many reasons we give you to buy a Dell system, sometimes it makes more sense to lease one instead.

Whether you need a single computer, or an entire office full,

## **BEST OF ALL, YOU WON'T HAVE TO EXPLAIN TO A COMPUTER RETAILER WHAT ALL THAT MEANS.**

our leasing plan is just like 100% financing. So you don't tie up working capital. Or credit lines.

Of course, there can be tax advantages as well.

And just as we can custom configure your computers, we can fit a lease plan to the exact needs of your business. A fact that has not gone unnoticed. Especially by the Fortune 500. Over half of whom now own or lease Dell systems.

We welcome your business, too. Just call us, toll-free. And don't be afraid to ask us the tough questions.

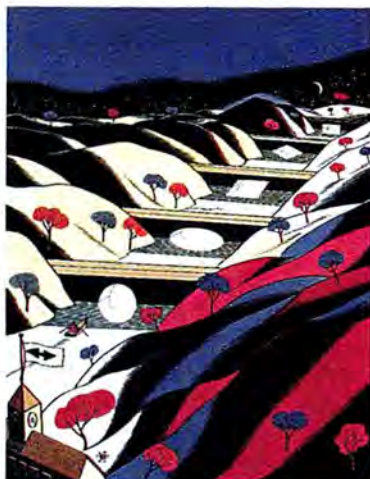
That's the part we like best.

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TO ORDER, CALL  
**800-426-5150**  
IN CANADA, CALL 800-387-5752



## REVIEWS



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**94 Integrated Excellence** *Dennis Dykstra*  
Four popular integrated packages deliver all-in-one convenience for less than \$300 apiece.

**102 The Hardware Shelf** *Edited by Michael Goodwin*  
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• Vector's Excalibur 286 blows past some 386s, but speed may not be enough  
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• Need a cheap LAN? CarrierNet transfers files using the wiring in your walls  
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**118 The Software Shelf** *Edited by William Rodarmor*  
• Multitasking with *Desqview/386*—better than doing *Windows*  
• Flexible *askSam 4.1* stores and retrieves text with lightning speed  
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• *Freedom of Press 1.0a* lets ordinary printers speak PostScript  
• *Always* dresses up plain 1-2-3 charts and worksheets  
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• *Cause* lets you create programs that run on both PC and Mac alike  
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*John Faulkner*

Pack up your laptop in your old kit bag—and take your accessories with you. This assortment of third-party modems, drives, expansion boxes, and more will keep your portable powerful.

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- Fast & Powerful curve editing

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- Gives your curves a human touch by allowing custom pen shapes & angles

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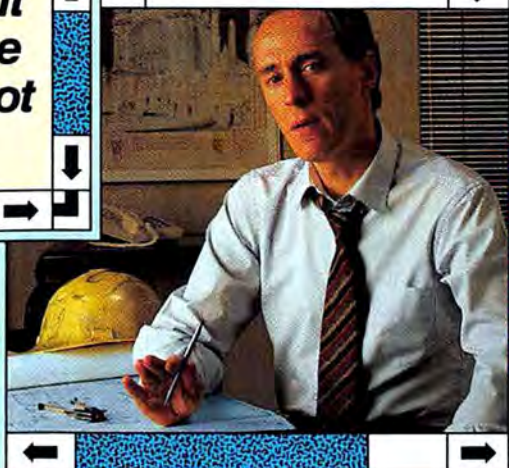
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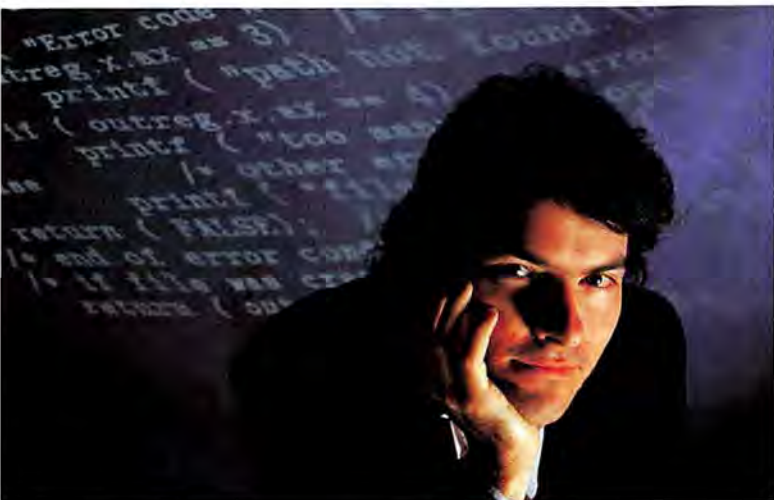
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## Getting With the Program



Assistant Editor  
Scott Spanbauer

**W**e weren't surprised when our reader surveys revealed that *PC World* readers spend at least a part of every working day programming. Sometimes the job is as simple as creating a batch file or developing a 1-2-3 macro. More complex projects include building and debugging a *dBASE* application. If you're ambitious, you might use a high-level language like C or Pascal to write a custom menu system for your organization's users.

For day-to-day productivity tips, *PC World* readers turn to *Star-Dot-Star* and our How To section. This month, our Special Report on languages offers something extra for those who need help with more complex programming projects. Assistant Editor Scott Spanbauer, who edited the section, points out that the focus is still on getting a job done.

"For the most part," Spanbauer explains, "people who read *PC World* are not software developers or professional programmers. They're in business, and they learn programming skills because they need to solve specific business problems. As with any skill, staying sharp requires exercise. Knowing what tools are available helps, too."

ROBERT CARDON

The products featured in our special section prove that powerful developer's tools don't have to carry a high price tag. Microsoft's \$99 *QuickBASIC 4.5* and Borland's \$149 combo of *Turbo Assembler* and *Turbo Debugger*, in fact, earned *PC World*'s nod as Best Buys for their combination of features, performance, ease of use, and overall value.

Jeff Duntemann's feature on object-oriented programming ("The Object Is Software Design") offers a glimpse into the not-so-distant future. The next generation of programming tools will be more powerful and easier to use, Duntemann predicts, thanks to the advances in object-oriented programming systems.

The last piece in the section, Michael Covington's "A Turbo Pascal File Finder," deserves special mention. "This is a very elegant, well constructed, tight program," Spanbauer says. "It's an excellent illustration of a difficult-to-master programming technique."

Also in this issue: What were once the highest-priced machines on the market may now be the best values in personal computing. Don't miss Contributing Editor TJ Byers' "16-MHz 386s: Safe Bets for the Nineties." We've had a chance to use *SQL Server* on our in-house OS/2 network. Check out our first impressions in Tony Lima's preview, "SQL Server: LAN-Tailored Data Management." And the first-ever Micro Channel clone is shipping; you'll find Senior Editor Eric Knorr's review of the Tandy 5000MC in *The Hardware Shelf*. ●

*Ed Bott*

Ed Bott  
Managing Editor





**Hatfield.**



**McCoy.**

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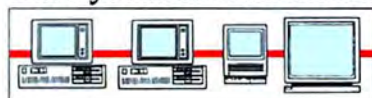
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FEBRUARY 28, 1989

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BY WINN L. ROSCH

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# TOP OF THE NEWS

## New 1-2-3 Release Debuts

*Lotus Will  
Cover the Most  
Important  
Bases With  
"Release  
2.whatever."*

In addition to its long-awaited release 3.0, Lotus Development plans to ship an update of 1-2-3 release 2.01 around midyear (see *Top of the News*, PCW, March 1989). Although the revision number had not been determined at press time, spreadsheet division general manager Frank Ingari confirms that the new product will be a member of the release 2.x line—"a tiny little assembler product," he calls it, completely compatible with release 2.01 files, macros, and third-party add-ins. The new version requires little more RAM than 2.01's 170K, but its feature set is such that many of the 4.5 million 1-2-3 users—particularly in large organizations—may not bother to upgrade to release 3.0. The upgrade will incorporate many utilities Lotus has been shipping retroactively—including an

undo facility, a macro recorder, minimal recalc, and drivers for PostScript and VGA screen displays. It will also have file linking and consolidation abilities (though somewhat less extensive than release 3.0's), style sheets, and the ability to keep macros in multiple library worksheets. Users who purchased release 2.01 after September 6, 1988, can obtain a free upgrade to either release "2.whatever" or release 3.0. Ingari reports that during 3.0's long development cycle, Lotus executives realized that most organizations are "mixed environments" where a significant number of users continue to need "8088 functionality"; these users would be left behind by the practical memory requirements of release 3.0's new features.

## EISA Progresses

*Bus Specification  
Finalized  
as Ranks of  
Supporters  
Grow*

The coalition of manufacturers offering Extended Industry Standard Architecture (EISA) as an alternative to IBM's Micro Channel Architecture has finalized the bus specification and anticipates the first EISA systems to ship as early as fall. Mike Swavely, Compaq's vice president of sales and marketing, reports that EISA's nine original backers have grown to more than a dozen, and more than 100 others—including 70 board makers—have obtained the spec's now-complete details. Products await volume shipments of EISA chipsets from Intel. Swavely says that because of the difficulty of ensuring compatibility, it's unlikely vendors will develop their own silicon before Intel does. But he adds that design team members—each of whom is contributing "millions" to the effort—are "pooling" their patents and may save money later by du-

plicating the Intel chips. Meanwhile, the EISA specification is being licensed at nominal cost to all who request it. "The intent is to make EISA a broadly supported industry standard, not a license-revenue-generation device," adds Swavely, referring to IBM's plan to charge up to 5 percent of a company's MCA product revenues for a bus license. EISA machines will enter the market as high-priced, high-powered work-group systems, while the current AT-compatible bus will continue to be an adequate platform for single-user applications. EISA's principal design goal is to let users mix 32-bit I/O cards, such as network adapters, with the large installed base of 8- and 16-bit cards that would not necessarily benefit from a wider data address or other advanced features.

## Atlas II Introduced

*Microrim's  
Relational  
Data Base  
Will Offer Ob-  
ject-Oriented  
Interface*

Microrim plans to release by year's end *Atlas II* (see *Top of the News*, PCW, February 1989), a relational data base management system designed to let nontechnical users develop applications and access data across different operating environments and locations. The initial release of the distributed data base system will be optimized for networks and run under OS/2 Presentation Manager, says Vice President Marco Hegyi. Releases for the Apple Macintosh, *Microsoft Windows*, and UNIX are planned for 1990. The program lets the user automatically create a data base application from data entry forms by pointing and clicking on objects in *Atlas II*'s pull-down menus. Hypertext-like buttons

can be added to portions of these forms to refer to data base records or other forms. Microrim is negotiating with third-party vendors to create a compatible paint program for graphic-oriented forms such as maps or tax returns, which also could exploit the buttons. Ultimately, says Hegyi, *Atlas II* will read and write *dBASE* and *R:base* files, and its Extended SQL Protocol will facilitate SQL queries as well as process queries from 1-2-3 and other front ends. Microrim will sell a single-user version of *Atlas II* and a version with a distributed data base engine for multiuser environments. A compiler will be sold separately. Prices have not yet been announced.



## Migent Teeters

Company  
Close to  
Chapter 11,  
but Creditors  
Hold Their  
Fire

Canada's Migent Software, holding company for Migent, Inc., of Incline Village, Nevada, is teetering on the brink of Chapter 11 restructuring. The company, which has marketed *Inhouse Accountant*, *Ability Plus*, *Emerald Bay*, and the Pocket Modem, lost \$9.8 million on sales of \$3.5 million in fiscal year 1988 (ended June 30) and \$1 million on sales of \$571,000 during the first quarter of 1989 (ended September 30). It currently owes more than \$9 million to more than 100 creditors, who had threatened Migent with legal action if it didn't become profitable by April 19. But none seem anxious to force the issue. "Even if we pushed them into Chapter 11, we wouldn't get 10 cents on the dollar," observes Craig Carlson, partner in PC Software Development of Mountain View, California. Carlson, who claims that Migent owes his firm \$100,000 in royalties on *Inhouse Accountant*, has taken

back the marketing rights and support responsibilities for the program. Similarly, modem maker Omnishore Corporation (formally Xebec) in Carson City, Nevada, won a judgment enabling it to sell its inventory of Pocket Modems in payment for debt. Migent still markets and supports the modem, as well as the *Ability Plus* integrated software and the *Emerald Bay* data base development environment. Bob Byers, spokesperson for Ratliff Software Productions, which owns *Emerald Bay*, says that his firm is developing a data base server version and will support the product regardless of Migent's fate. Migent director of marketing Mary Latterell claims that her firm has sold 3000 copies of *Emerald Bay*, which appears to be the company's best hope for a turnaround. Migent has lost more than \$21 million since 1985.

## Open Book Coming

Innovative  
Programming  
Environment  
Unveiled by  
Microsoft  
Cofounder

Seattle-based Asymetrix Corporation is reportedly planning an object-oriented development system that operates within *Windows*. Scheduled for June release, *Open Book* provides point-and-shoot programming of *Windows* applications. The applications are treated as books whose pages may be data base records, word processing files, and so forth. Assymetrix, a company owned by Microsoft cofounder Paul Allen, has been conducting R&D in object-oriented programming systems for four years, but *Open Book* is said to be a spin-off of after-hours tinkering by chief programmer Steve White. Unlike structured languages such as C, *Open Book* works by passing messages between libraries of objects selected from pulldown menus and linked via point-and-shoot techniques. An En-

glish-like script describing these objects is automatically generated and can be customized or linked to structured language routines. *Open Book* will ship with a series of ready-made applications, including a standard set of desktop utilities, a *dBASE* front end, tools for painting and drawing, and a clip-art library. Like the Whitewater Group's *Actor*, a *Windows*-based rival, *Open Book* enters an unproven market for object-oriented programming tools. But such software promises to one day replace today's structured languages by offering reusable code, greater interoperability across platforms, and easier programming by nonprofessionals. Assymetrix, which plans to sell *Open Book* for somewhere around \$300, also is working on a Presentation Manager version.

## Fax Add-Ins Ship

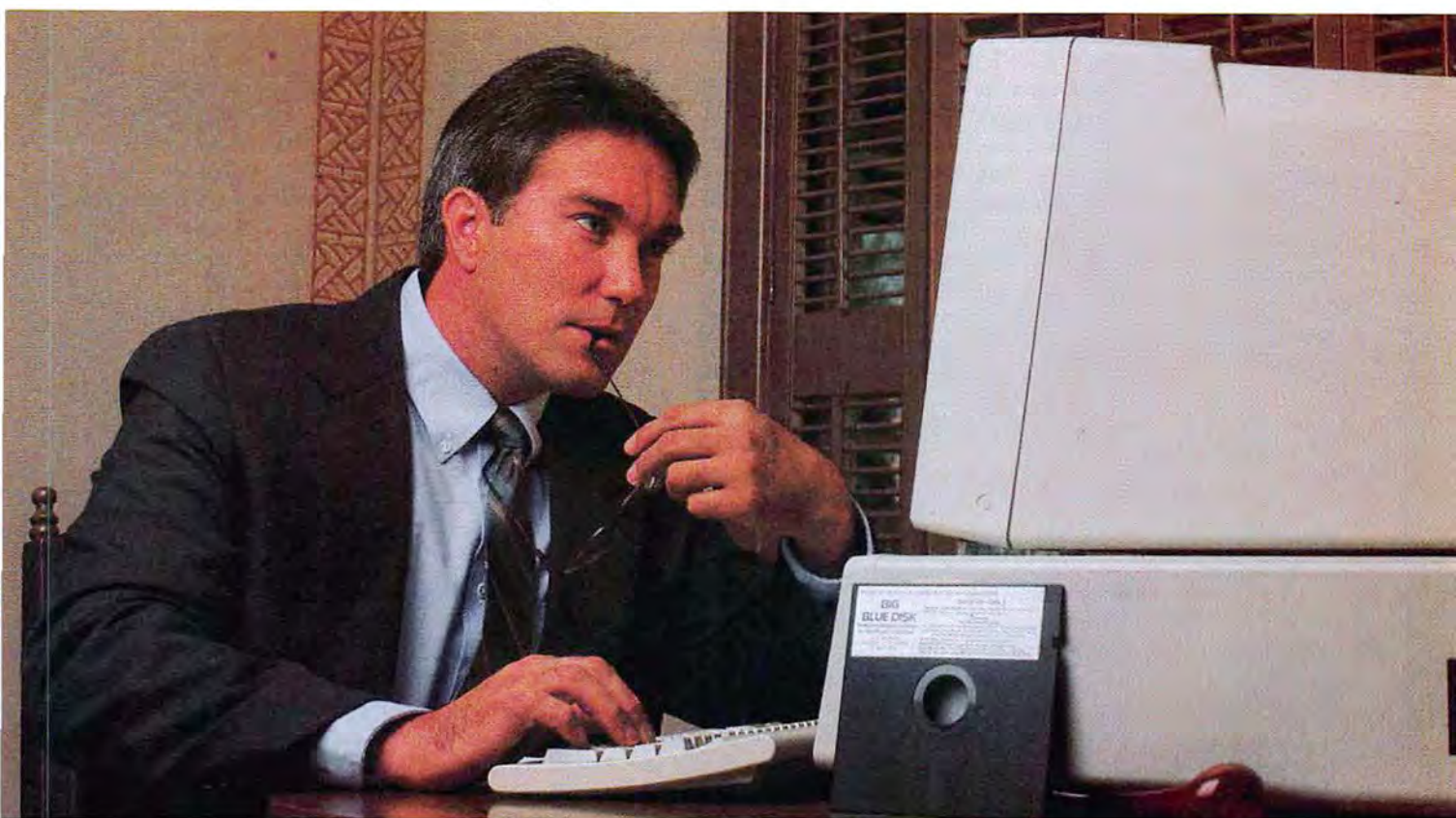
Nine Packages  
Support the  
DCA/Intel  
Spec for  
Background  
Communications

Intel Personal Computer Enhancement Operation (PCEO) has introduced *Send-Off* add-ins for 1-2-3 and *WordPerfect 5.0*, enabling users of these packages to send and receive fax and binary files with their Connection CoProcessor add-in boards without having to leave their primary application. Both add-ins support the DCA/Intel Communicating Applications Specification (CAS) and will be shipped free with all Connection CoProcessors. Intel PCEO will mail the 30K 1-2-3 add-in to all registered users of the board, while the 65K *WordPerfect* add-in will be available upon request. The memory-resident add-ins link with 1-2-3 and *Word-*

*Perfect 5.0* through their application program interfaces, and use the interface of the host application. Seven other applications will support CAS transfers of files, faxes, or both, including Symantec's *Q&A 3.0*, WordTech Systems' *DBXL* and *QuickSilver*, Conetic Systems' *Higgins*, Alcom's *LAN Fax/10*, *Crosstalk Mk.4*, and *cc:Mail*. In addition, Borland plans CAS support for *SideKick Plus*. The Connection CoProcessor is equipped with its own 80188 coprocessor and 256K of memory, allowing background communications without disturbing the foreground application.



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## Intel Cuts 80386SX Prices

*Ramped Up  
80386SX  
Production  
Plus Reduced  
Costs Should  
Trim System  
Prices*

Intel has slashed the price of its 80386SX processor by 33 percent, in a move that Product Line Manager Bruce Schechter predicts will lower system prices. Intel now charges \$89 per 1000 units of the SX chip, compared to \$133 prior to April, and \$165 at its introduction. By midyear, Schechter expects to see SX system prices in the \$1500-to-\$4000 range—depending on features—compared to the current floor of around \$2400. Demand has outpaced supply, he says, even though Intel delivered five times more SX chips during the six months following its June introduction than it did during the first six months of the 80386. Schechter

expects the number of vendors announcing SX systems to double to 100 this year, but Intel also doubled SX factory space and is using low-cost manufacturing processes. "That puts us in a position to move more aggressively on price," says Schechter. Intel's vow to "put a 386 on every desktop" targets the 286 chip shipments of its major competitors, such as Harris and Advanced Micro Devices. Schechter claims that it now costs only \$5 more to manufacture an SX system than a 16-MHz 286 system with the same features, and \$50 more than a 12-MHz 286. "If I were an OEM, I would recognize this as an opportunity that I couldn't miss," he says.

## New Framework Released

*Run-Time  
Version Lets  
Developers  
Ship Executable  
Framework  
Applications*

Ashton-Tate has released a new version of *Framework III* that will permit the creation and distribution of applications among work-group members, who won't need their own copies of *Framework*. The \$995 *Framework III Runtime* is identical to the \$695 *Framework III* in every way except that it includes a run-time module for the creation of executable applications in the FRED programming language. These applications can be distributed among an unlimited number of users. The package is compatible with the same local area networks as the \$995 *Framework III LAN*. However, the latter comes with five fully configured copies of *Framework*; also, run-time applications lack *Framework*'s pulldown menus and include only those portions of the integrated package added by the developer.

Ashton-Tate will distribute and support *Framework III Runtime* directly and require buyers to sign a licensing agreement intended to prevent them from simply cloning *Framework*. There are an estimated 10,000 FRED developers in the United States, but *Framework III Runtime* has still larger significance for Ashton-Tate's strategy of making *dBASE IV* an enterprise-wide data processing engine whose users make data queries from the applications of their choice. These front ends might be *Framework* applications or other applications such as *1-2-3* that can exploit *Framework*'s rich import/export and telecommunications facilities to convert and transmit both data and binary files.

## Crosstalk Does Windows

*New Version  
Targets Middle  
Ground Between  
Crosstalk XVI  
and Crosstalk  
Mk.4*

Several *Windows* implementations of major applications are expected this year; one of the first being a version of *Crosstalk* from Crosstalk Communications. Due to ship in the second quarter, *Crosstalk for Windows* displays a graphic user interface, unlike the market-leading *Crosstalk XVI* or *Crosstalk Mk.4*, reports Vice President of Marketing Chuck Rudolph. Similarly, the number of terminals and data transfer protocols it emulates lies somewhere between the best-selling *XVI*, first introduced in 1982, and the more ambitious *Mk.4*, introduced in 1987. *Crosstalk for Windows* supports the XMODEM, YMODEM, Kermit, Crosstalk, and Crosstalk DART protocols, among others. *Crosstalk for Windows* is a full *Windows*

application that supports dynamic data exchange (DDE); for example, the user can send and receive data between a mainframe host and an *Excel* spreadsheet while performing other tasks in the foreground. The package, whose price has not yet been set, offers a subset of the powerful Crosstalk Application Scripting Language (CASL), which has made *Crosstalk Mk.4* a corporate tool for jobs such as polling several remote locations overnight. Such background communications activities can be more easily automated, says Rudolph, by the combination of CASL and *Crosstalk for Windows*' support for a mouse, the *Windows* clipboard, and pulldown menus. ●



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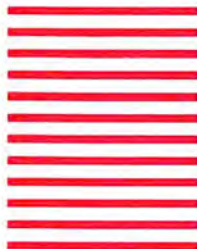
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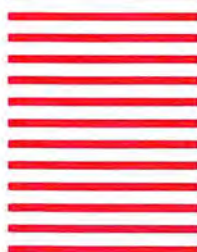
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# Talk Hyper to Me

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**Richard  
Landry**

**A**s data base companies go, Oracle has more of a reputation for mainframe might than for ease of use. So it was ironic to watch Oracle score big in the Macintosh market recently with *Hyper\*SQL*, an easy-to-use programmable front end to the company's back-end data base software.

*Hyper\*SQL* is important for several reasons. It's the first large-scale application built using Apple's *HyperCard*, which until now has been more of a helpful utility than an industrial-strength programming tool. Its point-and-click interface unleashes the power of a world-class relational data base without forcing Mac users to master arcane programming commands. Most important, *Hyper\*SQL* represents a new wave in application software that will eventually do away with programming languages as we know them.

The PC world doesn't have any shortage of powerful back-end programming tools, but easy-to-use front ends are another matter. Oracle took a step in this direction last year when it introduced *Oracle for 1-2-3*, a Lotus add-in that lets users tap the power of the Oracle data base through the guise of the familiar spreadsheet.

But *1-2-3* lacks some basic facilities that make *HyperCard* perfect for shielding users from the nasty underpinnings of a relational data base—in particular, a forms creation tool and a menu-driven script editor that allows you to tie actions to buttons or images. You can also combine *HyperCard* scripts with programs generated in traditional languages like BASIC, Pascal, and C—a trick not possible with most data base programs, let alone *1-2-3*.

Now *HyperCard* faces some competition on the PC side, from two new products due out this summer. Brightbill-Roberts' *HyperPad* and Asymetrix' *Open Book* use "hypercard" concepts to let users build complex applications quickly or browse through mounds of data without having to know how to program and query a data base. *HyperPad*, a character-based DOS program, lacks graphics pizzazz but runs on almost any machine (see *Top of the News*, PCW, March 1989). *Open Book*, a Windows application, has all the benefits and liabilities of its Macintosh counterpart (see *Top of the News* in this issue).  
(continues)





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Hypercard-like capabilities should make almost *any* complex application easier to use. No wonder rumors abound that such features will show up in next-generation versions of many older products like 1-2-3, as well as in some new ones you haven't heard of yet. The buzzword behind this development is *object-oriented programming* (see "The Object Is Software Design" in this issue's Special Report on languages). It promises a shorter learning curve and greater productivity gains from your investment in PC software.

Hypercard products can also replace an application's specific command language. Both *HyperPad* and *Open Book*, for example, will almost certainly ship with interfaces to dBASE. Their users won't write a lick of dBASE code—they won't need to. When you combine a hypercard front end with an SQL data base engine, you'll have arrived at a future in which traditional programming languages like dBASE won't really matter at all.

Lotus, Microsoft, and Oracle, among others, are not about to let this revolution in push-button programming pass them by. They recognize that the future belongs to open, accessible front-end tools, not to proprietary back-end languages. If the folks at Ashton-Tate can get their noses out of the law books, they will see this hyper-point, too!

As always, I'm interested in your opinions on this or any other subject. Write to me at *PC World*, 501 Second St., San Francisco, CA 94107; FAX 415/442-1891; or MCI Mail Richard Landry/301-3685. ●



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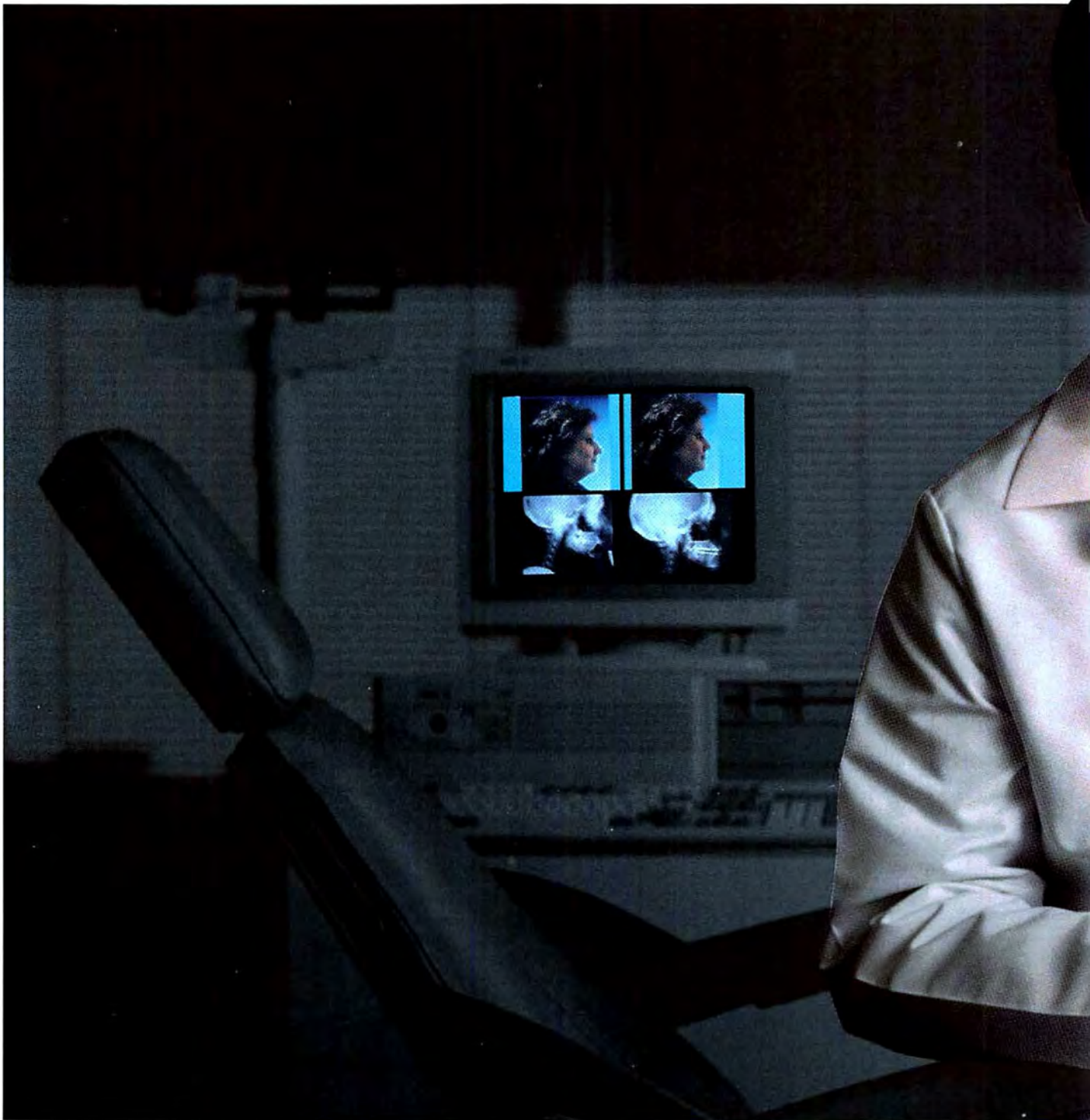


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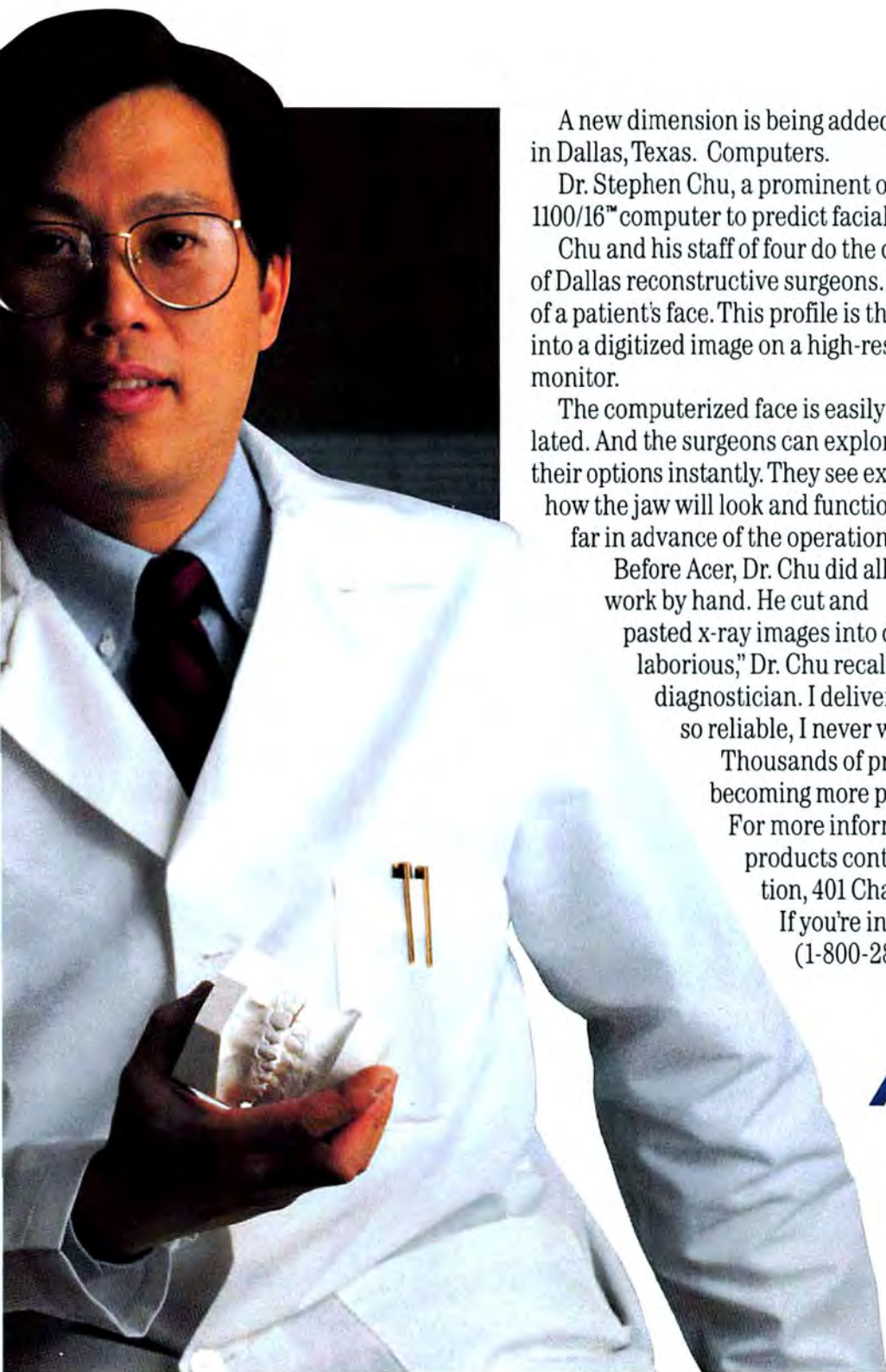
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## LETTERS

### Reactions and responses from the PC World community

#### Let's Hear From the Masses

My thanks to Richard Landry for his high-spirited 1989 wish list [*PCW*, December 1988], which I read with pleasure. My personal favorites: an OS/2 that multitasks DOS applications, an open-standard *dBASE*, and "a brawl...among Lotus, Microsoft, and Borland...over which can provide the best customer support."

I gather you're interested in feedback on *PC World*, so here goes. I'd like to see the increased use of reader polls, which both you and *PC Week* have begun to use. In particular, I'd be interested in polls that explore user satisfaction with after-sale support.

I'd also welcome more reader participation in your magazine along the lines of *Another Angle*. I'd like to hear what problems other users are addressing with computers and how they've approached them; what they feel

they did right and what they would change next time; and yes, what hardware and software choices they've made.

I like the changes in *PC World* over the last few months, and I hope this feedback helps. Keep up the good work!

*Greg Dunn*

*Woodland Hills, California*

#### The Problem of WordPerfect 5.0 and Printers: Part II

I second Jan Harrington's letter of frustration over *WordPerfect 5.0*'s failure to support a popular printer [*Letters, PCW*, December 1988]: I have been left with a printer (the Brother EM-100) that version 4.2 supported but that's been dropped in version 5.0. When I called the company, I was told politely but firmly that it could not afford to continue supplying drivers for less popular printers. Translation: If you buy *WordPerfect* because it supports your favorite printer, don't count on future versions of the program to do so.

I have an addition to Richard Landry's wish list for 1989: that manufacturers get together and agree on some standard to which all printers will conform. If they're not willing to do that voluntarily, I'm ready to call for

government regulation. The situation has gotten out of hand.

*Roger M. Scovil*

*Atlanta, Georgia*

I bought *WordPerfect 5.0* in August and immediately ran into problems with the Epson LQ printer driver. *WordPerfect* support told me there were some bugs in the initial release and sent me an upgraded driver. Later I bought an HP LaserJet II and had the same experience. In this case, the included HP driver lacked landscape orientation and had to be replaced.

The upgraded drivers work just fine, and *WordPerfect* deserves commendation for the skill, knowledge, and pleasant attitude of its support personnel. But forgive me if I'm more than a little upset that a program sold on the basis of superior printer support has difficulty with industry-standard machines like the LQ-1050 and the LaserJet II.

*James R. Greer*

*Norwalk, Connecticut*

#### Drivers! He Said

Finally someone touches upon the single greatest problem in personal computing! I speak of Daniel A. Morgan's complaint about the lack of standard printer drivers [*Letters, PCW*, December 1988].

*(continues)*



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**Stephen Manes,**  
PC Magazine



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Ask for operator #207



Knowledgeable vendors can perfectly match one or two software titles with one or two computers that will work with one or two printers. The problem comes later when it turns out, to the consumer's dismay, that an expensive but desirable, solve-all-your-problems software release doesn't support the printer he or she has purchased. There must be tens of millions of dollars waiting to flow to the person or company that provides a what-you-see-is-what-will-be-printed solution to this problem.

Randy D. Johnson  
Coolidge, Texas

### Just Say No

Why is *PC World* supporting the sale of computerized pornography? It all started a few months

ago in the *PC World Catalog* with an advertisement for *Adult Software*. Now it has progressed to a full-page color ad for *Interlude II*—complete with “Me Tarzan—You Jane” dialogue.

I think such advertisements belong in “sleaze” magazines down at the porno shop, not in a publication of *PC World*'s caliber. In the future, please use some discrimination in accepting advertisements.

Thomas L. Pugh  
Gladstone, Oregon

I respectfully request that you examine your policy regarding what ads you accept. I read *PC World* cover to cover, and sleazy advertisements like those for *Interlude II* and *Adult Software*

detract from the credibility of the publication.

William A. Stevenson  
Salt Lake City, Utah

It is *PC World*'s policy to refuse advertising that demeans or insults any individual or group. Although the *Interlude II* and *Adult Software* ads are sexual in nature, *PC World* feels that they neither demean any group nor fall outside the boundaries of good taste. Incidentally, *PC World*'s readers ranked the *Interlude II* ad first in the entertainment software category in December (through *Free Product Information* cards). *Adult Software* came in second.

In keeping with our commitment to uphold the interests of our readers, *PC World* has established an Advertising Review Board to review advertisements

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800 x 600 pixels (digital, analog, monochrome)  
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Auto-Tracking  
1024 x 768 pixels (typical)  
1280 x 1024 pixels (maximum)

**Diamond Scan 20L**  
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Up to 1280 x 1024 pixels  
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Monitors shown with optional bases

# A Clear View To Monitor Quality



for objectionable content and to monitor reader comments and complaints. If you have comments about any ad that appears in PC World, send them to the Advertising Review Board, Office of the President, PC World, 501 Second St., San Francisco, CA 94107. —John Griffin, President and Publisher

## ROI—Are You Kydding?

Charles Kyd's article "How Hard Is Your Money Working?" [PCW, November 1988] is interesting and very useful. He makes at least one serious error, however, in presenting the Du Pont return-on-investment (ROI) formula. What Mr. Kyd has shown in Figure 1 as "total investment" is

really total assets, which should be reduced by current liabilities to produce the actual total investment.

Investment is properly defined as either owners' equity + long-term debt, or, working capital + fixed assets + other assets (where working capital = current assets - current liabilities). It's improper to use gross investment (assets before deduction of accumulated depreciation) to calculate the turnover ratio, since by taking depreciation owner investment is reduced.

W. R. Tracey  
North Vancouver, British Columbia

As Mr. Tracey illustrates, return on investment describes a general concept, not one specific calculation. For example, "return" can refer to before-tax, af-

ter-tax, operating, and cash returns, to name a few. "Investment" can mean total assets with or without accumulated depreciation, stockholders' equity, total capital (as Mr. Tracey defines it), and so on.

I like the Du Pont chart for two reasons: First, managers can easily adapt it to just about any definition of ROI they want to use. Second, employees can use it to better understand how their performance affects the bottom line. —Charley Kyd

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Diamond Scan 14 (AUM1381A)	14/13V	15.7 ~ 36 auto-tracking	0.31	•	•	•	•	•	•		
Diamond Scan 16L* (HL6605TK)	16/15V	30 ~ 64 auto-tracking	0.31				•	•	•	•	•
Diamond Scan 20A (HA3905ADK)	20/19V	15.7 ~ 36 auto-tracking	0.31		•	•	•	•	•		
Diamond Scan 20L* (HL6905TK)	20/19V	30 ~ 64 auto-tracking	0.31				•	•	•	•	•
XC1429C	14/13V	31.5	0.28				•				
XC1410C	14/13V	22 or 15.75	0.40		•	•					
XC1430C	14/13V	22 or 15.75	0.31		•	•					

\*Microprocessor-enhanced programmable display settings

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printed a Buyers' Guide titled "Everything You Need to Upgrade Your PS/2," which referenced only Models 50 through 80. Why did you ignore the million-plus Model 25 and 30 users out there who may wish to upgrade their systems? I personally own a Model 25 and want to add a 20MB hard drive to it, and I'm having a hard time finding a good hard drive for my system (other than IBM's) at a reasonable price. Obviously, your article was of no help.

Mark Fielding  
Scottsdale, Arizona

### Arf!

I'd like to comment on Michael Goodwin's review of multitasking operating systems in the November issue of *PC World*

["Multitasking Without OS/2"], which included PC-MOS/386, a product I have used for almost a year. Though valid, Mr. Goodwin's criticisms of PC-MOS/386 may be misplaced. As has been noted of the talking dog, the issue is not what it says, but that it talks at all.

If you're trying to solve a single-user multitasking problem, then perhaps one of the products with a zippy front end and an installation process a novice can handle is a better choice. However, as the review notes, PC-MOS is a multiuser operating system, and its many features presume some technical expertise. I like easy installation as much as the next person, but I don't think a product should be dinged because the reviewer

couldn't get the hang of it in a single afternoon.

Kent Phelps  
Conifer, Colorado

### Correction

A description of the Toshiba T1200H(B) laptop computer in "Laptops With Storage to Spare" (*PCW*, December 1988) contains two errors. The T1200H(B) does in fact have an expansion slot, and memory expansion boards for this slot are available from Toshiba, as well as from third-party vendors (see "Buyers' Guide: Accessories for the Road" in this issue). *PC World* regrets the errors.

To send correspondence, please see *How to Contact PC World*, page 4. ●

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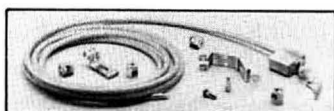
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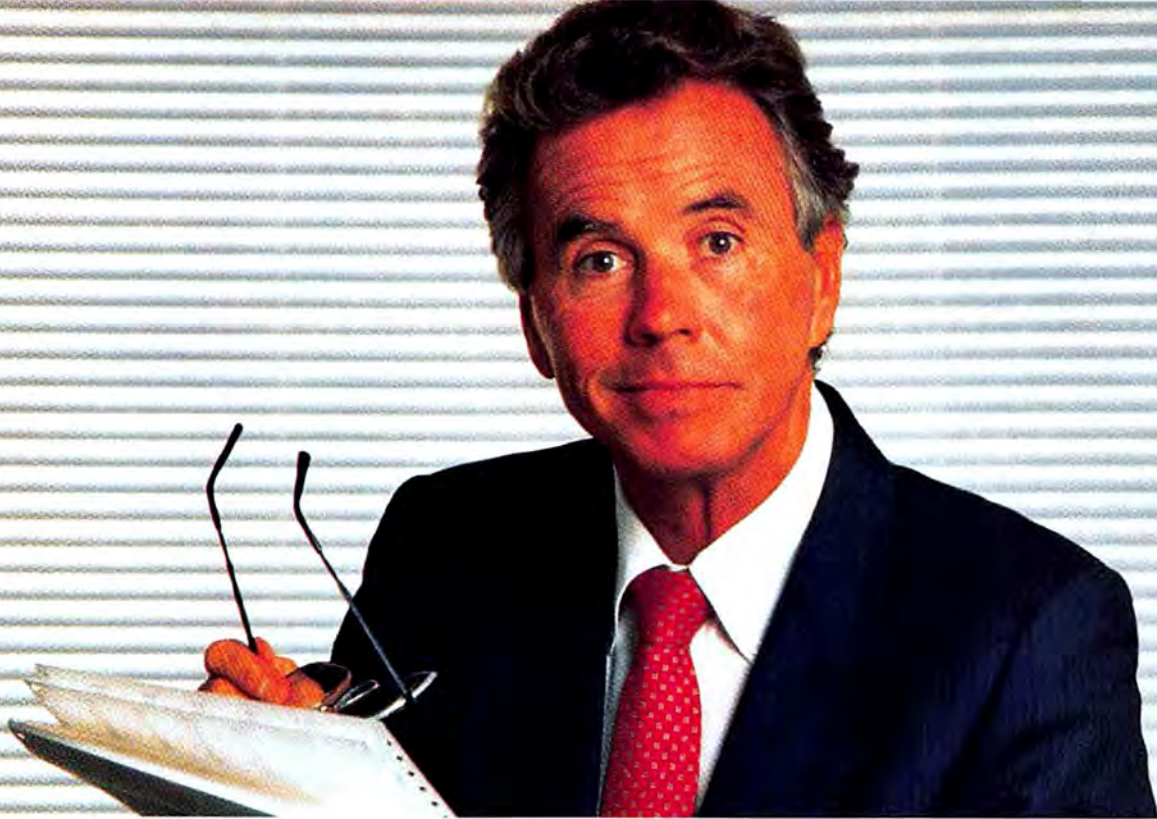
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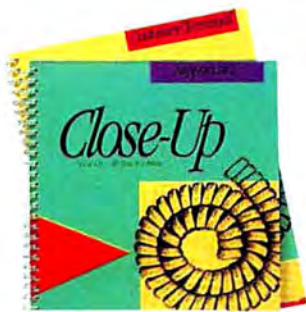
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# An Interface-Lift for the Rest of Us

Ready for a journey to the center of my mind?

Here's an idea for the shape of screens to come.



David  
Bunnell

**T**he DOS world's current mania for graphic interfaces might be called windowitis; whatever its name, it's contagious. But doesn't it strike you as a little odd that this interface—based on 20-year-old technology from Xerox and popularized 5 years ago by Apple—is perceived as futuristic today?

Still, now that virtually everyone else is showing symptoms of windowitis, I admit I've come down with a case of it myself. I suspect that like me, a lot of computer amateurs have better insight into the way we compute than do the industry behemoths. So I am offering something I conveniently (and modestly) will dub the Bunnell interface. Hear me out, and then think about what your own creation might be like.

First and foremost, the screen is the computer. By adding a mouse to a keyboard, we've actually moved backward in terms of ease of use. Our goal should continue to be eliminating peripherals, not increasing the number of pieces on the desk. So I propose no mice and no keyboards. A simple light pen would do nicely.

Furthermore, whether you use a desktop computer or a laptop, the screen should not be perpendicular. It should be on a horizontal plane, but slanted slightly

upward so you can look down into it. Cognitive studies show that our brain works better when we look down at an angle than when we crane our necks too far upward.

With the Bunnell interface, the keyboard, numeric pad, and function keys will appear on the lower part of the screen, which is touch sensitive. When you've finished with these features, they will disappear. Touch-typing will no longer be necessary. I think computing will be far easier when you can see the keys and the screen's work space at the same time. Except for that work area, my interface will eliminate windows and replace them with portholes. A circle is much more pleasing than a rectangle, after all.

Ultimately, the personal computer should not—and will not—be limited to the book- or tabloid-size two-dimensional flat screen that computer moguls have mandated. A spherical machine could allow for, say, completely visible three-dimensional spreadsheets that require no scrolling.

Let's get even more fanciful: Tap your finger on a screen's porthole, and it expands to fill a work space. Nod your head to  
(continues)



# FINALLY!

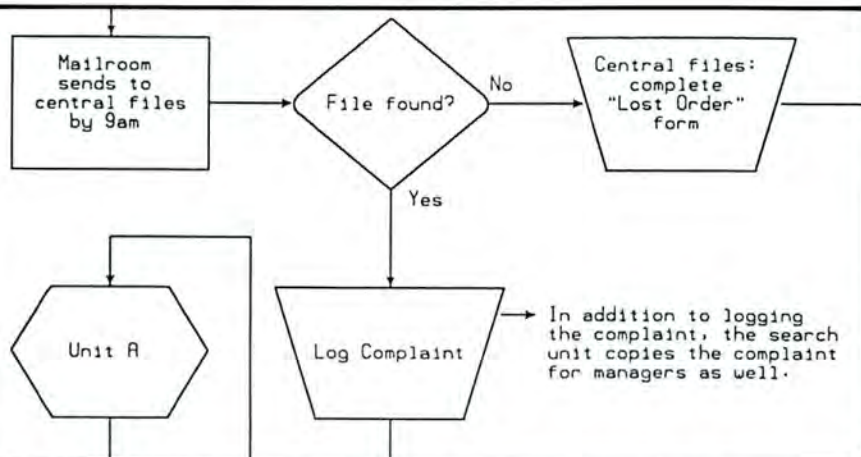
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DAVID BUNNELL

the left, and the work space reverts to a porthole. Wave your hand across the screen, and your machine turns on or off. Talk to your computer; it talks back. Want to draw a picture? The light pen is a hundred times easier to use than a mouse. (If you're skeptical, call up a drawing program and try to write your signature with a mouse.)

It looks as if all my wishes are adding up to an entire Bunnell PC, not just a new interface. (In that case, George Morrow and Adam Osborne may have some advice for me.) I'll also need to find a forward-thinking industrial designer to build this twenty-first-century machine. Until you see my machine in your PC store, though, I suggest you keep imagining how another kind of PC, one that's designed with your right brain in mind, might be more usable and—I dare say—more fun. ●

## POWER TIP NO. 41

### Draw WordPerfect Lines Last

When you use WordPerfect's Line Draw feature to create a box around text, the vertical line segments will shift if you inadvertently enter text with <Insert> on. The solution? Enter your text and the horizontal lines first and draw the vertical lines last.

George Beinhorn  
Nevada City, California

Circle 79 on reader service card



# Power without pain.

Viewing Customer table with form F: Record 1 of 315

**Customer Identification**

Customer ID #: 5  
 Customer's Name: George Bartelsbay  
 Address: 518 Pine St  
 City, State, Zip: Manchester, 43T  
 Country: England

**Customer Demographics**

Age: 38  
 Sex: M  
 Credit Balance: 988.88

**Product Order Information**

Product Code	Description	Language	Quan	Price
PB1-E	Paradox 3.0	English	1	725.88
PB12-E	Paradox OS/2	English	1	725.88
TLC-E	Turbo C	English	2	149.95
TLP-E	Turbo Pascal	English	1	149.95

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With Paradox 3.0, there are no Unclears, no Unknowns. You don't need an army of in-house technical support people. And best of all, you *don't have to be a programmer* to be a pro with Paradox. It's all gain, no pain.

## “Query-by-Example” for example

Use this checkmark and you're using QBE. It's that easy. Let's say you need to know in a hurry which of your Los Angeles customers bought more than 5 pairs of white shoes. First ✓ the customer field, then type “LA,” “white,” and “>5,” and you're done. Paradox gives you the right answer right now. And how much programming to do all that? Zero.

If your database experience so far is limited to the flat-file type rather than relational, or even if a

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Code: MP21

spreadsheet is the only program you've used before, Paradox gets you up and running immediately with just a ✓.

## Record-locking and Auto-Refresh make the network safely network

Paradox has become the leading networker because it handles multi-users intelligently. If someone in your group or network has accessed a record, automatic record-locking keeps everyone else from changing it.

That way, two or more people can't change the same data at the same time. (As a bonus, Paradox also tells you *who* is using a record at a particular instant.)

Once the record has been changed by someone in the network, *Auto-Refresh* kicks in *automatically* and updates everything. Everyone in the network is looking at up-to-the-minute information.

## Paradox, for the looks of things

Presentation-quality graphics are another Paradox distinction. They give you and your work the professional look.

Paradox instantly turns your tables into graphs with *one* keystroke—and in multiuser environments, with a few keystrokes your graph can show up-to-the-minute changes. Not only does everyone get the picture, they get an accurate picture.



## Award-winning Paradox Family

Paradox 3.0 is the latest addition to the award-winning Paradox Family. **Paradox OS/2 and 386 received PC Magazine's BEST OF 1988 AWARD** in the database category.

## it out

To order a trial version of Paradox 3.0 (\$14.95) or a demonstration disk (\$4.95), call (800) 345-2888, extension 100. Paradox owners may upgrade (\$175.00) by calling (800) 331-0877. (Please have your serial number available.)



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# PC WORLD

**May**

## Windows Special Report

Our May magazine-within-a-magazine surveys the Windows landscape—including reviews of important new word processing and graphics packages.

### Review Triple Play

Hate to leave your PC's power behind when you hit the road? *PC World* compares eight transportable systems and discovers that some are as easy to use and as capable as desktop units.

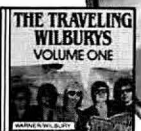
With dozens of graphics cards to choose from, deciding on the right VGA upgrade can be baffling. Bolstered by NSTL's first-ever applications-based tests of VGA performance, we sort the clear winners from the also-rans.

Finally, *dBASE* users have some alternatives. Five data managers promise to meet or beat the *dBASE* standard in compatibility and ease of use. And once again, NSTL benchmarks help define the essential differences in performance between the leader and the pack.

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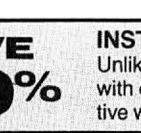
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# The New Compatibility

**For years the computer industry has worshipped two sacred cows: standards and compatibility.**

**Now a whole new definition of compatibility may bring us to greener pastures.**



*Stewart  
Alsop*

**T**hey don't make compatibility the way they used to. And we ought to be thanking our lucky stars that they don't, because it is a fundamental sign that the PC industry is ready to move into a new era of computing.

Back in the old days, *compatibility* meant that a PC could survive the Portia Isaacson test. If Portia, the founder of the leading PC market research firm in 1983, inserted off-the-shelf IBM versions of *1-2-3* and *Flight Simulator* into a computer and both started up the way they were supposed to, the machine was compatible with the IBM PC.

Remember, at that time the IBM PC-1 had been on the market for about 18 months, IBM was just introducing the PC XT, and a start-up company named Compaq was launching the original Compaq Portable. The computer industry operated under the assumption that compatibility meant using some form of MS-DOS with an Intel 8088-based processor, even if the computer had different graphics, disk, or input/output formats. After all, that was the model for the previous industry-standard operating system, CP/M.

It took Portia's test of software compatibility and Compaq's decision to adhere to a strict definition of compatibility to show

that what people really wanted (from companies other than IBM) was an identical system with additional features. One by one, the semicompatibles—the TI Professional, the DEC Rainbow, the Tandy Model 2000, the Victor 9000—fell by the wayside as Compaq and eventually others provided what came to be known as 100 percent compatibles, or clones. This inevitably led the PC industry to reserve the word *compatibility* for a computer design that had the same processor, disk drives, monitor, graphics, BIOS, and even the same appearance as the original IBM machines: the PC, the PC XT, and the PC AT.

But somehow, while we weren't watching, compatibility came to mean something else entirely. First, in the fall of 1986 Compaq introduced a machine based on the new 386 processor—the Compaq Deskpro 386—thus beating IBM to the punch and giving rise to a new term in the PC lexicon: *Compaq compatible*. This got a little confusing because the Deskpro 386 was actually based on the existing PC AT design, with extensions that enabled owners to use the 32-bit data path of the 80386 processor. *(continues)*



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Then in the spring of 1987, IBM had the temerity to introduce a new line of computers—the Personal Systems/2—that weren't strictly compatible with the "industry standard." This led to even more confusion about what compatibility meant, since the whole concept was based on adhering to designs introduced by IBM. The same software ran on PS/2s (when distributed on the right disks), but the machines were different. Did the fact that they were made by IBM make them instantly compatible? Or was compatibility now defined by another company?

Now, what used to be a simple concept of nearly identical hardware has become "virtualized." A British company called Insignia Solutions has a product named *SoftPC* that allows almost any computer with sufficient memory to emulate a PC-compatible computer. What Insignia has done is create, entirely in software, a near-perfect rendition of the IBM PC's hardware. *SoftPC* is now available on the Macintosh or on UNIX workstations from DEC, Sun, HP, Intergraph, Silicon Graphics, and other vendors. *SoftPC* requires at least 2MB of memory, but it recreates what appears to MS-DOS and application software as a complete PC hardware system: BIOS, graphics up to EGA, and appropriate disk-controller interfaces. (It still needs a physical disk drive, although it will work with other software that emulates such drives.)

What's most fascinating about this process is that it means the industry has absorbed everything about the architecture of the IBM PC and its successors. We can now incorporate all we know about the machine in a set

of software routines. It means that there are no new frontiers to conquer in that architecture. So it's about time we began looking for new frontiers in personal computing: in multitasking operating systems, in graphic interfaces, in storage devices, in silicon technologies.

Sure, sitting around smugly talking about industry standards can be gratifying, as though we had finally grown up as an industry. But compatibility's not what it's cracked up to be—it's certainly no measure of customer satisfaction. The bottom line is that users want better computers, and our new challenge should be to make sure that the technology does what it's supposed to do—serve users. ●

*Stewart Alsop is editor and publisher of P.C. Letter and a contributing editor for PC World.*

## POWER TIP NO. 42

### List 1-2-3 Named Ranges

To view a list of named ranges in a 1-2-3 worksheet, press <F5> immediately followed by <F3>. Then select a range to go to or punch <F3> again to see the next five ranges. This technique is also useful when 1-2-3 prompts you to enter a range and you want to specify a previously created name.

Thomas Oniguchi  
Santa Clara, California



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Edited by ERIC BENDER

## Bootstrapping a Business

### DataEase Quietly Builds Data Base Market Share

*Seeing Quick Return on Servers?*



Growing vendors like DataEase must make the right strategic alliances, says Chairman Arun Gupta.

Most software firms clamor for publicity—but not DataEase International. Its corporate headquarters in Trumbull, Connecticut, doesn't even display the firm's name.

But in the high-stakes race for relational data managers, low-profile DataEase is among the pack that's gaining on perennial front-runner Ashton-Tate. This year, Ashton-Tate is on the defensive, and DataEase sees rich opportunities opening up in network data base servers.

Arun Gupta and Joseph Busch were looking to create vertical applica-

tions when they formed the company (then called Software Solutions) in 1982. Finding no powerful data base tools, they built one of their own, aimed at industry veterans and inexperienced users alike. Gupta's brother, a physician, was a beta tester. "He kept saying, 'I can't use that,'" Gupta recalls. "So we focused on making [the program] really easy to use."

Launching *DataEase* in 1983, Gupta and Busch targeted large corporations, where ease of use is critical. Since then the firm has steadily refined the software, adopting DataEase as its company name in 1987. The latest

release adds such niceties as Multiforms, which lets end users update up to 32 data files from a single form.

"Our focus is on application development tools—not really data bases," Gupta declares. DataEase divides application development into four phases:

design, implementation, testing/documenting, and maintenance/enhancement. Application development tools usually concentrate only on implementation; DataEase wants to create computer-aided software engineer-  
*(continues)*

### Egghead Widens Markets and Expands Services

*But Low Margins Worry Wall Street*

Eggspansion" is the theme around the home offices of Egghead Discount Software, the nation's leading software retailer. But robust profits will have to wait a year.

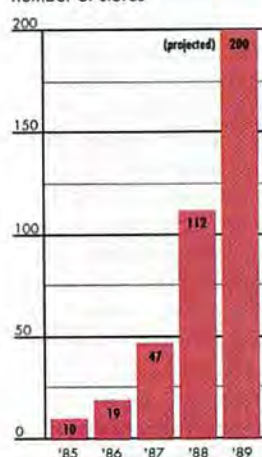
In the past two years, Egghead's annual sales have quadrupled, jumping from \$77.6 million to around \$300 million. At press time, the Issaquah, Washington, chain boasted 186 company-owned stores and a direct-sales staff of 200. Victor Alhadeff, Egghead's founder and chief executive, sees plenty of room for expansion, because Egghead hasn't yet cracked all of the top 25 metropolitan markets, and those that Egghead has entered are still far from saturated.

Alhadeff, who formed the company in 1983, has boiled Egghead's marketing approach down to the "Five S's," starting with savings—thanks to the

discounts Egghead obtains through volume purchases. Second is selection: Each store stocks 1300 titles. Third comes service; customers are en-  
*(continues on page 54)*

## Chain Reaction

number of stores



The number of Egghead stores has increased dramatically in the past two years, as shown in these year-end totals. (The software reseller's fiscal year closes in late March.)



## DataEase

(continued)

ing (CASE) tools for each phase. (However, Gupta says, "We don't want to call them CASE tools; that becomes daunting to some of our users.")

Plans are in the works for automating application design, "the area where most end users stumble," according to Gupta. DataEase has already responded to customer complaints about the drudgery of creating documentation by incorporating self-documenting features. "Once we thought of the idea, it was surprisingly easy to address," Gupta confides.

DataEase has also begun carefully branching out into connectivity, starting two years ago with the *DataEase Connect* micro-to-mainframe product. Other extensions delve into different kinds of data. Last fall DataEase introduced *DataEase Imag-In*, which handles scanned images. Future data base applications may include sound, Gupta suggests.

Additionally, DataEase seeks to provide alternative ways to manipulate data. *DataEase Cross-view*, which debuted quietly in December, is a multidimensional cross-tabular analysis tool that can find correlations—or looming disasters—in volumes of data too large for spreadsheets to handle. The strength of the product becomes evident "when you know something's wrong but you don't know which questions to ask," remarks co-founder Busch.

Like other DOS software suppliers, DataEase is preparing to move to new platforms, including OS/2 Presentation Manager, UNIX machines, and VAX minicomputers. But the company is placing its next major strategic bet on front ends for distributed systems built around Structured Query Language (SQL) commands.

"[Data base] servers are emerging as the most important trend," Gupta says. "The momentum is much faster than it was for local area networks." While DataEase hasn't announced a date for SQL products, it's investing heavily in the technology, so it will be ready when server packages ship from IBM, Microsoft and Ashton-Tate, and others. According to Gupta, customers already are installing the necessary hardware, the potential cost savings look good, and both end users and information systems managers will be advocates of the servers.

As servers and other enhancements raise the technical stakes, distribution channels for DataEase are shifting. Sophisticated value-added resellers "are very important and becoming more so," Gupta says. Aiming to expand this channel, DataEase hopes that such resellers will attract small and medium-size customers.

*DataEase* is offered in 13 languages and 37 countries; President Guy Scalzi estimates that overseas customers account for 40 to 45 percent of unit sales. The firm aims for long-term partnerships in royalty deals with independent distrib-

utors. This strategy has already paid off with a 25 percent market share for the U.K. distributor. "Their annual revenue exceeds ours," Gupta notes cheerfully.

DataEase received no outside capital until last year, when it accepted project funding from the state of Connecticut and a minority investment from two venture capitalists. "We've developed a real corporate culture for bootstrapping," says Scalzi.

With over 100 employees, the company expects to post sales in the \$15

million to \$20 million range for the fiscal year ending in June. Before going public, it wants to double market share, show a solid profit history, and find friendly stock market conditions. "We need to maintain a product edge against better-financed competitors—and not just those that exist today, but Microsoft and Lotus as well," Gupta says. "We need the right strategic alliances, with office automation firms and server suppliers. And we need to stay on the right side of the profit line." —E. B.

## Intel Plans to Up the Ante With 80486 Processor

*High Cost Will Limit Sales*

The 80486 cometh. Any doubts on that score were settled by Intel's New Year's card, which included a drawing of the mighty new 32-bit microprocessor.

So what does a power-hungry PC user do in 1989? Should you hold off moving to an 80386-based machine? Get ready to sell the one you've got?

No on both counts. Though the first 486-based computers may be announced along with the chip this spring, they probably won't be available in volume until mid-1990, market watchers say. Even then they'll be used by only a select—but powerful—few.

Today's 386 PCs can carry out close to 5 million instructions per second (MIPS), but 486 sys-



tems may do 12 to 15 MIPS. Cramping more functionality on each chip will provide some of the gains—the 486 is likely to hold around 1 million transistors, compared with 275,000 or so on the 386. Other gains will come from higher clock speeds. But the 486 is also expected to have unusual features on board, like cache memory control and numeric coprocessing. And it won't sacrifice (continues)



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| E <input type="checkbox"/> DP/MIS Manager       | 5. How many PCs do you (your company) plan to purchase in the next twelve months? |
| 2. Which products are you most interested in?   | A <input type="checkbox"/> 1-10   |
| A <input type="checkbox"/> 286 architecture     | B <input type="checkbox"/> 11-20  |
| B <input type="checkbox"/> 386 architecture     | C <input type="checkbox"/> Over 21  |
| 3. Are you interested in computer products for: | 6. Is your requirement:   |
| A <input type="checkbox"/> Home                 | A <input type="checkbox"/> Immediate  |
| B <input type="checkbox"/> Business             | B <input type="checkbox"/> 1-3 Months   |
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| C <input type="checkbox"/> Reseller             | C <input type="checkbox"/> Over 21  |
| D <input type="checkbox"/> Corporate Purchaser  |   |
| E <input type="checkbox"/> DP/MIS Manager       | 5. How many PCs do you (your company) plan to purchase in the next twelve months? |
| 2. Which products are you most interested in?   | A <input type="checkbox"/> 1-10   |
| A <input type="checkbox"/> 286 architecture     | B <input type="checkbox"/> 11-20  |
| B <input type="checkbox"/> 386 architecture     | C <input type="checkbox"/> Over 21  |
| 3. Are you interested in computer products for: | 6. Is your requirement:   |
| A <input type="checkbox"/> Home                 | A <input type="checkbox"/> Immediate  |
| B <input type="checkbox"/> Business             | B <input type="checkbox"/> 1-3 Months   |
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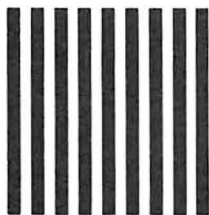
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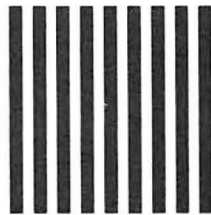
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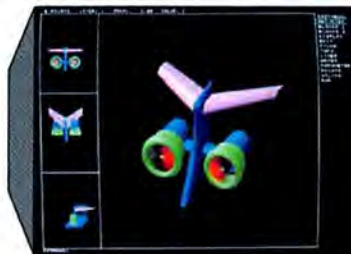
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DesignCAD 3-D version 2.0 is available from most retail computer stores, or you may order directly from us. DesignCAD 3-D is available in a number of foreign languages from distributors throughout the world. All you need to run DesignCAD 3-D is an IBM PC Compatible and 640K RAM. DesignCAD 3-D supports most graphics cards, printers, plotters and digitizers. Free information and a demo diskette are available by contacting us at:

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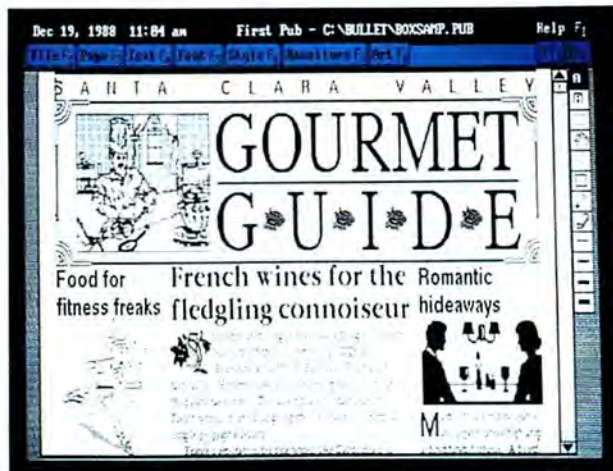
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# Tandy's DeskMate Interface Gains Support

*Promising Ease of Use in 384K*



Software Publishing revamped its popular *First Publisher* for the DeskMate interface.

International Data Corporation counts 17 million 8088 PCs out there, and almost none of them have more than 640K of memory. In that huge market *DeskMate 3.0* will be the interface of choice, declares Tandy chairman John Roach.

"We're not trying to compete with *Windows* or *Presentation Manager*," Roach says. And because *DeskMate* is an environment rather than a mere DOS shell, it exceeds the ambitions and scope of DOS 4.0.

Actually, the *DeskMate* label means more than one thing: the multiapplication packages that Tandy has sold since 1986, both separately and bundled into ROM; the shell that can launch any application; and the graphic interface.

Designed to run on machines with as little as 384K of memory and no

hard drive, the interface resembles *Windows* with its icon-based graphics, pulldown menus, and mouse commands. You can move quickly between tasks or cut and paste between *DeskMate* applications, but unlike *Windows* or *Presentation Manager*, *DeskMate* doesn't handle multitasking.

So far Tandy has bundled *DeskMate* with almost a million machines. Through its broad retail network—*DeskMate* is on the shelf in more than 600 Radio Shack Computer Centers and can be ordered through another 5400 Radio Shack stores—plus a multimillion dollar advertising campaign, Tandy virtually ensures that application developers will respond.

More than 100 software firms have requested *DeskMate* development kits since Tandy started

offering them, along with free worldwide licensing, last year. More than a dozen developers have unveiled products adapted to or expressly designed for *DeskMate*.

Software Publishing Corporation of Mountain View, California, is releasing *First Publisher* in a new version whose only significant addition is *DeskMate* support. "We think the *DeskMate* customer and the *First Publisher* customer are very similar," says product manager Jill Groginsky.

Star Software Systems of Torrance, California, publisher of *Accounting*

*Partner*, shipped its *Venture* business planning product as a *DeskMate*-based product with a runtime version of the interface. "Our main market is small business," explains Bill Webster, president of Star. "That led us to Tandy."

Tom Proulx, vice president of engineering at Intuit in Palo Alto, California, also wanted to tap Tandy's small-business connection, despite being "pretty iffy" about taking on the nine-month task of rewriting Intuit's *Quicken* bill-paying software for *DeskMate*. "We were pret-

*(continues)*

## Intel 486

*(continued)*

compatibility with earlier Intel processors.

The fireworks could be flashier still if Intel releases the N10, an even more secret chip based on reduced-instruction-set-computer (RISC) technology. An Intel scientific paper suggests that the N10 could be ten times faster than the 486, at least in some applications.

The N10 won't run standard IBM-compatible software. But as a coprocessor to the 486, the N10 should allow systems to carry out specialized math and graphics tasks at near-supercomputer speed, says Jake Richter, president of Panacea Inc., a Winchester, Massachusetts, consulting firm.

But most of us may never harness this horsepower. The 486 chip alone will probably cost about \$1500 initially, and systems employing it are expected to carry 8MB of extremely fast RAM and

300MB or so of disk storage. Translation: a price tag of \$15,000 or more for a desktop 486 machine, which puts it in the rarefied strata of workstations for engineers and other highly paid savants.

"Most users will be quite happy with the performance of a fast 386," says Michael Slater, editor of *Microprocessor Report*, a newsletter in Palo Alto, California. "I wouldn't be surprised if the 486 never exceeds 386 sales." The chip is expected to find widest use, in the first few years at least, in multiuser systems and LAN servers.

Keep in mind, however, that many people once believed the 80286 chip was too powerful for anything but multiuser systems. The 386 and then the 486 may ultimately repeat the earlier Intel generations' history of declining prices and broadening usage—especially as hot RISC chips begin to enter the market. —Don Clark



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# IBM, Compaq Clash On Graphics Standards

*CAD Users Lead Move Past VGA*



"So far, we've been able to set the standard in graphics," notes IBM's Peter McManus.

High-end PCs that run powerful computer-aided design software or advanced windowing environments already look like technical workstations, and their displays are gaining ever-greater resolutions. But vendors are taking conflicting routes past the VGA standard.

Having established the 640-by-480-pixel VGA standard and ignored the 800 by 600 extended VGA level offered by other suppliers, IBM says the customer's next major move will be to its 8514/A, which provides 1024 by 768 resolution. Increasingly, the 8514/A will start showing up in roles now filled by VGA, says Peter McManus, head of graphics hardware development at IBM's Hursley Park lab in England.

McManus says there's no technical reason why the 8514/A can't be squeezed into a single chip and plopped on the

motherboard. "In the normal course of evolution, that will happen in the next year or two," he predicts. The holdup is cost—particularly for memory chips, because the 8514/A needs roughly twice the memory of the VGA. (It's also right at the point where faster and more expensive video RAMs begin to make more sense than conventional DRAMs, McManus says.)

Beyond the 8514/A, IBM eventually will offer an optional graphics board with a dedicated processor to work as a busmaster on the PS/2's Micro Channel bus, McManus says. Additionally, he alludes to a need to move toward 1280 by 1024 resolution, but he declines to give further details.

Currently, IBM's \$1350 8514/A board requires a \$1620 IBM monitor with an interlaced display, in

which the electron gun draws every other line down the screen and then goes back and fills in the others. Noninterlaced monitors draw the screen line by line, which its adherents claim minimizes flickering and thus reduces eye fatigue. Interlacing "is a step backwards," declares Compaq product manager Lori Strong. That's one reason Compaq chose an alternate approach—its adapters offer the same resolution but differ in almost every other way.

Developed jointly with Renaissance GRX of Bellevue, Washington, Compaq's \$1499 board

speeds graphics performance by about five times via a Texas Instruments 34010 coprocessor. Compaq offers an accompanying \$1999 noninterlaced monitor, but the adapter also works with popular third-party monitors such as NEC's MultiSync 3D. It's targeted primarily at the 25 percent of Compaq buyers who run CAD applications, although Strong expects it to appeal to *Windows* and (eventually) Presentation Manager devotees as well.

Compaq's board is designed to coexist with rather than replace a (continues)

## DeskMate

(continued)

ty impressed with it," adds Proulx. "It's not flashy, it's not *Windows*, but it gets the job done." He expects *DeskMate*, and Tandy's lengthy coat-tails, to add up to 100,000 extra *Quicken* sales this year.

Symantec of Cupertino, California, still hasn't released the *DeskMate* version of *Q&A* announced a year ago, but the firm remains on the Tandy bandwagon. *Q&A*—or, more likely, *Q&A Write*—should be released by mid-1989, says David Watkins, vice president of data base products. Business-software developers want Tandy to segment *DeskMate* code more flexibly and ease overall memory restrictions. However, Roach is committed to holding down hardware prices, which will restrict the amount of memory in bottom-of-the-line systems and ensure that

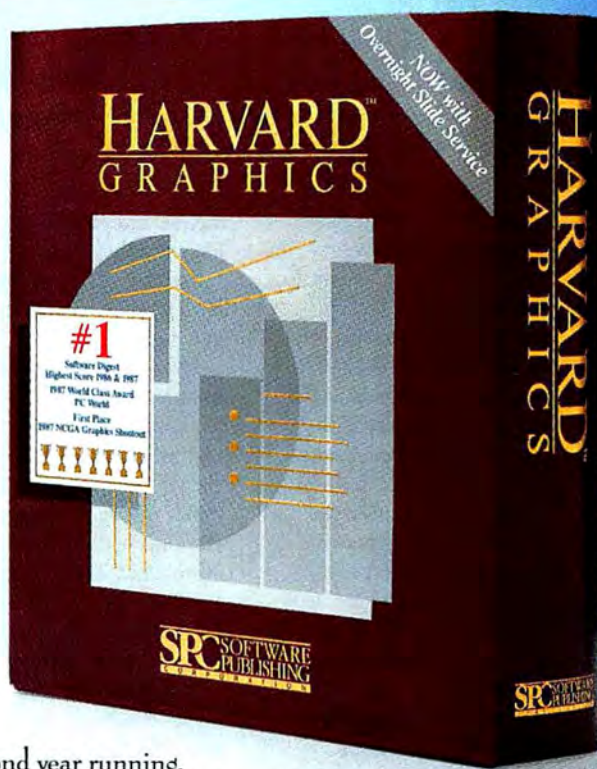
*DeskMate* applications will be similarly constrained.

On the other hand, Tandy is willing to talk to any other PC makers that wish to license the interface. Tandy will also exploit its monumental advertising clout to promote *DeskMate* sales by other major resellers. Among them is Babbage's, which will carry *DeskMate* in all 108 stores, says Gary Kusin, president of the Dallas software chain. "Tandy is putting personal computers in more households than anybody else," he explains.

*DeskMate* has as good a chance as any interface to dominate the low-end market, says IDC analyst Nancy McSharry. She cautions, though, that "the standard in the DOS marketplace, for better or for worse, is the DOS prompt. To get people to move beyond that requires a great leap of faith." —Mark Henricks



# A Few Words From The World's Most Celebrated Graphics Software.



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## Egghead

(continued from page 47)



Egghead's Victor Alhadeff aims "to put some fun in what for many people is an intimidating process."

couraged to try out packages, and every week each salesperson learns a new program—with training provided directly by the vendor. The fourth S is site—Egghead's goal is to operate several stores in each major market. Last but not least is sizzle—with Professor Egghead and eggserciating puns, Alhadeff says, "We're trying to put some fun into what for many people is an intimidating process."

How do the Five S's add up for customers? "Our experience has been good," says Linda Dienberg, section manager of end-user computing for Baxter Health Care. Egghead's staff has proved very helpful, she notes, and "they offer reasonable prices, although competition sometimes beats them out."

"Egghead is one of the few companies doing a professional job of retailing software," remarks Jeffrey Tarter, publisher of *Soft-letter* in Cambridge, Massachusetts. "The main advantage of

Egghead is that in the long run they're committed to software; they have a stake in what's going on."

Even competitors acknowledge Egghead's leadership in software-and-accessories stores, although it's not the only major player. Software Etc. has opened more stores, but its retail philosophy—placing outlets in upscale malls, with minimal training for salespeople—follows its bookstore heritage rather than the Egghead model. On the other hand, some retail heavyweights that have long dabbled in software, such as Businessland and Inacom, vow to match Egghead discount for discount.

They'll have to run to keep up. Egghead has rolled out Eggs-on-Legs, an on-site service program, and Egghead University, a classroom facility where users can learn how to run software. And it's test marketing a bigger, 5000-square-foot store called Egghead Plus.

Recognizing the shift toward a networked world, Egghead Plus stores will have an in-house PC network for demonstrating LAN applications, laser printer supplies and accessories, and vertical-market software. "Plotters and laser printers are growing in popularity," Alhadeff notes. "But where can you go for supplies? You have to get them from an office supply shop, or through a catalog." To solve this dilemma, Egghead Plus stores will carry supplies for a wide assortment of printers and plotters.

Half of Egghead's revenues, though, come from corporate sales—the company has direct-sales

staffs for national, government, and regional accounts. "Egghead certainly does a good job of servicing the customer," admits Mort Rosenthal, founder of rival Corporate Software in Westwood, Massachusetts. But Rosenthal adds that "the service is focused on the retail-store mentality as opposed to a corporate mentality."

Some industry observers caution that Egghead needs to consolidate its growth and concentrate on its operating margins. Wall Street also remains doubtful; analysts have nearly halved their profit projections since Egghead went public last year. —John Faulkner

## IBM, Compaq

(continued)

VGA adapter. At least for the short term, "this is likely to be a somewhat specialized product," Strong says. "We see all applications except CAD remaining at the VGA level for a while."

The migration beyond VGA will take even longer, of course, if software developers must support multiple graphics standards—and that's exactly what's happening. IBM wants developers to respect its high-level application programming interface for the 8514/A.

("That's what we released to the industry," McManus says.) But many developers chose instead to cut performance overhead by writing directly to the hardware for the 8514/A and its clones. As a third alternative, Compaq supports the architecture Texas Instruments is

building around its graphics coprocessor. Other chip makers (such as Intel, which offers a rival processor to TI's) and system vendors may take yet another approach. One ray of hope does shine through: Graphic environments like Presentation Manager mean that developers no longer need to write their own drivers.

"So far we've been able to set the standard in graphics," McManus says. "We would prefer to go on setting the standard." But here, as in other arenas, IBM may no longer play the leading role. —E. B. and Mike Hogan

*Don Clark is a business reporter for the San Francisco Chronicle, freelance writer John Faulkner is based in Oakland, California, and Mark Henricks is a contributing editor for PC World in Dallas. ●*



# TWO-FISTED MANAGEMENT



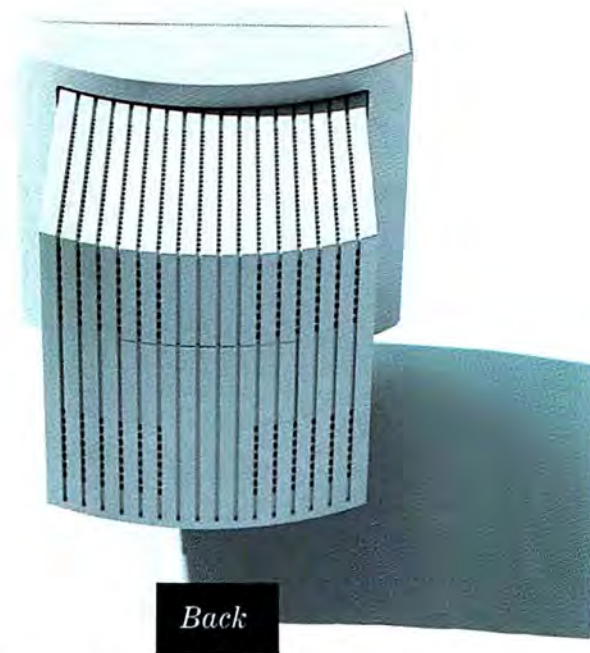


# Some views on why the NEC MultiSync

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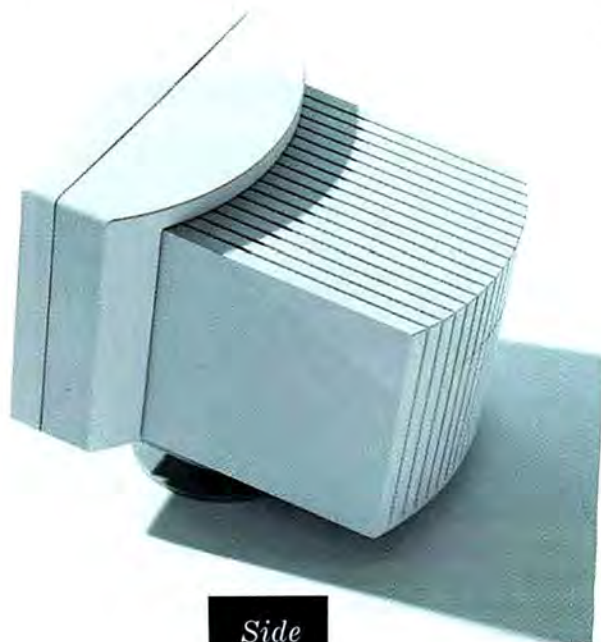


# 3D is the new monitor standard.

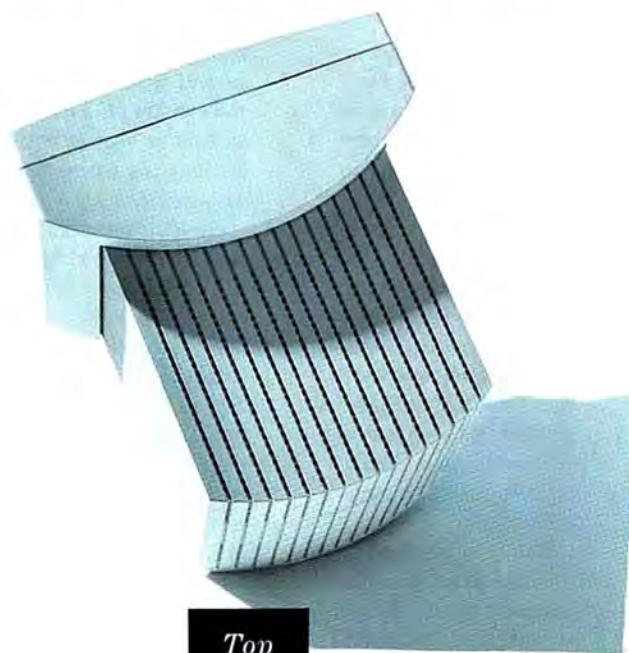
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# SQL Server: LAN-Tailored Data Management

SQL Server delivers powerful back-end data management based on the OS/2 LAN Manager.

Tony  
Lima

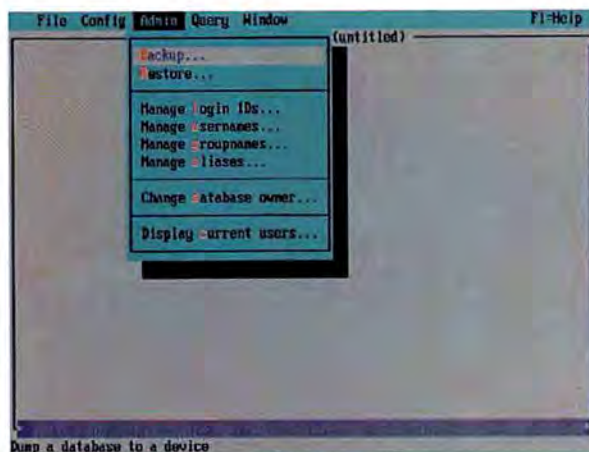
Network-based data managers work fine for most medium-size local area networks, but when you add data bases, servers, and users, performance suffers and administration becomes a nightmare. A better alternative is emerging—dedicated data base servers based on Structured Query Language (SQL) commands. Numerous vendors plan to offer SQL servers this year, but the Microsoft/Ashton-Tate *SQL Server* will be the one to beat.

Due to be released April 30, *SQL Server* will provide a robust SQL environment for programmers, including sophisticated administrative tools, transaction processing, and exciting new text

and image data types. Because *SQL Server* lets you spread data bases over several physical servers, you can fire off a query and get an answer without knowing where the data resides.

By splitting tasks between a dedicated back-end server and a front-end PC client, *SQL Server* improves performance on large data bases. Unlike a typical LAN-based data manager, which makes the PC workstation handle everything except file access, *SQL Server* handles processing and communications tasks and restricts the PC to data analysis and queries. Leveraging OS/2's multithreaded architecture, *SQL Server* suffers only slight performance degradation when you add users. In addition, you can fine-tune the system while users are on line.

*SQL Server's* upcoming front ends aren't yet available, but SQL versions of *dBASE* and *Paradox* are due this spring. Because you can simultaneously



**SQL Server's SAF utility provides superb administrative tools and an SQL query window on the data base. Yet most users will query the server via front ends built into upcoming versions of *dBASE* and *Paradox*.**

use different front ends with the same server, you're not locked into a single program. Nor are you limited to data bases—spreadsheets and other front ends are on the way.

Version 1.1 of *dBASE IV* will let you access *SQL Server* with SQL queries, via its Control Center interface, or by query by example (QBE). By modifying variable and file

names, you can convert existing *dBASE* programs to work with the server. Version 1.1 will feature an internal mapping library that will convert *dBASE* commands to SQL before passing them to the server. This arrangement should be much faster and easier than version 1.0's convoluted SQL scheme, which translates SQL into *dBASE* calls before execution.

**PC World** previews are informal assessments of products that at press time were still in the development stage. Complete reviews—including features evaluations and performance testing—will appear only after a product is officially released.



### The Price You Pay

*SQL Server's* key advantage over typical LAN-based data managers is speed. But you pay with a steep \$2495 outlay, massive disk and memory requirements, and a heavy investment in learning. Additionally, dedicated server hardware is a practical necessity.

The software requires a network running OS/2 and the *OS/2 LAN Manager*. Your PCs can run DOS as long as you install the DOS client software on each (at no extra cost), but performance may degrade somewhat. Each PC running DOS requires 640K of RAM, and PCs running OS/2 need at least 2MB. Each server requires 4MB of RAM and 15MB of storage, but 6MB of RAM and 20MB of storage are recommended.

Installing *OS/2* and *LAN Manager* is easy enough, but installing *SQL Server* is like trying to climb out of Dante's Inferno. Hopefully, the confusing beta documentation will be greatly improved.

### Tapping Transact-SQL

*SQL Server's* version of SQL, Transact-SQL, includes all the standard SQL commands (adhering to the IBM *DB2* set) plus 46 system procedures, 37 new or enhanced commands, 14 system functions, and 9 data type functions.

Transact-SQL is command driven and lacks a built-in QBE feature, but

excellent administrator utilities open up a window to Transact-SQL and manage the server program itself. You can use the interactive System Administrator Facility (SAF) or a batch mode programmer's tool called *isql*. SAF's pop-up menu interface lets you establish security levels, add users and servers, and issue SQL commands through a command window.

Transact-SQL includes stored procedures that access data base and system level information. Some of the major procedures define data types, check the amount of disk space taken by a particular table or index, determine common key columns in multiple tables, and report on current users and processes. To enforce data integrity and offer flexible data validation, *SQL Server* supports default values, rules, and triggered procedures.

*SQL Server* secures data in case of network crashes. Each transaction is logged to disk as it is posted, and the completed transaction and log entry are written to disk. If the system goes down, you can easily reverse any posted transactions and begin processing again without wasting time searching backup files. *SQL Server's* powerful transaction rollback feature allows intermediate saves and rollbacks.

### Moving Into Image Data

*SQL Server* looks forward to a future of image data management with a new binary image data type. Using this data type, you could program a front-end product to translate screen images into the *SQL Server* format and back again. Transact-SQL also includes partial matching functions that let you search for image data that approximates an image specified in the search command.

Word processing and hypertext vendors may want to add *SQL Server* support to tap the capacious new text data type. This type is similar to a *dBASE IV* memo field but much larger; you can make text fields as large as 2<sup>31</sup> (over 2 billion) bytes.

### Heated Competition

*SQL Server* won't be your only choice in this emerging category. *NetWare SQL* from Novell is already shipping. So is Gupta Technologies' *SQL:base*, which works with any major LAN operating system and offers stricter compatibility with *DB2* than *SQL Server* does. *Oracle Server*, due this spring, also will support a multitude of LANs and will include an extensive set of front-end tools, including built-in QBE. And later this year, you can expect IBM's OS/2 Extended Edition server, Microrim's *R:Server*, and still more contenders.

A true evaluation of

## SNAPSHOT

### SQL Server

One of the first of the new LAN-based data base servers, *SQL Server* offers good performance, powerful SQL queries, and excellent administrative tools.

#### KEY FEATURES

- Rapid query execution
- Management of massive data bases
- Useful extensions to basic SQL
- Transaction rollbacks
- New text and image types

#### AVAILABILITY

Release was scheduled for April 30, 1989.

#### PRICING

\$2495

#### Ashton-Tate

20101 Hamilton Ave.  
Torrance, CA 90502-1319  
213/329-8000

For more information,  
circle 670 on reader  
service card.

*SQL Server* waits upon the final versions of both server and front ends and better glimpses of its rivals. Meanwhile, the beta version shows great promise for data management designed from the LAN up. ●

*Tony Lima is a well-known dBASE programmer and seminar leader and the author of Inside dBASE IV (Addison-Wesley, Reading, Massachusetts, 1989).*



We keep telling people  
this is not a laser printer.



The \$995 HP DeskJet Printer.



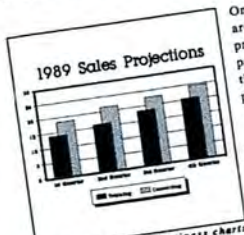
# But they keep looking at the evidence.



Mr. Arnold R. Jones  
220 Bush Street, Suite 845  
San Francisco, CA 94104

Dear Reader:

Imagine being able to put out merged text and graphics that look, in fact, that your clients will think you're using a laser printer. Now you're using the \$995 HP DeskJet printer instead.



This is one of many business charts you can print out on the HP DeskJet printer. Software for this text and graphics demonstration by Harvard Graphics.

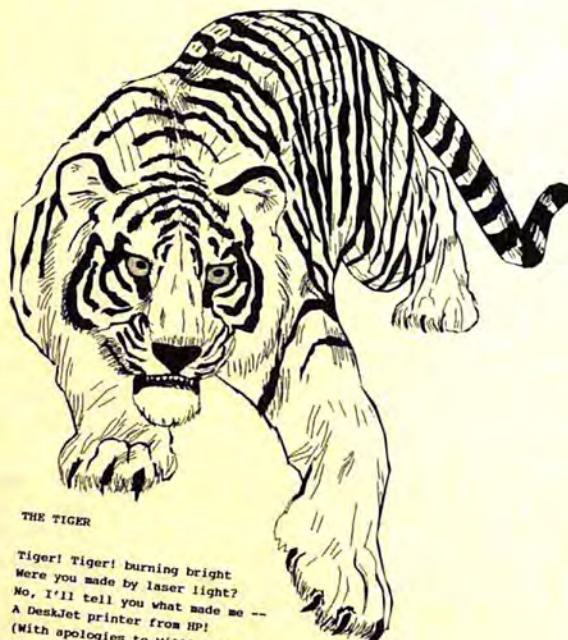
Sincerely,

*Alan Grube*  
Alan Grube

One reason you can't go around so easily is that your printer works with packages. So you can't use the PC, with you print it out quite

We call it a personal small price, for

Of course, how good a trip to you for yours



THE TIGER

Tiger! Tiger! burning bright  
Were you made by laser light?  
No, I'll tell you what made me --  
A DeskJet printer from HP!  
(With apologies to William Blake)

## MegaCorp 1988 Sales History



You may not believe your eyes, either. The HP DeskJet printer gives you the same crisp, black lettering. And clean, sharp graphics. But it uses advanced ink-jet technology to give you these laser-like qualities for the price of a 24-wire printer.

For just \$995, you get 300 dpi in a trim 15-pound package that sits easily on your desk. It has four built-in fonts, and over 100 optional fonts available in plug-in cartridges. With a 20,000-hour MTBF, it will keep working away for a long, long time. And it will do it all in blissful quiet.

So don't settle for a noisy dot matrix printer. Instead, call **1-800-752-0900, Ext. 296J** for a brochure and your nearest authorized HP dealer. Then judge the HP DeskJet printer for yourself.



**HEWLETT  
PACKARD**



# PRODUCT OUTLOOK

## 62 PRODUCT OUTLOOK

### **MultiSync 2A, MultiSync 3D**

Two good-looking multiscans. The color 2A packs more pixels than true VGA monitors, while the 3D courts corporate users with a passel of modes meant for OS/2 applications.

### **QuickPak Professional**

Quick solutions to BASIC problems from a package of utilities, routines, and tools.

### **Patrick Henry II**

Storage junkies, get ready for 2.6 gigabytes of headroom, speedy disk reads and writes, and built-in data protection.

### **Enhance**

Don't want to take the OS/2 road? *Enhance* retools DOS with the best features of UNIX and OS/2.

### **Vaccine Corporate**

Combat active viruses, police the use of applications within your company, and inoculate against future viral outbreaks.

### **Cause**

Even fledgling programmers can write applications that run on PCs and Macs alike—while *Cause* ghostwrites the manual.

### **Hitachi HM-4120**

If you need a big, top-quality screen, the 21-inch Hitachi flaunts 1280 by 1024 resolution that's sharp all the way to the corners.

## 70 BRIEFLY NOTED

### **IBM Proprinter III, Proprinter III XL**

These 9-pin Proprinters claim a ripsnorting 320 cps in draft mode and handle paper better than before.

### **AST Bravo/286**

Affordable and expandable, this no-wait-state 8-MHz machine conserves desk space.

### **T2400A, T2400B, T2400C**

Toshiba portables can improve their communication skills with this line of internal modems.

### **LaserKey**

Prepare quality presentations on transparencies with your laser printer and *LaserKey*.

## 72 UPDATE

### **Word For Word Professional 4.0**

A more intuitive interface and faster file conversions grace Mastersoft's update.

### **MS-DOS 4.01**

A classic gets better with expanded memory support, a DOS shell, and various bug fixes.

### **DataEase 4.0**

For building complex data bases, *DataEase* has added 70 features and supports expanded memory.

### **Tapestry II LAN Manager**

Integrate *LAN Manager* and *NetWare* file servers within the congenial confines of the *Tapestry* interface.

### **Byline 2.0**

Version 2.0 offers greater control over graphics and text and supports more printers and formats.

### **Managing Your Money 5.0**

An interface-lift, a 24-month budget period, and slicker loan calculations add finesse to this personal finance manager.

### **Bernoulli Box II/44, Bernoulli Boxes With PC-Kwik**

A well-known storage device becomes roomier and reportedly more than twice as fast.

### **Legend Twin Level III**

Now *Legend Twin* links and consolidates as many worksheets as RAM allows.



## MultiSync 2A, MultiSync 3D

### "Works Better!" "Looks Great!"

**P**icture a Miller Lite commercial set at a Chicago watering hole. But instead of burly football and hockey Munsters, you have a team of skinny PC engineers in plaid shirts arguing with a gaggle of artsy-craftsy types in Armani suits. Should customers buy the new NEC color monitors because they work better or because they look great? "Works better!" "Looks great!"

The folks who popularized multiscan monitors are stirring things up again with two versions of their popular VGA-compatible MultiSync that offer both better resolution and better looks. The MultiSync 2A pushes the color resolution envelope to Super VGA (800 by 600), while the MultiSync 3D takes it all the way to an interlaced 1024 by 768 resolution compatible with the IBM PS/2's 8514/A graphics adapter. Both offer what NEC calls a "360-degree ergonomic cabinet design" (read: looks good from the back).

The MultiSync 2A is a 14-inch analog color monitor with Super VGA and VGA (640 by 480) resolutions at what NEC insists is a VGA monitor price. But at \$799, the 2A offers 56 percent more pixels than VGA monitors do.

It also provides a black-matrix, dark-bulb tube with "non-long-persistence" phosphor for reduced flicker. It automatically scans at 56 Hz, 60 Hz, and 70 Hz vertically and 31.5 kHz and 35 kHz horizontally to sync with whatever VGA or Super VGA graphics board you've got.

The 14-inch MultiSync 3D (3 for third generation and D for digital controls with digital memory) incorporates the same high-quality tube as the 2A. But it's meant for users—particularly those in corporations—who run a variety of software but want to settle on a single monitor model. This monitor has all the latest modes, automatically scanning at 50 to 90 Hz vertically and 15.5 to 38 kHz horizontally.

NEC figures that for those using the OS/2 Presentation Manager, 1024 by 768 will be the mode of choice. (This is an interlaced mode, in which the electron gun draws every other line down the screen and then goes back and fills in the others. Other modes draw the screen line by line.) The 3D offers 10 preset and 19 user-defined scanning frequencies that can be set with front-panel digital controls. It retails for \$1049.

NEC engaged a Chicago design firm to come up with a new look for these monitors. The 2A and 3D have smaller footprints (about 14 inches high and wide and 16 inches deep). They sit on a tilt-and-swivel base with all their controls up front and a clean "visitor



From the maker of the original multiscan, the color MultiSync 2A serves up 800 by 600 pixels, while the MultiSync 3D boasts an interlaced 1024 by 768 resolution.

view" that doesn't show cabling, connectors, or labels. The cables extend from beneath the monitors, which are rounded for greater maneuverability within a limited work space. NEC Home Electronics, Inc., 1255 Michael Dr., Wood Dale, IL 60191; 312/860-9500. —Mike Hogan

Reader service no. 640

## QuickPak Professional

### BASIC Assistance

**I**f you're the designated BASIC guru at your company, you have a certain reputation to maintain, however informal the title. Even though the rep may be a little bigger than life, some intangible benefits go along with it, so you don't want to disappoint. And you won't have to when (as they say in the soap commercials) you

reach for Crescent Software's *QuickPak Professional*.

The next time your boss comes to you looking for a 1-2-3-style front end or a little interface magic for an ugly accounting program, you can dazzle him or her with pulldown menus, pop-up windows, and mouse support—without a big investment in time and patience.

A comprehensive set of Microsoft *QuickBASIC* tools, utilities, and routines, *QuickPak Professional* can make life easier not only for you, the BASIC guru, but also for professional programmers, students, scientists, or any BASIC hacker. Included are more than 300 canned solutions, written in either BASIC or speedier assembly language. All are easily tied in to those basic BASIC programs already lying around your office.

For example, *QuickPak Professional* comes with all of 1-2-3's financial func-





**QuickPak Professional** offers more than 300 QuickBASIC tools, utilities, and routines to help you build pop-up menus that will safeguard your reputation as BPAC (big person at corporation).

tions, so you can easily find averages and calculate interest payments. And if you want Lotus-like menus, they're available as well. Major utilities include a complete pulldown menu system with full Microsoft Mouse support. Also enclosed are a full-screen editor with word wrap and block operations, a pop-up calculator, a calendar, an ASCII chart, and a browse program.

Subroutines are added to your programs as they are compiled and linked, so no additional utilities are needed at run time. Tutorials and full source code are provided for each program. Each source listing contains extensive comments explaining how and why it works. *QuickPak Professional's* documentation provides tutorials on files, arrays, subprograms, sorting, and other capabilities.

About half of *QuickPak Professional's* toolbox routines are written in assembly language to perform functions that BASIC does slowly or not at all. You can speed up searching and sorting of

all types of arrays, access DOS and BIOS services, and do date and time arithmetic. And the new revision, which should be released by the time you read this, adds many more routines, including those for exploiting expanded memory. If all that doesn't satisfy the boss, maybe you should think about being your own boss.

Priced at \$149, *QuickPak Professional* can be used with *QuickBASIC 4.0* and *BASCOM 6*, with separate versions available for *QuickBASIC 2.0* and *3.0*. Crescent Software, 11 Grandview Ave., Stamford, CT 06905; 203/846-2500. —Glenn Grant

Reader service no. 641

## Patrick Henry II

### Storage Revolution

PCs pack formidable data processing punch into a small package. But the PC's meager storage capacity made massive data

bases minicomputer territory—until Patrick Henry II came along to declare independence.

This external hard disk subsystem from 1776 Inc. combines souped-up read/write performance with heavy-duty data storage to put a mini-size supercharge into AT-bus PCs. The tower system houses up to four 148MB, 338MB, or 650MB 5¼-inch removable Winchester disks for a maximum 2.6 gigabytes (GB) of formatted capacity. And 1776 claims average data access times from 0.5ms to 7ms, as compared to the typical AT or PS/2 hard disk's 28ms to 40ms.

The heart of the system and the key to its blazing performance is a built-in disk cache of up to 16MB, controlled by a dedicated Motorola 68000 processor. The 68000 tracks frequently used data in the cache and controls the read-ahead and write-back functions.

When the read-ahead function caches a requested sector, it automatically caches up to 4K of data following that sector, so Patrick Henry is always ready to go. The write-back function caches data to be written to disk. The computer continues its processing chores uninterrupted while in the background, Patrick Henry writes to the disk. You can increase the number of sectors that the subsystem reads ahead and adjust the size of the write-back cache with software utilities. A 9-inch CGA display monitors cache performance via the subsystem's memory-resident software.

If you need more than 3GB of storage, you can

daisy-chain up to 24 Patrick Henry units for a total capacity of 62GB. Patrick Henry II's disk union feature creates one disk partition that extends across several disks, up to 1GB. When you need more storage space, you can increase disk capacity incrementally without having to discard an existing drive.

Patrick Henry protects data with two optional tape backups and three levels of fault tolerance, called Fault Freedom. Tape backup comes in 150MB and 2.2GB capacities. Fault Freedom Level 1 remaps bad disk sectors on the fly and maintains duplicate copies of the directories and file allocation tables. Optional Fault Freedom Level 2 goes one step further by automatically duplicating the entire contents of a disk onto a second disk. If the primary disk finds a damaged sector, the subsystem automatically reads the duplicate data from the second drive and replaces the data in a good sector of the primary drive. If the primary drive fails altogether, the second one immediately takes over. Level 3 allows two computers to be attached to one Patrick Henry II so that if one computer fails, the other one can take over.

Patrick Henry II is available in three base configurations. The 148MB disk capacity unit costs \$12,250; add-on disks cost \$4350 each. The 338MB unit costs \$15,350, and add-on disks are \$6450. For the 650MB disk capacity, the price is \$17,550, with add-ons at \$8950. 150MB and 2.2GB





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Prices quoted are US Domestic suggested retail prices.



tape backups cost \$2750 and \$10,450, respectively. 1776 Inc., 452 Murietta Ave. #700, Sherman Oaks, CA 91423; 213/653-1776. —Wes Nihei  
Reader service no. 642

## Enhance

### Greater DOS Power

DOS is the operating system everyone loves to hate, but give Old Faithful its due: It gets the job done. Nevertheless, no one can deny that there's room for improvement.

*Enhance* is a memory-resident utility that teaches old DOS new tricks, borrowing some of the best features of UNIX, VMS, and OS/2, but without their highfalutin ways. Among the UNIX- and VMS-like capabilities, DOS gains more robust file management, the ability to retrieve up to 20 previously entered commands, and dynamic symbol definition and manipulation. *En-*

*hance* also adds OS/2's ability to enter and execute several commands at once, but without sacrificing standard DOS commands.

No mere DOS shell, *Enhance* sits between DOS and COMMAND.COM and executes from the DOS prompt. From there you can substitute symbols—words or letters—for single DOS commands, multiple commands, or parts of commands.

*Enhance* lets you use the symbol feature to swap a single letter for a DOS command—for example, *D* for *dir*. You can also use wild-card characters and special *Enhance* characters to string together several commands and define command parameters. For example, you can create a single macro-like command to list a directory, find file names with certain extensions, and copy the files to another directory. *Enhance* symbols can also contain other symbols.

If the idea of programming operating system

commands seems daunting, don't worry. *Enhance* provides 33 predefined symbols that you can rename or use with other symbols. You also can create symbols on the fly for a particular work session or save them for future use. *Enhance* enables you to enter more than one command at a time at the DOS prompt. In fact, you can execute as many commands as will fit on a single line.

For projects that demand DOS-intensive processing, *Enhance* conveniently recalls and displays a list of your last 20 commands. You can edit any command or use it in a symbol. To execute a command from the list, just highlight it with the cursor and press <Enter>.

*Enhance* also boosts DOS's file handling capabilities. For example, the SAVE command saves the current drive and directory so that after changing either, you can simply issue *Enhance*'s RETURN command to get back. And you can move, copy, or search for a group of files using wild-card characters, file extensions, and combinations of these and other parameters, such as a range of file names, not available in DOS alone.

*Enhance*, which lists for \$79.95, requires DOS 2.0 or a later version and 256K of memory. You can run *Enhance* in conventional memory or in expanded memory with a 6K kernel in conventional memory. Cortex Computing Corp., P.O. Box 116788, Carrollton, TX 75011-6788; 214/492-5124.

—Wes Nihei

Reader service no. 643



Vaccine Corporate tracks down invading computer viruses.

## Vaccine Corporate

### A Shot in the Arm

Sometimes a single symptom can reveal the presence of a widespread ailment. Such may be the case with computer viruses, whose recent proliferation hints at deep-seated weaknesses in the maintenance of corporate microcomputer software.

At the outset, *Vaccine Corporate* is your typical antiviral program: It tracks down and knocks off Trojan horses and other invading riffraff that can wreak havoc with your drives. But it doesn't stop there; the FoundationWare package is every bit as useful in auditing and controlling the usage of designated corporate applications.

*Vaccine Corporate* checks .EXE, .COM, and other files for signs of deviant code and protects direct writes to disk—features standard to most virus-stopping programs. The package also gives you a "Blue Disk" of 7000 program signatures

```
C:\>rec
** 20: type \autoexec.bat
** 19: prompt=$p$g
** 18: ret
** 17: dir *.doc,*.ar /excl=wp*.*
** 16: etime
** 15: mkdir backup
** 14: xfer /since=today-2 backup
** 13: save & cd \u\misc
** 12: dir /sort
** 11: move /r [bcl]*.doc \!\\backup
** 10: e read.me
** 09: cls
** 08: locate mail*.wp
** 07: sho
** 06: copy \u\annette\mail04.wp
** 05: setdir daily
** 04: dir [a-cl]*tmp.doc
** 03: return
** 02: show
** 01: wp newsletr
```

*Enhance* lets DOS users manage files better, dynamically define and manipulate symbols, and retrieve the last 20 commands entered (shown here).



# How Do You Fit THE BROOKLYN BRIDGE<sup>TM</sup> INTO YOUR OFFICE?



It's easy because The Brooklyn Bridge<sup>TM</sup> is the world's leading file transfer, file access and file management utility, and here's why: **IMPROVES PRODUCTIVITY & EFFICIENCY**

The Brooklyn Bridge is the fastest and easiest file transfer and printer sharing program. The Brooklyn Bridge works between any two IBM compatible desktop, laptop or PS/2 microcomputers with any size floppy or hard disk. The Brooklyn Bridge even gives you a sophisticated file manager and powerful DOS utilities. Whether you're a beginner or more experienced user The Brooklyn Bridge is tailored to your needs.

With The Brooklyn Bridge you have more benefits than



file transfer, without the headaches network problems cause.

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You can transfer an entire hard disk in just minutes while maintaining your hard disk integrity. And you can transfer specific directories and sub-directories or files. Now you can choose between our Serial and Parallel Versions. Our Serial Version gives you a transfer rate of 115,200 BAUD 10K bytes/sec at distances exceeding 50 feet. The Parallel Version gives you a transfer rate of up to 50K bytes/sec, equivalent to 500,000 BAUD at distances up to 15 feet. Both versions insure transfer accuracy with a full 16-bit CRC error check.

Most networks can even be accessed so you can transfer files from a network to a remote PC. **CONVENIENT PERIPHERAL SHARING**

Keeping files current between your desktop and laptop computers is just one benefit of The Brooklyn Bridge. You can also access any remote printer or peripheral devices such as plotters, Bernoulli Boxes, tape back-up systems, optical disks and more. One printer can now efficiently work for two people.

## **EASY DISK ORGANIZATION**

The Brooklyn Bridge file manager is so comprehensive it rivals stand-alone products. It has over 150 point-and-shoot operations for organizing files on your disk including file viewing, tagging, and sorting of directories and files. Files can be viewed from local and remote computers in a full-

screen, dual directory display, in directories, sub-directories, or in a visual tree. The Brooklyn Bridge gives you optimum disk navigation so you'll never misplace a file!

## **POWERFUL DOS PROCESSING**

Because The Brooklyn Bridge

provides you with innovative utilities like BK (back-up), RM (Remove), MV (Move), and CP (Copy), DOS processing becomes faster and more efficient. The Brooklyn Bridge can double your

processing power with the RUN utility. It lets you run applications on your remote computer from your master computer.

## **THE BROOKLYN BRIDGE**

## **THE SMALLEST RESIDENT RAM REQUIREMENTS**

While other link-up programs require 140K of resident RAM, The Brooklyn Bridge requires less than 5K! The Brooklyn Bridge works in the background and cannot interfere with your other applications.

Most importantly, The Brooklyn Bridge comes with everything you need. You receive both 5.25 and 3.5 inch diskettes, a complete reference manual, and either a Serial or Parallel Cable. Specify Serial Version for the 8-foot Universal Cable or Parallel Version for the 6-foot Parallel Cable. Your choice for only **\$139.95!**

A "Desktop-to-Desktop," 50-foot Universal Serial Cable is available so you can connect computers in separate offices for only **\$30.00.**

Order The Brooklyn Bridge from your local dealers or call White Crane Systems at **(404) 446-0660.**

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Suite 180

Norcross, GA 30071

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See us at Booth 6068

**COMDEX/Spring '89**

Circle 47 on reader service card

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against which you can check bulletin board or library software for signs of tampering.

But *Vaccine Corporate* goes further still: You can specify the programs that may run on a particular computer, which not only helps stop viruses but also lets micro managers control the user's computing environment. That capability promotes software standards and ensures maximum return on training and support dollars.

*Vaccine Corporate* provides a usage record showing which software packages have run on a micro. This information can reveal patterns of unauthorized use or, in the worst case, help track the propagation of an active virus. The program also automatically creates a "critical disk" containing the file allocation table and other crucial data, along with the battery-maintained system setup contained in AT- and 386-class machines. That way, in the event of battery failure or a crash (whether accidental or software-caused), you get your hard disk back fast.

In short, *Vaccine Corporate* is a full-featured bug-protection program with a generous helping of utilities, as helpful for maintaining and controlling program usage as for combating viruses.

*Vaccine Corporate*, which retails for \$189, requires DOS 3.0 or a later version, 384K of memory, and a hard drive. FoundationWare, 2135 Renrock Rd., Cleveland, OH 44118; 800/722-8737. —Mark Henricks  
Reader service no. 644

## Cause

### PC to Mac and Back

As Macintoshes crop up in corporate environments once monopolized by IBM compatibles, demand increases for in-house programs that link the two environments. But who has the time to learn to program on a new machine? With *Cause*, you already know how. This new object-oriented programming tool lets even a modestly talented programmer produce applications that run on both PCs and Macs.

It's as easy as pointing at *Cause*'s icons and color keys and clicking through a series of windows, each named for a typical task such as Compute, Decision, Display, End, and Report. Data storage and retrieval links are already set up, so you have only to define data—arranging it in items, folders, drawers, and indexes—and instruct the program how to work with it.

If you can navigate spreadsheet or data base macros, you should be able to create unique *Cause* applications in a matter of hours. It's essentially an intuitive graphic user interface atop a structured data base whose fortes are data entry, storage, manipulation, and reporting.

Programmers using *Cause* have already created more than 100 applications, ranging from professional service time-and-billing packages to payroll and video store management programs. Maxem is selling these *Cause*-created applica-

tions, dubbed *Effects*, for \$29 to \$99, including source code.

*Cause*'s best feature, though, is cross-compatibility. The program runs on any PC or Mac with at least 512K, and it's shipped on IBM-format 5¼-inch, IBM 3½-inch, or Apple Macintosh 3½-inch disks. The interface appears the same whether you work on an Apple or a PC, and any *Effect* you *Cause* will run on a PC or Mac. All that's necessary is to compile the program for the appropriate machine. Likewise, data files are cross-compatible.

Even ace programmers can become tongue-tied when it's time to write the user manual, so *Cause* automatically writes the manual as you create the program. After you've finished, a simple command prints out a manual complete with table of contents, introduction, index, and appendix.

The consumer version of *Cause* retails for \$495. A \$595 professional version includes a renewable one-year license for an un-

limited number of run-time applications. Maxem Corp., 1550 E. University Dr., Mesa, AZ 85203; 800/336-6296. —Mark Henricks  
Reader service no. 645

## Hitachi HM-4120

### Clearly Ahead

Hitachi's HM-4120 is a big, 21-inch monitor with a razor-sharp resolution of 1280 by 1024. It can slice and dice distortion right out of your CAD drawings and make details shine, even in the corners of your screen.

If you're an architect or another high-end CAD/CAM user, you may have wondered why close parallel lines blur together in the corners of the screen. That's because most monitors make a single focus adjustment for the entire screen. The farther an image is from the center, the greater its distortion. The HM-4120's circuitry automatically corrects focus for each area of the



The Hitachi HM-4120's big 21-inch display features razor-sharp resolution of 1280 by 1024 that eliminates distortion and makes CAD details sharp even in the corners.



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All artwork shown was created using Artline.

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Circle 266 on reader service card



screen, so even the corners maintain uniformly sharp focus.

Working in color, you'll view truer hues at high brightness levels. Hitachi uses a nickel alloy in its shadow mask (the thin sheet of metal behind the screen), which withstands heat better than typical iron masks. And blacks, whites, and grays don't merge into a muddy mix.

Pushing very-large-scale silicon integration, Hitachi cut the number of parts by 25 percent over its previous monitors, producing a more compact unit. The HM-4120 retails for \$4190. Hitachi America, Ltd., 19530 Cabot Blvd., Hayward, CA 94545; 415/785-9770.

—Mark Henricks

Reader service no. 646

## BRIEFLY NOTED

### IBM Proprinter III, Proprinter III XL

IBM's new 9-pin printers—the 80-column Proprinter III and the wide-carriage, 132-column Proprinter III XL—feature improved paper handling, expanded front-panel controls, and speedy draft printing.

The Proprinter III's Propark paper parking feature corrects a problem encountered with earlier models—losing the currently loaded sheet of fanfold paper before you could print a cut



IBM's new Proprinter III and wide-carriage, 132-column Proprinter III XL handle paper well, work fast in draft mode, and have an ample array of front-panel controls.

sheet. Now a single button press from the front panel triggers Propark, which enables the printer to print a single sheet without wasting fanfold paper. Envelopes and single sheets feed through a convenient front-load slot.

In addition to activating Propark, the Proprinter III's front panel controls let you choose among five resident fonts, eight pitches, and four print modes. Default settings are selected via a printed menu.

The Proprinter III and the III XL are ideal for fast drafts; IBM claims that the printers' Fastfont mode produces draft text at a blazing 320 characters per second (cps). The printers also offer print speeds of 270 cps in 10-characters-per-inch (cpi) draft mode and 65 cps in 10-cpi near letter quality. Each model is equipped with a built-in parallel port and a 7K buffer (expandable to 32K).

The new Proprinters don't come cheap; prices are \$699 for the Proprinter III and \$939 for the III XL. IBM, 900 King St., Rye Brook, NY 10573; 800/447-4700.

Reader service no. 647

### AST Bravo/286

Figuring that it's time for PC and XT users to move up to an 80286-based unit, AST Research has introduced an 8-MHz, zero-wait-state computer called the AST Bravo/286. The basic system is equipped with an 80286 processor, 512K of memory expandable to 4MB on the motherboard and

16MB overall, and both floppy and hard drive controllers.

The system employs AST's custom silicon and surface-mount technologies to provide maximum expandability in a small footprint (15 by 15¼ by 5 inches). It comes with one 8-bit and three 8/16-bit expansion slots and can hold two half-height storage devices. Also standard are a 101-key keyboard; a serial port; a parallel port; support for an 80287 math coprocessor; the ASTcache software for creating a 32K to 1MB disk cache; AST setup programs; and ASTute diagnostics software.

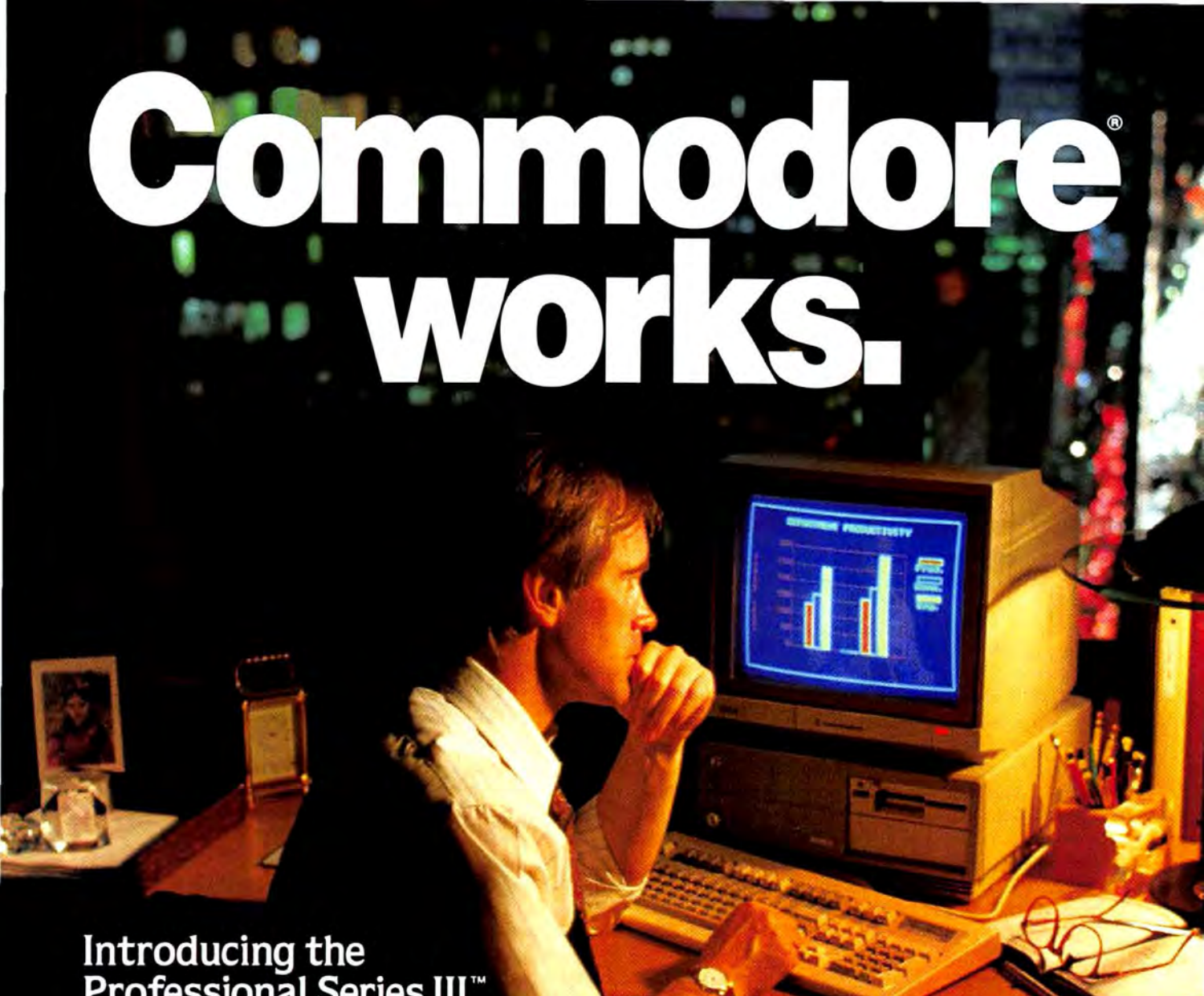
The AST 286 comes in three configurations: the \$1095 diskless Model 1, the \$1245 Model 5 with a single 5¼-inch floppy drive, and the \$2095 Model 45 with a 28ms 40MB hard drive. Displays and graphics adapters are op-



The 8-MHz, zero-wait-state AST Bravo/286 employs AST's custom ASIC, surface-mount, and VLSI technologies to provide maximum expandability in a small footprint. It still offers one 8-bit and three 8/16-bit expansion slots and holds two half-height storage devices.



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\*Four in PC40-III, three in PC10/20-III.

Circle 73 on reader service card





LaserKey's 19 predesigned formats in both vertical and horizontal layouts let you whip out presentation-quality text charts for overhead projectors.

tional, as is a \$275 1.44MB 3½-inch floppy drive. AST offers a \$195 monochrome monitor and both EGA and VGA color monitors at \$695 each, as well as \$445 AST-VGA 8-bit or \$599 AST-VGA Plus 16-bit adapters. You also can select another brand of adapter or display. AST Research, Inc., 2121 Alton Ave., Irvine, CA 92714; 714/863-1333.

Reader service no. 648

## T2400A, T2400B, T2400C

Toshiba America has introduced a new line of internal modems for its portables. These 2400-bps, Hayes-compatible modems are faster than the 1200-bps modems currently available and consume less power, extending battery life. The modems are activated by an interrupt from your communications package. When the interrupt is completed, the modems turn themselves off.

The T2400A fits the dedicated modem slot on the T1100 Plus, T1200

series, T1600, T3100, T3100/20, T3100e, T5100, and T5200, while the T2400B fits the T1000. Both retail for \$399. A \$349 T2400C fits the T1200 series and T1600 portables. Toshiba's 1200-bps versions have dropped \$50 in price to \$349, except for the 1200-bps modem for the T1000, which has dropped \$100 to \$299. Toshiba America, Inc., Information Systems Division, 9740 Irvine Blvd., Irvine, CA 92718; 800/457-7777.

Reader service no. 649

## LaserKey

At \$99.95, *LaserKey* is an economical way to make laser printers useful to managers, secretaries, and anyone who has to prepare text charts for presentation with overhead projectors.

*LaserKey* presents you with 19 predesigned formats, such as bulleted lists and numbered columns, in both vertical and horizontal layouts. You make your selection through an economical,

menu-driven command structure. Enter the information in fields prepared with preset type sizes and fonts, then load the film in your laser printer paper tray. A minute or so later you can view it on your overhead projector.

*LaserKey* also includes formats for labels, decals, and memos. Arkwright, which manufactures film, ships *LaserKey* with a

supply of clear and colored film and an assortment of labels and stick-on letters. The program requires DOS 2.0 or a later version and 256K of memory and is compatible with either Hewlett-Packard LaserJet II or PostScript-compatible laser printers. Arkwright Inc., 538 Main St., Fiskeville, RI 02823-0139; 800/942-5900.

Reader service no. 650

# UPDATE

## Word For Word Professional 4.0

Version 4.0 of MasterSoft's *Word For Word* features a new interface that lets you execute all commands either by selecting them from its menus or by entering them from the command line. The file conversion utility offers

more options for multiple file conversions and more format types—including *WordPerfect 5.0* and *XyWrite III Plus*.

Despite the additional menu options, *Word For Word* won't slow you down because it lets you default to your most often used subdirectories and file format choices. A brief help



With *Word For Word Professional 4.0*, you can execute commands by highlighting and selecting them from easy-to-follow menus. Version 4.0 offers more options for multiple file conversions and more format types—including *WordPerfect 5.0* and *XyWrite III Plus*.



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Circle 309 on reader service card



note for each menu selection is given at the bottom of the screen.

Mastersoft has rewritten its conversion modules to increase the speed of conversions by 25 to 50 percent and make them more complete. The program, which requires DOS 2.0 or a later version and 256K of memory, retails for \$149. Registered users can order upgrades for \$29.95 by mail or telephone. Mastersoft, 4621 N. 16th St. #B210, Phoenix, AZ 85016; 800/624-6107, 602/277-0900. Reader service no. 651

## MS-DOS 4.01

Microsoft is shipping an update of the latest DOS to systems makers other than IBM. In addition to fixing bugs discovered in IBM's PC-DOS 4.0 released in July (no MS-DOS 4.0 was released to compatibles makers), MS-DOS version 4.01 includes support for EMS 4.0 and all major expanded memory boards, and a driver that enables 80386 extended memory to simulate expanded memory. Its MEM utility lets you see a map of conventional memory utilization, and version 4.01 addresses hard drive partitions larger than 32MB.

DOS 4.01 includes both a tree directory and a DOS shell that lets you organize files, start applications, and select DOS commands in point-and-shoot fashion using pull-down menus and dialog boxes as well as the traditional DOS command line. Microsoft distributes DOS only through hardware manufacturers, who

in turn bundle it with their products and offer it as an upgrade through retail stores.

## DataEase 4.0

Version 4.0 of the *DataEase* data base development system sports more than 70 added features, including a new forms design editor, support for EMS 4.0, and enhancements to its query system.

Multiforms is a full-screen editor that enables you to build standard forms to automatically update and send appropriate data to as many as 32 associated files.

In addition, with version 4.0 *DataEase Query Language* gains 18 commands. Among additional capabilities, it allows you to break long reports into modules or call up only a portion of a report. *DataEase* claims that as a result of its new indexing algorithms, version 4.0 runs faster in both single-user and network modes. Its enhanced memory

management gives each file a capacity of 2 billion records.

*DataEase 4.0* is priced at \$700 for the single-user version and \$750 for the Workstation Pack for three network users. It requires DOS 3.1 and 640K of memory on both server and workstations, and is compatible with Novell, 3Com, and other NetBIOS-compatible networks. Upgrades are available for between \$125 and \$175, depending on your current version. *DataEase Int'l, Inc.*, 7 Cambridge Dr., Trumbull, CT 06611; 800/243-5123. Reader service no. 652

## Tapestry II LAN Manager

Torus Systems has incorporated Microsoft's OS/2 *LAN Manager* into its *Tapestry II* network and renamed it *Tapestry II LAN Manager*. The new edition offers you a high-performance file and printer server with the

same iconic interface of past *Tapestry II* releases. Over the long term, it will also handle upcoming OS/2 distributed applications. The latest version supports all *LAN Manager* transport protocols and seamlessly integrates both OS/2-based and DOS-based *Tapestry* file servers.

*NetWare* servers can be added to the same network using the *NetWare Integration Option*, which can be installed on any workstation that runs Novell's *NetWare* network operating system. The *Integration Option* requires an additional 54K of memory and an equal amount of disk storage. It retails for \$295 per *NetWare* server for an unlimited number of users.

The \$2995 *Tapestry II LAN Manager* starter pack with the software for a single *LAN Manager* server permits eight workstations per network. It includes OS/2 Standard Edition 1.0, and it requires DOS 3.3 and 640K of memory on both server and workstations. Torus Systems, 240 B Twin Dolphin Dr., Redwood City, CA 94065; 415/594-9336. Reader service no. 653

## Byline 2.0

Version 2.0 of Ashton-Tate's *Byline* desktop publisher lets you stretch, shrink, invert, rotate, and print lines of text in landscape mode. You can do all of the above with graphics and adjust spacing between words and letters in labels.

The software now supports a mouse and additional dot matrix and laser printers, including the

The screenshot shows a form titled "Customer" with a "Record found" status. The form contains the following data:

Customer #: 37362  
 Name: West Construction Company  
 Address: 2400 West Neck Road, Westborough, MA 01581  
 Phone: (516) 421-1337  
 Fax: (516) 421-1313  
 Contact: Paula Santucci

Below this is a table titled "INVOICES FILE":

Inv. #	Inv. Date	Terms	Delivery	Pay	Inv. Amount
128344	01/23/88	Net 60	UPS	yes	1,623.18
128821	02/07/88	Net 60	First Class	no	845.88
121366	10/18/88	Net 30	Blue Label	no	35,279.27

Below the table is a summary: "Total Purchase to Date: 37,747.36".

Below that is a table titled "PAYMENTS FILE":

Invoice #	Am. Due	Date Recd	Chk No	Am. Paid
128344	1,623.09	01/29/88	33299	1,623.09

Below the table is a summary: "Total Payments to Date: 1,623.09".

The forms design editor shown here is one of 70 new features in version 4.0 of the *DataEase* data base development system. Multiforms lets you build standard forms that automatically update data and send it to as many as 32 separate files associated with those forms.





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## Model 9841-File Server

**\$5199**

80386-25 CPU, 6/25 MHz clock speed, zero wait state, w/2MB 32-bit RAM, maximum 8MB on motherboard, two serial & one parallel ports, Phoenix BIOS, 1.2MB floppy drive, Perstor HD/FD controller, 130MB hard disk drive capacity (28MS access time), monographics card, 101 keyboard, amber monitor.

Same system w/290MB hard disk capacity

**\$6549**

Same system w/4MB, 290MB hard disk capacity

**\$7329**

## Model 9671

**\$2499**

80386-16 CPU, 16MHz clock speed, zero wait state, w/1MB 32-bit RAM, maximum 33MB 32-bit RAM, two serial & one parallel ports, AMI BIOS, 1.2MB floppy drive, 1:1 interleaved HD/FD controller, 40MB hard disk drive, EGA card, 101 keyboard, EGA monitor.

All systems include a one year nation wide on-site service.

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Stretch, shrink, invert, rotate, or print lines of text in landscape or graphics mode with Ashton-Tate's Byline 2.0 desktop publisher.

Hewlett-Packard LaserJet Plus and Series II. *Byline 2.0* imports more graphic file types—including *AutoCAD*—and *DisplayWrite* Document Content Architecture/Revisable Format Text for formats. Priced at \$295, *Byline 2.0* requires DOS 2.1 or a later version and 512K of memory. Upgrades are available for \$35. Ashton-Tate, 20101 Hamilton Ave., Torrance, CA 90502-1319; 213/329-8000. Reader service no. 654

## Managing Your Money 5.0

*Managing Your Money* gains a revamped interface and jettisons copy protection in version 5.0. In addition, the personal finance manager now lets you budget for 24 months and calculate loans with up to three different payment or interest alternatives. Version 5.0 stores a historical record of net worth, more effectively supports laser printers for printing checks, and lets

you archive expired appointments. The program requires DOS 2.0 or a later version and 256K of memory. Updates are available for \$49.95 by calling MECA Ventures Inc., 355 Riverside Ave., Westport, CT 06880; 203/222-9150. Reader service no. 655

## Bernoulli Box II/44, Bernoulli Boxes With PC-Kwik

Iomega is shipping a new 5¼-inch form factor Ber-

noulli Box II/44, which provides 44.5MB capacity and an average access time of 32ms, compared to 40ms for the original Bernoulli Box and Bernoulli Box II. A single-drive internal mount kit sells for \$1399, while a dual-drive external version sells for \$2799.

Iomega has incorporated a disk caching process in all Bernoulli drives that it claims more than doubles their speed. Iomega is bundling the *PC-Kwik* cache software from Multisoft Corporation with the Bernoulli Box, Bernoulli Box II, and Bernoulli Box II/44 so that frequently accessed data is stored in cache memory. The cache has a hit rate of 50 to 70 percent for a standard DOS application. The caching software is available for \$39 to current owners of Bernoulli drives.

Additionally, Iomega has more than doubled Bernoulli drives' mean time between failures to 25,000 hours. Tests revealed the life expectancy of Bernoulli cartridges to be five years, leading Iomega to extend its cartridge warranty to a year, up from 90 days. Iomega Corp., 1821 West 4000

South, Roy, UT 84067; 801/778-3000. Reader service no. 656

## Legend Twin Level III

Mosaic Software has included worksheet linking and consolidation in the most recent release of its 1-2-3-compatible spreadsheet. *Legend Twin Level III* lets you link the cells of two or more worksheets active in memory or on disk and consolidate their results later. The program lets you load as many worksheets as memory allows, and it both recalculates in the background and limits its recalculations to those cells affected by changes. *Legend Twin Level III* also lets you define your own @ functions from any mathematical formulas you have built into your worksheets.

The program, which requires DOS 2.0 or a later version and 640K of memory, sells for \$249. It is file compatible with 1-2-3 and its own past versions. Updates from *Twin Classic* are available for \$109, and from *Twin Advanced* and *Diamond* for \$199. Mosaic Marketing, Inc., 1972 Massachusetts Ave., Cambridge, MA 02140; 617/491-2434. Reader service no. 657

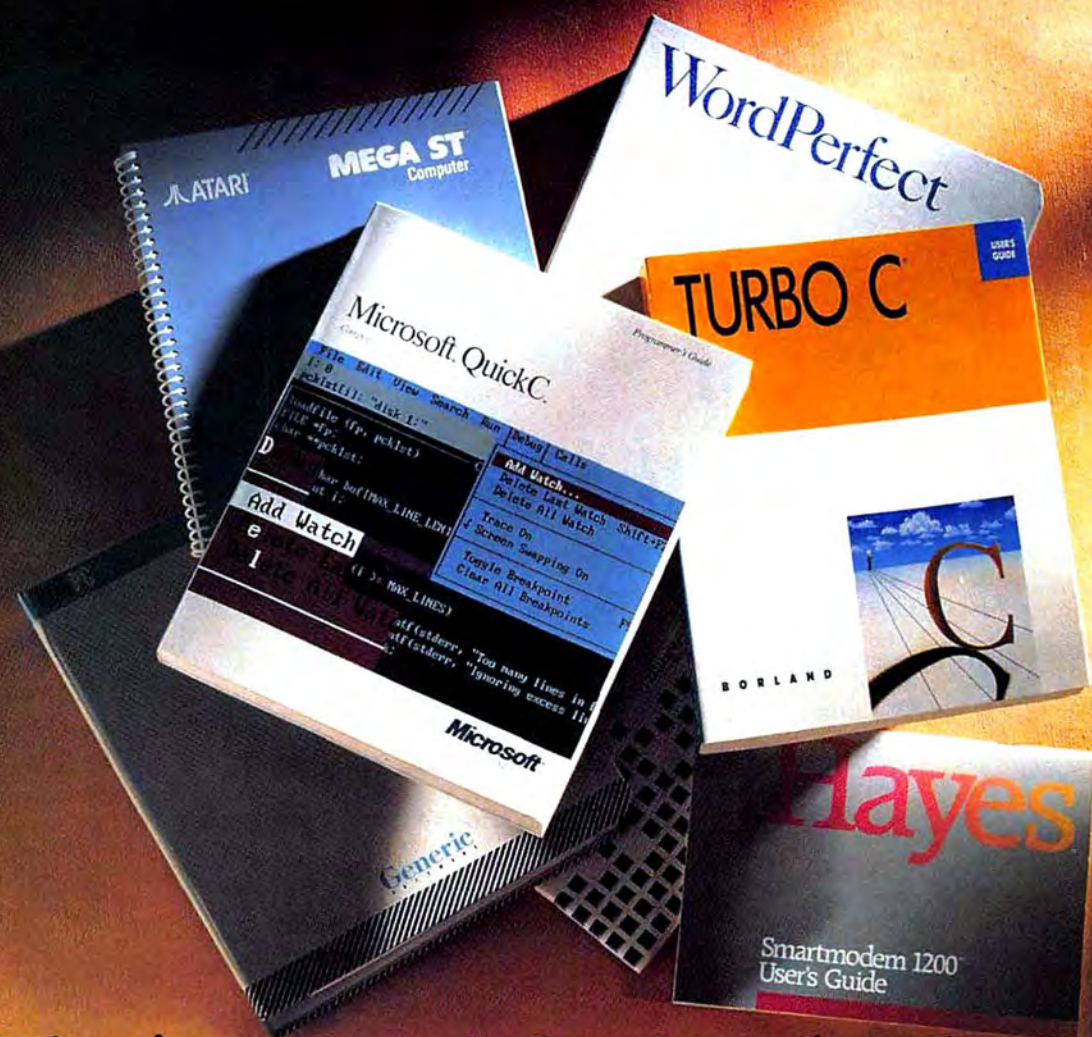
For more information about any product, contact the manufacturer or circle the number on the reader service card. ●

Wes Nihei is an assistant editor for *PC World*, Mark Henricks is a contributing editor in Dallas, and Glenn Grant is a freelance writer based in San Diego.



Iomega is bundling *PC-Kwik* cache software from Multisoft with the Bernoulli Box, the Bernoulli Box II, and the new 5¼-inch-form-factor Bernoulli Box II/44, which has a 44.5MB capacity.





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## 16-MHz 386s: Safe Bets for the Nineties

**You can buy a 16-MHz 80386 for  
little more than what you paid  
for an AT clone a year ago.**

**But with a wide range of features  
and prices to choose from, you'll  
have to do some comparison  
shopping to land the best deal.**

**TJ  
Byers**

**A**s the cutting edge of 80386 performance shifts to 25-MHz systems, the steady, reliable 16-MHz machines that once represented the ultimate in speed and power have plummeted in price. This means that an 80386 powerhouse, capable of running 80386-specific software and multitasking DOS applications via *Windows/386* or *Desqview/386*, is finally within the reach of even the most budget-conscious business buyers.

Of course, there's a wide range of prices and feature sets to choose from, so *PC World*, in conjunction with National Software Testing Laboratories (NSTL), tested nine of the most popular 16-MHz 80386 systems to find out what's hot and what's not.

The two fastest systems were the Everex Step 386/16 and the Tandon 386/16. The slowest machine was the Mitsubishi MP386, which was also the only system that ran into any trouble on the NSTL Crash Test.

The systems were set up to adhere as closely as possible to the standard *PC World* 16-MHz configuration: 2MB of 32-bit RAM (to allow headroom for running *Windows/386* or *OS/2*), a 1.2MB floppy drive, a 40MB hard disk with a standard ST505/412 disk controller, at least one parallel and one serial port, a 101-key keyboard, a VGA video board and color monitor (where possible), and DOS. Prices (which ranged from \$4913 to \$7402) were calculated accordingly.

Of course, not all systems fit the configuration perfectly. For example, the American



Mitac Paragon 386 comes standard with both a 5¼-inch and a 3½-inch floppy drive, plus a SCSI hard disk. Variations from the standard configuration are noted in the individual reviews.

### Acer 1100/16

The Acer 1100/16 is the kind of system budget-conscious users dream about. It holds third place in NSTL's speed trials, comes with both on-site *and* depot (authorized drop-off site) warranties, and sports a reasonable \$5699 price tag in the standard PC World configuration.

Systems with memory caching are usually faster than those with interleaved memory, but the Acer is the exception to the rule. Although it uses an interleave scheme, its excellent memory-access algorithm speeds it past everything else in the roundup except the Everex Step 386/16 and the Tandon 386/16.

The 1100/16 uses RAM chips on the motherboard rather than the smaller single in-line memory modules (SIMMs) now used by most vendors. Motherboard memory is expandable to 4MB; a 32-bit slot accepts a 4MB memory expansion board that raises the tally to 8MB, and a 4MB daughterboard brings the CPU-speed RAM capacity to a healthy 12MB.

The Acer's expandability is also decent. There are three externally accessible half-height drive bays and one internal full-height bay. The machine comes with five 8/16-bit slots and two 8-bit slots; you'll end up with



Acer's affordable 1100/16 combines good performance, a decent 12MB CPU-speed-RAM limit, and a one-year warranty that includes four months of on-site service.



The blazing Everex Step 386/16 is the fastest system in the roundup and includes a full year of on-site service—plus outstanding slot and memory expandability.



**EXECUTIVE SUMMARY****Acer 1100/16***16-MHz 80386 computer*

The Acer 1100/16 is both fast and affordable. Device and slot expandability are good, the warranty includes four months of free on-site service, and you even get *Windows/386* at no extra cost. Its only drawback: 32-bit RAM is limited to 12MB.

	POOR	FAIR	GOOD	EXCELLENT
Memory bus capacity			●	
Expandability			●	
Ergonomic design			●	
Performance				●
Overall value				●

four 8/16-bit slots open once you've installed a disk controller, an I/O adapter, and a video board. The motherboard supports both the 80387 and Weitek coprocessors.

CPU speed is unusually flexible. You can use the keyboard to step down from 16 MHz to 4.77 MHz in six incremental steps. A smart mode automatically slows the CPU to 8 MHz when accessing a floppy disk.

The 1100/16 offers an impressive one-year warranty: four months of on-site TRW service and eight months of depot service. Unfortunately, you may need that on-site service; the documentation is only a bit more informative than a Dick-and-Jane reader.

A generous software package includes *GW BASIC*, *Windows/386*, EMS 4.0 emulation, system diagnostics, and a disk caching utility. BIOS relocation (which speeds performance by moving BIOS routines from slow ROM into fast memory) and ROM-based set-up are also standard.

The Acer 1100/16 is a real find: unexpectedly fast, relatively inexpensive, comfortably expandable, and accompanied by an excellent warranty. You even get *Windows/386*. True, it is limited to 12MB of memory, but for most users, buying this system makes sense.

**American Mitac Paragon 386**

The American Mitac Paragon 386 is the lowest-priced system in this roundup; in the standard *PC World* configuration it costs only \$4913. But its low price doesn't mean it's stripped down; quite the opposite. The Paragon is the only system to come with a SCSI hard drive (which is up to 50 percent faster than a standard drive) and both a 1.2MB 5¼-inch and a 1.44MB 3½-inch floppy drive as standard equipment.

Unfortunately, this small-footprint system, which accesses memory via a slow interleaving scheme, is one of the slowest machines NSTL tested. The Paragon's memory capacity is also unimpressive. The machine comes with 2MB of 80ns SIMMs on the motherboard; you can upgrade to a maximum of 8MB of CPU-speed RAM only by switching to 1MB modules. Nor is it easy; four of the SIMM slots are stuck under an immovable bracket.

The Paragon 386's small footprint limits board and device capacity. The system unit can hold only two half-height 5¼-inch drives and one 3½-inch drive. You also get a mere four 8/16-bit slots and one 8-bit slot. One parallel and one serial port and a floppy control-

**EXECUTIVE SUMMARY****American Mitac Paragon 386***16-MHz 80386 computer*

The low-priced Paragon 386 gives you a lot for your money: a small footprint, dual 5¼- and 3½-inch floppy drives, and a SCSI hard drive. Although performance is sluggish and 32-bit RAM is limited to 8MB, this system has a lot to offer bargain hunters.

	POOR	FAIR	GOOD	EXCELLENT
Memory bus capacity			●	
Expandability			●	
Ergonomic design				●
Performance			●	
Overall value				●



ler are built into the motherboard, but with a video adapter and a hard disk controller installed, you end up with only three open 8/16-bit slots.

The CPU is permanently stuck on fast (16 MHz) and may not work with some speed-sensitive applications. The expansion bus, however, is switchable between industry-standard 8 MHz and 10 MHz, so you can try your luck with some of the newer, high-speed expansion boards.

The Mitac comes with a disk manager that permits hard disk partitions greater than 32MB and an EMS 4.0 expanded memory emulator. Documentation is terse but adequate; system setup is ROM-based, and BIOS relocation is included.

While the Mitac Paragon 386 is too slow to rate a Best Buy, the system still has a lot to recommend it: small footprint, SCSI hard drive, dual 5¼- and 3½-inch floppies, and low price. If you need the features and can live with the trade-off between lowball price and less-than-blinding performance, this machine is for you.

## AT&T 6386 WGS

If you have an insatiable hunger for RAM, and money to burn, AT&T's 6386 WGS might be your dream machine. With a humongous CPU-speed memory capacity of 48MB, it should satisfy power users looking to run a passel of OS/2 applications, or even serve as a UNIX host system with maximum headroom. However, this system is not aimed at the economy-minded business buyer; in *PC World's* basic configuration, the 6386 WGS weighs in at a hefty \$7142, one of the highest prices in the roundup. Nor do those thousands of dollars buy you the fastest system in town; the 6386 WGS rates near the bottom in three out of five of NSTL's tests.

The integrated motherboard, which contains one parallel port, one serial port, a floppy controller, and a coprocessor socket for either an 80387 chip or a Weitek adapter, is conveniently stashed beneath the false metal bottom of the chassis. On the top side, you'll find four standard slots (two 8/16 bit and two 8 bit); with a video adapter and a hard disk



At \$5902 (in *PC World's* configuration), the Wyse PC 386 is reasonably fast and delightfully low priced. It offers generous slot and device expandability.

controller installed, one 8-bit and one 8/16-bit slot remain free. Fortunately, you can use any of the system's three unoccupied 32-bit memory slots for 8/16 boards, but if you install a full complement of memory you'll be left with less expandability than most AT-class machines offer.

The memory consists of 120ns SIMMs mounted on an expansion board (or boards) and is accessed via a slow interleave scheme. The memory boards come in two flavors: the 1MB version bundled with the system can be expanded to 4MB; an optional 4MB board can be expanded to 16MB. So if you've got \$40,000 to spare, you can install three fully populated boards for a total of 48MB.

The room for mass storage is not quite so generous but still a class act. You get three externally accessible half-height bays, plus a full-height internal bay. The internal bay is surrounded by a metal cage that makes access difficult.

The little touches are mostly well done. Power and reset switches, a keylock, and a



**EXECUTIVE SUMMARY****AT&T 6386 WGS***16-MHz 80386 computer*

Although the 6386 offers a gigantic 48MB RAM capacity, its performance is lackluster, and its price is high. Worse yet, expandability is limited to two slots—unless you forgo memory expansion.

You can buy better for a lot less.

	POOR	FAIR	GOOD	EXCELLENT
Memory bus capacity				●
Expandability		●		
Ergonomic design			●	
Performance		●		
Overall value		●		

speaker volume control are located on the front panel. *Windows/386* comes with the system, and BIOS relocation is provided. EMS emulation, on the other hand, is not; nor is the ability to change speed from the keyboard. You can switch between 8 MHz and 16 MHz, but only via two utility programs, GOFAST and GOSLOW.

Overall, the AT&T 6386 WGS demonstrates a curious combination of good features and bad. Memory expansion is excellent, but performance is only fair; device expansion is good, but slot expansion is limited (a real blow if you plan to use the system

as a multiuser host). And the price is very high. Unless you can't live without huge amounts of memory, you'll probably do better with one of the higher performing, lower priced systems in this roundup.

**Everex Systems Step 386/16**

You can't get any hotter than the Everex Step 386/16. Not only did it place first in the speed trials, it boasts an outstanding one-year, no-strings-attached, *on-site* warranty and a surprisingly moderate \$6365 price tag (in the *PC World* configuration). Furthermore, the Step 386/16 is the only machine in this roundup to offer true switchless installation of hardware peripherals.

The Step 386/16 owes its performance to a unique static RAM memory cache that varies in proportion to the amount of RAM installed. The motherboard holds up to 8MB of RAM; another 8MB can be added via a proprietary 32-bit memory board, for a comfortable maximum of 16MB. The motherboard supports an 80387 or Weitek coprocessor.

Excellent expandability is a Step 386/16 trademark. Five half-height drive bays are externally accessible, and four of the six 8/16-bit and one of the two 8-bit slots remain free even when the video board, I/O board, and Adaptec hard/floppy disk controller are installed. The 32-bit slot doubles as an 8-bit slot when not occupied by a memory board. Unfortunately, you may have a problem populating slots three through six, because the memory modules get in the way of some wide full-length boards.

CPU speed is adjustable on the fly, from 5.2 MHz to 8 MHz to 16 MHz, via a slide switch conveniently located behind a sliding door on the front panel. This recess also sports a reset button, an LED display that tracks power-on tests, and a speaker on/off switch.

The Step 386/16's software package is underwhelming. The system comes with ROM-based setup, BIOS relocation, and utilities for setting up a RAM disk and a disk cache; you have to pay an extra \$40 for EMS 4.0 emulation.

**NSTL BENCHMARK TESTING**

The exclusive test facility for *PC World*, **National Software Testing Laboratories (NSTL)**, is an independent organization that specializes in evaluating personal computer hardware and software. A recognized pioneer in state-of-the-art test design, NSTL believes that the most useful benchmark tests measure how well products perform when executing typical business tasks. NSTL testers follow detailed test plans that simulate normal operating conditions. A controlled testing methodology ensures objective, accurate, and consistent results and gives consumers a sound basis for making purchase decisions. NSTL publishes its test results in *Software Digest Ratings Report*® and *PC Digest*.™ Neither publication accepts advertising. NSTL is located in Philadelphia, Pennsylvania.



## FEATURES EVALUATION

### At 16 MHz, a Wide Price Range

In roughly the same configurations, the nine 16-MHz 80386 PCs reviewed range in price from the lowball \$4913 Mitac Paragon 386 to the budget-busting \$7402 NCR PC916.

- Yes
- No
- ◐ Deficient

	Acer 1100/16	American Mitac Paragon 386	AT&T 6386 WGS	Everex Systems Step 386/16	Hewlett-Packard Vectra QS-16	Mitsubishi MP 386	NCR PC916	Tandon 386/16	Wyse PC 386
<b>Standard features</b>									
Price	\$5699 <sup>1</sup>	\$4913 <sup>2</sup>	\$7142 <sup>1</sup>	\$6365 <sup>1</sup>	\$6960 <sup>1</sup>	\$6455 <sup>1</sup>	\$7402 <sup>3</sup>	\$7271 <sup>4</sup>	\$5902 <sup>1</sup>
CPU	80386	80386	80386	80386	80386	80386	80386	80386	80386
Clock speed (MHz)	4.77-16	16	8/16	5.2/8/16	8/16	12/16	2.34-16	8/16	8/16
Built into motherboard									
Parallel ports	○	●	●	○	●	●	○	○	○
Serial ports	○	●	●	○	●	●	○	○	○
Floppy disk controller	○	●	●	○	○	●	○	○	●
Video adapter	○	○	○	○	○	○	○	○	○
Mouse port	○	○	○	○	○	○	○	○	○
Coprocessor support	80387/Weitek	80387	80387/Weitek	80387/Weitek	80387	80287/80387	80387/Weitek	80387	80287/80387/Weitek
Disk cache	●	○	○	●	●	○	○	●	○
Memory bus capacity	12MB	8MB	48MB	16MB	16MB	10MB	32MB	8MB	18MB
<b>Expandability</b>									
32-bit expansion slots/number free	1/1	0	3/2	1	1/0	3/2	5/3 <sup>5</sup>	0	4/2 <sup>5</sup>
8/16-bit expansion slots/number free	5/4	4/3	2/1	6/4	6/4	6/5	6/3	6/5	7/5
8-bit expansion slots/number free	2/0	1/0	2/1	2/1 <sup>6</sup>	1/1	2/1	2/2	2/0	3/1
Half/full-height storage device bays	5/2	2/0	3/1	5/2	3/1	5/2	5/2	5/2 <sup>7</sup>	5/2
120MB or larger hard disk available from maker	●	●	●	●	○	○	●	○	○
<b>Ergonomic design</b>									
Switchless installation	○	○	○	●	○	○	○	○	○
Compact footprint	○	●	○	○	◐	○	○	○	○
Complete documentation	◐	◐	◐	●	●	●	◐	●	●
Tilt-and-swivel monitor	●	●	●	●	○	○	○	●	●
Front-panel reset button	●	●	●	●	○	◐	○	●	○
Front-panel on/off switch	○	●	●	○	●	○	●	○	○

<sup>1</sup> Price based on 2MB RAM, 1.2MB floppy, 40MB hard drive, hard and floppy controllers, one parallel port, one serial port, VGA board and color monitor, 101-key keyboard, DOS 3.3, Windows/386, and GW BASIC.

<sup>2</sup> Price based on same configuration as footnote 1, except with SCSI drive.

<sup>3</sup> Price based on same configuration as footnote 1, except with EGA.

<sup>4</sup> Price based on same configuration as footnote 1, except with RAM cache.

<sup>5</sup> Uses a top-plane 32-bit bus connector.

<sup>6</sup> No 8-bit slot available if the 32-bit memory board is installed.

<sup>7</sup> Only three half-height bays if the optional Data Pac is installed.



**EXECUTIVE SUMMARY****Everex Step 386/16***16-MHz 80386 computer*

The Everex Step 386/16 is the fastest machine in this roundup and far from the most expensive. Excellent expandability, switchless peripheral installation, and a full year of on-site

service are additional pluses.

	POOR	FAIR	GOOD	EXCELLENT
Memory bus capacity				●
Expandability				●
Ergonomic design			●	
Performance				●
Overall value				●

Still, aside from the somewhat cramped interior and a paltry complement of software, the Everex Step 386/16 is a hard machine to knock. Speed, expandability, an excellent warranty, and an affordable price add up to an irresistible package.

**Hewlett-Packard Vectra QS-16**

Short on performance and long on price, the \$6960 Hewlett-Packard Vectra QS-16 offers a passive backplane design, with the CPU and memory modules located on an expansion board. By and large, backplane systems are slower than motherboard machines, although they also offer the possibility of easy upgrade—assuming the manufacturer makes an upgrade available.

Typically for a backplane system, the Vectra QS-16 placed in the bottom half of NSTL's performance tests. Furthermore, in the *PC World* configuration it stands as one of the pricier systems in the roundup.

The processor board, which goes into a proprietary 32-bit slot, holds up to 8MB of RAM; another 8MB can be added via a daughterboard, for a roomy total of 16MB of CPU-speed memory. Despite its small footprint, the QS-16 contains one 8-bit and six 8/16-bit expansion slots. After you install the

combination disk controller and I/O card and a video adapter, you'll end up with no fewer than four 8/16-bit slots and one 8-bit slot. The trade-off is that you get only three half-height drive bays (two are externally accessible).

Several features in the Vectra QS-16 stand out. The power supply monitors the line and automatically configures itself for 110V or 220V operation. An HP Human Interface Link (HIL) port is provided for special HP devices such as mice, digitizing pads, touch screens, and the like. And the warranty is unique in that you can choose between one year of depot repair and three months of on-site repair.

The Vectra QS-16 comes with a limited software package that includes a 9600-bps communications utility that lets your Vectra talk to HP mainframes (if you've got a modem), EMS 4.0 emulation, and a hard disk manager that breaks the 32MB barrier.

While the QS-16 is overpriced for its speed, it's not without its charms—including a small footprint and support from one of the most reputable companies in the business. These are significant features, but you'd better discuss the bottom line with your accounting department before you buy.

**EXECUTIVE SUMMARY****Hewlett-Packard Vectra QS-16***16-MHz 80386 computer*

Although the Vectra QS-16 is overpriced for its performance, it is backed by HP's excellent service facilities, training programs, and corporate reputation.

	POOR	FAIR	GOOD	EXCELLENT
Memory bus capacity				●
Expandability			●	
Ergonomic design			●	
Performance			●	
Overall value			●	



## Mitsubishi MP 386

The Mitsubishi MP 386 is a pricey system that turns in some of the slowest performance results of the systems reviewed. Its \$6455 price (in the *PC World* configuration) is based on an EGA display; no VGA is offered. The system's main selling point is the best device and board expansion capacity of any system in the roundup.

The MP 386's small, direct-mapped memory cache is partly responsible for its lackluster performance. A high-performance associative cache is available as a dealer-installed option, but a unit of this type could not be obtained in time for review.

The system dedicates three 32-bit slots to memory, but to take full advantage of memory expansion you'll need to fill the slots, leaving yourself with limited slot capacity. The memory board that comes with the machine takes up one slot and holds up to 2MB of RAM. Each of the two remaining 32-bit slots can hold a 4MB memory board, allowing a not-so-grand total of 10MB of CPU-speed RAM.

Standard board capacity adds up to an impressive six 8/16-bit and two 8-bit slots. Since a floppy controller and I/O ports are built into the motherboard, even with a hard disk controller and a video adapter installed, you'll have five 8/16-bit slots and one 8-bit slot free. What's more, when not accommodating memory boards, the 32-bit slots can be used for 8/16-bit adapters, leaving you with a potential of eight free slots. Sockets for both an 80287 and an 80387 coprocessor are also provided. Device expansion is excellent too. The MP 386 supports five half-height drive bays, of which three are externally accessible.

A handy front-panel trapdoor conceals setup switches, a 16-MHz/12-MHz CPU speed switch, and a reset button. However, you'll need a paper clip or another pointed object to make them work.

The MP 386 is weak in the software department. There's no BIOS relocation, EMS emulation, or disk caching. In fact, the only software you get (aside from DOS) is a diagnostic setup disk.

## EXECUTIVE SUMMARY

### Mitsubishi MP 386

16-MHz 80386 computer

Despite excellent hardware expandability, the Mitsubishi MP 386 costs too much for its slow performance.

	POOR	FAIR	GOOD	EXCELLENT
Memory bus capacity			●	
Expandability				●
Ergonomic design				●
Performance		●		
Overall value		●		

Poor performance at a premium price is never a winning combination. The MP 386's excellent slot expandability can't make up for its poor performance or its miserly software package. I recommend a pass on this one.

## NCR PC916

The NCR PC916 is a passive backplane system that got mixed results in NSTL performance tests. While holding the middle ground in most benchmarks, it took first place in the disk-intensive *dBASE III Plus* test but was inexplicably slow in the coprocessor-intensive *AutoCAD* test. While this uneven showing proves that backplane machines don't *have* to be slow, souping up backplane performance doesn't come cheap. Between expensive 60ns RAM chips that are soldered directly to the circuit board and a number of other pricey, high-performance components, it's no wonder that the PC916, which costs \$7402 (in the *PC World* configuration), is the most expensive system in the roundup. (This price is based on an EGA display. Although VGA is available, you'll have to discard the EGA adapter that comes with the basic system, making it an unduly expensive option.)

There are six 8/16-bit and two 8-bit slots. The 80386 CPU and 80387/Weitek coprocessor socket are mounted on a processor board that plugs into a standard 8/16-bit expansion



## NSTL TEST REPORT

## 16-MHz 80386 Systems: Nine Contenders Vie for Fastest Scores

The Everex Step 386/16 takes the top spot overall, including in the processor-intensive 1-2-3 benchmark. The Tandon 386/16 and the Acer 1100 turn in strong scores as well.

## Microsoft Word

Everex Step 386	76
Tandon 386/16	84
NCR PC916	89
Acer 1100/16	92
Wyse PC 386	92
Mitsubishi MP 386	98
Mitac Paragon	105
HP Vectra QS-16	106
AT&T 6386 WGS	107

seconds 0 125

## 1-2-3

Everex Step 386	132
Tandon 386/16	142
NCR PC916	150
Wyse PC 386	153
Acer 1100/16	156
Mitsubishi MP 386	158
AT&T 6386 WGS	173
HP Vectra QS-16	174
Mitac Paragon	174

seconds 0 175

## AutoCAD

Tandon 386/16	73
Everex Step 386	75
Acer 1100/16	77
HP Vectra QS-16	80
AT&T 6386 WGS	84
Wyse PC 386	85
Mitac Paragon	88
Mitsubishi MP 386	91
NCR PC916	114

seconds 0 125

## dBASE III Plus

NCR PC916	82
Tandon 386/16	83
Everex Step 386	88
Acer 1100/16	92
Wyse PC 386	92
AT&T 6386 WGS	99
Mitac Paragon	100
HP Vectra QS-16	101
Mitsubishi MP 386	159

seconds 0 175

## Microsoft C

Everex Step 386	302
Tandon 386/16	388
Acer 1100/16	389
NCR PC916	401
HP Vectra QS-16	420
Wyse PC 386	430
Mitac Paragon	453
Mitsubishi MP 386	488
AT&T 6386 WGS	521

seconds 0 500

## Methodology

All machines were tested with a coprocessor and a 256K extended memory disk cache, except in the 1-2-3 benchmark. All machines ran at a clock speed of 16 MHz. The Tandon 386/16 was configured with a 40MB hard disk and 2MB of RAM. The Hewlett-Packard Vectra QS-16 was configured with a 44MB hard disk and 2MB of RAM. The Everex Systems Step 386/16 was configured with a 40MB hard disk and 2.3MB of RAM. The American Mitac Paragon 386 was configured with a 43MB hard disk and 1.5MB of RAM. The Tandon 386/16 was configured with a 40MB hard disk and 1.5MB of RAM. The AT&T 6386 WGS was configured with a 41MB hard disk and 4MB of RAM. The NCR PC916 was configured with a 44MB hard disk and 1.9MB of RAM. The Mitsubishi MP 386 was configured with a 41MB hard disk and 1.5MB of RAM.

## Microsoft Word 4.0

A Microsoft Word macro loads a 35-page, 140-paragraph document and performs search-and-replace and spell-checking operations. The first page of the document is then printed. Although the results of the benchmark depend primarily on processor and memory access speeds, display adapter and hard disk speeds are also contributing factors.

## dBASE III Plus 1.1

The dBASE III Plus test measures the time required to prepare and print a report of past-due invoices. The report includes calculated fields and is based on three files: a 500-record customer file, a 1000-record invoice file, and a 2000-record item file. When disk caching is not used, the random access speed of the hard disk is, after processor speed, the most significant factor in this benchmark. With disk caching, sequential read performance becomes more important than random access.

## 1-2-3 2.01

In this benchmark, a 1-2-3 macro executes a series of recalculations using five different formulas within a 75-by-75-cell matrix. Because there are few screen updates and no disk access is required, the results depend almost entirely on processing and memory access speeds.

## Microsoft C 5.0

The Microsoft C benchmark measures the time required to compile and link XLISP, a public-domain program composed of 25 C source code files. The most important factors in this benchmark are processor and memory access speeds. The performance of the hard disk is also a factor; generally, disk caching has little effect.

## AutoCAD 9

In this benchmark, a three-dimensional sample drawing is retrieved and displayed using AutoCAD's EGA driver. The zoom function is used to display the drawing from various perspectives; then the full drawing is printed. The results of the benchmark depend primarily on the speeds at which the processor and coprocessor operate and at which memory is accessed. The performance of the display adapter and the hard disk also have some effect.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL). All rights reserved.



## EXECUTIVE SUMMARY

### NCR PC916

#### 16-MHz 80386 computer

The NCR PC916 combines good performance with a high 32MB RAM ceiling. Unfortunately, it's the highest priced machine in the roundup, making the slightly slower but much cheaper Wyse PC 386 a smarter buy.

	POOR	FAIR	GOOD	EXCELLENT
Memory bus capacity				●
Expandability			●	
Ergonomic design			●	
Performance			●	
Overall value		●		

slot. Memory is placed on either a 2MB or an 8MB memory board that fits into an adjacent 8/16-bit slot. A small 32-bit bus extender provides the 32-bit memory access between processor and memory boards. Since the extender can link as many as four 8MB memory cards to the processor, the system offers a high total of 32MB of CPU-speed RAM.

The parallel and serial ports, disk controllers, and video adapter all reside on a single "personality" board that goes into a third 8/16-bit slot. Fully configured with 2MB of RAM and the personality board, the PC916 still has two 8-bit and three 8/16-bit slots free.

Device expandability is good. There are five half-height drive bays, two of which are externally accessible. A speaker volume control comes standard, as does BIOS relocation.

A handy menu-driven utility lets you change the speed of the CPU to any value between 2.34 MHz and 16 MHz. In addition, you can set the system to run at 16 MHz but throttle down to 8 MHz when accessing the floppy drive.

The NCR PC916 delivers good performance and hardware expandability, and its memory capacity is outstanding. On the oth-

er hand, smart buyers should take note of some better deals. For example, if you're willing to settle for an 18MB memory ceiling, the Wyse PC 386 offers greater device expandability and similar performance, and it costs a cool \$1500 less.

### Tandon 386/16

The Tandon 386/16 offers impressive capabilities, but at an unimpressive price. Thanks to its fast, memory-caching architecture, it came in second overall in the speed ratings, actually beating the first-place Everex in the disk-intensive *dBASE* benchmark. But in the *PC World* configuration, this system runs no less than \$7271, the second-highest price in the roundup.

The Tandon lacks a 32-bit memory slot, so CPU-speed-RAM expansion is limited to the 8MB you can place directly on the motherboard. Coprocessor support is limited to the 80387. On the other hand, Tandon has substituted an 8/16-bit slot for the missing 32-bit slot, adding up to a generous six 8/16-bit and two 8-bit slots. With a video adapter, I/O card, and hard/floppy disk controller in place, you have five 8/16 slots left. (But as with the Everex, which uses a similar motherboard, it's a struggle to install full-length adapters in slots three through six.)

The device-bay count is excellent too, with five externally accessible half-height bays.

## EXECUTIVE SUMMARY

### Tandon 386/16

#### 16-MHz 80386 computer

The Tandon 386/16 is similar to the Best Buy Everex Step 386/16 but costs \$876 more. While performance is outstanding, a low 8MB memory ceiling limits its capabilities, and a high price makes it a less-than-brilliant buy.

	POOR	FAIR	GOOD	EXCELLENT
Memory bus capacity			●	
Expandability				●
Ergonomic design			●	
Performance				●
Overall value		●		



Moreover, the two left-hand bays can be fitted with a receptacle for an optional Data Pac, Tandon's removable Winchester (see *The Hardware Shelf*, PCW, August 1988).

A generous software bundle includes *Windows/386*, *GW BASIC*, an EMS 4.0 emulator, and a disk caching utility. The setup routine is ROM-based, and BIOS relocation is included.

While the Tandon 386/16 is a fast stepper, its high price and low 8MB RAM capacity put it at a distinct disadvantage. Unless you're hooked on the Data Pac approach to mass storage, it's not a smart buy.

### Wyse PC 386

The backplane Wyse PC 386 is a slightly smarter twin (fraternal, not identical) of the backplane NCR PC916. Not only does the Wyse PC 386 nearly equal the PC916 in performance, it offers better slot and device expandability and a much lower price. Listed at \$5902 (in the *PC World* configuration), the Wyse PC 386 will save you a full \$1500 over the cost of NCR's PC916.

As in the PC916, the Wyse PC 386's CPU resides on a processor board, along with the BIOS chips and two coprocessor sockets designed to accommodate an 80287, 80387, or Weitek chip. The RAM chips are placed on

an adjacent memory board, with a 32-bit top-plane connector to link the memory to the CPU. However, there are important differences between the machines.

Instead of an interleaved memory architecture, the Wyse PC 386 uses 80ns static-column RAM chips. This scheme is usually a bit faster than interleave.

The main memory board holds only 2MB of RAM. Two optional memory boards (either 2MB or 8MB capacity) can be added to bring the system up to an 18MB total of CPU-speed RAM. While not as good as the NCR's 32MB total, this still provides 2MB more than OS/2 can use.

The backplane has three 8-bit and seven 8/16-bit slots. The processor and memory boards occupy two of the 8/16-bit slots, and an I/O card and a video adapter fill two of the 8-bit slots, leaving an unusually high total of seven slots open—two more than NCR's PC916. There are five half-height drive bays, four of them externally accessible. The standard ST506/412-type hard disk controller is built in and doesn't need a slot.

A handy front-panel push button lets you switch the CPU speed between 16 MHz and 8 MHz. An eight-character LCD readout displays the CPU speed, along with the current date or time. And if you get bored, you can set the readout to display a bar graph of CPU activity.

The Wyse PC 386 is one of the best deals in the roundup. It's neither a racer nor a bargain basement system, but if you're willing to pay its midlevel price, you'll get a winning combination of power, expandability, and memory headroom.

### Hot Stuff

Picking the top winners of this roundup is easy. Running far ahead of the pack is the fast, mid-priced Everex Step 386/16, a high-performance system with a 16MB RAM capacity. The second-place winner is the Acer 1100/16. Although it's slower than the Everex Step 386/16, it sells for almost \$700 less, and is suitable for all applications—except, perhaps, as a multiuser host (because of its limited 12MB memory). The Wyse PC 386 is a strong third-place finisher thanks to its good

### EXECUTIVE SUMMARY

#### Wyse PC 386

16-MHz 80386 computer



The Wyse PC 386 is almost as fast as NCR's PC916, has better slot expandability, and costs \$1500 less. Its 18MB RAM capacity is shy of the NCR's 32MB but should be plenty for

most multitasking applications.

	POOR	FAIR	GOOD	EXCELLENT
Memory bus capacity				●
Expandability				●
Ergonomic design			●	
Performance			●	
Overall value				●



performance, high 18MB RAM capacity, and reasonable price.

If you're looking for an inexpensive, small-footprint machine that can handle the shuffle of everyday desktop applications, the American Mitac Paragon 386 is a good choice. Its small footprint and SCSI support are major pluses, while its standard configuration of both 5¼-inch and 3½-inch floppy drives will be a godsend for those having to move data between the two formats.

Corporate buyers who are more concerned with reliability and service than short-term savings may want to consider the Vectra QS-16 based on Hewlett-Packard's strong reputation. Of course, this is neither the fastest system in the roundup nor the cheapest.

Users looking for a multiuser host will probably be very happy with the NCR PC916, which offers generally good performance, decent expandability, and a whopping 32MB RAM capacity. Unfortunately, the

NCR is quite expensive, but you'll get what you pay for.

Three machines to avoid are the AT&T 6386 WGS, the Mitsubishi MP 386, and the Tandon 386/16. The first because it's too slow to compete in today's 80386 market, the latter two because their performance doesn't justify their price.

80386 systems offer both processing power and the ability to run the glorious new 386-specific applications. While these 16-MHz machines are relatively slow compared to the hotter 20- and 25-MHz 80386s, let us not lose sight of the fact that compared to 95 percent of the PCs in the world, they *fly*—and they bring the world of 386 applications within affordable reach. If you can't have the power and the glory, they'll still put your feet firmly on the glory road. ●

*TJ Byers is a contributing editor for PC World.*

#### WHERE TO BUY

##### Acer 1100/16

Acer Technologies Corp.  
401 Charcot Ave.  
San Jose, CA 95131  
408/922-0333

**List price:** with 2MB RAM, 40MB hard disk, 1.2MB floppy, one parallel and one serial port, mouse, 101-key keyboard, DOS 3.3, Windows/386, GW BASIC \$4695; with VGA adapter and color monitor \$5699

**Accessories:** 2MB RAM at market price; unpopulated memory expansion board \$849, unpopulated memory expansion daughter-board \$149; VGA adapter \$349; VGA monochrome monitor \$225, VGA color monitor \$655

**Warranty:** one year parts and labor with first four months on-site

TRW service; remaining eight months are factory depot service

**Extended warranty:** through TRW

**Technical support:** toll-free number, M-F 7:30 a.m.—6 p.m.

**Other support services:** CompuServe BBS

**For more information, circle 610 on reader service card.**

##### American Mitac Paragon 386

American Mitac Corp.  
410 E. Plumeria Dr.  
San Jose, CA 95134  
408/432-1160

**List price:** with 2MB RAM, 1.2MB floppy drive, 1.44MB floppy drive, one parallel and two serial ports, 101-key keyboard, DOS 3.3 \$3295; with 40MB SCSI hard disk, VGA adapter and color monitor \$4913

**Accessories:** 256K and 1MB SIMMs at mar-

ket price, 40MB hard disk \$650, SCSI controller \$69, VGA adapter \$349, VGA color monitor \$549

**Warranty:** one year parts and labor through TRW depot

**Extended warranty:** available from TRW

**Technical support:** toll-free number, M-F 8–5

**Other support services:** 24-hour answering service

**For more information, circle 611 on reader service card.**

##### AT&T 6386 WGS

AT&T  
4513 Western Ave.  
Lisle, IL 69532  
312/971-6000

**List price:** with 1MB RAM, 40MB hard disk, 1.2MB floppy drive,

one parallel and one RS-232C serial port, 101-key keyboard, Windows/386 \$4795; with 2MB RAM, VGA adapter and monitor, DOS 3.3 \$7142

**Accessories:** 1MB and 4MB SIMMs at market price; 1MB memory expansion board (expandable to 4MB) \$849, 4MB memory expansion board (expandable to 8MB) \$2799; VGA adapter \$599; VGA monitor \$899; 135MB hard disk \$3595, 300MB ESDI hard disk \$5995; ESDI controller \$530; 1.2MB floppy drive \$298, 1.44MB floppy drive \$275; 40MB streaming tape drive \$995, 60MB streaming tape drive \$1495, 125MB streaming tape drive \$1795; 80387 \$1199; DOS 3.3 \$95, OS/2 \$325

**Warranty:** one year parts and labor

**Extended warranty:** AT&T maintenance contracts available

**Technical support:** 24-hour, toll-free number

**Other support services:** none

**For more information, circle 612 on reader service card.**

##### Everex Systems Step 386/16

Everex Computer Systems Division  
48431 Milmont Dr.  
Fremont, CA 94538  
800/356-4283

**List price:** with 2MB RAM, 1.2MB floppy drive, one parallel and one serial port, 101-key keyboard, DOS 3.3 \$4499; with 40MB hard disk, VGA adapter and multiscan monitor \$6365

**Accessories:** 1MB SIMMs at market price; cache upgrade kit



comes with memory upgrade only; 40MB hard disk \$868; EGA adapter \$230; VGA adapter \$399; EGA monitor \$485; multiscan monitor \$599; 80387 \$450, Weitek 1167 \$1095; EMS 4.0 emulator \$40

**Warranty:** one year parts and labor, on-site NCR service

**Extended warranty:** through NCR

**Technical support:** no toll-free number, M-F 8-5

**Other support services:** BBS

**For more information,** circle 613 on reader service card.

#### Hewlett-Packard Vectra QS-16

Hewlett-Packard Business Computing Systems 19091 Pruneridge Ave. Cupertino, CA 95014 800/752-0900

**List price:** with 1MB RAM, 40MB hard disk,

1.2MB floppy drive, one parallel and one serial port, HIL port, 101-key keyboard \$5095; with 2MB, VGA adapter and color monitor, DOS 3.3 \$6960

**Accessories:** 1MB memory expansion kit \$575, 4MB memory expansion kit \$2595; VGA adapter \$445; VGA color monitor \$695, VGA monochrome monitor \$250; 44MB floppy drive \$325; Vectra DOS 3.3 \$120, Vectra BASIC \$89

**Warranty:** one year parts and labor at HP depot, convertible to three months on-site service

**Extended warranty:** HP service contracts available

**Technical support:** through dealer; or \$45 charge per problem using HP's toll-free number, M-F 7:30 a.m.-9 p.m.

**Other support services:** fee-based support packages available **For more information,** circle 614 on reader service card.

#### Mitsubishi MP 386

Mitsubishi Electronics America, Inc. 991 Knox St. Torrance, CA 90502 213/515-3993

**List price:** Model 142V with 1MB RAM, 40MB hard disk, 1.2MB floppy drive, one parallel and two serial ports, VGA adapter and color monitor, 101-key keyboard, DOS 3.3 \$6195; with 2MB RAM \$6455

**Accessories:** 1MB RAM at market price, 4MB memory expansion card \$2195; 64K cache upgrade kit \$130; 360K floppy drive \$147, 1.2MB floppy drive \$185

**Warranty:** one year parts and labor

**Extended warranty:** TRW service available

**Technical support:** through dealer

**Other support services:** through dealer **For more information,** circle 615 on reader service card.

#### NCR PC916

NCR Corp. Computer Products 1601 S. Main St. PCD-1 Dayton, OH 45479 513/445-7478

**List price:** with 2MB RAM, 44MB hard disk, 1.2MB floppy drive, one parallel and one serial port, EGA adapter, DOS 3.3 \$6553; with EGA monitor, 101-key keyboard \$7402; with VGA adapter and color monitor, 101-key keyboard \$8001

**Accessories:** 2MB memory expansion kit \$1550; VGA piggyback adapter \$599; EGA monitor \$699, VGA color monitor \$799; tilt-and-swivel monitor stand \$65; four-position extender bus card \$45, five-position extender bus card \$70; 84-key keyboard \$100, 101-key keyboard \$150, 116-key keyboard \$220; 80387 \$895; vertical mount kit \$165

**Warranty:** one-year parts and labor

**Extended warranty:** NCR service contracts available

**Technical support:** through NCR dealers

**Other support services:** BBS

**For more information,** circle 616 on reader service card.

#### Tandon 386/16

Tandon Corp. 301 Science Dr. Moorpark, CA 93021 805/523-0340

**List price:** Model 40 with 1MB RAM, 40MB

hard disk, 1.2MB floppy drive, one parallel and one serial port, 101-key keyboard, DOS 3.3, Windows/386, GW BASIC \$4999; with 2MB, RAM cache, VGA adapter and monitor \$7271

**Accessories:** 1MB SIMMs at market price; RAM cache \$599; VGA adapter \$399; VGA monochrome monitor \$249, VGA color monitor \$699; 30MB Data Pac \$399, In-Pac connector \$599

**Warranty:** one year parts and labor

**Extended warranty:** through dealer

**Technical support:** through dealer

**Other support services:** through dealer **For more information,** circle 617 on reader service card.

#### Wyse PC 386

Wyse Technology 3571 N. First St. San Jose, CA 95134 800/438-9973

**List price:** with 1MB RAM, 40MB hard disk, 1.2MB floppy, one parallel and two serial ports, 101-key keyboard, Wyse DOS 3.3 \$4299; with 2MB, VGA adapter and color monitor \$5902

**Accessories:** 1MB RAM chips at market price, 2MB memory expansion board \$1635; VGA adapter \$399; VGA color monitor \$629; OS/2 \$325

**Warranty:** one year parts and labor

**Extended warranty:** Wyse service contract

**Technical support:** no toll-free number, M-F 8-5

**Other support services:** BBS

**For more information,** circle 618 on reader service card.

## POWER TIP NO. 43

### Printer Codes for Better-Looking dBASE Output

You can spruce up dBASE III Plus reports by using printer control codes to produce compressed type, underlining, boldface, and other print styles. Just use the following commands:

.Set device to print

.@ Prow(), Pcol() Say chr(15)

.Set device to screen

In the example above, @ Prow(), Pcol() Say sends the control code chr(15) (compressed type for Epson printers) to the printer at its current location. Substitute other control codes (which of course must be specific to your printer) to effect other print styles. The commands can be entered at the dot prompt, saved in their own command file, or used within other command files.

Alan Schwartz  
San Francisco,  
California



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**MITSUBISHI  
ELECTRONICS**

Circle 229 on reader service card



# THE EASY PART OF NEW FRAMEWORK III IS USING IT.

Built-in telecommunications to connect with on-line services

Pull-down menus show consistent commands in all applications

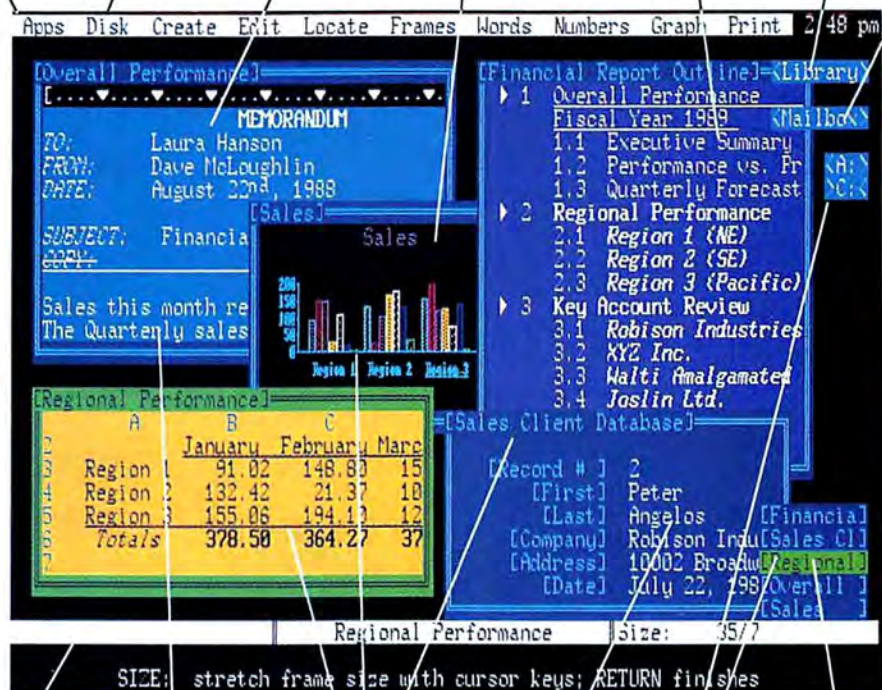
Advanced word processor with spell checker and thesaurus

Choose from eight pre-defined graph types

Outliner lets you build an entire document from multiple files

Store often-used macros

Send and receive electronic mail \*



Status and message lines offer helpful prompts

Hotlink spreadsheet with graphs and databases

Access any number of files from the desktop at once

Import and export files in any of ten popular formats

Build your own database or import and export dBASE files

Work with a mouse or with cursor keys



# THE HARD PART IS EXPLAINING ALL IT DOES.

Here's the difficulty. Framework III™ is a decision support tool with no fewer than six powerful functions built into it. So even we have a difficult time describing exactly what it does best. But we'd like to give it a shot anyway.

Framework III is an organizing tool. Its versatile outlining function helps you keep your thoughts—as well as your documents—in perfect order.

On the other hand, it's an analyzing tool. The spreadsheet's speed and power help you manipulate numbers any way you want. And its charts and graphs let you see exactly what they mean.

On the other hand, which by now makes three hands, it's also a great communicating tool. The word processor has features as

advanced as any top-of-the-line program. Like a built-in thesaurus. And an 80,000-word spell checker that checks your spreadsheets, too. There's also electronic mail to communicate with your workgroup without ever leaving Framework.

As if all that isn't enough (apparently, it isn't) Framework III is an applications generator. Because you can customize or design applications from scratch.

Are you still following this? Because there's more.

You can use Framework III as your sole working environment. With its versatile window frames, you can work on several different projects at the same time. Or, you can use it to import, export, and combine files from other programs like dBASE®, Lotus® 1-2-3®,

and WordPerfect®. Which means you can pull together data from different sources faster and easier than you ever thought possible.

So what is Framework III, exactly? It's a lot of things to a lot of people. But what it isn't, is easy to explain.



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That's why we've created a videotape that, we promise, will spell it all out for you. Just call 800 437-4329 ext. 3005, and if you're one of the first 5000 requests, we'll send it to you free.

There. Now that wasn't so hard after all.



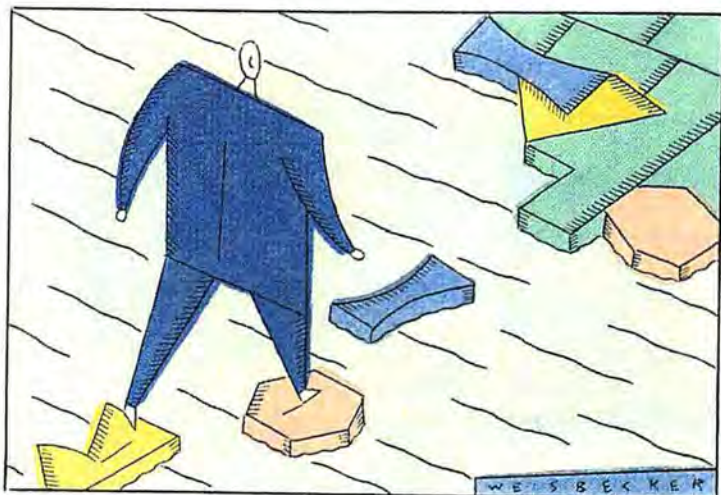
ASHTON • TATE®



# Integrated Excellence

**You can get a first-rate set of integrated applications for a relative pittance.**

**Our roundup of market leaders yields a pair of winners.**



**Dennis  
Dykstra**

**N**eed a solid word processor that can merge text and graphics; a flat-file data base manager with wild-card and multiple-field searches; a fast spreadsheet that can read and write 1-2-3 files; presentable graphics; and built-in telecommunications? You can get all these features in one integrated package without paying big bucks for *Symphony* or *Framework*. Each of the current low-end market leaders—Migent's *Ability Plus*, Alpha Software's *AlphaWorks*, Microsoft *Works*, and Software Publishing's *PFS: First Choice*—delivers at least five capable applications for under \$300.

Of course, the low price doesn't come without trade-offs. All four of the packages

read .WKS files, for example, but none preserve 1-2-3 macros or support all 1-2-3 functions. And the packages can be eccentric in their nomenclature and finicky in device support. But even if they're used as stepping-stones to full-featured stand-alones, these inexpensive packages are ideal for occasional users, managers, laptop toters who need all-in-one convenience, and small businesses on a budget.

## Ability Plus 1.01

Migent's *Ability Plus* is a fast, well-integrated package with the only word processor that can run in graphics mode. The package's standout features are its dynamic links between modules and its ability to accept files in different formats and translate them on the fly. Its low points are a weak graphics module and an interface in need of upgrading. At press time, Migent was contemplating a price cut to below \$200.

*Ability Plus* is the only package here that lacks pulldown menus, and novices may find its main Library Screen menu daunting. You use the Library to instantly load and unload files and translate them from foreign formats.



The program's gift for dynamically linking files produces seamless integration across modules. Changes in a price list, for example, could be instantly reflected in the text of a word processing document.

In *Ability Plus's* word processor, users are greeted by a barren rectangle within space-wasting margins; only the menu line at the bottom hints at the package's features. Respect grows when you bring up a second document to join the first, and cut and paste between them. In fact, the word processor is the only one reviewed that can operate in graphics mode, displaying character attributes and merged graphs on screen. Too bad the graphs themselves are lackluster. *Ability Plus's* graphics module supports only five chart types, and its graphs and text labels—on screen and printed—look decidedly amateurish next to the fancy output generated by *Microsoft Works*.

*Ability Plus's* speedy data base can handle 65,000 records per file, but surprisingly it shows records only in form view; no table view is offered. *Ability Plus* can validate field entries and lets you specify mandatory

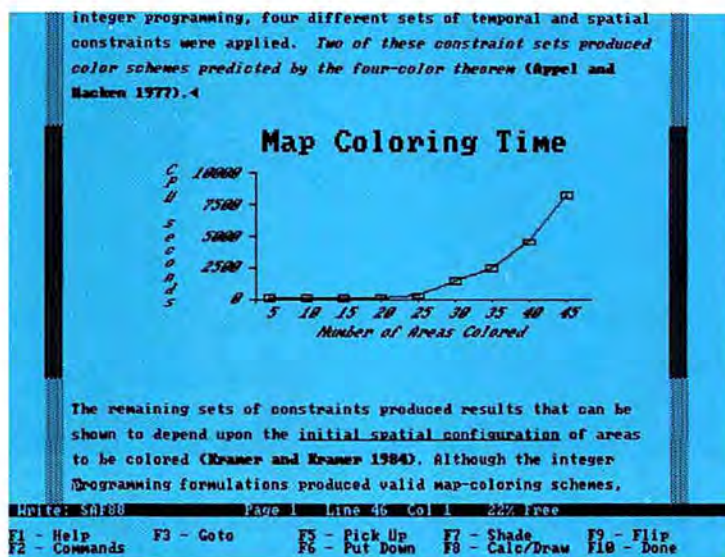
## EXECUTIVE SUMMARY

### Ability Plus 1.01

#### Low-end integrated package

*Ability Plus* is a well-integrated program, but its interface and graphics module are due for an upgrade. Its word processor is the only one reviewed here that can work in graphics mode, displaying fonts and merged graphics on screen. The program excels at handling foreign file formats.

	POOR	FAR	GOOD	EXCELLENT
Word processor				●
Data base			●	
Spreadsheet			●	
Telecommunications			●	
Graphics		●		
Integration and file compatibility				●
Overall value			●	



fields. Searching is simple and fast, and you can print both form and summary reports.

*Ability Plus's* spreadsheet supports worksheets as large as 9999 rows by 702 columns, and compatibility with 1-2-3 is passable: The spreadsheet reads and writes .WKS, but not .WK1, files. Its 46 functions support most 1-2-3 capabilities, though it has no equivalents for such functions as @ISNA, @NA, and @ERR. The spreadsheet even adds such advanced features as cell linking between worksheets.

*Ability Plus's* telecommunications module is impressive, providing emulation for DEC, TTY, VT 100, and VT 52 terminals, along with XMODEM, ASCII with XON/XOFF, and proprietary error-checking protocols. It turned in some of the fastest file-transfer times in tests of these packages by National Software Testing Laboratories (NSTL).

*Ability Plus* is best suited to users who need good external-file support and a solid data base and spreadsheet but can dispense with fancy graphics. And it helps if they aren't afraid to spend some time learning the ropes.

### AlphaWorks 1.0

In a refreshing departure for integrated software, *AlphaWorks* loyally adheres to industry-standard dBASE and 1-2-3 file for-

*Ability Plus* is the only package reviewed that provides a true WYSIWYG screen in the word processor. However, chart titles and labels use low-resolution fonts.



F1	F2	F3	F4	F5	F6	F7	F8	F9
Help	Cell	Style	Layout	Arrange	Graph	File	More	Window
12	A	B	C	D	E			G
13						Recalc	^R	(27.50)
14						Calc-Mode		(77.50)
15						Status		(32.95)
16						Goto	^G	8.00
17								99.00
18								220.00
19								(130.43)
20								(52.05)
21								(17.95)
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The pulldown menus in AlphaWorks's spreadsheet don't follow the 1-2-3 style precisely but are far easier for novices to use.

mats instead of creating its own proprietary formats. So it's an excellent choice for anyone who wants to swap files with users of other applications (see *The Software Shelf*, PCW, January 1989). The data base and spreadsheet are strong, the word processor solid. Integration is excellent, except for one critical lapse: *AlphaWorks* is the only product reviewed that can't merge text and graphics.

Depending on memory, the program can theoretically keep up to 29 files open at once (9 apiece in word processing, data base, and spreadsheet and 2 in communications), letting you toggle quickly between them. Not only can you display two windows at once, you can choose between pulldown menus or a 1-2-3-like command line.

*AlphaWorks*'s word processor is easy to use and features automatic reformatting, rapid search and replace, and even a 120,000-word thesaurus. Unfortunately, the word processor imports and exports only ASCII files.

Among the packages reviewed, *AlphaWorks* has by far the most adaptable data base. Not only does it use the standard *dBASE* .DBF format, but data base files can have an unlimited number of records, with up to 128 fields and 4000 characters per record. You can examine records in form or table view and completely restructure a data base without losing data. Thanks to pop-up lists of files, field names, and available functions, you can quickly create forms and re-

ports and easily establish sophisticated field rules to automatically fill in values, define defaults, or update all records at once.

*AlphaWorks*'s impressive spreadsheet supports worksheets of up to 8192 rows by 255 columns and comes with an astounding 75 functions, outdoing even 1-2-3. Its native format is .WKS and, like *Microsoft Works*, it offers background recalc. You can prowl a 1-2-3-style command line, but *AlphaWorks*'s default interface is friendlier, with pop-down menus that respond instantaneously to the slash command. You can name ranges for convenience in writing formulas and specify any single character to be used in place of the \$ currency symbol. Although it can't use a math coprocessor, the *AlphaWorks* spreadsheet's time was second overall in NSTL's recalculation test; with background recalc on, recalculation was instantaneous.

As in *Microsoft Works*, *AlphaWorks*'s graphics manager is part of the spreadsheet rather than a separate module. It offers five chart types and is quite easy to use. As noted, charts can't be merged with word processing documents.

The telecommunications module is comparable to *Ability Plus*'s, with support for

## EXECUTIVE SUMMARY

### AlphaWorks 1.0

Low-end integrated package



Nifty task switching makes *AlphaWorks* a breeze to use. This excellent package features a solid word processor, a data base that can restructure data quickly, and a sensible com-

mand structure in the spreadsheet.

	POOR	FAIR	GOOD	EXCELLENT
Word processor				●
Data base				●
Spreadsheet				●
Telecommunications			●	
Graphics		●		
Integration and file compatibility				●
Overall value				●



## FEATURES EVALUATION

### Four Integrated Packages: Low-End in Price Only

Among inexpensive integrated packages, AlphaWorks and Microsoft Works lead a very capable pack.

	Ability Plus 1.01	AlphaWorks 1.0	Microsoft Works 1.05	PFS: First Choice 3.0
<b>Standard features</b>				
List price	\$259	\$195	\$149	\$159
RAM required	384K	512K	384K	512K
Supports expanded memory	○	●	○	○
Maximum files open at once	△	29 <sup>1</sup>	8	1

#### Word processor

Spelling checker/thesaurus	○ <sup>2</sup>	●	○ <sup>3</sup>	●
Document size (in lines) <sup>4</sup>	3142	1285	▼	1230
Headers/footers	●	●	●	●
Shows formatting, page breaks on screen	●	●	●	●
Background printing	●	●	○	○
Merges graphics with text	●	○	●	●

#### Data base

File size	△	▼	△	8MB
Records per file	65,000	▼	4096	64,000
Fields per record	32,000	128	256	▼
Reads/writes ASCII	●	●	●	●
Reads/writes .DBF	●	●	○	○
Table view	○	●	●	●
Checks data type	●	●	●	●
Searches/sorts on multiple fields	●	●	●	●
Allows wild-card search	●	●	●	●
Boolean operators	●	●	●	●
Report generator	●	●	●	●
Headers/footers	○ <sup>5</sup>	●	●	○ <sup>5</sup>
Calculated fields	●	●	●	●

#### Spreadsheet

Rows	9999	8192	4096	1024
Columns	702	255	256	768
Maximum cell width	72	240	255	20
Windows per screen	2	2	4	1
Reads/writes ASCII	●	●	●	●
Reads/writes DIF	●	●	○	○
Reads/writes .WKS and .WK1	○ <sup>6</sup>	○ <sup>7</sup>	○ <sup>6</sup>	●
Global search and replace	○ <sup>8</sup>	●	○ <sup>8</sup>	○
Background calculation	●	●	●	○
Supports mouse	○	○	●	●

#### Spreadsheet (continued)

Supports math coprocessor	●	○	○	●
Maximum report width (characters per line)	132	255	132	255
Prints sideways	●	○	○	○
Spooler	○	●	○	○
Macro capability	●	●	●	●

#### Telecommunications

On-line text editor	○	●	○	●
Terminal emulation				
TTY	●	●	●	●
VT 100/52	●	○	●	●
ANSI	○	○	●	●
IBM 3101	○	○	○	○
Error-checking protocols				
XMODEM	●	●	●	●
Proprietary	●	●	○	○
ASCII with XON/XOFF	●	●	●	●
Auto-capture buffer	●	●	○	●
Script language	●	●	●	○
Multiple sessions	○	●	●	○

#### Graphics

Chart types	5	5	10	9
Freehand drawing	○	○	○	○
Type styles provided	3	1	12	4

#### Device support

PostScript	○	●	●	○
Laser printer	●	●	●	●
Color printer	●	●	●	●
Plotter	●	○	●	●

● Yes ○ No ◐ Deficient

△ Limited only by available RAM ▼ Limited only by available disk space

<sup>1</sup> Theoretical maximum.

<sup>2</sup> Spelling checker only.

<sup>3</sup> Spelling checker only; thesaurus available at extra cost.

<sup>4</sup> Per NSTL tests.

<sup>5</sup> Headers only.

<sup>6</sup> WKS only.

<sup>7</sup> Writes .WK1 only.

<sup>8</sup> Search only.






## NSTL TEST REPORT

## Integration With All Deliberate Speed




Despite poor printing and communications performance, Microsoft Works was the fastest low-end integrated package tested.

## Word Processor

## Global search and replace

Microsoft Works 1.05		3.6
AlphaWorks 1.0		8.9
Ability Plus 1.01		18.0
PFS: First Choice 3.0 <sup>1</sup>		

## Print a file

AlphaWorks 1.0		4.2
Ability Plus 1.01		7.4
Microsoft Works 1.05		10.0
PFS: First Choice 3.0		18.6

seconds 0 4 8 12 16 20

## Data Base

## Print one-across mailing labels

Ability Plus 1.01		2.2
AlphaWorks 1.0		4.4
Microsoft Works 1.05		7.9
PFS: First Choice 3.0		8.6

seconds 0 2 4 6 8 10

<sup>1</sup> Program can't perform whole-word search.

<sup>2</sup> With background recalculation.

<sup>3</sup> Produced 'Out of memory' error message.

## Methodology

All tests were performed on a 12-MHz Compaq Deskpro 286 equipped with a 20MB hard disk, 1152K of RAM, and a 256K extended memory disk cache. All tests were timed from the command to initiate the test function until control was returned to the user.

## Global search and replace

With the cursor positioned at the beginning of a 10<sup>1/2</sup>-page text file, the program was instructed to automatically replace all 275 instances of the with thee and to reformat and repaginate the document as necessary.

## Print a file




A 10<sup>1/2</sup>-page document was "printed" to a device that simulates an infinitely fast printer, one not slowed by paper or printhead movement.

## Print one-across mailing labels




This test measured the time required to print mailing labels consisting of eight fields to a null printer.

## Spreadsheet

## Recalculate

AlphaWorks 1.0		0.1 <sup>2</sup>
Microsoft Works 1.05		2.1
Ability Plus 1.01		7.3
PFS: First Choice 3.0 <sup>3</sup>		



## Insert, copy, and delete columns

Microsoft Works 1.05		7.1
Ability Plus 1.01		8.9
AlphaWorks 1.0		14.7
PFS: First Choice 3.0 <sup>3</sup>		

seconds 0 3 6 9 12 15

## Communications

## Transmit file without protocol

AlphaWorks 1.0		25.5
Ability Plus 1.01		25.8
PFS: First Choice 3.0		26.5
Microsoft Works 1.05		58.5

seconds 0 12 24 36 48 60

## Recalculate

With the cursor positioned at cell B18, a new value was entered and the spreadsheet recalculated. Recalculation was set to automatic.

## Insert, copy, and delete columns

This test measured the time required to insert 15 blank columns (P1..AD1), copy other columns into the new columns (AE1..AS204 to P1..AD1), then delete the copied columns. Each step was timed separately; the times were then added.

## Transmit file without protocol

A 10K text file was transmitted at 9600 bps without protocol to an identically configured Compaq Deskpro 286 running Crosstalk XVI communications software. The Deskpros were connected by a null modem.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL). All rights reserved.

XMODEM, proprietary, and ASCII XON/XOFF file-transfer protocols. If you want to connect to a mainframe, however, *AlphaWorks* can't emulate any of the full-screen terminals; it provides only line-oriented teletype emulation. But *AlphaWorks* is the only package that lets you run two communications sessions simultaneously.

If you need a fast data base manager and a powerful spreadsheet that feels (but doesn't look) like 1-2-3, *AlphaWorks* is an excellent choice. Except for graphics, its modules are well integrated, and its use of industry-standard file formats may prove invaluable.



## Microsoft Works 1.05

An impressive piece of software artistry, *Microsoft Works* sports an elegant interface, a first-class spreadsheet, great graphics, and mouse support. It's too bad *Works* turns a deaf ear to many foreign file formats, which makes integration with stand-alone applications difficult.

*Works*'s array of pulldown menus looks much the same from one module to the next. A clipboard lets you cut and paste data easily between modules. In addition, *Works*'s manual is excellent and its interactive tutorial one of the best in the business.

The word processor has more features than any reviewed here, with files limited only by disk space. Like the data base, however, the word processing module understands only its own proprietary format or plain-vanilla ASCII. The program disk includes a stand-alone utility that can convert files in IBM Document Content Architecture (DCA) and *Microsoft Word* formats and *Microsoft Interchange Rich Text Format*, but this miserly selection—and the necessity of



exiting to DOS to run the utility—offers nothing like the flexibility of *Ability Plus* or *PFS: First Choice*.

*Works*'s data base manager looks a bit unusual—more like a spreadsheet than the familiar data form—but it's easy to use. An individual form in the data base can run to eight screens in length, giving you unusual flexibility in designing user entry screens. Search criteria can include all fields or any subset of them and can use both relational and logical operators. You can create custom reports or use a standard design and edit it to your satisfaction. While the data base supports only ASCII, you can copy spreadsheet data to the data base through the clipboard.

The spreadsheet module is where *Works* really shines. Its native file format is 1-2-3 .WKS, but it also reads and writes .WK1 files. *Works* provides background recalc and a generous 62 functions. The spreadsheet uses its own nomenclature (A1:B23 instead of A1..B23, for example), but 1-2-3's formulas are automatically translated when 1-2-3 files are loaded.

Like *AlphaWorks*, *Works*'s graphics module is an integral part of the spreadsheet, so charts are linked to worksheets and updated with them. And the module's output is impressive: The number of graph types it supports is second only to *PFS: First Choice*'s

**Microsoft  
Works's data  
base supports  
both the con-  
ventional form  
view and the ta-  
ble view shown  
here.**

## EXECUTIVE SUMMARY

### Microsoft Works 1.05

Low-end integrated package

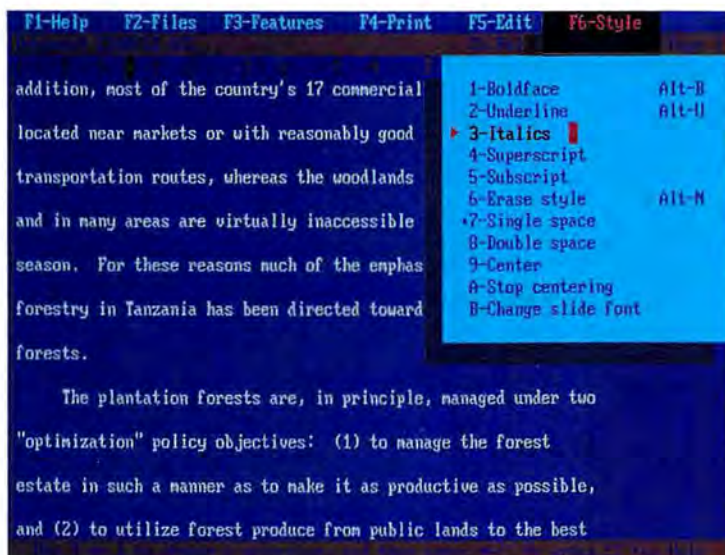


*Microsoft Works* has an enticing interface, consistent command structure, and well-integrated modules. The fast spreadsheet uses 1-2-3's .WKS file format, but the word processor's and

data base's proprietary formats ignore the outside world. Novices will find *Works*'s manual excellent and its disk-based tutorial outstanding.

	POOR	FAIR	GOOD	EXCELLENT
Word processor			●	
Data base			●	
Spreadsheet				●
Telecommunications			●	
Graphics				●
Integration and file compatibility			●	
Overall value				●





Created with novice users foremost in mind, PFS: First Choice boasts attractive menus and accepts a wide variety of word processor file formats.

selection, and *Works* provides a wide variety of text fonts and sizes. You merge charts with text documents at print time by inserting a placeholder in the document.

While telecommunicating with *Works* is limited, it's about as transparent as it can be. However, *Works* is the only package without an auto-capture buffer, and its file transfers are slow. It provides VT 100 and VT 52 terminal emulations but offers only XMODEM for transferring binary files.

In present company, *Microsoft Works* is quite a power package. It has the best graphics, fastest spreadsheet, largest word processing and spreadsheet capacities, and the best tutorial and manuals of the products reviewed. Even though it suffers a black eye in file format support, *Works* ranks as the best all-around choice.

### PFS: First Choice 3.0

*PFS: First Choice* has a superb user interface, broad support for foreign file formats, and sparkling graphics. In version 3.0, Software Publishing has added macro capabilities, greater data capacity and validation, .WK1 file compatibility, and more terminal emulations. So why doesn't the package get a gold star? Because its spreadsheet and data base are slow and severely limited in size.

The three main modules have smaller maximum file sizes than those in the other packages. And paging through a word processing file—even a small one—can be tedious. *First Choice* was the only package to run out of memory in attempting to recalculate NSTL's test spreadsheet file.

*PFS: First Choice* has always had a good word processor; new in version 3.0 are multiple rulers, on-screen page breaks, and spell-checking of selected text. *First Choice* can accept only files in ASCII or its proprietary format, but a separate conversion disk expands the selection to include files from *Microsoft Word*, *MultiMate*, *Wang PC*, *WordPerfect 3.0* through 4.2, and *WordStar 4.0*.

*First Choice's* data base is a true gift to novice users. The data entry form can be redesigned and field types changed at any time. You can append up to 20 lines of background comments to any data field, and a programming feature lets advanced users customize forms for novices. You can search and sort on any field and display records in form or table view. Reports can have up to 20 printed columns and can even include "invisi-

## EXECUTIVE SUMMARY

### PFS: First Choice 3.0

#### Low-end integrated package

An attractive interface makes this package comfortably accessible to novices, and the graphics module is first-rate. Unfortunately, the otherwise competent word processor, data base, and spreadsheet are limited in both file size and performance.

	POOR	FAIR	GOOD	EXCELLENT
Word processor				●
Data base			●	
Spreadsheet		●		
Telecommunications				●
Graphics				●
Integration and file compatibility				●
Overall value			●	



ble" (nonprinting) columns for calculations or as keys for sorting.

Capacity and speed problems aside, *First Choice's* spreadsheet offers a lot of power. It provides a whopping 71 functions, including the powerful IF...THEN...ELSE construct. The spreadsheet accepts .WKS, .WK1, and ASCII files. Column widths must be set globally, not individually, and must range between 6 and 20 characters. On screen, rows and columns are separated by lines, which looks nice but wastes space.

*First Choice's* graphics module offers a generous nine basic chart types, and its output is first-rate. As the graphics module is separate from the spreadsheet, it doesn't suffer the memory-draining presence of a large worksheet.

Telecommunications capabilities are better than average; *First Choice* supports TTY, VT 100, VT 52, and ANSI terminals and XMODEM and ASCII XON/XOFF protocols but offers no scripting capability. Its file-transfer times ranked third overall.

With so much else going for it, it's a shame *PFS: First Choice* should be so slow and limited. For large files, *First Choice* should be your last choice—at least until Software Publishing comes out with another upgrade.

## A Pair of Top Choices

Each of the packages reviewed has strengths and limitations that should inform your buying decision. Well-integrated *Ability Plus* is the one to choose if you need WYSIWYG word processing, with fonts and graphics shown on screen. And despite its sluggishness and file size limitations, *PFS: First Choice* has the friendliest interface, making it worth considering for light-duty use.

The two remaining packages are the real winners, however. For people who swap files with their office mates, *AlphaWorks* bolsters a fast data base and powerful spreadsheet with industry-standard *dBASE* and *1-2-3* file formats. If file swapping isn't a concern, *Microsoft Works* wins the award for the top low-end integrated package. It has the best graphics, fastest spreadsheet, largest word processing and spreadsheet capacities, and the best tutorial and documentation. *Works* is the kind of program that defines what integrated software is all about. ●

*Dennis Dykstra is a contributing editor for PC World and a professor at Northern Arizona University.*

## WHERE TO BUY

### Ability Plus 1.01

Migent Inc.  
865 Tahoe Blvd.  
P.O. Box 6062  
Incline Village, NV  
89450  
800/633-3444,  
702/832-3700  
**List price:** \$259  
**Requirements:** 384K (with tutorial 512K), two disk drives, DOS 2.0 or later version  
**Not copy protected**  
**Technical support:** unlimited to registered users, no toll-free number, M-F 8-4  
**Other support services:** none  
**For more information,** circle 601 on reader service card.

### AlphaWorks 1.0

Alpha Software Corp.  
One North Ave.  
Burlington, MA 01803  
617/229-2924,  
617/229-2915 (BBS)  
**List price:** \$195  
**Requirements:** 512K, two disk drives, DOS 2.0 or later version  
**Not copy protected**  
**Technical support:** unlimited, no toll-free number, M-F 9:15-5:30  
**Other support services:** 30-day money-back guarantee, company BBS  
**For more information,** circle 602 on reader service card.

### Microsoft Works 1.05

Microsoft Corp.  
16011 N.E. 36th Way  
P.O. Box 97017  
Redmond, WA  
98073-9717  
800/426-8400,  
206/454-2030 (tech support)  
**List price:** \$149, network version \$149 plus \$75 each node  
**Requirements:** 384K, two disk drives, DOS 2.0 or later version  
**Not copy protected**  
**Technical support:** unlimited, no toll-free number, M-F 8-5  
**Other support services:** 90-day money-back guarantee,

CompuServe forum (GO MSAPP), quarterly newsletter on Microsoft products, training courseware available  
**For more information,** circle 603 on reader service card.

### PFS: First Choice 3.0

Software Publishing Corp.  
1901 Landings Dr.  
P.O. Box 7210  
Mountain View, CA  
94039-7210  
415/962-8910  
**List price:** \$159  
**Requirements:** 512K, two disk drives, DOS 2.0 or later version (640K and DOS 3.1 or

later version required to run on a network)  
**Not copy protected**  
**Technical support:** unlimited, no toll-free number, M-F 8-4  
**Other support services:** 90-day money-back guarantee, CompuServe forum (GO SPCFORUM), quarterly newsletter free to registered users  
**For more information,** circle 604 on reader service card.



# THE HARDWARE SHELF

## 102 **Tandy 5000MC**

For true Micro Channel believers, Tandy's faithful clone one-ups the Model 70-121 in price and performance.

## 106 **Vector Excalibur 286**

A record-breaking 286 that even laps some 386s...what's the catch? The simple fact that the Excalibur is a 286 in what's becoming a 386 world.

## 110 **NEC P5300**

A 24-pin thoroughbred dot matrix printer with superb speed, paper handling, and print quality.

## 112 **Carrier Current Technologies CarrierNet**

Need a basic business net for sharing printers and files? CarrierNet installs in minutes and taps into existing electrical wiring to save you the cost of LAN cable.

## 114 **DayStar Digital LT200-MC**

A nifty network board that unites Macs and Micro Channels, it's inexpensive, easy to install, and—best of all—lets Micro Channels speak LocalTalk.



One of the few Micro Channel compatibles, the Tandy 5000MC is faster and cheaper than IBM's Model 70-121.

## **Tandy 5000MC**

*80386-based Micro Channel compatible*

**PROS:** Solid 20-MHz performance, large CPU-speed memory capacity, automatic expansion board configuration, support for 5¼-inch drives

**CONS:** Expensive, won't accept AT-compatible boards, FCC Class A rating

IBM has made plenty of promises, but in the two years since the Micro Channel's debut, the new architecture has delivered only one concrete advantage over the good old AT bus: an easier way to install and configure expansion boards. Faith in IBM is the real reason over a million and a half Micro Channel machines have been sold. Perhaps that's why Tandy, at this writing, is the only company actually shipping a Micro Channel clone.

The Tandy 5000MC is a 20-MHz 80386 desktop whose closest competitor is the 20-MHz IBM Model 70-121 (see "Compaq and IBM: Faster, Top to Bottom," *PCW*, October 1988). In addition to Micro Channel architecture, the 5000MC offers the usual PS/2 features: built-in VGA graphics, a 3½-inch floppy drive as standard equipment, a floppy controller on the motherboard, and easy assembly. To tantalize IBM loyalists, the 5000MC adds greater memory capacity, plus room for 5¼-inch drives.

Best of all, the 5000MC provides better performance at a lower price than the Model 70-121. Unlike IBM's entry, which uses memory interleaving, the 5000MC employs the 82385-based memory caching scheme popularized by the Compaq Deskpro 386/20. As benchmarks by National Software Testing Laboratories (NSTL) reveal, this helps give the 5000MC about a 9 percent performance edge over the Model 70-121.

The price advantage is also substantial, though the 5000MC is hardly the cheapest 20-MHz 80386 around. A hefty \$7927.90 nets you a 5000MC with 2MB of RAM, a fast 140MB ESDI hard disk, and a color VGA monitor. Pay about \$660 more, and you get an identically configured Model 70-121, except with 20MB less disk space.



Tandy's drive options are much more flexible than IBM's. While the Model 70-121's 120MB ESDI drive is standard equipment, you can choose from a wide array of devices for the 5000MC—including SCSI drives. A single \$500 SCSI interface board can host up to three SCSI devices; SCSI drives in 40MB, 80MB, 170MB, and 344MB capacities are available, as is a 150MB SCSI tape backup.

According to Tandy, the company's SCSI drives have a higher maximum transfer rate than ESDI units, but NSTL's tests (in which the 5000MC had an 80MB SCSI drive) show that in practice IBM's ESDI drive is faster. In the processing-intensive 1-2-3 test, the 5000MC outdid the Model 70-121 by a resounding 20 percent; in the disk-intensive *Microsoft C* benchmark, the Model 70-121 actually beat the 5000MC.

One obvious plus for the 5000MC is its memory capacity. The system has two special CPU-speed memory slots, each of which accommodates a board that holds up to eight SIMMs (single in-line memory modules). With 256K SIMMs, you get 2MB per board; with 1MB SIMMs, 8MB per board. That yields a maximum of 16MB of memory bus RAM, compared to the Model 70's lackluster 6MB limit.

The downside to Tandy's memory options is that the 1MB SIMMs cost about \$800 each, while four 256K SIMMs run about \$150 less. Given that 2MB in 256K SIMMs comes with the system, and you must have either all 256K SIMMs or all 1MB SIMMs on the memory bus, you'll have to chuck those 256K SIMMs if you want more than 4MB of CPU-speed RAM. In addition, adding memory to the 5000MC's memory bus means messing with as many as four jumpers and two DIP switch blocks—pretty primitive for a Micro Channel machine.

Another rough edge was an eyebrow-raising number of patch wires on the review unit's motherboard. In addition, the 5000MC has an FCC Class A rating, making it unsuitable for home use. (Class A devices generate excessive RF emissions that can interfere with TV reception. All IBM machines

## FEATURES EVALUATION

### A Bigger Micro Channel Box for Less

*The Tandy 5000MC offers more board and drive capacity than IBM's PS/2 Model 70-121 at a price more than \$600 lower.*

- Yes  
○ No

	Tandy 5000MC	IBM PS/2 Model 70-121
<b>Standard features</b>		
Price	\$7927.90 <sup>1</sup>	\$8590.00 <sup>2</sup>
CPU	80386	80386
Clock speed	20 MHz	20 MHz
Built into motherboard		
Parallel ports	1	1
Serial ports	1	2
Floppy disk controller	●	●
Hard disk controller	○	●
Video adapter	●	●
Mouse port	●	●
Coprocessor support	20-MHz 80387	20-MHz 80387
Disk caching software included	●	●
Memory bus capacity	16MB	6MB

#### Expandability

32-bit expansion slots/number free	2/2	2/2
16-bit expansion slots/number free	3/2	1/1
8-bit expansion slots/number free	0/0	0/0
Half/full-height storage device bays	4/1	3/0
300MB or larger hard disk available from manufacturer	●	●

#### Ergonomic design

Switchless installation	○	●
Compact footprint	●	●
Complete documentation	●	●
Tilt-and-swivel monitor	○	●
Front-panel reset button	●	○
Front-panel on/off switch	●	●

<sup>1</sup> Price includes 2MB RAM, 1.44MB floppy, 140MB ESDI hard disk, one parallel and one serial port, VGA, VGA color monitor, 101-key keyboard.

<sup>2</sup> Price includes 2MB RAM, 1.44MB floppy, 120MB ESDI hard disk, one parallel and one serial port, VGA, 8512 VGA color monitor, 101-key keyboard.

are Class B and can be used at home.) The Class A rating is probably due to the fact that the 5000MC's CPU, the 82385 controller, the 80387 coprocessor socket, and the static




## NSTL TEST REPORT



## Tandy Tops IBM

Tandy's Micro Channel-based 5000MC beats IBM's Model 70-121 in four out of five tests.

**Microsoft Word**

Tandy 5000MC		72
IBM Model 70-121		82



**dBASE III Plus**

Tandy 5000MC		68
IBM Model 70-121		71

**1-2-3**

Tandy 5000MC		110
IBM Model 70-121		137

**AutoCAD**

Tandy 5000MC		59
IBM Model 70-121		68

**Microsoft C**

IBM Model 70-121		339
Tandy 5000MC		341

seconds 0 70 140 210 280 350

**Methodology**

Both machines were tested with a coprocessor and a 256K extended memory disk cache for all tests except the 1-2-3 benchmark. The 20-MHz Tandy 5000MC was configured with an 80MB SCSI hard disk and 2MB of RAM. The 20-MHz IBM PS/2 Model 70-121 was configured with a 120MB ESDI hard disk and 3MB of RAM.

**Microsoft Word 4.0**

A Microsoft Word macro loads a 35-page, 140-paragraph document and performs search-and-replace and spell-checking operations. The first page of the document is then printed. Although the results of the benchmark depend primarily on processor and memory access speeds, display adapter and hard disk speeds are also contributing factors.

**dBASE III Plus 1.1**

The dBASE III Plus test measures the time required to prepare and print a report of past-due invoices. The report includes calculated fields and is based on three files: a 500-record customer file, a 1000-record invoice file, and a 2000-record item file. When disk caching is not used, the random access speed of the hard disk is, after processor speed, the most significant factor in this benchmark. With disk caching, sequential read performance becomes more important than random access.

**1-2-3 2.01**

In this benchmark, a 1-2-3 macro executes a series of recalculations using five different formulas within a 75-by-75-cell matrix. Because there are few screen updates and no disk access is required, the results depend almost entirely on processing and memory access speeds.

**Microsoft C 5.0**

The Microsoft C benchmark measures the time required to compile and link XLIISP, a public-domain program composed of 25 C source code files. The most important factors in this benchmark are processor and memory access speeds. The performance of the hard disk is also a factor; generally, disk caching has little effect.

**AutoCAD 9**

In this benchmark, a three-dimensional sample drawing is retrieved and displayed using AutoCAD's EGA driver. The zoom function is used to display the drawing from various perspectives; then the full drawing is printed. The results of the benchmark depend primarily on the speeds at which the processor and coprocessor operate and at which memory is accessed. The performance of the display adapter and the hard disk also have some effect.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL). All rights reserved.

RAM memory cache are mounted on a proprietary expansion board, instead of being surface mounted on the motherboard.

Tandy clearly holds a winning hand in board and device capacity. With two 32-bit slots and two 16-bit Micro Channel slots open on the expansion bus, board accommodations are closer to the Model 80's than the Model 70's. In addition, the 5000MC will hold four half-height devices—two 5¼-inch and two 3½-inch—compared to the Model 70's space for three half-height, 3½-inch devices. The trade-off is a footprint 3 inches wider than the Model 70's.

The NSTL Crash Test didn't uncover any problems with the 5000MC's software compatibility. However, we couldn't let this machine go without testing Micro Channel hardware compatibility. Three IBM Micro Channel products—a 32-bit memory adapter with 2MB, an 8514/A graphics board and monitor, and an ESDI controller hooked to a 70MB hard disk—all ran as well with the 5000MC as they did with the Model 80 we stole them from.

As with IBM's Micro Channel machines, a bootable Reference Diskette sensed the presence of the Micro Channel boards and correctly listed them slot by slot. Running an automatic configuration routine resolves most board conflicts, and you can manually change arbitration levels to give certain devices priority, just like the real thing.

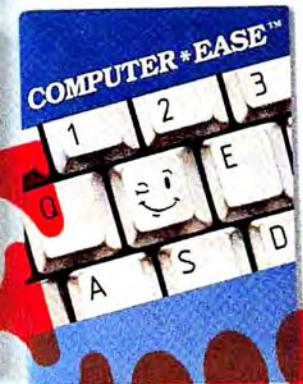
Simply put, the 5000MC has nearly everything that the Model 70-121 has, plus better performance, larger memory capacity, and more room for boards and drives. Patch wires aside, it's a better Micro Channel machine for a lower price—but the big question is whether you want a Micro Channel machine at all.

Most of the Micro Channel's benefits are still to come, supposedly; in the meantime, you're stuck with a premium price and incompatibility with AT boards. The much-hyped Micro Channel busmasters—intelligent devices, such as drive controllers or communications boards, that would share control of the bus and vastly increase overall throughput—haven't arrived, rendering the bus's sophisticated arbitration scheme super-

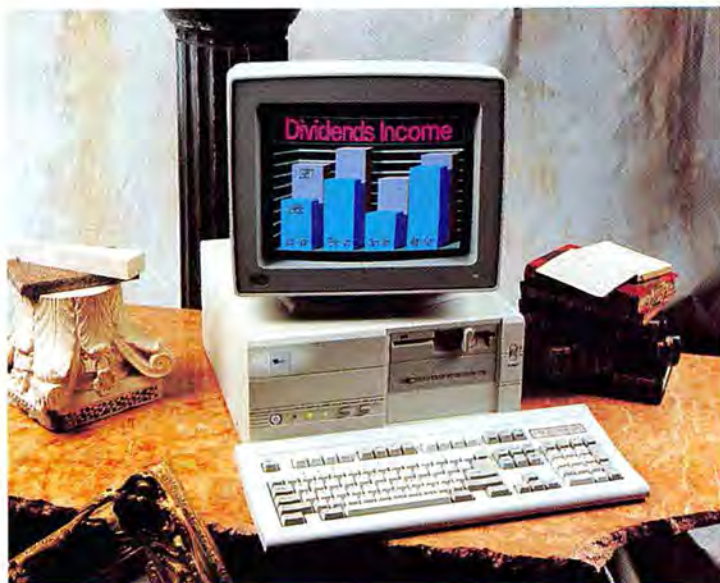




## FloppyDRIVER







The pricey Vector Excalibur stands as the fastest 286 system tested by PC World.

fluous. And as yet there's no way to verify IBM's claims of greater reliability. Ironically, only those who still have faith in IBM's master plan will want to consider the Tandy 5000MC. —Eric Knorr

#### WHERE TO BUY

##### Tandy 5000MC

Tandy Corp.  
1700 One Tandy Center  
Fort Worth, TX 76102  
817/390-3300

**List price:** with 2MB RAM, 1.44MB floppy disk drive, built-in VGA, one parallel and one serial port \$4999; with 19ms 40MB hard disk \$6499; with 16ms 80MB hard disk \$6999

**Accessories:** 1MB RAM (in four 256K SIMMs) \$649, 2MB RAM (in two 1MB SIMMs) \$1599; 1.2MB floppy drive \$299.95, 1.44MB floppy drive \$279.95; color VGA monitor with .31mm dot pitch \$629, color VGA monitor with .42mm dot pitch \$499.95, monochrome VGA monitor \$199.95; SCSI adapter \$499.95; 28ms 40MB SCSI hard disk \$999, 19ms 80MB SCSI hard disk \$1499, 16ms 170MB SCSI hard disk \$2499, 344MB SCSI hard disk \$3499; 150MB SCSI tape backup \$1299; 20-MHz 80387 math coprocessor \$1095; MS-DOS 3.3 and BASIC \$119.95, MS-OS/2 1.0 \$325

**Warranty:** one year parts and labor

**Extended warranty:** three years parts and labor \$129, five years \$139

**Technical support:** unlimited phone support, no toll-free number, M-F 8:30–5

**Other support services:** newsletter, tech support through CompuServe  
For more information, circle 630 on reader service card.

## Vector Excalibur 286

AT-compatible system

**PROS:** Exceptionally fast, small footprint, ROM-based setup

**CONS:** Limited drive and memory expandability, poor keyboard

Speed records fall with predictable regularity, but at press time the 20-MHz Vector Excalibur 286 was the fastest 286 machine ever tested by *PC World*. This sizzling-hot system easily outperformed its nearest 80286 rival, the 20-MHz Dell 220, and even blew past some popular 20-MHz 80386 machines (not shown in the NSTL Test Report). It boasts a small footprint, too, but it's far from cheap.

With 2MB of RAM, a 65MB hard drive, a 1.2MB floppy drive, an EGA board (no VGA is available), a \$500 color monitor provided by the dealer (since Vector doesn't sell one), and the usual amenities, the system retails for around \$4329. The Dell, similarly configured but with a smaller 44MB hard drive and a VGA color display, comes in at \$3979, \$350 less. As a matter of fact, you can get a lowball 80386 clone like the 20-MHz Fortron 80386-20 (see "Surprise Values at 20 MHz," *PCW*, December 1988) for \$229 less.

Like the Dell 220, the Excalibur is built around Harris's 20-MHz 80286 processor and the NEAT (New Enhanced AT) chipset from Chips and Technologies. But instead of the Dell's Phoenix BIOS, the Excalibur uses an Award BIOS, which probably contributes to its superior performance. The system also passed the NSTL Crash Test without a hitch.

The Excalibur comes with two provisos. First, as with the Dell 220, top performance requires at least 2MB of RAM. The interleaved memory access scheme used by both machines is defeated by 1MB, 3MB, 5MB,



# ...with the incredible HeadStart III.™



At Vendex we design every computer as a complete system. We integrate peripherals usually offered only as options and include an unprecedented package of 14 name brand programs worth thousands of dollars FREE!... All you have to do is add the electricity and you're immediately productive.



5 1/4" and 3 1/2" Diskdrive  
Both Standard

**Incredibly convenient.** The HeadStart III has two internal drives: a 1.2 megabyte, 5.25-inch and a 1.44 megabyte 3.5-inch, both standard.

So you don't have to choose between the two, you use either, depending on your software.

**Incredible performance.** At the heart of the HeadStart III is a 12MHz 80286 processor with one megabyte of standard RAM, with the hard drive system delivering 32 megabytes of storage operating at 28 milliseconds with astonishing 1 to 1 interleave. Plus, true 16 bit built-in VGA Graphics is component matched for high speed and clarity.

**Plus, incredible expandability and support.** The HeadStart III is designed for your future as well as your present applications, with four expansion slots for networking and for the diverse peripherals already becoming available. With the HeadStart III, you're OS/2 ready right now. You can add two full megabytes of RAM, without

having to buy any additional boards.

In addition, our PC Coach hotline is available to registered owners with questions about hardware, software or service.

To obtain more information about the HeadStart III and our full line of advanced computer systems, or to find the name of the nearest dealer call toll free **1-800-882-1888.**

You'll see, it really is incredible.

## SPECIFICATIONS

MICROPROCESSOR: Intel 80286-12  
SPEED: 12MHz/8 Switchable  
BIOS: Award  
BUILT IN RAM: 1 Megabyte  
EXPANDABLE TO: 3 megabytes  
POWER SUPPLY: 145 watts 110/220 switchable  
KEYBOARD: 101 key PS/2 compatible  
GRAPHICS: VGA Autosync  
FLOPPY DRIVES: one 5.25" 1.2 megabyte, one 3.5" 1.44 megabyte

HARD DRIVE: 32.1 megabyte, 28 milliseconds, 1:1 interleave  
BUILT IN INTERFACES: Parallel, 2- RS232 serial, mouse, joystick  
EXPANSION SLOTS: 3 available  
MOUSE: Standard  
SOFTWARE: DOS 3.3, GW Basic, HeadStart Advanced Environment, Floppy Driver, Framework II, 3-D Graphics, AFI and Computer-EEZ Tutorial Software, Xtree hard disk manager, Publish-It! Chessmaster 2000, Splash VGA paint program, Bookmark, plus Twist and Shout.

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# VENDEX HEADSTART™ III

Built to be compatible with you.™



## FEATURES EVALUATION

## World's Fastest 20-MHz 80286 Speedsters

Vector's Excalibur 286 boasts a bigger hard disk than the Dell 220 and runs significantly faster. But it costs \$550 more, has a much smaller memory-bus RAM capacity, and offers only EGA graphics.

	Excalibur 286	Dell 220
● Yes ○ No		
<b>Standard features</b>		
Price	\$4329 <sup>1</sup>	\$3979 <sup>2</sup>
CPU	80286	80286
Clock speed	10/20 MHz	20 MHz
Built into motherboard		
Parallel ports	0	1
Serial ports	0	2
Floppy disk controller	○	●
Video adapter	○	●
Mouse port	○	●
Coprocessor support	8/10-MHz 80287	10-MHz 80287
Disk-caching software included	○	○
Complete documentation	○	●
Maximum bus capacity	2MB	8MB
<b>Expandability</b>		
8/16-bit expansion slots/number free	5/3	3/3
8-bit expansion slots/number free	3/2	0/0
Half/full-height storage device bays	3/1	2/1
120MB or larger hard disk available from manufacturer	●	○
<b>Ergonomic design</b>		
Switchless installation	●	○
Compact footprint	●	●
Tilt-and-swivel monitor	●	●
Front-panel reset button	●	○
Front-panel on/off switch	●	●

<sup>1</sup> Price based on 2MB RAM, 1.2MB floppy, 65MB hard disk, at least one parallel and serial port, EGA board, color monitor, 101-key keyboard, DOS 3.3, and GW BASIC.

<sup>2</sup> Same as footnote 1 except with 44MB hard drive and VGA.

or any other odd number of megabytes, degrading performance by about 15 percent (NSTL's tests used 2MB). Second, unlike 80386 systems, the Excalibur has no equivalent coprocessor to match the CPU's speed. It supports the 10-MHz 80287 and the 12-MHz Microway coprocessors, but it won't give you the kind of performance from CAD

and other math-intensive software that you'd get from a coprocessor-equipped 20-MHz 80386.

Furthermore, CPU-speed memory is currently limited to the 2MB you can place on the motherboard. A high-speed memory expansion slot is designed to accept a board that will hold an additional 14MB of CPU-speed RAM, but the board won't be available until June.

Standard board capacity is quite generous. You start with five 8/16-bit and three 8-bit slots, and after installing a video board, a hard disk controller, and an I/O board, you still end up with five slots open.

The Excalibur's small footprint necessitated some trade-offs in the drive department. There are only three half-height, 5¼-inch drive bays (all externally accessible), which means if you want two floppies, there's only one half-height bay left for a hard drive. Users who need lots of data storage can buy a 120MB half-height unit from Vector for \$600 more than the 65MB unit.

Vector also could have given more thought to its keyboard, which has a cheesy feel. In addition, the frequently used backslash resides on a standard-width key, as opposed to the wide key it inhabits on most modern keyboards.

Apart from the clunky keyboard, using the Excalibur is a pleasure. All the controls are conveniently located on the front panel, including large push buttons for on/off and reset, and a switch that toggles between 10 MHz and 20 MHz. The Excalibur comes with DOS 3.3 and GW BASIC, and ROM-based setup is built-in. Two complaints: It lacks a disk caching program, and its 32-page operator's manual could be more thorough.

The Excalibur performs as fast as many 80386s, but buying an 80286—even a racer like the Excalibur—means you'll be giving up the ability to run 80386-specific software like *Windows/386* and upcoming 32-bit versions of OS/2. Aside from this drawback—and the usual uncertainty of buying from a little-known manufacturer—there's little to detract from this amazingly speedy 80286 contender. —Alan Southerton





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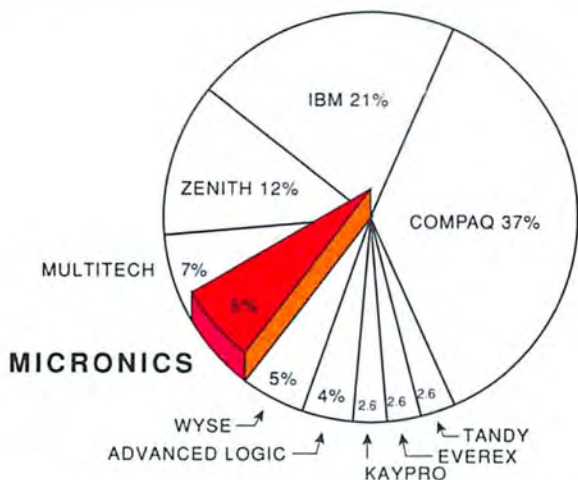
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\* Source data available upon request.

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## NSTL TEST REPORT

## Flat Out at 20 MHz

The Vector Excalibur and the Dell 220 both offer 80386-class performance, but the Excalibur has an edge.

## Microsoft Word

Vector Excalibur 286	81
Dell 220	83

## dBASE III Plus

Dell 220	74
Vector Excalibur 286	75

## 1-2-3

Vector Excalibur 286	136
Dell 220	145

## Microsoft C

Vector Excalibur 286	314
Dell 220	354

## AutoCAD

Vector Excalibur 286	92
Dell 220	114

seconds 0 70 140 210 280 350

## Methodology

Both machines were tested with a 256K extended memory disk cache for all tests except the 1-2-3 benchmark. The 20-MHz Vector Excalibur 286 was configured with a 33MB hard disk and 2MB of RAM. The 20-MHz Dell 220 was tested with a 40MB hard disk and 2MB of RAM.

## Microsoft Word 4.0

A Microsoft Word macro loads a 35-page, 140-paragraph document and performs search-and-replace and spell-checking operations. The first page of the document is then printed. Although the results of the benchmark depend primarily on processor and memory access speeds, display adapter and hard disk speeds are also contributing factors.

## dBASE III Plus 1.1

The dBASE III Plus test measures the time required to prepare and print a report of past-due invoices. The report includes calculated fields and is based on three files: a 500-record customer file, a 1000-record invoice file, and a 2000-record item file. When disk caching is not used, the random access speed of the hard disk is, after processor speed, the most significant factor in this benchmark. With disk caching, sequential read performance becomes more important than random access.

## 1-2-3 2.01

In this benchmark, a 1-2-3 macro executes a series of recalculations using five different formulas within a 75-by-75-cell matrix. Because there are few screen updates and no disk access is required, the results depend almost entirely on processing and memory access speeds.

## Microsoft C 5.0

The Microsoft C benchmark measures the time required to compile and link XLIUP, a public-domain program composed of 25 C source code files. The most important factors in this benchmark are processor and memory access speeds. The performance of the hard disk is also a factor; generally, disk caching has little effect.

## AutoCAD 9

In this benchmark, a three-dimensional sample drawing is retrieved and displayed using AutoCAD's EGA driver. The zoom function is used to display the drawing from various perspectives; then the full drawing is printed. The results of the benchmark depend primarily on the speeds at which the processor and coprocessor operate and at which memory is accessed. The performance of the display adapter and the hard disk also have some effect.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL). All rights reserved.

## WHERE TO BUY

## Vector Excalibur 286

Vector Computer Corp.

7 Vernon St.

Norwood, MA 02062

800/634-6070

**List price:** with 512K of RAM, 1.2MB 5¼-inch floppy drive, 101-key keyboard, DOS 3.3, GW BASIC \$2295

**Accessories** (available through dealers only): 512K RAM upgrade \$220, 1.5MB RAM upgrade \$660; 65MB hard drive \$654, 120MB hard drive \$1254; EGA board \$220

**Warranty:** one year parts and labor

**Extended warranty:** none

**Technical support:** no toll-free number, M-F 8-5, Sat 10-4

**Other support:** on-site service contract available

For more information, circle 631 on reader service card.

## NEC P5300

24-pin dot matrix printer



**PROS:** Excellent print quality, fast, seven built-in fonts

**CONS:** Serial interface costs extra

Even workhorses get put out to pasture, and so it is with printers. NEC's 24-pin P7 has been a longtime office favorite, thanks to its print speed and excellent paper handling. But now there's a new horse in town, the NEC P5300, and it's a racer.

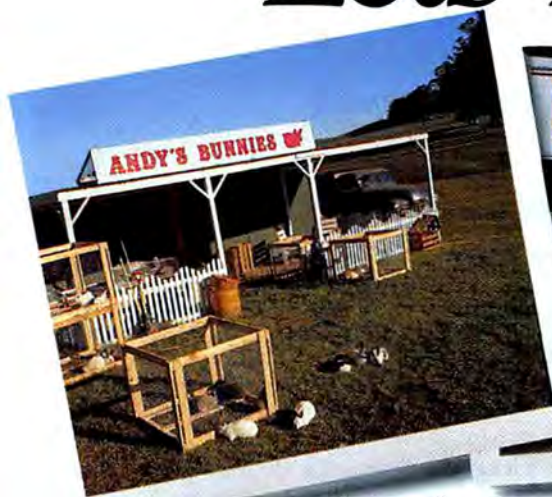
The \$1069 NEC P5300 is a fast, wide-carriage printer (the narrow-carriage version, the P5200, costs \$799) that features seven resident fonts and a hefty 80K buffer. Designed to take the pounding of everyday office duty without a whinny, the new machine is several inches wider than the P7 and takes up a healthy chunk of desktop real estate.

The P5300's print speed is outstanding. A 250-word, double-spaced page printed out in a mere 7 seconds in high-speed mode, 12 seconds in draft, and only 25 seconds in NLQ mode. This is actually a bit speedier than the Epson LQ-1050, which costs \$130 more.

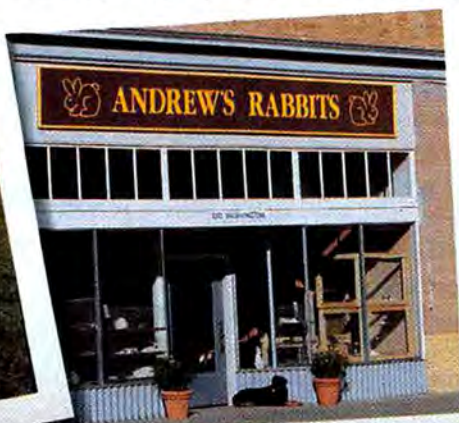
Better yet, the NEC 5300's print quality is top-notch. High-speed text is perfectly serviceable, draft output is clear and precise,



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and NLQ printout is nothing short of fabulous. To my eye, this printer produces even better looking copy than Toshiba's top-rated P341SL. It is supported by many software packages, either via its own print driver, the old P7 driver, or Epson LQ-850 emulation.

Of the seven resident typefaces, six are for NLQ (Bold PS, Courier, Prestige Elite, ITC Souvenir, Times, Helvetica), and one is draft Gothic. NEC also sells eight IC cards containing a number of additional fonts (in pitches from 10 point to 24 point), and bar codes. The P5300 can print all typefaces in italics, bold, enhanced, and doublestrike; you select fonts via software or the printer's control panel. Graphics resolution is a more-than-respectable 360 by 360 dots per inch.

The P5300 offers an up-to-the-minute package of paper-handling facilities, including an auto-advance feature, which rolls up the fanfold paper at the end of a print job so you can tear off the last sheet, and then rolls it back for the next print job. Paper parking requires a button-press and two lever-pulls to roll out the fanfold and feed in single sheets and envelopes flawlessly. A paper-thickness lever adjusts printhead position for envelopes and thick forms.

The control panel on the front of the printer—five membrane switches and a two-character LED—is comprehensive and easy to use. It enables you to cycle through the resident fonts and change default settings such as form length and lines per inch. There are no DIP switches.

If you need a steady performer for everyday office printing chores, the NEC P5300 makes real horse sense. It is a reasonably priced, high-performance 24-pin printer that works at top speed and packs outstanding print quality, ease of use, and a wide variety of fonts and styles. —Wes Nihei

#### WHERE TO BUY

##### NEC P5300

NEC Information Systems  
1414 Massachusetts Ave.  
Boxborough, MA 01719-9988

**List price:** \$1069, P5200 (narrow carriage) \$799

**Accessories:** font cards \$125; serial interface \$131; color print option \$131; 100-page sheet feeder \$274; black

multistrike ribbon \$14, black fabric ribbon \$12.50, four-color fabric ribbon \$25

**Warranty:** one year parts and labor  
**Extended warranty:** on-site service contract available

**Technical support:** no toll-free number, M–F 8:30–5:30

**Other support:** none  
For more information, circle 632 on reader service card.

## Carrier Current Technologies CarrierNet

*Power-plug serial port LAN*

**PROS:** No network wiring, easy to install, background print spooling

**CONS:** Slow file transfers, no file sharing, hard to configure second serial port

People have started using the electrical wiring in their walls for a lot of strange purposes: intercoms, stereo extension speakers, appliance remote control. Now Carrier Current Technologies brings PC users into the fray with a unique serial port LAN that uses electrical wiring to transfer files and share printers. It may sound like a harebrained idea from an old issue of *Popular Mechanics*, but it works. And considering that installing cabling is often the most costly part of setting up a LAN, at \$219 a node the price is right.

CarrierNet consists of a disk full of software and a small box with two wires coming out of it. One wire connects to your 25-pin RS-232C port (an optional adapter is required for 9-pin ports). The other plugs into the nearest three-pronged AC power outlet. There's no cable to lay and no network board to install. All that's left to do is run the simple, menu-driven installation program, give your PC a network name, and you're on the LAN. The vendor claims that up to 255 nodes can be attached, at distances of up to one mile, as long as none of the outlets are separated by a transformer; reportedly, it even works between adjacent houses.





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**Math Co-processor:** 80387 and 80287 sockets.

**I/O Ports:** 1 parallel and 2 serial ports (on board).

**Disk Controller:** Combined two-hard, two-floppy.

**Floppy Drive:** 1.2 MB (also reads/writes 360KB disks).

**Keyboard:** 101-key enhanced AT-style.

**Software:** Setup utilities. Models 40 & 70 include MS-DOS® operating system and Directory Assistance™ file/directory management software.

386/20 Uprights	Model 10 Basic Unit, 3.1 disk controller.	Model 40 43MB (28ms) hard disk, 3.1 disk controller, MS-DOS.	Model 70 65MB (28ms) hard disk, 1.1 disk controller, MS-DOS.
<b>Basic</b> No monitor. No video adapter.	<b>\$1,795</b> or \$64.89/month	<b>\$2,395</b> or \$86.58/month	<b>\$2,595</b> or \$93.82/month
<b>Mono</b> Mono monitor¹. Mono/graphics adapter². 720x348.	<b>\$1,995</b> or \$72.12/month	<b>\$2,595</b> or \$93.82/month	<b>\$2,795</b> or \$101.05/month
<b>VGA</b> VGA monitor¹. VGA adapter, 640x480 by 16 colors.	<b>\$2,495</b> or \$90.20/month	<b>\$3,095</b> or \$111.89/month	<b>\$3,295</b> or \$119.12/month
<b>VGA-Plus</b> VGA monitor¹. VGA adapter, 800x600 by 16 colors.	<b>\$2,595</b> or \$93.82/month	<b>\$3,195</b> or \$115.51/month	<b>\$3,395</b> or \$122.74/month

<sup>1</sup>Monitors are 14" diagonal; VGA monitor is IBM VGA compatible; VGA-Plus monitor is NEC Multisync-compatible. <sup>2</sup>Mono/graphics adapter is Hercules-compatible and includes one parallel printer port. <sup>3</sup>Hard disks have high-speed voice-coil actuators and auto-park heads.

Options	Price
25 MHz: Turbo upgrade	\$399
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MS-DOS: Version 3.3	\$95
Math Co-processor: 80387	\$528

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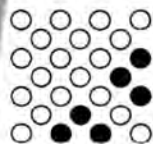
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Of course, it's not *NetWare*. Aside from the time-and-money-saving no-cable feature, CarrierNet is still just a simple serial port LAN that lets you copy files from one PC to another, share printers, and little more. A primitive E-mail utility is included, but it's not good for much.

CarrierNet lets you access remote PCs and their attached printers easily. Using DOS-like commands or a slightly awkward menu, you can view, create, rename, type, or delete directories and files on remote PCs. (To keep unauthorized intruders from trashing your files, you can place password protection on any subdirectory.) Files can also be copied from any networked PC to any other, in the background, while both computers are used for other tasks. Data is transferred at 19,200 bps.

A menu lets you configure up to three remote printers as LPT1, LPT2, and LPT3. Thereafter, you can print to them from your applications by simply sending data to the appropriate LPT port. The same menu allows you to make your local printer available to the network. Incoming print jobs spool to your hard disk, an arrangement that may introduce a slight keyboard delay while you're working, although the slowdown is not severe.

A few problems were encountered installing CarrierNet. While it worked perfectly with a variety of machines—including two Compaq Deskpro 386s (a 16-MHz and a 25-MHz model), a Toshiba T1200 laptop, and a generic AT clone—it refused to run on an AST Premium/286. In addition, getting it to work with COM2 requires you to know that port's I/O address and interrupt; finding out may be the toughest part of the installation.

CarrierNet's capabilities are definitely limited. Files must be copied to the local disk before they can be accessed from within an application. No third-party E-mail packages are supported. Furthermore, while Carrier Current Technologies claims CarrierNet is NETBIOS compatible, no record-level locking is provided, meaning you can't run file-sharing network applications. Finally, you may not be able to get CarrierNet to work properly if the power plug has surge protection.

Nonetheless, CarrierNet is an intriguing, cost-effective solution for business users who need a way to share expensive printers and want a slightly more elegant alternative to sneaker-net file transfers. The only hard part is overcoming that awful moment of doubt when you plug your serial port into the wall socket. —Robert Lauriston

#### WHERE TO BUY

##### CarrierNet

Carrier Current Technologies, Inc.  
1804 W. Southern Pkwy., Bldg. A-112  
Durham, NC 27707  
919/490-4970

**List price:** \$219

**Accessories:** none

**Requirements:** DOS 2.0 or later version, one serial port

**Warranty:** one year parts and labor

**Extended warranty:** none

**Technical support:** toll-free number, M-F 8:30–5:30

**Other support:** none

For more information, circle 633 on reader service card.

## DayStar Digital LT200-MC Micro Channel

*LocalTalk network board*

**PROS:** Easy to install, compatible with TOPS and AppleShare

**CONS:** Crude software, lacks menus and help screens

If Apple's Macintosh is a little fish in a Big Blue pond, then a great many businesses seem to be acquiring a taste for seafood. If yours is among them, and you're looking for an easy, inexpensive way for your Macs and Micro Channel PCs to share files and printers, consider the DayStar Digital LT200-MC LocalTalk network board.

LocalTalk (originally called AppleTalk) is a twisted-pair cabling scheme developed by Apple for the Mac. Although it will never get a speeding ticket—it moves data at 230 kilobits per second, versus ethernet's 10 megabits per second—it does have its strengths, one of which is economy. Since LocalTalk ca-





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pability is built into every Mac and almost every PostScript printer, Mac users can network their machines and printers simply by adding a \$75 connector kit.

Endowing a PC or PS/2 machine with a LocalTalk connector is almost as easy, if a bit more expensive. All you need is a LocalTalk network board. At least three such boards are available for PCs and ATs, but the \$395 LT200-MC is the only Micro Channel LocalTalk board you can buy. (You'll also need that \$75 connector, bringing the total cost to \$470 per machine.)

Like all Micro Channel peripherals, the LT200-MC is a breeze to install. You install the board in a vacant slot, hook up the LocalTalk connector, copy a configuration file from the DayStar disk to your IBM Reference Disk, and start the PS/2 with the Reference Disk. When asked if you want to auto-configure the system, answer yes. Copy the DayStar software to your hard disk, connect the LocalTalk twisted-pair cable, and you're in business.

Chances are, your LocalTalk LAN runs either *TOPS* or *AppleShare* network software. In the former case, you'll need to buy and install *TOPS* for your PC (see "TOPS—The Low-End Link to Macs," *PCW*, March 1989). In the latter case, everything you need is included with the LT200-MC.

Either way, sharing files and printers is a snap. A network driver that uses only 51K of RAM implements Apple's networking protocols. After loading that, you can communicate with other machines on the network. If the net is running *TOPS*, you can use its menu-driven interface to access remote files and printers. If the net is running *AppleShare*, you'll need two slightly clunky utilities, *Mount* and *UnMount*, included with the board.

Regardless of which networking software you run, you'll have to use a second driver (this one requiring only 6K of RAM) to access a LocalTalk printer. If the printer and your application both support PostScript, you can simply load these two drivers, configure your program to print to LPT3 (the de-

fault remote printer port), and you're ready for network printing.

Unfortunately, there is one big drawback to accessing a PostScript printer over LocalTalk: You can't use Adobe Systems' downloadable fonts. Adobe's DOS font downloader supports serial operation only; it can't download fonts to a printer via a network. With LocalTalk gaining popularity in the DOS world, it's time Adobe developed a network downloading utility.

The LT200-MC's software needs an interface-lift, but otherwise this board is a winner. The LT200-MC puts a Micro Channel PS/2 on LocalTalk; no other board can make that claim. —*Jim Heid*

#### WHERE TO BUY

##### LT200-MC Micro Channel

DayStar Digital  
5556 Atlanta Hwy.  
Flowery Branch, GA 30542  
404/967-2077

**List price:** \$395

**Accessories:** LocalTalk Connector Kit \$75

**Requirements:** IBM PS/2 Model 50, 60, 70, or 80 or compatible, 256K RAM, DOS 3.0 or later version

**Warranty:** one year parts and labor

**Extended warranty:** none

**Technical support:** no toll-free number, M-F 9-5

**Other support services:** none

For more information, circle 634 on reader service card.









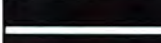

*Eric Knorr is a senior editor for PC World. Alan Southerton is a freelance writer who is currently finishing a book on programming the OS/2 Presentation Manager. Wes Nihei is an assistant editor for PC World. Robert Lauriston is a San Francisco-based computer consultant specializing in WordPerfect and LAN installations. Jim Heid is a freelance writer and the author of Power Windows, forthcoming from Microsoft Press (Redmond, Washington). ●*



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# Hercules



## 118 **Desqview/386**

The latest *Desqview* is simpler to set up than *Windows* and juggles multiple DOS sessions efficiently—just be prepared for a few crashes along the way.

## 120 **askSam 4.1**

Speed and flexibility are this data manager's watchwords. It accepts freeform or structured text and will hustle to fetch it later, but its command language is a bear.

## 124 **The Norton Utilities 4.5 and Advanced Edition 4.5**

Although both versions look better, only the *Advanced Edition* shows substantial improvements. Its Disk Doctor utility diagnoses and treats sick disks automatically.

## 126 **Freedom of Press 1.0a**

If your documents occasionally cry out for special treatment—but not often enough to justify a PostScript printer—this utility gives you 35 PostScript fonts to play with.

## 128 **Allways**

Ugly-duckling charts and worksheets get a reprieve with a 1-2-3 add-in that enhances text and layout alike.

## 130 **Look & Link 1.04, @WSLink 1.0**

Two add-ins that link 1-2-3 worksheets: *@WSLink* stresses ease of use and *Look & Link* opts for sophistication.



## Desqview/386

*Operating environment and expanded memory manager*

**PROS:** Multitasks DOS applications, easy to install, works well with almost all applications

**CONS:** Hard to master, can require extensive fine-tuning

Like marriage, Quarterdeck's multitasking environment *Desqview/386* takes some getting used to, but once you're past the initial hurdles it can be bliss. This bundling of *Desqview 2.2* with version 4.2 of Quarterdeck's *QEMM-386* memory manager offers nimble multitasking and extensive customization, but new users should expect a few crashes until they get their systems tuned. *Desqview/386* is easier to install and runs applications better than *Desqview 2.01* and continues to outpoint *Windows/386* in speed and convenience (see "Multitasking Without OS/2," *PCW*, November 1988).

*QEMM-386* is a device driver that enables *Desqview 2.2* to tap the 80386's ability to run multiple DOS sessions simultaneously, each in a separate memory partition, or *virtual machine*. *QEMM* also turns extended memory into EMS 4.0 expanded memory, using the 386's built-in memory manager. *QEMM* uses available memory addresses between 640K and 1MB to store most of its own code, thereby increasing memory each DOS session by as much as 80K. By putting most of *Desqview's* code in expanded memory as well, *QEMM* gives you more memory per window, depending on the video adapter. For example, *Desqview* windows can be as large as 635K on a Hercules-based system and 575K with EGA. (For a discussion of extended and expanded memory, see *The Help Screen* in this issue.)

*Desqview/386* can run practically anything inside of windows. Normally, programs that write directly to video—and that includes most major applications—can't be windowed. Under *Desqview/386*, however, these pro-



grams are actually each writing to a virtual screen, so *Desqview* can pick any portion of each virtual screen and display it on the real screen. (Note that if you choose to have text- and graphics-based applications on screen at the same time, the text-based ones will slow to a crawl, as their output is converted to graphics mode.)

Overall, *Desqview/386* runs applications very well. *WordPerfect 4.2*, *dBASE IV*, *Clipper*, *Summer '87*, and *Clipper*-compiled programs worked flawlessly in *Desqview* windows, as did *Paradox 386*, *SideKick*, *SideKick Plus*, *Norton Utilities*, and *WordStar 4.0*. Others were more problematic. *WordStar 5.0* worked fine in EGA, but its page preview crashed the Hercules setup. *Microsoft Excel* proved difficult and unpredictable—again, more so in Hercules than in EGA.

Alas, when it comes to memory management, *Desqview/386* still has a few problems. Applications aren't always adequately isolated from each other. When you run a TSR like *SmartKey* that first looks for itself in memory before loading, it won't come up in the current virtual machine because it will find itself in another one. Worse, a crash in one virtual machine can lock up the entire system, an occurrence that, in theory, the 80386 should be able to prevent. Lotus's *Metro/Express* combo—as troublesome a RAM ruffian as *SideKick* ever was—likewise causes problems. *Desqview/386* comes with a new protection-level setting that is supposed to safeguard you from systemwide crashes, but it's not much help. Set at the highest level, even minor memory conflicts produced error messages, yet the system would sometimes crash anyway.

*Desqview*'s excellent handling of hardware has been further improved in *Desqview/386*. Several options have been added for setting up a program, including one for controlling access to serial ports. Best of all, a new Tune Performance menu lets you change parameters on the fly. For instance, if your word processor is set to suspend in the background so as not to slow other programs, and

## FEATURES EVALUATION

### Desqview/386: Multiple Talents

A fast, compact multitasking environment,  
*Desqview/386* can be tricky to set up.

- Yes
- No
- ◐ Deficient

#### Application management

	1.0 <i>Desqview/386</i>	2.1 <i>Windows/386</i>
Runs two or more programs in a virtual machine	●	●
Runs EGA and VGA applications	●	◐ <sup>1</sup>
Specifies processor time per application	●	○
Swaps serial port automatically	●	○
DOS operations from menu	●	●
Overlapped/tiled windows	●	●
Cuts and pastes text/graphics	◐ <sup>2</sup>	◐ <sup>3</sup>
Key-repeat speedup	○	○
Macro processor	●	○
Disk cache	○	●
Notepad	◐ <sup>4</sup>	●
Paint program	○	●
Print spooler	○	●
Word processor	◐ <sup>4</sup>	●

#### Installation and configuration

Disk space required	360K	1.7MB
Minimum RAM required	1.5MB	2MB
80387 coprocessor support	●	●
On-line help	●	○

#### Memory management

Virtual memory system	●	◐ <sup>5</sup>
Provides EMS 4.0 to applications	●	◐ <sup>6</sup>
Sizes virtual machines	●	●

<sup>1</sup> Applications that use high-resolution graphics VGA mode can only run full-screen.

<sup>2</sup> Text only.

<sup>3</sup> Text and graphics between Windows applications and between DOS applications that use the Windows clipboard API (such as Microsoft Word); text only into DOS applications that can run in a window.

<sup>4</sup> Available at extra cost.

<sup>5</sup> Swaps only Windows itself and Windows-specific applications.

<sup>6</sup> For Windows applications; DOS applications are restricted to using an EMS 3.2 page-frame.

you want to print from it while working elsewhere, you can now change the 'Run in background' option without leaving the word processor.





Desqview/386's new Tune Performance menu lets you temporarily reset several parameters for the current window (or for Desqview itself) on the fly.

Desqview/386's big competition, of course, is Windows/386. Microsoft's environment runs both DOS and Windows applications, and its users will have an edge in moving up to the OS/2 Presentation Manager. But Desqview/386 is simpler to install and configure, and its fast screen refreshes make it feel much quicker in use. The occasional crashes are discouraging, but users willing to tinker will get a powerful, practical multitasking environment for their pains. —Lincoln Spector

#### WHERE TO BUY

##### Desqview/386

Quarterdeck Office Systems  
150 Pico Blvd.  
Santa Monica, CA 90405  
213/392-9851, 213/392-9701 (technical support)

**List price:** \$189.90 (includes QEMM); upgrades from Desqview 2.0 or later version \$24.95, from QEMM 4.0 or later version \$19.95 (free if either program purchased after August 1988)

**Requirements:** 1.5MB, two disk drives, DOS 2.0 or later version

##### Not copy protected

**Technical support:** 30 days free, no toll-free number, M-F 9-5; 12-month Priority Service \$30 a year; corporate support \$600 a year

**Other support services:** Forums on CompuServe (GO IBMSW) and BIX (JOIN DESQVIEW), MCI Mail (QUARTERDECK)

For more information, circle 620 on reader service card.

## askSam 4.1

Text data base manager

**PROS:** Impressive range of text storage and retrieval options, blazing speed, valuable hypertext feature

**CONS:** Command-driven, hard to learn

**a**skSam is the dBASE of text-management systems—only faster. A specialized data base manager, askSam stores masses of either structured or free-form text and retrieves them with breathtaking speed. But the price of that power is a complex, non-English-like command language—and documentation to match. In version 4.1, askSam gains indexing, context-sensitive help, and a hypertext search facility that makes some query operations effortless. At press time, a network version and a version that can store graphics were slated for release early this spring.

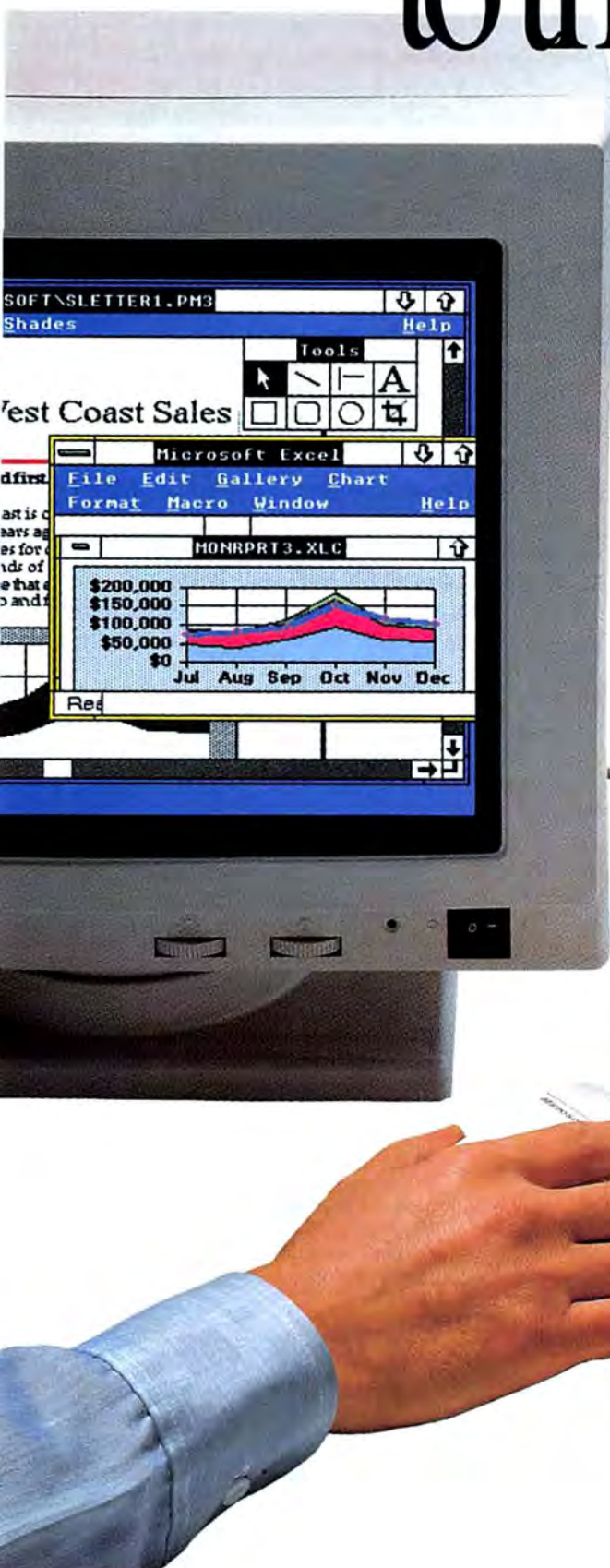
Unlike flat-file managers, askSam doesn't require that data be in structured fields. And unlike such general-purpose personal information managers (PIMs) as Lotus's *Agenda* or Valor's *Info-XL*, askSam doesn't make you define text entries by keywords or categories. Of the various PIMs, it most resembles Persoft's *Ize* (see *The Software Shelf*, PCW, September 1988). *Ize* is easier to use, but askSam is more powerful and flexible.

You can enter data in askSam in any shape you choose. Its standard data-entry screen looks like a word processor's, and you can define structured data-entry forms if you like. In contrast to *Ize*, however, askSam's file importing is pretty basic: It accepts ASCII files only.

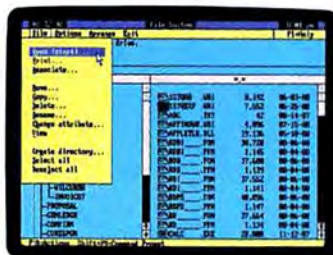
askSam's new hypertext facility is what really makes the program take off. In hypertext mode askSam treats any word or phrase you designate as if it were a command. Looking for customers who live in Ithaca? Highlight the word *Ithaca* in any data record, and askSam instantly displays excerpts from all



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Microsoft Windows/286 with PC Paintbrush® for Windows, Microsoft Paintbrush or EasyCAD™2 actually come with the Mouse (or vice versa).

Already, the Microsoft Mouse has made its way into the hands of over one million personal computer users. And that number is sure to grow even faster. After all, graphically oriented software is the driving force behind improved productivity.

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```

file: CLIENT2      RECORD QUERY
<Esc> done Print Hypertext Last-screen Update <other> next-screen
:
:BIB
{STREAM REC SKIP 1}
{SORT AUT}
AUI {bsp " ", (" bsp" YRI
{bsp " ")." LONG TI{ bsp " ".}
{IF} @BOOK
  PUI {bsp " ", PLI {bsp " ".}
{ELSE} @JOURNAL
  {LONG JMI bsp " ", U." bsp" VOI {bsp " ".}
  {IF COUNT} ISI = 0
  { "p." } PGI {bsp " ".}
  {ELSE}
  {bsp "(" bsp" ISI {bsp " ") p." } PGI {bsp " ".}
  {END}
{ELSE} @CHAPTER
  {"In:" } BAUI {bsp " ". LONG BIII{ bsp " ".}
  PUI {bsp " ", PLI {bsp " ", p." } PGI {bsp " ".}
{END}

-MORE-

```

**askSam can correctly format and print a bibliographic listing from a data file containing book title, author, and publication information.**

records that contain it, with the highlighted word surrounded by as much of its context as you choose. You can also use hypertext to run an *askSam* program, instantly switch files or directories, or access *askSam*'s new context-sensitive help. Best of all, hypertext lets you search across multiple files without resorting to menus or command lines.

If you're an *askSam* devotee, a host of new 4.1 commands will make your life easier. As before, you can progressively refine your search criteria and store the command sequences in a library for reuse. In 4.1, you can mark individual records or sets of records in a data file for printing, exporting, or limiting queries—which will make subsequent searches much faster. New in this version, indexing also substantially speeds searches. It is one of *askSam*'s few menu-driven processes, though you still have to specify an index by name at the command line when querying.

*askSam*'s new Go command lets you temporarily interrupt retrievals and jump to specified records before returning to the main query. Finally, a powerful Show command enables you to tailor searches as never before. For example, you can specify that you only want to find occurrences of *Ithaca* that are within ten words of *Cornell*.

*askSam* remains a born-and-bred speed demon. Searching a 370K data file on a 4.77-

MHz PC, *askSam* flashed retrieved records on the screen faster than I could cycle through them by pressing the Spacebar.

Even with the assistance of hypertext and context-sensitive help, however, you must still use *askSam*'s arcane programming language to produce even very simple reports. Nobody nurtured on *Paradox* or *Q&A* will have the patience to create a sorted client list by typing {SORT :L AGENT[:L NAME[] AGENT[ {COL 25} NAME[.

Programmers who want to create free-standing data bases in *askSam*—parts lists, product catalogs, reference works, and so on—can now distribute them in read-only versions with a \$75 run-time add-on called *HyperSift* that has all of *askSam*'s retrieval features but can't modify the data.

Attorneys, librarians, and archivists use *askSam* for sophisticated text retrieval, but if you venture very far beyond simple queries, it's a hard program to learn. Nevertheless, if you need to extract important data from large amounts of unstructured text, *askSam* offers matchless speed and power. —George Beinhorn

#### WHERE TO BUY

##### askSam 4.1

askSam Systems  
P.O. Box 1428  
Perry, FL 32347  
800/327-5726, 904/584-6590,  
904/584-7481 (FAX), 904/584-8287  
(BBS)

**List price:** \$295, upgrade from version 4.0 \$15, from version 3.0 \$85; *HyperSift* \$75, 10 copies \$450, 20 copies \$600, 50 copies \$1000, 100 copies \$1500

**Requirements:** 256K, DOS 2.0 or later version

**Technical support:** unlimited, no toll-free number, M-F 9-6

**Other support services:** company BBS (where users can upload problem files for diagnosis and repair), quarterly newsletter free for registered users; training available

**For more information, circle 621 on reader service card.**



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power users of all stripes."  
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process  
program  
Burnett,  
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we ever seen."  
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is a superior value." - InfoWorld

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In The Norton Utilities 4.5, the new Norton Disk Doctor queries the user about hard disk testing after analyzing the drive.

## The Norton Utilities 4.5 and Advanced Edition 4.5

*Hard disk utility package*

**PROS:** New Disk Doctor utility automates hard disk error correction

**CONS:** Only the Advanced Edition is significantly improved

The Norton Utilities has added still more tools to fix your hard disk and its files, but in this semi-upgrade, only the *Advanced Edition* got the goodies. Both the *Standard* and *Advanced* editions gained attractive screens and a number of options, including a new Norton Control Center to replace DOS's MODE command. In the \$150 *Advanced Edition* package, however, the new Norton Disk Doctor checks and treats ailing disks automatically, and a well-written Norton Troubleshooter manual gives step-by-step procedures for diagnosing and correcting disk problems.

If you spend the extra \$50 for the *Advanced Edition*, you'll probably use the new Norton Disk Doctor (NDD) more than any of the other utilities. NDD tests the system area on the subject disk, offers to correct any problems it finds, then offers to test the entire disk. It can even handle DOS 4.0 and

Compaq DOS 3.31 disk partitions greater than 32MB. In addition, NDD can revive a defective disk by replacing its physical format information while retaining the data. It can also make a disk bootable. When a Compaq Deskpro refused to boot from drive C: after its hard disk had been formatted and partitioned, NDD saved the day: It made the disk bootable in about 30 seconds.

In both editions, version 4.5's Norton Control Center (NCC) elegantly controls cursor size, screen colors and palette, key repeat rate, and your PC's time and date clocks—tasks usually associated with RAM-eating device drivers or the cantankerous DOS MODE utility. NCC ran on a variety of systems without problems but lacks one useful control: It won't set or swap printer ports.

Of version 4.5's remaining three new utilities, you'll probably use Safe Format (SF) most. It lets you choose between formatting the whole disk or just the boot area. A File Date utility can change a file's date and time. While not completely new, Batch Enhancer now combines several version 4.0 batch-file utilities into a single program.

Version 4.5's only quirk involves NDD, which insists on reading and analyzing the hard disk when it first runs—even if you specify a floppy disk drive on the command line. On an XT with two 20MB hard drives, NDD took about 30 seconds to analyze each drive. With a big hard disk, you may be in for a wait.

Since only the *Advanced Edition 4.5* has the Disk Doctor and Troubleshooter, it's now a better buy than the *Standard Edition*. *Mace Gold* or *PC Tools Deluxe 5.0* may give the Norton Utilities a run for the money, but for now, Norton's latest is still the greatest. —Steve King

### WHERE TO BUY

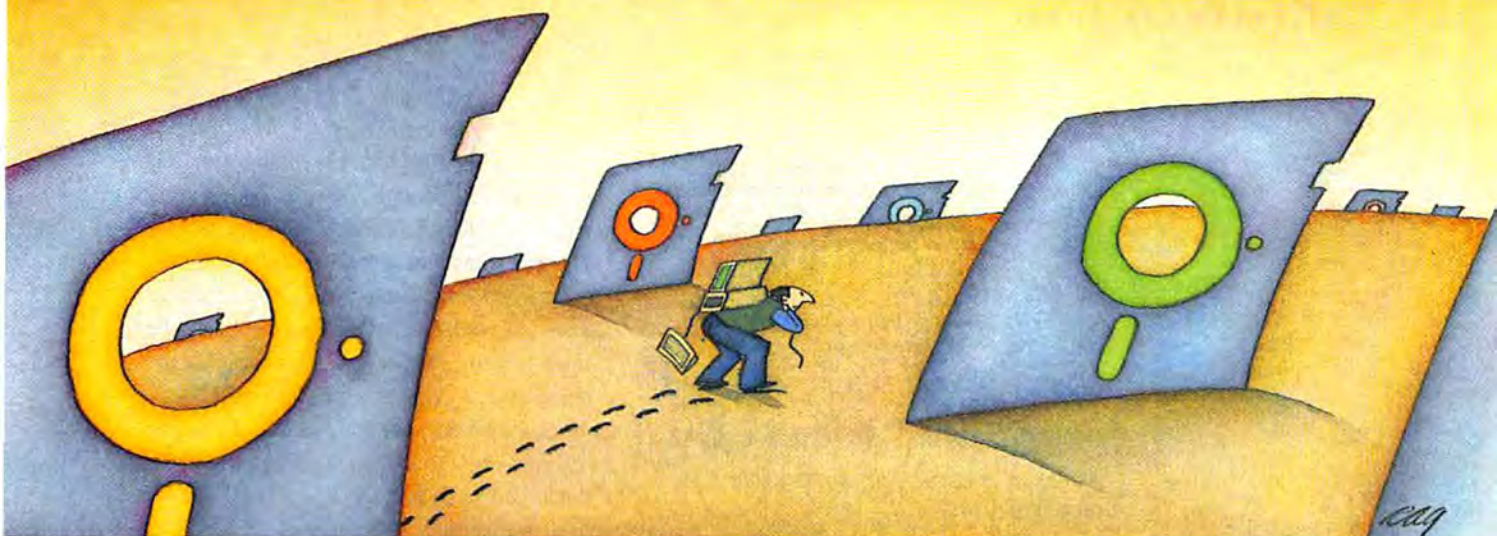
#### The Norton Utilities 4.5

Peter Norton Computing, Inc.  
100 Wilshire Blvd., 9th Floor  
Santa Monica, CA 90401  
800/365-1010, 213/319-2000,  
213/319-2020 (technical support)

**List price:** Standard Edition \$100, upgrade \$25; Advanced Edition \$150, upgrade \$39

**Requirements:** 260K, two disk drives (Advanced Edition requires hard disk), DOS 2.0 or later version





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—Colin Ralph, Ralph & Panzer, Inc., Seattle, WA

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## Freedom of Press 1.0a

*Disk-based PostScript-compatible interpreter***PROS:** Enables LaserJets and other non-PostScript printers to produce PostScript output**CONS:** Stiff hardware requirements, two-step printing routine, not compatible with Adobe downloadable fonts

If you wish you could occasionally use PostScript on a LaserJet but balk at spending \$2000 to \$4000 for a PostScript board, there's a cheaper solution. For \$495, Custom Application offers *Freedom of Press*, a PostScript language-compatible interpreter on a disk. It requires a well-stocked 286 or 386 and must be run as a foreground application, but it gives you virtually 100 percent PostScript compatibility. At press time, version 2.0 was due to ship in February. It offers color and much greater speed.

In exchange for 4MB of disk space, 530K of conventional memory, and 512K of expanded memory—and a math coprocessor for added performance—*Freedom of Press* supplies the same 35 fonts found in most PostScript printers. It drives not only LaserJets but HP's DeskJet and 24-pin dot matrix printers from IBM, NEC, Epson, Tandy, and Fujitsu, and others.

*Freedom of Press*'s interpreter uses Compugraphic font outlines and scaling routines. The fonts match Adobe's, so a printer driven by *Freedom of Press* can even print proofs of documents destined for a PostScript-based typesetter such as a Linotronic 100.

*Freedom of Press* can't use Adobe's library of 300-odd downloadable PostScript fonts, but it can download fonts from Bitstream's *Fontware* library. Version 2.0 will include Compugraphic's *Type Director* font utility, so users can add new fonts from Compugraphic's growing typeface library direct-

ly to the *Freedom of Press* interpreter. The new version will also create color PostScript output on HP's PaintJet ink jet printer and Howtek's hot-wax PixelMaster.

To create a document destined for *Freedom of Press*, simply configure your applications to print PostScript output to disk instead of to a printer. When you exit the application and load the disk file, *Freedom of Press* creates a bit-mapped image of the document page by page in memory (it swaps to disk if there isn't enough RAM) and sends it to the printer.

That sounds slow, and it can be. On an IBM PS/2 Model 50 with 1MB RAM and 1.2MB of EMS 4.0 expanded memory, *Freedom of Press* took 19 minutes to process and print a 20-page, typographically complex document created with *Microsoft Word 4.0* on a LaserJet Plus. With an 80287 coprocessor installed, the time dropped to 10 minutes. *Freedom of Press*'s sole screen output is a bar graph that charts the program's progress so you won't think your machine has frozen.

Verifying *Freedom of Press*'s PostScript compatibility would require a battery of tests, but informal testing revealed just one cosmetic flaw: In underlined text created by *Windows*' PostScript driver, the underline touched the characters above it. Otherwise, *Freedom of Press* accurately processed print jobs from *Word*, *Adobe Illustrator*, *PageMaker*, *Excel*, *Ventura Publisher*, *ScenicWriter*, and even ones created on a Macintosh.

*Freedom of Press* isn't the only PostScript printing utility you can buy. *GoScript* from LaserGo in San Diego drives LaserJets and 19 dot matrix printers and costs only \$195. But *GoScript* includes only 13 fonts, the original LaserWriter mix of (yawn) Times Roman, Courier, Helvetica, and Symbol. (At press time, a 35-font \$395 version called *GoScript Plus* had just shipped.)

*Freedom of Press* is too slow and inconvenient for regular PostScript use and worthless to fans of Adobe fonts. And while it goes for a fraction of the price of a PostScript board, \$495 isn't exactly small change. But if you need PostScript's rich printing features



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once in a while, it's the most cost-effective way to get them. —Jim Heid

#### WHERE TO BUY

##### Freedom of Press 1.0a

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5 Middlesex Technology Center  
900 Middlesex Turnpike  
Billerica, MA 01821  
800/873-4367, 508/667-8585,  
508/667-8821 (FAX)  
**List price:** \$495  
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## Allways

### 1-2-3 add-in

**PROS:** Excellent worksheet formatting, good page layout, can combine worksheets and charts on the same printed page

**CONS:** Limited chart formatting, slow video refresh rate for charts

If you're among the millions of die-hard 1-2-3 loyalists who would rather endure its archaic print functions than switch to Borland's *Quattro* or Microsoft *Excel*, suffer no

more: *Allways*, a \$149.95 add-in from Funk Software, can dramatically enhance charts and worksheets produced by 1-2-3 releases 2 and 2.01. It also combines worksheets and charts on the same printed page, a trick until now the monopoly of Paperback Software's *VP-Planner Plus* (see *The Software Shelf*, PCW, November 1988).

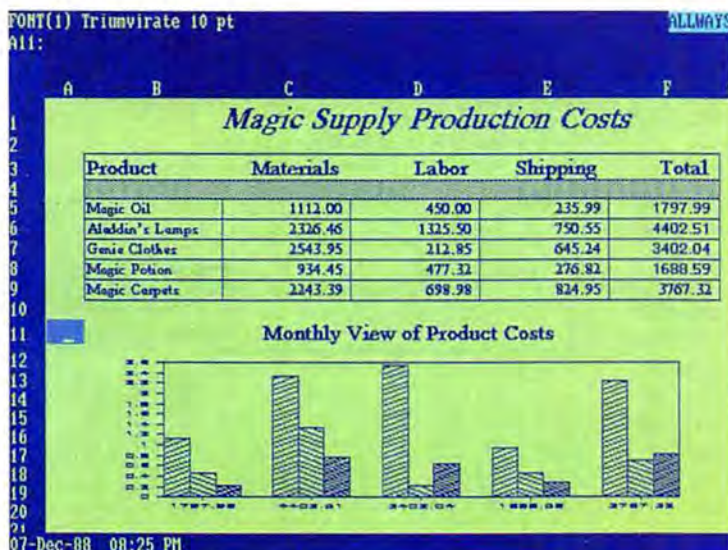
*Allways* handles up to 20 charts per worksheet file, lets you recolor chart components such as pie slices, resize charts, and quickly switch between charts. But *Allways*'s charting functions take some getting used to. After you create a chart in 1-2-3 you must save it as a .PIC file, toggle to *Allways*, specify a range where you want to insert the chart, and finally retrieve it from disk. If you make a change on the 1-2-3 side, you must save the .PIC file again. And each time you change the chart image, you'll twiddle your thumbs as *Allways* ever so slowly redraws the screen.

Spiffing up a worksheet is much more fun. *Allways* gives you instant access to eight fonts, halftone shading, color options, line- and box-drawing functions, and resize and magnify options. *Allways* also lets you underline and boldface any font, including italics. If you don't like a particular set of fonts, you can customize your own set from a total of 14 Compugraphic soft fonts bundled with *Allways*, plus any already available to your printer.

Alas, the only way to use these text enhancements with a chart is to import the chart into the *Allways* worksheet screen and then use *Allways*'s worksheet fonts to place text that simulates titles and captions around the chart's boundaries. If you insist on editing the chart image in the *Allways* chart screen, you're limited to *PrintGraph*'s default micro-fonts, and you can't increase the thickness of the chart's grid lines or frame. The add-in lets you scale the size of these fonts, but it takes practice to keep text, labels, and y-axis from winding up in an overlapping jumble.

*Allways*'s impressive layout commands let you set page size, margins, borders, titles, and headers and footers. They also let you increase the thickness of worksheet rules, but again, this doesn't work with charts. As

With *Allways*'s powerful worksheet formatting tools, you can give proper emphasis to titles and ranges.





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All Other Models	Call
ATI	
EGA Wonder	225
VIP VGA	265
Hercules	
Graphics Card Plus	175
All Other Models	Call
Intel	
Inboard 386 PC	720
Co-processors	Call
Orchid	
Designer 800	235
Pro Designer	295
Tiny Turbo 286	255
Paradise	
Autoswitch 350	155
Autoswitch 480	170
All Other Models	Call
Video-7	
Fastwrite VGA	345
VGA	265
Vega deluxe	205
Zenith	
449	239

### FAX BOARDS

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4800	\$225
9600	389

### COMPUTERS

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Single Drive	775
AST	
Model 80	1430
Other Models	Call
NEC	
Multispeed EL II	1479
Multispeed HD	2299
Toshiba	
T-1000	789
T-1200FB	1569
T-1600	3375
T-3200	3665
T-5100	4795
Zenith	
Supersport/2	1655

### MONITORS

Amdek Monitors	
210A	\$80
410	135
Mitsubishi	
Diamond Scan 14"	499
NEC	
Multisync II	589
Multisync Plus	899
Other Models	Call
Princeton	
Ultrasync 14"	499
Ultrasync 16"	839
Other Models	Call
Sony	
Multiscan (1303)	535
Zenith 1490	599



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Order Processing: (602) 944-1037  
10:00 a.m.-3:00 p.m. Mon.-Fri.





with most *Allways* formatting controls, you can save a given page layout and use it later as a default template.

*Allways*'s print functions are laudable too. If a print range exceeds a single page, the add-in automatically inserts a page break, and a landscape print option makes Funk's *Sideways* obsolete. Supported printers include most dot matrix printers, PostScript-compatible printers, and HP laser printers (with extensive cartridge support for the HP LaserJet Series II). You can also create PostScript files for export to other popular software such as desktop publishing packages.

*Allways*'s charting enhancements could be strengthened, but it's a valuable program nonetheless. By bringing quality printing to 1-2-3 worksheets, *Allways* is an inexpensive way to extend 1-2-3's considerable usefulness. —Alan Southerton

#### WHERE TO BUY

##### Allways 1.0

Funk Software Inc.  
222 Third St.  
Cambridge, MA 02142  
617/497-6339

**List price:** \$149.95

**Requirements:** 128K, hard disk,  
DOS 2.0 or later version

**Not copy protected**

**Technical support:** unlimited, no toll-free number, M-F 9-5:30

**Other support services:** none  
For more information, circle 624 on reader service card.

In both *Look & Link* and *@WSLink*, the linking @ functions can accept parameters in quotation marks or as cell references.

B52: [W35] 'Linking With @ Functions

READY

	A	B	C	D
52	Linking With @ Functions			
53				
54	Cell D10 in the worksheet WEST.WK1 has the value 475000			
55	and the range name WEST_TOTAL. Here are some examples of functions			
56	that link that cell into this current worksheet:			
57				
58			Worksheet	Cell
59	@WSLINK Functions		=====	=====
60			WEST.WK1	D10
61	Value Text			
62	475000 @wslink("WEST.WK1","D10")			
63	475000 @wslink("WEST.WK1","-WEST_TOTAL")			
64	475000 @wslink(C60,D60)			
65				
66	LOOK & LINK @Functions			
67				
68	475000 @wkscell("WEST","D10")			
69	475000 @wkscell("WEST","-WEST_TOTAL")			
70	475000 @wkscell(C60,D60)			
71				

30-Nov-88 10:58 AM

## Look & Link 1.04

1-2-3 add-in

**PROS:** Displays ranges as you link them, quickly consolidates or recalculates multiple worksheets, easily links formulas into current worksheet

**CONS:** Relatively expensive

## @WSLink 1.0

1-2-3 add-in

**PROS:** Links worksheets easily, requires little RAM, easy to learn, inexpensive

**CONS:** Difficult to copy formulas using linking function

If you need to link 1-2-3 worksheets—say, to compile an annual report—and can't wait for release 3.0, Personics's \$99.95 *Look & Link* and Goldata's \$49.95 *@WSLink* will hook them up now. Of the two add-in packages, *@WSLink* is the easier to use—and the only one that includes a version for *Symphony* worksheets—but you can't directly copy linking formulas for a range of cells in the source worksheet. *Look & Link* is actually two different add-ins. One lets you browse one worksheet while using a second; the other lets you reference cells in external worksheets and consolidate or recalculate a series of linked worksheets. Note that both *@WSLink* and *Look & Link* will balk if you make structural changes in the linked worksheets.

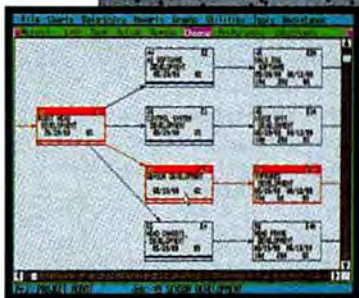
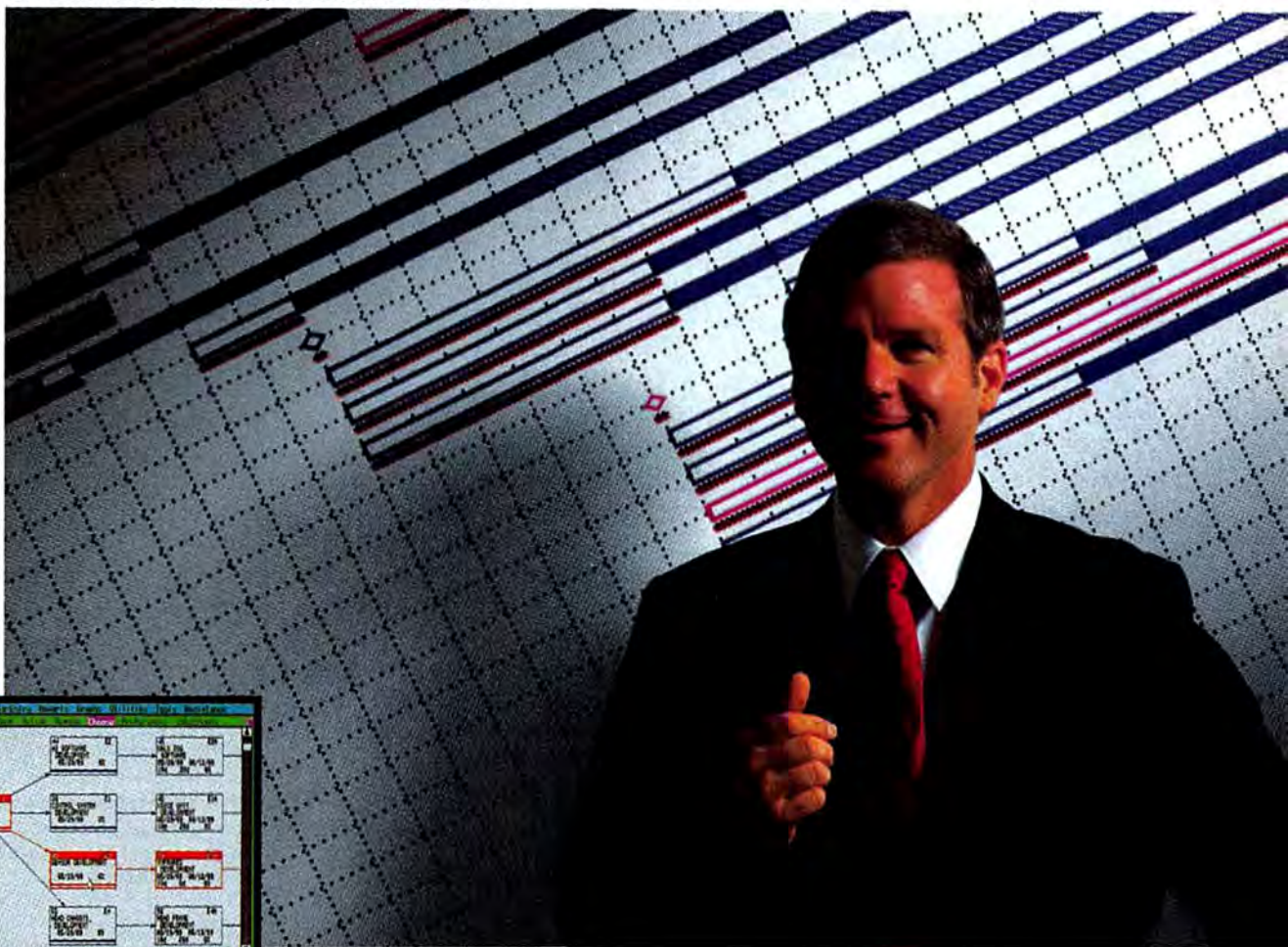
Using *@WSLink* is simplicity itself. You just use the function *@WSLink* in formulas to refer to external worksheets. To import the value or contents of cell B50 in an external worksheet called WEST.WK1, for example, enter the formula *@WSLink* ("WEST.WK1", "B50") in your current worksheet. (The external file name can be prefixed with the file's drive and/or path.) You can also refer to cells in external worksheets by specifying a directional (row or column) offset from a range name or label string.



Announcing  
Version 1.5

# "Project Scheduler 4. The difference is graphically clear."

ROGER MEADE, PRESIDENT, SCITOR CORPORATION



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totally new product with unmatched speed, power, and ease-of-use. They met this challenge with Project Scheduler 4.

"Project Scheduler 4 is the first PC-based package that integrates high-resolution graphics with all the management tools you need. You understand more because you see more on the screen. At last, PERT and Gantt charts make sense. And responsibilities, deadlines,

and resource bottlenecks are all spotted at a glance.

"You see more on paper, too. Project Scheduler 4 gives you graphic reports that minimize tedious cut-and-paste assembly. They're instantly understandable. Not to mention simple to generate for impressive presentations.

"Because scheduling is primarily a visual process, Project Scheduler 4 uses an intuitive, graphic

interface that gives you a clear view of the big picture. Gone are hard-to-remember commands and keystroke sequences. Here is the future of advanced productivity tools."

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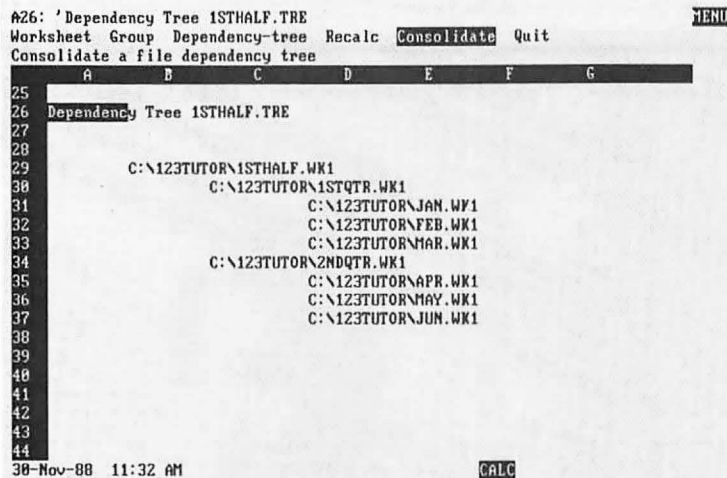
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The Consolidate command in the Link menu will recalculate and save all the monthly files, then consolidate the proper months into 1STHALF.WK1.

Because the cells referenced by @WSLink are outside the current worksheet, however, you can't copy @WSLink formulas for a range of cells in the source worksheet without exiting from the one you're working on. The add-in comes with some example macros that can help you copy the @WSLink function across a row or down a column, but they're for experts only.

In *Look & Link*, *Look* lets you examine a second worksheet. You highlight the range in the source worksheet to be combined, then specify the destination range in the target worksheet. It's much easier than 1-2-3's /File Combine procedure, which makes you work blind.

*Link*, Personics's second add-in, lets you reference cells in external worksheets with an @ function, and—unlike @WSLink—copy ranges with linking formulas to ranges in the target worksheet. Besides the basic @ function, *Look & Link* also has @ functions to sum, average, find the maximum or minimum, and use a lookup table for a range in an external worksheet. *Link* also lets you consolidate or recalculate a series of linked worksheets.

Of the two packages, *Look & Link* is more adept at creating and copying linking formulas and performing multiple worksheet consolidations. For occasional or light-duty worksheet linking, the cheaper @WSLink will do the job. And either one is better than 1-2-3 alone. —Paul Lichtman

## WHERE TO BUY

### Look & Link 1.04

Personics Corp.  
63 Great Rd.  
Maynard, MA 01754  
800/445-3311, 508/897-1515

List price: \$99.95

Requirements: 55K, DOS 2.0 or later version

Not copy protected

Technical support: unlimited, no toll-free number, M-F 9-5

Other support services: 30-day money-back guarantee

For more information, circle 625 on reader service card.

## WHERE TO BUY

### @WSLink 1.0

Goldata Computer Services, Inc.  
2 Bryn Mawr Ave.  
Bryn Mawr, PA 19010  
800/432-3267, 215/525-1036,  
215/527-6597 (BBS)

List price: \$49.95

Requirements: 18K (25K for Symphony version), DOS 2.0 or later version

Not copy protected

Technical support: unlimited, no toll-free number, M-F 9-5

Other support services: 30-day money-back guarantee, BBS

For more information, circle 626 on reader service card.

*Lincoln Spector edits technical publications for 800-Software in Berkeley, California, does private consulting, and writes a humor column for Computer Currents magazine. George Beinhorn is a freelance writer in Nevada City, California. Steve King is a program analyst for a California state agency and the coauthor of The Dataflex Developer's Handbook (Wordware Publishing, Plano, Texas, 1988). Jim Heid is a former typographer, a contributing editor and columnist for Macworld, and the author of Power Windows (Microsoft Press, Redmond, Washington, 1988). Alan Southerton is the author of Programmer's Guide to the OS/2 Presentation Manager (Addison-Wesley, Redding, Massachusetts, 1989). Paul Lichtman is an independent writer and financial systems analyst in Millburn, New Jersey. ●*



# Why LAP-LINK Has Connected Over 200,000 Computers.



In less than two years, LAP-LINK has connected over 200,000 computers to become the standard in accessibility software for IBM's and compatibles, laptops, and Apple Macintosh computers.

But outstanding sales aren't the only way to recognize great software. Consider what the experts have to say.

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"...LAP-LINK...sets a record for the fastest serial transfer on a P.C." **Howard Marks, P.C. MAGAZINE** — July 21, 1987. And LAP-LINK is not only the fastest, it's also the most accurate. LAP-LINK's error checking system guarantees that all data is transferred with 100% accuracy.

## Easy to set up.

"LAP-LINK is the absolute easiest, simplest and most convenient." **Harry Newton, TELECONNECT** — April, 1987. LAP-LINK comes with everything you need to set it up—including 3½" and 5¼" disks, documentation, and Traveling Software's universal cable with both 9-pin and 25-pin connectors.

## Easy to use.

"...I don't know if the manual is any good or not: I've never had any reason to open it. LAP-LINK is so thoroughly intuitive, fast and simple to use, the manual is blooming near superfluous." **Jerry Pournelle, BYTE MAGAZINE** — July, 1987. All you need to do is connect our high quality universal serial cable (no need to unplug your printer's parallel cable), type "LL" on both computers and LAP-LINK will automatically connect itself, ready to transfer single files, entire sub-directories, or hard disks.

## Award winning.

"If you like a package that's fast, efficient, and easy to use, LAP-LINK is clearly the...program of choice." **M. David Stone, P.C. MAGAZINE** — January 12, 1988. P.C. Maga-

zine was so impressed with LAP-LINK's performance that they gave it their Editor's Choice and "Best of '87" awards.

## LAP-LINK

LAP-LINK transfers files between IBM and compatibles, laptops and desktops, including the new IBM PS/2. It installs in seconds, features a split-screen design for showing files in both computers, and transfers data at incredible speeds of over 115,200 baud.

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With all the simplicity and file transferring capabilities of LAP-LINK, LAP-LINK Plus also offers the option of direct disk drive and printer sharing between any two connected computers. It's like having a two computer network. You can easily switch between local and remote printers using a pop-up window without leaving your application.

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Everything you need to share files between any model of the Apple Macintosh (512, Plus, SE and Mac II) and an IBM compatible laptop or desktop computer (including the IBM PC, XT, AT, and PS/2). It's easy to use and it's fast, over 57,000 baud. LAP-LINK Mac is also fully compatible with both Macintosh Finder and MultiFinder, as well as AppleTalk, TOPS, and 3Com.

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LAP-LINK is surprisingly affordable at \$129.95, LAP-LINK Plus \$139.95 and LAP-LINK Mac \$139.95 (Suggested retail prices including cable).

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We only carry the latest versions of products. Version numbers in our ads are current at press time.

### Aldus ... NCP

- PageMaker 3.0 ..... call
- Alpha Software ... NCP
- AlphaWorks 1.0 (integrated package) ... 115.
- ALPHA/three 1.0 (dBase file compatible) ... 219.



### Epson ... 1 year

FX-1050 Printer—Feature laden 136 column, 9 pin dot-matrix printer. Smart-park mode loads single sheets without removing continuous form paper. Prints 264 cps draft (12 cpi mode) and 54 cps letter quality (12 cpi mode) ... call

### American Small Business Computers

- Design CAD 3.1 (NCP) ... 159.
- Design CAD 3D 1.1 (NCP) ... 159.

### Application Techniques ... NCP

- Pizazz Plus 1.2 ..... 75.

### Ashton-Tate ... NCP

- dBASE IV 1.0 ..... call
- MultiMate Advantage II 1.0 ..... 299.

### Autodesk

- Autosketch Standard 1.04 ..... 55.

### Barron's ... CP

- SAT (Test preparation program) ..... 35.

### Best Programs ... NCP

- Label Master 3.1 (mailing label program) ... 29.

### Bible Research ... NCP

- The Word 4.2 (King James version) ..... 159.

- The Word 4.2 (New International version) ... 159.

### Bloc Publishing ... NCP

- FormTool 2.01 ..... 55.
- Form Filler 1.5 ..... 89.



### Broderbund ... CP

Jetfighter—Choose among three different fighting aircraft—an F-14 Tomcat, F-16 Fighting Falcon, or F/A-18 Hornet. Encounter Soviet Mig aircraft. Over 30 missions are included; supports land or carrier-based attacks... \$35.

- Personal Lawyer 2.0 ..... 39.
- PopDrop 3.1 ..... 32.

### Borland International ... NCP

- Superkey 1.1 ..... 69.
- Turbo C 2.0 ..... 99.
- Turbo C Professional Pack (w/Debugger) ... 169.
- Turbo Pascal 5.0 ..... 99.

- Turbo Pascal Professional Pack (w/Debugger) ... 169.

- Prolog 2.0 ..... 99.

- Turbo Assembler & Debugger 1.0 ..... 99.

- Sidekick Plus 1.0 ..... 135.

- Sprint 1.0 ..... 135.

- Quattro 1.0 w/SQZ!Plus 1.0 ..... 165.

- Paradox 3.0 ..... call

- Paradox OS/2 1.0 ..... 479.

### Bourbaki ... NCP

- 1DIR+ 3.0 ..... 49.

### Bridgeway Publishing ... NCP

- FastTrax 3.9 ..... 35.

### Broderbund ... CP

- Print Shop 2.41 (incl. Graphics Library 1) ... 39.

- Memory Mate 3.01R (NCP) ..... 45.

### Chipsoft ... NCP

- TurboTax Personal/1040 6.01 ..... 45.

- State Packages Personal/1040 6.0 ... each 32.

### Chronos Software ... NCP

- Who•What•When (people, projects, time) ... 119.

### Core International ... NCP

- Corefast 2.0 ..... 95.

### Crosstalk Communications ... NCP

- Remote\* 1.01 ..... 95.

- Crosstalk XVI 3.7 ..... 95.

- Crosstalk MK.4 1.1 ..... 124.

### Dac Software ... NCP

- Dac-Easy Payroll 3.0 ..... 59.

- Dac-Easy Light 1.0 ..... 45.

- Dac-Easy Accounting 3.0 ..... 59.

### Datastorm ... NCP

- Procomm Plus 1.1B ..... 49.

### Delrina Technology ... NCP

- Per:FORM 1.0 ..... 159.

### 5th Generation ... NCP

- Fastback Plus 2.01 ..... \$109.

### Fox Software ... NCP

- Foxbase Plus 2.1 (single user) ..... 209.

### Funk Software ... NCP

- Sideways 3.21 (creates wide printouts) ... 42.

- Worksheet Utilities 1.0 (1-2-3 utilities) ... 59.

- Allways 1.0 ..... 85.

### General Information ... NCP

- Hot Line Two 2.0 ..... 49.

### Generic Software ... NCP

- Generic CADD Level 2 (now includes DeskConvert and Pen Plot) ..... 89.

- Generic CADD Level 3 (now includes Dot Plot and DeskConvert) ..... 179.

- Estimator ..... 159.

- Basic Home Design 3.0 ..... 35.

- CADD Starter Kit (Includes Level 2) ..... 119.

### Great American Software ... NCP

- One Write Plus Master 2.01 (General Ledger) ... 129.

- AP, AR, or Payroll 2.01 ..... each 129.

### Harvard Associates ... NCP

- PC Logo 3.0 ..... 59.

### Hayes ... NCP

- Smartcom II 3.0 ..... 89.

### Hilgraeve Software ... NCP

- HyperACCESS 3.31 ..... 89.

### Individual Software ... NCP

- Typing Instructor Encore 2.13 ..... 26.

- Professor DOS 2.51 (with Smartguide) ... 27.

### Intuit ... NCP

- Quicken 2.0 ..... 35.

### Javelin ... NCP

- Javelin Plus 2.02 ..... 249.

### Lifetree ... NCP

- Volkswriter 4 ..... 159.

### Lotus ... NCP

- Agenda 1.0 ..... 289.

- 1-2-3 2.01 (upgrade free to version 3.0) ... call

- Symphony 2.0 ..... 459.

- Magellan 1.0 ..... call

- Freelance Plus 3.0 ..... 345.



### NorthEdge Software ... NCP

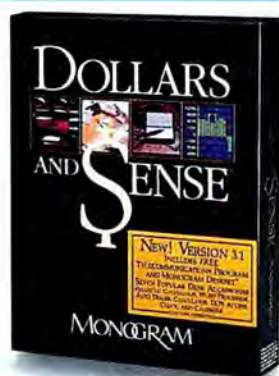
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## Monogram ... NCP

□ **Dollars & Sense 3.1**—Unscramble your nest egg and meet your tax deadline with this program's powerful money management abilities ... \$105.

## MECA ... NCP

- Checkwrite Plus 1.0 ... 29.
- Managing Your Money 5.0 ... 119.
- Andrew Tobias' Tax Cut 1040 ... 49.

## Meridian Technology ... NCP

- CarbonCopy Plus 5.0 (2 required) ... 115.

## Micro Logic ... NCP

- Tornado 1.8 ... 55.

## Microlytics ... NCP

- GOfar 1.0 (text retrieval system) ... 45.
- Wordfinder 4.0 (electronic thesaurus) ... 35.

## MicroPro ... NCP

- WordStar Professional Release 5 ... 259.

## Microrim ... NCP

- R:BASE for DOS (version 2.1) ... 449.

## Microsoft ... NCP

- Learning DOS 2.0 (for any DOS version) ... 35.
- Windows 286 2.1 ... 69.
- Works 1.05 ... 99.
- Windows 386 2.1 ... 129.
- Word 5.0 ... call
- Excel 2.1 (requires 80286/80386 CPU) ... 239.

## LANGUAGES

- Quick BASIC 4.5 ... 69.
- Quick C 2.0 ... 69.
- Macro Assembler 5.1 ... 99.
- Basic Compiler 6.0 ... 199.
- C Compiler 5.1 ... 299.

## Monogram ... NCP

- Dollars and Sense 3.1 (w/Tax Advantage) ... 105.

## Nantucket Software ... NCP

- Clipper (Summer '87, dB3 Plus compiler) ... 429.

## New England Software ... NCP

- Graph-in-the-Box Release 2 ... 75.
- GB-Stat 1.0 ... 159.
- GB Analytic 1.0 ... 105.

## Nolo Press ... NCP

- WillMaker 3.0 ... 35.

## NorthEdge Software ... NCP

- Timeslips III 3.3 ... 169.

## Owl International ... NCP

- Guide 2.0 ... 143.

## Paperback Software ... NCP

- VP-Info 1.4 ... \$65.
- VP-Planner Plus 2.0 ... 145.
- VP-Expert 2.0 ... 145.

## Paul Mace ... NCP

- Nvelope 1.02 ... 29.
- HTest—HFormat 2.0 ... 49.
- Mace Utilities 5.0 (DOS utilities) ... 55.
- Mace Gold 1.0 ... 79.

## PC Support Group ... NCP

- Lightning 4.82 ... 39.
- Lucid 3-D 2.0 ... 75.

## Personics ... NCP

- SmartNotes 2.0 ... 49.
- SeeMORE 1.02 ... 49.
- Look&Link 1.01 ... 59.
- Ultravision 1.1 ... 79.

## Peter Norton ... NCP

- Norton Editor 1.3 ... 39.
- Norton Commander 2.0 ... 45.
- Advanced Utilities 4.5 ... 79.
- Dan Bricklin's Demo Program 2 ... 99.

## Quarterdeck ... NCP

- Expanded Memory Manager 4.2 ... 39.
- DESQView 2.2 ... 79.
- DESQView 386 1.0 ... 115.

## Reference Software ... NCP

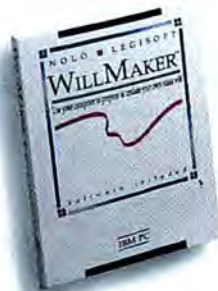
- Grammatik III 1.07 (electronic proofreader) ... 52.
- Reference File 1.0 (pop-up DB manager) ... 49.

## Relay Communications

- Relay Gold 3.0 ... 149.

## Revolution Software ... NCP

- VGA Dimmer 2.01 (screen saver) ... 19.
- Cruise Control 3.02 ... 39.



## Nolo Press ... NCP

□ **WillMaker 3.0**—Prepare your own valid Last Will and Testament without a Lawyer. Follows a simple question and answer format, and allows you to update your will whenever necessary. ... \$35.

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## Rightsoft ... NCP

- Rightwriter 3.0 ... \$54.

## Simon & Schuster ... NCP

- Typing Tutor IV ... 33.

## Softlogic Solutions ... NCP

- Software Carousel 2.02 ... 49.
- Disk Optimizer 4.01 (w/Data Guardian) ... 45.
- FATCAT 1.0 ... call

## SoftView ... NCP

- TaxView (for 1988 taxes) ... 69.

## Software Publishing ... NCP

- Professional Plan 1.01 ... 59.
- PFS:First Publisher 2.0 ... 79.
- PFS:First Graphics 1.0 ... 95.
- PFS:First Choice 3.01 ... 99.
- Professional Write 2.0 ... 125.
- Professional File 2.0 ... 189.
- Office Writer 6.0 ... 259.
- Harvard Graphics 2.12 ... 299.
- Harvard Graphics Accessories Pack ... 299.
- Harvard Project Manager 3.0 ... 439.



## Microsoft ... NCP

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## Spinnaker ... NCP

- Resume Kit 1.0 ... 25.
- Splash 1.0 ... 59.
- Pinstripe Presenter 1.0 ... 115.

## Springboard ... NCP

- Newsroom Pro 1.0 ... 45.
- Certificate Maker ... 34.

## Symantec ... NCP

- SQZ!Plus 1.11 ... 69.
- Q & A Write 1.01 ... 135.
- Grandview 1.0 ... 195.
- Q & A 3.0 (database, word processor) ... 235.
- Breakthrough Timeline 3.0 ... 395.
- Spreadsheet Analyst 2.5 ... 99.
- Think Tank 2.4NP ... 135.

## T/Maker ... NCP

- Scrapbook+ 1.0 ... 79.
- ClickArt Business Images ... 42.
- EPS (PostScript) Illustrations ... 79.

## The XTREE Co. ... NCP

- XTREE Pro 1.1 ... 69.

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Flashcard (AppleTalk network card; 1 year warranty) . . . . . 169.  
NetPrint 2.0 (share printers) . . . . . 119.  
TOPS 2.0 . . . . . 119.  
TOPS Repeater (extends network) . . . . . 132.

## Traveling Software ... NCP

Battery Watch 1.0 (3 1/2" only) . . . . . 27.  
LapLink Mac 2.0 (Mac-PC transfer) . . . . . 79.  
LapLink Plus 2.1 . . . . . 85.  
ViewLink 1.0 (first product to link all your existing software programs and data) . . . . . 95.  
DeskLink 2.21 . . . . . 99.

## True BASIC, Inc. ... NCP

True BASIC 2.1 (now includes Runtime) . . . . . 57.  
3-D Graphics . . . . . 45.

## Vericomp ... NCP

SoftBytes 2.0 . . . . . 35.

## WordPerfect Corp. ... NCP

WordPerfect Library 2.0 . . . . . 69.  
WordPerfect 5.0 . . . . . 239.  
WordPerfect Office 2.0 . . . . . 269.  
WordPerfect Executive . . . . . 129.

## Wordtech ... NCP

DBXL 1.2 . . . . . 119.

## Xerox ... NCP

Ventura Publisher 2.0 . . . . . call

## XYQUEST ... NCP

XyWrite III Plus 3.54 w/A-la-Carte Menus . . . . . 239.

## RECREATIONAL/EDUCATIONAL

### Accolade ... CP (reqs. graphics brd.)

Hardball (baseball simulation) . . . . . 11.  
Testdrive (driving simulation) . . . . . 22.  
Jack Nicklaus' 18 Greatest Holes . . . . . 29.  
Grand Prix . . . . . 22.

### Broderbund ... CP

Where in the World is Carmen San Diego? . . . . . 25.  
Where in the USA is Carmen San Diego? . . . . . 25.  
Where in Europe is Carmen San Diego? . . . . . 29.  
JetFighter (by Velocity) . . . . . 35.

### Electronic Arts ... CP (reqs. graphics brd.)

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Earl Weaver Baseball . . . . . 32.  
Life and Death (from Software Toolworks) . . . . . 35.  
Wasteland . . . . . 39.  
Skate or Die! . . . . . 32.

### Microprose ... CP

F-19 Stealth Fighter (requires CGA or EGA) . . . . . 39.  
F-15 Strike Eagle (requires CGA) . . . . . 22.

### Microsoft ... NCP

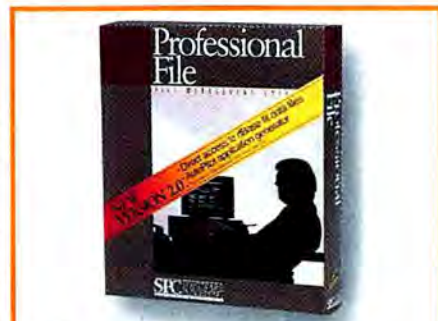
Flight Simulator 3.0 (reqs. graphics brd.) . . . . . 35.

### Mindscape ... CP

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Paperboy . . . . . 29.  
Colony 1.0 . . . . . 30.  
Balance of Power 1990 . . . . . 30.

### One Step Software ... NCP

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Golf's Best Pinehurst #2 4.0 (play the best) . . . . . 12.  
Golf Statkeeper 1.0 . . . . . 27.  
(includes USGA Handicapper)



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### Parlor Software ... CP

Bridge Parlor 2.3 . . . . . 49.

### Sierra On-Line ... CP

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King's Quest IV (512k version) . . . . . 33.  
King's Quest IV (256k version) . . . . . 33.  
Manhunter . . . . . 33.  
Police Quest . . . . . 33.  
Police Quest II . . . . . 33.  
Gold Rush . . . . . 25.

### Spectrum Holobyte ... NCP

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Tetris (addicting mind teaser) . . . . . 24.  
Falcon (F-16 simulation, reqs. graphics brd.) . . . . . 32.

### Stone & Assoc. ... NCP (reqs. graph. brd.)

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My Letters, Numbers, Words (2 to 6) . . . . . 22.  
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### True BASIC, Inc. ... NCP

Kemeny/Kurtz Math Series . . . . . 32.

### XOR ... NCP

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Advantage Premium 512k S/P . . . . . 429.  
RAMpage Plus 286 512k (for XT286/AT) . . . . . 539.  
RAMpage Plus MicroChannel 512k . . . . . 539.

### Compucable ... 2 years

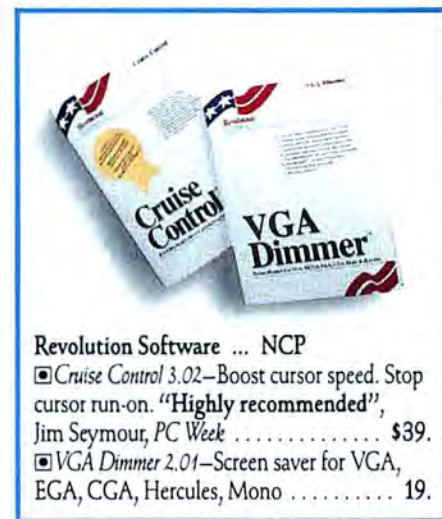
2-Position switch box . . . . . 29.  
3-Position switch box . . . . . 39.

### Cuesta ... 1 year

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(standby power backup)

### Curtis ... lifetime

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3 1/2" Disk Holder DB-2 (holds up 40 disks) . . . . . 8.  
Printer Stand PS-1 . . . . . 18.  
Smartmodem-to-PC Cable EC-7 (9 feet) . . . . . 17.  
Printer-to-IBM cable EC-6 (9 feet) . . . . . 17.  
Filtered SafeStrip SPF-3 . . . . . 21.  
Emerald SP-2 . . . . . 36.  
Ruby SPF-2 . . . . . 36.  
(6 outlets; EMI/RFI filtered; 6 ft cord) . . . . . 55.  
Ruby-Plus SPF-2 Plus . . . . . 69.  
(w/FAX & modem protection)



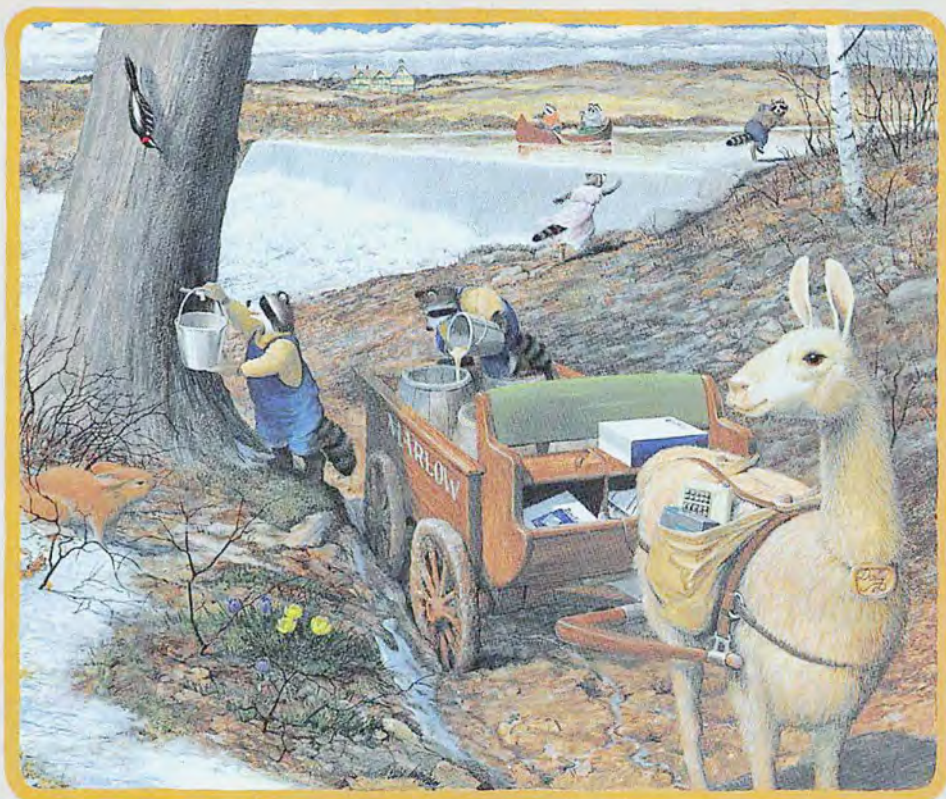
### Revolution Software ... NCP

Cruise Control 3.02—Boost cursor speed. Stop cursor run-on. "Highly recommended", Jim Seymour, PC Week . . . . . \$39.  
VGA Dimmer 2.01—Screen saver for VGA, EGA, CGA, Hercules, Mono . . . . . 19.

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---------------------------------	-----

Verbatim Datalife (10 disks per box)	13.
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-------------------------------	-----

Sony (10 disks per box)	23.
-------------------------	-----

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Verbatim Datalife (10 disks per box)	22.
--------------------------------------	-----

### 3 1/2" DS/DD Diskettes (720k)

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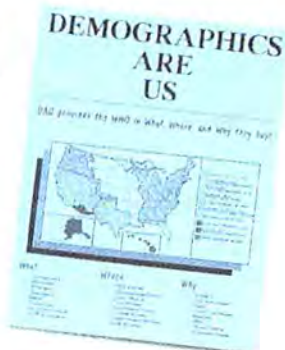
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SPECIAL REPORT

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## FEATURE

# The Object Is Software Design

**Object-oriented programming is still in its infancy, but a new breed of PC-based languages points the way to the future of software development.**

Jeff Duntemann

**P**lumber have it easy. They can find ready-to-wrench fittings at any hardware store and skip reinventing the gooseneck. Why, then, do programmers persist in handcrafting such standard software parts as menus and dialog boxes? The answer lies in a combination of factors—programmer ego, primitive development tools, and industry inertia—that together have slowed change. But a new software development paradigm called object-oriented programming (OOP) could change the way programmers work as well as bring the power of programming to a broader computing community.

Object-oriented design concepts have been around for years, lurking in research labs such as Xerox's Palo Alto Research Center (PARC) and in the conceptual framework underlying *Microsoft Windows*. But it was Steve Jobs' introduction of the totally object-oriented Next machine last fall that placed OOP in the spotlight. Now, IBM is claiming object orientation as a strategic direction for OS/2's Presentation Manager, and OOP products are starting to crop up throughout the software development spectrum.

## Data Central

OOP is a programming philosophy that considers data the primary element in a program. Program actions such as printing and displaying data are reduced to peripheral elements, called *methods*, that are bolted onto data elements. The resulting hybrid is called an *object*. OOP programs instruct objects to perform the methods through a process called *message passing*. For example, to print a data base record object, the programmer needn't write a print procedure; simply passing the proper message to the object causes the object to print itself.

Because OOP programs are modular, they're easy to design and maintain. New programs can be constructed Tinkertoy-style, by plugging standard objects together. If the objects are well written and tested, few bugs will appear in the final application.

OOP is not the answer to every problem, and like all

good things, it doesn't come for free. OOP requires the programmer to plan the ultimate purpose and shape of an application in advance—programs can no longer “just grow.” For creating simple utilities, or for people who program infrequently, the current crop of OOP products may be more trouble than they're worth. For more complex designs, however, especially in-house systems that evolve over many years, OOP could cut costs. Extra care given in designing objects pays off later on when they are reused in other programs.

## Taking the Plunge

Several OOP implementations—some currently available, others nearing completion—address an audience with varied programming experience and goals.

Maxem's \$495 *Cause*, due to be released in late 1989, is an object-oriented application generator that requires no programming in the traditional sense. Prefabricated objects bundled with *Cause*—including file drawers, file folders, records, and file indexes—understand numerous *steps* like display, report, and compute. You combine objects and steps into applications by clicking on icons and following the prompts of the Macintosh-like display.

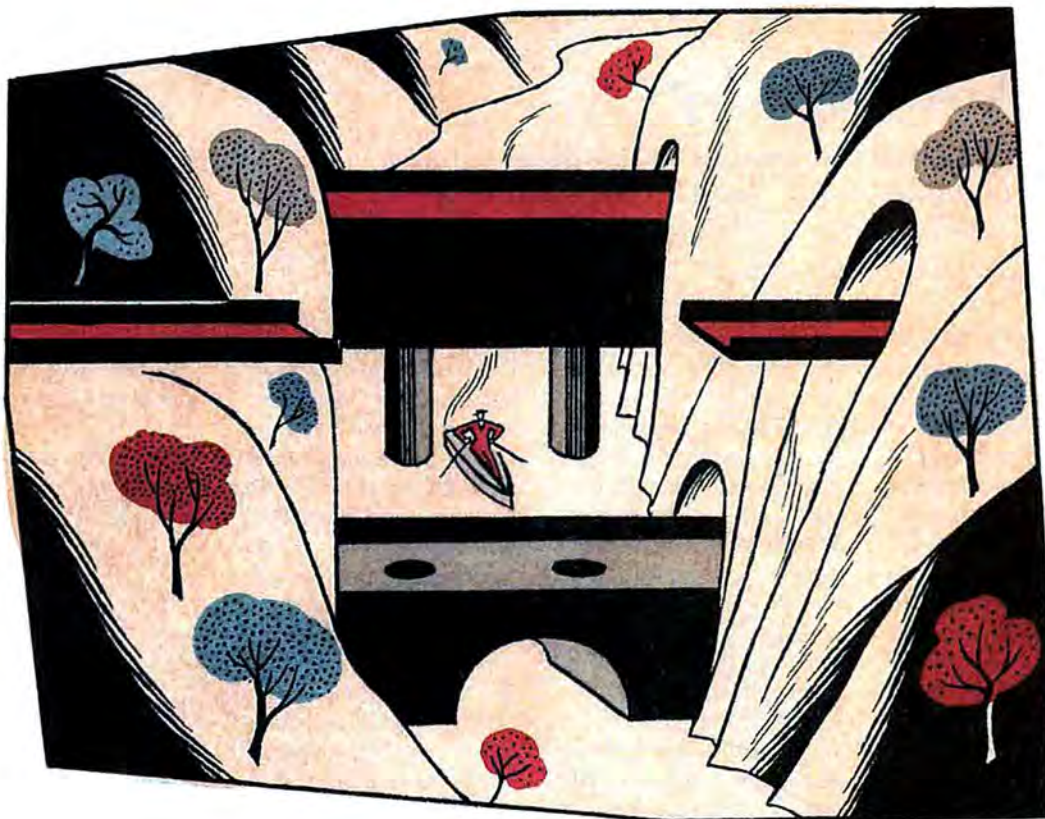
To be fair, *Cause* is meant for data base applications and is not a true programming language. On the other hand, it incorporates the most important OOP principles and allows more rapid application development than any traditional or OOP language.

For \$100, you can program in the language that created the OOP genre: Digitalk's interpreted *Smalltalk/V*, a faithful (if slow) implementation of Xerox PARC's *Smalltalk-80* language. *Smalltalk/V* incorporates an elegant, windowed interface that works best on fast machines. (A version for 80286- and 80386-based machines sells for \$200.)

*Smalltalk* is utterly consistent with object-oriented design principles; everything in the language is an object, without exception. Since OOP principles are fundamentally at odds with those of traditional languages, *Smalltalk* is easier to learn when you have no BASIC or Pascal structured programming habits to unlearn. But master this purest of object-oriented programming languages, and you've mastered OOP.

The Whitewater Group's \$500 *Actor* is a new language embodying the principles and philosophy of *Smalltalk* in a framework more derivative of Pascal or C. It currently uses the *Microsoft Windows* interface (a Presentation Manager version should be available by mid-1989), and it can't be used to create non-*Windows* programs. At present, *Actor* is the only way to develop *Windows* programs





without resorting to C.

*Actor* simplifies *Windows* application development by replacing two complex programming languages with one. Conventional *Windows* programming requires the developer to know not just C but also the *Windows* programming interface, itself an object-oriented language in which system components communicate by passing messages to one another. Although *Actor* is an interpreted system, that fact doesn't seriously cripple application speed.

One of the best ways to learn OOP is by examining and customizing existing objects, and *Actor* obliges new users with a multitude of sample objects. While *Actor* is not for the novice programmer, C- or Pascal-literate programmers can learn it quickly.

Finally, there is C++, an extension to the C language defined at Bell Labs in 1985. C++ is the least stringent OOP implementation, and it lacks some object-oriented features such as message passing. But C++ is probably the most versatile of all OOP languages and can be used to create any kind of software, including operating systems themselves.

Of the several PC implementations, one of the cheapest and most popular is the \$100 Zortech C++. Zortech's compiler produces code faster than that of many C compilers. Its text-based environment includes a com-

piler and linker, a program editor, a librarian, and numerous other utilities.

Because it is a superset of C, C++ is decidedly not for programming newcomers. Like C, it is difficult to learn, write, and maintain, but if you are familiar with C, Zortech C++ is an easy way to try your hand at OOP without breaking the bank.

### What's Next?

Although object-oriented tools have been available to professional programmers for the past year or two, OOP concepts have yet to migrate to the macro and batch languages that nonprogramming power users prefer. Truly object-oriented equivalents of the Macintosh *HyperCard* for the PC are still months away.

Awareness of OOP is growing, thanks to events such as the Next announcement. The Next interface and operating system are object-oriented from top to bottom, and center on an object-oriented C derivative, StepStone's *Objective C*. Next is an experiment and a bellwether. If it succeeds, the rest of the industry may well follow. Meanwhile, a variety of PC-based OOP products can give you a head start on the future of program design. ●

*Jeff Duntemann is a programmer and a technical editor and writer; he was formerly the editor of Turbo Technix.*



## PREVIEW

## QuickC Powers Up

**QuickC's professional features and on-line documentation up the ante in the low-end C compiler marketplace.**

Bill Catchings and Mark L. Van Name

Like Borland's *Turbo C 2.0*, Microsoft's latest entry in the maturing C-compiler marketplace greatly narrows the gap between low-end compilers and "professional" tools. *QuickC 2.0*, like *QuickC 1.0*, is an inexpensive, integrated environment for developing small programs, but it adds compiler and debugger features that suit it to larger, more complex programs as well. A wealth of manuals and computer-based tutorials and an extensive help facility will also attract beginning C programmers.

*QuickC* integrates a program editor, compiler, linker, and debugger within a single menu-driven display. Most of *QuickC 2.0*'s enhancements serve to round out the environment, providing tools for the entire edit, compile, and debug development cycle. For example, *QuickC 2.0* lets you recompile and link only those parts of a program that have changed, cutting compile and link time. More important, *QuickC 2.0* supports all five memory models—small, medium, compact, large, and huge—and permits in-line assembly code in your programs. The debugger has been spiffed up as well, permitting you to step backward through a program's execution—a useful feature when you accidentally pass by a key statement and want to back up.

Other improvements allow the user to customize the environment's interface. You can now tailor *QuickC*'s editor to use your favorite editor's commands; the default mimics *WordStar*. The program even comes with sample key definitions for some popular editors, including *Brief* and *Epsilon*.

A big boost for novice programmers is the *QuickC* Advisor, a context-sensitive help facility that supplies aid and tutorials concerning not just *QuickC* but the C language itself. Need help on a particular C construct? Forget

the syntax of a for loop or an if statement? Curious about a *QuickC* compiler error message? Put your cursor on the text in question, and press <F1>. You can leave your manual on the shelf.

With these improvements, the \$99 *QuickC 2.0* may be a threat to Microsoft's own \$450 *Microsoft C 5.1* compiler. *Microsoft C* offers better code optimization and OS/2 support, but these aren't crucial features for most programmers. If you've been waiting for the right time to learn C, this may be it. If you already have *QuickC*

1.0, the rather steep \$50 upgrade nevertheless merits consideration. ●

Bill Catchings and Mark L. Van Name are independent computer consultants based in North Carolina.

**QuickC 2.0**  
Microsoft Corp.  
16011 N.E. 36th Way  
Box 97017  
Redmond, WA  
98073-9717  
206/882-8080

For more information, circle 800 on reader service card.

```

File Edit View Search Make Run Debug Utility Options Help
HELP: if
Keyword: if
Syntax:  if (<expression>)
          <statement1>
          [else
            <statement2>]
Summary: Executes statement1 if expression is true (nonzero); otherwise,
          skips statement1 and executes statement2, if else is present, and
          passes control to the next statement.
See also: switch

C:\LANG\QC2\SAMPLES\CFLOW.C
if ( ( c = *argv ) == '-' || c == '/' )
{
    /* we are processing a flag */
    while ( c = *(++argv) )
    {
        switch( c )
        {

```

<F1=Help> <Esc=Close> <F6=Window> <Shift+F5=Restart> 00258:025

Besides new compiling and debugging capabilities, *QuickC 2.0* features an extensive on-line help facility, *QuickC* Advisor.



# Through Basic training? Graduate to Turbo Pascal.

Turbo Pascal® is easy to learn, fast, powerful, and the most popular Pascal compiler in the world.

When you graduate from Basic to Turbo Pascal, you have entirely new freedoms and powers. Modern, modular programming for one. Basic doesn't support that. Complete control over your computer's memory is another. Basic doesn't give you that.

Turbo Pascal's .EXE files are streamlined and fast, just like the pros'. And Pascal doesn't promote Basic flaws like "GOTO" that lead to spaghetti code.

None of which matters as much as the spectacular difference Turbo Pascal makes to the size and speed of your programs. Basic is big and slow. Turbo Pascal is just the opposite.

## You'll like Turbo Pascal 5.0's environmental impact

With Turbo Pascal, you're in a completely integrated environment that includes source-level debugging. You can step code, watch expressions, change variables and set breakpoints. Edit, compile, run and debug.

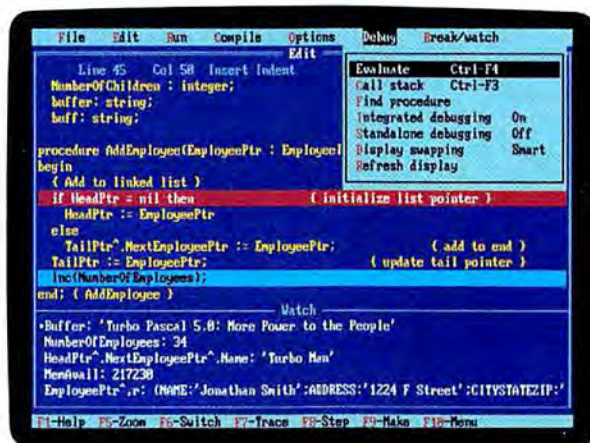
## You are not alone

We're here to help—whether on CompuServe, by phone to Tech Support or through User Groups. Borland revolutionized programming languages, made Pascal the worldwide favorite, and we're committed to supporting you. Our manuals and tutorials—unlike most others—are clear, concise, and thoroughly professional.

We also offer an extended family of Turbo Pascal Toolbox programs including source code: Runtime Library, Database Toolbox, Graphix Toolbox, Turbo Pascal Tutor, Editor Toolbox, Numerical Methods Toolbox, and GameWorks. Borland is the Pascal one-stop shop.

## 60-Day Money-back Guarantee.\*

\*Customer satisfaction is our main concern. If within 60 days of purchase this product does not perform in accordance with our claims, call our customer service department, and we will arrange a refund. \*\*Includes upgrade manual plus disks for just \$49.95 (plus tax for CA and MA residents, and \$5.00 for handling within the U.S., \$10.00 in Canada). All Borland products are trademarks or registered trademarks of Borland International, Inc. Other brand and product names are trademarks or registered trademarks of their respective holders. Copyright ©1988 Borland International, Inc. BI-1285A



The integrated development environment lets you easily write and debug real programs.

## Turn pro for only \$250 with new Turbo Pascal Professional

This special package—Turbo Pascal Professional—includes everything you need for professional programming in Pascal.

- New Turbo Pascal Version 5.0
- New Turbo Debugger\*
- New Turbo Assembler\*

Turbo Debugger, recent recipient of PC Magazine's Technical Excellence Award in the development tools category, lets you debug *any* size program

and have up to 12 views of your code. Turbo Assembler is much faster than MASM and more compatible with MASM than MASM is with itself. Turbo Pascal Professional: it's nothing but the best.

## A fast look at 5.0

- Fully integrated development environment
- .EXE files bigger than 64K
- New source-level debugger
- Demand Overlays
- 34,000 lines a minute on PS/2 Model 60
- EMS support
- RAM-resident context-sensitive Help
- Separate compilation by Units

## Forget the Basics for only \$149.95

Ready to move onward and upward from Basic? You can make easy entry to Pascal with 5.0 for only \$149.95.

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# BORLAND

Code: MA07

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## REVIEWS

# Clarion Personal Developer

*Application development utility*

**PROS:** Creates polished, relational data base applications without programming; includes professional screen-design tools

**CONS:** Applications lack file maintenance capabilities, don't allow batch record processing, and can't export or import data



Which would you prefer, power or ease of use? This question has become the Zen koan of the software marketplace. For data base applications, users have had to choose between friendly but limited flat-file managers like Q&A and intimidating but robust powerhouses such as dBASE. A new application generator, *Clarion Personal Developer*, targets users in the middle who need customized stand-alone applications but don't want to learn a data base programming language.

At the heart of *Personal Developer* lie three powerful yet intuitive modules that automate the design of custom menus, data entry screens, scrollable tables, and printed reports. You create data base elements with just a handful of commands; the program prompts you at every step and often supplies acceptable responses in pop-up menus. As you build an application, *Personal Developer* charts your progress on a tree diagram; to add or delete menus, screens, and other elements, you just move the cursor to a branch and press <Ins> or <Del>. The report module is not unlike the popular *R + R Relational Report Writer*. You arrange data and calculated fields, subtotals, rules, labels, headers, and footers wherever you please within horizontal bands. Once all the elements are in place, *Personal Developer* compiles them into a stand-alone .EXE program; you can easily modify and recompile applications.

*Personal Developer* has the power to generate sophisticated multiple-file applications such as personnel or inventory data bases, but there are two big catches: Applications lack basic file maintenance functions (such as the power to delete groups of records), and they can't import or export data. Moreover, despite *Personal Developer's* hand-holding ways—and a Quick Start feature that spits out simple flat-file applications in minutes—you'll have to spend some time with printed and on-line tutorials.

Still, building an application is simple. To add a menu, for example, *Personal Developer* prompts you for the menu's name, title, and preferred colors, then draws a titled and bordered box. To create menu options, you move the cursor to the desired location, press <Ctrl>-F, and type in the choice and the procedure it will invoke. The procedure needn't be defined; saving the completed menu returns you to a summary screen where the undefined procedure appears as a branch on the tree diagram labeled 'To Do'. Move the cursor to the procedure, press <Enter>, and follow the prompts to create the procedure.

You'd have to write reams of dBASE code to match



*Personal Developer's* menu-selectable specifications for field display formats, insert or overwrite mode, required data entry, justification, and unique key testing, to name just a few. Even linking a scrollable lookup list from a related file to a field for point-and-select data entry is surprisingly painless.

But such pluses can't compensate for the severe limitations *Personal Developer* imposes on applications. You can't copy, change, or delete groups of records, and you can't perform relational operations such as joins, unions, or appends; relational effects are limited to screens and reports and are based on the actual designs of those elements. Worse, hard-earned data is literally trapped, because *Personal Developer* applications can't import or export any file format but Clarion's, including ASCII, 1-2-3, and dBASE. If you create a *Personal Developer* application to replace a bloated spreadsheet or to automate the customer list you keep in *WordStar*, be prepared to rekey all your data.

*Personal Developer* makes sense as a friendly front end for Clarion's full-featured *Professional Developer*. But until Clarion supplies *Personal Developer* with some basic tools, its claim as an application generator for the rest of us is shaky at best. —Alan Schwartz ●

#### WHERE TO BUY

##### Clarion Personal Developer

Clarion Software  
150 E. Sample Rd.  
Pompano Beach, FL 33064  
305/785-4555

**List price:** \$169

**Requirements:** 512K RAM, DOS 2.0 or later version, hard disk

**Not copy protected**

**Technical support:** unlimited, no toll-free number, M-F 8:30-5

**Other support services:** company BBS

For more information, circle 801 on reader service card.

## QuickBASIC 4.5

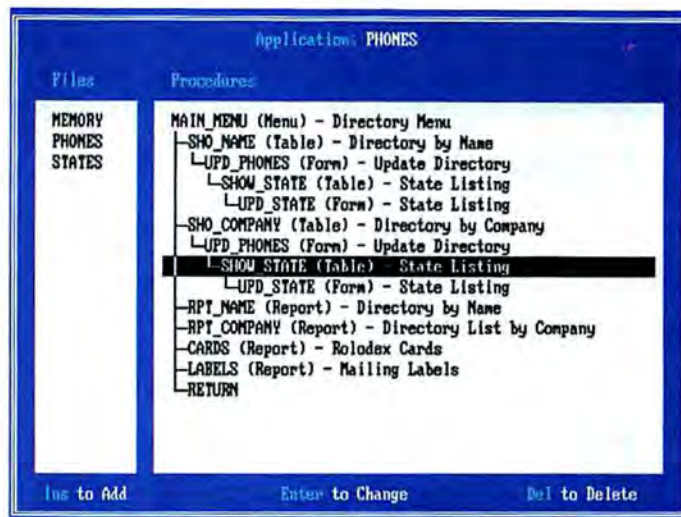
BASIC compiler



**PROS:** Integrated edit, debug, and compile environment; automatic syntax checking; thorough on-line help

**CONS:** Compiled programs are slower than those compiled with Turbo BASIC

Contrary to conventional thinking, programming is not the exclusive province of nerdy misanthropes. When you need to configure a printer, convert a file, or step beyond the limits of DOS's batch language, writing your own



**Personal Developer's application summary screen lets you navigate and display program procedures.**

program can be the easiest and least expensive software solution. *QuickBASIC 4.0*, with its integrated environment, automatic syntax checking, and fast compilation, almost made the process fun. Now, by adding a comprehensive on-line help facility, Microsoft has made it easier for programming dabblers to acquire and maintain coding skill. In fact, *QuickBASIC's* reference manual has literally been replaced by the context-sensitive, hypertext-style QB Advisor.

To activate QB Advisor, move the cursor to any BASIC keyword, variable, or menu command displayed on screen and press <F1> or click the right mouse button. Up pops a text screen bearing a brief definition of the term and highlighted key words (hyperlinks) that are tied to related help screens; clicking on a hyperlink brings up information on a related topic, QB Advisor's table of contents, or an index of BASIC keywords. The time you spend perusing one of the included sample programs with the aid of QB Advisor is more instructive and interesting than reading the manuals.

Except for optional short menus offering fewer choices (pruned to suit the easily daunted beginner), *QuickBASIC's* interface remains the same: You write, edit, and compile *QuickBASIC* programs in the View window, and the Run command executes programs in a separate DOS output screen.

*QuickBASIC 4.5's* excellent debugging facilities are virtually identical to 4.0's. A new menu option, Instant Watch, now lets you check variable values when execution is paused or stopped: Simply highlight the variable and choose the Instant Watch command; *QuickBASIC* will then display the current value in a dialog box.

QB Advisor isn't the only help *QuickBASIC 4.5* offers. QB Express, a disk-based tutorial, and *Learning to Use*



## NSTL TEST REPORT

## A Quicker, Gentler BASIC

QuickBASIC 4.5 shows a slight improvement over version 4.0 in the size and speed of executable files it produces, but Turbo Basic programs are still faster.

## Globe

## Execution

Turbo Basic 1.1	38.2
QuickBASIC 4.5	49.9
QuickBASIC 4.0	52.8

seconds 0 11 22 33 44 55

## Size

QuickBASIC 4.5	48,358
Turbo Basic 1.1	48,784
QuickBASIC 4.0	54,533

thousands of bytes 0 12 24 36 48 60

## Methodology

Benchmarks were conducted on an 8-MHz IBM AT Model 339 with a 30MB hard disk using IBM PC-DOS 3.30. *Globe* is a calculation-intensive program that uses DRAW "M x,y" repeatedly. All tests were measured from the time the command was issued until control was returned to the user.

## Execution

The execution times for *Globe* represent the time it took to calculate over 1100 points and connect them to form the image of longitude and latitude lines in perspective.

## Size

These figures represent the size in bytes of the stand-alone .EXE files.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL). All rights reserved.

Microsoft *QuickBASIC*, a printed guide, describe the programming environment ably, although they don't shed any light on the BASIC language. The *Programming in BASIC* manual competently explains the language and includes a lengthy tutorial, but it doesn't cover fundamental program design or debugging theory.

If you're a registered *QuickBASIC 4.0* owner, the \$25 upgrade for QB Advisor is definitely worth the price. You'll also find that the programs it compiles are a bit smaller and faster. If you don't have 4.0 and want to learn the BASIC way, *QuickBASIC 4.5* is the way to go—a hands-down winner over Borland's *Turbo BASIC*. —Marty Franz

## WHERE TO BUY

## QuickBASIC 4.5

Microsoft  
16011 N.E. 36th Way  
Box 97017  
Redmond, WA 98073-9717

List price: \$99

Requirements: 384K, DOS 2.1 or later version; mouse recommended

Not copy protected

Technical support: unlimited, no toll-free number, M-F 6-6

Other support services: GEnie user support and product forum \$5 per hour non-prime time, GEnie technical data base \$10 per hour non-prime time, \$35 per hour prime time for both; for corporate users and professionals, Microsoft OnLine technical support BBS \$495 for the first 12 hours, \$25 per hour thereafter

For more information, circle 802 on reader service card.

Turbo Assembler 1.0,  
Turbo Debugger 1.0

Macro assembler, debugger



**PROS:** Assembler offers fast compilation, compatibility with Microsoft's Macro Assembler versions 4.0, 5.0, and 5.1; Debugger features an interactive window-oriented interface, debugging features not found in CodeView

**CONS:** Neither supports OS/2 or Windows programming; Assembler lacks Borland's integrated development environment

Programmers otherwise enamored of Borland's languages have long complained of two serious omissions: an assembler and a *CodeView*-like source-code debugger. Borland has been listening, and the result is *Turbo Assembler (TASM)*, a multifeatured macro assembler, and *Turbo Debugger*, an essential programming tool that beats *CodeView* at its own game. The programs, which aren't sold separately, are bundled together for \$149.95; they're also available with *Turbo C 2.0* or *Turbo Pascal 5.0* in the *Turbo C Professional* and *Turbo Pascal Professional* packages, which cost \$250 each.

## Turbo Assembler

Borland's first stab at the assembler market boasts speedy compiling but lacks the interactive programming environment familiar to *Turbo Pascal*, *Turbo Basic*, and *Turbo C* users. *TASM* is a conventional command-line assembler that requires you to first create assembly-language source files in your own ASCII text editor and then assemble them into .OBJ files by typing *TASM*, fol-

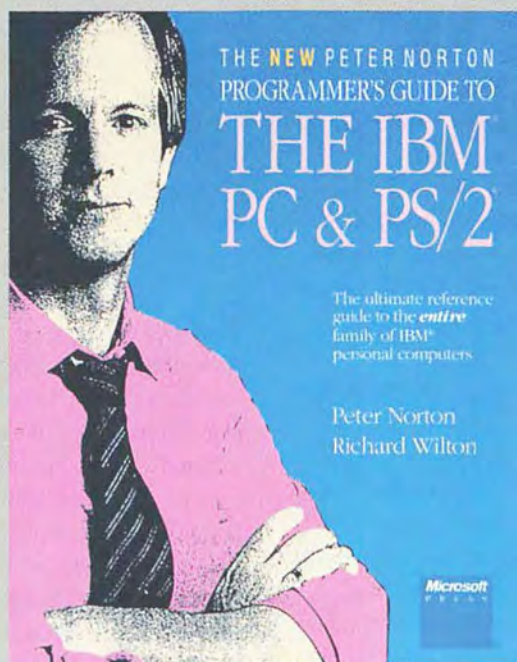


# Knowledge is Power

*"...both a text to be read from front to back and a reference book to sit on the shelf waiting with immediate answers to questions... a must for every serious PC user's technical library."*

*PC Magazine*

*"If you plan on some serious programming using an IBM PC, this book will be a good companion to ease you through the rough spots." BYTE*



To be a real power user, you must understand the technical details and working concepts of your PC. That's where THE NEW PETER NORTON PROGRAMMER'S GUIDE TO THE IBM PC & PS/2 comes in. This clearly written reference and how-to book provides the knowledge, skills, and concepts you need to master your computer—whether it's an IBM PC, PS/2, or PC/AT—and write clean, effective, portable programs.

## Unmatched Programming Advice

Norton and Wilton's characteristically astute advice, programming methods, and techniques will help you tackle tough programming problems with ease. You won't find better authorities—their down-to-earth

style makes even the most complex concepts readily understandable.

## Solid Technical Data

Included is up-to-date information on ROM software; video, disk, and keyboard basics; clocks, timers, and sound generation; device drivers and video programming; ROM BIOS basics and the ROM BIOS services; DOS basics, interrupts, and functions through version 4; and programming in C, QuickBASIC, assembly language, and Turbo Pascal®. If you're ready to make the move up to power user or serious programmer, add THE NEW PETER NORTON PROGRAMMER'S GUIDE TO THE IBM PC & PS/2 to your programming bookshelf. **\$22.95**

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lowed by the name of the source file, at the DOS prompt. Additional parameters appended to the command sequence activate *TASM's* numerous assembly options. Warnings and error messages are about all the feedback *TASM* offers before it returns you to the DOS prompt. As a final step, you must convert .OBJ files to .COM or .EXE format with *TASM's* command-line linker.

Assembling speed is *TASM's* main edge over its competitor, Microsoft's *Macro Assembler (MASM)*. My informal tests show that *TASM* produces an object file two to three times faster than *MASM*. Better yet, *TASM* is highly compatible with code written for *MASM 4.0*, *5.0*, and *5.1* via its Quirks mode. In fact, it's more compatible with *MASM 4.0* than is *MASM 5.1*, which requires that *4.0* code be rewritten before being assembled.

Another plus is *TASM's* unique Ideal mode, which imposes a structure on assembly language syntax that eliminates the possibility of writing ambiguous instructions that might not perform as expected. *TASM* can assemble Ideal-mode programs about 30 percent faster than it can assemble *MASM-mode* programs.

The *Turbo Assembler* package contains several utility programs, including the essential *MAKE* utility, which facilitates incremental recompiling and relinking of programs built from multiple .OBJ files. It also includes a text-search utility; two library cross-reference programs; and an excellent library manager that works with Borland, Microsoft, and third-party object libraries. *TLINK*, a fast but incomplete linker, can't do overlays or handle object files produced by *Microsoft C* or *Microsoft FORTRAN* compilers. However, *TASM's* linker can pro-

duce .COM files directly; *MASM* requires an extra conversion step using *EXE2BIN.EXE*.

Like *MASM*, *TASM* supports all instructions and modes for the 80286 and 80386 and permits direct assembly of math coprocessor instructions. Yet despite *TASM's* many strengths, one weakness may force some programmers to stick with *MASM*: *TASM's* current lack of support for either OS/2 or *Windows*. Borland promises to remedy this in future versions.

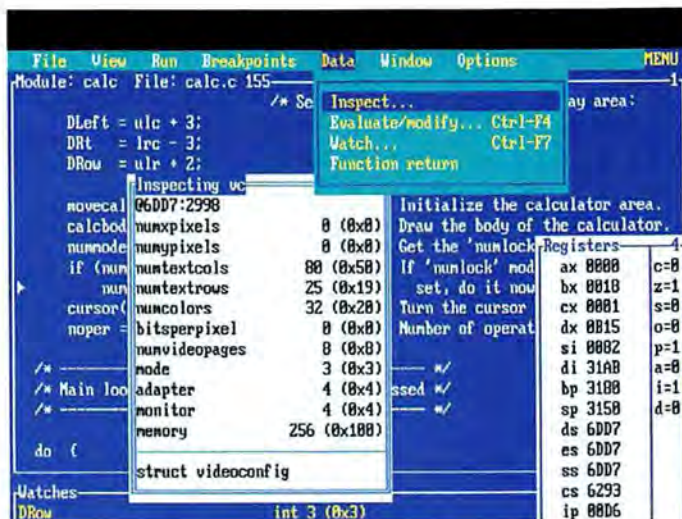
*TASM's* hulking user guide makes a commendable attempt to explain assembly-language programming to the novice, but a good book on the subject is still essential for beginners. The reference guide neither lists Intel CPU instruction sets nor provides an easy-to-read summary of *TASM's* command-line options. On the plus side, the package includes 78 sample assembly-language source files.

## Turbo Debugger

Although *Turbo Assembler* is a competent product, the real showpiece of this duo is *Turbo Debugger*, a stand-alone source-level debugger for programs compiled with Borland's *Turbo Pascal 5.0*, *Turbo C 2.0*, or *Turbo Assembler 1.0*. Astonishingly, *Turbo Debugger* can also debug programs compiled for *CodeView*, although you must first convert the *CodeView* debugging information with a supplied utility. However, like *TASM*, *Turbo Debugger* can't deal with *Windows* or OS/2 programs.

*Turbo Debugger* takes Borland's menu-driven interface and adds some features, notably overlapping windows you can move or resize that display the contents of variables, memory locations, source- or assembly-language instructions, CPU and coprocessor registers—even the contents of the stack. As with *CodeView*, you can set conditional and absolute breakpoints, specify watch variables and watch expressions, change the contents of memory locations and registers, and execute—a line at a time—the program you're debugging. An additional animated mode executes the entire program line by line in slow motion, letting you inspect the contents of structures, unions, and arrays as program conditions change. You can accomplish the same thing with *CodeView's* animated mode, but it can't automatically display the contents of those variables.

Another useful *Turbo Debugger* feature is its capacity to modify source- or assembly-language instructions during a debugging session, allowing you to test possible program fixes easily. To make any changes permanent, however, you must still edit and recompile the source code. You can configure *Turbo Debugger* to load your favorite editor, but the only editor that I could squeeze into the remaining memory was *EDLIN*—not my favorite.



Via *Turbo Debugger's* pulldown menus, you can pop up windows that display the contents of the CPU registers or of structures, arrays, and other variables. You can also resize and move windows when they get in the way of your source code.



# Turn a task into child's play.



## PROBAS™ Basic Programming Library

Announcing PROBAS Version 3.0, now with over 365 assembly routines to really kick QuickBASIC and BASCOM into high gear. BYTE magazine calls PROBAS a "Super-charger for QuickBASIC". Thousands of programmers rely on PROBAS to make their life easier and to enhance their programs with features like:

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- Full-featured windowing
- Screen snapshots (Text & Graphics)
- String, array, and pointer sorts
- Lightning-fast file I/O
- Full mouse support

Create dazzling screens in text mode, CGA, EGA, VGA or Hercules graphic modes. Save and restore screen snapshots to arrays, EMS memory or files. Full featured windowing to meet the most demanding jobs. The PROBAS system of virtual screens allows you to draw full or partial screens to memory, and then snap them on in an eyeblink. You can even create virtual screens far larger than the display screen.

Sick of running out of string space? Store hundreds of K in numeric arrays or megabytes in extended or expanded memory. Tired of using a kludgy SHELL to DIR to read a directory or archive files? Scan sub-directories or .ARC files using wild-cards and store thousands of file names, dates, and times. Wish you could drag a window containing text or a menu around the screen with a mouse? It's easy!

PROBAS gives you a complete set of blazingly-fast file routines. Read or write huge chunks of data at a clip, with file locking and error handling so that you can even use them in subprograms. You'll never want to use BASIC's file I/O again! Sort data with lightning fast array and pointer sorts. Search files or arrays at assembly speeds. PROBAS also has over 200 other essential services including handy string, date, time, directory and array manipulation, string, screen and data compression, full mouse support, valuable equipment and input routines and faster replacements for most BASIC commands.

Whether you are a professional or a novice, PROBAS will boost your BASIC in ways you never dreamt possible. PROBAS allows professionals to save time and work and lets novices write professional-quality programs quickly and easily. After all, how much is a few hundred hours of your time really worth?

For all versions of QuickBASIC and BASCOM including BASCOM 6.0 for OS/2. **Just \$135.00!**

## PROREF™ On-Line Help For PROBAS

PROREF provides pop-up help for the routines in PROBAS and is an extension of the QuickBASIC programming environment. Find help on any routine with a few key-strokes or mouse clicks. Pop-up an ASCII chart, calculator, scan code module, box diagram, your own help information or almost any DOS program via a hot-key. **Just \$50.00!**

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As if these advanced features weren't enough, being able to move and resize *Turbo Debugger's* register and variable display windows makes it easier to use than *CodeView*, especially when source code stretches all the way across the screen. And context-sensitive help is just an <F1> key away. The user manual is superior to *Turbo Assembler's* and provides commentary on several sample buggy programs included on disk. However, mouse support, now lacking, would make operations like moving and resizing windows a lot easier.

Unless you're out for raw speed or don't own an assembler, *TASM* alone won't have you running down to your local software store. But *Turbo Debugger's* unique powers may prove irresistible—it's one product I'd recommend, whether you make a living at programming or not. —Dennis Dykstra

## WHERE TO BUY

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**Not copy protected**

**Technical support:** unlimited, no toll-free number, M-F 8-5

**Other support services:** Compu-Serve forum (type GO BORLAND)

**For more information, circle 803 on reader service card.**

*Alan Schwartz is a Northern California consultant specializing in data base development. Marty Franz is a software engineer and freelance writer based in Kalamazoo, Michigan. Dennis Dykstra is a contributing editor for PC World and a professor at Northern Arizona University. ●*

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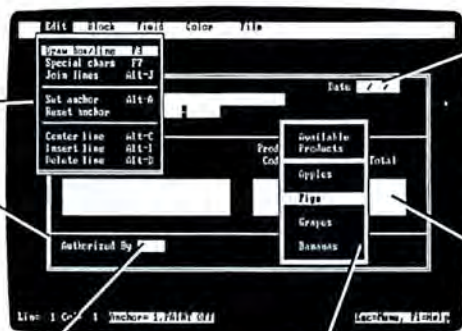
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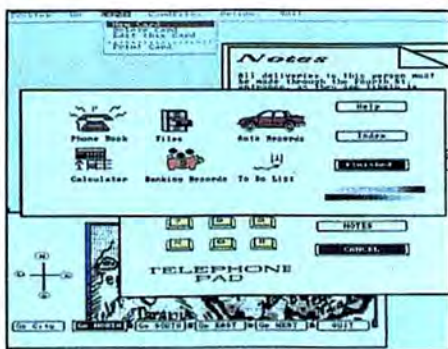
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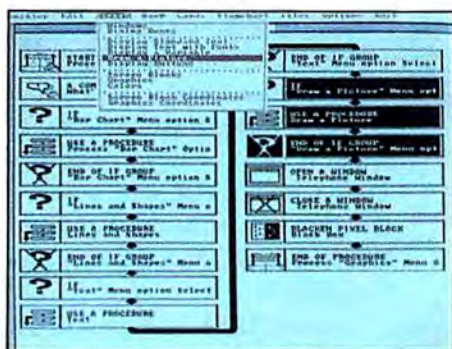
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# How To

## A Turbo Pascal File Finder

**Create a fast file finder and learn Turbo Pascal's directory search techniques.**

What you need: Turbo Pascal 4.0 or 5.0

Searching through myriad sub-directory levels for an essential file can be a frustrating exercise. Commercial program features such as *The Norton Utilities'* File Find can do the job, but if you want something beyond this basic function, turn to the Pascal program presented here, *WHERE.PAS* (see **LISTING 1**). Though you can use *WHERE.PAS* as is, it can also serve as the starting point for a variety of custom file-manipulation utilities.

To use *WHERE.PAS*, type in the listing with your favorite editor, load it into *Turbo Pascal*, and compile it with the destination 'disk' to create an .EXE file. Run *WHERE.EXE* by typing **WHERE** followed by the name of the file to be found. You can broaden the search with DOS wild cards \* and ?, or narrow it by specifying a search path such as *WHERE C:\WORD\\*.DOC*. *WHERE* displays the name and path of each file that matches the name you typed in that directory and every directory underneath it. (You can also redirect output to printer or disk by typing **WHERE filespec >** followed by PRN or a file name.) If you don't specify a path or drive, *WHERE* will start at the root directory or default drive, respectively.

### Recursive Searching

*WHERE.PAS*'s search logic is simple: It starts with the specified directory, lists the files that match the file-search template (e.g., \*.DOC),

```

program Where;
uses Dos;

type str80 = string[80];

procedure Instructions;
begin
  writeln('WHERE -- File finding utility -- M. Covington
1988');
  writeln;
  writeln('where *.com');
  writeln('  searches whole disk for .COM files');
  writeln('where b: *.com');
  writeln('  searches disk B: for .COM files');
  writeln('where c:\mydir\*.com');
  writeln('  searches C:\MYDIR and all directories under
it');
end;

procedure Split(Name: str80; var Dir, FileSpec: str80);
{ Splits file name into directory and filespec }
var I: integer;
begin
  I := length(Name);
  while (I > 0) and not (Name[I] in [':', '\']) do I := I-1;
  Dir := copy(Name, 1, I);
  if Dir[I] <> '\' then Dir := Dir + '\';
  FileSpec := copy(Name, I+1, length(Name));
end;

procedure SearchDirectory(Path, FileSpec: str80);
{ Searches the directory denoted by Path for files that
match }
{ FileSpec, then does the same for all subdirectories
under it }
var FileInfo: SearchRec;
begin
  { Look for files that match FileSpec }
  FindFirst(Path+FileSpec, 0, FileInfo);
  while DOSerror = 0 do
    begin
      writeln(Path+FileInfo.Name);
      FindNext(FileInfo);
    end;
  { Look for subdirectories and search them }
  FindFirst(Path+'*.*', Directory, FileInfo);
  while DOSerror = 0 do
    begin
      if ((FileInfo.Attr and Directory) > 0) and
        (FileInfo.Name <> '.') and
        (FileInfo.Name <> '..') then
        SearchDirectory(Path+FileInfo.Name+'\'', FileSpec);
      FindNext(FileInfo);
    end;
end;

{ Main program }
var Dir, FileSpec: str80;
begin
  if ParamCount = 0 then
    Instructions
  else
    begin
      Split(ParamStr(1), Dir, FileSpec);
      SearchDirectory(Dir, FileSpec);
    end;
end.

```

**LISTING 1: WHERE.PAS finds files on any hard disk, no matter how complex the directory structure.**



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## SPECIAL REPORT

then does the same thing in each subdirectory.

"Doing the same thing," aka recursion, turns one big problem into several smaller ones. Every time WHERE.PAS encounters a new subdirectory, the SearchDirectory procedure loads another copy of itself with the new directory name as its argument. The copy of SearchDirectory does its work (and will call in additional copies of SearchDirectory if it finds more subdirectories) and eventually returns control to the first copy of SearchDirectory. If a disk is packed with multilevel subdirectories, SearchDirectory could be replicated 20 or 30 times or more.

### Inside the Code

Consider the logic of WHERE.PAS, starting from the top. The 'uses Dos' statement gives WHERE.PAS access to Turbo Pascal's DOS unit—a library of DOS-related procedures, data types, constants, and even global variables for exploring directories. Next comes the global definition of the string variable type str80, then the three procedures called by the main program—Instructions, Split, and SearchDirectory.

The 10-line main program at the end of the listing does little more than coordinate the procedures. After declaring variables that will contain file and path information, 'if ParamCount = 0' checks for a command-line parameter. If it doesn't find one, it invokes Instructions, which displays user information and halts the program. If a parameter is found, it's passed to Split, which divides it into the path (including drive letter) and the file search template, and passes these on to SearchDirectory.

SearchDirectory searches the specified directory twice. On the first pass, it looks only for files. The DOS unit procedure FindFirst locates the first file matching the template; FindNext finds all subsequent

matches until no files remain. Each time a file is found, its name, attribute, and other information are stored in FileInfo, and the file's path and name are printed to the screen.

On the second search, FindFirst's second argument is set to 'Directory', a constant that means "look for files and directories." The program checks the Attr field of FileInfo and rejects names that are not subdirectories, as well as the directory names '.' and '..'. Once SearchDirectory finds a valid subdirectory, it calls a new copy of SearchDirectory and passes it the current path with the subdirectory name appended. When SearchDirectory runs out of directories to search, it returns control to the main program.

### Customizing WHERE.PAS

WHERE.PAS can do more than just find files. With a little modification, it can:

- List hidden files. Just change '0' to 'Hidden + SysFile' in the first call to FindFirst.
- Process files. Instead of just displaying the paths and names of files found, you could make SearchDirectory call a procedure that processes them. For example, the program could track down errant WordPerfect macros and collect them into a single directory.

Turbo Pascal's Reference Guide documents many other file-handling procedures that are built into the DOS unit. Add that intelligence to a basic understanding of recursion, and you'll be able to write utility programs that give you total control over your hard disk. —Michael Covington

Michael Covington is a researcher with the Advanced Computational Methods Center at the University of Georgia in Athens and coauthor of Prolog Programming in Depth, (Scott, Foresman & Co., Glenview, Illinois, 1988). ●



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# ACCESSORIES

## FOR THE ROAD

**Time to upgrade your mobile PC? Thanks to third-party manufacturers, you can choose from a wealth of modems, floppy drives, tape backups, expansion boxes, and other accessories.**

**John Faulkner**

The same shortcomings that limit desktop PCs also hobble laptop and portable computers: too little mass storage, not enough expansion capacity, and inadequate methods for sharing data. The problem is, when it's time to add options, mobile PCs have a tougher time. An old 8088-based desktop can be upgraded ad infinitum with standard boards and drives, but the proprietary designs of laptops and portables limit the choice of add-ons.

Fortunately, a number of third-party vendors have emerged to give users more options than the manufacturer offers. This guide lists a variety of both third-party and manufacturer-supplied accessories, with a special focus on the most popular option—internal modems. In addition, you'll find a representative sampling of expansion boxes, hard disks, graphics boards, screen enhancements, external floppy drives, and external tape backups.

Because it's impossible to cover add-ons for all available mobile systems, we've listed accessories for only the most popular laptops and portables. In addition, we've omitted memory boards because they must be bought from the manufacturer in almost every case. We've also excluded battery packs: Either they're generic for all systems (depending on power requirements), or they're strictly proprietary.

For those who haven't yet bought a laptop or portable, remember that thinking ahead and buying a system with all the goodies you're likely to need is usually better than upgrading later. Third-party vendors make a living selling add-ons for less than the manufacturer does, but it's often cheaper still to buy a system that has all the power you require built in. Most important, check with your system's manufacturer to ensure that the third-party equipment you buy does not violate your system's warranty.



## EXPANSION BOXES

### Axonix DeskPack Series

Machines supported: all Toshiba models except the T1000; Zenith TurboPort; Sharp PC-4502 and PC-4521

Designed as a desk-bound docking station, the DeskPack features a half-height 5¼-inch bay and accommodations for three 8-bit cards. The DeskPack also comes with its own AC power supply and connects to the laptop via an interface card that occupies the modem slot.

List price: \$549; with 65ms 20MB hard disk \$1049; with 40ms 20MB hard disk \$1249; with 40ms 30MB hard disk \$1349; with 28ms 40MB hard disk \$1549  
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### Axonix ThinPack Series

Machines supported: all Toshiba models except the T1000; Sharp PC-4502 and PC-4521

Offering a half-height 5¼-inch bay and two half-card 8-bit slots, ThinPack expansion units average 5.3 pounds unoccupied and

snap on to the system chassis. They connect through the expansion slot normally used for modems. An expansion port supports multiple ThinPacks, and Seagate hard disks are available from Axonix in 20MB, 30MB, and 40MB capacities (although any half-height 5¼-inch hard disk will work). The unit comes with its own AC adapter.

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### Connect Computer's WonUnder

Machines supported: Toshiba T1100 Plus, T1200, T3100, and T5100

A small, 5-pound (with AC adapter) expansion box that accommodates one 8-bit card, the WonUnder mounts easily to the bottom of the laptop and connects via an interface board that fits in the modem slot. All supported units still fit into their standard cloth carry-

ing cases with WonUnder installed.

List price: \$379  
**Reader service no. 703**

### Connect Computer's WonUnder II

Machines supported: Zenith Z-183 and Epson Equity LT

A stand-alone desktop expansion chassis that can hold two full-size 8-bit expansion cards, the 5-pound (with AC adapter) box connects easily by cable to the laptop through the expansion port.

List price: \$459 (Z-183), \$479 (Equity LT)  
**Reader service no. 704**

### Toshiba Expansion Chassis and Interface Card

Machines supported: Toshiba T1100 Plus, T1200 series, T1600, T3100, T5100, and T5200

This desktop expansion box with its own power supply provides five full-length 8-bit slots. The box measures 8.8 by 15 by 5.4 inches and connects via an interface board that fits in the modem slot.

List price: \$999  
**Reader service no. 706**

### Zenith SupersPort Expansion Chassis

Machines supported: all SupersPort models and the TurboPort/386

This desktop expansion chassis with three full-size 8-bit slots has its own internal AC power supply, and it connects to the laptop through a proprietary expansion slot. The unit weighs 8.5 pounds and measures 15 by 6 by 4.7 inches.

List price: \$499  
**Reader service no. 707**

### Zenith TurboPort Expansion Chassis

Machines supported: all TurboPorts

This chassis is identical to the SupersPort Expansion Chassis, but it's cut to fit the TurboPort.

List price: \$449  
**Reader service no. 708**

## HARD DISKS

### Compaq 40MB Fixed Disk Drive

Machines supported: Compaq SLT/286

This internal 29ms hard disk has a formatted capacity of 43MB and is factory installed. It connects to the SLT via a proprietary adapter included with the drive and runs off the laptop's power supply.

List price: \$1399  
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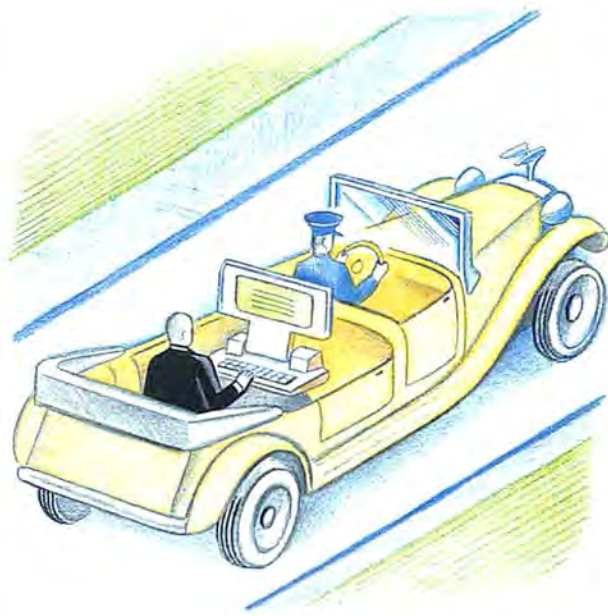
Machines supported: Toshiba T1000, T1100 Plus, T1200, T3100, and T5100

These external 20MB, 40MB, and 100MB SCSI hard drives have 28ms average access times and require special SCSI interface boards, which are sold separately by CPI. Each system requires a different type of interface board, so specify the system model when ordering.

List price: T-Drive/20 \$499, T-Drive/40 \$799, T-Drive/100 \$1399; SCSI adapter \$299  
**Reader service no. 710**

### SPC Export Series

Machines supported: Toshiba T1100 Plus, T1200,





## INTERNAL MODEMS

SYSTEM	Modem manufacturer	Modem <sup>1</sup>	Machines supported	Max. bps rate	Software included	List price	Reader service number
COMPAQ	Megahertz	EasyTalk Q1200	Portable III, 386	1200	ProComm	\$249	731
		EasyTalk Q2400	Portable III, 386	2400	ProComm	\$399	731
DATAVUE	Holmes Microsystems	Correspondent D-1200	Spark	1200	Mirror <sup>2</sup>	\$299	732
		Correspondent D-2400	Spark	2400	Mirror <sup>2</sup>	\$349	732
		Correspondent Snap 1200	Snap 1 + 1	1200	Mirror <sup>2</sup>	\$299	732
		Correspondent Snap 2400	Snap 1 + 1	2400	Mirror <sup>2</sup>	\$349	732
EPSON	Holmes Microsystems	Correspondent E-1200	Equity LT	1200	Mirror <sup>2</sup>	\$299	732
		Correspondent E-2400	Equity LT	2400	Mirror <sup>2</sup>	\$349	732
	Megahertz	EasyTalk E2400	Equity LT	2400	ProComm	\$399	731
IBM	Holmes Microsystems	Correspondent IBM	PC Convertible	1200	Mirror <sup>2</sup>	\$299	732
MITSUBISHI	Megahertz	EasyTalk MIT2400	MP286L	2400	ProComm	\$399	731
NEC	Holmes Microsystems	Correspondent N-1200	MultiSpeed EL, HD	1200	Mirror <sup>2</sup>	\$299	732
		Correspondent N-2400	MultiSpeed EL, HD	2400	Mirror <sup>2</sup>	\$349	732
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		LapModem N24	all NEC	2400	Quick Link	\$399	733
		LapModem N24 EC <sup>3</sup>	all NEC	2400	Quick Link	\$599	733
		LapModem N48	all NEC	4800	Quick Link	\$699	733
	Megahertz	EasyTalk NEC1200	MultiSpeed series	1200	ProComm	\$299	731
		EasyTalk NEC2400	MultiSpeed series	2400	ProComm	\$399	731
SHARP	Holmes Microsystems	Correspondent S-1200	PC-4501, -4502, -4521	1200	Mirror <sup>2</sup>	\$299	732
		Correspondent S-2400	PC-4501, -4502, -4521	2400	Mirror <sup>2</sup>	\$349	732
TOSHIBA	Computer Peripherals	Hook-Up T-24bi	Toshiba	2400	ProComm	\$299	734
		Hook-Up T-24ac <sup>4</sup>	Toshiba	2400	ProComm	\$349	734
		Hook-Up T-24es <sup>5</sup>	Toshiba	2400	ProComm	\$399	734
	Holmes Microsystems	Correspondent T-1200	T1100 Plus, T1200, T3100, T5100	1200	Mirror <sup>2</sup>	\$299	732
		Correspondent T-1212 DI	T1200 series	1200	Mirror <sup>2</sup>	\$299	732
		Correspondent T-2400	T1100 Plus, T1200, T3100, T5100	2400	Mirror <sup>2</sup>	\$349	732
		Correspondent T-1224 DI	T1200 series	2400	Mirror <sup>2</sup>	\$349	732
	Incomm Data Systems	Correspondent T-1012	T1000	1200	Mirror <sup>2</sup>	\$299	732
		Correspondent T-1024	T1000	2400	Mirror <sup>2</sup>	\$349	732
		LapModem T12	T1100 Plus, T1200, T3100, T5100	1200	Quick Link	\$299	733
		LapModem T24	T1100 Plus, T1200, T3100, T5100	2400	Quick Link	\$399	733
	Megahertz	EasyTalk T1200	T1100 Plus, T1200, T3100, T5100	1200	ProComm	\$249	731
		EasyTalk T2400	T1100 Plus, T1200, T3100, T5100	2400	ProComm	\$299	731
		EasyTalk T2400SER (with serial port)	T1100 Plus, T1200, T3100, T5100	2400	ProComm	\$329	731
		EasyTalk T1000	T1000	1200	ProComm	\$249	731
	Toshiba	EasyTalk T1K24	T1000	2400	ProComm	\$399	731
		T1200A	all except T1000, T3200	1200	no	\$349	649
		T1200B	T1000	1200	no	\$299	649
		T1200C	T1200, T1600	1200	no	\$299	649
		T2400A	all except T1000, T3200	2400	no	\$399	649
		T2400B	T1000	2400	no	\$399	649
		T2400C	T1200, T1600	2400	no	\$349	649
ZENITH	Computer Peripherals	Hook-Up Z-12	Zenith	1200	ProComm	\$299	734
		Hook-Up Z-24	Zenith	2400	ProComm	\$499	734
	Holmes Microsystems	Correspondent Z-1200	Z-181, Z-183, Z-184, SupersPort, SupersPort/286	1200	Mirror <sup>2</sup>	\$299	732
		Correspondent Z-2400	Z-181, Z-183, Z-184, SupersPort, SupersPort/286	2400	Mirror <sup>2</sup>	\$349	732
	Megahertz	EasyTalk Z1200	Z-181, Z-183, SupersPort, SupersPort/286	1200	ProComm	\$249	731
		EasyTalk Z2400	Z-181, Z-183, SupersPort, SupersPort/286	2400	ProComm	\$399	731
	Zenith	SupersPort 1200/300 Internal	SupersPort, SupersPort/286	1200	no	\$299	735
		SupersPort 2400/1200 Internal	SupersPort, SupersPort/286	2400	no	\$449	735
		TurbosPort 2400/1200 Internal	TurbosPort	2400	no	\$599	735

<sup>1</sup> Manufacturers claim Hayes compatibility for all products listed.

<sup>2</sup> Customers can also choose MTE.  
<sup>3</sup> With built-in error correction.

<sup>4</sup> Acoustic coupler.  
<sup>5</sup> Includes one serial port.



## EXTERNAL TAPE BACKUPS

MANUFACTURER Product	Machines supported	Formatted capacity	Format/media	Interface board	List price	Reader service number
AXONIX Thinstream	XT and AT compatibles	40MB	QIC-40/DC2000	n/a	XT \$749, AT \$799	740 740
COMPAQ 40MB Tape Backup <sup>1</sup>	Compaq SLT/286	40MB	read-write/DC2000, read/DC1000	n/a	\$799	741
COMPUTER PERIPHERALS T-Tape/40	Toshiba T1000, T1100 Plus, T1200, T3100, T5100	40MB	QIC-40/DC2000	n/a	\$749	742
GRID SYSTEMS Pouch Tape	all Grid	40MB	QIC-40/DC2000	included	\$895	743
PROCOM TECHNOLOGY PLT40	Toshiba, Zenith, NEC MultiSpeed HD series	40MB	QIC-40/DC2000	n/a	\$750	744
MICRONET COMPUTER SYSTEMS MCS-LTB-20	Toshiba, Zenith TurbosPort and SupersPort, NEC MultiSpeed, Sharp, Datavue Snap 1 + 1, Spark same as 20MB model	20MB	Archive 3 1/2 inch	n/a	\$479	745
MCS-LTB-40		40MB	Archive 3 1/2 inch	n/a	\$629	745

<sup>1</sup> Requires the \$299 External Storage Module.

and T3100; Tandy 1400LT; IBM PC Convertible

The Export is an external, AC-powered drive bay that supports a full range of removable hard drives, including 20MB, 30MB, and 40MB drives with 35ms average access times and an 86MB drive with a 19ms access time. With a hard disk installed, the drive bay weighs only 2 pounds. All drives feature automatic head parking. A proprietary adapter that connects by cable to the Export is included with each unit, so you must specify the model of computer when ordering. The Export comes with its own AC power supply; an optional battery pack can run a hard drive for almost 5 hours on one charge. With the addition of an optional BridgeCard adapter, the Export drives can be shared with any XT or AT compatible.

List price: Export chassis with 20MB hard disk \$895, with 30MB hard disk

\$1095, with 40MB hard disk \$1295, with 86MB hard disk \$1995; hard drive cartridges: 20MB \$595, 30MB \$795, 40MB \$995, 86MB 1695; battery pack \$195; BridgeCard \$195

**Reader service no. 711**

### SPC Laptop Hard Disk Series

Machines supported: Toshiba T1100 Plus, T1200, and T3100; Tandy 1400LT; IBM PC Convertible

This nonremovable version of the Export series is meant to stay on the desk and has its own built-in power supply. It also requires a different adapter for each manufacturer's laptop. As with the Export, the BridgeCard lets other systems share the hard disk.

List price: chassis with 20MB hard disk \$695, with 30MB hard disk \$895, with 40MB hard disk \$1095, with 86MB hard disk \$1795

**Reader service no. 712**

## EGA AND VGA

### ADAPTERS

#### Grid Systems VGA Video Controller Expansion Cartridge

Machines supported: Grid-Case 1500 series

This board fits in one of the GridCase's proprietary slots and drives VGA monitors at full VGA resolution. It also supports CGA, EGA, and Hercules modes and has both analog and digital monitor ports.

List price: \$695

**Reader service no. 714**

#### Megahertz Easy EGA1231

Machines supported: Toshiba T1200 and T3100

This EGA board slips into a proprietary expansion slot and drives standard monochrome, CGA, and EGA monitors. In addition to providing EGA graphics, the card emulates the MDA, HGC, and CGA.

List price: \$449

**Reader service no. 715**

## SCREEN

### ENHANCEMENTS

#### Axonix Thin E/L

Machines supported: most laptop models without backlit screens

Installed by Axonix, Thin E/L provides electro-luminescent backlighting for most LCD screens and adds about 4 ounces of weight. Axonix guarantees a one-week turnaround for installation.

List price: \$295

**Reader service no. 718**

#### Toshiba Backlit Super-twist Display Kit

Machines supported: Toshiba T1200 series, Models F and H

Factory-installed electro-luminescent display with backlighting.

List price: \$475

**Reader service no. 719**



## EXTERNAL FLOPPY DISK DRIVES

MANUFACTURER Product	Machines supported	Maximum formatted capacity	AC power required	List price	Reader service number
AXONIX ThinDisk	XT and AT compatibles	XT 360K, AT 1.2MB	yes	XT \$249, AT \$299	750 750
COMPAQ 360K FDD 1.2MB FDD	Compaq SLT/286 Compaq SLT/286	360K 1.2MB	yes yes	\$275 \$275	751 751
DOLPHIN SYSTEMS TECHNOLOGY Matchmate Plus 360K Matchmate Plus 1.2MB	Toshiba, Zenith Toshiba	360K 1.2MB	yes yes	\$399 \$399	752 752
KRES ENGINEERING FDD-360	Zenith, Toshiba, NEC	360K	optional	\$309	753
GRID SYSTEMS Pouch Floppy	GridCase 1500/Gridlite Plus	360K	yes	\$395	754
PROCOM TECHNOLOGY PLF1200 PLF360	most major brands most major brands	1.2MB 360K	yes yes	\$425 \$395	755 755
MICRONET COMPUTER SYSTEMS MCS-786T-1 MCS-786T-2 MCS-786Z-1 MCS-786Z-2 MCS-786D-1 MCS-786D-2 MCS-786S-2 MCS-786N-1 MCS-786N-2	Toshiba Toshiba Zenith Zenith Datavue Datavue Sharp NEC NEC	1.2MB 360K 1.2MB 360K 1.2MB 360K 360K 1.2MB 360K	yes yes yes yes yes yes yes yes yes	\$349 \$299 \$349 \$299 \$349 \$249 \$299 \$349 \$299	756 756 756 756 756 756 756 756 756
TOSHIBA External FDD	Toshiba	360K	yes	\$499	757
WELTEC DIGITAL 525 Subsystem 525 Subsystem 525 Subsystem	Toshiba, Zenith Toshiba, Zenith Mitsubishi	360K 1.2MB 1.2MB	yes yes no	\$279 \$329 \$449	758 758 758

## WHERE TO BUY

**Axonix Corp.**  
2257 S. 1100 East  
Salt Lake City, UT 84106  
801/466-9797

**Compaq Computer Corp.**  
20555 FM 149  
Houston, TX 77070  
713/370-0670

**Computer Peripherals, Inc.**  
667 Rancho Conejo Blvd.  
Newbury Park, CA 91320  
800/854-7600,  
805/499-5751

**Connect Computer Co.**  
9855 W. 78th St. #270  
Eden Prairie, MN 55344  
612/944-0181

**Dolphin Systems Technology**  
603-B E. Alton Ave.  
Santa Ana, CA 92705  
714/558-3879

**Grid Systems Corp.**  
47211 Lakeview Blvd.  
P.O. Box 5003  
Fremont, CA 94537-5003  
415/656-4700

**Holmes Microsystems, Inc.**  
2620 S. 900 West  
Salt Lake City, UT 84119  
801/975-9929

**Incomm Data Systems, Inc.**  
652 S. Wheeling Rd.  
Wheeling, IL 60090  
312/459-8881

**Kres Engineering**  
P.O. Box 1268  
La Canada, CA 91011  
818/957-6322

**Megahertz Corp.**  
4505 S. Wasatch Blvd.  
Salt Lake City, UT 84124  
801/272-6000

**Micronet Computer Systems**  
13525½ Alondra Blvd.  
Santa Fe Springs, CA 90670  
213/921-0068

**Procom Technology**  
200 McCormick Ave.  
Costa Mesa, CA 92626  
714/549-9449

**Systems Peripherals Consultants (SPC)**  
9747 Businesspark Ave.  
San Diego, CA 92131  
619/693-8611

**Toshiba America Information Systems Division**  
9740 Irvine Blvd.  
Irvine, CA 92718  
714/583-3000

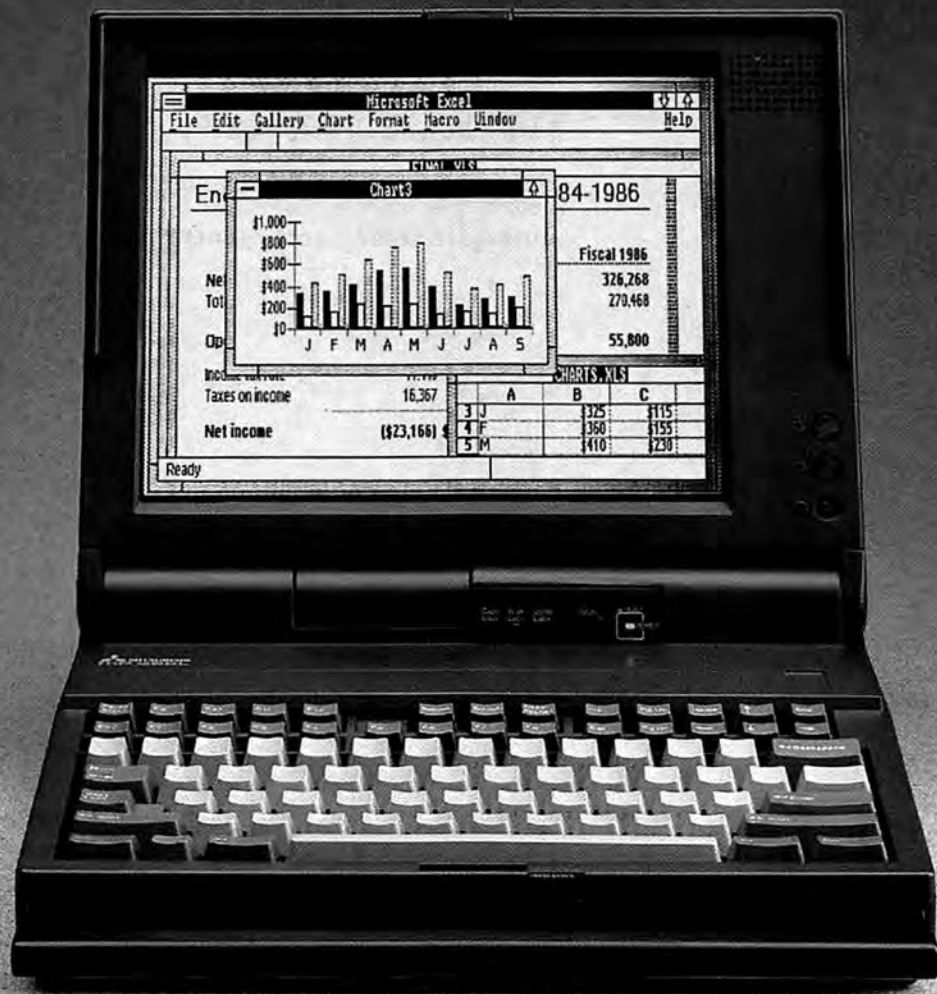
**Weltec Digital**  
17981 Sky Park Cir.,  
Ste. M  
Irvine, CA 92714  
800/333-5155,  
714/250-1964

**Zenith Data Systems**  
1000 Milwaukee Ave.  
Glenview, IL 60025  
800/842-9000

*John Faulkner is a freelance writer and editor in Oakland, California. ●*



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**MITSUBISHI  
ELECTRONICS**



# More Power From Paradox

**Tired of falling down Paradox  
rabbit holes?**

**Learn how to sidestep query  
traps and corrupted tables and  
automate some knotty functions.**



Data Management

**Celeste  
Robinson  
and  
Steve  
King**

**D**espite its reputation for ease of use, Borland's *Paradox* has its share of obstacles and idiosyncrasies. As with any programmable data manager, learning *Paradox* well takes a good deal of time and effort—and not all the wisdom can be gleaned from the documentation and help screens.

The following tips cure some of the most common *Paradox* vexations, ranging from query errors to memory problems. Unless otherwise specified, these tips apply to both *Paradox 2.0* and the new *Paradox 3.0*.

## **Watch Those ORs**

*Paradox's* query-by-example method makes it easy for most users to set up queries involving one table and a single search criterion. However, crafting more

complex queries take practice, and one wrong move can result in empty answer tables.

Building an OR query in *Paradox 2.0* can be especially tricky, because each criterion must be placed on a separate line of the query form. (*Paradox 3.0* users don't face this problem because they can string together any number of conditions on a single query line using the new OR operator.)

Press <F6> to checkmark the same fields on each line of the query. When you enter an example element, be sure to use the <F5> key also. If you're linking tables in the OR query, you must use different example elements on each line. If you use the same examples, *Paradox* will think you're looking for linked records that satisfy all the selection criteria instead of just one.



### Quotable Keywords

Misusing keywords (such as UNIQUE) and pattern operators (such as .. and @) in a query can also lead to empty answer tables. Always surround these expressions with quotation marks whenever they're used as search criteria.

### Check Your Case

Having trouble finding all the customers named Jones in a data table? Don't forget that *Paradox* queries can be case-sensitive. Chances are some records may be entered in all lowercase or uppercase, with initial caps, or in some unexpected mixture. If you enter *Jones* as the selection criterion, *Paradox* ignores records with *JONES* or *jONES* in the last-name field. However, if you use the .. operator and search for *jones..*, the program will retrieve the appropriate records regardless of case.

### Using Paradox Pattern Operators

Can't remember how to spell your Honolulu district manager's name? Use .. as a pattern operator. For example, searching for *sm..t..* will find both *Smythe* and *Smith*.

### Fix Corrupted Tables

If *Paradox* tells you that a table is corrupted, don't panic—restoration may still be possible. Tables can be damaged by power failures or by rebooting the PC while *Paradox* is still loaded.

New page length: C Report Ins 1/2  
Enter number of lines per page.  
.....18.....28.....38.....4\*.....18.....28.....38.....4\*  
-page-  
-form-  
AAA. AAAAAAAAAAAAAAAAAA AAAAAAAAAAAAAA  
AAAAAAAAAAAAAAAAAAAAAAAAAAAA  
AAAAAAAAAAAAAA, AA AAAAA  
AA  
-form-  
-page-

To use *Paradox* to print envelope addresses with a LaserJet, you have to change *Paradox*'s form length from the standard 66 lines to C (for continuous). You then insert a \012 as a calculated field in the lower form band. *Paradox* represents this expression as AA.

Sometimes the program fails to spot the damage, but you can usually identify the problem on your own. Common warning signs include blank records, random ASCII characters, and records disappearing when you page through a table.

In most cases, you can repair corrupted tables using the Tutility program included on the *Paradox* installation disk. Copy the program to the directory where the suspect table resides, and type TUTILITY at the DOS prompt. This menu-driven utility offers a Verify option, which determines if a table has been damaged, and a Rebuild option that recovers corrupted data. If Tutility can't rebuild the entire table, it will rebuild as much of it as possible.

### Wordwrap Fields

Need to create large fields in data entry forms or print out inventory descriptions, comments, and other humongous fields in a report? With *Paradox*'s little-known field word-wrap function, you can display field values in paragraph style.

The first order of business is to reformat the field by changing the length of the field mask. The steps:

1. Select either Form or Report from *Paradox*'s main menu.
2. Choose between designing a new form or report (Design), or changing an old one (Change).
3. Press <F10> and select Field.
4. Select Reformat, move to the desired field, and press



<Enter> to select it.

5. Use the <Cursor Left> key to shrink the field mask to the desired size, and press <Enter>.

6. Press <F10> and choose Field.

7. Select Wordwrap and press <Enter>.

8. When *Paradox* prompts you, type in the number of lines needed for the wrapped text and press <Enter>.

9. If you want to reserve any blank lines beneath the word-wrapped fields in a report, type BLANKLINE at the beginning of the line.

A few caveats: Wordwrap won't work with field labels and other descriptive text that you type into a specification. And when you reformat a field, the report may contain unwanted page widths, resulting in blank pages at the end of the report. To delete page widths, enter Report mode, press <F10>, and select Setting, PageLayout, Delete, and OK from the subsequent menus.

### Print Custom Reports With Selected Records

Normally, *Paradox*'s report generator prints all the records in a table. However, you can print a select group by creating a query answer table that contains only the records you want.

1. Choose Ask from the main menu, and specify the name of the table to query.

2. Press <F6> to place a check mark in the leftmost column of the query image so that the answer table will match the original table's structure.

3. Enter the criteria that select the desired records and press <F2>. If you want to

print out a standard tabular report, press <Alt>-<F7>, and you're done. If you want to use an existing custom report, take the following steps:

4. After *Paradox* generates the answer table, press <F10> to display *Paradox*'s main menu.

5. Select Tools and then Copy.

6. Select JustFamily, which copies the source table's reports and forms to the answer table.

7. Supply the name of the source table. When asked for the target table, enter "answer," the answer table's name.

8. At this point, *Paradox* asks if you want to cancel the operation. Select Replace from the menu.

9. Now you can use the original table's custom report specification for the answer table. From the main menu, choose Report and then Output.

10. When prompted for the table's name, select Answer.

11. Choose the report number, and indicate if the output should be directed to the printer, screen, or file. Select Printer, and your custom report will roll out.

12. To automate the process for future use, save the keystrokes as a script.

### Change Page Lengths on the LaserJet

Do your LaserJet-generated *Paradox* reports seem to start in the middle of the page—or do subsequent report pages break in all the wrong places? Check *Paradox*'s default page-length setting. Although an 11-inch page should hold 66 lines of text, the LaserJet's default ½-inch top and bottom margins soak up 3 lines apiece; so instead of 66 lines on a page, you get only 60 lines. The solution? Change *Paradox*'s

page-length setting from 66 to 60, and your reports will snap to attention.

If you change a report's line spacing or a font's point size, you'll have to calculate the number of lines that can fit on the LaserJet's 10-inch page and change *Paradox*'s page-length setting accordingly. Simply count the number of lines that will fit on a page and then subtract the number of lines taken up by the LaserJet's default margins. For example, if a given font packs 8 lines of text to the inch, *Paradox*'s page-length setting should be 80 (88 minus 8).

If you want to print envelopes or generate a free-form report that prints one record (or form) per page, take the following steps:

1. Set the *Paradox* page length to C for continuous.

2. To send a formfeed to the printer, you must place a calculated field on a blank line just above the bottom line of the on-screen form.

3. Press <F10>, choose Field, and select Place.

4. Select Calculated, and type in the expression "\012" when prompted.

### Keep an Eye on Disk Space

Unlike most data management programs, *Paradox* tries to do all its work in memory. But if RAM runs short, *Paradox*'s virtual memory scheme diverts data to temporary files on disk. Although this lets you work with huge files, it also temporarily eats up huge amounts of disk space. To keep the 'Not enough disk space' error message at bay, calculate the size of the tables



you'll be working with, and make sure you have three times as much disk space.

You can also fritter away disk space if you query a corrupted table, because *Paradox* can get stuck in a loop and fill up the entire disk with temporary files. If this happens, abort the session and rebuild the table with Tutility.

### Unload TSRs Before Using Pprog

*Paradox's* Personal Programmer (Pprog) application generator is something of a RAM hog, sucking up 595K of conventional RAM. Load anything but the tiniest memory-resident program, and you'll be greeted with a 'Not enough memory' message.

### Increment Fields Automatically

If your data base contains numeric fields that must be unique, such as invoice and customer numbers, you'll want to be able to increment them automatically. Unfortunately, *Paradox* won't automatically increment a field's value when new records are added to a table. With PAL's SETKEY command, however, you can add this function in a flash. In the following examples, the SETKEY command is put in *Paradox's* INIT script, and thus takes effect every time *Paradox* loads.

Open your INIT script; if you don't have one, create it with PAL's editor or any ASCII text processor. Just make sure you save the file with an .SC file extension. The following examples assume that the fields are nu-

meric and that you're using Edit mode to add records to a table.

This first PAL script is designed for keyed tables (an indexed table that sorts by key fields) and requires that you display the table in Form view. The script works well with tables that contain numerous records because *Paradox* does not have to calculate the maximum value for the field each time the value is incremented.

Open the INIT script and type the following on one line:

```
SETKEY 14 PgUp x=[] PgDn []=x+1
```

The 14 refers to the ASCII code for <Ctrl>-N, the key combination that executes the script. PgUp moves the cursor back to the prior record to gather the latest, highest value. (Because the table is keyed, this value should be the highest in the table.) The x=[] string assigns the highest value to the variable x. PgDn moves back to the record being edited, and the []=x+1 string increments x by one and assigns a new value to the field.

To increment a field in a non-keyed table where the highest field value may not necessarily be in the previous record, use this instead:

```
SETKEY 14 [] = CMAX("table",  
"field")+1
```

Make sure that setkey and the commands that follow it are on one line in the INIT script. In place of *table* and *field*, enter the name of the table in use and the field to be incremented. This approach works with tables in either Form or Table view. If you commonly work with both keyed and nonkeyed tables, create two different SETKEY commands and assign them to two different key combinations in the INIT script.

### De-Paradoxing Paradox

If you have a trickier *Paradox* paradox on your hands, help is available. Besides Borland's technical support phone line and private BBS for registered users, the company also supports a *Paradox* section on CompuServe (GO BORAPP). In addition, most major U.S. cities have a *Paradox* user group; some publish newsletters that are available to nonmembers. In the meantime, these tips should help keep *Paradox* running trim. ●

*Celeste Robinson is assistant manager of Borland's Paradox Product Support department. Steve King is a program analyst for the state of California and moonlights as a computer consultant and writer.*

### POWER TIP NO. 44

#### Handy WordPerfect 5.0 Directory Lists

You can quickly create neatly formatted printouts of WordPerfect 5.0 directories by pressing <F5> to display the directory contents and then pressing <Shift>-<F7>. WordPerfect will print a listing of all the files and directory information, even if it occupies more than one screen.

*George Beinhorn  
Nevada City, California*



TIPS &  
TECHNIQUES

Integrated Applications

## Fancy Reporting With Symphony

**Experienced Symphony users learn how to tackle multi-pass data base reports.**

What you need: Symphony 2.0

Using *Symphony's* data base is no mystery—until you need a report that lists data in groups or produces subtotals. To gather data into subgroups, you must build a multi-pass report, a fiendishly tricky procedure that even seasoned *Symphony* veterans try to avoid.

*Symphony* prints data base records according to formats designated in the data base report ranges. In a typical single-pass report, the program prints only those records that match the current entry in the criterion range; in a multi-pass report, it prints several different subgroups of the records, using a different criterion key for each

pass. This article explains how to produce a list of subgroup keys and generate a multi-pass report.

### Preparing the 1-2-3 File

Let's say you use a *Symphony* data base to maintain a household budget. For each transaction, you record an account category key, the item number, the date, a description, and the amount (a negative number for checks). You're aiming for a report that lists the items by account category and then subtotals the amounts for each category.

Generate a sample data base (called BUD) with the fields ACCT:L:6, ITEM:L:5, DATE:L:10, DESC:L:20, and AMOUNT:N:9. Then press <Shift> - <F10>, switch to the FORM environment, enter some data, and then press <Shift> - <F9> to return to SHEET MODE.

Once you've created the data base, you'll need to perform three major operations to generate a multi-pass report. First, you'll set up a special output range for the data base and produce a list of subgroup keys that *Symphony* will use to generate subtotals. Next, you'll create three report ranges to format the multi-pass report. You will use a data base statistical function to actually produce the subtotals. Finally, you'll create Query Settings and Print Settings sheets to link all the pieces and print the report.

### Setting Up the Output Ranges

In the SHEET environment, press <F10> and use *Range Name Create* to display and examine (but not change) the data base ranges. Your *Symphony* data base will have automatically generated a Query Settings sheet called BUD and a set of data base ranges, including the BUD\_CR and BUD\_DB ranges.

BUD\_CR is the criterion range (see **FIGURE 1**). The top row of this range contains a list of the data base field names; the second row should be blank (entries here determine the records that will be selected for reports). BUD\_DB is the input range; it holds the data base records you've entered. The top row of BUD\_DB also lists the field names. The second row holds the first data record; its cells have range names that correspond to the field names ACCT, ITEM, DATE, and so on.

Next you will set up two special ranges (see **FIGURE 1**) for the multi-pass report—an output range and a cell under ACCT in the criterion range. You'll use the output range to extract subgroup keys (in this case, all the account codes). During the multi-pass report, *Symphony* will insert these account codes one at a time into the criterion cell to select and total each group of records.

To make room below the criterion range for the new output range, you need to move the data base out of the way: In SHEET mode, press <F10> and select *Move*; then highlight the BUD\_DB range and move it six col-



umns to the right. Adjust the widths of the new data columns if desired.

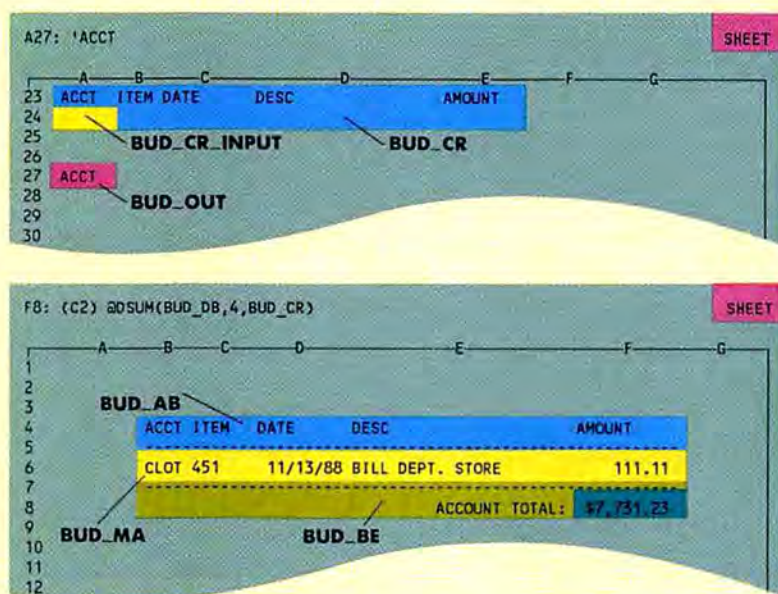
To create the subtotal keys, go to a cell in column A below the blank line under the criterion range's (BUD\_CR's) labels, and enter the field name <ACCT>. Use <F10> *Range Name Create*, and name that cell BUD\_OUT. Now move the cursor into BUD\_CR, place it on the cell underneath ACCT, and name the cell BUD\_CR\_INPUT.

### Creating the Report Ranges

When you generated the BUD data base, you automatically created two standard report ranges: BUD\_AB, which *Symphony* will use to print the field labels for each group of records, and BUD\_MA, which will print the data records themselves. The following procedure redesigns these two ranges for the subtotal report and creates a third (BUD\_BE) to print out subtotals during the multi-pass report.

Begin by inserting new columns to the left of the data base area of the worksheet to create space for a new report. To do so, press <Home> to get to cell A1, use <F10> *Insert Column*, and insert eight columns (A through H).

Now redesign the BUD\_AB report range as shown in **FIGURE 1**. Starting in cell B4, copy the field names from BUD\_AB by pressing <F10>, choosing *Copy*, pressing <F10>, highlighting BUD\_AB, and pressing <Enter> twice. The field names will appear, and you can set the column widths according to the desired page layout. Then, press <F10>, choose *Range Name Create*, select BUD\_AB, press <Backspace> <Tab>, highlight B4..F5, and press <Enter>.



**FIGURE 1:** The top worksheet shows the ranges used to extract the subgroup keys, which will be listed below cell A27. Below you see the ranges used to format the multi-pass report.

Next, rework BUD\_MA. The formulas in this range must contain only direct references to the field range names in BUD\_AB. Move the cursor to cell B6 and enter the formula +ACCT. Repeat this step for ITEM, DATE, and DESC, substituting the name of the respective field in each. Format cell D6 to date format. In cell F6 enter the formula @ABS(AMOUNT). Now use *Range Name Create* to assign the range name BUD\_MA to B6..F6.

Finally, create the BUD\_BE range, which will contain a data base statistical function to subtotal the records in the group: Enter the repeated dashes and the label ACCOUNT TOTAL as shown in **FIGURE 1**. In cell F8 enter @DSUM(BUD\_DB,4,BUD\_CR). BUD\_DB is the input range, 4 indicates that AMOUNT is in the fourth column of the data base (ACCT is in column 0), and BUD\_CR is the criterion. Format cell F8 to currency format. Now name the range B7..F9 BUD\_BE.

### Putting It All Together

Now you need to create a list of subgroup keys that *Symphony* will use to select and print groups of records. First, check to be sure there are no criterion entries in BUD\_CR. Then press <F10> and select *Query Settings* to display the Query Settings menu. Check the basic ranges to be sure you haven't disturbed BUD\_DB or BUD\_CR. Then select *Basic Output*, press <F10>, and select BUD\_OUT as the output range. Press <Esc>, select *Sort-Keys*, choose *1st-Key*, press <F10>, select ACCT, and press <Enter> to sort records in ascending order. Press <Esc> and choose *Record-Sort All* to sort the data base (and hence your report) by ACCT. Select *Unique*, and a sorted list of account codes will appear under BUD\_OUT; these are the subgroup keys. Quit this menu to return to SHEET mode and go to BUD\_OUT to examine the list.



Database, Criterion, Output ranges

Basic Ranges

Database: BUD\_DB

Criterion: BUD\_CR

Output: BUD\_OUT

Form Ranges

Entry: BUD\_EN

Definition: BUD\_DF

Underscores: No

Sort-Keys

1st-Key: ACCT

Order: Ascending

2nd-Key:

Order:

3rd-Key:

Order:

Report Ranges

Main: BUD\_MA

Above: BUD\_AB

Below: BUD\_BE

Type: Multiple

Entry list: BUD\_ACCTLIST

Input cell: B\_CR\_ACCT

One-Record: No

Database Settings: BUD

Query Settings

SCREEN 1: Here's how the criterion range and the new report ranges should look.

It's good *Symphony* practice to give a range name to the list of subgroup keys. Use <F10> *Range Name Create*, name the range BUD\_ACCTLIST, and highlight the extracted keys (omitting the field heading ACCT).

Finally, set *Symphony* up to produce a multi-pass report. Press <F10> and select *Query Settings* to return to the Query Settings menu. Select *Report Below*, press <F10>, and select BUD\_BE, the subtotals range. Select *Type Multiple*, press <F10>, and specify BUD\_ACCTLIST as the list. Next, press <F10> and select BUD\_CR\_INPUT as the input cell. Double-check your settings sheet (see SCREEN 1), and then select *Quit* to return to SHEET mode.

All that remains is printing the report. Press <Home> to see the report ranges. Enter the Print Settings menu by pressing <F9> and choosing *Print Settings*. Select *Source Database* and choose the Database Settings sheet BUD. Set your destination and select any other print settings, then choose *Quit* to dis-

play the Print menu. Finally, select *Align and Go* to print the report.

Multi-pass reports aren't for everyone, but with a little patience you can master this useful process. —Richard Scoville



Word Processing

## From Worksheets to WordPerfect

**Here's how to make drab 1-2-3 worksheets jump off the page in WordPerfect reports.**

What you need: 1-2-3 version 2.0, WordPerfect 5.0, and proportional fonts

**W**ordPerfect and 1-2-3 are both best-sellers: That should be a match made in heaven. But like any relationship, the union of these popular programs demands compromises and hard work—especially if you want fancy output.

You can easily import a 1-2-3 print file into WordPerfect 5.0 and print it with an ordinary monospaced font such as Courier (see FIGURE 1), but for snappy-looking worksheets like the one in FIGURE 2, proportionally spaced fonts such as Bitstream's Dutch (Times Roman) or Swiss (Helvetica) are the way to go.

Unfortunately, since 1-2-3 aligns data with spaces instead of tabs, simply printing a 1-2-3 print file with WordPerfect and proportional fonts scrambles the rows and columns. Although you can purchase a program such as Corel's *Tabin* to convert 1-2-3 print files for WordPerfect printing, this article describes how to do the job without using third-party products. This technique requires some work, though, so it's recommended only for small worksheet files.

### Preparing the 1-2-3 File

Before you import a 1-2-3 print file into WordPerfect, you must edit the file so WordPerfect can convert it to the proper format. First you'll insert a column of exclamation points between each existing column and substitute spaces in labels with underline ( ) characters. Later you'll use WordPerfect to replace the exclamation points with decimal tabs and the underlines with spaces. You can simplify part of this process by creating a 1-2-3 macro that inserts a blank column and then fills it with exclamation points.



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Bugs	0.30	0.33	0.50	0.74	1.67	1.67
Ricochet	1.10	1.11	1.82	2.72	4.08	6.13
Peter	0.10	0.11	0.17	0.25	0.37	0.56

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Crusader	0.70	0.77	1.16	1.73	2.60	3.90
Bugs	0.30	0.33	0.50	0.74	1.67	1.67
Ricochet	1.10	1.21	1.82	2.72	4.08	6.13
Peter	0.10	0.11	0.17	0.25	0.37	0.56

FIGURES 1 and 2: A 1-2-3 worksheet before (top) and after its WordPerfect 5.0 makeover

1. Load *1-2-3* and type `'M` in cell A1. In cell B1, type the macro keystrokes `{Right}/WIC~!!!~/C~.` and press `<Enter>`.

2. Save the file with */File Save* and name it *Insert*.

To use the macro, load your *1-2-3* worksheet and extract the print range you want to include in the *WordPerfect* document. Use */File Xtract Values*, enter a file name, and press `Enter`. Highlight the print range and press `<Enter>`.

Now load the new print range worksheet. Go to an empty area of the worksheet by pressing `<End> <Home> <Cursor Down> <Cursor Right>` and use */File Combine Copy Entire-file* and select *Insert*. Use */Range Name Labels Right* and press `<Enter>`.

Go to the first data column and press `<Alt>-I`. Use `<Page Down>` and `<Cursor Down>` to highlight the column, then press `<Enter>`. Go to the next column, use `<Alt>-I`, and so on until all the columns are separated.

Now, substitute underline characters for all spaces in labels like this: Rabbit\_Inc. Just press `<F2>` to edit a label, hit `<Insert>`, move the

cursor to each space, and press `<Shift>-<->` to type an underline.

Set the margins and print the file to disk. To do so, press */Print File*, enter the file name, highlight the print range with the cursor, and press `<Enter>`. To set the left margin, select *Options Margin Left* and enter 0. Use *Margins Right* and enter 240 to set the right margin. Select *Margins Top* and enter 0 to set the top margin. Use *Margins Bottom* and enter 0 to set the bottom margin. Finally, press *Other Unformatted Quit Go* to print it and then quit *1-2-3*. Now your file will have a .PRN extension.

### Setting WordPerfect Tabs

Before you pull the reformatted worksheet into *WordPerfect*, open a new document and set the left and right margins to 0. Load the *1-2-3*.PRN file into *WordPerfect* and check the width of the widest column using the measurements in the lower right corner of the screen. Clear any existing tabs by pressing `<Shift>-<F8> <LT> <Home> <Home> <Cursor Left> <Ctrl>-<End>`.

Now set the first tab by entering the width of the widest column. (Start 1 inch from the left margin if you want a 1-inch margin.) To make it a decimal tab (so the numbers line up on the decimal point instead of on the first character), press `D` for decimal.

Once you've set the first decimal tab, you can set the rest automatically by retyping the first tab location, followed by a comma and whatever increment you've used. For example, entering 1.5,.75 sets the first tab at 1½ inches and the remaining tabs at ¾-inch intervals. Return to the document by pressing `<F7>` twice.

### A 1-2-3 File Import Macro

Now you can convert the *1-2-3*.PRN file for printing with proportional fonts. The following *WordPerfect* macro, called "123," automates the process.

1. Press `<Ctrl>-<F10> 123 <Enter>`, type *Convert 123 print file*, and press `<Enter>` to begin recording the macro.

2. Press `<Alt>-<F2> N <Space> <F2> <F2>` to remove all the spaces from the file.

3. Press `<Home> <Home> <Home> <Cursor Up>` to move the cursor to the very top of the file, above all the format codes.

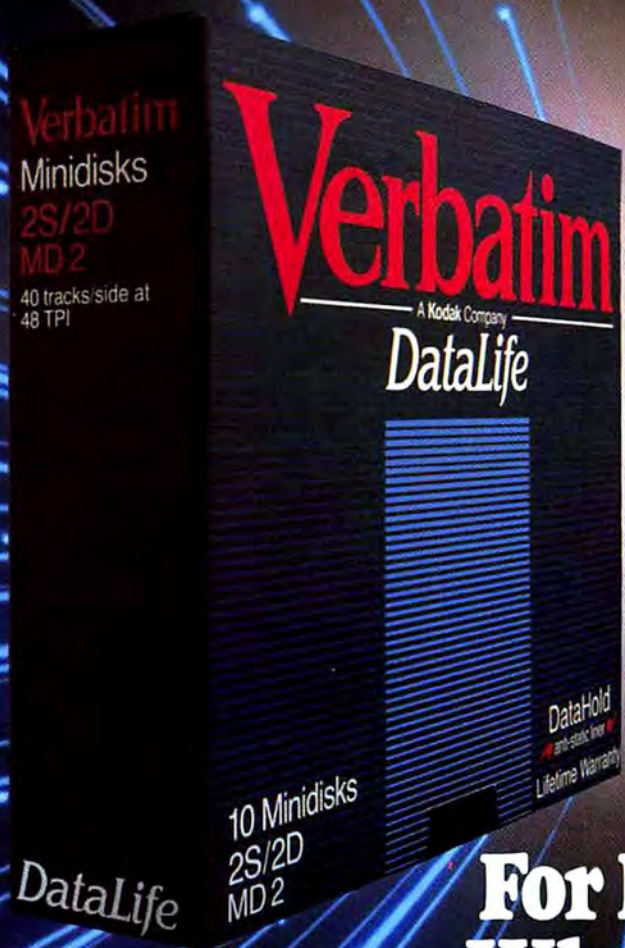
4. Now press `<Alt>-<F2> N <_> <F2> <Space> <F2>` to replace all underlines with spaces.

5. Press `<Home> <Home> <Home> <Cursor Up>` again and press `<Alt>-<F2> N!!! <F2> <Tab> <F2>` to replace all !!!'s with tabs.

6. Finally, press `<Ctrl>-<F10>` to save the macro.

Later, you can use this macro by pressing `<Alt>-<F10> 123 <Enter>`.





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## Finishing Touches for WordPerfect Worksheets

Now that you know the basics, here are some tips for creating the output in **FIGURE 2**.

**Mix and match fonts.** **FIGURE 2** uses Bitstream's *Fontware* Dutch (Times Roman) font in 12-point size for body text, 14-point for column and row labels, and 24-point for the worksheet titles. The *Fontware* installation program including Dutch and Swiss (Helvetica) is available on request to registered *WordPerfect 5.0* owners (call 800/222-0409). Of course, you can substitute your own proportional fonts if desired.

To use any font, simply move the cursor to the first letter of the label. Press **<Ctrl> - <F8> 4** to display the list of fonts installed for your printer. Highlight the appropriate font and press **S**. You can press **<Alt> - <F3>** (Reveal Codes) to check the placement of the font codes.

**Make separator rows.** Most spreadsheets contain separator rows of dashes or equal signs to segment the spreadsheet into readable chunks, but they look clunky.

The solution is simple: Replace them with *WordPerfect* graphic lines. To make the line stop at the last column, move the cursor to the right of the last character in the column and note the measurement displayed at the cursor position marker. Subtract the left margin setting from that number, and you'll have the correct line length. Create a left-aligned line by pressing **<Alt> - <F9> LHHL**. Then press **L** and enter the line length.

Finally, to print the file, press **<Shift> - <F7> S**, highlight the appropriate driver, and press

**<Enter> 1**. Any printer that supports proportional fonts will do the trick.

With a little bit of effort, *WordPerfect 5.0* may be all you need to make 1-2-3 files look their best. —Daniel Will-Harris



Word Processing

## Four MultiMate Shortcuts

**Key procedures can streamline cumbersome MultiMate Advantage II chores.**

What you need: MultiMate Advantage II

**K**ey procedures are a bonus that's often overlooked among *MultiMate Advantage II*'s features. Like macros in other programs, key procedures store commonly used document formats, replay repetitive commands, and string together program functions to automate time-consuming tasks. This article provides tips on using key procedures and shows you how to automate four chores, from creating ASCII files to printing envelopes.

### Key Procedures in a Nutshell

Building a key procedure is as simple as pressing **<Ctrl> - <F5>**, naming the procedure, entering the desired keystrokes,

and pressing **<Ctrl> - <F5>** to finish recording. An inverse-highlighted 'B' is displayed in the bottom right corner of the screen when the key procedure build function is on. If you make a mistake, just press **<Ctrl> - <F5>** to end key recording, press **<F10>** until the main menu displays, and start over.

*MultiMate* automatically tags key procedure files with the file extension *.key*. To use a key procedure, press **<Ctrl> - <F8>**, type the file name, and press **<Enter>**. An inverse-highlighted 'E' at the lower right corner of the screen indicates that the key procedure is running.

### ASCII.key: Create an ASCII File

Normally, to create an ASCII file with *MultiMate*, you exit the program and use a separate utility. *ASCII.key* avoids this process by "printing" a document to an ASCII file. Once you use this key procedure on a file, that file's print format will be changed, so if you think you may want to print the document using its original print format, use this key procedure on a copy of the document. To be safe, use a test document when you create this key procedure.

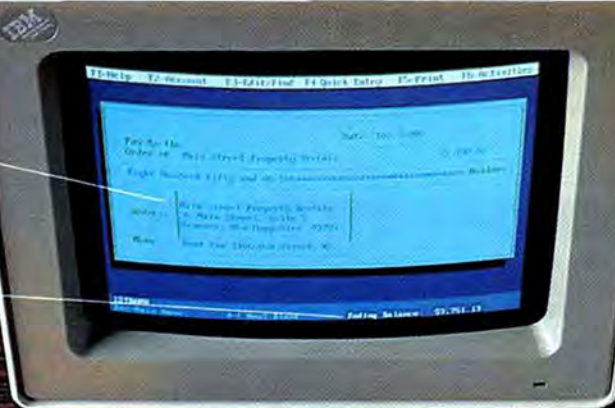
1. From within a document, press **<Ctrl> - <F5>**, name the key procedure **ASCII**, and press **<F10>**.
2. Press **<Alt> - 3** to display the document print option menu.
3. Type **001999Y** and press **<Tab>**.
4. Type **000000** and press **<Tab>** twice.
5. Type **TTYCRLF** to use the generic printer driver; press



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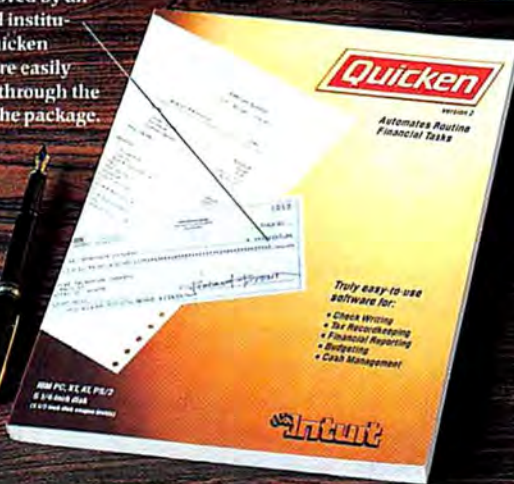


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The Agenda key procedure produces a two-column agenda memo and pauses while you type in time and topics.

<Tab>, and type F to print to a file.

6. Press <Tab> 16 times, and type 001 at the Paper Length prompt.

7. Press <F10> twice and <Ctrl>-<F5> to finish recording the key procedure.

### Agenda.key: Two-Column Agenda Style

*MultiMate Advantage II* doesn't have a styles feature like *Word* or *WordPerfect*, but you can use key procedures to save commonly used document formats. For example, Agenda.key creates a two-column meeting agenda with headings for Time and Topic/Speaker and space for ten agenda items. This key procedure also uses <Ctrl>-<F6>, *MultiMate*'s Pause toggle, which in this case prompts the user to enter the time, the topic, and the name of the speaker. When you use Agenda.key you must press <Ctrl>-<F6> to restart the key procedure after each pause.

1. From the main menu, press

<Ctrl>-<F5>, type Agenda as the key procedure file name, and press <F10> twice.

2. Press 2 to create a new document, press <Ctrl>-<F6> (Pause), and type in a name for the agenda file (in this example, use Agenda).

3. Press <F10> <Ctrl>-<F6> to display the document summary screen and to insert a pause for the user to type in any appropriate information. Next, press <F10> twice to display the document screen.

4. Now insert another pause so the user can enter an agenda title centered at the top of the page. Press <F3>, press <Ctrl>-<F6>, and then press <Enter> twice.

5. To create a two-column format, press <Shift>-<F9>, press <Cursor Right> 17 times, press [, press <Space> 5 times, press [, and press <F10>.

6. To create the first column label, press <F3> to center the cursor in the first column, type Time, and press <Enter>.

7. Next press <Shift>-<F3> (Column mode), and then press

<Shift>-<Enter> to switch to the second column.

8. To create the second column label, press <F3> and type Topic/Speaker.

9. Switch back to the Time column by pressing <Shift>-<F3> <Shift>-<Enter>, insert a Pause by pressing <Ctrl>-<F6>, and press <Space>.

10. Now switch to the Topic/Speaker column by pressing <Shift>-<F3> <Shift>-<Enter>, and press <Ctrl>-<F6> <Space> to insert a Pause.

11. To create entries for ten agenda items, repeat steps 9 and 10 nine times.

12. To convert to standard page format, press <Shift>-<F9>, press <Space> 21 times, and press <F10>.

13. Press <Ctrl>-<F5> to finish recording the key procedure.

### Search.key: Search Document Summary Screens

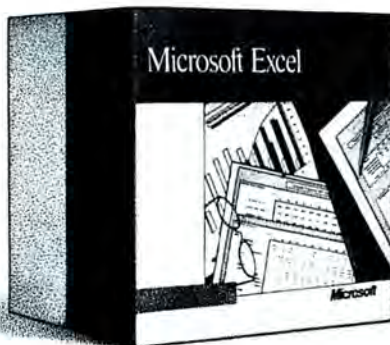
Search.key scans the document summary screens of all the files in a directory for keywords you specify, lists the documents it finds, and then displays the edit menu so you can retrieve a file. If the search fails to find a document, the key procedure uses the <Ctrl>-<F7> Prompt command to start another search. When the prompt appears, press C to continue or N to stop. If you select C, simply press <Ctrl>-<F6> to display the Search Document Summary Screen menu.

1. From the main menu, press <Ctrl>-<F5>, name the key procedure Search, and press <F10> twice.

2. Press 66 and then <F10> to display the Search Document Summary Screen menu.



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3. Press <Ctrl> - <F6> to insert a pause for the user to enter the keywords, press <F10>, and then press <Esc> three times.

4. Press 1 (Edit), press <Ctrl> - <F6> to pause while the user enters a file name tagged by the search, and press <F10> twice to display the file.

5. Press <Ctrl> - <F7> to insert the Prompt command, and press <F10>.

6. Press <Ctrl> - <F5> to finish recording the key procedure.

### Env.key: Envelope Printing

The Env.key key procedure reads the address block from a letter and prints it on a standard business envelope. The procedure adds a new page to your document, searches for the address block, copies it to the new last page, prints an envelope, and then deletes the extra page. This procedure assumes that the address block is three lines long, followed by three blank lines, and not preceded by three blank lines. Use an appropriate letter file to create this key procedure.

1. From the main menu, press <Ctrl> - <F5>, name the key procedure Env, and press <F10> twice.

2. Press 1 to edit a document, press <Ctrl> - <F6>, enter the name of the desired letter file, and press <F10> twice.

3. Press <F1> <End> to move the cursor to the end of the letter file, then press <Ctrl> - <End> <F2> to create a new last page.

4. Move the cursor to the top of the letter file by pressing <F1> - <Home>.

5. Press <F6>, press <Enter> three times, and then press <F10> to search for the address block.

6. Press <Cursor Down> three times, and then press <Alt> - <F3>.

7. To activate the move feature and block the address, press <F8>, press <Cursor Down> four times, and press <F10>.

8. Press <F1> <End> and then <F10> to copy the address block to the last page.

9. Now set a page format to print the address at column 40 (for a standard legal-size envelope). Press <F9>, press <Space> to move the cursor to column 40, press <Tab>, and press <F10>.

10. Press <Insert> and then press <Tab>.

11. Press <Cursor Down> <Alt> - <F3> <Tab> to move the first line of the address to column 40.

12. Repeat step 11 for each line of the address block (three times in this example).

13. Press <Insert> <Alt> - 3 <Ctrl> - <F6> <F10> to print the address. *MultiMate* displays the main menu after it prints a file.

14. To return to the letter so you can delete the extra address, press <Ctrl> - <F6>, press 1, and then press <F10> twice.

15. Now you can delete the address. Press <F1> <End> <Delete> followed by <Ctrl> <End> <Delete>, and press <Enter>.

16. To delete the additional format line, press <Cursor Up> <Delete> <F9> <Delete>, and then press <F10> twice.

17. Finally, press <Ctrl> - <F5>.

Key procedures aren't the state of the art in macros, but they'll help you be more productive with *MultiMate*. —Eileen Jeffery

*Richard Scoville is director of training at The Office Works in Research Triangle Park, North Carolina, and a contributing editor for PC World. Daniel Will-Harris is the creator of Designer Disk Stylesheets for WordPerfect and the author of WordPerfect 5: Desktop Publishing in Style (Peachpit Press, Berkeley, California). Eileen Jeffery, a freelance writer in Phoenix, Arizona, was technical editor of MultiMate Advantage II: Tips and Techniques. ●*

## USER GROUP TIPS

### Helpful hints from members of the nation's user groups

#### WordPerfect 5.0 Does LaserJet Envelopes

Printing envelopes with the Hewlett-Packard LaserJet Series II and *WordPerfect 5.0* is tough. Here's a *WordPerfect* <Alt>-key macro that copies an address from a document, places it in an envelope template, and prints it via the Series II.

First create an envelope template (called Envelope in this example). Open a new document, and display the Format menu by pressing <Shift> - <F8>. Press 4621 and type the LaserJet Series II escape codes <027> &l1o81a3H. To double-check the codes, press <Alt> - <F3> (Reveal Codes); you should see '[Ptr Cmnd:<27> &l1o81a3H]'.

Next, format the template to print the address on a standard business-size envelope. Press



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Circle 212 on reader service card



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## PC WORLD

<Shift> - <F8> 13N0 to turn off justification. To set the vertical margin, enter 25, type 4.25, and press <Enter> <Enter> 0. To set the horizontal margins, press 175 <Enter> 0 <Enter> . Press <Enter> twice more to exit the Format menu. Save the envelope template by pressing <F7> Y, typing *Envelope*, and then pressing <Enter> N.

To create the <Alt>-key macro, open a new document and create a dummy address, followed by two hard carriage returns. Position the cursor on the first letter of the address.

To record the macro, press <Ctrl> - <F10> and name the macro <Alt> -E. Now press <Alt> - <F4> (Block) and press <F2> (Search). Press <Enter> <Enter> <F2> to highlight the address. Press <Ctrl> - <F4> 12 to copy the address block to memory. Open a second document by pressing <Shift> - <F3> . To retrieve the envelope template file, press <Shift> - <F10> , type *Envelope*, and then press <Enter> . Press <Home> twice and then press <Cursor Down> <Enter> to place the address in the template.

To print the address, press <Shift> - <F7> 1. Finally, press <F7> NY to clear the template and exit the file. Finish recording the macro by pressing <Ctrl> - <F10> .

All you need do now to print envelopes with the LaserJet is position the cursor at the beginning of an address and press <Alt>-E. The macro will do the rest.

Christine Rivera  
New York PC User Group

### Monitor Paradox Searches on Screen

Whenever you sort or search a massive data base with *Paradox*,

it's worth remembering that the screen freezes while the program processes data. Since a static display can tempt even the most experienced user to reboot the system, here's a simple PAL program that displays the number of the record that *Paradox* is processing and then lets you know when the program has finished the sort.

```
Clear
:
Edit "filename"
@ 5,0 ?? "Processing the File"
Scan
@ 5,30 ?? Recno()
:
Endscan
@ 5,0 ?? "All Done with the
Processing"
Do_It!
Brian J. Smith
President
LAPALS (Southern California
Paradox Users Group)
```

### Quick Text Moves With MultiMate

You can use *MultiMate Advantage II's* <F7> (Move) key to reposition text, but the Undo Delete feature is quicker. First delete text with the <Delete> key, then move the cursor to the spot where you want to place the text. Press the asterisk key (Undo Delete) on the numeric keypad, and the text reappears at its new location.

A word of caution: *MultiMate* stores deleted text in memory, the contents of which are lost when you repaginate or exit a document. Also, only characters deleted with the <Delete> key can be restored.

Jo-Ann Edinburg  
MultiMate Users Group of the  
Boston Computer Society ●



# From creation

# To completion...

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### Completion.

Easily fill out forms right on screen and get letter-perfect results. Form after form. Simply tab from blank to blank and type in your data, or merge

data from existing dBASE or ASCII files. Entries go exactly where they belong. No overwrites. No misalignments. No "white-out."

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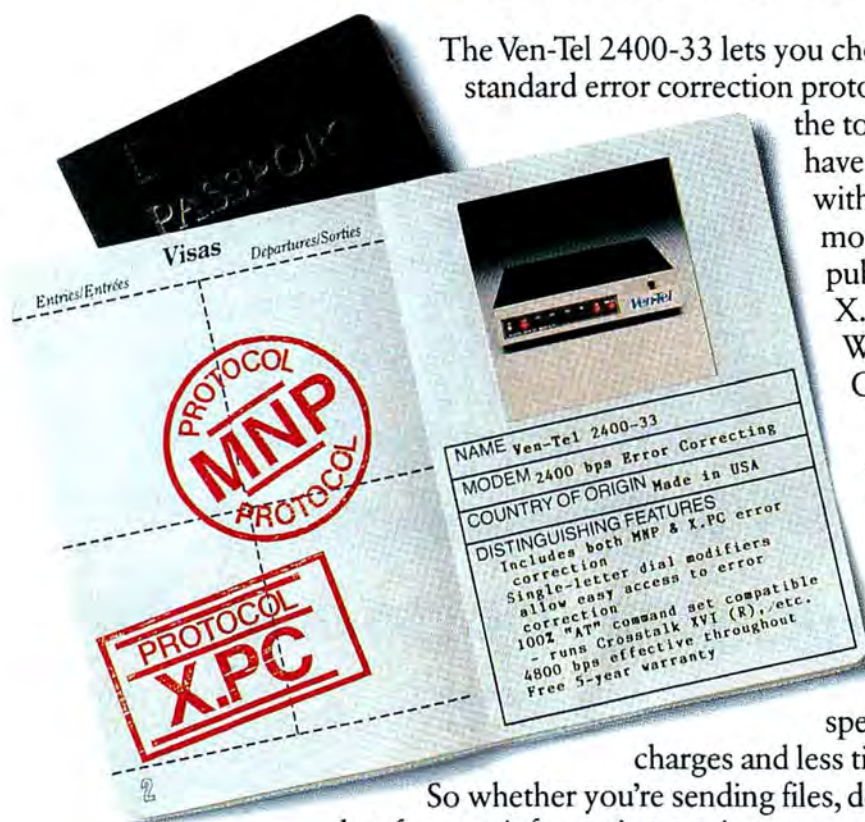
Reservoir Place, 1601 Trapelo Road, Waltham, MA 02154

Forms shown were printed using version 2.5 on an HP LaserJet II with downloaded fonts. Digitized logo printed within FormWorx by invoking a printer macro. Some features shown not available on all printers. **45-day money back guarantee on direct purchases.** When ordering by mail, include \$6.75 for shipping in U.S. and Canada. Air mail overseas—\$18. In Massachusetts add 5% sales tax. Purchase orders accepted from government agencies, institutions, and rated corporations. FormWorx with Fill & File is a trademark of FormWorx Corporation. dBASE is a registered trademark of Ashton-Tate.

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## CONSUMER WATCH

### Advice and information for the computer consumer

This month: A new national organization seeks to link all user groups. Also, check our nationwide listing for the user group nearest you.

Anita  
Amirrezvani

Americans, it has been said, have a peculiar fondness for organizing—into clubs, associations, institutes, federations, societies—and more recently, user groups.

For consumers, user groups are an invaluable resource. Enthusiastic volunteers organize meetings and arrange for speakers, provide training and technical support, and produce information-packed newsletters. User group officers negotiate product discounts for members and lobby manufacturers to improve computer products and services.

Jerry Schneider, past president of Capital PC User Group, estimates that the thousands of user groups in the United States have an aggregate membership in the hundreds of thousands. But until recently, there's been no national organization to link the groups or fight their common battles.

APCUG (the Association of Personal Computer User Groups) may change that. APCUG is a fledgling organization that has grown out of a dialogue among user group presidents over the past few years, according to Schneider, who is coordinating APCUG's development. Schneider describes a two-part goal: to encourage information sharing among user groups and to represent user groups to the computer industry.

APCUG's charter was still being drafted at press time, and sensitive issues such as voting

rights were still being discussed. So far, it appears that all APCUG office holders will serve as unpaid volunteers. Each user group will be asked to pay \$25 per year to join APCUG and will have voting rights only if it has more than 100 members. Membership is open to all groups, regardless of the type of computer they use.

APCUG defines a user group as an organization that has regular meetings and offers either a newsletter or a BBS. The point of this definition is to prevent bogus groups from joining. "Some computer stores have set up groups that are thinly disguised marketing efforts," says Boston Computer Society president Jonathan Rotenberg. "The difference between marketing campaigns and groups that have a genuine interest in helping users is pretty obvious."

Rotenberg, who supports APCUG's efforts, feels that the organization has yet to address some important issues. How can APCUG fairly represent its entire constituency? How can it help user groups provide better services to their members? How should it handle relationships with manufacturers? How can it best support itself financially? "I think all the problems are solvable, but I don't think they've all been thought out," says Rotenberg.  
(continues)



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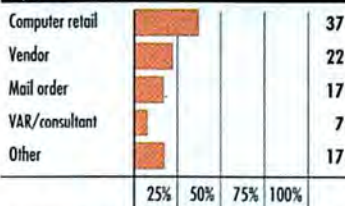
### RATE YOUR SATISFACTION: Buying Software

Big organizations are willing to buy software from a variety of sources—computer stores, vendors, mail order—according to this survey by International Data Corporation.

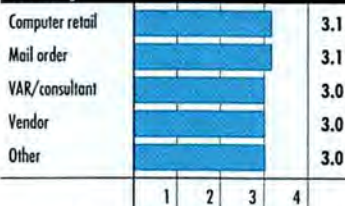
That may be because no one source is noted for better service—users say they're about equally satisfied with all sources. Surprisingly, consultants didn't rate as high as mail-order companies and computer stores.

What factors are important to software buyers? Three points in particular: software without copy protection, free upgrades, and free telephone support. Among price considerations, only volume discount made the list, where it ranked fourth.

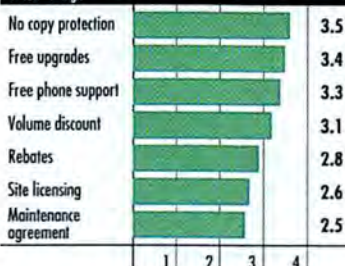
#### Where users buy software in percent



#### Users rate their satisfaction 1=low 4=high



#### What's important to buyers? 1=low 4=high



Source: International Data Corporation. From a survey conducted in May 1988 of 191 organizations, each with at least 50 PCs.

One immediate benefit APCUG offers member user groups is a bulletin board sponsored by Borland, Intel, and Tymnet where user group officers can discuss user group organizational issues and members can exchange information.

But will freebies like the BBS make the APCUG too cozy with manufacturers? "You can't be naive and ignore the issue," says Schneider. "You have to be careful about any relationship you set up, and monitor it. But in the past, user groups have developed relationships with vendors that haven't compromised the groups in any way."

User group officers who want to learn more about APCUG can send a message on MCI Mail addressed to APCUG or write to 1101 Connecticut Ave. NW #901, Washington, DC 20036. APCUG's next general meeting is scheduled for Spring COMDEX in Chicago.

To send correspondence or to submit material for publication in this column, please see How To Contact PC World, page 4. (User group list follows, next page.)

## POWER TIP NO. 45

### Fast WordPerfect Directory Listings

Here's a snippet of information that the WordPerfect 5.0 manual doesn't mention. You can redisplay the last directory listing you asked for if you press <F5> twice from a clear screen or from within a document. Press 0 to return to the document.

George Beinhorn  
Nevada City, California





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## NATIONWIDE GUIDE TO USER GROUPS

### User group information code

NL: newsletter  
SIG: special interest group  
TS: technical support  
TE: training and education  
BBS: bulletin board system

(User groups are listed alphabetically by state and city, not by user group name.)

### ALASKA

Alaska Computer Society  
2042 E. Third Ave.  
Anchorage, AK 99501  
907/277-2406  
\$25/yr. NL, 2 SIGs, TS, TE

Polar PC User Group  
c/o Glen Wilcox  
P.O. Box 72934  
Fairbanks, AK 99707  
907/452-2500  
\$10/yr. NL, 3 SIGs, TS, TE

### ALABAMA

Birmingham IBM PC User Group  
c/o Fred Hilbers  
P.O. Box 19248  
Birmingham, AL 35219-9248  
205/871-1939  
\$20/yr. NL, 15 SIGs, TS, TE

Montgomery PC Users Group  
c/o James Morrow  
3505 McGehee Rd.  
Montgomery, AL 36111  
205/288-4434  
\$25/yr. NL, 3 SIGs, TS, TE, BBS

### ARIZONA

Phoenix PC Users Group  
P.O. Box 44150  
Phoenix, AZ 85064  
602/943-7907  
\$40/yr. NL, 2 SIGs, TS, TE, BBS

Tucson Computer Society  
c/o Rice Bullock  
P.O. Box 1489  
Tucson, AZ 85702  
602/886-3661  
\$30/yr. NL, 15 SIGs, BBS

### ARKANSAS

N.W. Arkansas Micro-computer Users Group  
c/o Kermit Baker  
2568 Sweet Briar  
Fayetteville, AR 72703  
501/521-2292  
\$15/yr. NL, TS, TE

Central Arkansas PC Users Association  
c/o Mark Penny  
P.O. Box 2095  
Little Rock, AR 72203  
501/225-8288  
\$20/yr. NL, TE, BBS

### CALIFORNIA

Gold Country PC Users Group  
1980 Canal St.  
Auburn, CA 95603  
916/885-8022  
\$25/yr. NL, 1 SIG, TS, TE, BBS

Kern Independent PC User Group  
c/o Jim Harter  
P.O. Box 2780  
Bakersfield, CA 93303  
805/395-0223  
\$20/yr. NL, 4 SIGs, TS, TE, BBS

Berkeley PC/Compatibles User Group  
c/o Mel Mann  
1145 Walnut St.  
Berkeley, CA 94707  
415/526-4033  
No fee, NL, TS, TE, BBS

Sacramento PC Users Group  
c/o Rick Hellewell  
P.O. Box 685  
Citrus Heights, CA 95611-0685  
916/386-9865  
\$25/yr. NL, 20 SIGs, TS, TE, BBS

FOG  
P.O. Box 3474  
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415/755-2000  
\$30/yr. NL, 4 SIGs, TS, TE, BBS

UCLA PC Users Group  
c/o Peter Chow  
12127 Ramona Blvd.

El Monte, CA 91732  
818/444-6280  
\$25/yr. NL, 15 SIGs, TS, TE, BBS

Orange Coast IBM PC User Group (OCIPUG)  
c/o Stan Sabin  
20322 Camfield Ln.  
Huntington Beach, CA 92646  
714/898-7998  
\$36/yr. 21 SIGs, TS, TE, BBS

SLO Bytes PC Users Group  
c/o Bob Ward  
2100 Andre Ave.  
Los Osos, CA 93402  
805/528-0121  
\$18/yr. NL, 1 SIG, TS, TE, BBS

North Orange County Computer Club  
c/o Tracey Lenocker  
P.O. Box 3616-A  
Orange, CA 92665  
714/549-3227  
\$25/yr. NL, 25 SIGs, TS, TE, BBS

Pasadena IBM Users Group  
c/o Steven Bass  
711 E. Walnut St. #306  
Pasadena, CA 91101  
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c/o James Heidecke  
7860 Live Oak Dr.  
Riverside, CA 92509-5339  
714/685-5407  
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San Diego Computer Society  
P.O. Box 87770  
San Diego, CA 92138  
619/284-7802  
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PC Clone User Group  
P.O. Box 15000/324  
San Francisco, CA 94115  
415/861-9321  
\$25/yr. NL, TS, TE, BBS

San Francisco Computer Society  
c/o Ralph Gallagher

P.O. Box 783  
San Francisco, CA 94101  
415/929-0252  
\$10/yr. TS, TE

San Francisco PC Users Group  
3145 Geary Blvd. #155  
San Francisco, CA 94118-3316  
415/221-9166  
\$30/yr. NL, 17 SIGs, TS, TE, BBS

Silicon Valley Computer Society  
c/o Kent Safford  
1330 S. Bascom Ave., Ste. D  
San Jose, CA 95128-4502  
408/286-1271  
\$30/yr. NL, 14 SIGs, TS, TE, BBS

Diablo Valley PC Users Group  
c/o Bill McCauley  
P.O. Box 8040 #117  
Walnut Creek, CA 94596  
415/943-1367  
\$30/yr. NL, 16 SIGs, TS, TE, BBS

### COLORADO

PC Users Group of Colorado  
P.O. Box 944  
Boulder, CO 80306  
303/442-4815  
\$18/yr. NL, 2 SIGs, TE, BBS

Colorado Springs PC Users Group  
c/o George Wing  
P.O. Box 1028  
Colorado Springs, CO 80901  
\$20/yr. NL, 2 SIGs, TS, TE, BBS

### CONNECTICUT

Connecticut IBM PC User's Group  
c/o John McGuinley  
P.O. Box 291  
New Canaan, CT 06840  
203/762-0229  
\$20/yr. NL, 6 SIGs, TS, TE, BBS

Southeast Connecticut PC Users Group  
c/o Catherine Winslow  
P.O. Box 180  
West Mystic, CT 06388  
203/889-2540  
\$12/yr. NL, 3 SIGs, TS, TE, BBS

### DELAWARE

PC Professional Users Group  
P.O. Box 2350  
Wilmington, DE 19899  
302/764-4723  
\$30/yr. TS, TE

### DISTRICT OF COLUMBIA

Capital PC User Group, Inc.  
51 Monroe St. Plaza East 2  
Rockville, MD 20850  
301/762-6775  
\$35/yr. NL, 30 SIGs, TS, TE, BBS

### FLORIDA

South Polk PC Users Group  
c/o Bill Goddard  
815 N. Lake Reedy Blvd.  
Frostproof, FL 33843  
813/635-3381  
No fee, TE

Pinellas IBM PC Users Group  
c/o Dick Shutt  
1331 Seagull Dr. S  
St. Petersburg, FL 33707  
813/347-5444  
\$25/yr. NL, 35 SIGs, TS, TE, BBS

University of South Florida PC Users Group  
University of South Florida  
SVC 409  
c/o U.C.S. Infocenter  
Tampa, FL 33620-7250  
813/974-3190  
No fee, NL, 4 SIGs, TS, TE, BBS

### GEORGIA

Atlanta PC User's Group, Inc.  
P.O. Box 28788  
Atlanta, GA 30358  
404/446-6611  
\$30/yr. NL, 5 SIGs, TS, TE, BBS

### IDAHOO

Idaho PC Users Group  
c/o Richard Chambers  
P.O. Box 9136  
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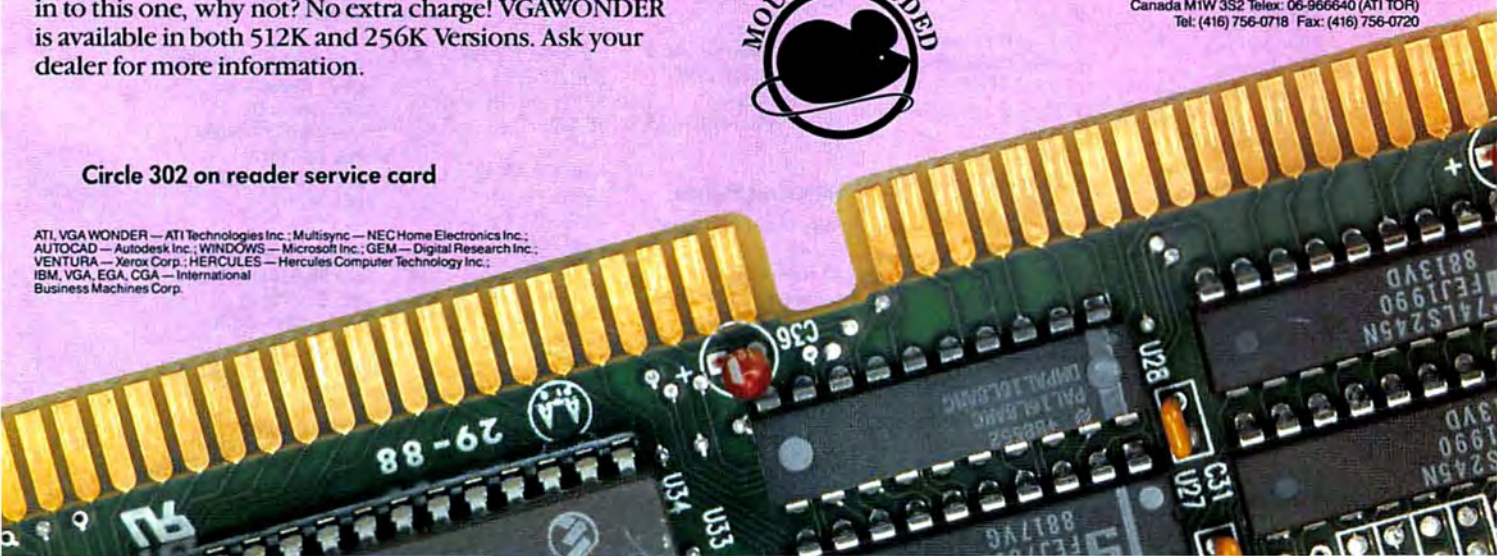


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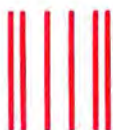
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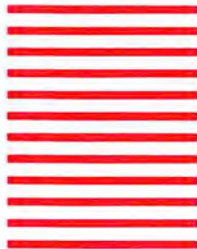
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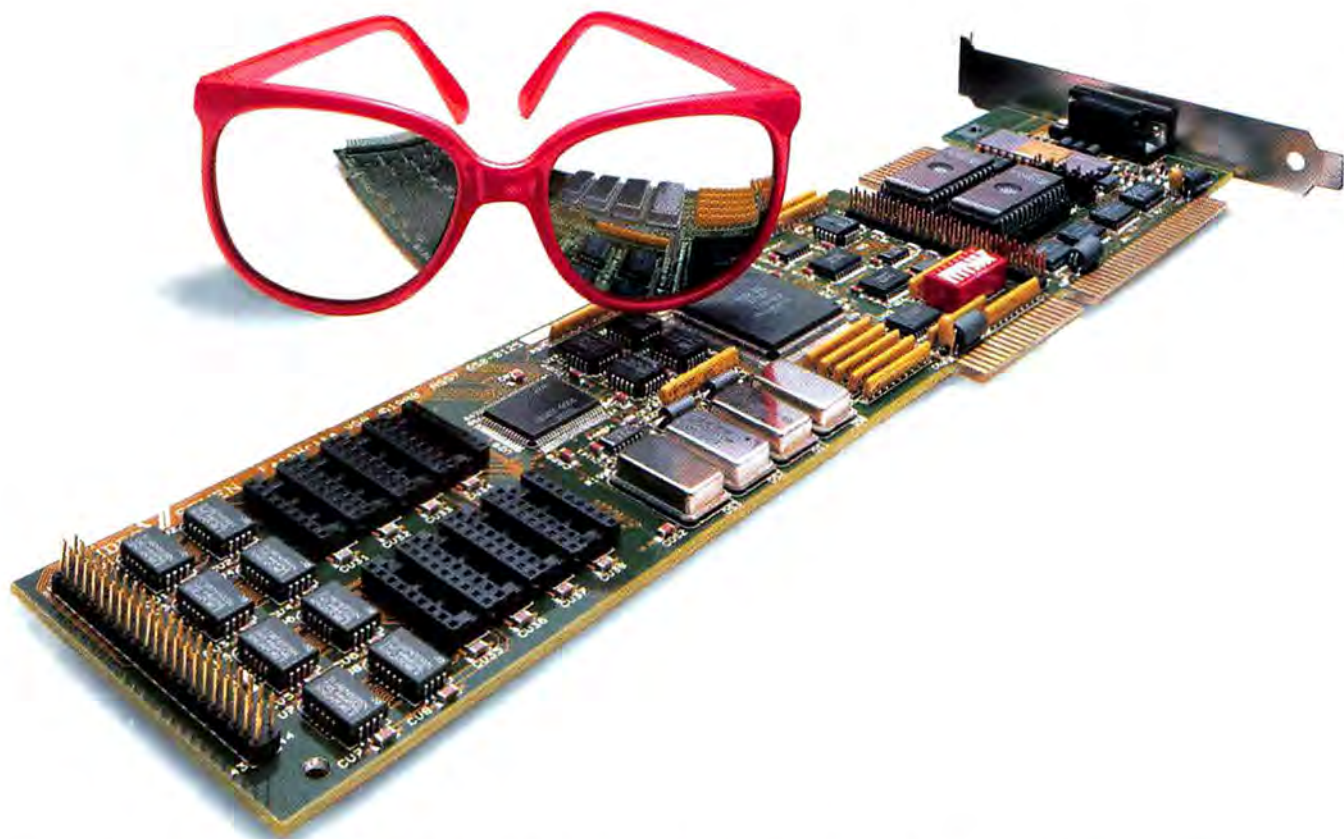
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Learn the difference between extended and expanded memory, turn echo off for DOS 3.2 batch files, ease the Mac-to-PC transition with GEM, and copy files faster.

Karl  
Koessel

### Thanks for the Memories

**Q.** *In last September's Upgrade Path, PC World recommended Aubrey Pilgrim's book, Build Your Own 80286 Compatible and Save a Bundle [Tab, Blue Ridge Summit, Pennsylvania, 1988]. On the strength of that endorsement, I've worked up the courage to attempt to build my own PC. Before I start my project, however, I hope you can clear up some confusion for me.*

*What is the difference between extended memory and expanded memory? When and why is each type of memory used? Can they be used together, or are they mutually exclusive? Where in the computer are they located, and how do they relate to the stated size of RAM (such as 640K or 1MB) for a PC? Are both available for all PCs? And finally, why do I read so much about accessing and using such memory; why can't the BIOS, the operating system, and the system configuration files set up the memory when I turn on the PC?*

*Ed Buffum*

*Charlotte, North Carolina*

**A.** To understand extended and expanded memory, we first need to understand the original PC memory architecture from which they evolved. A personal computer is fundamentally a machine in which a microprocessor manipulates values stored in memory. The microprocessor that runs the IBM PC is an Intel 8088. It has an address range of

1MB; that is, it can read and change values for 1,048,576 ( $2^{20}$ ) different bytes of memory. The more powerful IBM XT uses the same processor but adds a hard disk and more expansion slots and originally used a modifiable operating system, DOS 2.0.

IBM's next personal computer, the AT, incorporated the Intel 80286 microprocessor. This chip has two operating modes: One simply mimics the 8088; the other offers significant new capabilities, including the ability to address 16MB ( $16,777,216$ , or  $2^{24}$ , bytes) of memory. Because the 80286 extended the memory address range beyond the 8088's 1MB, addresses beyond that range are said to be in *extended memory* (see **FIGURE 1**).

The same term is used in connection with computers driven by an 80386, which has an address range of 4 gigabytes ( $4,294,967,296$ , or  $2^{32}$ , bytes). Since an 8088-based PC cannot address memory beyond 1MB, the PC and XT and their respective clones cannot support extended memory.

In the DOS environment, extended memory has only limited use; its most popular functions are as a RAM disk or a print spooler. Recent releases of *Windows* include a driver that enables them to use the first 64K of extended memory. Other operating systems, such as UNIX and (*continues*)



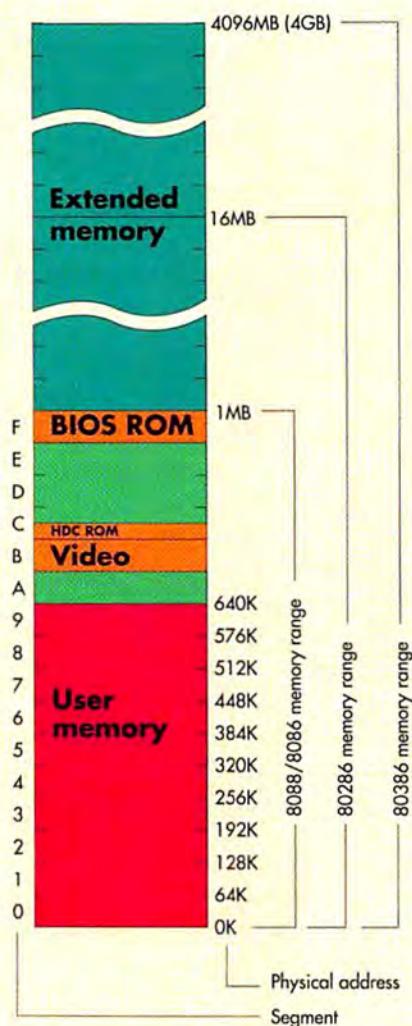
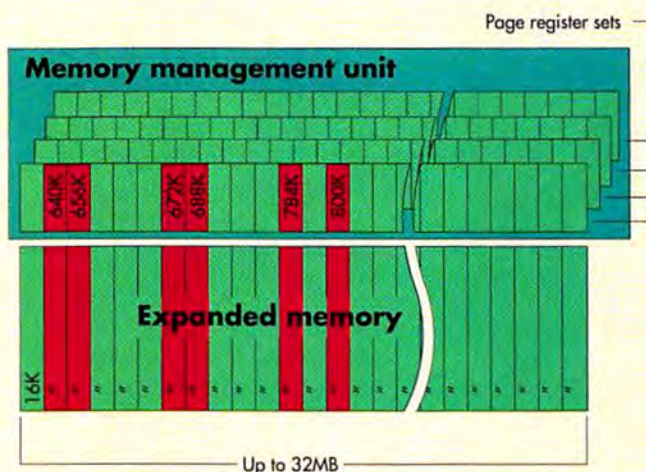


FIGURE 1

## Extended vs. Expanded Memory

*Extended memory is available only on 80286- and 80386-based PCs and comprises addresses beyond 1MB. While some other operating systems benefit from extended memory, DOS makes very little use of it. Expanded memory has no fixed addresses; a memory management unit sets address registers for a finite number of banks at a time, enabling different banks to use the same addresses. Only EMS-aware programs can use expanded memory.*



OS/2, can and do use extended memory.

*Expanded memory*, on the other hand, does not have specific memory addresses. Instead, expanded memory is divided into 16K banks, each of which has a register that specifies that bank's address. At any given time, only a finite number of registers have values—that is, only some of the 16K banks have addresses. Thus, when a program needs more expanded memory, the currently active address registers are cleared (the contents of their associated 16K remain intact), and the registers of another set of banks are then as-

signed address values.

Expanded memory registers use only address values below 1MB, which means that expanded memory can be installed in an 8088-, 80286-, or 80386-based computer. Because extended memory uses only addresses greater than 1MB, 80286- and 80386-based computers can contain both extended and expanded memory.

Expanded memory boards require expanded memory registers and the memory management unit (MMU) that controls them; extended memory boards don't need these. Many expanded memory boards can also be used as extended memory, in

which case their costly MMU and expanded memory registers are unnecessary.

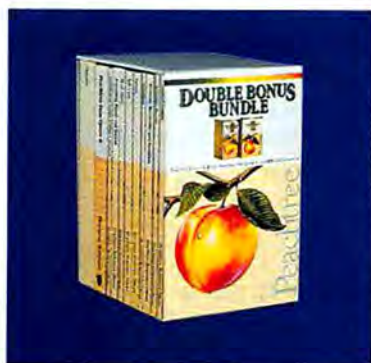
Note that not every program can use expanded memory. It's not enough to install an expanded memory board; you must also have software that is written to exploit expanded memory.

80386-based systems add another twist to the story. The 80386 has a built-in MMU. Unlike its predecessors, this chip can change the address of any bank of memory. Thus, with the help of a software driver, extended 80386 memory can be used as expanded memory.

(continues)



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To facilitate working with the PC's 1MB range, programmers treat it as 16 segments of 64K each, from segment 0 to segment F (see **FIGURE 1**). The PC designates the first ten segments, or 640K, of memory for *user RAM* (also called conventional memory), which holds the operating system, device drivers, memory-resident programs (TSRs), and applications and their data. A PC need not have a full 640K, but what user memory it does have must be contiguous and must begin at address 0. The last 6 segments (384K) are reserved for system support, such as video RAM, device ROMs (which control hard disks and EGA displays, for example), and the PC's ROM BIOS and ROM BASIC (in segment F).

Because the system reserves the addresses from 640K to 1MB, and because an 8088-based PC or XT cannot address memory beyond 1MB, PCs and XTs almost never have more than 640K. Some may have slightly more, but in doing so render themselves nonstandard.

With 80286- and 80386-based systems, if a machine's stated memory size is larger than 640K, 640K of that memory occupies the addresses from 0 to 640K, and the remainder uses addresses from 1MB up. Thus, a 1MB system usually has 640K of user memory and 384K of extended memory. Exceptions include some newer 80286-based AT clones and almost all 80386-based systems that advertise 1MB of RAM, both of which reserve some of that surplus 384K for their own use, leaving less

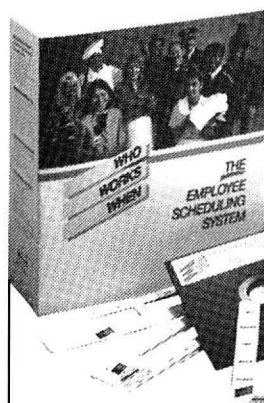
extended memory than you'd expect.

As for setting up extended and expanded memory, it *does* happen automatically. Installed extended memory is ready to be used when the system is turned on, and CONFIG.SYS can set up available expanded memory.

### Now You See It, Now You Don't

**Q.** By default, *echo* is on when batch files execute; commands are displayed on screen. In the interest of keeping an uncluttered screen, I'd like to know how to modify MS-DOS 3.2 to make *ECHO OFF* the default for batch files.

(continues)



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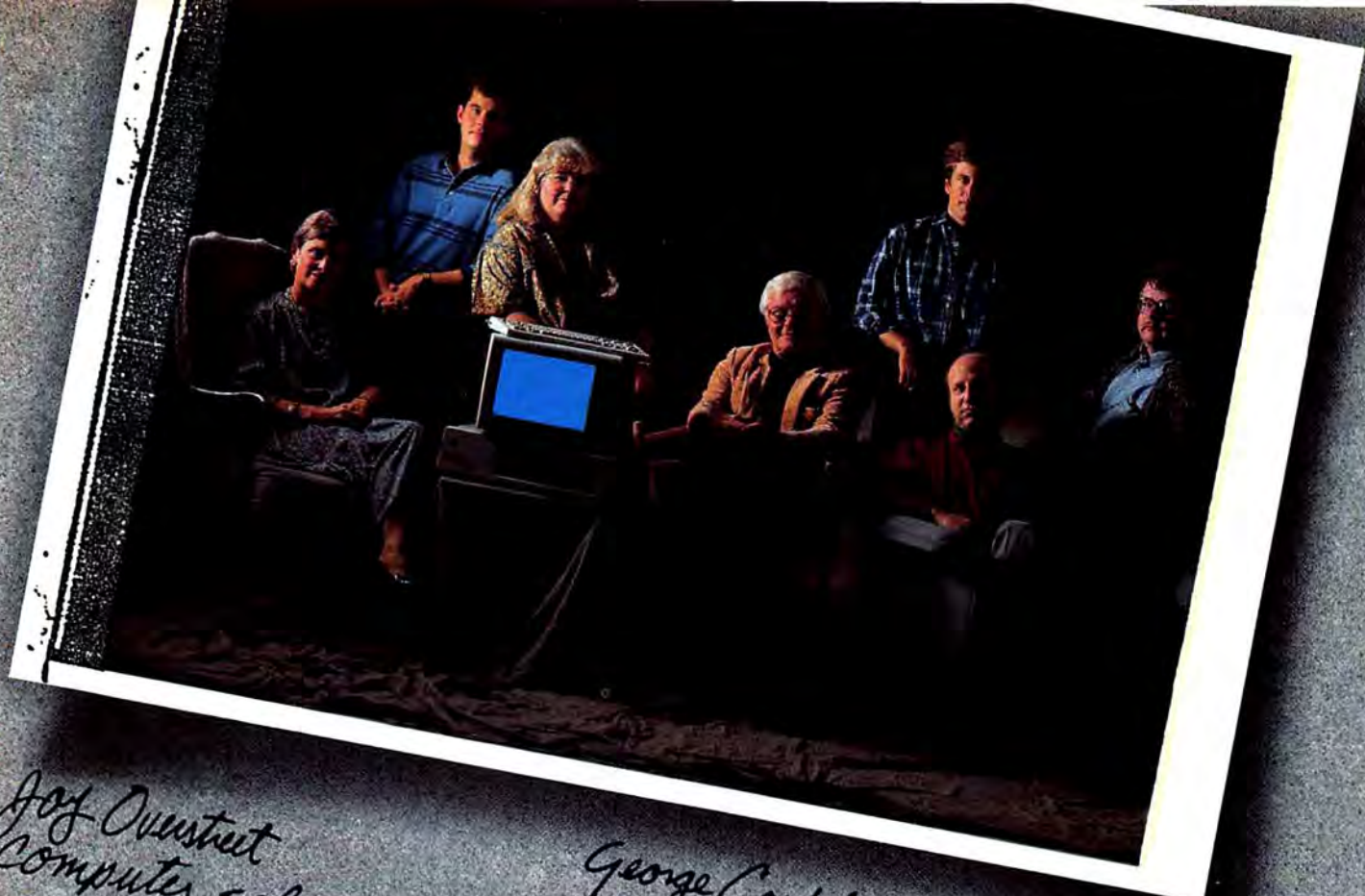
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*I modified MS-DOS 3.1 to do this, but now I don't remember how. And I don't want to upgrade to MS-DOS 3.3 because it doesn't add enough benefits to justify the extra memory it uses. Can you help?*

*Richard E. Ozaroff  
New York, New York*

**A.** You obviously know that in DOS 3.3 you can prefix any batch command with an @ to suppress its display. Therefore, placing the command @ECHO OFF at the beginning of a batch file prevents subsequent commands from being "echoed" to the screen while the batch file runs—unless, of course, an ECHO ON command turns echo back on. The extra memory required for DOS 3.3 isn't that great—10K. But, depending on

which computer vendor you deal with, the cost of upgrading to DOS 3.3 can be as much as \$120.

At the end of "EGA at Length" (*Star-Dot-Star, PCW*, July 1986), reader Photios G. Ioannou of Ann Arbor, Michigan, provided the patch to make echo off the default for PC-DOS 3.1 batch files. The patch simply changes the byte that determines echo's default state from a 1 to a 0. Many, if not all, releases of MS-DOS 3.1 can be patched with the following steps:

Boot DOS 3.1 and then use the command **format a:/s** to make a bootable DOS 3.1 disk so that you are patching a copy of DOS and not your original. Copy DEBUG.COM onto this new disk from the DOS Supplemental Programs disk. With the new disk in drive A:, type **a:debug**  
**a:\command.com** and press

```
C>a:debug a:\command.com <Enter>
-s 100 5000 24 01 50 <Enter>
xxxx:yyyy
xxxx:zzzz
-e zzzz <Enter>
xxxx:zzzz 24. <Space> 01.0 <Enter>
-w <Enter>
Writing www.bytes
-q <Enter>
```

**FIGURE 2:** By patching COMMAND.COM with DEBUG.COM, you can make echo off the default for MS-DOS 3.2 batch files.

<Enter>. When DEBUG's hyphen prompt appears, type **e 1967 00** and press <Enter> to change the byte at offset 1967 to 0. Press **w** and <Enter> to write the patched COMMAND.COM to disk. Finally, type **q** and press <Enter> to quit DEBUG.

To patch PC-DOS 3.2, you need to change the byte at offset (continues)

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1B2C instead of 1967. With other versions of DOS 3.2, however, the byte to be changed lies elsewhere. Compaq's MS-DOS 3.2, for example, has it at offset 1B6C; another computer vendor's MS-DOS 3.2 may place it at an altogether different location. Boot MS-DOS 3.2, create a new system disk with the command `format a:\s`, and copy 3.2's `DEBUG.COM` onto the new disk. Type the characters shown in bold in **FIGURE 2**, pressing <Space> and <Enter> as indicated. The characters shown in italics will be replaced by hexadecimal numbers that vary for different machines and versions of DOS (also note that `DEBUG`'s `s` command may return a different number of addresses than the two shown in the figure); `DEBUG` displays the other characters. Also, instead of typing 'zzzz', enter the four hexadecimal numbers that appear on screen at the end of the preceding line (shown as zzzz in the figure).

Note that regardless of the DOS version, this patch turns echo off only for batch files that are initiated from the DOS prompt; it will not affect the initial (boot time) execution of `AUTOEXEC.BAT`.

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graphs that Ventura Publisher can import; 5) support the Hewlett-Packard LaserJet Series II printer; and 6) last, but not least, be easy to use—I'm not a software engineer!

Grace Mellano  
Ottawa, Ontario, Canada

**A.** Last month's *Software Shelf* column looked at two low-end graphing packages, *PFS: First Graphics 1.0* and *Graph-in-the-Box 2.2*. Both are easy to use, but neither fills your bill perfectly. *PFS: First Graphics* does 3-D bar charts but doesn't output to Ventura, while *Graph-in-the-Box* gets along well with Ventura but can't work in 3-D. If you really need all those features in one package, take a look at Digital Research's *GEM Graph*.

The *GEM* interface (which looked almost identical to the Mac's until Apple threatened to sue Digital Research) is easy to learn and use. Included with *GEM Graph* is Bitstream's LaserJet-compatible *Fontware* installation kit plus enough fonts to get you going (you can add more later). *GEM Graph's* output, unlike that of most other business graphics packages, can be read directly by *Ventura Publisher*. Yes, the package produces 3-D graphics, bar charts, pie charts, and even pictograph charts (which use icons of your choice instead of bars). And *GEM Graph's* built-in spreadsheet is a breeze to use.

If you get a chance to test drive *GEM Graph* and find it to your liking, take a look at *GEM Presentation Team*. This collection of DRI programs includes *GEM WordChart*, *GEM Draw Plus*, and *GEM Draw Business Library* as well as *GEM Graph* and the *GEM* operating environment.

## Xpedited File COPY

**Q.** I hope you can help me with this minor problem. I use an Iomega Bernoulli Box weekly to archive consecutive files from my AT compatible's hard disk. I could save lots of time if I had a program that could read the next file from the hard disk while it was saving the current file. Do you know of such a program?

Ronald F. Burke  
Gusenbury, West Germany

**A.** I don't, but you can speed up the copying of groups of files by using the DOS command *XCOPY* instead of *COPY*. *COPY* works one file at a time: It reads a file, writes the copy, then reads the next file, and so on. *XCOPY*, on the other hand, reads as many files as it can into memory before writing out the copies and is therefore much faster, especially when the files are being copied to another drive.

You can also use the DOS command *FASTOPEN d:=nnn*, where *d:* is the drive containing the files and *nnn* is the maximum number of that drive's subdirectories and files whose locations you want the system to memorize. *FASTOPEN* enables DOS to find subdirectories and files faster than on its own, which allows both *COPY* and *XCOPY* to execute faster.

Disk optimizers such as *Fast-Trax* and *The Norton Utilities'* *Speed Disk* program also shave a bit of time off copying and other disk operations, though they themselves take a while to run.

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## STAR-DOT-STAR

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*Edited  
by  
Tom  
Swan*

#### See dBASE Run

Do your dBASE users have to exit to DOS to execute commands and run programs? If so, you can use RUNDOS.PRG [see LISTING 1], which prompts for and passes a command string to DOS. After the command executes, your program regains control. You can also insert the code as a subroutine in a main program.

*Marcus G. Jeter  
Corpus Christi, Texas*

*Editor's note: With RUN-DOS.PRG in the current directory, type **DO RUNDOS** at the dot prompt, and then type a program name or a DOS command (for example, DIR /W). After the command finishes, press <Enter> to return to the dot prompt.*

#### Cleaning Up the Environment

Nowadays it seems that many programs require their directories to be listed in a DOS PATH command or use DOS variables, which compete with PATH for environment space. Because a short PATH helps DOS search directories more quickly, it pays to limit PATH length and keep total environment space slim and trim. To do this, I first create a minimum PATH with the line PATH = C:\BATCH;C:\UTIL;C:\DOS in my AUTOEXEC.BAT file.

Next, I store a batch file in C:\BATCH for each program on disk. Each batch file copies the current path to the DOS variable OLD\_PATH, specifies a new PATH, sets other DOS variables, and runs its program. After the program ends, the batch file restores the original path and removes the DOS variables that are no longer needed. For an example, take a look at my batch file QB.BAT [see LISTING 2] for QuickBASIC.

*Ron Borthwick  
Manheim, Pennsylvania*

*Editor's note: The purpose of the PATH command is to provide DOS with a list of subdirectories to search when a command's file (which has an .EXE, .COM, or .BAT extension) is not in the current directory. However, many programs inspect the environment's PATH list themselves to find their overlay and other support files, so their directories must be listed in the current path.*

*The first line of this example saves the current PATH in OLD\_PATH. Next, the batch file builds a new PATH by prefixing C: QB4; to the DOS variable %PATH%, which represents the existing PATH. Then QB.BAT specifies the value of the variable LIB, which QuickBASIC uses to learn the name of the directory holding library files needed by the linker, and runs QuickBASIC with up to nine parameters (continues)*



```

** PROGRAM: RUNDOS.PRG
** RUNS DOS COMMAND OR PROGRAM
CLEAR
DO WHILE .T.
  CLEAR
  STORE SPACE(55) TO MRUN
  @ 10,10 SAY "Enter DOS command;
or <Enter> for none"
  @ 12,10 GET MRUN
  READ
  IF MRUN = " "
    EXIT
  ELSE
    RUN &MRUN
    WAIT
  ENDIF
ENDDO
RETURN

```

**LISTING 1: RUNDOS.PRG** lets you run DOS commands from within your dBASE programs.

```

SET OLD_PATH=%PATH%
PATH=C:\QB4;%PATH%
SET LIB=C:\QB4\LIB
C:\QB4\QB %1 %2 %3 %4 %5 %6 %7 %8
PATH=%OLD_PATH%
SET OLD_PATH=
SET LIB=

```

**LISTING 2: QB.BAT** modifies the environment for QuickBASIC and restores the original environment after you exit QuickBASIC.

ters. After the program ends, the batch file cleans up the environment by restoring the original PATH and removing the OLD\_PATH and LIB variables.

## QuickBASIC Quickie

For debugging programs, I use a simple QuickBASIC technique. First, I insert an apostrophe to the left of a suspect line, converting the code to a comment, and then I type a new line. After testing, I remove the apostrophe to recover my original statement, or if the fix works, I simply delete the commented line. This tip may be obvious to experienced programmers, but I've never seen it mentioned in any QuickBASIC reference.

Charles M. Larson  
Whittier, California

```

PROGRAM TestEdit;
USES Dos, Crt;
CONST HOME=18176; ENDD=20224; LEFT=19200; RIGHT=19712;
BACK=8; ENTER=13; ESC=27; INS=20992; DEL=21248; WRDLEFT=29440;
WRDRIGHT=29696; DELWRD=20; DELEOL=17; Blank=' '; (one blank)
VAR teststr: string; p: integer;

FUNCTION GetKey: Integer;
VAR regs: registers; key: integer;
BEGIN
  regs.ah := 0;
  intr( $16, regs );
  IF regs.al = 0 THEN BEGIN
    key := regs.ah; key := key shl 8
  END ELSE
    key := regs.al;
  GETKEY := key
END; ( GetKey )

PROCEDURE GetLn( VAR xstr: string; n: integer; VAR position: integer );
VAR
  oldx, oldy: byte; workstr: string; xlen: integer;
  strpos: integer; oldlen: integer; key: integer;
  insmode: Boolean; i: integer;

  procedure initialize;
  BEGIN
    oldx := wherex; oldy := wherey;
    workstr := xstr; insmode := true;
    xlen := lo( windmax ) - lo( windmin ) + 1 - oldx;
    IF n > xlen THEN n := xlen;
    IF length( workstr ) > n THEN workstr[0] := char(n);
    IF position < 1 THEN position := 1;
    IF position > length( workstr ) THEN
      position := length( workstr ) + 1;
    strpos := oldx + position - 1;
    write( workstr );
    gotoxy( strpos, oldy )
  END; ( initialize )

  BEGIN ( GetLn )
    initialize;
    REPEAT
      key := getkey;
      CASE key OF
        32..126: IF ( length( workstr ) < n ) AND ( insmode OR
          ( position > length( workstr ) ) ) THEN BEGIN
          insert( char(key), workstr, position );
          inc( position );
          gotoxy( oldx, oldy );
          write( workstr )
        END ELSE
          IF ( NOT insmode ) AND ( position < n + 1 ) THEN BEGIN
            workstr[ position ] := char( key );
            write( workstr[ position ] );

```

**LISTING 3: TESTEDIT.PAS** shows how to use the WordStar-compatible string editing procedure GetLn.

## Half Line, Will Space

A client of mine prints Q&A data on preprinted forms with an HP LaserJet Series II. Unfortunately, with this setup the printer's horizontal spacing doesn't match that of the form, throwing registration off by about half a line. Though Q&A does not support half-line spacing, I came up with a solution. Inserting subscript and superscript commands with <Shift>-<F6> lets me realign the merged text with the

preprinted form, achieving acceptable results.

John Kalotai  
Bridgeport, Connecticut

## Bullet-Proofing Pascal Input

Although Turbo Pascal's Readln and Read procedures can input strings, they lack the editing features a word processor would



```

        inc( position )
    end;
INS:    insmode := not insmode;
ENTER:  xstr := workstr;
LEFT:   if position > 1 then dec( position );
RIGHT:  if position <= length( workstr ) then inc( position );
HOME:   position := 1;
ENDD:   position := length( workstr ) + 1;
BACK:   if position > 1 then begin
        dec( position );
        delete( workstr, position, 1 );
        gotoxy( oldx, oldy );
        write( workstr, Blank )
    end;
DEL:    if position <= length( workstr ) then begin
        delete( workstr, position, 1 );
        gotoxy( oldx, oldy );
        write( workstr, Blank )
    end;
DELWRD: begin
    oldlen := length( workstr );
    if workstr[ position ] = Blank then
        while ( workstr[ position ] = Blank ) and
            ( position <= length( workstr ) ) do
            delete( workstr, position, 1 )
        else begin
            while ( workstr[ position ] <> Blank ) and
                ( position <= length( workstr ) ) do
                delete( workstr, position, 1 );
            while ( workstr[ position ] = Blank ) and
                ( position <= length( workstr ) ) do
                delete( workstr, position, 1 );
            end; ( else )
            gotoxy( oldx, oldy );
            write( workstr );
            for i := 1 to oldlen - length( workstr ) do
                write( Blank )
            end;
        end;
    DELEOL: begin
        oldlen := length( workstr );
        case getkey of
            89, 121: if position <= oldlen then
                    delete( workstr, position, 256 )
                end; ( case )
            for i := 1 to oldlen - length( workstr ) do
                write( Blank )
            end;
        end;
    WRDLEFT: if position > 1 then
        if ( position = 2 ) and
            ( workstr[ position ] <> Blank ) and
            ( workstr[ position-1 ] = Blank ) then dec( position )
        else begin
            if ( workstr[ position - 1 ] = Blank ) or
                ( workstr[ position ] = Blank ) then
                repeat dec( position );
            until ( position = 1 ) or
                ( workstr[ position ] <> Blank );
            while ( workstr[ position ] <> Blank ) and
                ( position > 1 ) do dec( position );
            if ( workstr[ position ] = Blank ) and
                ( workstr[ position + 1 ] <> Blank ) then
                inc( position )
            end;
        end;
    WRDRIGHT: if position < length( workstr ) + 1 then begin
        while ( workstr[ position ] <> Blank ) and
            ( position < length( workstr ) + 1 ) do
            inc( position );
        while ( workstr[ position ] = Blank ) and
            ( position < length( workstr ) + 1 ) do
            inc( position );
        end;
    end; ( case )
    strpos := oldx + position - 1;
    gotoxy( strpos, oldy )
    until ( key = ENTER ) or ( key = ESC )
END; ( GetLn )

BEGIN { TestEdit }
    clrscr;
    teststr := 'Read Star-Dot-Star in PC World!';
    p := 1;
    GetLn( teststr, 79, p );
    gotoxy( 1, 3 );
    writeln( 'Edited string = ', teststr )
END.

```

LISTING 3: (continued)

provide. To enable users to edit input strings more easily, I wrote a *WordStar*-compatible routine, *GetLn* [see LISTING 3].

Because *GetLn* restricts editing to a single line within the current window, the procedure is ideal for designing bulletproof data entry programs. *GetLn* takes three arguments—a string variable, the maximum length, and the initial cursor position. As in *WordStar*, <Cursor Right> and <Cursor Left> move the cursor space by space; <Ctrl>-<Cursor Right> and <Ctrl>-<Cursor Left> jump it to the next and previous words; and <Home> and <End> take you to the beginning and end of the input string. <Insert> toggles between insert and overstrike modes. <Ctrl>-T deletes from the cursor to the end of a word. <Ctrl>-QY deletes from the cursor to the end of the line. <Delete> deletes characters at the cursor, and <Backspace> deletes characters to the left. Pressing <Enter> saves your editing, while <Esc> restores the original string. When *GetLn* ends, the integer variable *position* represents the cursor location.

Michael Fang  
Austin, Texas

*Editor's note: GetLn requires Turbo Pascal 4.0 or a later version. To add the procedure to your own code, be sure a USES statement lists Dos and Crt. Then, copy the CONST declarations to your program plus the statements from FUNCTION GetKey:Integer; through END; { GETLN }.*

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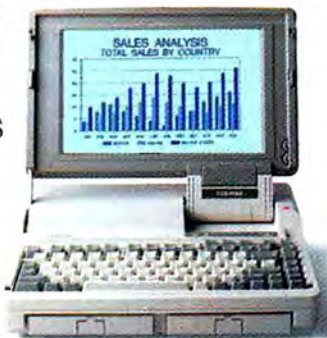
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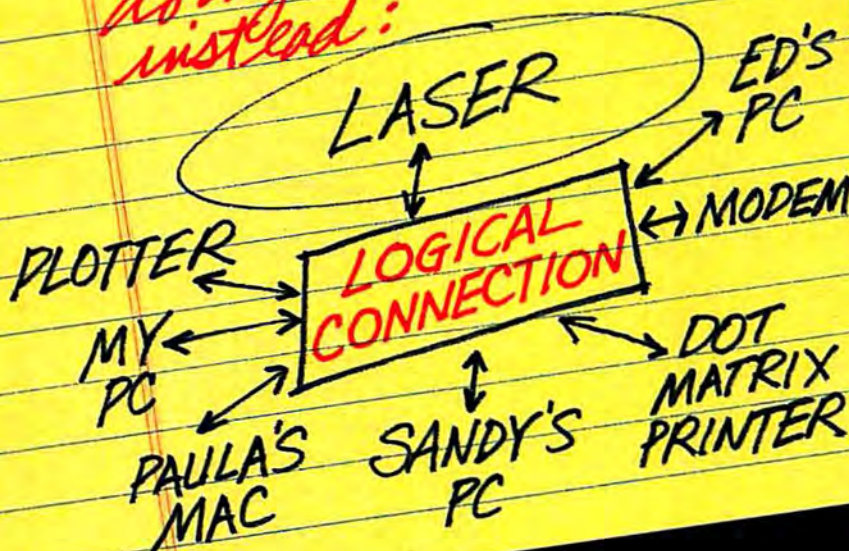
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## NETWORK Q & A

### Tips and strategies for departmental networking

Selecting your LAN's wiring scheme and adapter cards may be easier than you think—but watch out for incompatibilities and hidden costs.

David  
Ferris

**Q.** *What type of adapter cards and cabling should I buy for my LAN?*

**A.** Choosing the nuts and bolts of network hardware is an agonizing process for a lot of people, but it shouldn't be. The choice of adapter cards and cabling is important, but for most LANs it's not critical—as long as the two are compatible. They're far less important than your LAN operating system (LAN OS) and much easier to upgrade (see *Network Q&A*, PCW, March 1989).

Keeping an eye on costs is vital. For each PC you'll spend about \$500 for an adapter card and about \$200 on cabling materials and labor. However, you may find shortcuts to reduce these expenditures. The following tips should steer you toward your best options.

**Card and Driver.** Just as a modem controls communications with the outside world, an adapter oversees data transmission between your PC and the LAN. The card fits into an expansion slot in PCs, file servers, and print servers and connects to the network via cable—usually thin coaxial cable (coax) or shielded or unshielded twisted pair. Special driver software controls the card's operation and places it at the disposal of the LAN OS. These drivers usually come with the LAN OS, but you can also buy them from the adapter vendor or other sources.

To ensure compatibility with your LAN OS and other third-party network components, it's usually best to buy adapters that adhere to one of the standard types. The most popular adapter types are Ethernet, Arcnet, and, to a lesser degree, Token-Ring. Starlan and Omnet cards are also popular, but their slower performance does not recommend them for most new LANs.

Each adapter expects to send its signals over a specific type of cable, so make sure the adapter and cable match up properly. Ethernet cards, for example, refuse to work with RG62 coaxial cable, Arcnet cards can't stomach RG58 coax, and Token-Ring won't work with coax at all.

Theoretically, your LAN OS should be compatible with any cards and cable you choose. Yet a few LAN OS packages (notably 3Com's *3+* and IBM's *PC LAN*) limit you to a handful of options because the vendors want you to buy their cards.

#### **Wiring Hubs: A Star Is Born.**

One major decision you'll face is whether to set up your LAN in a *star* topology, in which nodes (PCs, servers, and so on) are linked through a central hub, or a *bus* topology, where you daisy-chain PCs like Christmas tree lights. Unless your network is small—say, fewer than 10 PCs in close proximity—a star topology is generally preferable. With a star network it's easier to add  
*(continues)*



and remove new workstations and to isolate and fix faults; you simply alter the connections in the hub rather than physically rewire the LAN. And by locking the hub in a wiring closet, you make your network more secure.

Keep in mind, however, that a star topology is usually more expensive. This is mostly because of the cost of the hubs, but other factors also come into play. A star network almost always takes more cabling than a bus LAN, and labor costs increase due to the difficulty of installation.

The hubs used in star networks are essentially patch boxes that redirect data to different nodes. A single hub links either four or eight adapters, but you can add as many hubs as you need. Generally, you purchase the hubs from the adapter vendor.

Arcnet and Token-Ring cards require hubs for all types of cable. Technically speaking, in a token ring network, a "token" is passed in a circle from one PC to the next, giving each PC the right to transmit; the PCs are physically wired in a star. Ethernet networks, on the other hand, traditionally rely on a bus topology linked with coaxial cable. However, you can choose to set up the network in a star (a must with twisted pair).

**Adapter Costs.** At \$250 to \$350 per card, Arcnet is the cheapest of the three major types of adapters. If you're using coaxial cable, add about \$130 per PC for cabling costs (a wiring hub, installation labor, and materials); if you're using twisted pair, add another \$60 per node for special adapters called baluns. Thus, you pay a total of somewhere be-

tween \$380 and \$540 per PC.

Ethernet cards typically run \$400 to \$500, and cabling costs about \$100 per node with coax and \$150 with shielded twisted pair. With unshielded twisted pair you pay about \$300, which includes the \$150 cost of the hub (a concentrator, in Ethernet terminology). Depending on your cabling type, total costs range from \$500 to \$800 per PC.

Token-Ring is the most expensive approach. Cards cost \$650 to \$750; the hub, called a multi-station access unit, is \$80 per PC; and cabling runs about \$160 per shot. Add it up, and you pay a total of \$890 to \$990 per PC.

**Adapter Speeds.** Throughput is the measure of any adapter card. Most range from 1 megabit per second (mbps) to 16 mbps. Vendor claims, however, are misleading. Actual performance is affected by the cards' ROM-based protocols for exchanging data and the size of their buffers.

Omninet and Starlan cards both chug along at somewhat less than their listed 1-mbps rate—suitable for printer sharing, but a bit sluggish when running multiuser software. (AT&T's new 10-mbps Starlan should breathe new life into this dependable standard.)

Arcnet claims speeds of 2 to 2.5 mbps but actually performs at about 1.5 mbps. That should be fast enough for most small to medium-size LANs. Most Token-Ring cards claim 4 mbps and offer an actual throughput of 2.5 mbps, which is sufficient for the vast majority of LANs.

Beyond 2.5 mbps, however, speed is less important. LAN performance is limited by the PC's poky bus and the server's disk access speed and cache

memory. Ethernet cards boast 10 mbps and provide a realistic throughput of 4 mbps, but the difference between 4 mbps and the Token-Ring's 2.5 mbps is practically indiscernible.

It's relatively easy (albeit expensive) to move up to faster adapters later. You can even change adapter types, as long as you do it throughout the LAN and your cabling is compatible. But if you're planning for the future—and you want to minimize upgrade costs—a faster board may be a good long-term buy. Faster PCs, speedier LAN components, and applications that take advantage of greater network throughput are on the way. But don't lunge for the 16-mbps Token-Ring cards currently grabbing the headlines unless you have a vast, busy network that frequently exchanges large graphics files.

You can mix slow and fast adapter cards on a network as long as they're the same type. For example, 16-mbps Token-Ring cards can easily blend with 4-mbps Token-Ring cards, but overall LAN performance will usually hover around 4 mbps. The best performance gains are realized by placing a high-speed card in the network server.

#### **The Twisted World of Cabling.**

Cabling is the physical medium that makes a LAN a LAN. The most common cabling types are unshielded twisted-pair, shielded twisted-pair, and thin coaxial cable. All these cable types can transfer data far faster than current adapters. However, older types of unshielded twisted pair can't handle 16-mbps speeds.

Unshielded wire (also known as Type 3 twisted pair) is the  
(continues)



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same as common telephone wire—and it's dirt cheap, ranging from 6 cents per foot for standard polyvinyl chloride (PVC) wiring to 25 cents per foot for the fire-resistant plenum. And if your building is less than 15 years old, you may be able to use spare telephone wire that's already cabled to a wiring closet. Make sure an expert cabler checks the quality of the lines—roughly 30 percent won't be up to snuff for reliable data transmission.

Shielded twisted pair is essentially Type 3 wire encased in metal foil for better data integrity over longer distances. If you're starting from scratch, go with shielded—it's more reliable and almost as cheap to install. Shielded comes in two basic varieties: Type 1 (50 cents a foot for PVC and 90 cents for plenum) and Type 2 (about 80 cents a foot for PVC and \$1.20 a foot for plenum). Both types contain two shielded pairs, but Type 2 offers four more unshielded pairs outside the foil casing for voice transmission. If your phones are already wired, go with Type 1.

Another reliable medium is thin coaxial cable (often referred to as thin Ethernet), which is similar to TV cable. You can also buy thick coax, but its greater throughput is overkill for most PC LANs, and its thickness makes it difficult to bend around corners. The most common varieties of thin coax are RG58 (25 cents a foot for PVC, 50 cents for plenum) and RG62 (18 cents a foot for PVC, 65 cents for plenum).

Coax is designed for a bus topology, but you can link it to a hub with the help of special baluns. The major benefit of coax is

the cost of installation: It's so easy to install that experienced cablers don't charge much, and in a pinch, budget-strained networkers could even do it themselves.

Unless you have a jumbo LAN with significant distances between nodes, don't choose cabling on the basis of price per foot. Installation labor costs almost twice as much as the actual cable.

**Go Forth, Young LAN.** Installing LAN cabling is a job for experts, so hire experienced LAN cablers. Ordinary electricians often botch the job, leaving a legacy of transmission glitches that are hard to diagnose and fix. Your board supplier may provide an installation service; if not, the vendor should be able to refer you to people who can.

If you are short on time and expertise—and have no special cabling or adapter needs—you may want to leave these purchasing decisions in the hands of those who install and maintain your cable. Whoever performs these tasks should know the cabling type well so they can quickly fix any future problems. More challenging issues lie elsewhere. ●

*David Ferris is the president of Ferris Networks, a San Francisco-based reseller of PC products and services, including systems configuration, installation assistance, training, and maintenance contracts.*

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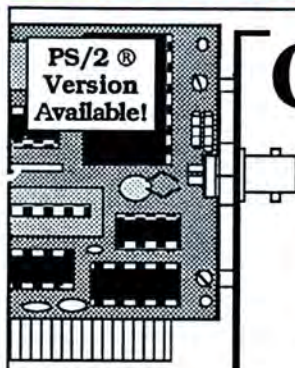


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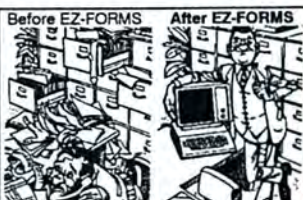
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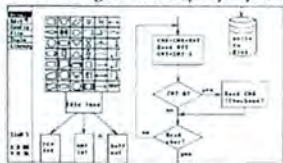
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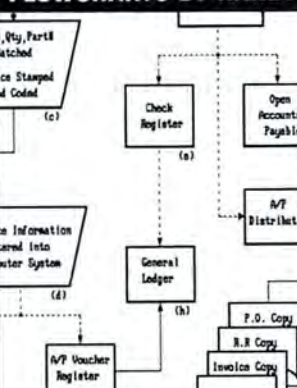
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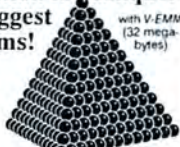


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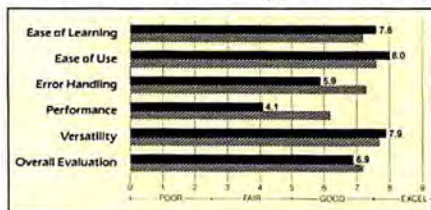
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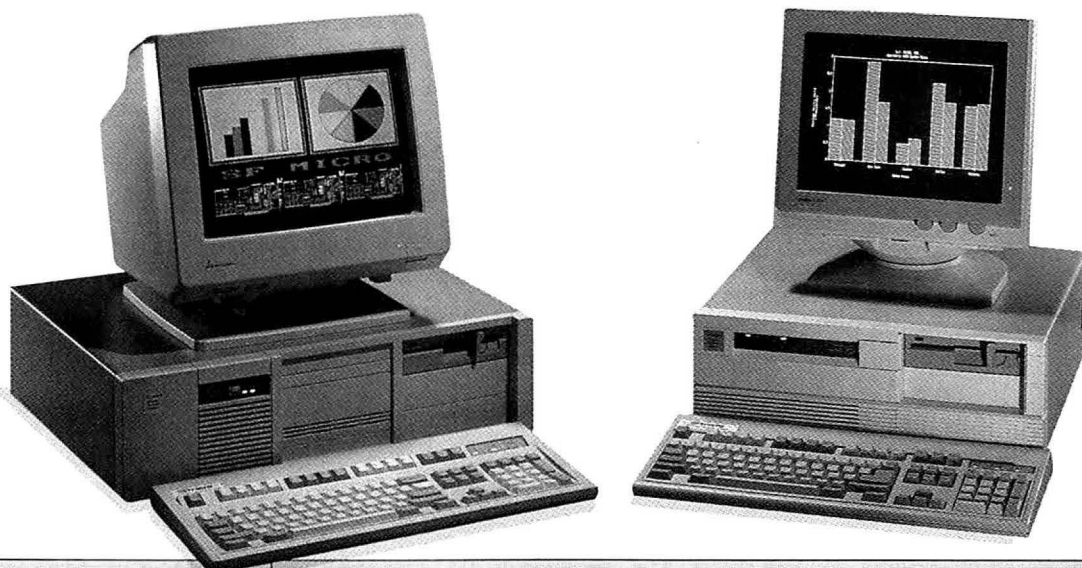
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Seagate ST225 20MB + Cont. .... \$265  
Seagate ST238 30MB + Cont. .... \$289  
Seagate ST251 40MB + Cont. .... \$449

## Hard Disk Special (for AT)

Seagate ST125 20MB (40ms) ..... \$269  
Seagate ST138 30MB (40ms) ..... \$339  
Seagate ST251 40MB (40ms) ..... \$369  
Seagate ST251-1 40MB (28ms) ... \$429  
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- HP II, Diablo 630, Epson FX-80 and IBM Proprinter XL emulation
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- 512K standard memory, upgradable to 1MB, 2MB or 4MB
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Mini I/O with Game Port ..... \$65  
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TEAC 3.5" 1.44MB floppy drive .... \$129  
150 Watt Power Supply ..... \$55  
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3MB EMS memory with OK (AT) ... \$99  
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- List \$245

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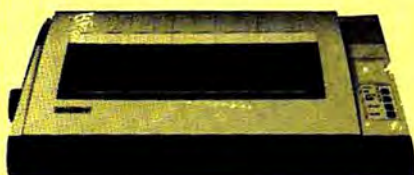
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- Fits IBM AT & Compatibles
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### TEAC 720K - 3 1/2" Drive

- PS2 Compatible
- Double Sided/Double Density
- Fits IBM PC, XT & Compatibles
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- PS2 Compatible
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- 7 System Indicator Lights
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Monitor shown available for \$49.95 List \$179

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### Panasonic

Office Automation

#### KX-P1191

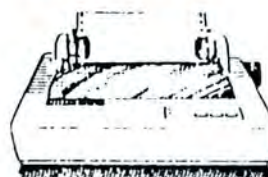
Announcing the Panasonic KX-P 1191, a 9 pin printer with advanced features that put it ahead of its class. The 1191 features the EZ-Set operator panel that lets you access the most commonly controlled printer functions right from the front panel. The 1191 has other advanced features, including an adjustable push/pull tractor feed and multiple paper paths. All these features come packaged in a rugged, ergonomic design with a two year limited parts and labor warranty.



**\$245<sup>95</sup>**

### CITIZEN

#### Citizen 120-D



If you are seeking world renowned printer performance for your home, look no further than the 120-D. Your data processing needs are handled quickly at a print speed of 120 cps (draft) or 25 cps (NLQ). The 120-D features 9 pin dot matrix print quality, standard parallel centronics interface and a 4K text buffer.

**\$137<sup>95</sup>**



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Offer expires 4/30/89

#### Panasonic

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1124	\$319.95

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For All Applications

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An 800 cps workhorse for your office environment. Standard features include a 64 k buffer, 18 pin printhead and 32 character LCD readout. Unprecedented high speed printing from Seikosha.

**\$2995<sup>95</sup>**



### CITIZEN

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**\$455<sup>95</sup>**

When convenience and ease of operation is required in a 15" carriage printer, you'll look twice at the Citizen MSP 55. Citizen has set standards with 300 cps (draft) and 50 cps (NLQ), quiet mode operation, exclusive push/pull tractor and convenient soft touch control panel. For world class performance in your office, select the Citizen MSP 55.

**1-800-233-8760**



## 2400 Modem

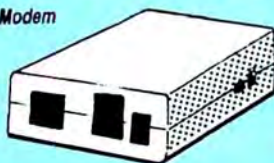


- Auto/manual Originate or Answer
- Auto Speed Select in Originate/answer Modes
- RS-232C Interface
- 2-Year Warranty

**\$149<sup>95</sup>**

## 1200P Avatex™

Pocket Modem



- Pocket Size
- Plugs Directly to RS 232C
- Battery Charger Included
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- 2-year warranty

**\$89<sup>95</sup>**



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## MODEMS

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- IBM PC XT/AT Compatible
- 720 K
- 3.5" DSDD
- Universal Installation Kit Included
- Full Manufacturers Warranty

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ST 250 RP 40 meg Parial	
Solution	\$299.95
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ST 138N 30 meg SCSI	\$334.95
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ST 157N 48 meg SCSI	\$445.95

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ATI VIP	\$299.95
Everex Micro Enhancer	\$189.95
EGA-Grace	\$189.95
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# GoldStar

## 1440 Super

GoldStar, a solid performer in computer electronics, now introduces the 1440 Super Scan monitor. The 1440 is a 14" multi-scan monitor which supports a high resolution of 800H x 560V. A .31mm dot pitch with non-glare surface and TTL or Analog signal are standard features.



**\$475<sup>95</sup>**

# OKIDATA

**393:** Lightning quick speed of 450 cps draft and 120 LQ Mode at your command. Add to this Okidata's paper park feature, push tractor and standard 30K buffer and you have a 24 pin printer capable of the most demanding office environment.



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**Toshiba**  
**T-1000**

Pick up on the T-1000 and you'll go far. Give yourself desktop PC power wherever you need it. Toshiba's T-1000 includes 512K RAM, one built-in 720KB 3.5" disk drive, supertwist LCD display with CGA capability.

**\$799<sup>95</sup>**



**MAGNAVOX**

**9CM-053**



For full EGA capability, the Magnavox 9CM-053 should be your choice. This 14" CRT provides 690 H x 390 V resolution with text modes in both green and amber. Add to this a two-year warranty and you'll decide to stay smart with Magnavox.

**\$345<sup>95</sup>**

**VENDEX®**

**VTI-33-XT**

**\$669<sup>95</sup>**

- IBM XT Compatible with Award Bios
- Small Footprint
- 8088-1 Turbo Processor with 4.77 or 9.54 MHz Software Switchable
- 640K
- 2-360K Floppy Disk Drives or 1 Floppy Drive
- Parallel Printer Port
- RS232 Serial Port
- Clock Calendar with Battery Backup on Board
- AT Style 84 Key Keyboard
- CGA/MGA and Hercules Graphics Adaptor
- 8 Total Empty Slots
- 135 Watt Power Supply
- MS-DOS Version 3.3
- GW-Basic
- Easy Working Writer (Word Processor by Spinner)
- Monitor optional



FCC APPROVED

**Seagate**

**ST138R 30 Meg**  
**Internally Mounted**  
**Card**

- Premounted on its own Controller Card
- EZ Slot Installation (app. 10 min.)

**\$329<sup>95</sup>**

20-30-49 meg drives available!

**LASER**

**Turbo XT**  
**Model II**

Monitor Optional

**\$629<sup>95</sup>**

Out perform the conventional PC/XT competition with Laser's Turbo XT-II. The Laser provides everything you expect from an XT plus such standard features as 4.77/10 MHz speed, 102 key enhanced keyboard, security lock and a clock/calendar with battery backup. Laser's compatibility is guaranteed through a 150W power supply, four accessible drive slots (1 360K 5.25 standard) 8 I/O expansion slots, parallel centronics and RS 232 interfaces, 640K RAM standard (expandable to 1.8 MB) along with a CGA video card already installed. Introduce yourself to the new generation XT through Laser's Turbo XT-II.



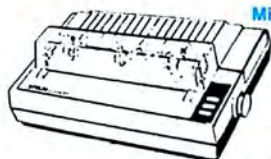
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**EPSON®**

**LQ-500**

Your Cost — \$304.95  
Minus Rebate — \$25.00  
Final Cost

**\$279<sup>95</sup>**



For a 24 pin dot matrix printer that offers high performance and remarkable value, Epson sets the standard with the LQ-500. The LQ-500 is at home whenever you need high resolution text or graphics combined with high-speed operation. An 8K buffer SelectType control panel, pull tractor and parallel interface will allow the LQ-500 to expand to meet your growing needs.

**Panasonic**  
Office Automation

**KXP4450 Laser Partner**

**\$1399<sup>95</sup>**



Move your business in the laser age with Panasonic. 512K memory comes standard. 11 pages per minute print speed makes it the fastest in its class. Panasonic's laser technology and 2-year warranty — commitment to your printing needs.

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We decided several years ago that a Customer Service Department was needed in the industry. Unfortunately, few of our competitors offer this service. Our Customer Service Department is available at (717) 494-1670 to provide assistance in all warranty matters. Our product line enjoys "name brand recognition," and we back all of our manufacturer's stated warranty terms. Many manufacturers will allow defective products to be exchanged. Before returning any item that appears to be defective, we ask that you call our Customer Service Department to assist you in determining if the product is defective. If the product is determined defective, they will give you a special authorization number and speed processing of your order.

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Stat Disk .....	\$13.95

## Mice

Kraft PC Serial Mouse .....	\$41.95
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<b>Mindscape:</b>	
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Questron II .....	\$25.95
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Western Europe Scenery Disk .....	\$14.95
<b>Timeworks:</b>	
Wordwriter PC .....	\$27.95
PC Quintel .....	\$49.95
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## Disc Storage

QVS-10 5¼ .....	\$3.95
QVS-75 5¼ .....	\$10.95
QVS-40 3½ .....	\$9.95

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### REGULAR KEYBOARD

Word Perfect 4.2 ..	\$14.95
Word Perfect 5.0 ..	\$15.95
Word Star .....	\$12.95
Word Star 2000 ....	\$12.95
Turbo Pascal .....	\$12.95
Microsoft Word ....	\$13.95
Displaywrite 3 .....	\$12.95
Lotus 1-2-3 .....	\$13.95
Dos + Basic .....	\$14.95

### ENHANCED KEYBOARD

Word Perfect 4.2 ..	\$14.95
Word Perfect 5.0 ..	\$15.95
Symphony .....	\$14.95
Microsoft Word ....	\$14.95
Microsoft Word 4.0 .....	\$14.95
D-Base .....	\$14.95
Blank .....	\$9.95
Lotus 1-2-3 .....	\$14.95

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Cent '25' AB .....	\$39.95
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Cent ABC .....	\$49.95
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Banner Paper 45" Roll ..	\$10.95
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PP102-6 Outlet .....	\$16.95
PP106-6 Outlet With EMI/RFI .....	\$28.95
PP104-6 Outlet With Indicator .....	\$19.95
PP101-6 Outlet Powerstrip .....	\$9.95
Modem Protector .....	\$10.95

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### 3.5

<b>Maxell:</b>	
SSDD .....	\$11.50
DSDD .....	\$17.95
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SSDD .....	\$10.95
DSDD .....	\$13.95
<b>Verbatim:</b>	
SSDD .....	\$12.95
DSDD .....	\$18.95

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SSDD .....	\$9.95
DSDD .....	\$13.99

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<b>Maxell:</b>	
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DSDD .....	\$8.95
<b>Bonus:</b>	
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DSDD .....	\$6.95
<b>SKC:</b>	
DSDD .....	\$6.95
DSHD .....	\$13.95

### Generic:

DSDD .....	\$4.95
<b>Verbatim:</b>	
SSDD .....	\$8.99
DSDD .....	\$11.50

## Joysticks

Tac 3 .....	\$9.95	Winner 909 .....	\$24.95
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Tac 5 .....	\$12.95	Lpstick Plus .....	\$14.95
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3-Way .....	\$19.99	Epyx 500 XJ .....	\$13.95
Bathandle .....	\$16.75		



## RGB Color Monitor

by Samsung

# \$199



These 14" monitors were purchased from a large PC manufacturer who was overstocked. They are brand new with one year warranties and are made by Samsung. They are fully CGA compatible and work with PC compatibles. A CGA (640 x 200 resolution) card is just \$49 and comes with a printer port. This is the perfect video combo for your new XT or AT clone.

## SPECIALS

### WordPerfect 5.0



# \$215

The most popular word processor is now even better than ever! Version 5.0 adds multiple font support, graphics integration, page preview and much more. WordPerfect 5.0 still retains its feel and ease of use that made it #1. Combine this with the best support in the industry and you can't lose.

## FoxBASE+

# \$185



FoxBase+ 2.10 is simply the fastest dBASE compatible database software available. FoxBase+ also adds many enhancements to the dBASE language. And it's user-friendly too, its FoxCentral uses pull-down and pop-up menus and you can perform every important database operation without programming! There are even LAN, runtime, and 386 FoxBase versions available.

## HARDWARE

### PRINTERS

ALPS	LIST	FAST
Allegro 24	499	319
Citizen		Call
Diconix		
150P	499	299
Epson		Call
Fujitsu		
DL3400	995	549
NEC		
P2200	569	339
P5200	799	500
P5300	1049	669
LC890	4799	Call
Okidata		
182 Plus	319	219
320	499	329
390	699	469
393	1499	949
Panasonic		
KXP1180	300	Call
KXP1191	400	Call
KXP1124	529	309
KXP1595	749	419
KXP1524	949	519
KXP4450	2595	1479
Star		
NX1000	289	169
NX2400	499	299
Toshiba		
P321SL	749	459
P341SL	999	599
P351SX	1499	929

### FAX MACHINES

Murata M1200	899	699
Murata M1600	1599	849
Toshiba 30100	1396	949

### BOARDS

AST	LIST	FAST
Hot Shot 286	645	339
Six Pak Plus 64K	210	119
DTK		
286 10mhz M/B	499	249
XT 1.2mb FDC	79	45
Everex		
1200B Int Modem	149	69
2400B Int Modem	249	129
Genoa		
Super EGA Hi-Res+	399	169
Super VGA #5100	445	239
Super VGA #5300	499	299
Hercules		
Graphic Card +	299	169
Intel		
8087-2	250	139
80287-10	480	249
Above Board Plus	795	415
Orchid		
ProDesigner	499	297
ProDesigner Plus	599	397
Tiny Turbo 286	445	269
Paradise		
Autoswitch 480	349	Call
VGA Plus	399	255
VGA Plus 16	499	295
VGA Professional	799	465
Practical Peripherals		
1200B Int Modem	99	65
2400B Int Modem	199	149
Prometheus		
Promodem 2400B	199	129
Promodem 2400G	249	149

### The Complete PC

LIST	FAST
Answering Machine	349
Fax 4800	399
Hand Scanner 400	249
USRobotics	
1200 Baud Internal	149
1200 Baud External	179
2400 Baud Internal	249
2400 Baud External	279
Video 7	
Fast Write VGA	549
Vega Deluxe	379
Vega VGA	499
V-RAM VGA	799

### LAPTOPS

LIST	FAST
Megahertz Modems	
2400B Toshiba	299
2400B NEC, Epson	
Mitsubishi or Zenith	399
Mitsubishi	
MP-286L Dual	3195
MP-286L 20mb	4595
NEC	
Multispeed EL II	2295
Multispeed HD	3695
Toshiba	
T1000	1249
T1000 768k Card	399
T1200F	2099
T1200FB Backlit	2399
T1200HB Backlit	3599
T1600	4999
T5100	7499
Zenith	Call

### MONITORS

Magnavox	LIST	FAST
7BM749 VGA	229	149
9CM082 VGA	649	419
Mitsubishi		
1409 RGB	399	259
1410 EGA	599	349
Diamond Scan 1381	799	479
NEC		
Multisync 2a	799	Call
Multisync Plus	1399	869
Princeton		
Max15	389	Call
Ultrasync	849	479
Ultra 16	1375	859
Seiko CM1430	995	599
Sony		
1302 Multiscan	995	659
1303 Multiscan	825	469
Zenith 1490	999	599

### DISK DRIVES

Miniscribe	LIST	FAST
40MB AT #3650	499	319
Mitsubishi		
40MB AT MR535 22ms	825	399
Seagate		
20MB XT Kit #225	599	267
30MB XT Kit #238	699	287
40MB AT #251	899	349
40MB AT #251-1	999	449
80MB AT #4096	1199	549
Toshiba		
360K Floppy	119	69
720K 3.5" Floppy	149	79
1.2MB 5.25" Floppy	149	79
1.44MB 3.5" Floppy	189	99

Call On Non-Listed Items

## SOFTWARE

### Database

Clipper	LIST	FAST
DataEase	699	399
DataEase	600	389
dBase IV	795	439
dBXL Diamond	199	105
Foxbase Plus	395	185
Foxbase Plus Lan	595	295
Paradox 3.0	725	429
RapidFile	295	179
Rbase for DOS	700	Call
Reflex	150	90
Q & A	349	199
Q & A Lan Pack	299	185
Quicksilver	599	329

### Desktop Publishing

Byline	295	175
GEM Desktop Pub.	299	169
Pagemaker	795	Call
PFS:First Publisher	129	69
Publisher's Paintbrush	285	149
Ventura	895	489

### Financial

Bedford Integr. Acct.	249	139
Computer Assoc. BPI		Call
DAC 3.0	99	59
DAC Payroll 3.0	99	59
Dollars & Sense	179	99
Managing Your Money	199	117
Peachtree Complete II	199	149
Turbo Tax 1040	75	42

### Graphics

Deluxe Paint II	LIST	FAST
First Graphics	105	67
Freelance Plus	129	Call
GEM Artline	495	Call
GEM Draw Plus	495	269
Generic Cadd Level 3	299	165
Graph Plus	200	97
Harvard Graphics	495	299
Perspective Jr.	495	Call
Integrated		
First Choice	159	Call
Works	149	89
Windows 286	99	59
Windows 386	195	117

### Mice

Keytronics Serial or Bus	119	75
Logitech Serial or Bus	119	65
Logitech HiRes Bus	150	79
Microsoft Serial or Bus	150	95
Microsoft W/ Windows	200	129
OmniMouse	89	45
PC Mouse II Serial or Bus	149	82

### Power Protection

Curtis Ruby Plus	115	59
Datasheild 85	90	50
Datasheild 100	99	57

### Programming

Macro Assembler	LIST	FAST
Norton Guides (Specify)	150	89
Turbo Basic	100	58
Turbo C 2.0	99	60
Turbo Pascal 5.0	149	90
Quick Basic	149	90
Quick C	99	60
Spreadsheets		
Allways	150	82
Excel	495	Call
Lotus	495	Call
Lucid 3-D	99	59
Quattro	248	149

### Utilities

CoreFast	149	71
Desklink	170	95
Desqview	130	73
Desqview 386	189	109
Fastback Plus	189	99
FastTrax	60	37
Formtool	95	54
Laplink Plus	140	77
Norton Advanced	149	74
PC Tools Deluxe	80	36
SideKick Plus	199	119
XTree Pro	129	61

### Word Processors

Ami	LIST	FAST
Easy Extra	149	89
Easy Extra	99	55
GEM First Word Plus	199	117
Grammatik III	89	49
Manuscript	495	Call
Multimate Adv. II	565	247
Professional Write	199	109
Rightwriter	95	49
Sprint	195	119
Q & A Write	199	109
Webster's Writer	60	47
Word	450	Call
Word Perfect	495	215
Word Perfect Library	129	60
WordStar Prof. 5.0	495	209

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LASER TURBO	
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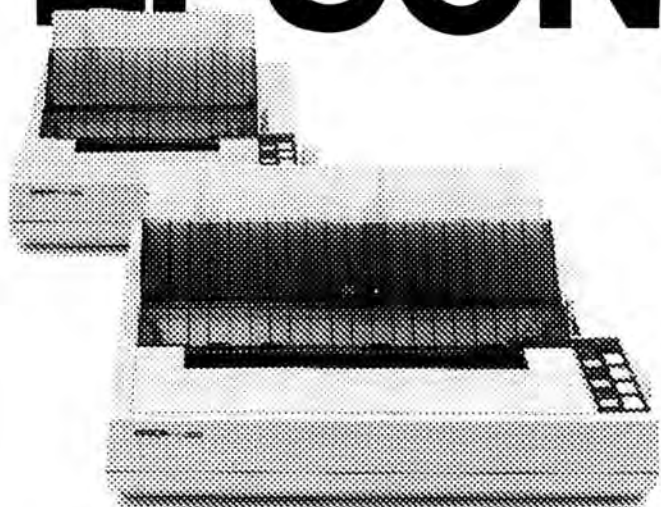
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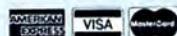
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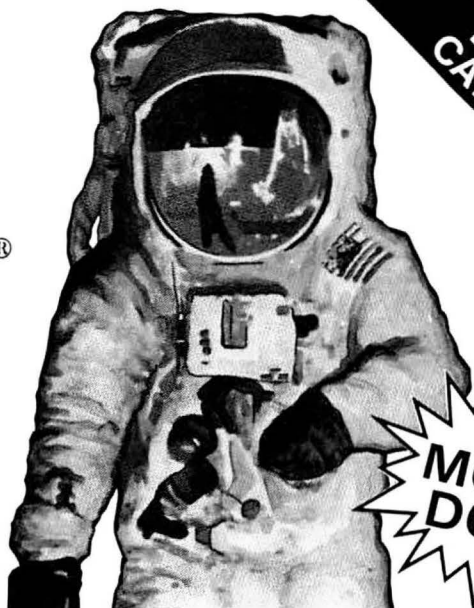
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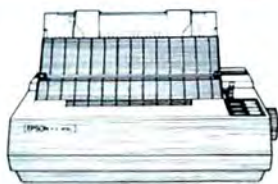
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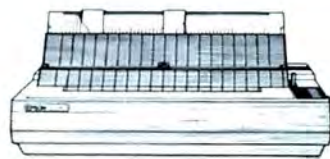
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- Exclusive SelectType front control panel puts popular printer features and SmartPark operations at your fingertips.
- The FX-850 prints 264 characters per second (CPS) in high-speed draft mode (12 CPI); 54 CPS in Near Letter Quality mode (12 CPI).



## Epson FX-1050

- Wide-carriage 9-pin, dot-matrix printer.
- SmartPark™, a unique Epson paper-handling innovation, lets you switch from fanfold to single sheets or envelopes without removing hardware or paper.
- With a standard push feed tractor and single sheet friction feed, the FX-1050 can handle virtually any type of paper as well as envelopes.
- Exclusive SelectType front control panel puts popular printer features and SmartPark operations at your fingertips.
- The FX-1050 prints 264 characters per second (CPS) in high-speed draft mode (12 CPI); 54 CPS in Near Letter Quality mode (12 CPI).



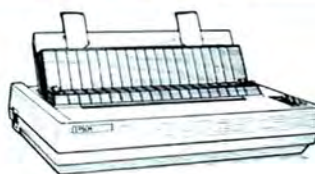
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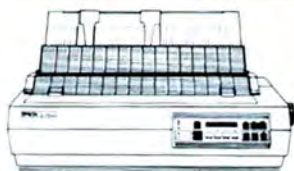
## Epson LQ-850

- Epson's 24-pin, dot-matrix technology creates true letter quality characters
- Epson's SmartPark™
- Exclusive SelectType front control panel offers quick, easy selection of popular types, fonts and pitch
- 264 Characters per second in the high-speed draft mode delivers outstanding productivity
- 88 Characters per second in Letter Quality mode for enhanced, high-resolution characters
- In draft mode or Letter Quality mode, the LQ-850 runs at a surprisingly quiet 55 dB noise level



## Epson LQ-1050

- Epson's 24-pin, dot-matrix technology creates true letter quality characters
- Epson's SmartPark™
- 264 Characters per second in the high-speed draft mode delivers outstanding productivity
- 88 Characters per second in Letter Quality mode for enhanced, high-resolution characters
- In draft mode or letter quality mode, the LQ-1050 runs at a surprisingly quiet 55 dB noise level
- Exclusive SelectType front control panel offers quick, easy selection of popular types, fonts and pitch



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Take it to school, court, news events or anywhere that you require "computing power" on the go. Built in 2400 bps Hayes compatible modem allows you to transfer data files with your home office or any World wide data base.

A little to large to be called a laptop but the Amstrad 640 is a true battery operated IBM compatible portable. (17 1/4 by 9" footprint). Includes: full featured AT style 101 keyboard • 2400 bps modem • DOS 3.3 • serial port • printer port • carrying case • power adapter and cigarette lighter power cord.



## NEC/890 Laser Printer \$3095

PC Magazine has chosen the NEC-890 best laser printer of the year. (Jan. 12, 1988). And its obvious why... the printer is Postscript, Hewlett Packard, and Apple compatible, and comes standard with three megabytes of memory. The 890 accepts data from parallel, serial and Apple-Talk devices.  
NEC has also incorporated 40 built-in fonts along with two paper trays into this industrial quality laser printer.

### Other Laser Printers Available

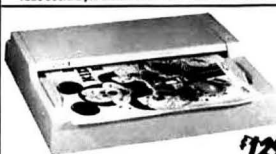
Hewlett Packard Laser II, 8 pages per minute.....	\$1659
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NEC 890/XL (new for Fall 1989).....	call

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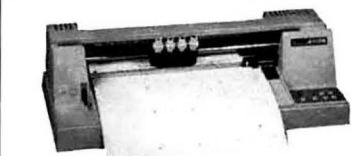
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Teac 360K/Byte disk drive.....	59	CD ROM, disk control, clock, game.....	59



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The 672 plots at a fast eight inches per second in axial direction and eleven inches at an angle of 45 degrees. The plotter also features a self contained digitizing function that allows data to be entered into your computer from printed graphs and blue prints. Four different color pens are supplied with the plotter but a wide variety of technical pens are available.

## Heath H/89 Computer \$179

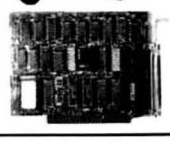


Hard to believe... but we found a stash of brand new fully factory assembled Zenith/Heath Model H/89s. These computers feature 64K/byte of memory, the Zilog Z-80 CPU and operate under CP/M. The unit incorporates a 12 inch green screen, three serial ports and one 5 1/4" disk drive.  
Zenith's original price was \$1895. We have still 97 units available for sale, while supplies last we are offering the H/89 at only \$179. CP/M operating system available \$24.95

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## dBASE Users: Don't Take It!

Pat  
Adams



**T**o borrow a line from the movie *Network*, I'm mad as hell—and I'm not going to take it any more!

I'm mad at Ashton-Tate for launching yet another look-and-feel lawsuit. I'm mad at Lotus, Microsoft, Apple, and all the other companies that have so cluttered the industry with their legal maneuvers that I can't even keep track of them any more!

Every time a company engages in such activities, it's users who get the fuzzy end of the lollipop. Financial and personnel resources are wasted on these squabbles instead of being applied to creating new and better products. Worse, such suits usually are thinly disguised attempts to eliminate more innovative or less expensive products that threaten the plaintiff's hold on the market.

It seems that every time a company files one of these lawsuits, it's a signal that its creativity and excellence are in decline. Instead of working harder to win in the marketplace, the company uses the courts to try to stamp out competitors—or at least slow them down long enough to give itself a leg up.

But Ashton-Tate's lawsuit against Fox Software and The Santa Cruz Operation (SCO) goes a step further. It threatens

the livelihood of *dBASE* consultants (myself included) and will create repercussions throughout the mainframe, mini, and micro worlds.

The suit claims not only that the defendants copied the look and feel of *dBASE*, but that Ashton-Tate actually owns the *dBASE* language and the .DBF file format. Ashton-Tate doesn't produce a Xenix/UNIX version of *dBASE*, but that didn't stop it from suing SCO. And although Ashton-Tate's *dBASE Mac* doesn't use .DBF files and is nothing like *Foxbase/Mac*, the suit includes *Foxbase/Mac*.

Apparently, the issue has never been adequately tested in court, but common sense tells you that no individual or company can own a computer language. If Ashton-Tate owns *dBASE*, who owns C? Who owns COBOL, Fortran, Pascal? If Ashton-Tate owns *dBASE*, do I have to pay Ashton-Tate a royalty on every program I write? Does it mean that every company producing add-ons for *dBASE* must obtain a license from Ashton-Tate? Will clone makers—such as Word-Tech, Nantucket, Fox Software, and Recital—who have contributed so much to the *dBASE* language, fold if Ashton-Tate doesn't grant them licenses?

If the court upholds Ashton-Tate's position, it will stifle the creativity of thousands of commercial and in-house application developers, and millions of *dBASE* users will be the poorer for it. Ashton-Tate and similarly minded companies should consider the impact of this bickering on their users.

Of course, we won't wait for that to happen. At the International Dbase Users Group (IDBUG), we plan to file an amicus curiae (friend of the court) brief on behalf of users. We are talking with IEEE, the Independent Computer Consultant Association, and user groups here and abroad and hope to convince them to join with us.

I urge you to take the time to write Ashton-Tate and other companies to let them know how you feel about their lawsuits. And I urge you to join with us at IDBUG (70A Greenwich Ave., New York, NY 10011) and let your voice be heard. ●

*A Brooklyn-based computer consultant, Pat Adams is founding treasurer of IDBUG and founder of the New York PC Consultants SIG.*

*Have a different perspective? Write Dan Lavin, User Ombudsman, PC World, 501 Second St., San Francisco, CA 94107.*



# Keep your power at hand, no matter where your computer is. Master Piece® Remote.



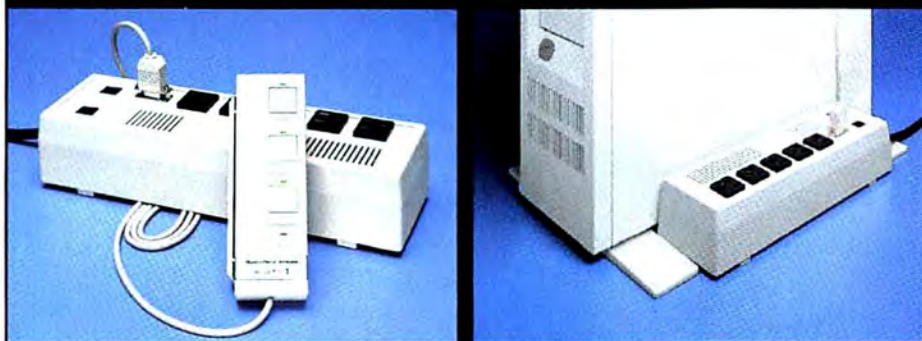
If you use an IBM PS/2® Model 60, Model 80, or other PC that doesn't sit on the desktop, Master Piece Remote is the perfect power center for you.

Like all our power centers, it protects and organizes your entire system. What makes it unique is its two-part design. Its Outlet Strip hides behind your desk, while its Remote Control keeps your power switches in easy reach.

Master Piece Remote organizes your power with five outlets, a master switch, two individual switches, and one continually powered outlet.

And it protects your entire system with heavy duty surge suppression and noise filtering circuitry, two phone jacks for modem/phone line protection, and an anti-static nameplate. All for just \$169.95.

Call 800-535-4242 or 212-475-5200 for a dealer near you. Or write to us at Kensington, 251 Park Ave. South, New York, NY 10010.



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*Setting new standards  
of performance.*



*The Experts in Accessories*

# CURTIS



## Curtis Clip, Only \$6.<sup>95</sup>

### Improve Data Entry, Reduce Eye Fatigue

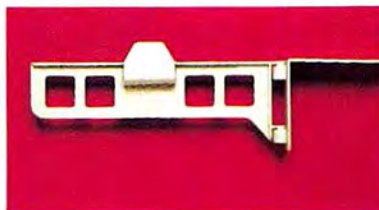
The new Curtis Clip positions copy perfectly so your eyes no longer have to refocus from desktop to monitor. Holds any standard paper, uses no desktop space! Plus, the Curtis Clip swings out of the way when not in use.

Safe non-magnetic, reinforced construction. Fits all monitors. Ready to use, includes VELCRO® Brand fasteners. The new Curtis Clip—it will change the way you work with computers forever. #CC-1 Retail... Only \$6.95

Curtis products are available nationally from leading Dealers, Distributors, and Retail Chains.  
In Canada: Personal Computer Assoc. Inc., P.O. Box 235, Ajax, ONT, L1S 3C3, (416) 427-6612

**For the Curtis dealer nearest you call (603) 532-4123 Ext. 99**

Fits all monitors;  
includes ready to use  
VELCRO® Brand fasteners.



Reduce eye fatigue;  
no more refocusing from  
desktop to monitor. Speeds  
and improves data entry.



Holds any standard paper;  
uses no desktop space  
at all; swings out of  
way when not in use.



Switches for right or  
left hand use  
in seconds!

Manufacturing Company, Inc.

# CURTIS

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A subsidiary of Rolodex Corporation

Made in U.S.A.  
Lifetime Warranty

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Insilco  
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Company