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PC WORLD

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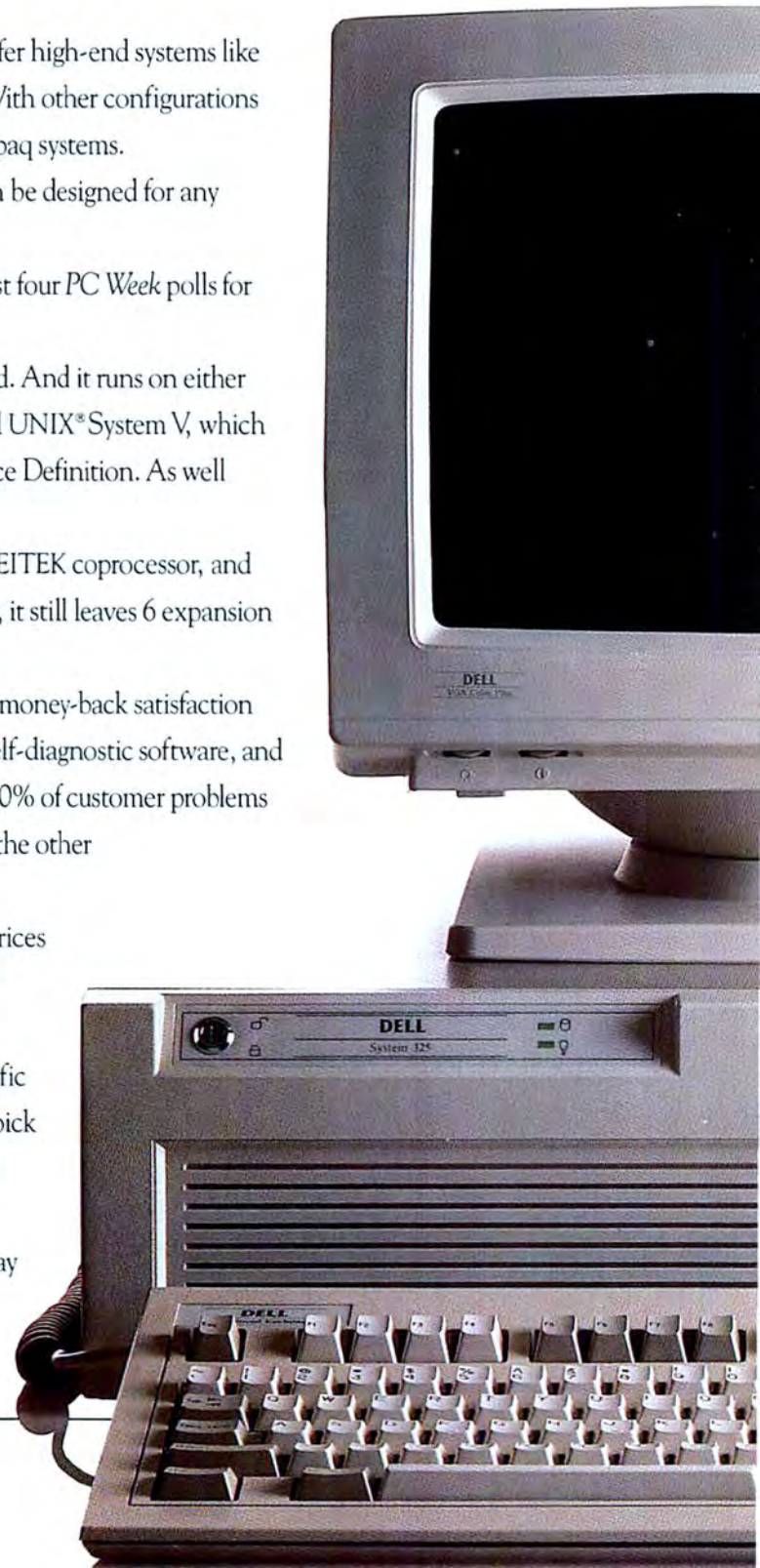

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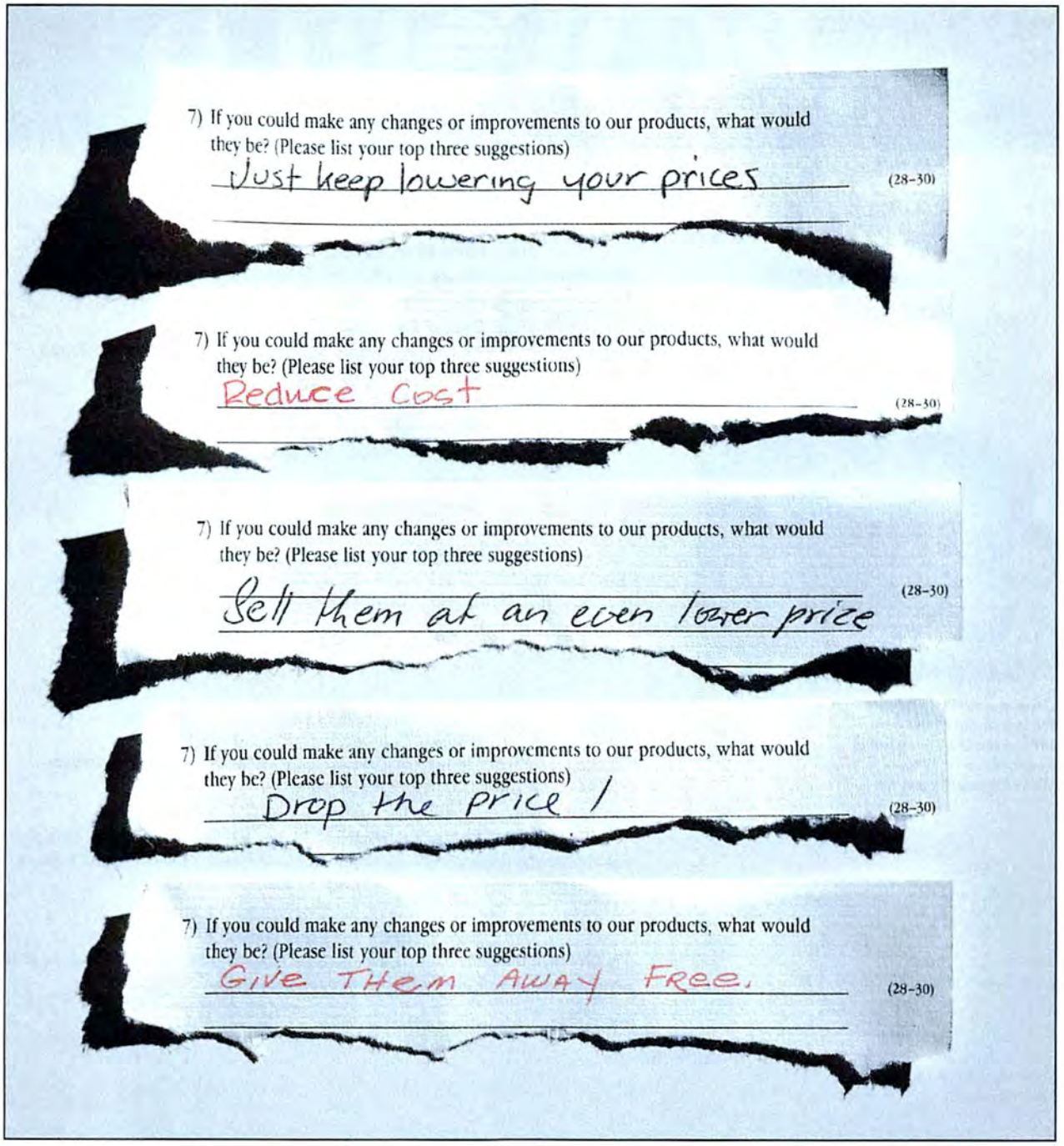

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PC WORLD

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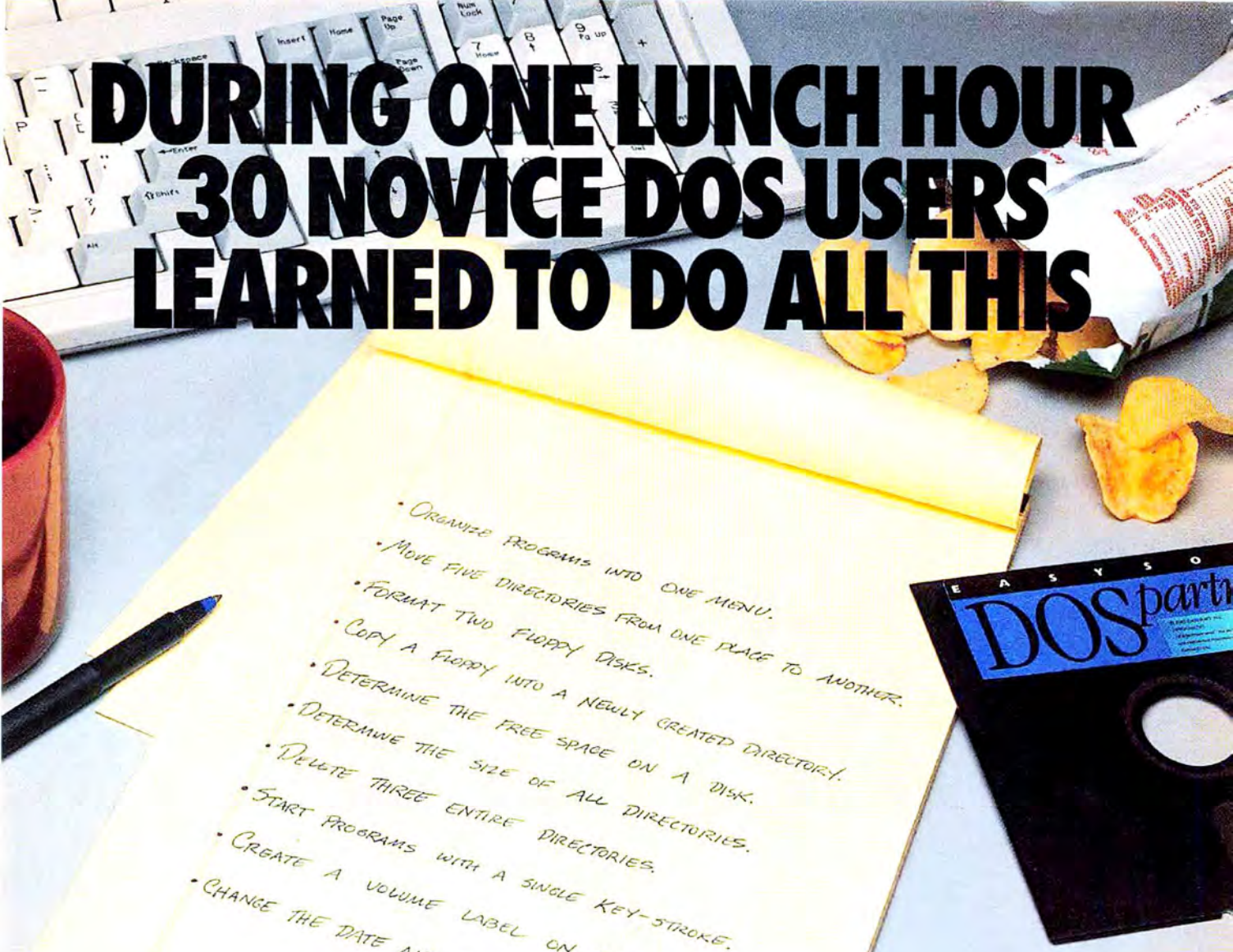

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At the Crossroads

ROBERT CARDIN

Nancy Mulvany, whose Bayside Indexing Service produced PC World's 1989 Annual Index.

For the first *PC World* of the nineties, we thought we'd look forward and backward in equal measure. Try as we might, though, the future wound up with the lion's share of the pages.

Granted, the coming decade is irresistibly intriguing, with exotic hardware, advanced operating systems, and whole new classes of applications poised to change the face of personal computing. This issue tackles two hot topics: Our cover story previews the first wave of EISA machines, while "Software's Next Wave" focuses on advanced tools for application development from some surprising sources.

But there's a time and place for looking back—especially when it helps you find that elusive bit of essential information. Our 1989 Annual Index is a compact, complete reference to a full year's worth of *PC World*. And it didn't compile itself.

Nancy Mulvany, whose Bayside Indexing Service prepared our index for the second year, says a proper index is "complete, accurate, consistent in its handling of terms and ideas, and easy to use. When you go to look for something and you can't find it, some indexer did a lousy job."

Mulvany's crew has indexed user manuals for some of the industry's finest, including 3Com, Symantec, and Claris. "Indexing *PC World* was harder," she says, "since the magazine spans a full year and covers an industry with no vocabulary control. Last year we had a category called *Work-Group Productivity.* This year the buzzword is *Groupware.* And what *do* you call those hand-held gadgets?"

Can't a PC prepare an acceptable index? "Computers ease the drudgery of entering and editing information," Mulvany admits. "But nothing will ever replace the handcrafted index. It provides access points to all the important information in a publication. The real work comes in the kind of editing only a human can do."

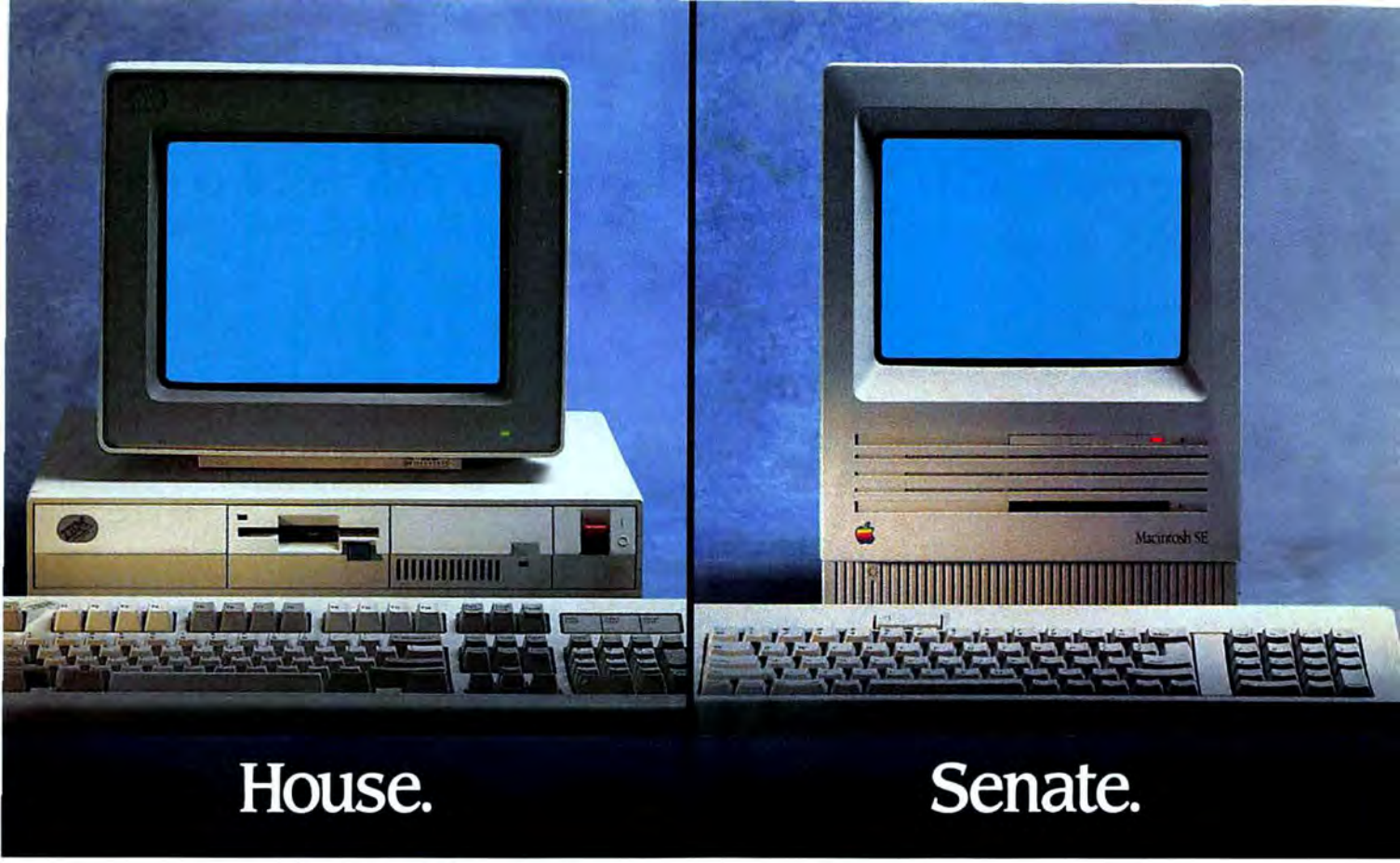
Because of space limitations, every printed index involves compromises. "*PC World*'s index is organized by category," Mulvany explains. "To find an article about a specific product, you have to think in terms of what kind of product it is, although big names are cross-referenced."

But there's an on-line alternative—a disk-based version of the index, built around a powerful hypertext engine. You can search for a keyword, a product name, or a category to quickly locate that story you know you read last year. (For ordering information, see the first page of the index.) Mulvany predicts that hypertext-based information-retrieval systems will experience huge growth in the coming decade, especially as CD ROM applications take hold.

You see? Even when you start by looking backward, it's hard to keep from focusing on the future. ●

Ed Bott

Ed Bott
Managing Editor



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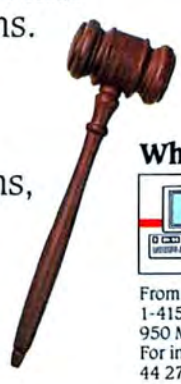

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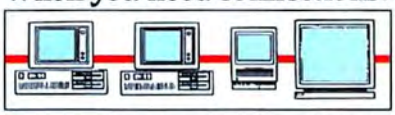

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August 1989 Everex STEP 386is

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10/89

1-2-3/G Enters Beta

Lotus Debuts Graphic Version of Spreadsheet at COMDEX

Intent on closing the final gap in its wall around the spreadsheet market, Lotus demonstrated a beta version of *1-2-3* running under OS/2 Presentation Manager at COMDEX Fall. The exact feature set of *1-2-3/G* hasn't been finalized, and ship day is at least six months away. But *1-2-3/G* director of marketing Jeffrey Beir is quick to point out that the latest version exercises the unique attributes of OS/2 in ways that PM's other graphics spreadsheet, *Microsoft Excel*, doesn't. Specifically, *1-2-3/G* employs the multithreading capability of OS/2 to do recalc and to perform a unique form of "what-iffing" in the background. A new Solver module on the Lotus menu will enable users to find the best set of alternatives for allocation of resources such as personnel, or decide the optimal mix of products to manufacture given certain constraints. The application smoothly handles both keyboard and mouse commands and uses up to 16MB of conventional memory plus disk swapping to keep open multiple files—each of which can have up to 256 worksheets arrayed in 3-D. Considering that Lotus has more than a 50 percent share of worldwide spreadsheet shipments and *1-2-3*'s installed base is 8 million—several times the size of its nearest competitor—International Data Corporation analyst Nancy McSharry concludes, "I don't think anyone will knock Lotus off its pedestal anytime soon."

Compaq Challenges MCA, Minis

High-End System Launch Threatens IBM and Traditional Computer Companies

Compaq's latest round of high-end system offerings pushes the EISA bus ahead of the Micro Channel in terms of available bus-master products and constitutes an increased threat to minicomputer and mainframe makers (see the EISA preview in this issue). Compaq North America president Mike Swavely calls the Systempro and Deskpro 486/25 announcement "the most significant since the introduction of our first portable," claiming that the Deskpro's 128K memory cache and subsystem enhancements such as disk array storage technology make it the most powerful computer on a desktop. He also observes that the 20 add-on boards for these systems' EISA bus—14 of which have bus-master capability—are more than IBM has been able to muster for MCA in three-and-a-half years on the market. Additionally, Swavely claims that Compaq's Systempro is 9 to 38 times as powerful as an IBM AS/400 Model B30 (but $56,000 cheaper). He predicts a restructuring of the entire computer industry in the 1990s as large-system makers are forced to adopt PC technology and reseller distribution. According to Dataquest, PCs already account for 66 percent of CAD/CAE sales in units, with Compaq in the lead. The new systems accelerate the migration of Compaq toward advanced system solutions. Today, 5 percent of all Compaq's systems and 40 to 50 percent of its high-end 386 computers are sold for multiuser/network applications. Swavely expects 25 percent of the company's business to go this way during the early nineties. Insisting that its dealers are up to the challenge, Compaq will spend tens of millions of dollars to enhance their training and support capabilities.

i486 Bugs Found

Intel and System Manufacturers Replacing Faulty Chips With New Version

A pair of bugs in the integrated math coprocessor of Intel Corporation's i486 chip forced the recall of the earliest computers built with this processor and postponed volume shipments of such products until late December, 1989. IBM halted shipments of its 486/25 Power Platform and will soon begin replacing the CPU boards for the limited number of customers who have them. AST Research and Advanced Logic Research also are notifying their i486 customers that replacement boards with new CPUs—bearing an 80486DX-25 rather than an 80486-25 designation—will be forthcoming in December. Compaq, which discovered the errata, was forced to break its long-standing policy of not unveiling product before shipment day. Compaq doesn't expect to ship its Deskpro 486/25 or the i486 version of its Systempro—both announced November 6—before the end of December. Intel was immediately able to send system vendors a workaround for one bug that caused rare arithmetic calculations to produce wrong answers. But a second bug, which appears during some equally rare trigonometric calculations by programs such as *1-2-3*, *AutoCAD*, and *PageMaker*, can be eliminated only with a new version of the chip.

OS/2 Strategy Remapped

IBM Acknowledges Windows Role, Plans OS/2 Version That Runs in 2MB

After years of disparaging *Windows*, IBM is finally bowing to market reality and integrating Microsoft's graphic environment into its software strategy. IBM is recommending *Windows* as an entry-level graphic environment for PCs with up to 2MB of memory. Furthermore, IBM will make the data base and communications features of OS/2 Extended Edition available to other Microsoft customers and will merge its OS/2 network software technology with Microsoft's. Acknowledging customer resistance to high hardware requirements, IBM also disclosed plans for a 16-bit OS/2 version that will run in as little as 2MB of memory. But both IBM and Microsoft insist that the "desktop platform of the nineties" will be a 386 or 486 PC with at least 4MB of memory and a 60MB hard drive, running the 32-bit OS/2 version expected this summer. Besides being faster, this release will run multiple DOS applications concurrently. Despite rumors that IBM will ship *Windows* with DOS, "we have no plans to distribute *Windows*," says James Cannavino, IBM's general manager for personal systems. This fall IBM contemplated a slimmed-down version of Presentation Manager that would run atop DOS. Instead, Microsoft persuaded IBM to make space for *Windows*—perhaps by agreeing to limit future *Windows* enhancements. "Some of the things that Microsoft has been talking about for *Windows* are no longer there," notes Lotus chairman Jim Manzi.

War of the Words Coming

Microsoft Hopes Word for Windows Will Drive a Wedge Between WordPerfect and Customers

After four years in development and two years in beta, Microsoft's multitalented word processor for *Windows* will finally ship by year-end (see the preview "Word Meets Windows" in this issue). Most analysts give *Word for Windows* an early thumbs-up: "Microsoft has done a real rethink of word processing, with a significant improvement in interface, in trench-level features, and in WYSIWYG," comments Dataquest's Fred Thorlin. The first in a line of graphic, programmable packages designed to work closely with others on PC networks, *Word for Windows* aims to undermine WordPerfect Corporation's dominance in word processing—36 percent of worldwide sales in 1988, compared with *Word*'s 9 percent. Both have gained share from weak counterparts like *WordStar*, but International Data Corporation analyst Nancy McSharry doesn't expect *WordPerfect* to lose much ground to *Word for Windows*. Neither does WordPerfect executive vice president Pete Peterson, who plans to respond with a *Windows* version of *WordPerfect* this summer. Believing *Windows* to be a relatively short-term opportunity, WordPerfect has invested more heavily in OS/2 Presentation Manager. And while *Word for Windows* boasts such bells and whistles as its own full-fledged control language, Peterson cautions that "we'll have to be careful to hit the traditional word processing user rather than overshoot the market."

Notes Ships

First Major Vendor Work-Group Application to Take Advantage of PM

Lotus has just begun shipping *Notes*, a document-oriented data base for work groups that flexes the muscles of OS/2 Presentation Manager. The result of two years of extensive beta testing and intended to run on networks, *Notes* lets teams of employees maintain and access data bases critical to their common job assignments; employees add to them using a built-in word processor and communicate via E-mail within or across nets. Variously described as a computer bulletin board and a multiuser version of the *Agenda* personal information manager, *Notes* lets work groups customize views of data. Internally, Lotus uses *Notes* applications to collect and discuss field-staff reports on its products as well as on the many business proposals that it receives. *Notes* takes advantage of Presentation Manager's ability to show multiple graphic-intensive files simultaneously on the desktop while net servers process file requests, update data bases, and route mail in the background using multiple OS/2 threads. *Notes* reads the files of the major word processing packages, Lotus worksheets, and ASCII files as well as *1-2-3* PIC, TIFF, and scanned input. It runs on Novell *NetWare*, 3Com's *3+Open*, and other NETBIOS-compatible LANs, but not OS/2 *LAN Manager*. Unlike most Lotus products, *Notes* will be marketed by a direct sales force rather than Lotus retailers. Pricing, still undetermined at press time, will be based on server licenses. ●

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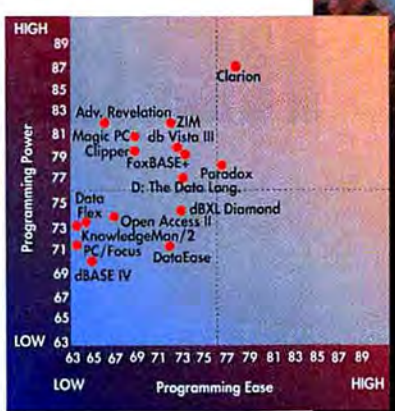
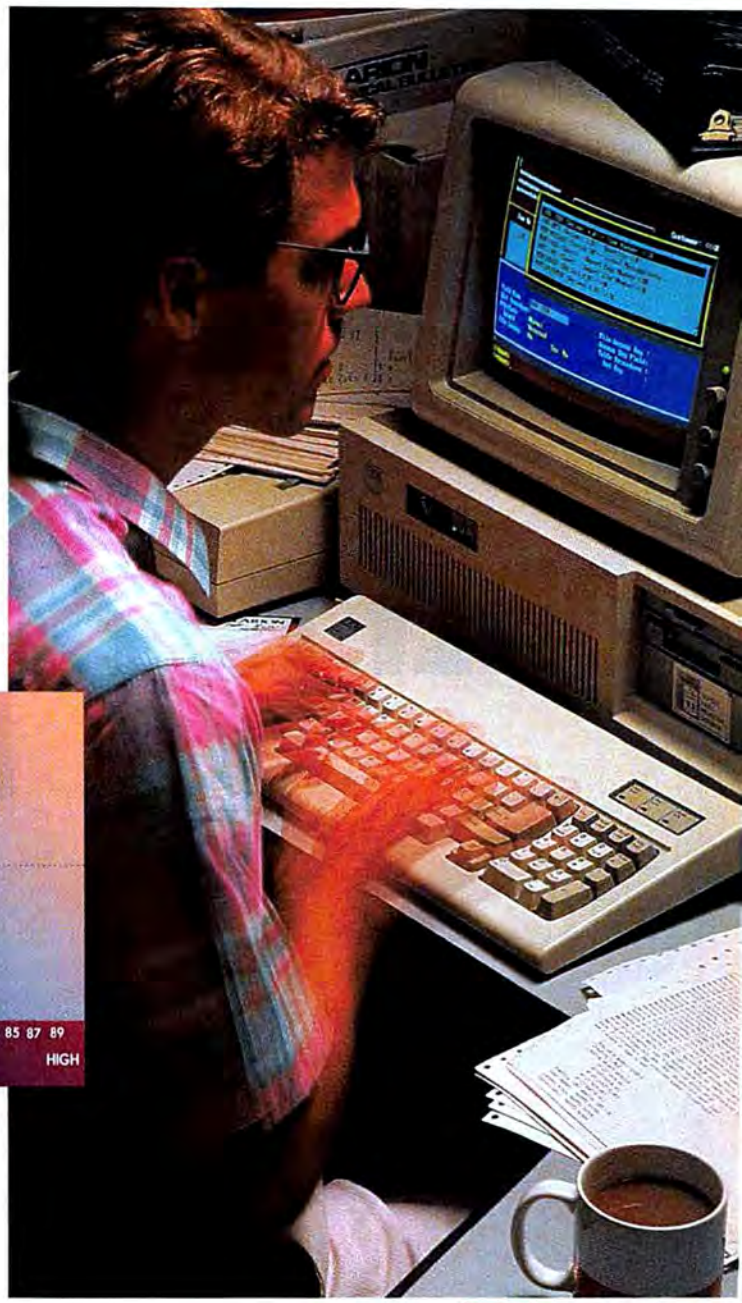


Here's what American corporations in a PC Week survey thought of the power and ease of use of Professional Developer vs. competitors. Any questions?



PC MAGAZINE EDITORS' CHOICE

INFO WORLD Clarion Professional Developer 8.2

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1 The NeXT™ Computer System is the first computer in the world (and so far the only) to use read/write/erasable optical storage. While PCs today are typically equipped with Winchester drives that store 20 to 40 MB, a single optical disk can store 256 MB. Plus, it is removable, for portability and added security. This dramatically new technology provides storage that is simultaneously vast, reliable and cost-effective—a combination unmatched by computers of any size.

2 NeXT has made the power of UNIX® usable by mere mortals. UNIX is the high-performance operating system used by workstations to achieve true multitasking and superior networking. Unfortunately, it has always been the antithesis of user-friendly. NeXT has given UNIX a revolutionary new interface—one that is both visual and intuitive. Now computer users of every level can instantly wield this tremendous power, with no technical knowledge whatsoever.

3 To achieve the power needed for the 90s, NeXT bypassed traditional workstation architecture and went directly to that of a mainframe. This eliminates bottlenecks and attains an extraordinary level of system "throughput"—the true measure of computer performance. Only through the use of VLSI (Very Large Scale Integration) technology could this architecture be reduced in size so that it could fit inside a desktop computer. It's a mainframe on two chips.

4 While PostScript® has long been the industry standard for printing, NeXT has made it fast enough to also be used on the display. This "unified imaging model" ensures that what you see on

the display is precisely what you will get on paper. All your work, in any size type and any degree of rotation or magnification, appears with perfect 92-dots-per-inch clarity on the NeXT MegaPixel Display. And with laser precision at 400 dpi on the NeXT Laser Printer.

IN THE 90s, WE'L
ONLY TEN REAL BREAKTH
HERE ARE SEV

5 The NeXT Computer System is the first to be capable of producing CD-quality sound. Without requiring any additional equipment. This feat is made possible by a chip that has been specifically designed for the task of manipulating sound–the Digital Signal Processor (DSP). Because this processor is standard in every NeXT machine, software developers will be able to call upon its power to enrich programs we use every day. Now computers will not just be seen, but heard.

6 NeXT Mail takes electronic communications beyond anything you've seen on a personal computer before. Now you can send and receive multimedia mail–including text (with varied type fonts, styles and sizes), graphics and voice messages. And despite its high level of sophistication, NeXT Mail is so intuitive, you may not ever need to open the manual. NeXT Mail is built into the system, along with Ethernet and TCP/IP, so the NeXT machine can quickly become a part of existing networks.

7 Programmers can create software on the NeXT Computer up to ten times faster than on any other computer–the result of a breakthrough called NextStep.® It gives software developers the power to create the graphical user interface portion of their applications (often the most time-consuming and difficult part) without any programming at all. This revolutionary environment means we will see more programs, and better ones, in less time than ever possible before.

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ClipArt from A to Z.

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B is for Baseball

C is for Cartoons

D is for Dinosaur

E is for Easter

F is for Flags

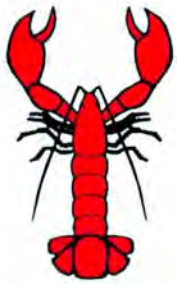
G is for Gears

H is for Heart

I is for Ice Cream

J is for Jet

K is for King



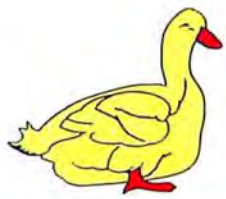
L is for Lobster

M is for Motorcycle

N is for Nutcracker

O is for Olympics

P is for Penguin



Q is for Quack

R is for Reagan

S is for Santa

T is for Texas

U is for Uncle Sam

V is for Valentine

W is for World

X is for X-ray

Y is for Yacht

Z is for Zip Code

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Richard Landry

FRED STIMSON

Hardware Gaps and Software Bridges

Software developers are struggling to keep pace with rapid advances in next-generation hardware.

Will they remember to build bridges back to today's desktops?

People agree that there's a widening gap between hardware and software, but not everybody sees it the same way. On the one hand, pundits and other industry types point to the enormous gulf between the power of next-generation hardware platforms like the Micro Channel and EISA and the poky pace at which software developers seem able to exploit it. On the other hand, users express concern about a more basic gap—between the power of the desktop systems they own today and the requirements of software being built for the 1990s. The fit between hardware and software is becoming increasingly uncomfortable, both sides say, and unfortunately the seams are tearing in both directions.

OS/2 epitomizes this rift—at base, a split between industry ambition and user needs. Too big to run well on the older 286 systems for which it was designed, OS/2 today nevertheless lacks the muscle to exploit more powerful 386 and 486 computers. And while everyone bemoans the absence of new applications that deliver on OS/2's promise to make PCs fundamentally easier to use, nobody seriously expects users to jump on the upgrade bandwagon as soon as those applications arrive. What's missing from this picture is a logical bridge between the systems of today and the software of tomorrow.

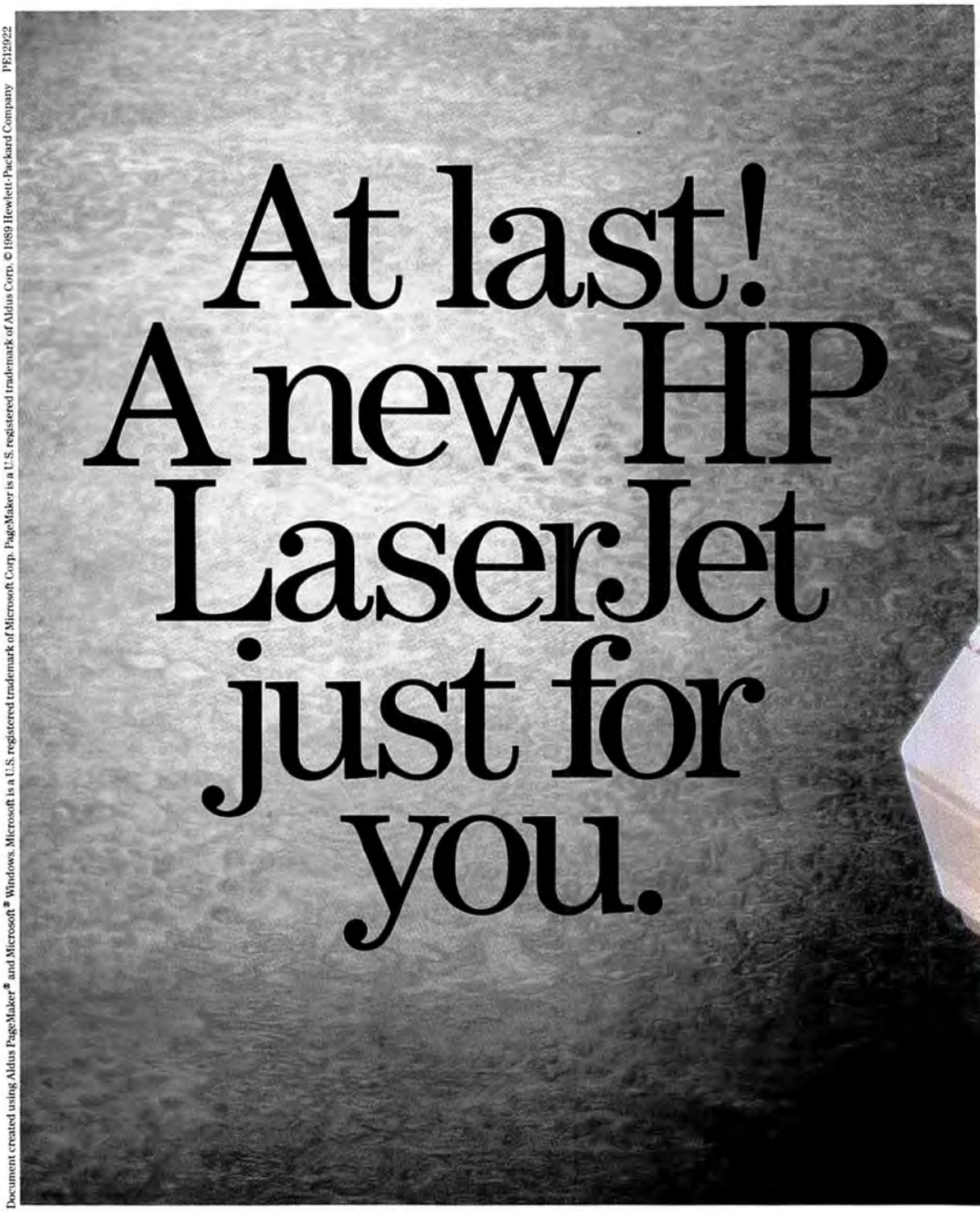
Windows Is the Bridge

Microsoft has long been pitching *Windows* as the logical bridge between present and future for both developers and users, but until recently nobody was listening. Developers saw (and continue to see) *Windows* as Microsoft's thinly veiled attempt to capture the entire desktop market. And IBM deliberately built a technological wall between *Windows* and OS/2 to prevent developers and users alike from sticking with any enhanced version of DOS. But recently Big Blue had a change of heart. After reportedly toying with the notion of offering a DOS version of OS/2's Presentation Manager environment, IBM publicly endorsed *Windows* for systems with 2MB of RAM and 30MB or less of hard disk storage—which includes most systems at work in business today, and most of the IBM PS/2 line as well (see "OS/2 Strategy Remapped" in this issue's *Top of the News*).

Critics argue that OS/2 makes a much more sensible platform than *Windows* for multitasking power workstations, at about the same hardware cost. That's true, and it will probably remain true even with the arrival of the unannounced but much-rumored *Windows 3.0* sometime this spring. But such arguments ignore the way that OS/2 can best shine in the short term—as a network operating system that supports a whole new class of server-based applications like Saros's *FileShare* and Lotus's *Notes*. In both cases, OS/2 resides at the network core while users are free to use OS/2 or *Windows* at their desktops. This arrangement makes the most of precious desktop resources while allowing companies to shift hardware dollars into applications that everybody in a company can benefit from.

Hardware development should precede software design. New

(continues)



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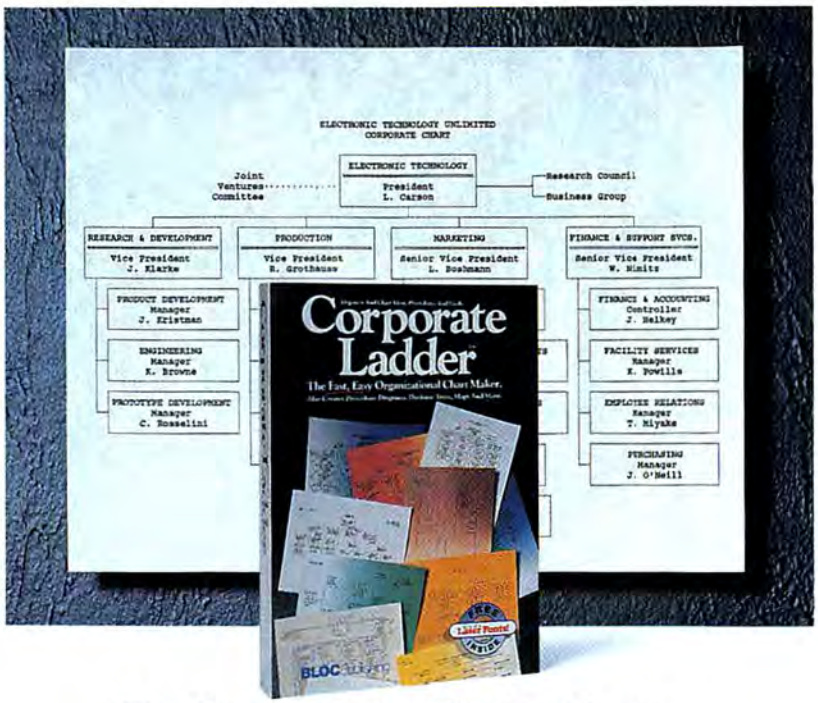

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hardware, like Steve Jobs' Next computer, can inspire software developers and give them the basic tools they need to build tomorrow's breakthrough solutions. PC users need to see advanced new hardware, too—for power applications and to give direction to their hardware acquisition strategies. But software must provide the necessary bridge between present and future. In the PC world, *Windows* is finally emerging as that bridge. It remains to be seen how sturdy a structure the software development community will make it.

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; MCI Mail Richard Landry/301-3685.

Doug Norde, 1952–1989

Few readers knew Doug Norde, yet as *PC World*'s circulation fulfillment manager, his job was to make sure your magazine arrived promptly on your doorstep every month. Doug served in *PC World*'s circulation department since 1984; he was a kind teacher who made newcomers welcome, and an expert at navigating the intricate maze of postal regulations that threaten to trip up publishers at every turn. In enthusiasm, dedication, and inventiveness, Doug served as a model to his fellow staff members. Late last year Doug passed away after a long illness. Everyone at *PC World* misses him. ●

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Cut & paste between sheets	YES	no	YES
Point-and-shoot link setup	YES	no	YES
Automatic consolidation	YES	no	YES
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*Release 3 is two to three times slower than Release 2.01 in PC Magazine benchmarks. (9/12/89 issue.) It needs lots of memory, lots of hard disk space, and does not support Release 2 add-ins. Expanded memory cards must be re-configured.

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PC Week
January 30, 1989

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P.C. Week, August 14,1989

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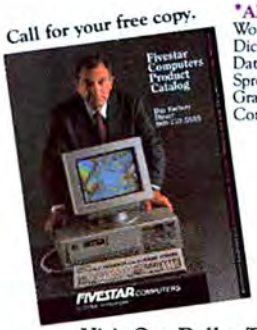

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LETTERS

Reactions and responses from the PC World community

ANTHONY RUSSO

Beyond the BASICs

Thanks to Richard Landry for his October 1989 column, "How BASIC Is It?" Many software packages would benefit from an integrated macro language, and I wouldn't object if it were BASIC. Even *WordPerfect*'s highly developed macro capabilities would be enhanced with a broader language. And flat-file data bases with their ease of setup and general friendliness would be hard for even sophisticated developers to ignore if they provided a hardy macro capability.

Tom Marcellus
Torrance, California

Do I Hear 486? 586, Anyone?

I disagree with Richard Landry's assessment of the 80486 processor ["Why You'll Want a 486," September 1989]. The average business user can do very well with a 286 chip. Even those who dabble in CAD don't need any more than a 386—even a 286 with a coprocessor is usually adequate. If anything, the 486 will be more a status symbol than a real necessity. The fact that *DesqView* and Concurrent DOS do now what OS/2 is supposed to do—without obscene RAM requirements—makes existing equipment more attractive than the untested 486. It's nice to hear about upcoming products, but not to be told that we need them before they're a reality.

BUD PEEN

Ken Simmons
New York, New York

Wait Till You See the 686...

Don't get a 286, wait for the 386. Don't get a 386, wait for the 486. Don't get a 486, wait for the 586? After waiting ten years for upgrades, through drought and high water, I'm getting a 386. Why should I keep waiting?

Paul G. Spohn
Blackwood, New Jersey

Shattering Windows

Three cheers for Randolph Cabell's comments about *Windows*' ease of use ["Rose-Colored Windows," *Letters*, October 1989]. What good is a user interface that's balky, expensive, and not intuitive and that eats RAM like Godzilla? I suspect that users of RAM-poor 8088 and 286 machines don't see the PC future through a window but rather through DOS and DOS shells.

Scott A. Carson
Indianapolis, Indiana

Mighty Mouse

George Campbell's review of *Microsoft Word* ["Word Closes the Gap," September 1989] barely mentions mouse support. The mouse is far superior to cursor key combos for highlighting, scrolling, moving text, and copying. Other chores at which the mouse excels include choosing directories, files, and commands and copying soft font text formats. Without full mouse support, even the great *WordPerfect* wastes the user's time.

Bruce D. Wedlock
Cambridge, Massachusetts

Somebody in Utah must have been listening. WordPerfect 5.1 *(previewed last month) adds full mouse support. —Ed.*

Words to the Wise

I don't get it. Why do people keep raving about *WordPerfect* being much "much friendlier" than *WordStar* ["1989 World Class Awards," October 1989]? How can *WordPerfect*'s finger-

(continues)

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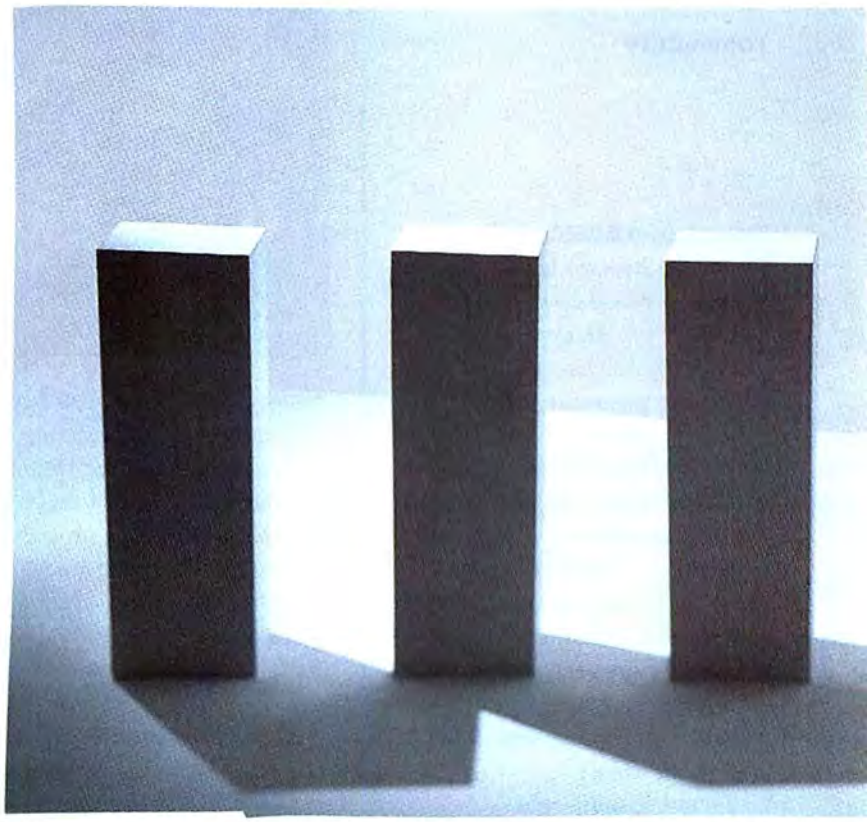

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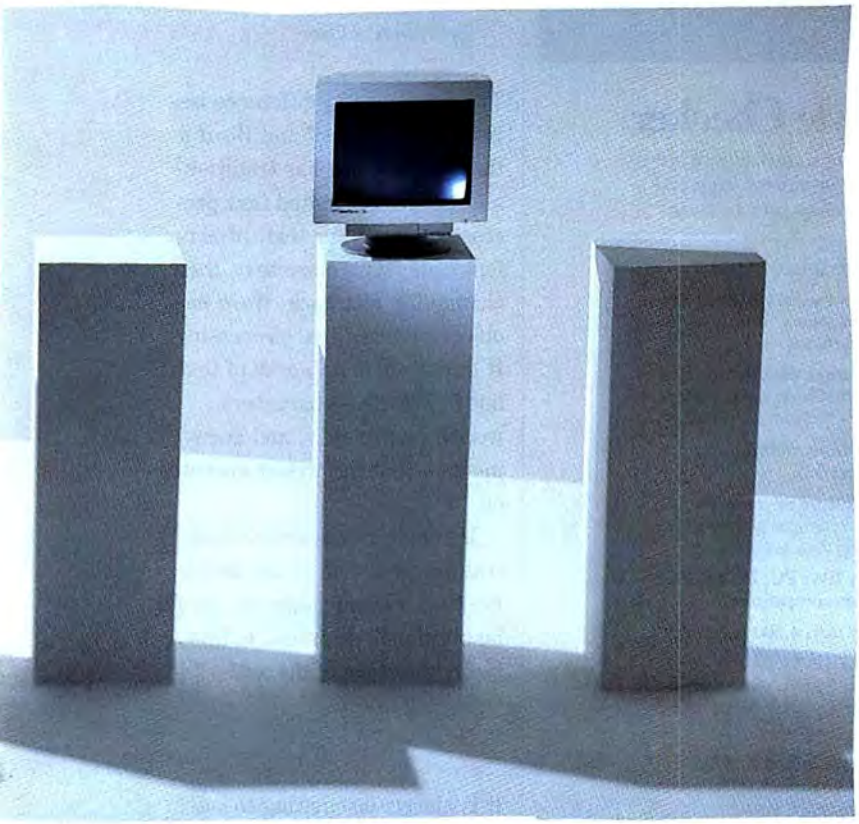

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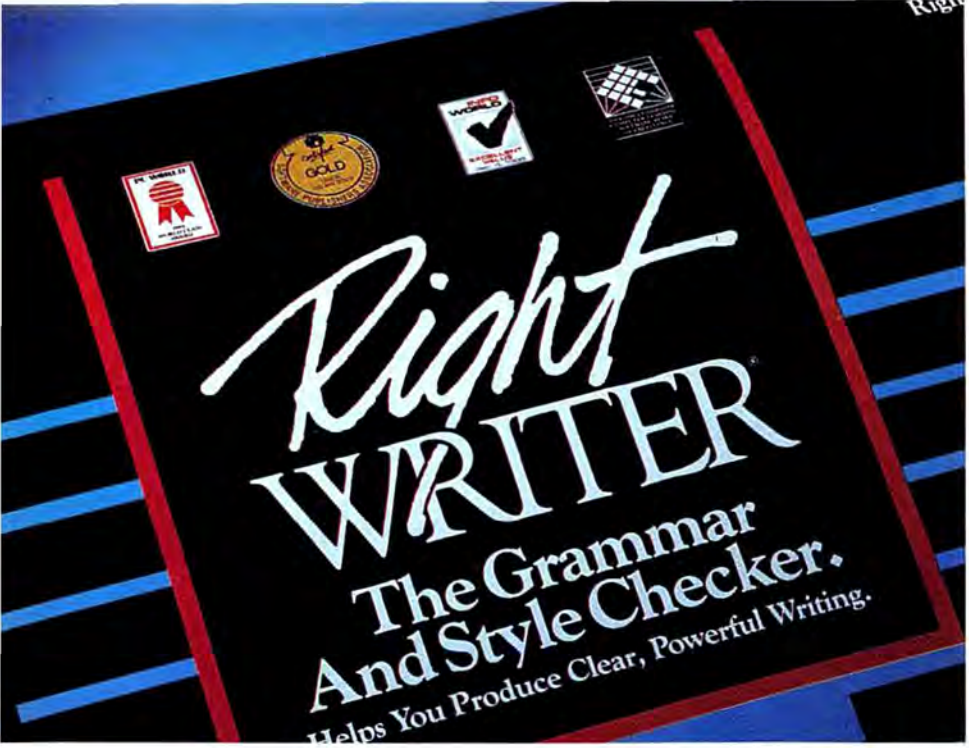

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breaking function-key interface be friendlier than *WordStar*'s never-lift-your-fingers-from-the-home-row interface? *WordStar* provides a variety of on-screen help levels ranging from full menus to none. *WordPerfect* gives the user only one choice: no on-screen help at all. And the list goes on. *WordPerfect* may be the new emperor of word processing, but when it comes to friendliness, the emperor has no clothes.

Daryl Close
Sycamore, Ohio

The fundamental difference between *WordPerfect* and *Word* is that *WordPerfect* has traditional procedure-oriented text processing. You enter text, insert a font code, type more text, then change the font back. *Word* has object-oriented text processing: It doesn't deal in blocks of text but in objects—characters, words, paragraphs, and documents—that the writer operates on.

If I were faced with the job of training someone to use *WordPerfect*'s Reveal Codes mode, I'd be horribly depressed. Is this really the state of the art?

Jeffrey Rocchio
Hudson, Ohio

It is always fascinating to see how other word processors try to catch up with the leader—*WordPerfect*. However, mistakes and inaccuracies in *PC World* do the leader an injustice. Power Tip No. 66 [September 1989, page 46] applies to version 4.2, and it simply doesn't describe the way *WordPerfect 5.0* operates. September's article "Word Closes

(continues)

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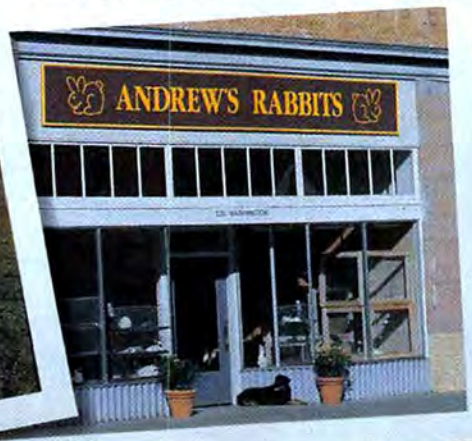

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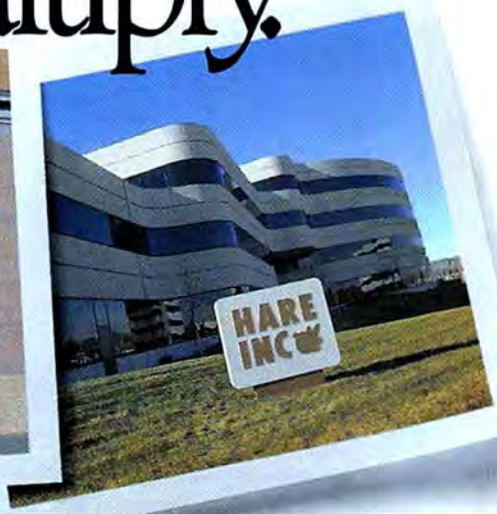

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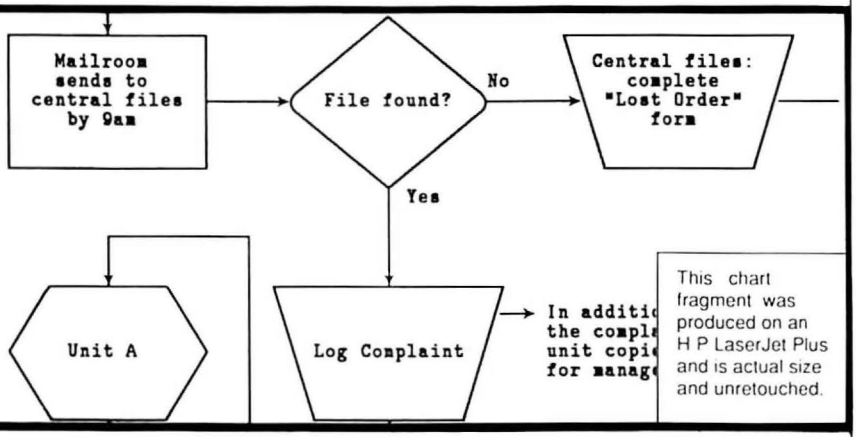

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the Gap" states that "only *Word 5.0* lets you alter a rule or box instead of making you delete it and start over." *WordPerfect 5.0* lets you make any kind of rule or shade changes to existing boxes and also lets users modify an existing rule.

Ralph Blodgett
Hagerstown, Maryland

Neither Rain nor Snow nor...

Your September 1989 review "Lan E-Mail Delivers the Goods" took *Higgins Mail 2.2* to task for its user interface. The new release of *Higgins Mail* specifically addresses that issue. We reorganized the command line, added help, and reduced the number of menus required to send a message. We think your editors would rank *Higgins Mail* quite differently today. Even so, I was disappointed to see the user interface weighted so heavily in your evaluation. Mail administration, connectivity options, reliability, and support are also key features.

Howard Case
Enable Software, Higgins Group
Alameda, California

Clearly, Mr. Case and I disagree about the importance of the user interface. In a network with 30 nodes and one administrator, 30 people can be exasperated by interface issues, only one by administration problems.

The other factors you mention weighed quite heavily in my judgment of the five programs. Administrative features were not discussed due to lack of space. Connectivity options were discussed in detail: DaVinci eMail *and* cc:Mail *clearly offer more options than* Higgins Mail *at a lower price. Reliability is im-*

(continues)

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Corel Draw! 1.01 (Corel Systems Corp.)	82	2.4/1.0	89	86	84	83	82	83	78	82	79	83	73	81
Arts & Letters Graphics Editor 1.02 (Computer Support Corp.)	80	3.0/1.0	87	80	84	79	78	79	76	82	74	78	90	76
Micrografx Designer 2.0 (Micrografx Inc.)	78	6.3/1.0	84	80	80	77	73	78	78	81	74	74	78	77
Kinetic Art 1.20G (Kinetic Presentations Inc.)	76	11.6/2.0	92	83	80	67	76	64	58	76	87	83	63	78
Artline 1.0 (Digital Research Inc.)	72	3.7/1.0	87	77	81	70	71	69	61	78	66	74	57	67
Adobe Illustrator 88 1.8 (Adobe Systems Inc.)	71	5.6/2.0	83	68	78	73	61	76	70	74	70	62	63	67

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PC Illustration Software

	(InfoWorld weighting)	Adobe Illustrator Windows Version 1.0	Arts & Letters Graphic Editor 1.02	Corel Draw 1.01	GEM Artline 1.0	Micrografx Designer 2.0
List price		$695	$695	$495*	$495	$695
Performance						
Speed	(125)	Poor	Satisfactory	Very Good	Very Good	Very Good
Input/output	(125)	Good	Good	Very Good	Good	Excellent
Drawing/editing	(200)	Good	Good	Very Good	Satisfactory	Very Good
Documentation	(100)	Excellent	Good	Excellent	Satisfactory	Very Good
Ease of learning	(100)	Very Good	Good	Excellent	Good	Very Good
Ease of use	(100)	Satisfactory	Satisfactory	Very Good	Satisfactory	Good
Error handling	(75)	Good	Satisfactory	Good	Satisfactory	Good
Support						
Support policies	(50)	Satisfactory	Satisfactory	Good	Poor	Poor
Technical support	(50)	Good	Very Good	Very Good	Good	Good
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Highest Ranking Score!

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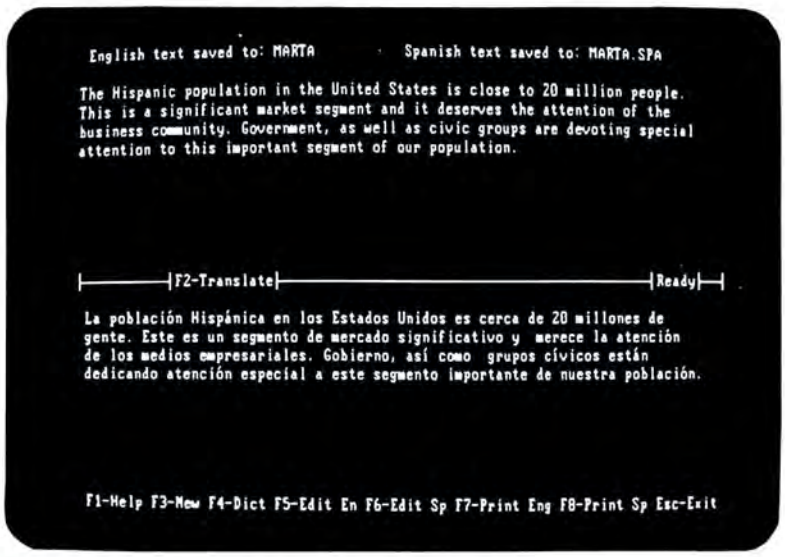

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portant, but I found no significant differences between the programs. Support is crucial—and I commend Enable for providing toll-free assistance—but good design and ease of use are even more important, and both were lacking in the version of Higgins Mail *reviewed. —Robert Lauriston*

Key Problems

Northgate's OmniKey/102 is a fine keyboard, but compatibility is more of a problem than your review suggests [*The Upgrade Path*, September 1989]. The review states that the keyboard may balk at some original 8088 PCs. It refused to work with my Dell System 200—a relatively new 286 system. Recently OmniKey advertising began listing incompatible computers, including the IBM PS/2, Zenith, and others, but the warning could easily be missed.

Stephen McAliley
West Palm Beach, Florida

Corrections and Clarifications

Our item on Cuesta Systems' DataSaver 600 backup power supply in August 1989's *Product Outlook* should have equated the unit's 600-watt rating with 750VA output.

Power Tip No. 70 (October 1989, page 124) omitted a vital step. To perform arithmetic functions in *WordPerfect 5.0*, enter <Ctrl>-<PageUp>, then enter 1. Enter the equation (for example, 60*4), then press <Enter>. Pressing <Alt>-1 reveals the answer.

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

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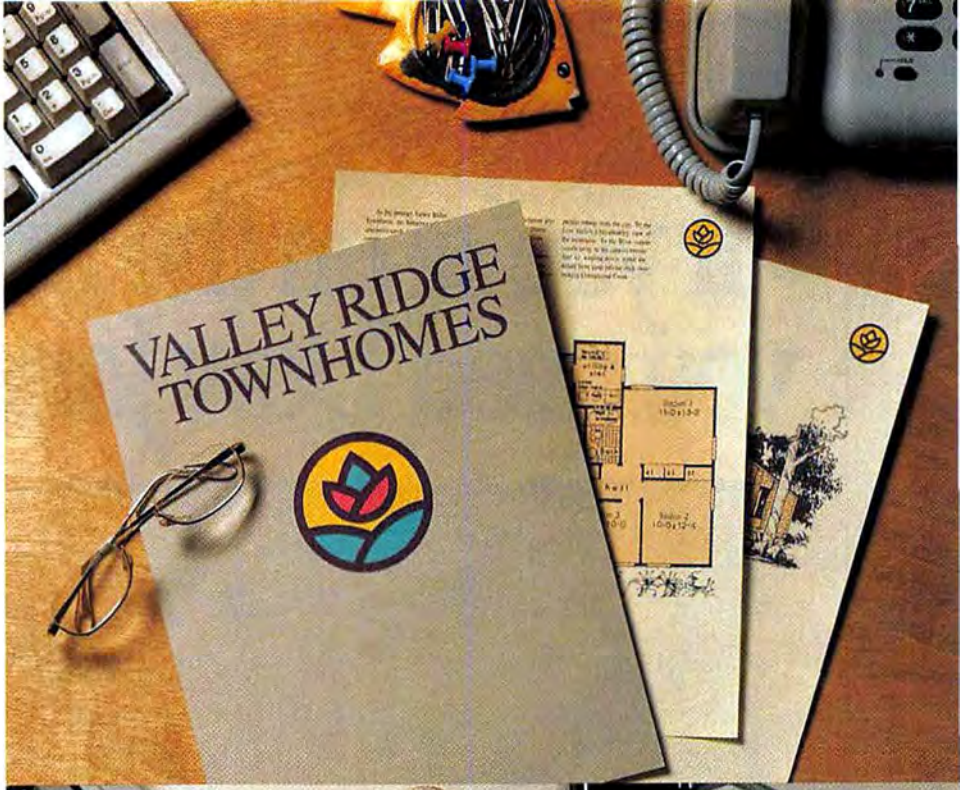

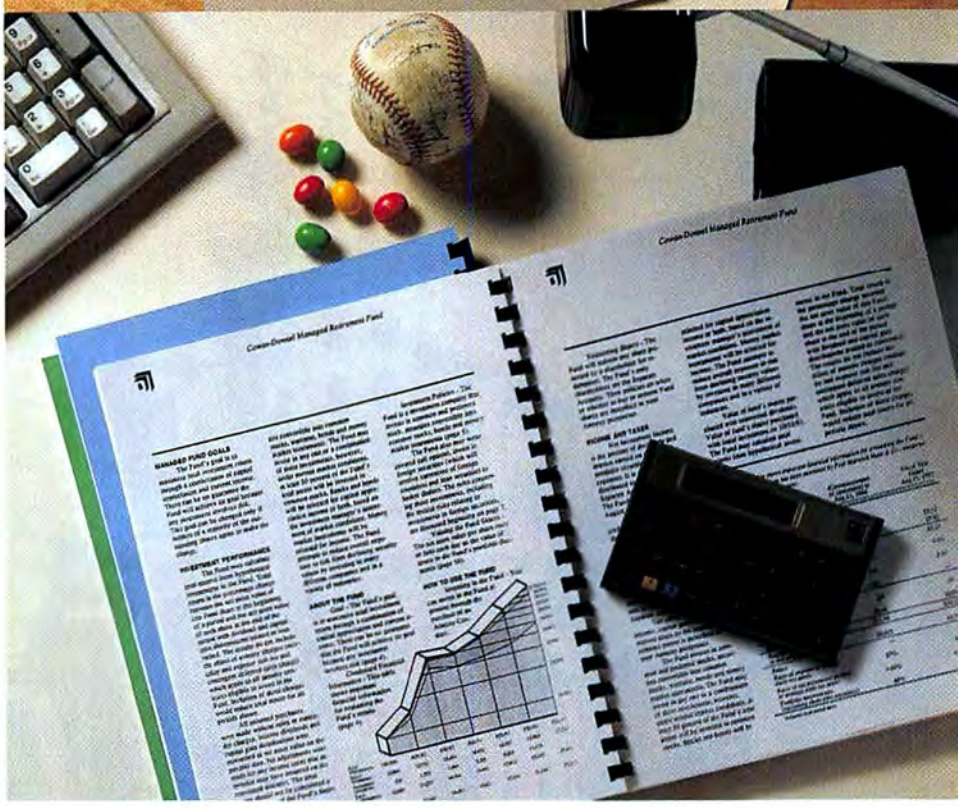

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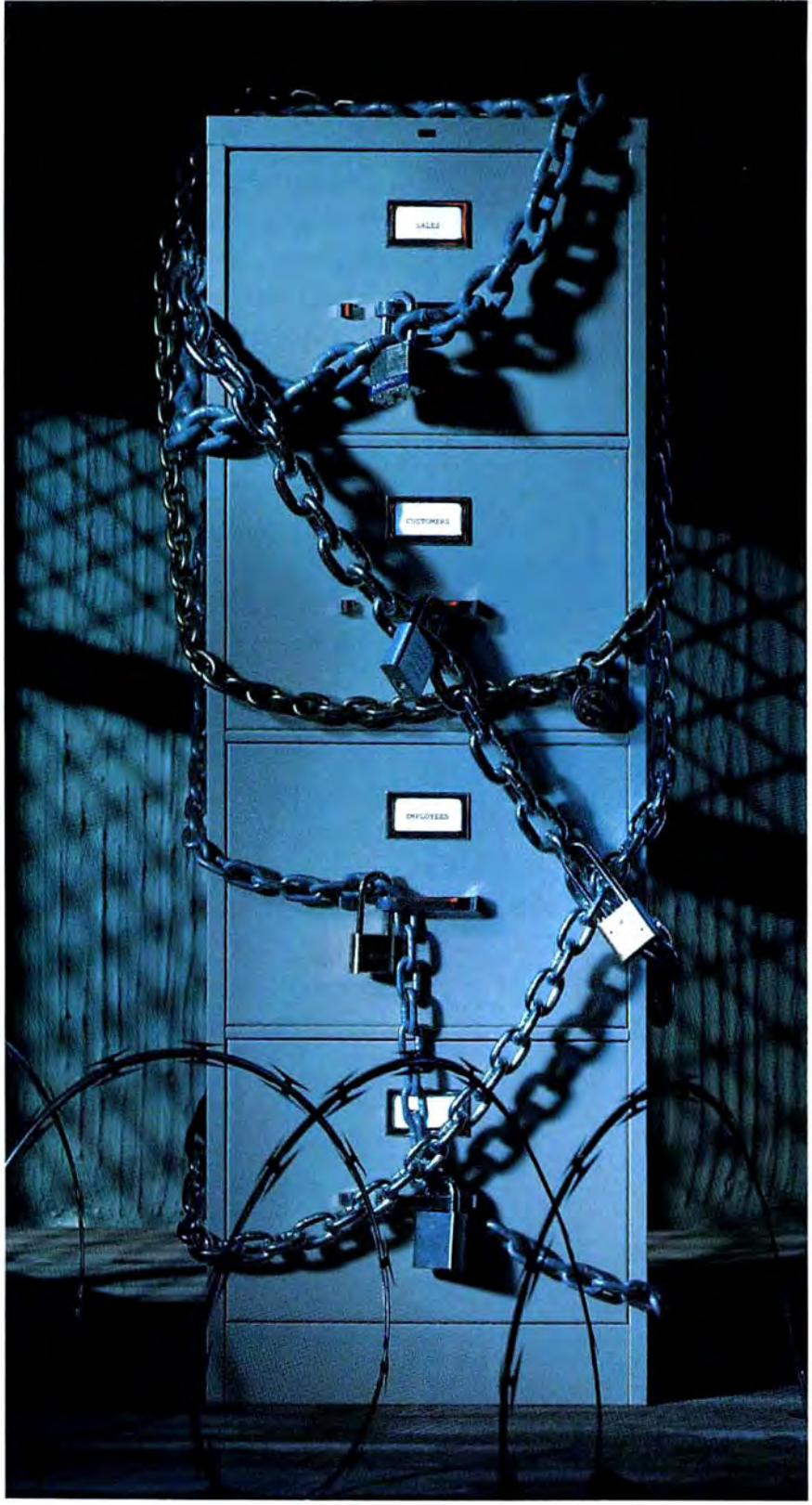

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THE HELP SCREEN

PC World offers answers and advice at every level

Replace your AT's clock battery for the last time, find help in your own backyard, upgrade WordPerfect 4.2 macros, send a serial formfeed from the keyboard, and print data base reports on PostScript printers.

Karl Koessel

A Battery of Information

Q. *My Epson Equity III + computer's lithium battery, which maintains the date, time, and other setup information, went dead long before it should have (one year after purchase). Epson, for whatever reason, won't replace it.*

My dealer is willing to charge me only the dealer cost of about $55. However, I see alkaline batteries in other computer shops for $18 to $27. The manufacturers claim that these alkaline batteries last as much as 45 percent longer than lithium batteries.

My manual says that the Equity III + needs a lithium battery. Can I safely replace the Equity's lithium battery with alkalines? What are the benefits and drawbacks of each type?

Stuart Baron
San Juan Capistrano, California

A. You *could*, assuming you also had the proper connector, use alkaline batteries inside your PC. However, I adamantly disapprove. They do last longer than lithium batteries, but you've seen what alkaline batteries do to your flashlight when they leak; now imagine them leaking inside your PC. (While we're on the subject of pollution damage, I should remind you to be sure to dispose of your old lithium battery properly—they are not allowed in most dumps and can explode if water gets inside them.)

The output voltage of lithium batteries decays very slowly for most of the battery's life, and then suddenly drops to ineffective levels. Because this characteristic makes it impossible to determine how much battery life is left, almost no computer manufacturer warrants the batteries they use.

But you do have alternatives. Check out Accumation's Last-.Bat in "Ten Top Upgrades for Under $500" in last month's issue. This $49.95 nickel-cadmium battery-cum-recharger slips easily inside your PC and will last

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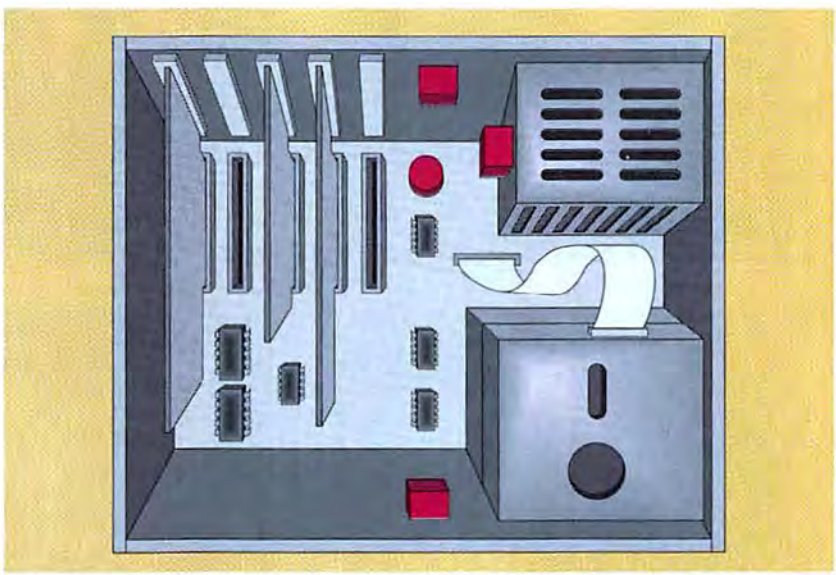

KEITH BAUMANN

The clock/calendar battery shown in red is often found attached to the inside back or inside front of the system unit, to the power supply, or sometimes, onto the motherboard itself.

ANTHONY RUSSO

for at least ten years. Furthermore, Last.Bat has a lifetime, free-replacement warranty (including shipping) for the original purchaser and computer. Because very little current is required of the battery, and the battery is recharged very slowly, Last.Bat does not suffer from the recharge problem associated with nickel-cadmium batteries (in which the battery puts out only as much power as was put in by the last charging). But the best news for you is that Accumation makes a Last.Bat specifically for the Epson Equity III+.

FIGURE 1 shows the typical locations of batteries in PCs. In most systems, the battery is connected by wires to two pins on the motherboard. Some connect the battery by other means; most notably, every IBM PS/2 has a lithium battery mounted on its speaker assembly.

WHERE TO BUY

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Miami, FL 33176
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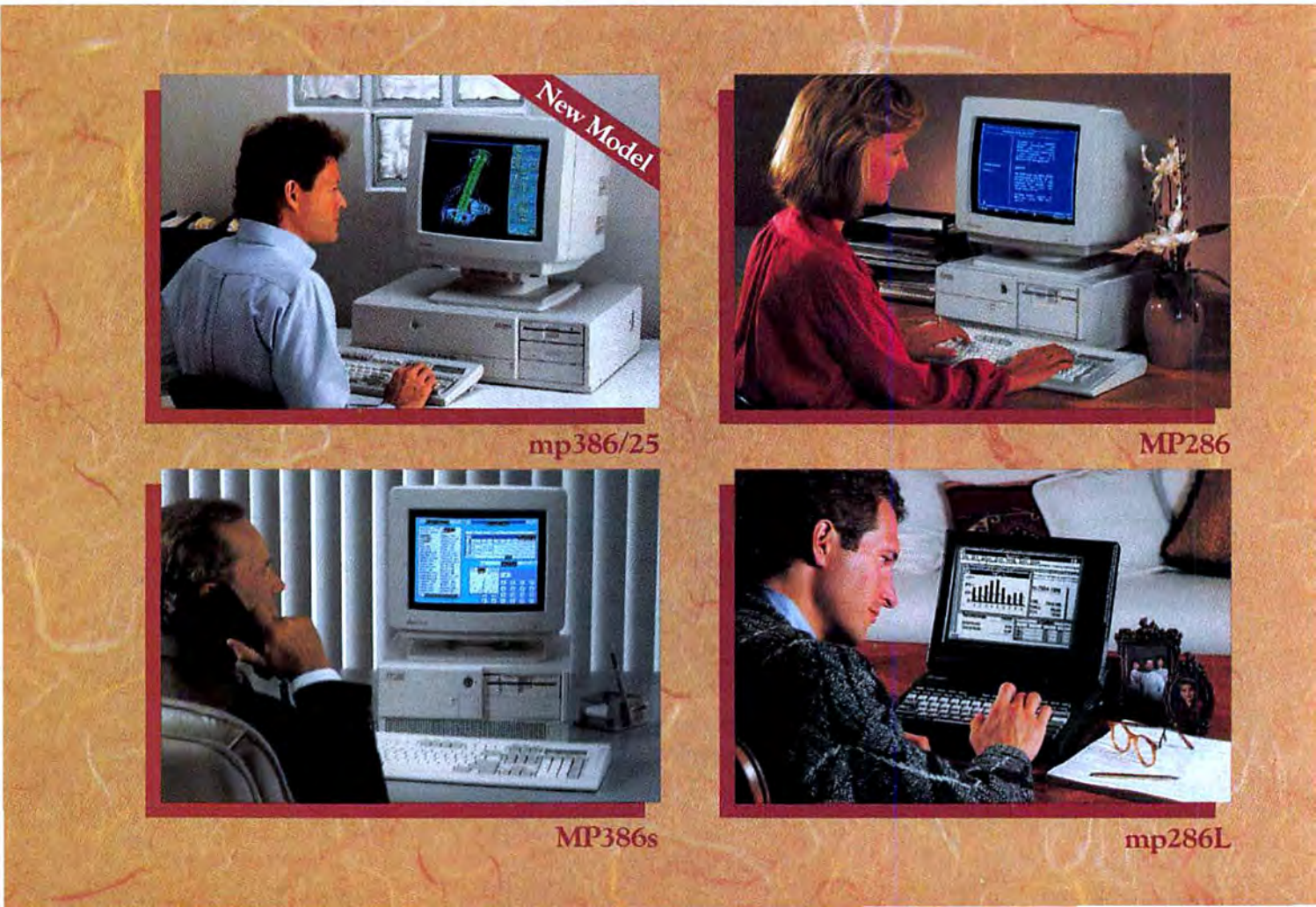
Brave New User

Q. *I just bought a used IBM PC. I also purchased a 384K memory expansion board to bring system RAM to 640K. However, I'm not sure that it was installed correctly, since I can't get the PC's only floppy drive to read disks. I'm stuck. I can work in BASIC, but otherwise I find the PC difficult to operate at all. Is there any advice you or your readers can offer this new user?*

Michael Faturoti
Roxbury, Massachusetts

A. Inside a PC there are two banks of tiny switches (eight each) that must be set to indicate the amount of installed memory. Switch settings also indicate whether other system resources—for example, the math coprocessor—are present. I'd bet that when the memory board was added, the switches were set incorrectly, telling the system that there are no floppy drives installed. It's pretty simple to set the switches once you learn how. What you need is someone to introduce your PC to you.



Seek out a user group. Your local computer dealer or local computer publication can probably lead you to one. There you'll find users of all kinds. You'll gain familiarity with the PC faster when you hear others recount their experiences, such as how expansion boards inside PCs can come loose during shipping. And you'll find that members learn from and teach each other. I'm sure someone would be willing to explain how to set the system board switches inside the PC to indicate the amount of installed memory, and why the original IBM PC limits system RAM to 544K. Someone may even have a copy of the premier issue of *PC World*, which, in an article about do-it-yourself RAM expansion, illustrates the possible settings.

WordPerfect Macro Conversion

Q. *It was kind of you to send me your new-subscriber premium of selected tips from* PC World's Star-Dot-Star *column. I copied the* WordPerfect *macros to my word processor's directory, but when I try to use them I get a 'File not found' error message. Those macros have a MAC extension, whereas* WordPerfect 5.0 *macros have a WPM extension. Should I assume those macros are only for version 4.2? Or is there some way I can use them with* 5.0? *I tried renaming ALTB.MAC to ALTB.WPM, but it didn't help.*

Michael Dawson
Cambridge, Massachusetts

A. The *WordPerfect 5.0* Conversion disk includes a "macro convert" utility, MACROCNV.EXE. It converts *4.2* MAC macros into *5.0* WPM macros, except for keystrokes and functions that have changed, which are converted into comments. A single command can convert one macro or a set of macros. The old macros remain undisturbed; the new ones are given the same name with a WPM extension. Copy the utility into your *WordPerfect* directory and issue the command MACROCNV /H for more detailed directions.

MACROCNV converts ALTB.MAC and ALTT.MAC. However, because ALTE.MAC (an envelope-printing macro) contains several page formatting commands that were changed for

(continues)

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5.0, MACROCNV cannot successfully convert that macro. But don't despair—*WordPerfect 5.0* includes a macro that will print envelopes. It's called <Ctrl>-E and is on the Conversion disk under the MACROS.WPK keyboard layout. Copy MACROS-.WPK into the Keyboard/Macro Files directory defined under Setup, Location of Auxiliary files (<Shift>-<F1>L); if no directory is defined, copy MACROS-.WPK to your *WordPerfect* program's directory (usually C:\WP50).

To select the MACROS keyboard layout, press <Shift>-<F1>K, highlight MACROS, and press <Enter> twice. Now press <Ctrl>-E to print an envelope. If the macro doesn't work, make sure there's an envelope form in the Select Printer: Forms menu. You can phone WordPerfect's toll-free printer support line at 800/541-5097 if you need help defining an envelope form. (General *WordPerfect* support is available at 800/321-3349.)

Note that the MACROS keyboard layout redefines the Font (<Ctrl>-<F8>) and Graphics (<Alt>-<F9>) keys, and also includes ten <Alt>-*key* macros, which will override any you may have defined already. To get around this problem, save the <Ctrl>-E macro as ALTE-.WPM using these steps: Press <Shift>-<F1>K, highlight MACROS, press E, highlight <Ctrl>-E, press S, type ALTE and press <Enter>, press Y if prompted to replace, then press <F7> to exit the macro editor and O<Enter> to restore the original keyboard layout.

Serial Feed

Q. *At the beginning of the year,* PC World *provided a nice program in "Lazy Formfeeds" [*Star-Dot-Star, *February 1989]. It works great on the printer attached to my parallel port. How can I modify it for the HP LaserJet connected to my COM1 serial port?*

Wilson V. Kone
Ithaca, New York

A. There's no need to modify the FF.COM program since it sends the formfeed command to the standard output device; you

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just need to designate the LaserJet as the standard output device before issuing FF.COM. Assuming FF.COM and the DOS command MODE.COM are in directories listed in your system's PATH command, you can make a batch file called LJFF.BAT using the following steps: At the DOS prompt, type **COPY CON LJFF.BAT** and press **<Enter>**. Type **MODE LPT1=COM1** and press **<Enter>**. Type **FF** and press **<Enter>**. Type **MODE LPT1** and press **<Enter>** (this command resets LPT1 as the standard output device, but output sent to COM1 will still go to that serial port). Press **<F6>** or **<Ctrl>-Z** and press **<Enter>** to save LJFF.BAT. Then move the batch file to a directory listed in your system's PATH command, and issue LJFF at the DOS prompt whenever you need to formfeed the LaserJet.

If you're a new reader without a copy of last February's *PC World*, you'll need to create FF.COM. Save the following lines in a plain ASCII file called FF.MAK:

```
A100
MOV DL,C
MOV AH,5
INT 21
MOV AX,4C00
INT 21

N FF.COM
R CX
B
W
Q
```

(You must include the blank line after the second INT 21.) With the DOS command DEBUG.COM in the same directory as FF.MAK (or available via the PATH command), enter the command **DEBUG<FF.MAK** at the DOS prompt.

PostScript ASCII

Q. *I have an AST TurboLaser/PS PostScript laser printer and would like to print reports directly from* dBASE III Plus. *Presently I go through the time-consuming process of converting the* dBASE *report files to ASCII and then importing the ASCII files into* PageMaker.

Do you know of any software with drivers that would enable me to convert my reports into

(continues)

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output that my AST printer will accept and print?

David J. Rylander
Panama Beach, Florida

A. Fortunately, there are few PostScript printers that don't support ASCII. Unfortunately, you've got one of them. Check out the latest version of your word processor; chances are, it includes a PostScript driver. It would probably be easier to pull your ASCII files into a word processor than into *PageMaker*. Furthermore, if you can modify the code that produces your reports so that it "tags" the beginning and end of headers with unique character strings, you'll be able to use your word processor to replace those tags with formatting commands to quickly spruce up your printed reports.

You should also be aware that your printer is capable of HP LaserJet and Diablo emulations when upgraded to EL status (although the $695 EL LPC Upgrade is no longer manufactured and may not be available). If your printer has the EL upgrade installed, a program to invoke the emulation modes should have been copied to your hard disk. With one of those emulations activated, you're able to print directly from *dBASE III Plus*.

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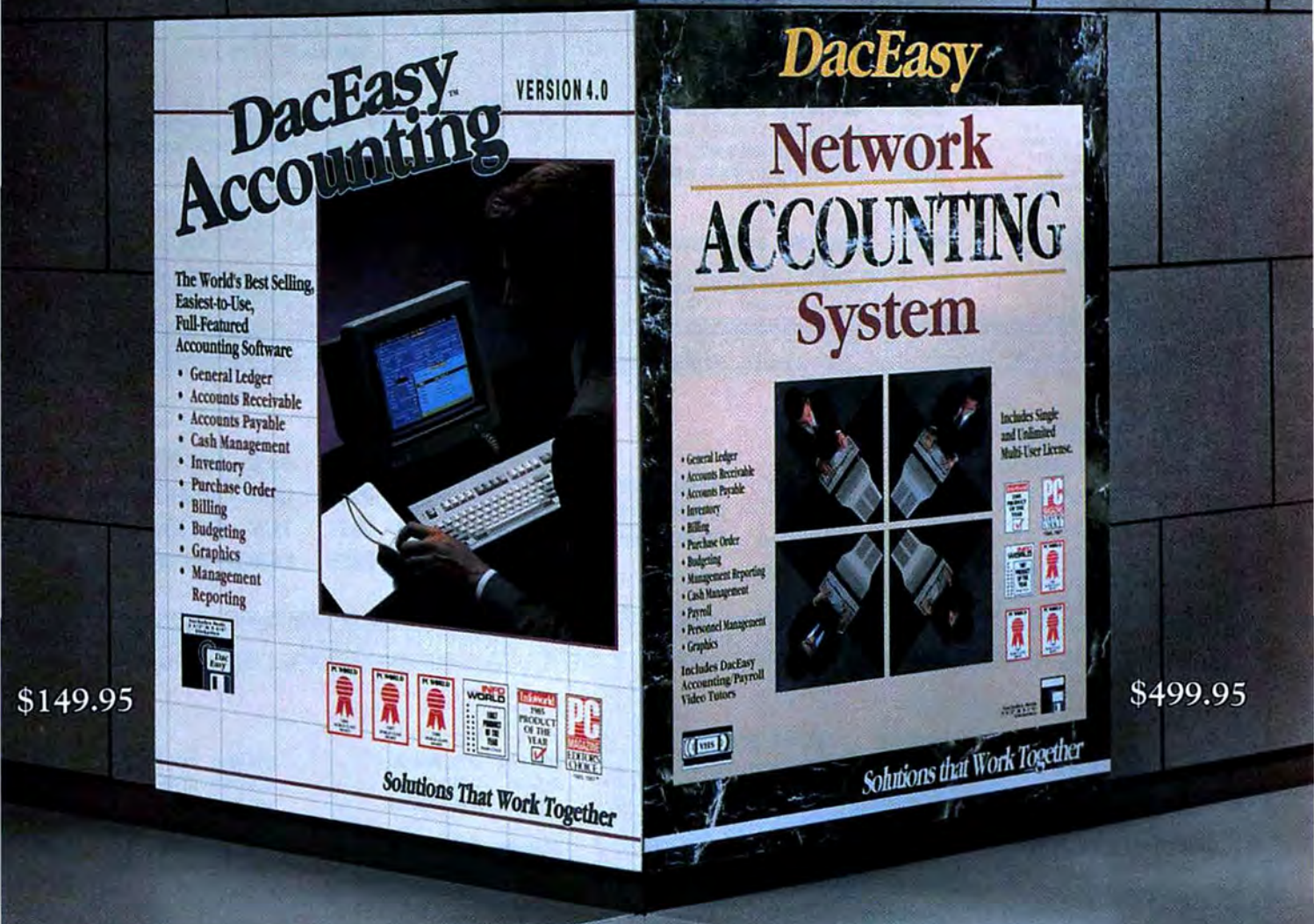

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WINDOWS JOURNAL

Firsthand dispatches from the Windows front

Microsoft finally brings word processing to Windows and gives Samna some stiff competition.

Stewart Alsop

A classic David-and-Goliath battle is developing over who will sell the primary word processor for the *Windows* environment. Small, Atlanta-based Samna, our story's David, has had a product in the marketplace for almost a year. That product, *Ami*, has won wide praise for being capable and easy to use, with an innovative approach to style sheets that even new computer users seem able to grasp quickly.

But *Ami* has had to compete with long-established DOS products as well as with the ultimate in vaporware, the unannounced but widely anticipated Microsoft offering. Since early 1989 almost everybody has known unofficially that Microsoft would be making a *Windows*-based word processor. Forewarned, Samna set out to build a second-generation version of *Ami*, called *Ami Professional*, that made clever use of the graphic user interface. Samna's design goals were to be competitive with Microsoft and to match users' expectations of what a powerful word processor can do, creating a major upgrade in the bargain.

Industry giant Microsoft, our Goliath, has clearly learned how to be successful in the applications software business. The first rule is not to worry about being nice to competitors (even if they are supporting an environment produced and promoted by your own system software operation). The second rule is to focus on designing a great product for the intended user. So Microsoft has been working on a word processor that is new and, in some respects, different from its progenitors, PC *Word* and Macintosh *Word*. And the scuttlebutt from beta testers and corporate evaluators has been very, very positive. At press time, *Word for Windows* was scheduled to ship by late December.

So that's the scenario: Both companies have experience with *Windows* and with word processing; both companies know what the competitive situation is; both knew in advance about the other's product. What's the reality? Which product is better? Does that even matter?

The Friendly Professional

As its name suggests, *Ami Professional* is a friendly program. As with the original (Samna plans to continue selling *Ami* as an entry-level product), the new interface is accessible and presents most of its features on the surface (instead of forcing users to burrow through dialog boxes or menu levels). It still sports the user-configurable icon palette along the left side of the screen so you can choose the most-used features by pointing and clicking. And it still uses the direct style sheet approach of its predecessor. But it has several new sets of features that propel it into the power category of word processors: macros and networking.

Since *Ami* was designed to be a graphical word processor, it starts with the idea that you should be able to edit your document as it will appear on paper. *Ami Professional* uses frames to enable you to drop graphics and sidebars onto the page, and it automatically reformats text around new or modified frames. *Ami Professional* reformats the page every few seconds. As a result, there is no print preview; the so-called normal layout mode shows what your page will look like at all times. You also get a draft mode, which drops all the formatting and just shows your text in the system font *Ami Professional* also includes full-

(continues)

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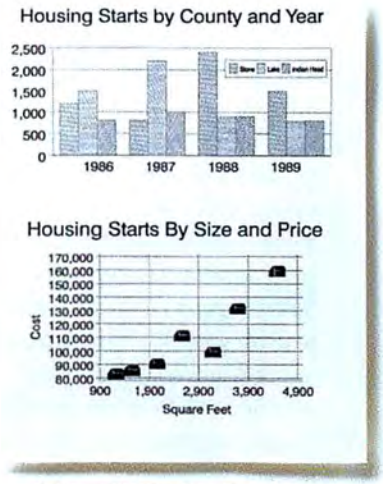

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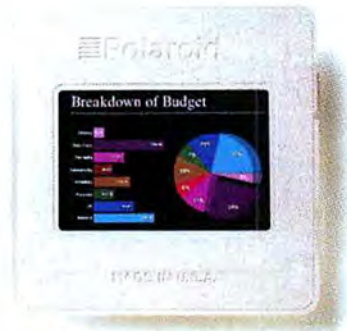

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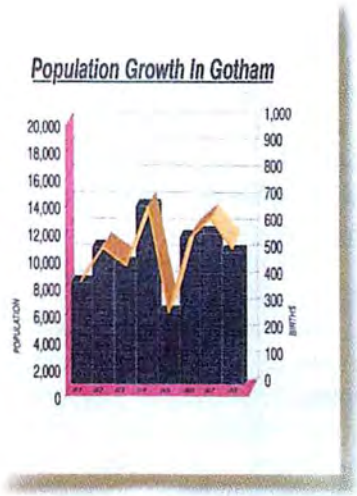

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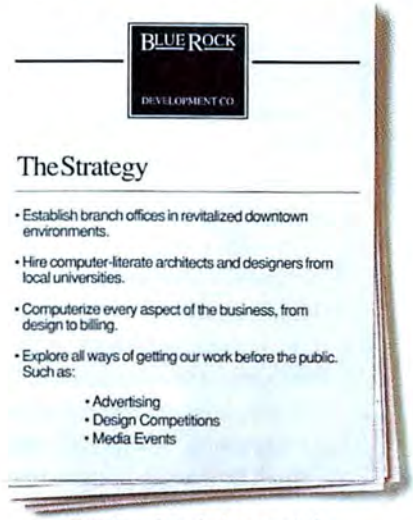

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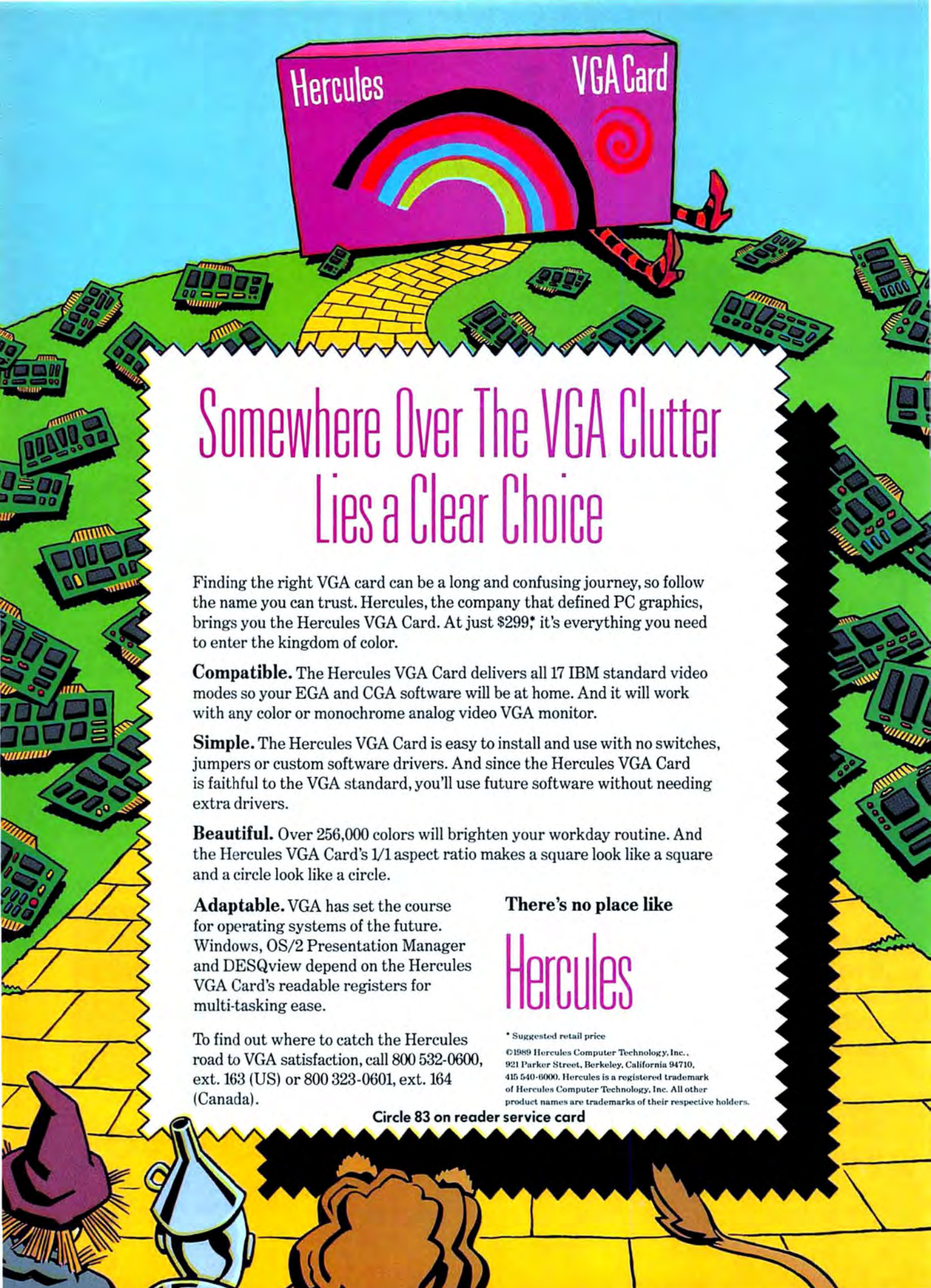

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Circle 83 on reader service card

featured drawing and charting that, combined with its typographic controls and graphics import feature, make it almost as capable as a simple desktop publishing program.

The Updated Monster

Microsoft Word has been around in various forms since 1983, when version 1.0 was introduced for PC-DOS. And *Word for Windows* still has its roots in that early version—DOS or Macintosh users who have acclimated themselves to Microsoft's nonintuitive way of implementing style sheets will recognize the product immediately, even though it uses different speed keys and command names. But *Word for Windows* is also a new product, designed to work well in the *Windows* environment, with a host of convenience features that come from Microsoft's long experience with word processing.

Word for Windows is a powerful screen-oriented text editor that also composes and prints documents on the latest output devices. Sound complicated? It is. But given the relatively disorganized nature of computers today and the mixed metaphors they present to both software developers and users, it fits right in.

Word for Windows has two faces: It's screen oriented so that banging out text is straightforward, and editing text on screen is equally direct. But once you want to print, it gives you powerful features for formatting text and then takes advantage of the best technology from Hewlett-Packard– or PostScript-compatible laser printers.

And the Winner Is...

So that's the battle line: a well-integrated, understandable, powerful product that takes most of its cues from desktop publishing, versus an integrated but still dual-personality product that has a much longer development history and appears more powerful and extensible. Both products have virtually every word processing feature there is. Both use *Windows* to the greatest degree possible. Both have annoying inconsistencies. The only major advantage to one side or the other is that Microsoft is Microsoft: owner of *Windows*, a company with demonstrated smarts and tremendous resources, and a worthy competitor. But then *Ami Professional* has a good chance of defining its own position in the marketplace.

Word processing, or more properly writing, is a uniquely personal application of personal computers, and users have always had strong opinions about their word processors. The result has been that word processing is a fragmented market with many successful products. When the dust settles, it looks like the winner will be the user. ●

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

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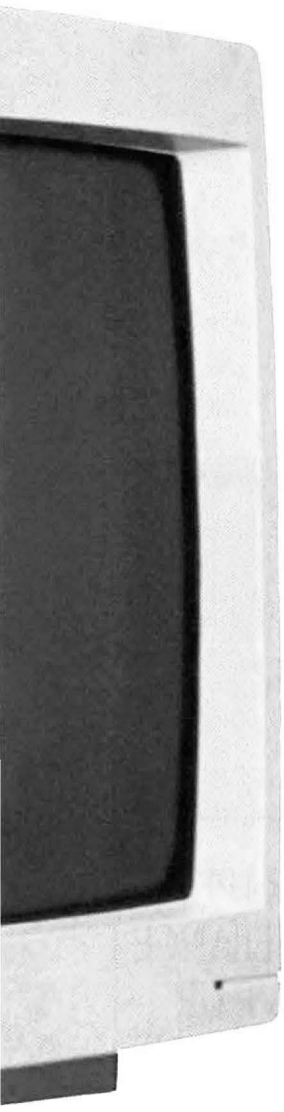

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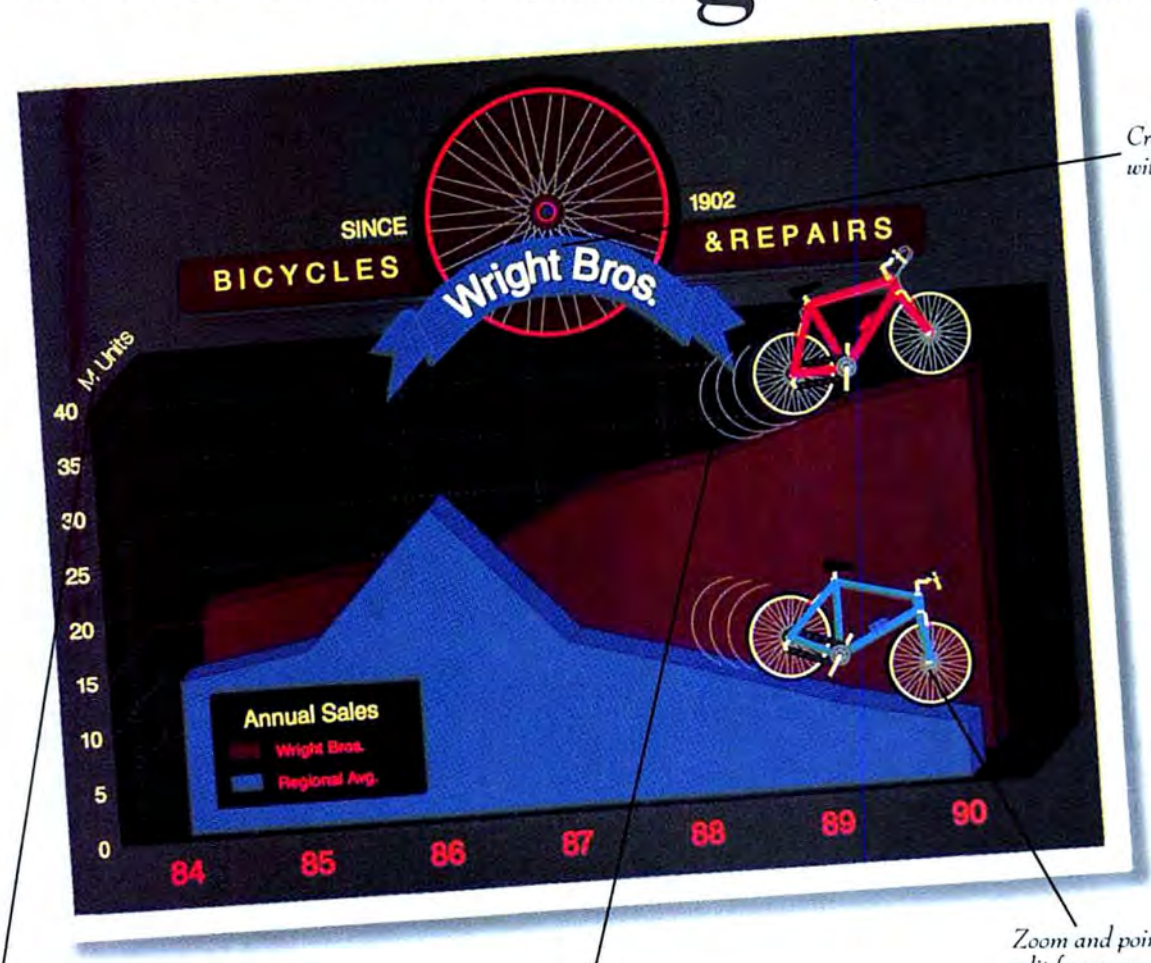

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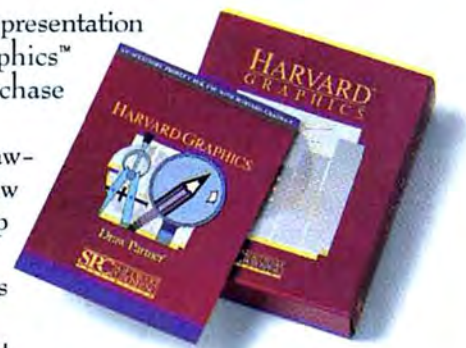

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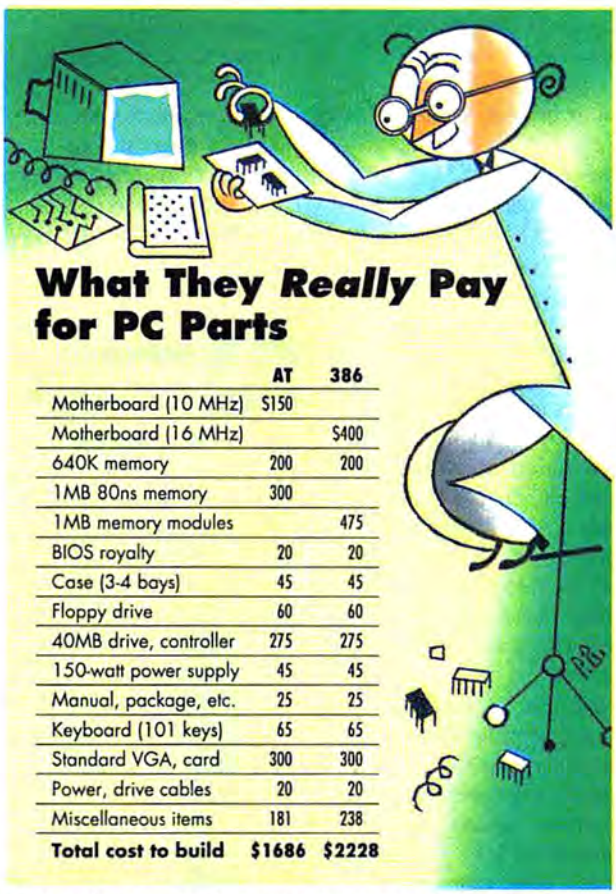
Circle 278 on reader service card

Edited by ERIC BENDER

Checking Out Low-End Firms

What Does a PC Cost?

Vendors Disagree on Parts Pricing



	AT	386
Motherboard (10 MHz)	$150	
Motherboard (16 MHz)		$400
640K memory	200	200
1MB 80ns memory	300	
1MB memory modules		475
BIOS royalty	20	20
Case (3-4 bays)	45	45
Floppy drive	60	60
40MB drive, controller	275	275
150-watt power supply	45	45
Manual, package, etc.	25	25
Keyboard (101 keys)	65	65
Standard VGA, card	300	300
Power, drive cables	20	20
Miscellaneous items	181	238
Total cost to build	**$1686**	**$2228**

The costs above are manufacturers' lowball estimates for complete low-to-midrange configurations. Vendors pay an additional 12 to 22 percent of the cost of finished goods for miscellaneous items such as labor, import duty, overseas freight, and DOS and other royalties; twelve percent is assumed here.

PHILIP ANDERSON

You've seen them in magazines and newspapers and even on the street: It's hard to ignore ads for XTs priced as low as $549, ATs for $999, or a 386 for the incredible price of $1995. But as manufacturer FastMicro asks rhetorically in ads for that last machine, "What's the catch?"

If these bargains are quality products backed by quality service, why don't Compaq and IBM or solid second-tier vendors like AST Research and Zenith sell at those cover prices? Are the name manufacturers price-gouging? Or are clone makers like FastMicro simply better business managers—able to sell for less and still prosper?

To start with, many of the lowest prices (although not FastMicro's) apply to stripped-down offerings that lack certain "nonessentials" like a monitor and a hard disk.

But beyond that, large and small manufacturers aren't even close to agreement on what it costs to build a PC. The accompanying chart gives a breakdown of typical system component costs according to several brand-name PC makers. These high-volume vendors put the cost to manufacture and deliver a low-end AT at $1686 and the cost of a 386 at $2228 (a similar XT would cost $1154). If these numbers are reliable, the big suppliers' manufacturing costs exceed the list price of many cut-rate PCs.

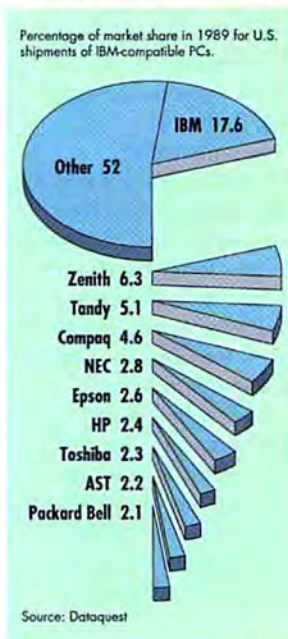
"Way overstated," retorts Joe Lackey, president of FastMicro in Phoenix, commenting on those figures. He maintains that he can put together an AT for $1162 and a 386 for $1547 and sell the systems for $1645 and $2175, respectively. In fact, he claims to be "a little miffed" that name-vendor prices are so high.

Component costs vary daily with supply and demand and also reflect the quality of the part used. But large vendors gain preferential pricing through volume purchasing and may save still more by designing and/or manufacturing their own components?

Small manufacturers conserve money by forgoing fancy offices and large staffs. Since many sell through mail order, mass merchants, or their own independent storefronts, they don't incur the added cost of managing a far-flung network of resellers. Jim Ashbrook, senior vice president of AST Research, reports that as much as 14.5 percent of the roughly $2000 that dealers pay for the AST Bravo 286 goes to this type of overhead.

Even Lackey admits that clone makers like himself stick to older *(see PC Cost, p. 62)*

Leading PC Supplier: "Other"



U.S. customers bought slightly less than half their PCs from the top ten suppliers in 1989—emphasizing the opportunities that dozens of other manufacturers have found.

Specialized Servers Target Corporate Network Jobs

Standard 386 Servers Remain Competitive

NetFrame was born and bred for service—PC network service. This "network mainframe" server's esoteric multibus architecture can be crammed with up to eight 386 or 486 boards to zip data around the network. It boasts carefully crafted mainframe-style reliability safeguards, software designed to smooth network life, and a voice synthesizer that can cheerfully recite a list of ailments to the net administrator.

The first in a new class of machine, NetFrame received much publicity when it debuted this fall —partly because of a distribution contract with reseller giant Businessland (which was cofounded by Enzo Torresi, now president of NetFrame Systems in Sunnyvale, California).

Soon thereafter, though, NetFrame found itself upstaged by a rival Compaq product, the Systempro. While the Systempro can't approach NetFrame's raw throughput, it too takes the Godzilla approach to net service, with dual 486 processors and plenty of EISA slots for other net functions (see the sidebar "Super Servers" in the EISA preview in this issue). And it adheres to Compaq's genetic code, Industry Standard Architecture.

NetFrame and Compaq's Systempro are leading the charge of specialized hardware on the multibillion-dollar PC network server market. They join more conventional offerings from network vendors, such as 3Com's 3Server/500, which has a unique memory architecture, and the Everex/Storage Dimensions NetWare server, which doubles the speed of I/O traffic over an AT bus.

Despite these new alternatives, high-performance PCs will run most PC nets for the foreseeable future and may remain competitive as servers even in large corporate sites.

With NetFrame, you get the greatest power, specialization, and cost. "It's a very nice package for large, complex installations," comments Lee Doyle, manager of the LAN program at International Data Corporation in Framingham, Massachusetts. The biggest plus, he says, is ease of administration. Nor is the boosted reliability that NetFrame provides a trivial advantage. Observes Nina Burns, vice president at Infonetics in San Jose, California, "What does it really cost your company when your network goes down?"

Still, with NetFrame prices starting at $22,500, "you pay substantially more than you do for a standard Compaq," Doyle says. "And it's a proprietary design, so you'd better hope the thing works and the company stays in business."

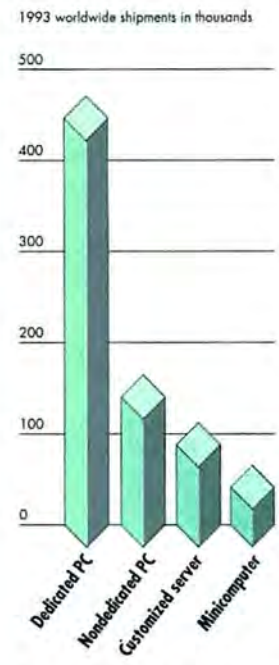
According to Steve Guengerich, editor in chief of *NetWare Advisor* in Houston, Texas, "You don't have to lock yourself into a specialized architecture." Powerhouse servers make sense for client/server data base jobs. But in other situations, rather than installing a large net with a screamer of a server, you may be better off building bridges between smaller nets with standard PC servers.

Curiously, the world's largest provider of big-ticket hardware also advocates a decentralized approach. "You should think of the network server as a busmaster card that you drop into a PS/2," declares Robert Carberry, vice president for systems at IBM Entry Systems Division: With that approach, he argues, you can exploit all the Micro Channel slots on machines throughout the net.

But NetFrame offers much higher performance than any PC-based alternative, argues Chuck Stegman, senior marketing manager for Businessland Advanced Systems, and it makes sense on any net that needs more than one 386 server because bridges aren't both cheap and flexible.

Given all the choices, it's time for some serious tire kicking, Doyle suggests. Burns anticipates that PC servers will remain the most common choice, but we'll see "all sorts of servers all over the place." —*E. B.*

PC Servers: Bright Future on PC Nets



While a new breed of customized network server will find a corporate home by 1993, most PC nets will incorporate a high-end standard-architecture PC server, International Data Corporation predicts.

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PC Magazine [July 1989, Page 263]:
"The Buffalo SL peripheral sharing device is simple enough to use immediately yet sufficiently flexible to form the center of a fairly complex network. It's a good choice..."

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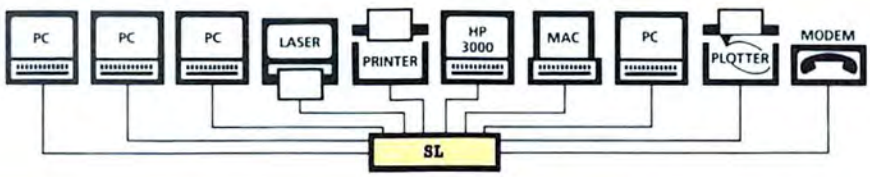

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Lotus Still Dominates Spreadsheet Marketplace

Excel Gains Share, but Not From 1-2-3

If Microsoft ever had a chance to grab the lead in spreadsheets, it came when Lotus stumbled badly in updating *1-2-3*. The largest PC software house unleashed a full-scale assault behind *Excel*—everything from promotions to personal appearances by Bill Gates—but failed.

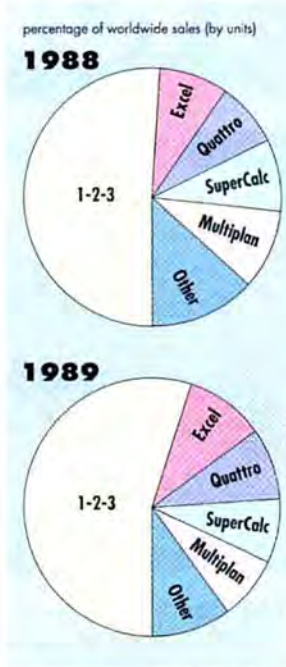
Well, not really—Microsoft chairman Gates claims that *Excel* PC sales rose 75 percent in the past year, and the package did gain market share. But not at Lotus's expense—every independent survey shows Lotus maintaining or lengthening its lead during that time. "Frankly, I was surprised at the lack of impact," comments Rick Faulk, marketing vice president at Lotus.

Lotus had fought back with all its marketing might and savvy and with costly promotions that dragged down the bottom line. By this fall, with *1-2-3* releases 3 and 2.2 both shipping, the numbers looked rosy again, with profits up 51 percent. Sales were evenly split among the three *1-2-3* versions, and three-quarters of the upgrades from *2.01* were to the heavyweight release 3. Moreover, an upcoming version for Tandy's *DeskMate* environment represents "real incremental opportunity," notes David Bayer, analyst with Montgomery Securities in San Francisco.

"The spreadsheet race is not all features and price; it's largely one of familiarity," says Bayer. *1-2-3* users stood firm; *Excel* gained at the expense of *SuperCalc* and other also-rans.

"The next battlegrounds will be OS/2 and, to a lesser extent, UNIX," comments Nancy McSharry, analyst at International Data Corporation. Here also Lotus is well established. Microsoft now sells a version of *Excel* for OS/2 Presentation Manager while Lotus doesn't yet, but the timing's not critical because OS/2 hasn't spread beyond firms that already own a corporate jet. And Lotus's upcoming *1-2-3/G* not only finesses the challenge of embracing both familiar keystrokes and the Presentation Manager interface, it will add major "what if" problem-solving skills. —*E. B.*

Lotus's Woes Can't Stop 1-2-3 Growth



Despite Lotus's well-publicized problems in updating its best-seller, *1-2-3* gained market share in 1989, according to International Data Corporation. IDC estimates that 2.2 million spreadsheet packages shipped worldwide in 1989.

PC Cost

(continued from p. 59)

technologies and therefore save the 5 percent or so that an AST spends on pushing the state of the art. Other large-vendor investments include extensive compatibility and quality testing.

Ultimately, though, the price you pay for a PC has little to do with what it costs to build. As any business student will tell you, price is a function of demand, not cost: Price is merely the manufacturer's best guess at the most it can charge and still sell every unit. When sales go down, so do prices, until a company can no longer cover costs and post a profit.

That's where manufacturer costs begin to affect you, the buyer. Big-name vendors claim that long before their clone-making cousins go Chapter 11, those companies will cut back on component quality and service. "Clone makers take off-the-shelf components wherever they can get them, and they may be using reject memory or even CPUs," asserts Fred Helms, vice president of sales for Amstrad. "They are definitely sacrificing things like service, good staffing, and R&D."

Balderdash, says Packard Bell marketing director Dennis Cox, who claims that his Legend 5 286 uses only quality parts and that consumer electronics stores' $1750 price for the machine includes $250 worth of free software. The Legend's one-year warranty includes four months of on-site service by AT&T Paradyne. So does the company's Force 386SX, which sells for around $2400 sans software.

Still, Amstrad's Helms suggests that before buying, you check the vendor's financial statements or Dun & Bradstreet ratings, or consult the Better Business Bureau or local chamber of commerce. You can even call the Federal Communications Commission to determine if that agency's approval rating on the box is forged. A less than professionally printed label on the DOS copy is one tip-off to trouble. Ashbrook suggests popping the top of a system to judge quality before you purchase.

In the end, you decide how much you're willing to pay for the security of a name brand. As Ashbrook reminds us, "there is no free lunch. There are bargains, but they always come with tradeoffs." —*Mike Hogan*

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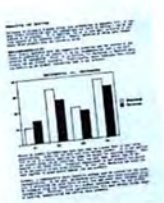

These days, if you want someone's undivided attention, you have to command it. Introducing the new NEC Pinwriter® P2200XE. A top quality 24-wire dot matrix printer with the commanding presentation skills of an old pro, the high speed and low price of a young upstart. It's the perfect printer for anyone on a budget.

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Pinwriter P2200XE

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Suppliers Shift Focus as Utility Sales Grow

Unifying Broad Product Lines

The PC Tools Deluxe standard-interface approach has paid off well, says Central Point's Michael Brown.

Is there really one utility software title for every PC user? No. But the blizzard of packages conceals a market that reached $164 million in 1989, according to Dataquest estimates. Three firms, each claiming more than a million users, are duking it out at the top.

Peter Norton Computing, formed by the PC technical guru, is the veteran company that pioneered data recovery/disk management packages. While Norton steadily churned out updates to *The Norton Utilities* and the *Norton Commander* DOS shell, the firm's business planning seemed on autopilot until early last year. Since then, "we've been getting a whole lot more serious," says Norton.

Last spring Norton brought in industry hotshot Ron Posner as chief executive, plunging the Santa Monica, California, firm into turmoil and triggering a lawsuit from the executive Posner replaced. Posner, at his fourth PC software firm since 1985, predicts Norton Computing will post $25 million–plus sales for 1989 and show 50 percent annual growth for the next two years. This fall the company updated *Commander*, entered the disk backup arena, and turned away from its programming tools.

Fifth Generation Systems, which expects $42 million–plus revenues for 1989, shot by Norton largely on the success of its *FastBack* backup software. The Baton Rouge, Louisiana, firm is also cobbling together an extensive product line, mostly acquired, picking up the Paul Mace data protection/recovery products last summer and the *Brooklyn Bridge* communications program this fall.

Central Point in Beaverton, Oregon, began hitting the jackpot two years ago with *PC Tools Deluxe*, which combines a DOS shell, data recovery/disk maintenance features, a desktop organizer, and other tools under an SAA-style user interface. Central Point president Michael Brown, who expects around $30 million in sales in the year ending this March, declares that "users want to spend time on major applications, not on utilities," a consideration that mandates a single, standard interface. Brown underlines the importance of ease of use by noting how products like *The Mace Utilities* offer excellent functionality but still don't climb the hot lists.

"It's essential that we have a common look and feel to our products, and we're working on that," responds Fifth Generation president Barry Bellue. Norton feels that the need for a single interface has been oversold, but he acknowledges that "you don't want wildly different interfaces between products."

While Norton strengthens *Commander* with E-mail capabilities, file viewing, and other goodies, Bellue sees little future in DOS shells. "The leaders are seeing an enormous shrinking of demand," he says, and this will only accelerate as IBM and Microsoft nudge the PC world toward graphic environments.

All three utility firms plan to boost functionality in their star products, to pounce on opportunities in communications and nets, and to selectively move onto platforms like *Windows* and UNIX. All three also emphasize prompt technical support —users who have just lost their accounting data don't want to listen to mood music. Fifth puts 30 of its 140 employees on the support lines.—*E. B.* ●

ROBBIE MCLAREN

The Price of Portability

Low-end battery-powered laptops without hard disks cost relatively little more than corresponding desktop models. But if you want a more powerful laptop with a hard disk, be prepared to dig into your wallet. This figure compares similar configurations of Tandy floppy-based models, Compaq AT compatibles, and Zenith SX-based machines; desktop prices include monochrome monitors.

TWO-FISTED MANAGEMENT
Marek, 33
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"NEW AGE PROFITEERING"
WE'VE COME A LONG WAY IN UNDERSTANDING OUR COSMIC INTERDEPENDENCE. WITHOUT EACH PERSON'S UNIQUE INNER CONTRIBUTION TO THE WHOLE, A PROFIT OF 60 TO 70% MIGHT NOT BE POSSIBLE.

It's no longer enough to simply chalk up high profits. Now we must profit in tune with the universe.
Lois, I want this deal ready by the end of the week – before the moon hits its 2nd phase.

Breaks will never be the same.
Hold all my calls, Ms. Verner.
OOOMMM

The old employer/employee adversarial roles will disappear.
We are One (in all but salary).

A balanced diet will be essential.
That brown, lumpy stuff — is it organic?

New sources of corporate counsel will be tapped.
As your accountant, I'd say it would be in your best interest to sell the division.
As your astrological adviser, I must warn you... bad karma, sir, bad karma.

Of course, it is very early in the '90s, so there will be occasional lapses back to the "ME" decade.
Sell the division.
CRACK!

MARK MAREK

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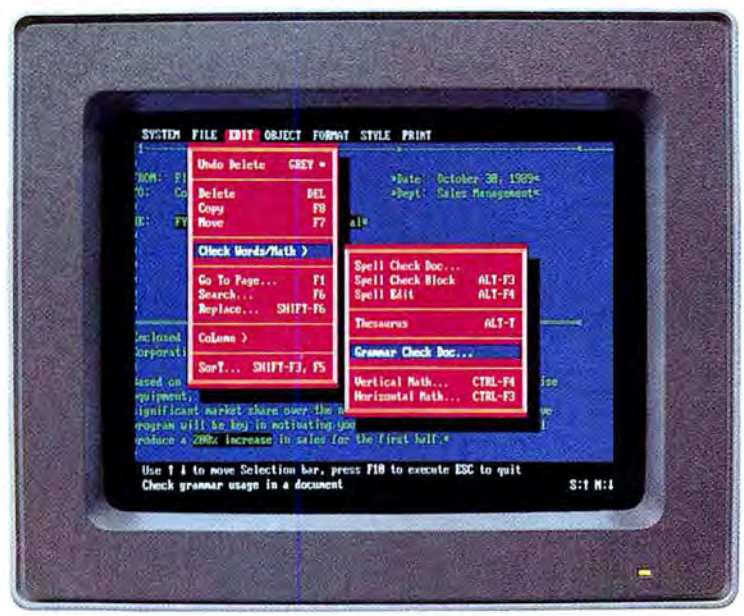
Now virtually any graphic can be imported by using easy Pull-down Menus.



Integrated grammar checker (Grammatik™ IV) helps you automatically enhance grammar and style.

Ashton-Tate's new MultiMate® version 4.0 takes you beyond word processing. And beyond other word processors.

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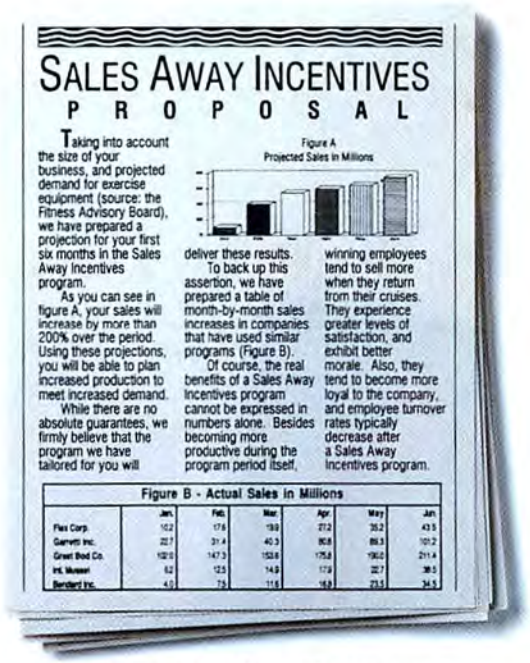

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Better yet, imagine how MultiMate's new integrated Electronic Mail will let you send or receive documents and messages instantly. The convenient Pull-down Menus give you access to a modem or local network from within MultiMate. Or, you can exchange mail via gateways with IBM PROFS, DEC All-In-One and other systems.

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HP's EISA Breakthrough

Hewlett-Packard demonstrates the first PC with Extended Industry Standard Architecture (EISA), the industry's bold rebuttal to IBM's Micro Channel.

Eric Knorr

The Vectra 486 PC offers eight EISA slots, but so far HP has no EISA boards to fill them.

PC World offers first impressions of prerelease hardware and software

It's hard to find applications that tax the good old AT bus. But for tasks that do, such as serving large networks, transaction processing, or playing host to dumb terminals, Hewlett-Packard offers a sensational solution—the HP Vectra 486 PC, the first EISA machine.

Shipping this quarter, the 25-MHz Vectra 486 PC offers large expansion capacity, special graphics options, high-speed mass storage, and processing performance that HP estimates to be 33 percent faster than that of a 33-MHz 386. And of course, EISA provides intelligent, high-throughput capabilities similar to those offered by Micro Channel architecture (MCA). However, at this writing, the company has not yet announced any EISA boards to fill the system's eight 32-bit EISA slots.

Fortunately, EISA slots (unlike MCA slots) accommodate standard 8-bit and 16-bit expansion boards, so the Vectra 486 PC has no shortage of potential peripherals. Perhaps the most impressive of them is the machine's custom-tailored SCSI drive subsystem, which comes with a choice of three 15ms HP drives and an Adaptec controller with a 20-megabit-per-second throughput rating. With HP's tanklike tower chassis wrapped around all this computing power, and room for up to six 5¼-inch half-height devices, the Vectra 486 PC could make a monster server.

***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.**

FRED STIMSON

A Titan for Tough Jobs

The Vectra 486 PC is hardly an impulse buy. The base model costs $13,999 with 2MB of RAM and a 150MB SCSI hard disk, and $16,999 with 2MB RAM and a 330MB SCSI hard disk (a 670MB model will also be available, but no pricing has been announced). That's a nice chunk of change, but remember that EISA machines aren't designed to be everyday workstations.

In addition to serving a network, the Vectra 486 PC could easily host a horde of terminals, thanks to 486 processing power, the EISA bus's capacity for multiple high-throughput peripherals, and the ability to hold 64MB of CPU-speed RAM—four times the amount supported by most 386 systems. Running UNIX System V/386, the machine can support 64 users, claims HP.

The company would also like you to consider the Vectra 486 PC a CAD workstation. Selling to design professionals has become the cornerstone of HP's system marketing strategy, and many HP dealers now offer elaborate bundles that include HP plotters, engineering software, and high-end graphics hardware. The 486's built-in math coprocessing power is ideal for CAD, and the EISA bus's ability to arbitrate multiple peripherals could help protect a boardpacked CAD system from interrupt conflicts.

Of course, you can always consider the Vectra 486 PC tomorrow's business PC (any *Excel* user who's seen the program run on a 486 breathes a sigh of relief). But you'd probably be wasting the EISA bus's superior throughput. Unless multitasking several heavy-duty, disk-intensive applications is a serious possibility, a single user is unlikely to run up against the limitations of a standard AT bus.

Switching to the Latest Channel

EISA's most conspicuous benefit is the same as MCA's: software-based installation and configuration of expansion boards. Although it wasn't available for preview, an EISA Configuration Utility will ship with the Vectra 486 PC and claims to offer features similar to those

SNAPSHOT

HP Vectra 486 PC

The first EISA system to appear in public, the Vectra 486 PC has a tower chassis with plenty of room for boards and drives and comes standard with one of three high-speed SCSI drive options.

KEY FEATURES

- **Extended Industry Standard Architecture**
- **25-MHz 486 CPU**
- **64MB CPU-speed memory capacity**
- **Room for six 5¼-inch half-height drives**
- **150MB and 330MB 15ms SCSI drive options**

AVAILABILITY

First quarter 1990

PRICING

$13,999 to $16,999

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

Reader service no. 665

of IBM's Programmable Option Select.

When you install an EISA expansion board, you'll simply copy configuration files from a disk bundled with the peripheral and run an automatic configuration routine. A readout will include a description of all boards and which slots they occupy, and you can change arbitration levels for EISA boards to give certain devices priority. If you have standard expansion boards installed, the Configuration Utility suggests the optimum DIP switch settings.

Of the eight EISA slots in the Vectra 486 PC, two were occupied in the prototype we examined: One held the Adaptec controller, the other an HP VGA card. Pushing boards in and pulling them out seems to take about the same amount of force as with standard slots.

SUPER SERVERS

Designed to serve a work group, Compaq's EISA-based Systempro accepts two CPUs, which divide up application and operating-system tasks.

To most users, EISA is just another four-letter acronym. Vendors are acutely aware of this "show me" attitude about latest/greatest technology and so are taking great pains to debut EISA systems with immediate, demonstrable benefits.

Compaq, Zenith, and NEC have EISA PCs in the works that show the bus's advantages where they count the most—in high-performance mass storage. Although prototypes were unavailable at this writing, the companies provided considerable detail, revealing that four of the five fledgling machines incorporate EISA bus-master controllers designed to handle multiple high-speed drives.

All of these heavy-duty systems are meant to serve multiple users. Zenith's Z-386/33E was scheduled to ship in December and to include the company's EISA Mass Storage Controller, a bus master that handles up to 14 drives. NEC plans to deliver two units this month: the 25-MHz, 486-based PowerMate 486/25E, and the 33-MHz, 386-based 386/33E. Both come standard with NEC's EISA Peripheral Controller, yet another bus master.

Compaq's 486/25, which the company intends to ship sometime this quarter, is the only one of the five systems that lacks an intelligent controller. But Compaq's Systempro (scheduled to arrive in December) offers more performance potential than any PC we've seen. It appears to have the most powerful mass storage subsystem, but the real innovation is a multiprocessing architecture that promises to bring a whole new level of computing to PC applications.

Systempro: Mainstream Multiprocessing?

The benchmarks aren't in, but EISA bus masters should speed throughput considerably—especially when handling multiuser I/O. However, these devices still leave the CPU to manage both operating system and file I/O tasks.

Compaq's Systempro, with its removable-processor-board design, goes beyond mere bus-master support. The system can actually accommodate two CPU boards—two 386s, a 486 and a 386, or two 486s—enabling users to nearly double server performance using special software. With Compaq's new proprietary version of OS/2 *LAN Manager*, the Systempro dedicates one processor to *Compaq LAN Manager* and the high-performance file system, while the other CPU runs OS/2 and OS/2 applications. Systempro-specific extensions to SCO UNIX System V/386 and Novell's *NetWare 386* will also provide special performance advantages.

The extension to *Compaq LAN Manager 386/486* should be ready when the machine ships—at a cost of $2500 (on top of the $2500 you'll spend for a ten-user version of the LAN operating system). No release dates have been set for the other extensions.

Of the intelligent controllers discussed, the Systempro's 32-bit Intelligent Drive Array (IDA) looks like it will have the most smarts. Its 16-MHz Intel 80186 processor handles up to four synchronized hard disks, distributing data across multiple drives as if they were one drive. The 80186 receives and queues multiple simultaneous requests, allowing the drives to operate concurrently.

Compaq claims that with four drives, the IDA's parallel data transfer scheme yields a fourfold increase in mass storage performance, reaching a 6MB-per-second array transfer rate. In addition, the

The motherboard also holds four proprietary slots—two for I/O, one for a special CPU board, and one for the system memory board. One of the I/O boards offers a serial port, a mouse port, and the keyboard port; the other has one parallel and one serial port.

As with all Vectra towers, the CPU board sits at the base and can be removed easily. (This would seem to offer an easy way to upgrade to, for example, a 33-MHz 486, but HP has not revealed any plans to allow users or dealers to do so.) Unlike other announced 486 units, the system does not include a socket for the Weitek 4167 math coprocessor, which seems odd considering that the chip is meant to speed CAD applications, HP's specialty.

A custom memory controller on the Vectra's sys-

IDA supplies several data integrity features, including data guarding, which backs up all data in compressed form using only 25 percent of a drive array's storage. You can also employ conventional disk mirroring or duplexing to protect data.

The Systempro offers many other striking features. It provides six EISA slots, supplies a fast 64K memory cache for the 386 CPU, and accommodates up to 256MB of RAM ($176,000 worth of memory, anyone?). With 4MB of RAM and a two-drive, 240MB array, the 386-equipped Systempro costs $15,999; with a two-drive, 420MB array, the price rises to $19,999. And for really big work groups, $25,999 will get you a unit with a four-drive, 840MB array.

Drives That Know It All

Compaq's Deskpro 486/25, like the HP Vectra 486 PC, will ship without any EISA peripherals. But the Deskpro 486/25 is still no slouch; offering six EISA slots, support for the 486's burst mode, and a 128K secondary memory cache, it will hold up to a whopping 100MB of CPU-speed RAM. The standard configuration includes 4MB of RAM; with a 120MB hard disk, you'll pay $13,999. The 320MB model costs $17,499; the 650MB model $20,499.

The Zenith Z-386/33E couples an EISA bus with an intelligent controller that can handle four ESDI, seven SCSI, and two floppy drives.

NEC's PowerMate 486/25E includes a bus-master hard disk controller, a secondary cache for the 486, and accommodations for up to 64MB of CPU-speed RAM.

However, the systems offered by Zenith and NEC seem to show more sizzle than Compaq's desktop. The Zenith Z-386/33E's claim to fame is an EISA Mass Storage Controller that, like the Systempro's IDA, employs multiple drives to improve performance. Driven by a NEC V30 (plus a less powerful proprietary processor), it queues multiple requests and coordinates concurrent activity on up to four ESDI drives.

The controller's special monitoring scheme constantly tracks where data is on disk, reducing seek time and ensuring that the right requests go to the right drive. Zenith claims that a 1MB cache, coupled with a 15-megabit transfer rate and a 32-bit interface, enables the controller to shovel a whopping 16MB per second onto the bus using EISA's burst mode. Along with the four-drive array, you'll also be able to hook up two floppy drives and as many as seven SCSI devices. If you wish, the board can also function as a conventional ESDI controller, handling a single hard disk.

The Z-386/33E has six EISA slots total. It holds up to 20MB of CPU speed RAM, and like the Z-386/33 and

(continues)

tem memory board supports the 486's burst mode—without the expense of super-fast RAM for a secondary cache. Instead, the memory controller uses a paging/interleaving scheme that relies on a special 64-bit–wide data path to main memory, resulting in burst mode support that HP claims is on a par with secondary cache systems from other vendors.

Just Another 486?

HP was the first to show a working EISA system, but it was also the only vendor to introduce one without any EISA boards, let alone the bus-master EISA boards announced by Compaq, Zenith, and NEC (see the sidebar "Breaking the Board Barrier"). Instead, the company offered high-speed SCSI options and high-end graphics boards that could enhance any standard system.

The graphics boards clearly target the CAD market. The Intelligent Graphics Controller (IGC) 10 (available now) is one of the first boards based on the high-performance TI34010 graphics coprocessor to offer 1024 by 768 resolution for under $1000. On the high end, the IGC 20 (available in February) will be the first graphics board based on the 34020 Texas Instruments' new 12-MIPS (millions of instructions per second) processor. For $2495, this board will give you blazing CAD performance at a resolution of 1280 by 1024.

Without EISA boards to exploit the bus, however, the Vectra 486 PC is just another 486 box. For the time being, you'll have to go to other vendors to find the intelligent peripherals necessary for the system to realize its greatest potential—serving multiple users with unprecedented efficiency. ●

Eric Knorr is a senior editor for PC World.

SUPER SERVERS

(continued)

Z-386/25, it comes with a 16K removable memory cache that you can replace with a larger cache as options become available. With 4MB of RAM and a 150MB ESDI drive, the Z-386/33E costs $11,999; with a 320MB ESDI drive, $13,799.

At press time, information about NEC's PowerMate 486/25E and PowerMate 386/33E was sketchy. NEC says the 32-bit EISA Peripheral Controller used by both units is a bus master that handles up to seven SCSI devices, and the company claims the board can support a 33MB-per-second burst transfer rate (EISA's maximum). The controller uses a 68000 processor and queues requests to support high-speed, concurrent drive activity.

Both PowerMates have five EISA slots and are the only EISA systems announced so far that also include a standard 16-bit AT slot. The PowerMate 486/25E has a 64K secondary cache for the 486 and holds up to 64MB of CPU-speed RAM; with 2MB of RAM and a 118MB SCSI hard disk, the unit costs $11,999. (With a 300MB SCSI drive, the price rises to $13,999; a 600MB model will ship midyear, but no pricing was available.)

The PowerMate 386/33E has a 64K memory cache for the 386 but half the CPU-speed memory capacity of the 486/25E. All 386/33E units come standard with 2MB of RAM; the 100MB SCSI-drive model goes for $8499, the 300MB one for $10,799. NEC plans to ship a 600MB SCSI model at midyear, but again pricing was not set.

NEC, Compaq, Zenith, and the rest of the EISA gang clearly made a collective effort to deliver multiuser solutions that provide clear-cut benefits impossible with standard-architecture systems. With intelligent EISA devices from system manufacturers and third-party support to match, it looks as though work groups that need a new class of powerful server or multiuser host won't be disappointed. —E. K.

WHERE TO BUY

Deskpro 486/25
Compaq Computer Corp.
20555 SH 249
P.O. Box 692000
Houston, TX 77269-2000
800/231-0900,
713/370-0670
LIST PRICE: with 4MB of RAM and 120MB hard disk $13,999; with 320MB hard disk $17,499, with 650MB hard disk $20,499
Reader service no. 666

PowerMate 386/33E
NEC Technologies, Inc.
1414 Massachusetts Ave.
Boxborough, MA 01719
508/264-8000
LIST PRICE: with 2MB RAM and 100MB hard disk $8499; with 300MB hard disk $10,799
Reader service no. 667

PowerMate 486/25E
NEC Technologies, Inc.
LIST PRICE: with 2MB RAM and 118MB SCSI hard disk $11,999; with 300MB SCSI drive $13,999
Reader service no. 668

Systempro
Compaq Computer Corp.
LIST PRICE: with 4MB RAM and a two-drive, 240MB array $15,999; with a two-drive, 420MB array $19,999; with a four-drive, 840MB array $25,999
Reader service no. 669

Z-386/33E
Zenith Data Systems
1670 Milwaukee Ave.
Glenview, IL 60025
800/553-0331
LIST PRICE: with 4MB of RAM and 150MB ESDI drive $11,999; with 320MB ESDI drive, $13,799
Reader service no. 670

CAN EISA LIVE UP TO THE MICRO CHANNEL'S POTENTIAL?

Michael Goodwin and Karl Koessel

For two-and-a-half years, IBM has been making big claims for MCA—increased system performance, higher reliability, easier configuration, support for multiple intelligent devices, and so on. But so far, the only obvious benefit has been the ability to install and configure expansion boards using a clever utility instead of DIP switches.

Now EISA has arrived, proffering all the advantages of MCA plus the ability to accept old-fashioned PC/XT/AT expansion boards. Will EISA do any better at fulfilling its promises, especially higher performance?

The answer may be yes, simply because the industry consortium that proposed EISA has focused on an application where the high capacity and intelligence of the bus will really matter: high-speed mass storage to serve multiple users. At this writing, we're still waiting for an application that makes the MCA bus strut its stuff. On paper, at least, some of the peripherals being released with EISA systems look like they deliver blazing server performance.

A Tale of Two Philosophies

With the appropriate peripherals, an MCA machine should make as good a server as an EISA machine. Both —especially in a high-volume, transaction-oriented environment—could beat an AT-bus system handily. The differences lie in the master plans.

The first round of EISA systems is optimized for client/server networking in which most of the network resources reside on a massive 80486 file server that will also handle transaction-oriented computing with back-end applications like *SQL Server*. In this scenario, the EISA server offers minicomputer-like processing and storage, while standard desktop PCs concentrate on running the front end.

IBM, however, has no reason to cultivate MCA systems that compete with the company's own minicomputers. Instead, it envisions MCA as part of a peer-to-peer local area networking scheme, in which processing power and network resources (disks, printers, modems, and so on) are shared across the LAN—from larger IBM systems to MCA workstations.

Without much help from IBM, third-party board manufacturers have been hard-pressed to create peripherals that demonstrate MCA's advantages over the standard AT bus. But both EISA *and* MCA have the features to handle tomorrow's high-throughput, mission-critical needs.

Accelerating I/O

EISA and MCA buses have the same basic function: providing an I/O conduit through which a system can shovel more data faster and with greater reliability than through an AT bus.

The AT bus is an 8-MHz, 16-bit bus. At a time when 386 and 486 processors shuttle data in and out of memory in 32-bit chunks at speeds as high as 33 MHz, I/O has some catching up to do. That's why both EISA and MCA support 32-bit I/O.

Full 32-bit I/O requires a new slot design with more pins. Furthermore, to enable systems to use faster peripherals without compromising data integrity, bus data transfer rates must be accelerated without producing unacceptable electromagnetic interference. To accomplish these goals, IBM chucked backward compatibility and started from scratch; the EISA consortium, on the other hand, created a connector that accepts either old-fashioned or EISA boards.

The pins in MCA slots are twice as close together as the pins in AT slots, and every signal pin is adjacent to a ground pin—enabling smaller circuit loops that minimize generation of (and susceptibility to) electromagnetic interference. Furthermore, inserting or removing an MCA board takes less force than an AT board does, easing the rigors of installation and upgrading.

The EISA solution is an ingenious, two-tier slot. The top tier of contacts maintains compatibility with old-style boards, while the lower tier provides MCA-like extensions (interspersed grounds, 32-bit support, and so on). EISA's 32-bit slot is the same size as an AT's, and the force needed to insert or remove boards is also similar.

New slots are only part of the story. To further boost throughput, both EISA and MCA need a way to circumvent their relatively slow clock speeds (8.3 MHz and 10 MHz, respectively). That's why both MCA and EISA provide a burst mode that permits data to move almost three times faster than in an AT. This feature becomes more important when you install several ultrafast I/O devices in one system.

Smart Subsystems

To exploit the high-throughput virtues of MCA and EISA, you need devices that—collectively or individually—move more data than an AT bus could handle. Currently, the most taxing devices are hard disk subsystems with large, controller-based disk caches. Couple one of these with a high-speed network adapter and a souped-up printer controller, and the new buses earn their keep where an AT bus would fail.

But managing so many high-powered peripherals can overburden the CPU, slowing system throughput. That's why both the MCA and EISA buses support bus masters, intelligent peripherals that can take control of the bus in order to read from or write to system memory or another I/O device—without involving the CPU. Compaq, Zenith, NEC, and other vendors promise EISA bus masters that control multiple drives and use the burst mode to transfer large quantities of data to and from system memory.

A bus master is itself a computer, an expansion board with its own processor—typically an 80186, a 68000, or another relatively low-power chip. A bus master must work hand in glove with the host system, and ensuring correct interaction between the two is no trivial task.

(continues)

CAN EISA LIVE UP TO THE MICRO CHANNEL'S POTENTIAL?

(continued)

So far, MCA hasn't delivered on its bus-master potential, partly because IBM has provided little support for board designers until recently. By contrast, EISA seems to be enjoying a glut of bus-master support, largely due to productive industrywide collaboration, prompt publishing of detailed specs, and the talents of a star member of the EISA chipset—the Bus Master Interface Controller (BMIC).

Designed to reside on bus-master boards and support the processor, the BMIC interfaces between the intelligent devices and the bus, greatly easing the burden on peripherals designers. In conjunction with IBM, Chips and Technologies has developed an equivalent of the BMIC, the Bus Master MicroChip. However, preproduction samples of the chip won't be available until sometime this quarter.

Handling Heavy Traffic

With so many smart devices clamoring for access to the bus, you need a strategy to ensure that bus masters (including the CPU itself) get their fair share. MCA uses an arbitration scheme that gives control to the requesting device with the highest priority level. A "fairness" algorithm forces devices that have just been serviced to wait until other requesting devices get their turn. EISA also supports bus masters, but it arbitrates bus access among requesting devices on a rotating basis.

A glut of devices also increases the chance of false interrupts and lost interrupt requests—which can crash the system. The AT bus's interrupts, which require the system to detect a sudden change in voltage, are all too prone to such errors. Interrupt problems are even more troublesome in a high-performance PC that supports a work group.

The MCA solution is to use level-sensitive interrupt handling. Requesting devices raise interrupt line voltage and hold it high until they're serviced; the result is a significantly more reliable system. EISA uses level-sensitive interrupts for EISA boards, but if any AT boards are installed, it must use edge-triggered interrupts to service them.

Painless Peripherals

Most hardware problems are due to improper installation of an expansion board. That's why MCA includes Programmable Option Select (POS), a feature that identifies the type of MCA board you're installing and automatically assigns system resources to it.

No switch-setting is required. POS allows duplicate boards to be installed as active spares that can take the place of a failing board; diagnostics are also simpler since POS can activate boards individually. And because POS can identify the requesting device, MCA allows devices to share interrupt request levels. This is why, for example, an MCA system can support eight serial ports, while the AT supports only two.

EISA systems also support switchless configuration of EISA boards and internal devices. The installation utility even recommends switch settings for many older-type boards. EISA also provides slot-specific I/O address ranges intended to prevent conflicts between EISA boards, allow installation of duplicate boards, and aid diagnostics.

Which Bus to Board?

On the strength of greater reliability and higher throughput potential—but mostly because of the IBM name—Big Blue has sold millions of MCA boxes. The EISA consortium is less ambitious, positioning the first EISA machines as work-group behemoths, not the average user's workstation.

Deciding which bus to go with requires thinking ahead. IBM's vision of peer-to-peer networking isn't entirely clear, but it holds the promise of exploiting networkwide resources—including existing mainframes and minis—without the expense of a dedicated multifunction server. Recent IBM announcements (particularly those concerning subsystem control-block architecture, a software protocol scheme that enables bus masters to work more efficiently with each other and with the system) indicate that IBM aims to bring peer-to-peer networking to new levels of productivity using MCA-specific features.

Thanks to the coming avalanche of EISA peripherals, it looks as though EISA machines will offer concrete benefits sooner. If you see client/server computing in your business future, then you're a prime candidate for EISA. Currently, the biggest advantage of MCA machines is that they're readily available, and they work. EISA's super servers look great on paper, but MCA has taught us that you can't live on promises.

Michael Goodwin is an associate editor and Karl Koessel is the technical editor for PC World.

POWER TIP NO. 82

Printing Multiple Copies of a Q&A Report

Q&A has no menu option for printing more than one copy of a report, but you can create a pair of macros that will do the job. First, from the Report menu, create a macro that prints your report once. To do this, use the Define option on the pop-up Macro menu (<Shift>-<F2>). Next, create a second macro that simply replays the first one as many times as needed.

George R. Beinhorn
Nevada City, California

BREAKING THE BOARD BARRIER

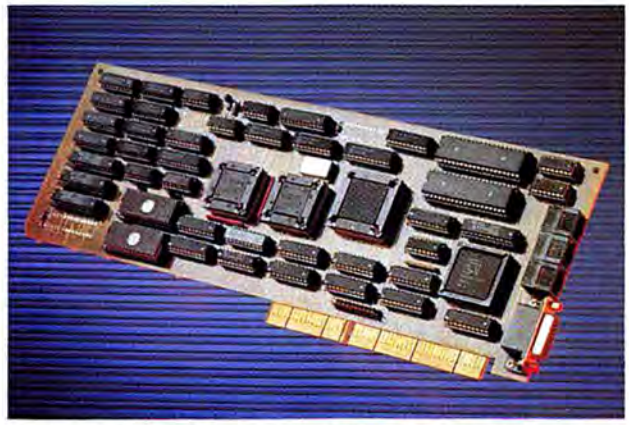
Eric Bender

In the first crop of EISA add-ins, some of the most compelling offerings—such as Compaq's Intelligent Drive Array controller, which harnesses up to eight internal 210MB drives in parallel—are coming from system vendors. But EISA machines, which are bred to accept standard PC boards, also boast about a dozen 32-bit EISA boards from third parties. As you might expect, these products primarily target ultra-high-end storage and communications tasks.

While many prices were not yet set at press time, the EISA offerings will carry a premium over their AT-bus predecessors. "But there's no reason that once production gets going, EISA and ISA products can't be very close [in price]," comments Larry Barber, vice president for marketing and sales at Mylex in Fremont, California.

Controllers for both SCSI and ESDI devices were among the first to appear, helped in part by a recently standardized interface between EISA and storage controllers. Mylex, for example, plans to offer a caching SCSI controller with up to 16MB of on-board memory; the prototype bus-master device showed throughput exceeding 25MB per second. Distributed Processing Technology in Orlando, Florida, also will offer a series of SCSI and ESDI bus-master controllers.

In network products, engineers differed on whether to follow a bus-master blueprint for fastest throughput. For instance, Proteon of Westborough, Massachusetts, took the bus-master route for its $995 16-mbps token ring card. But Racal-InterLan in Boxborough, Massachusetts, chose a slave design for its ethernet controller. At the high end of the market, Codenoll Technology in Yonkers, New York, will offer fiber-optic bus-master network boards—a $995 ethernet model and, looking toward the future, 100-megabit Fiber Distributed Data Interface models starting at $5495.



The Computone ALC combines an intelligent controller with up to four feature modules to provide multiple services for network users.

Computone Products of Roswell, Georgia, is adopting the Vegematic approach to communications server tasks, offering a $1595 board that accepts up to four functional modules. Thus, within a single slot and without clashing communications, you can let network users transmit a fax, connect to net or mainframe, and send E-mail. The first offerings include a $695 ethernet module, an $1195 asynchronous communications module, an unpriced asynchronous/synchronous combo, and an unpriced fax/scanner module.

While several firms say they will offer high-resolution graphics controllers, plans weren't finalized at press time. "We don't want to be premature," comments Bob Butchko, vice president for marketing and sales at Renaissance GRX in Bellevue, Washington. "At this point, the EISA bus is being seen primarily from a communications/networking viewpoint; we haven't seen a lot of demand for anything very specific related to graphics."

Board manufacturers admit that although they are working from a well-designed specification, they haven't yet been able to test their wares on commercial machines. They expect some minor compatibility problems, but no showstoppers. Those incorporating Intel's bus-master chip say they have experienced delays. "The chips are like hens' teeth," says one developer.

Most communications board suppliers also offer MCA equivalents, but most high-end disk controller vendors won't, because customers don't want to throw away the disks built into high-end PS/2s. While IBM and the EISA system vendors continue to snipe at each other's technical claims, until commercial products are benchmarked, the jury's out on any practical technical edge for either camp.

"For the past few years, we've been increasing CPU power like crazy, but throttling the system with slow disk drives and graphics boards," comments Mylex's Barber. With EISA correcting that problem, and with 486 machines arriving, "users will see a very steep performance improvement curve." He emphasizes, however, that picking the right system and options for a given job will prove much more complicated than simply choosing the right CPU and speed.

Eric Bender is PC World's East Coast editor.

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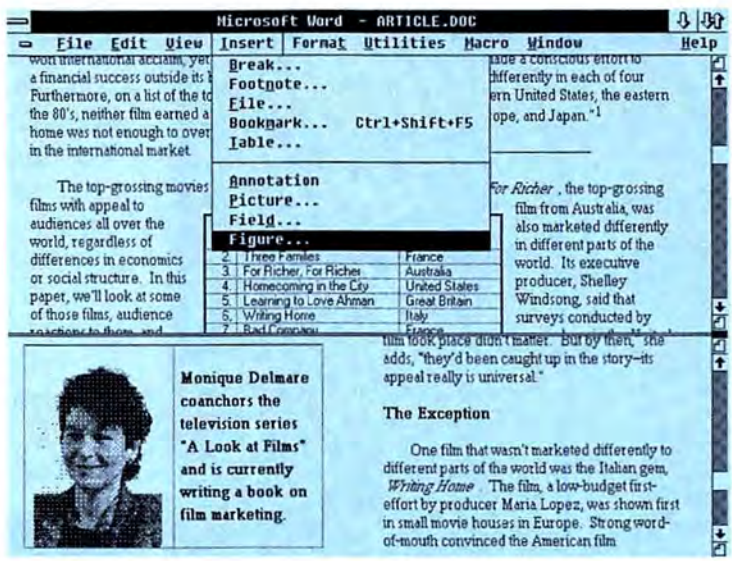
Word Meets Windows

Microsoft's long-awaited Word for Windows won't beat Ami Professional's publishing skills—but it may be a better word processor.

Jim Heid

How do you design a heavy-duty word processor for *Windows?* Do you combine power word processing features with desktop publishing tools? Or do you integrate those power features with *Windows'* intrinsic data-exchange talents and a pliable user interface that you can tailor to your tastes?

If the former approach appeals, proceed directly to Samna's *Ami Professional*. Otherwise, turn to Microsoft's *Word for Windows*, scheduled for release by the end of 1989. *Word for Windows* doesn't venture as far into desktop publishing territory as *Ami Professional* does, but it aims to make power word processing far more accessible. And for the most part, it succeeds.



Word for Windows offers WYSIWYG display and the ability to split the screen to view different parts of a file. You can also add custom menu options. The Insert Figure option runs a macro that prompts for a caption, then inserts the image and caption on the page.

Family Resemblance

Cosmetically, *Word for Windows* and the character-based *Word* are worlds apart, but conceptually they're very similar. Like *Word 5.0* (and unlike *Ami Professional*), *Word for Windows* handles rudimentary formatting at the paragraph level: Changes in line spacing, justification, tabs, and so on are applied only to the selected paragraph. This lets you easily vary formatting from one paragraph to the next, but it also means you must select a range of paragraphs to impose a new format on all of them.

As with *Word*, you can also split the screen into multiple document windows—a trick *Ami Professional* hasn't learned.

Both *Word* versions match up in the advanced formatting department as well. You can do everything from create multiple columns and fancy tabs to combine text and graphics, create style sheets, and automatically generate indexes and tables of contents. As you'd expect, *Word for Windows* includes a spelling checker, a thesaurus, and an outliner, plus on-line help and tutorials. Both products also use bookmarks for quickly navigating large documents and automatically updating cross-references to text passages, page numbers, or paragraph numbers.

Point and Click Interface

But *Word for Windows* isn't simply *Word 5.0* with *Windows* dressing. Its fluid, interactive interface makes formerly thorny tasks a snap. For example, importing and manipulating graphics in *Word 5.0* requires a cartload of keystrokes. In *Word for Windows*, you simply select a file from a list and resize and position the image with the mouse.

When it comes to formatting, you can largely avoid the Format menu and directly manipulate an on-screen "ruler" to change margins, tabs, and alignment, and a "ribbon" to summon fonts, sizes, and styles. To set a tab, for example, just click a spot on the ruler. To change the justification, click a ruler icon or drag the tab into place.

But creating style sheets is still a pain. In *Ami Professional* you merely select options from one screen. In *Word for Windows*, you must thread your way through several dialog boxes. Fortunately, there's a "style by example" feature that generates a style sheet based on existing formatted text.

Like *Ami Professional*, *Word for Windows* can generate tables with cells you resize and reformat at will. Paste cells directly from *Microsoft Excel*, and *Word for Windows* maintains formatting. Select the Paste Link command, and *Word for Windows* establishes a two-way DDE (dynamic data exchange) hot link between the spreadsheet and the table.

For group writing projects, *Word for Windows* lets you attach electronic Post-it–style notes to documents and print them separately. There's a Compare Versions command that flags differences between two documents, and another that marks new or changed text.

Although Microsoft has focused on ease of use, performance hasn't been ignored. *Word for Windows* has not only a speedy *Ami*-like text-only draft mode but also outline and normal views. Outline view lets you reorganize a document simply by shuffling headings and subheadings. In normal view, the program cleverly displays everything but headers, footers, footnotes, and multiple columns.

Menus Made to Order

Word for Windows' biggest claim to fame is its malleability. If you don't like the program's logical menus and keyboard shortcuts, you can create your own via dialog boxes and even add custom commands with *Word for Windows*' macro language. Better still, you can save such custom interfaces in a template, along with related macros, boilerplate text, and style sheet definitions—in essence, the document's design *and* the custom interface that manages it.

It's a brilliant concept, and the flexibility makes it easy for in-house gurus to simplify the program's use and to standardize written corporate communications. You could create a whole set of task-specific templates that contain their own menu—for example, one for managers with a Create Business Letter option that prompts you for an address, inserts the information into the letter, and prints out an addressed envelope. *Word for Windows* will also come with canned templates.

You can, of course, create macros just by turning on a macro recorder and typing away. But doing something fancy means digging into the *QuickBASIC*-style macro language. With a little work you can create macros that issue commands, perform math, read and write to disk files, and display dialog boxes asking for information. And thanks to DDE, macros can start other *Windows* applications, send them keystrokes, and establish hot links with other DDE-supporting applications.

Word for Windows will appeal to those who want bone-crunching word processing power wrapped in an approachable, customizable user interface. *Ami Professional* is a better publishing program, aimed at users who want one-stop writing, drawing, graphing, and publishing. But *Word for Windows* promises to be a better word processor. It's a logical step up for *Word 5.0* users and, given its titanic features, a tempting reason to make the switch to *Windows*. ●

Jim Heid is the author of Power Windows *(Microsoft Press, Redmond, Washington, 1988).*

SNAPSHOT

Word for Windows

Microsoft's word processor for *Windows* packs heavy-duty text editing and formatting features in an easy-to-use, customizable interface—and leaves desktop publishing to *Ventura*.

KEY FEATURES

- **Word 5.0–like power**
- **Point and click formatting**
- **Three draft modes**
- **Customizable menus and hot keys**
- **QuickBASIC-like macro language**
- **Easy-to-tap two-way dynamic data exchange**

AVAILABILITY

Scheduled for December 1989

PRICING

$495, $150 upgrade from any DOS-based *Word* in first 90 days

Microsoft Corp.
16011 N.E. 36th Way
P.O. Box 97017
Redmond, WA
98073-9717
206/882-8080

Reader service no. 661

PRODUCT OUTLOOK

INSIDE PRODUCT OUTLOOK

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IBM's smaller, faster printer challenges the LaserJet.

81 **NEC Intersect CDR-35**
The first portable CD ROM player offers error-free performance in a 3-pound package.

82 **The Agilis System**
Assemble a hand-held workstation for computing in the wild.

82 **PacificPage**
A plug-in cartridge gives your LaserJet PostScript compatibility at a reasonable price.

84 **Syzygy 1.0**
Syzygy gives everyone in the office a manager's-eye view of goals, tasks, and responsibilities.

84 **Myriad 1.0**
This word processor knows how to blend text and graphics in multiple windows.

86 **NEC ProSpeed CSX**
A technological first from NEC—color in a portable.

86 **A-to-Z Hardfont Cartridge**
Everex packs 231 HP fonts into a single cartridge.

88 **AST FASTboard 486/25**
Rev up your AST Premium 386 with Intel's i486 chip.

88 **Q-System PC**
Stretch resources with a device that manages traffic between four PCs and a central printer or plotter.

UPDATE

88 **Applause II**
A chart-oriented graphics package from Ashton-Tate offers a dazzling array of options.

90 **DynaComm 2.1**
Communications are streamlined in object-oriented *NewWave*.

92 **Micrografx Designer 3.0**
New features keep the *Windows*-based draw package on the cutting edge.

92 **XtreePro Gold**
A skilled hard disk manager becomes more versatile.

94 **Lotus Spreadsheet for DeskMate, DeskMate Q&A Write**
Popular packages customized for Tandy's graphic user interface.

94 **Peachtree Complete III**
Expanded capabilities make this a more complete accounting package.

The IBM Laserprinter 4019 is a smaller, faster challenge to the LaserJet Series II, offered at the same $2699 list price.

IBM Laserprinter 4019

A Faster LaserJet Compatible at the Same Price

IBM's Laserprinter 4019 is designed to give consumers a choice—and Hewlett-Packard a headache. This sleek machine, based on IBM's own print engine, is 40 percent smaller than HP's 8-ppm LaserJet Series II and cranks out two more pages per minute for the same $2699 price. Like the LaserJet, the 4019 uses a single-cartridge drum/toner system, but IBM claims that at about 2 cents per page for text, it's a third cheaper to run.

The printer comes with the usual 512K of memory, but IBM says that unlike with the LaserJet, almost all of that can be used for a print buffer. Although the 4019 holds up to 4MB of RAM, you'll want to determine your memory needs in advance, because it has only one memory slot, and its $449 1MB and $899 2MB boards are not upgradable. You'll have to toss them to go to the $1599 3.5MB board.

Ten Courier fonts are built in, and two slots accommodate credit-card–size, HP-compatible font cartridges. IBM claims that 47 cartridges will be available (at $142 to $245 each); the printer also accepts any standard HP-compatible soft font. At least 20 top software vendors have announced drivers for the 4019, but in case your favorite business application isn't among them, the printer provides HP and IBM Proprinter emulation.

You also enjoy a couple of other options. You can buy the 4019 with its standard 200-sheet paper tray, adjustable to the four most popular paper sizes, and later add a $399 500-sheet paper drawer to the base of the printer and a $329 envelope feeder on the back. By mid-year, IBM will release two add-on boards to give the 4019 full Adobe PostScript capability. The 17-font board will cost around $1100 and the 39-font version around $2000. Because the boards reside in the Laserprinter, you can share PostScript among several users on a network.

Despite this compatibility, IBM bills the 4019 as a personal printer. That may be less than wise, since HP just rolled out a 4-ppm IIP personal printer that will sell on the street for an incredible $1000. The Laserprinter 4019 is an attractive machine, but it remains to be seen whether it's a LaserJet killer. IBM, 1133 Westchester Ave., White Plains, NY 10604; 800/426-2468. *—Michael Goodwin*

Reader service no. 625

NEC Intersect CDR-35

Portable CD ROM Reader

The 2.2-pound NEC Intersect CDR-35 brings portability to CD ROM data storage and can read 540MB disks with an only slightly longer seek time than standard players.

The first portable CD ROM player, a snazzy little data demon that weighs in at 2.2 pounds (3 pounds with battery pack), has arrived from NEC Home Electronics. Compatible with standard CD ROM players, NEC's Intersect CDR-35 reads the same 540MB optical disks, provides the same error-free performance, and transfers data at the same 150K-per-second rate. The only noticeable difference is that average seek time is 1.5 seconds—three times that of NEC's standard CD ROM devices. Intersect CDR-35 costs $599, plus $199 for a SCSI interface board for XTs, ATs, and PS/2s. The optional $79 battery pack provides 90 minutes of continuous use.

When CD ROM business applications finally appear in force, the Intersect's low price, small footprint, and easy portability should make it a natural for shared use in an office. In the meantime, traveling professionals at major accounting firms and other service-oriented corporations can use the portable player to carry reams of information on products and services. And on flights home, they can remove the Intersect's modular audio unit and relax by listening to CD disks. NEC Technologies, 1255 Michael Drive, Wood Dale, IL 60191; 312/860-9500. *—Eric Bender*

Reader service no. 627

The Agilis System

Workstations by the Slice

Configure your own hand-held workstation by snapping together the Agilis CPU, disk drive, display, and other components à la carte. You have a choice of IBM-compatible 80C88- or 80386-based systems.

Most laptops are fine if you're sitting snugly in an airplane seat, but what do you use if you're working on the engine? The Agilis System is a hand-held computer designed for down-and-dirty computing at remote locations. It's beefed up with packet radio capability for wireless network links, and Agilis has plans for reaching out to land mobile radio and even cellular phones.

You configure your own workstation by assembling "slices"—CPU, disk drives, display, keyboard, battery pack, and communications module—which you either connect end to end or stack atop each other. This makes for an à la carte pricing setup, with complete system price tags ranging from $4000 to $20,000. Slices snap together with 34-pin connectors and communicate with one another via a built-in 10-mbps Ethernet bus.

The processor slice comes in two basic configurations—an 80C88-based unit with a top speed of 9.754 MHz, and a 16-MHz 80386-based version. The 1-pound 80C88 CPU is a minuscule 8.85 inches long by 3.75 inches deep—roughly one-third the size of a sheet of paper—and a mere inch thick. You get 640K of 120ns zero-wait-state RAM and a serial port. For data storage, the 80C88 takes credit-card–size 512K, 1MB, or 2MB RAM cards that slip into a slot on the side of the CPU.

Like the 80C88 slice, the 32-bit 80386 processor slice is just 8.85 inches long, but it's twice as deep, twice as thick, and three times as heavy. It comes with 1MB of 100ns RAM, expandable to 8MB, and it works with an optional Prairietek 20MB removable 2½-inch hard disk with 28ms average access time and a 1:1 interleave. Both system units accept an optional 3½-inch floppy disk slice and support 3Com's *3+* network operating system.

Display choices consist of two EGA slices, both of which include the display adapter, 30 programmable function keys, and on-screen keyboard emulation in addition to the 86-key keyboard. The standard 6.5-by-4-inch backlit supertwist LCD display offers 640-by-400-pixel resolution. There's also a touch screen version of the display with mouse emulation.

Both models run off a 28-volt power supply that gets its juice from nickel-cadmium batteries. Depending on how you've sliced the system, a battery charge lasts up to 5 hours for the 80C88 system and 3 hours for the 80386, claims Agilis. A combination battery charger/AC-DC adapter lets you run the Agilis off household current or a car battery.

The Agilis System 80C88 CPU costs $1895, and the 80386 CPU retails for $4995. The regular EGA display, which retails for $2000, includes controller, processor, and 30 programmable keys. The display with a touch screen option costs $2395, and the keypad slice is $300. Agilis Corp., 1390 Shorebird Way, Mountain View, CA 94043-1349; 415/962-9400. *—Wes Nihei*

Reader service no. 628

PacificPage

PostScript Emulation in a Cartridge

When you bought your LaserJet Series II printer, you probably didn't want to spend the extra dough for PostScript compatibility. But if your thinking has changed, you don't have to replace your printer—just plug PacificPage into your Series II font cartridge port and get painless PostScript.

You won't require add-in cards, cables, or extra disk or desk space. You will need 2.5MB of memory in the printer. Otherwise, you can plug in the cartridge and get immediate access to 35 scalable Apple LaserWriterNT–equivalent fonts.

Thanks to a Phoenix Technologies emulation, you can reverse or rotate text and images and jazz up your documents with halftones and fancy graphics like stretched, skewed, and outlined type—all with your formerly text-oriented LaserJet. If you want to go back to PCL mode for text-only word processing, just toggle off PostScript, either on screen or on the printer's panel. Since PacificPage needs the 1.5MB of ROM on its cartridge in order to run, you will lose PostScript capability if you remove the cartridge to use the slot for, say, fonts.

PacificPage also runs considerably slower than a PostScript-equipped Apple LaserWriter. But at only $695, PacificPage is a reasonable way to get output from *PageMaker, Harvard Graphics, Ventura Publisher, WordPerfect 5.0, Microsoft Word,* and other PostScript-compatible applications. Pacific Data Products, 6404 Nancy Ridge Dr., San Diego, CA 92121; 619/552-0880. *—Mark Henricks*

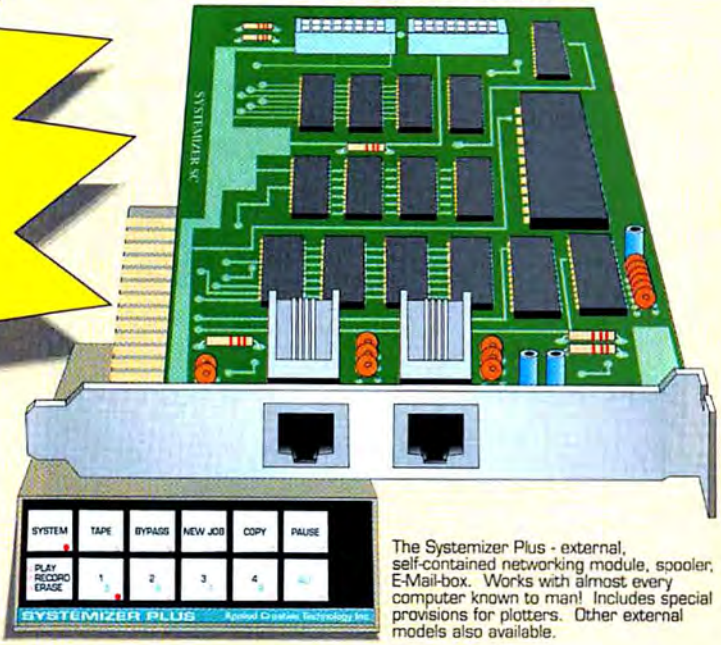
Reader service no. 633

NEW Slot Card Systemizer SC!

Systemizing

The truly universal LAN alternative...

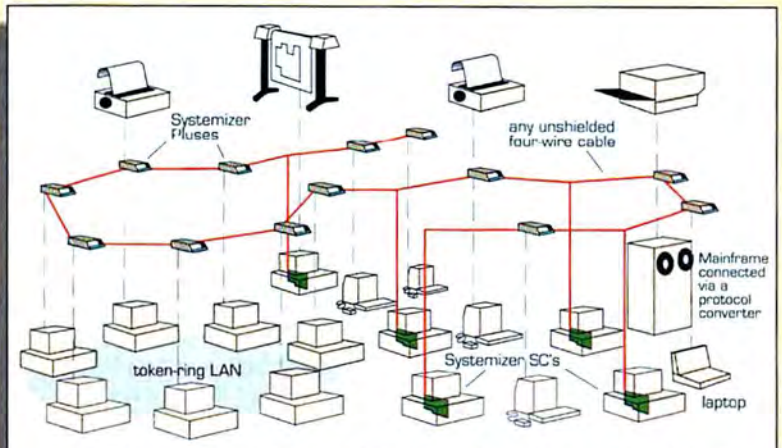
The Systemizer SC - features memory resident printer controller, spooling, E-Mail and file transfer. For all MS-DOS® PC's and compatibles.



The Systemizer Plus - external, self-contained networking module, spooler, E-Mail-box. Works with almost every computer known to man! Includes special provisions for plotters. Other external models also available.

Up to 31 users can...

- Share Printers
- Share Plotters
- Share a Modem
- Exchange E-MAIL
- Transfer Datafiles



Example: 17 micros, of various brands, *plus* a mainframe, all sharing printers, data and E-Mail via Systemizing. Note how some PC's on a token-ring LAN are also part of the Systemizer LAN.

Systemizing has become the connectivity standard at many of the world's largest corporations and throughout the federal government. Ten's of thousands are already in use. The new Systemizer SC is the latest model in Applied Creative Technology's line of Systemizing products, and it delivers what 95% of corporate computer users want from a Local Area Network— at far less cost and complexity, and yet with much more versatility.

Corporate computing managers prefer Systemizing over other connectivity methods because it offers:

- Guaranteed software/hardware compatibility.
- Ability to mix PC's, LAN's, mainframes, laptops.
- Easy owner installation. Low cost cabling.
- 5 min. user training with no support needed after.
- Flexibility; readily accomodates growth and changes.
- Distributed processing for high speed and reliability.

And with the new SC, everyone can afford to Systemize!

Call 1-800-433-5373 to get a FREE demo!

The CONNEXPERTS℠

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(214) 739-4200

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Circle 77 on reader service card

Syzygy 1.0

Big View on the Work Group

A successor to the single-user Action Tracker, Syzygy is a multiuser information manager that lets you keep up-to-date with your work group's tasks, deadlines, and responsibilities.

If everyone in the work group is pounding away at a personal information manager, who's keeping an eye on the big picture? With PIMs, there's no easy way to integrate and share data among them or even to assure that everyone is moving toward the same goal.

But that's the promise of Information Research's *Syzygy*. A successor to the company's single-user *Action Tracker*, *Syzygy* is a project scheduler that gives managers an overall view of tasks, deadlines, and responsibilities. You can buy a single-user version, but *Syzygy* really blossoms on a local area network.

Combining network E-mail (based on the MHS store-and-forward standard) with individual and group calendars and to-do lists, *Syzygy* shares some features with groupware packages such as *WordPerfect Office* and *The Coordinator II*. But it stands out from the crowd by virtue of its project-management flavor and powerful relational engine, which provides numerous views on PIM-type data.

The core of the program is a work base—a multiuser data base of objectives, tasks, and related material. Activities are grouped into top-down management categories such as responsibilities, schedules, and due dates. You can zoom in and out of view windows several layers deep to reveal the requirements of each project. Various symbol icons indicate status, and you can view Gantt charts to monitor a project's progress.

To generate your own views, you edit predefined TaskTemplates designed to organize generic activities such as planning a meeting, launching a new product, or writing a business plan. Output can be funneled to more than 50 report formats including status, budget, assignments, and phone directories. A SQL-based query language lets you create custom reports and relational data base queries.

Syzygy imports and exports files from *Agenda*, *GrandView*, *1-2-3*, and *Excel* and supports SDF, ASCII delimited, DIF, and other formats. *Syzygy* requires DOS 3.1 or a later version, 512K, and a hard disk. The single-user version costs $395; the NETBIOS-compatible *Syzygy/Network* is $1295 for 3 to 10 users, $1995 for 11 to 25 users, and $2995 for unlimited users per server. Information Research Corp., 414 E. Market St., Charlottesville, VA 22901; 800/368-3542, 804/979-8191. *—Eric Brown*

Reader service no. 631

Myriad 1.0

Windows on the Words and Graphics

Even though desktop publishing–*like* features are becoming de rigueur in power word processors, mixing text and graphics well is done best under a graphic user interface. *Myriad 1.0* takes advantage of *Microsoft Windows* to provide text and graphics editing entirely in graphics mode.

Myriad offers both the standard array of word processing features and a well-equipped palette of drawing tools (basic objects such as lines, circles, ellipses, and boxes). Desktop publishing features include kerning, leading, text wrap, and the ability to anchor graphics with text. The program also can expand and crop imported text.

Since you can open up to eight windows—and thus documents—simultaneously, that last feature comes in especially handy, allowing you to edit copy and move it between multiple documents. *Myriad* accepts TIFF graphics files, supports dynamic data exchange with other *Windows* programs like *Excel*, and directly imports from many other popular packages such as *WordPerfect*. A page-preview mode automatically sizes a window to full screen to display all graphics and fonts. You also can manually zoom a window 25 to 300 percent to view detail.

Style sheets let you control margins, line spacing, fonts, type size, and more. You can even store boilerplate text and graphic elements such as lines and paragraph shading. *Myriad* lets you enclose text, graphics, headlines, and more in frames that can be sized and moved.

Priced at $249.95, *Myriad 1.0* requires 512K (1MB is recommended); DOS 2.1 or a later version; a Hercules, EGA, or VGA graphics card; *Microsoft Windows 2.03* or a later version; and a hard disk. Beckman Associates, 2418 Towncrest Dr., Iowa City, IA 52240; 800/633-2027. *—Wes Nihei*

Reader service no. 629

Imagine painting a canvas
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when your brushes are
in Baltimore.

That's the idea behind Carbon Copy Plus.™ PC software that defines the art of remote control. With Carbon Copy Plus you don't have to go to a problem to solve it. Or be with your users to train them. Or visit a customer to troubleshoot. Via a modem, Carbon Copy Plus gives your PC complete control of another PC. Letting you remotely share keyboards, disks and programs. Even translate graphic images when two PC's use different graphic standards. A brush stroke may never span a thousand miles. But with Microcom Carbon Copy Plus, a keystroke will. For information, call 617-551-1999, ext.

Carbon Copy Plus

Microcom Software Division, Still River Corporate Center, 55 Federal Road, Danbury, CT 06810.
Sales and Product Information: 500 River Ridge Drive, Norwood, MA 02062. Carbon Copy Plus is a trademark of Microcom Systems, Inc.

Circle 173 on reader service card

NEC ProSpeed CSX

A Portable of a Different Color

If even 16 MHz of 386SX power in a briefcase isn't enough, NEC has one word for you: color. Its ProSpeed CSX is the first portable to sport a color LCD—specifically, one offering 16 colors from a palette of 64 in EGA mode for graphics and VGA mode for text. But like many technological firsts, NEC's clamshell represents only a first step toward full desktop quality in a portable.

The CSX's 8.3-by-5.2-inch LCD is plagued by mottled colors and looming shadows. And when viewed from the side, screen colors grow muddy or fade to orange or blue, limiting its appeal for business presentations. However, for extended use, you can plug in a VGA monitor (and detach the LCD, if you like).

The CSX employs what could be considered an intermediate color technology—a 640-by-400-line compensated super-twisted nematic display backlit by a cold-cathode fluorescent tube. Each pixel consists of red, green, and blue filters that create colors in the active LCD layer. Because of the filters, backlighting must be five times brighter than with a monochrome LCD, ruling out battery-powered use. (The CSX comes with a built-in AC adapter.)

The 18-pound luggable ships with 2MB of 80ns RAM (expandable to 4MB in a proprietary slot) and room for an 80387SX coprocessor. *Windows/386* is bundled with the system, which also includes a 1.44MB 3½-inch floppy drive, parallel and serial ports, and a slot for a 2400-bps internal modem. The CSX is available in two versions. A 40MB hard disk model sells for $8499, while a 100MB drive unit costs $9499. NEC Home Electronics, 1255 Michael Dr., Wood Dale, IL 60191; 312/860-9500. —*Daniel Tynan*

Reader service no. 626

NEC has updated its PowerMate line with an improved graphics capability and more options for expansion. The PowerMate SX Plus lets you run 32-bit software at 16 MHz.

A-to-Z Hardfont Cartridge

Fonts Coming Out of Your Ears

Everex Systems goes Hewlett-Packard's ProCollection "super-cartridge" of laser fonts one better with the A-to-Z Hardfont Cartridge. This one packs functional equivalents of 231 HP fonts into a single cartridge, nearly quadrupling HP's font-packing feat.

You'll get all the HP-equivalent fonts in crisp, true reproduction, accessed directly from 1.8MB of on-board ROM so your printer's memory isn't waterlogged by downloaded fonts. Also, Everex says, a secret technique lets LaserJet II printers access all 231 fonts, evading the 168-font limit HP built into the series.

The 50 landscape and 181 portrait fonts on the A-to-Z cartridge include Courier, Times Roman, Gothic, Prestige Elite, and two varieties of Helvetica in a total of 11 different point sizes ranging from 6 to 18 points. There are 27 symbol sets to go with the typefaces.

The cartridge comes with drivers for popular programs such as *Windows*, *WordStar 2000*, *WordPerfect 4.2* and *5.0*, *Word 4.0* and *5.0*, *1-2-3*, *PageMaker*, and *Excel 2.0*. The A-to-Z Hardfont Cartridge works only with later LaserJets, including the LaserJet+, LaserJet II, and LaserJet IID models. It retails for $695. Everex Systems Inc., 48431 Milmont Dr., Fremont, CA 94538; 800/821-0806, 415/498-1111. —*Mark Henricks*

Reader service no. 634

Everex's A-to-Z Hardfont Cartridge gives you the functional equivalent of 231 HP fonts in a single cartridge.

Monet, not money.

The HP
PaintJet.
$1395.*

Who says fine art is out of reach? The HP PaintJet color printer produces brilliant color for a price any business can afford.

So now there's no limit to what you can create

with your business communications. Surprise your audience with thousands of colors. Beamed up on an overhead. Or tucked neatly into a report. Persuading people up to 85% more effectively than black and white.

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There is a better way.

HEWLETT PACKARD

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Circle 114 on reader service card

AST FASTboard 486/25

More Powerful Than a Speeding 386

During the past year, development of 386-based PCs has proceeded at a dizzying pace, with vendors cranking out new machines before the ink dried on the ads for the old ones. But the event of the year was the debut of Intel's i486 chip, and some vendors prepared for it by putting their 386 CPUs on cards that could be easily swapped when the time came.

Well, the time has come. AST's FASTboard 486/25 is a CPU card upgrade that soups up AST's 25-MHz Premium 386/25 and 33-MHz Premium 386/33 with Intel's 25-MHz i486 chip. Unlike 386 iterations, the i486 gets its muscle from its optimized processor design rather than merely from a faster clock speed.

The addition of 8K of cache and a math coprocessor as well as more effective methods of transferring instructions between CPU and memory make this 25-MHz chip almost twice as powerful as the 33-MHz 386 (*with* 387 coprocessor) and almost three times as powerful as the 25-MHz 386. Of course, performance varies widely among applications; you're likely to get the most oomph in math-intensive processes.

Other than the processor, there's nothing fancy about the FASTboard 486/25; it also houses 2MB of 80ns system memory and sockets for a Weitek 4167 math coprocessor, with space for up to two more 1MB memory modules. Two additional dual-purpose memory and I/O slots in the Premium machines let you upgrade memory to 36MB running at processor speed.

Upgrading a Premium 386 is straightforward. All you or your dealer has to do is replace the existing plug-in CPU board with a FASTboard. The board uses the proprietary 32-bit slot built into Premium systems and configures itself without your having to check hardware or set DIP switches.

The FASTboard 486/25 costs $3695 for an upgrade from the Premium 386/25 model and $2995 for the Premium 386/33 upgrade. AST Research, 2121 Alton Ave., Irvine, CA 92714; 714/863-1333. *—Wes Nihei*

Reader service no. 630

Q-System PC

Printer Sharing

You can stretch your printer resources with the Q-System PC. The $349 printer-sharing device dedicates its microprocessor and memory to manage printer or plotter jobs sent to one output device from up to four PCs.

Available in both parallel and serial versions, the Q-System PC relies on a Zilog Z80 processor to field print jobs sent individually or simultaneously, store them in RAM, and then print them in the order received. The Z80 allocates RAM according to the number of PCs using the printer sharer: If only one machine is on line, it can use all available RAM; with two machines, each gets half the RAM, and so on.

The 7¼-by-9¾-by-2¼-inch Q-System holds a standard 64K RAM, expandable to 2MB with user-installable 1MB memory modules. Sequential Systems Inc., 1200 Diamond Cir. #M-2, Lafayette, CO 80026; 800/759-4549, 303/666-4549. *—Mike Hogan*

Reader service no. 635

The Q-System PC uses its own microprocessor and memory to manage printer or plotter jobs sent to a single output device from up to four PCs.

UPDATE

Applause II

Business Graphics Roundup

Once upon a time, Ashton-Tate held four graphics aces: *Chart-Master, Sign-Master, Diagram-Master,* and *Draw Applause.* Today its *Applause II* offers all the functionality of those packages plus a few extras under a three-pane windowing interface.

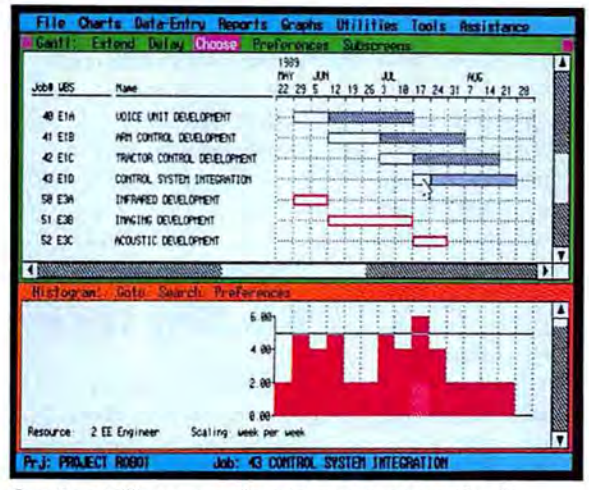
Applause II aims to be all graphics things to all people, whether they're generating black-and-white charts from spreadsheets, creating sharp color graphics for a marketing brochure, or preparing a sales meeting slide show. Considering the popularity of presentations, it's no surprise that *Applause II* is unabashedly chart-oriented.

The chart window opens up on an almost bewildering array of bar, line, table, pie, organization, *x-y,* scatter, and high/low/close choices. Bar charts alone can be vertical or horizontal, clustered, stacked, overlapped, or seen in 3-D from eight angles. They can be combined with data tables and filled in with 16 different black-and-white patterns in *(see Applause II, p. 90)*

"Project Scheduler 4:™ Finally, an easy-to-use project manager"

PC MAGAZINE, SEPTEMBER 12, 1989

Everyone promises ease of use. Project Scheduler 4 really delivers. Expert after expert agrees, Project Scheduler 4 is the fast track to automated project management. And once you're started, Project Scheduler 4 keeps you going with outstanding power, world-class speed, and industry-leading capacity. Project Scheduler 4 is the clear choice for today, and tomorrow.



Our Gantt Histogram pinpoints resource overloads.

EXPERT TESTIMONY

PC WEEK, MARCH 13, 1989:
"Easy for novices to learn, but packs enough power and functionality for experienced project managers."

DESIGN NEWS, MARCH 27, 1989:
"PS4 is a thorough and complete management system. Its built-in flexibility and abundant features allow for efficient planning of even the most complex projects."

DANIEL YAHDAV, PM SOLUTIONS, JUNE 1989:
"Project Scheduler 4 earns PM Solutions' highest marks in ease of use. It leads its competition in schedule recalculation and resource leveling performance."

PC MAGAZINE, SEPTEMBER 12, 1989:
"Context-sensitive help and three levels of automatic prompting offer enough assistance that you may never open the fine manual that accompanies the program."

"Project Scheduler 4's project management graphs and charts are simply the best around."

"With good scheduling facilities, excellent graphics, and the best interface in its class, the program is well on its way to becoming the premier project manager."

INFO WORLD, SEPTEMBER 25, 1989:
"Project Scheduler 4 is the one program you can't ignore."

"...Project Scheduler 4 provides a superior balance of features and ease of use."

The difference is graphically clear.™

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 both on screen and in the reports. At last, PERT and Gantt charts make sense. And responsibilities, deadlines, and resource bottlenecks are all spotted at a glance.

Announcing Version 2.0.

We've made the best product even better with expanded memory support and enhanced reporting and tracking. And you still get the benefits of a full graphic environment without expensive hardware upgrades because Project Scheduler 4 runs under DOS on PC systems from the XT on up.

The corporate choice.

Whether you're managing a single project in a small business or multiple projects at a Fortune 500 corporation, Project Scheduler 4 helps you succeed. For more information and a brochure, call or write:

415/570-7700
393 Vintage Park Drive
Suite 140
Foster City, CA 94404

Scitor Corporation

Applause II

(continued from p. 88)

CGA or Hercules mode or, in EGA and higher modes, with up to 5000 simultaneous on-screen colors chosen from 11 palettes of 256 colors each.

Applause II's import options include the native files of *dBASE IV*, *Framework III*, *1-2-3*, and *Applause*'s Ashton-Tate predecessors as well as ASCII, DIF, and SYLK.

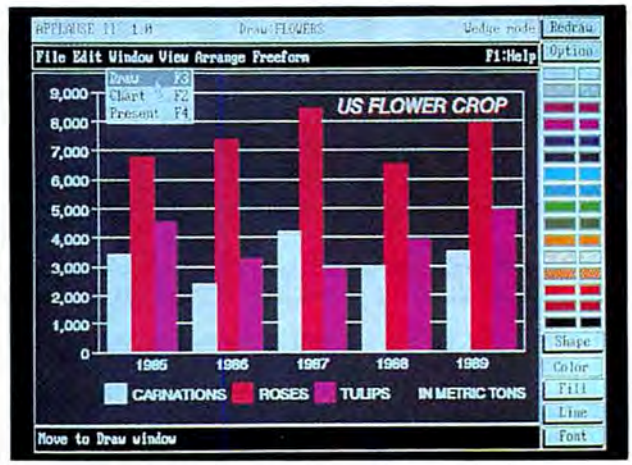
After you get your chart, you can open the draw window to annotate it, add one of 400 clip-art images, or scan in or draw other images. You also can manipulate the color, shape, rotation, and other features of scanned, clipped, imported, or drawn images as well as choose from eight text fonts. *Applause II* accepts CGM, TIFF, GX2, PCX, and GCX files in addition to the DIA and SGN formats of the *MasterGraphics* series.

You can raise the presentation window to create batch files controlling your electronic slide shows and manage 14 screen transition effects including fades, wipes, and scrolls. There's also a built-in link to an Ashton-Tate–endorsed slide, overhead, and transparency service.

Fitting it all into 512K meant losing a few capabilities such as some direct manipulation of drawn charts (although this is still available in the drawing window) and a light-table organizer for slide shows. But the $495 *Applause II* will run on low-end machines equipped with CGA through VGA displays and at least 2.5MB of hard disk space. You also need DOS 2.1 or a later version for the 5¼-inch version and at least DOS 3.3 for the 3½-inch one. Upgrades from both *Draw Applause* and the *Master* series products are priced at $79. Ashton-Tate Corp., 20101 Hamilton Ave., Torrance, CA 90502; 800/437-4329 ext. 1301, 213/329-8000.

—Mark Henricks

Reader service no. 636



Applause II aims to be all graphics things to all people, under a three-pane windowing interface. You can create a wide variety of charts and sharp color graphics.

DynaComm 2.1

New Wave Communications

In a world where even this morning's numbers may be too old, communications is the tie that either binds PC workers together or ties them into knots. And when it comes to loosening those knots, a *NewWave* communications program like *DynaComm 2.1* is worth a troop of Boy Scouts.

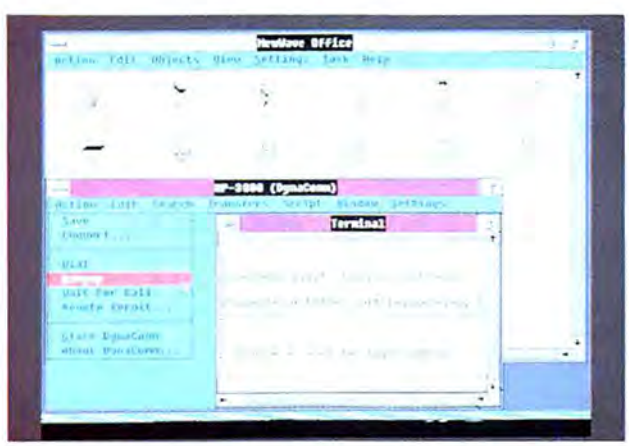
The upgrade handily translates the features of this *Windows* communications program into Hewlett-Packard's *NewWave*, an object-oriented superset of *Windows*, so that *DynaComm* becomes an object in the *NewWave* environment. With it, you create other objects that give you access to CompuServe, Dow Jones News/Retrieval, or the company E-mail system just once. To send an E-mail message, for example, you click on a document object, move it atop the *DynaComm* E-mail object, address it, and click. *DynaComm 2.1* logs on and sends the message.

Perhaps you want to include the latest financial data from the mainframe in spreadsheet form, inserted into an E-mail memo. Exploiting *NewWave*'s connectivity, you can make the spreadsheet an interconnected object. *DynaComm* will dial up the computer, download the data you need, and insert it in the proper place in your spreadsheet—each time you send it.

The $295 *DynaComm 2.1*, which does not include a run-time version of either *NewWave* or *Windows*, requires 150K of memory. You'll also need a *NewWave*-capable platform, meaning DOS 3.0 or a later version and a 286-based machine with at least 4MB of memory and a hard disk. Future Soft Engineering Inc., 1001 S. Dairy Ashford #203, Houston, TX 77077; 713/496-9400.

—Mark Henricks

Reader service no. 643



One of the first applications to take advantage of Hewlett-Packard's NewWave environment, DynaComm 2.1 makes data communications as simple as clicking and moving your communications objects around.

Cure Hayes fever.

2400etc/*e*

V.42 compliant

Get fast relief from high prices with ATI's high-performance, error-free modem for a fraction of the price.

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Circle 22 on reader service card

Micrografx Designer 3.0

Speeding Your Fonts on Their Way

When it comes to high-end graphics, *Micrografx Designer* has been on the cutting edge of PC-based drawing since 1987. Version 3.0 of the *Windows*-based draw package does it again. It's the first to incorporate an improved font-scaling technology from Bitstream, which lets you scale and see 35 different fonts from 6 to 126 points as fast as you can scroll down one of *Designer 3.0*'s pulldown menus and click.

Because of the speed of the compile and the need to save only outlines, you may no longer need to waste time saving and managing massive font files for each application—just make 'em when you need 'em.

Beyond fonts, *Designer 3.0* provides a new object-oriented text editor that combines standard word-processing features such as word wrap with the capability to mix font sizes and colors on the same line. *Designer* treats paragraphs and graphics as objects, and the number per drawing is limited only by the amount of available system and expanded memory. You also can fill one object, such as a shape, with another, like a pattern or text.

The package offers an improved way to click on and import sections of a drawing or clip art, and import/export facilities have expanded to include GEM, Macintosh PICT versions 1 and 2, and color (not just gray-scale) TIFF and PCX. The new version's virtual–bit-map capability breaks the 64K barrier of former versions, limiting file size by disk space only.

Designer 3.0's stronger text-editing features give it beefed-up presentation capabilities. New slide-show fade-and-wipe effects for predrawn slides, controlled by a batch file, don't hurt either. Remote printing services are supported. So are spot color swatches from the package's $99 Pantone color add-on and process color for four-color film separations.

Also new is the wire-frame mode, which lets you make a skeletal drawing to preview lines and shapes and switch modes to fill it with color afterward at the touch of a key. Micrografx Inc., 1303 E. Arapaho Rd., Richardson, TX 75081; 800/272-3729. —*Mike Hogan*

Reader service no. 637

Micrografx Designer 3.0 is the first draw package to incorporate Bitstream's improved font-scaling technology. It has the ability to mix different font sizes and colors on a single line.

XtreePro Gold

Hard Disk File Management Gets Easier

The classic among hard disk file managers, *Xtree* has always excelled at finding and displaying files quickly. *XtreePro Gold* adds EGA/VGA and mouse support, memory economy, and more ways to look at files.

Xtree veterans will especially like the upgrade's versatility. You can view an expanded list of files, including those from *1-2-3*, *dBASE*, *WordPerfect*, *Word*, and *PageMaker* in addition to ASCII and hexadecimal formats. You can split your screen to display two directories (or a directory and the contents of a file) simultaneously. Additionally, you can prune and graph directories freely. Need to locate a phrase in a misplaced file? Find it with a text-string search through a set of tagged files.

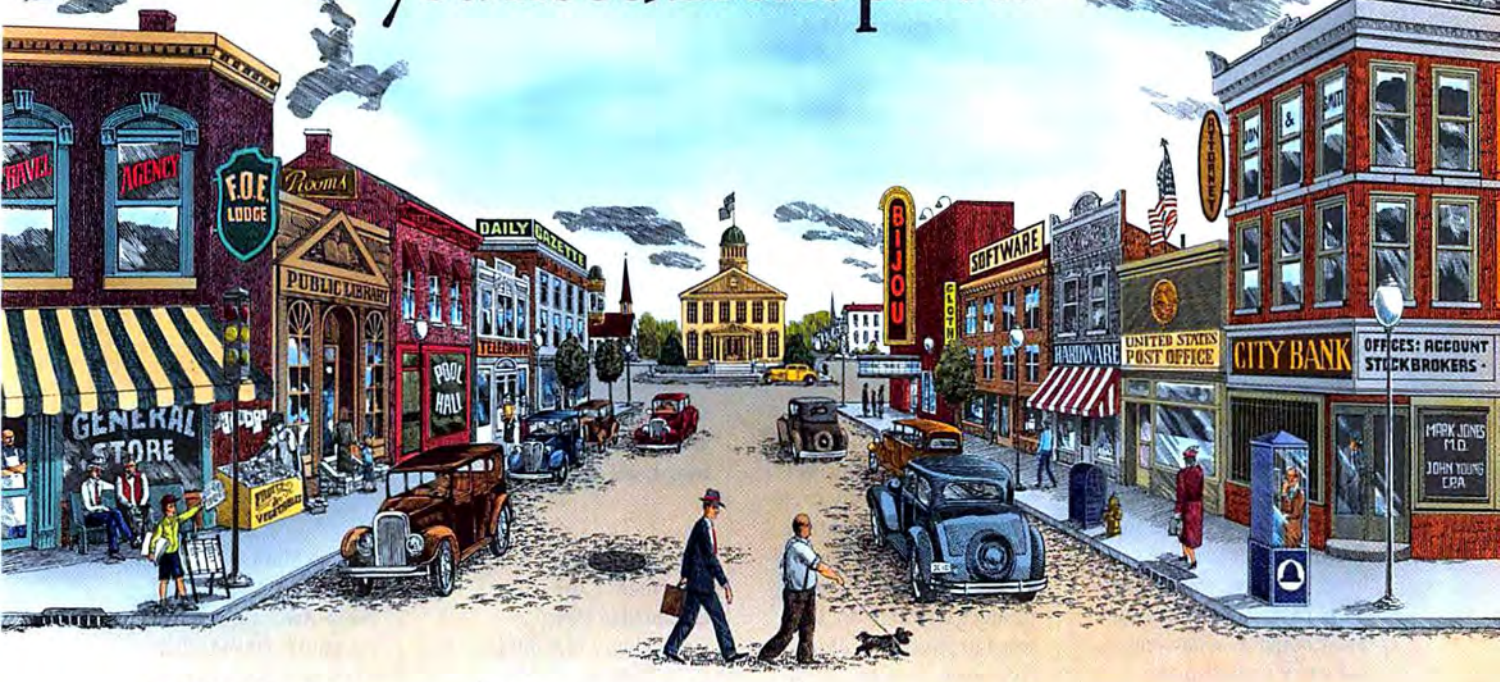
XtreePro Gold even makes DOS functions more nimble. You can format all standard disks from within the tree shell, even if you're in the middle of copying files to a disk. And a new application launcher lets you simultaneously launch program and data files now, or up to 12 at any time à la batch mode.

When you execute or open programs from within *XtreePro Gold* or use the editor, the shell shrinks down to a scant 7K of memory. And to save disk space, it automatically compresses and decompresses your files. Other niceties include context-sensitive help, keystroke logging, and password protection for archived files. You also can use your own word processor in place of *XtreePro Gold*'s 1Word.

XtreePro Gold costs $129; upgrades from *Xtree* or *XtreePro* are $25. Xtree Company, 4330 Santa Fe Rd., San Luis Obispo, CA 93401; 800/634-5545, 800/551-5353 California, 805/541-0604. —*William Rodarmor*

Reader service no. 638

There's nothing new about having everything you need in one place.



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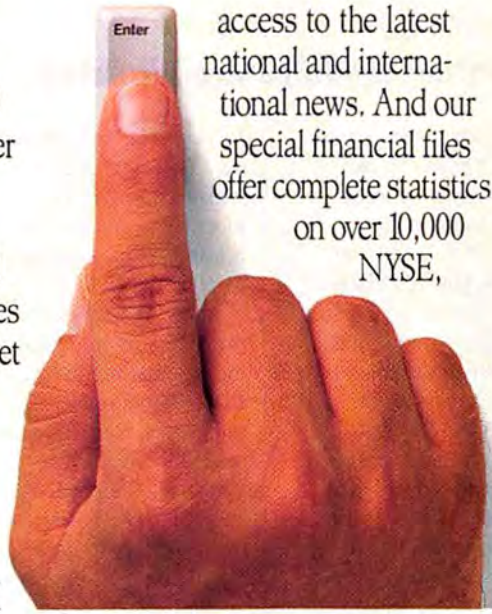

We can even trade online with our local discount brokers.

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CompuServe

Circle 66 on reader service card

Lotus Spreadsheet for DeskMate, DeskMate Q&A Write

DeskMate Denizens

For many work-at-home and small-business users with a low tolerance for computer lingo, ease of use can be worth more than an abundance of features. So it's not hard to understand the recent collaboration between Tandy and software powers Lotus Development and Symantec.

Lotus Spreadsheet for DeskMate and *DeskMate Q&A Write* are "lite" versions of the hot-selling spreadsheet and word processor, customized for the *DeskMate* graphic user interface, which Tandy is having some success positioning as a low-end software environment standard.

Lotus subjected *1-2-3* to some pruning so that it would fit into the 640K memory target for *DeskMate* machines. Missing from this smaller version of release 2.01 are macros, support for expanded memory, and the ability to run *1-2-3* add-ins.

You still can import files from other *1-2-3* versions or *Symphony*, and *DeskMate*'s mouse-driven pulldown menus and pop-up dialog boxes should make Lotus spreadsheets easier for most novice users to pick up.

DeskMate Q&A Write uses a different math, adding rather than subtracting features from the original DOS version. Page preview and an undelete feature are the two most notable. You also get mouse support, which wasn't available in the regular version of *Q&A Write*. And you can paste in words and graphics from a Lotus worksheet or any of more than 100 other *DeskMate* applications.

Both *DeskMate* packages require DOS 3.2 or a later version, 512K of memory, and a graphics card. Both come with run-time versions of the *DeskMate* interface which, unlike more advanced multitasking interfaces, performs adequately even on an 8088-based system. Suggested retail prices are $220 for the Lotus product and $149 for the word processor. —*Mark Henricks*

DeskMate Q&A Write is a scaled-down version of the popular word processor Q&A Write that adds capabilities like page preview, an undelete feature, and mouse support.

Lotus Spreadsheet for DeskMate, Lotus Development Corp., 55 Cambridge Pkwy., Cambridge, MA 02142; 617/577-8500.
Reader service no. 640

DeskMate Q&A Write, Symantec Corp., 10201 Torre Ave., Cupertino, CA 95014; 800/441-7234, 800/626-8847 California.
Reader service no. 641

Peachtree Complete III

Accounting Modules Are Ripening

If you're like most people, you aren't ready to cast last year's financials in concrete until around April 15. With *Peachtree Complete*, you don't have to; it has the capability to keep multiple financial periods open at a time and print reports on them.

You also can consolidate financial statements for multiple companies, repeat and reverse journal entries, and add customers, vendors, general ledger accounts, and other items on the fly.

Peachtree Complete III adds a new purchase-order module to its eight others—general ledger, accounts payable, accounts receivable, inventory, payroll, invoicing, fixed assets, and job costing. This combination makes *Peachtree Complete III* as complete an accounting package as you can find for $199.

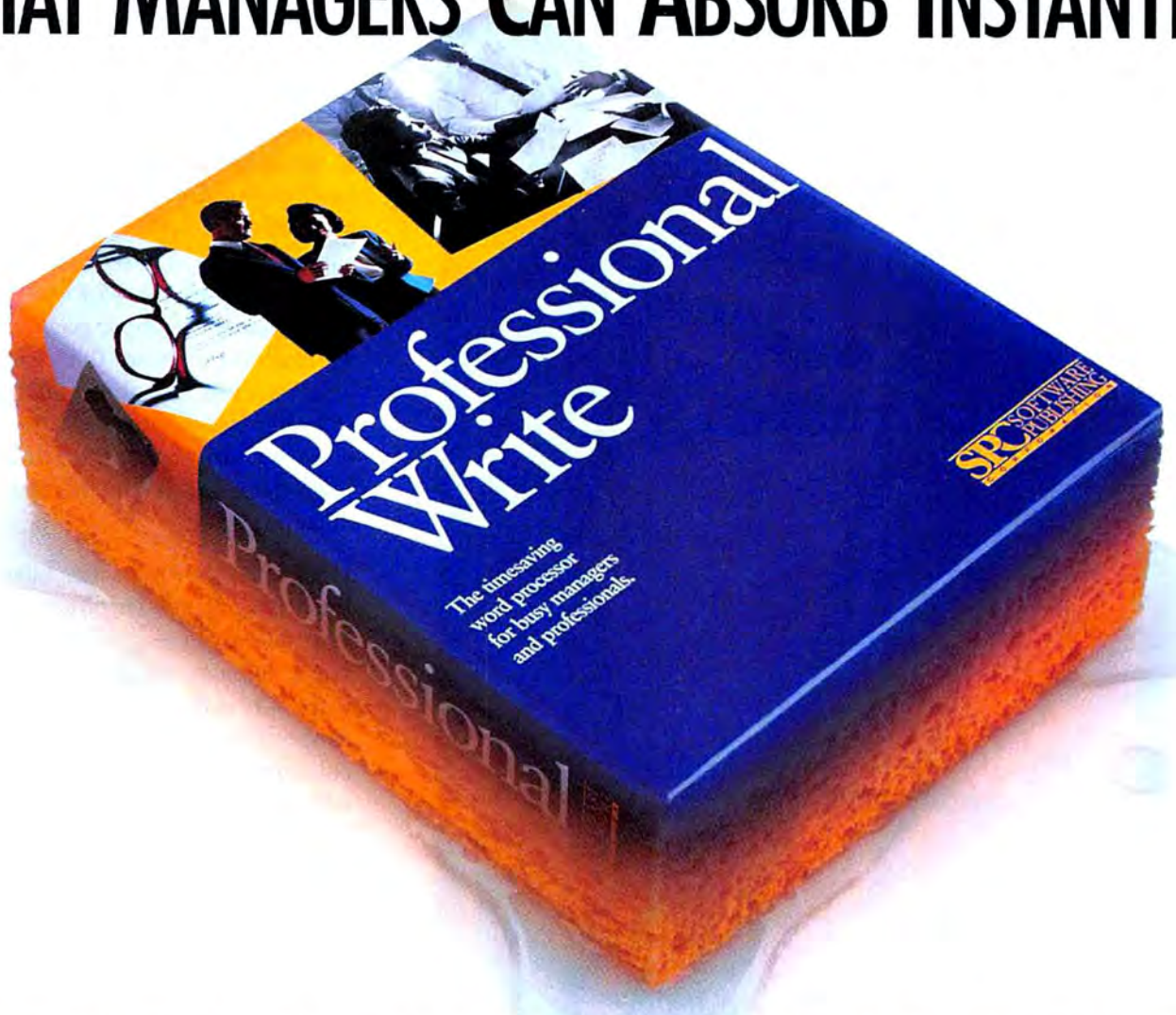
Peachtree has improved its limited reporting by bundling in its *PDQ* custom reporting tool, which includes more than 450 standard reports. The bundled version sports such extras as the capability to generate reports on multiple periods.

Similarly, *Complete III*'s rewritten inventory module now handles five costing types—LIFO, FIFO, and specific unit inventory keeping as well as standard and average cost. You can combine multiple products into single inventory types with extended descriptions, serial numbers, and assemblies entered as items. Products and services and billable hours spent on them can be entered in the same file.

Peachtree Complete III requires DOS 3.0 or a later version, 640K of memory, a hard disk, and either a 132-column printer or an 80-column printer capable of condensed mode. Upgrades from *Complete II* are available for $99. Peachtree Software Inc., 1505 Pavillion Pl., Norcross, GA 30093; 800/247-3224. —*Mark Henricks*
Reader service no. 642

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

WORD PROCESSING SOFTWARE THAT MANAGERS CAN ABSORB INSTANTLY.



Busy professionals need a word processor which will quickly soak up their ideas and help them create impressive-looking documents. New from Software Publishing, Professional Write 2.1 incorporates all the features managers want into an easy to use program. Follow-along tutorials, pull-down menus and context-sensitive help will have managers pouring out memos and reports in less than an hour with no special training or MIS support. What's more, its Preview feature wipes out wasted printing runs by showing what a report will look like before it's printed. Professional Write even shares files with other popular word processing programs. And supports high quality laser and dot matrix printers, providing managers access to a flood of fonts. So call today for a free trial disk. Professional Write will have managers instantly producing sophisticated documents, instead of wringing their hands over complicated software.

FOR FREE TRIAL DISK
CALL 1·408·848·4391
• OPERATOR #60 •
FOR UPGRADE INFO
CALL 1·303·799·4900

SPC SOFTWARE PUBLISHING CORPORATION

Runs on IBM PC and MS DOS compatibles. © 1989 Software Publishing Corporation, 1901 Landings Dr., Mountain View, CA 94039-7210.

Circle 281 on reader service card

Ramses II was not one to mince words. When it came to getting a point across, he was very direct — what was written was in fact etched in stone.

If he ruled today — in this exciting *Information Age* — he'd feel compelled to update his method to input and retrieve information. Being the meticulous type, Ramses would choose page recognition software that was accurate, fast and above all, flexible. Ramses would definitely choose *OmniPage®* when doing page recognition with his 286 or 386 computer.

Let's face it, some scribes have less than perfect "*chipmanship.*" Ramses would require the most versatile page recognition software — one that could scan any font or font size, even multiple columns of text — no matter which scribe created it. There's nothing more frustrating than a misplaced hieroglyph. He'd definitely want it to support the most powerful word processors available in the known world. When it comes to page recognition software, he'd want the very best product at the best possible price.

He'd want *OmniPage*! And who would argue with the Pharaoh?

Can you really blame him? There's just no substitute for a powerful, full-featured page recognition package. Can you afford to make a mistake when your entire "dynasty" depends on it?

So It Is Written...
So It Shall Be.

Means that *OmniPage/386* can read virtually any font, in sizes that range from 8 pt. to 72 pt.

This unique landscape feature means that spreadsheets and financial documents are only a scan away. A great addition to your royal granary if storing and accessing numerical data really counts!

With *OmniPage/386* all that is required is the software — no add-on boards — this translates into recognition power at a fraction of the price.

Transitional Editor™ lets you edit scanned text — without leaving the program — before exporting it to a file. Cut, copy, paste, insert and delete text — or take advantage of the powerful search and replace tools which allow you to modify a page.

Reads and outputs underlines, bold faces and italics.

Supports the most popular word processing, spreadsheet and data base programs.

Supports 11 of your favorite Indo-european languages, including French, German and Spanish.

WYSIScan™ interface takes full advantage of the *Windows* environment — an excellent compliment to any AT or 386 machine.

OmniPage/386 has even more features than ever before — which translates into the most comprehensive page recognition software available — anywhere — for any dynasty — at any price.

Partial Page allows you to scan only that text which is relevant to your business needs.

The bottom line in page recognition software — eliminating excessive key strokes* for all time.

Now... *OmniPage/386* software only!

*Egyptian scribes had a real time of it when it came to excessive key strokes. Each letter, or hieroglyph, had to be individually etched into stone. And we complain today about writer's cramp?

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CAERE

Caere Corporation
100 Cooper Court
Los Gatos, CA 95030
1-800-535-SCAN

Circle 17 on reader service card

Micro Channel Clones Flunk the Test

You'll pay a hefty premium for any of these four MCA-equipped systems—and what do you get? Incredibly, every one failed our exclusive compatibility test.

Michael Goodwin and Karl Koessel

IBM's Micro Channel architecture (MCA) offers business users a tempting set of features. For most of us, the primary benefit is switchless installation of boards and peripherals. However, MCA also solves another problem: Thanks to more system resources (and better handling of them), you can now install multiple drives, ports, and network boards in your PC with far less danger of hardware conflicts.

Nor is that all. Looking down the road, MCA systems—with their high-throughput I/O and support for multiple bus masters (devices with their own CPUs that can take control of the bus)—should be well suited for multiuser and multitasking operations.

Until recently, if you wanted to buy into the MCA bus, you were faced with a narrow choice of vendors. *Very* narrow: Tandy and IBM. Now, finally, the clones are multiplying—but how compatible *are* these compatibles? Do they offer extra benefits or significantly lower prices? Does it make sense to stick with Big Blue? Or, with the emergence of a rival architecture, EISA, is the correct answer None of the Above (see the sidebar "Can EISA Live Up to the Micro Channel's Potential?" in this issue's EISA preview)?

This article examines all the production MCA clones we could get our hands on: two 16-MHz 80386SXs (American Mitac's MPS 2386 and NCR's 386SX) and two 20-MHz 80386s (Tandy's 5000MCA and Grid's 386MCA). With National Software Testing Laboratories (NSTL), we ran them through an exhaustive set of DOS and OS/2 benchmarks and a compatibility torture suite.

Clearly, the key issue in buying an MCA system is MCA compatibility. That means, first of all, that MCA boards ought to fit in the slots, and switchless installation should work properly. Once installed, the boards should function correctly: Modems should dial out, network boards should talk to one another, and so on.

We used five MCA boards—all of which worked flawlessly in our reference IBM PS/2 Models 70 and 55 SX—to test MCA compatibility. To our surprise, not *one* of the clones

was fully compatible. Every one required manual configuration to accept Quadram's JT Fax board; not one would function as a file server with an IBM Token-Ring or SMCA Arcnet PC 100MCA board installed; and they all lacked the MCA floppy disk cable connector required to install an MCA Alloy tape backup unit. Three of the four systems refused to work with the Hayes 2400P internal Smartmodem. Two required you to set switches on the motherboard if you added extra memory.

To simplify price comparisons, we set up each system in the standard *PC World* configuration. Each system was provided with 2MB of RAM; a 1.2MB or 1.44MB floppy drive; VGA graphics and a color VGA monitor; at least one parallel, one serial, and one mouse port; a 101-key keyboard; and DOS 3.3 or a later version. The SX systems were equipped with either a 40MB or a 44MB hard disk; the 80386 systems had a 150MB or 170MB ESDI hard disk.

For all their advanced technology, MCA computers are still very much like "regular" systems in most respects: Price, performance, device and slot capacity, and quality of service and support are all important factors in reaching a buying decision. But since you're paying extra for MCA, keep a close eye on the compatibility issues as you read on.

American Mitac MPS 2386

American Mitac's MPS 2386 is a well-constructed 80386SX system with a clean motherboard (without patch wires); the unit boasts a low $4189 price tag (in the *PC World* configuration)—over $1000 less than the NCR 386SX and more than $400 under IBM's PS/2 Model 55 SX. It delivers good slot and drive capacity, a comfortable 8MB

The SX-based American Mitac MPS 2386 boasts fine performance for $400 less than IBM's Model 55 SX. But there's a problem with MCA compatibility.

NCR's 386SX is a bit faster than the competition, but it's relatively expensive—and MCA compatibility leaves much to be desired.

JOHN GREENLEIGH

FEATURES EVALUATION

MCA Clones Lack the Biggest Feature of Them All

Micro Channel systems from Mitac, Grid, NCR, and Tandy offer the usual array of features. But since not one of the systems delivers acceptable MCA compatibility, any comparison with a True Blue MCA system is beside the point.

● Yes
○ No
◒ Deficient

	American Mitac MPS 2386	Grid 386MCA	IBM PS/2 Model 55 SX	IBM PS/2 Model 70-121	NCR 3865X	Tandy 5000MCA
Standard features						
Price	$4189 [1]	$8298 [2]	$4610 [3]	$8814 [4]	$5194 [5]	$8048 [6]
CPU	80386SX	80386	80386SX	80386	80386SX	80386
CPU speed	16 MHz	20 MHz	16 MHz	20 MHz	16 MHz	20 MHz
Coprocessor support	80387SX-16	80387-20	80387SX-16	80387-20	80387SX-16	80387-20
Disk caching software	○	● [7]	● [7]	● [7]	●	● [7]
CPU-speed RAM						
Capacity [8]	8MB	16MB	4MB	6MB	8MB	16MB
Expandability						
32-bit expansion slots/number free	0/0	2/2	0/0	2/2	0/0	2/2
8/16-bit expansion slots/number free	6/5	3/2	3/3	1/1	7/5	3/2
8-bit expansion slots/number free	0/0	0/0	0/0	0/0	0/0	0/0
Half/full-height storage device bays	4/1	4/1	2/0	3/0	3/1	4/1
300MB or larger hard disk available from manufacturer	○	●	○	●	○	●
Ergonomic design						
Switchless setup	●	○	●	●	●	○
Compact footprint	●	○	●	●	●	○
Complete documentation	●	●	●	●	●	●
Tilt-and-swivel monitor	●	●	●	●	●	◒ [9]
Front-panel reset button	●	●	●	○	○	●
Front-panel on/off switch	●	●	○	●	●	●
Service and support						
Warranty period (months)	12	12	12	12	12	12
On-site service	◒ [9]	◒ [9]	◒ [10]	◒ [10]	◒ [9]	◒ [9]
Toll-free support number	○	●	◒ [10]	◒ [10]	◒ [10]	○
Daily support (hours)	9	9	◒ [10]	◒ [10]	◒ [10]	8.5
Weekend support	○	○	◒ [10]	◒ [10]	○	○
BBS	○	●	○	○	○	●

[1] Price based on standard PC World 16-MHz 80386SX system configuration: 2MB RAM, 1.2MB floppy drive, 40MB ST506 hard disk, parallel port, serial port, VGA video board and color VGA monitor, mouse port, 101-key keyboard, DOS 3.3 or later version.

[2] Price based on standard PC World 20-MHz 80386 system configuration: 2MB RAM, 1.44MB floppy disk, 170MB SCSI hard disk, parallel port, serial port, VGA video board and color VGA monitor, mouse port, 101-key keyboard, DOS 3.3 or later version.

[3] Same as footnote 1 except with 30MB hard disk.

[4] Same as footnote 2 except with 120MB ESDI disk.

[5] Same as footnote 1 except with 44MB hard disk.

[6] Same as footnote 2 except with 150MB ESDI hard disk.

[7] Cache provided with purchase of DOS.

[8] Includes motherboard memory and RAM installable in proprietary slots accessed at full CPU speed.

[9] Available at extra cost.

[10] Via dealer only.

EXECUTIVE SUMMARY

American Mitac MPS 2386

16-MHz 80386SX-based computer

Although it's fast, well-built, and relatively inexpensive, this system fails to deliver adequate MCA compatibility.

	POOR	FAIR	GOOD	EXCELLENT
CPU-speed RAM			●	
Expandability				●
Ergonomic design				●
Service and support				●
Performance				●
Overall value			●	

Reader service no. 615

ceiling for CPU-speed RAM, and excellent SX performance. Its only serious problem is compatibility; along with all the others, this system failed to work correctly with four important MCA peripherals.

The Mitac's motherboard holds up to 8MB of RAM, all of which can be addressed at full CPU speed—as opposed to memory that must be installed on boards in the slower (10-MHz) expansion bus. While OS/2 can address 16MB of RAM, 8MB is a common ceiling for SX systems and should be plenty for nonserver applications (at least until a high-performance 32-bit version of OS/2 arrives).

The motherboard also holds six 8/16-bit MCA slots, one of which is used by the hard disk controller. Since VGA, I/O, and a mouse port are built in, you'll end up with five usable slots—a good count. There are four drive bays—two 5¼ inch and two 3½ inch—three of which are externally accessible.

The MPS 2386 performed quite respectably on both DOS and OS/2 tests. It's a bit slower than the (more expensive) NCR, but it outstrips IBM's Model 55 SX in most benchmarks—and took top place among the SX systems in the *AutoCAD* and *Word* events.

Although users must pay any toll charges for calls to American Mitac's technical support number, the quality of support was quite good. We placed three calls on three different days—one at the beginning of the day, one at noon, and one toward quitting time. Two calls were answered instantly; the third reached an answering machine, and a technician called back 30 minutes later.

The MPS 2386 has a lot to recommend it: a low price, good expandability, and strong performance. Unfortunately, incompatibilities with the MCA standard make it unacceptable.

NCR 386SX

You'll pay a premium price for the NCR 80386SX system ($5194 in the *PC World* configuration), but you won't get your money's worth. True, it delivers the best MCA compatibility of any system in the roundup—but that isn't saying much. It's stingy with drive bays, tech support is available only via dealers, and while it's faster than the entries from American Mitac and IBM, it's not *that* much faster.

EXECUTIVE SUMMARY

NCR 386SX

16-MHz 80386SX-based computer

This system is faster than its rivals, but considering its high price, it fails to deliver value equal to its cost. MCA incompatibilities make it even less attractive.

	POOR	FAIR	GOOD	EXCELLENT
CPU-speed RAM			●	
Expandability				●
Ergonomic design				●
Service and support n/a				
Performance				●
Overall value			●	

Reader service no. 617

NCR's 386SX passed one compatibility test that the other systems failed: It was the only machine to work properly with the Hayes internal Smartmodem 2400P. However, like all the others, it came to grief with JT Fax, IBM Token-Ring, SMCA Arcnet, and Alloy.

8MB is a common ceiling for SX systems and should be plenty for nonserver applications.

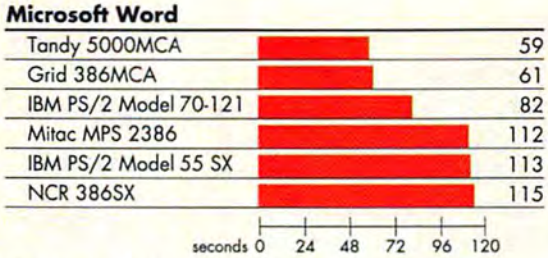
NSTL TEST REPORT

MCA Clones Outperform IBM? Not Exactly...

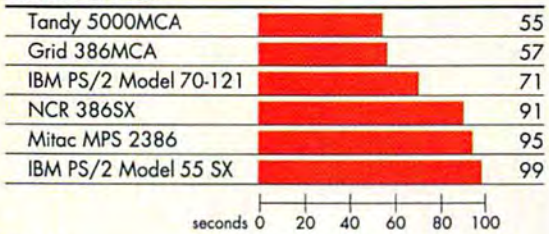
Micro Channel clones consistently beat their IBM competitors in speed tests. But it's a Pyrrhic victory, since none of these systems deliver adequate MCA compatibility.

DOS

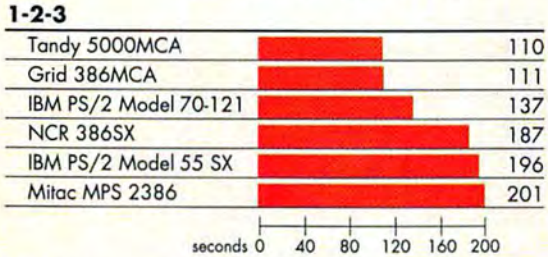
Microsoft Word



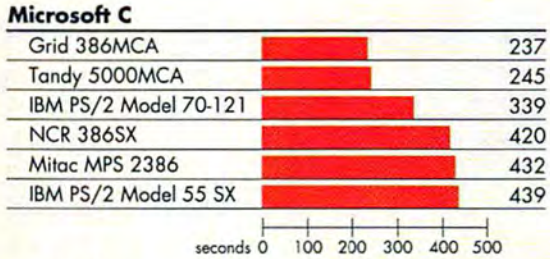
dBASE III Plus



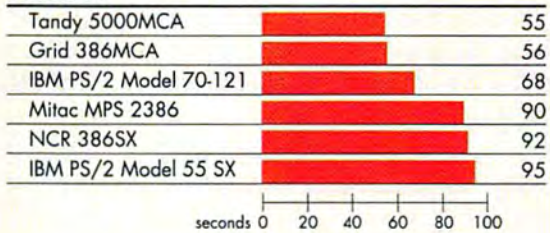
1-2-3



Microsoft C



AutoCAD



Methodology
All machines were tested with a coprocessor and a 256K extended memory disk cache (except in the *1-2-3* benchmark). Each system was tested with 2MB of RAM. Systems were configured with the following sizes of hard disks: IBM PS/2 Model 55 SX, 30MB; Mitac MPS 2386, 40MB; NCR 386SX, 44MB; Grid 386MCA, 120MB; IBM PS/2 Model 70-121, 120MB; Tandy 5000MCA, 150MB.

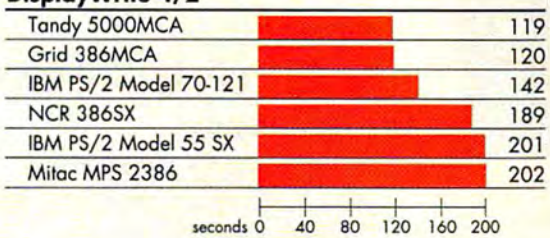
Microsoft Word 4.0
A *Microsoft Word* macro loads a 35-page, 140-paragraph document and performs search-and-replace and spell-checking operations. The first page of the document is then printed. Although the results of the benchmark depend primarily on processor and memory access speeds, display adapter 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.

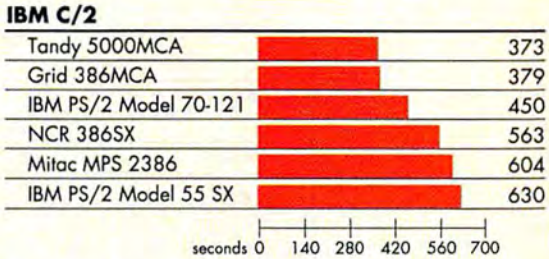
1-2-3 2.01
In this benchmark, a *1-2-3* macro executes a series of recalculations using five different formulas within a 75-by-75-cell matrix. Because there are few screen updates and no disk access is required, the results depend almost entirely on processing and memory access speeds.

OS/2 Single-Tasking

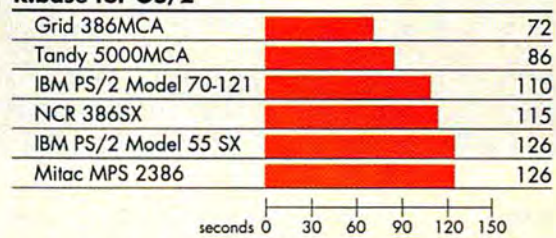
DisplayWrite 4/2



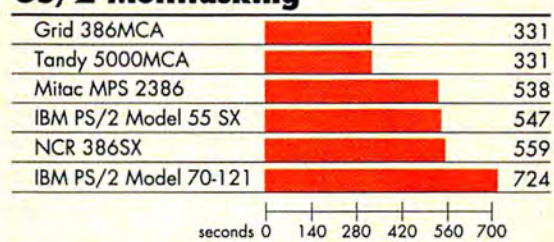
IBM C/2



R:base for OS/2



OS/2 Multitasking



Microsoft C 5.0
The *Microsoft C* benchmark measures the time required to compile and link *XLISP*. 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.

DisplayWrite 4/2
Although the hard disk access rate plays a small part in this benchmark, processing and memory access speeds are the most significant factors. Memory architecture affects memory access speed: Systems that require additional memory in standard expansion slots to run OS/2 exhibit below-average performance.

While *DisplayWrite 4/2* is loading, the keystrokes to start a *DisplayWrite* macro are entered. The macro loads a 35-page, 140-paragraph document, replaces each occurrence of the word *today* with *tomorrow*, uses the built-in spelling checker to look for any incorrectly spelled words (there are none), paginates the document, prints the first page to an IBM Proprinter II, and exits *DisplayWrite*.

IBM C/2
In this benchmark, processing and hard disk sequential access speeds are the most important factors. The benchmark measures the time required to compile the 25 source code files that make up *XLISP*, a public-domain LISP interpreter.

R:base for OS/2
Processing and hard disk random access speeds are the most significant factors in this benchmark. Disk caching dramatically improves apparent disk access speed. This benchmark measures the time it takes to produce a report based on a three-file join, select, and sort.

OS/2 Multitasking
In two sessions, IBM's *C/2* compiles the 25 C source code files that make up *XLISP*. The results of this benchmark are determined by calculating the difference between the first session's starting time and the second session's ending time.

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

Grid's 20-MHz 386MCA is speedier and more expandable than IBM's PS/2 Model 70-121—and costs about $500 less. But MCA compatibility is unacceptable.

The motherboard (which had a few patch wires) holds a special memory slot with a NuBus-style connector that accommodates 8MB of CPU-speed RAM. There are also seven 8/16-bit MCA slots—two of which are needed for video and hard disk controllers—leaving you with a full five slots. The drive bay situation is less terrific; there's room for only three 3½-inch drives, two stacked for front panel access and one stowed inside.

Both reviewed SX systems (and the IBM Model 55 SX) scored very closely on the DOS benchmarks, but the NCR 386SX still took top honors in three out of five events. It did even better on the OS/2 tests, beating the competition in everything but the OS/2 Multitasking test.

Service and support are handled via dealers only. While this isn't necessarily bad, it's not necessarily good either—and it makes it impossible to generalize about the quality of support you're likely to get. There's no national tech support line for users.

The NCR 386SX gives you a bit of a performance edge and fewer MCA incompatibilities than any other clone in this roundup. But when you can get an IBM PS/2 Model 55 SX with impeccable MCA compatibility for $584 less, the NCR 386SX doesn't make much sense.

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.

EXECUTIVE SUMMARY

Grid 386MCA

20-MHz 80386-based computer

It's cheaper and faster than IBM's Model 70-121 and offers greater expansion capacity in every respect, but poor MCA compatibility does it in.

	POOR	FAIR	GOOD	EXCELLENT
CPU-speed RAM				●
Expandability			●	
Ergonomic design			●	
Service and support			●	
Performance				●
Overall value		●		

Reader service no. 616

Grid 386MCA

You can buy Grid's 20-MHz 80386-based system for $8298 (in the *PC World* configuration, with a 170MB SCSI hard disk)—about $500 less than IBM's corresponding Model 70-121. What's more, the 386MCA delivers hotter performance, more usable slots, more drive bays, and more than twice as much capacity for CPU-speed RAM. What it doesn't deliver is acceptable MCA compatibility.

In fact, the 386MCA ties for the worst MCA compatibility in the roundup. In addition to the incompatibilities listed previously that were common to all the systems, the 386MCA's motherboard has two switches which you (or a factory technician) will have

to reset if you install more memory; so much for switchless installation.

The motherboard, which had patch wires showing, is designed to accommodate a generous 16MB of CPU-speed RAM via two proprietary memory slots. A dedicated MCA slot holds a processor board with CPU and support chips, cache memory, and a socket for a coprocessor. Five additional MCA slots (two 32 bit and three 8/16 bit) are built in. One of the 16-bit slots is needed for a hard disk controller; with video, I/O, and a mouse port on the motherboard, four slots remain free—not a great count, but better than the Model 70-121's three. The case includes space for four half-height drives, all externally accessible: Two 5¼-inch bays are stacked; two 3½-inch bays are placed side by side.

The Grid 386MCA's excellent performance scores are virtually identical to those of the Tandy 5000MCA—which should come as no surprise, since both machines use the same motherboard. And both systems leave the IBM Model 70-121 in the dust on every test.

Service and support are quite good. Grid is the only vendor in the bunch to offer a toll-free support line. Better yet, all three of our test calls were answered instantly—and an in-house BBS provides help at *your* convenience.

Low price and strong performance (at least compared to the IBM) make this system tempting—until you remember that it failed to support any of our five MCA test boards.

Tandy 5000MCA

Tandy owns Grid—and aside from a few inconsequential differences (a round hole in the case for the power switch instead of a square one, a 150MB hard disk instead of a 170MB disk, and a price that's $250 cheaper), the $8048 Tandy 5000MCA is virtually identical to the Grid 386MCA. Both 20-MHz 80386-based systems share the same impressive performance—and the same poor MCA compatibility.

The only significant difference between these systems is Tandy's service and support, which is not nearly as good as Grid's.

JOHN GREENLEIGH

The 20-MHz Tandy 5000MCA is a virtual twin of the Grid 386MCA—only $250 cheaper. Both systems share good performance—and poor MCA compatibility.

For one thing, you'll have to pay charges on calls to the tech support line. For another, you may not even get through—one of our three calls encountered an endless busy signal; the others were answered after an average of 2 minutes on hold, with the long-distance meter running. (Tandy points out that you can always call your local Radio Shack.)

EXECUTIVE SUMMARY

Tandy 5000MCA

20-MHz 80386-based computer

A virtual twin of the Grid 386MCA, this system delivers the same strong performance—and the same unacceptable MCA compatibility. Tandy's tech support falls short.

	POOR	FAIR	GOOD	EXCELLENT
CPU-speed RAM				●
Expandability			●	
Ergonomic design		●		
Service and support		●		
Performance				●
Overall value		●		

Reader service no. 618

Given the 5000MCA's inferior support, the buying recommendation here is the same as the Grid's, only more so: Don't.

Not Ready for Prime Time

Not only are there no Best Buys in this roundup, MCA incompatibilities leave you without the possibility of even a decent buy. Under the circumstances, smart buyers will either hew to the Blue, wait for EISA, or try out these clones *very* carefully, with every board and peripheral they want to use, before buying.

The days are over when companies can get away with building an MCA system just to prove they have the engineering muscle to pan for gold in IBM's stream. Vendors who want to stake a legitimate claim must deliver machines with true MCA compatibility, or the promise of the future may turn to fool's gold. ●

Michael Goodwin is associate editor and Karl Koessel is technical editor for PC World.

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

WHERE TO BUY

American Mitac MPS 2386

American Mitac Corp.
410 E. Plumeria Dr.
San Jose, CA 95134
800/648-2287,
408/432-1160
LIST PRICE: Model 003 with 1MB RAM, 1.44MB floppy drive, 101-key keyboard, DOS 3.3 and GW BASIC $2695; Model 0344 same as Model 003 except with 4MB RAM, 1.44MB and 1.2MB floppy drives, and 30MB hard disk $4144; Model 0648 same as Model 0344 except with 8MB RAM and 65MB hard disk $5334
ACCESSORIES: 1MB expansion RAM $250; 1.2MB floppy drive $99; monochrome video adapter $65; 12-inch amber monitor $110, 12-inch monochrome VGA monitor $210, 14-inch color VGA monitor $549; 30MB hard disk and controller $600, 40MB hard disk and controller $695, 65MB hard disk and controller $790
WARRANTY: 12 months mail- or carry-in to TRW or Mitac service centers, on-site service contract optional
EXTENDED WARRANTY: available
TECHNICAL SUPPORT: toll number, M–F 8–5
OTHER SUPPORT: none
Reader service no. 615

Grid 386MCA

Grid Systems Corp.
47211 Lakeview Blvd.
Fremont, CA 94537
800/222-4743,
415/656-4700
LIST PRICE: Model 1 with 2MB RAM, 32K static RAM cache, 1.44MB floppy drive, CGA video adapter, 101-key keyboard, and parallel, serial, and mouse ports $4999; Model 40 same as Model 1 except with SCSI controller and 40MB SCSI hard disk $6298; Model 80 same as Model 40 except with 80MB SCSI hard disk $6798
ACCESSORIES: unpopulated memory expansion adapter $100, 1MB memory $600, 2MB SIMM kit $1299; 360K floppy drive $200, 1.2MB floppy drive $280, 1.44MB floppy drive $300; SCSI adapter $500; 40MB SCSI hard disk $799, 80MB SCSI hard disk $1299, 170MB SCSI hard disk $2499, 344MB SCSI hard disk $3499; 150MB SCSI tape backup $1299; 80387-20 math coprocessor $730; 14-inch monochrome VGA monitor $250, 12-inch color VGA monitor $650; DOS 3.3 $150
WARRANTY: 12 months mail- or carry-in to company, on-site service contract optional
EXTENDED WARRANTY: available
TECHNICAL SUPPORT: toll-free number, M–F 8–5
OTHER SUPPORT: in-house BBS
Reader service no. 616

NCR 386SX

NCR Corp.
1601 S. Main St.
Dayton, OH 45479
800/544-3333,
513/445-5000
LIST PRICE: Model 3420-1010 with 1MB RAM, 1.44MB floppy drive, one parallel, one serial, and one mouse port, DOS 4.01 $3145; Model 3420-1210 same as Model 1010 except with 44MB hard disk $3895; Model 3420-1220 same as Model 1210 except with 4MB RAM $5595; Model 3420-1420 same as Model 1220 except with 100MB hard disk $6345
ACCESSORIES: memory upgrade board with 3MB RAM $1995; 1MB RAM upgrade $600, 4MB RAM upgrade $2395; 1.44MB floppy drive $245; 100MB SCSI hard disk $1695; 80MB tape drive $800; 12-inch monochrome VGA monitor $255, 12-inch color VGA monitor $699, 14-inch color VGA monitor $699; Microsoft Mouse $150; 80387SX math coprocessor $799
WARRANTY: 12 months mail- or carry-in to NCR, on-site optional
EXTENDED WARRANTY: available
TECHNICAL SUPPORT: via dealer only
OTHER SUPPORT: none
Reader service no. 617

Tandy 5000MCA

Tandy Corp.
1800 One Tandy Center
Fort Worth, TX 76102
817/390-3700
LIST PRICE: Model 5000MCA with 2MB RAM, 1.44MB floppy drive, VGA, 101-key keyboard $4999; with 80MB hard disk $6999
ACCESSORIES: unpopulated memory expansion adapter $100; 1MB memory kit $649, 2MB memory kit $1299; 1.44MB or 1.2MB floppy drive $280; SCSI adapter $500, ESDI controller $430; 40MB SCSI hard disk $799, 80MB SCSI hard disk $1299, 170MB SCSI hard disk $1999, 344MB SCSI hard disk $2999, 150MB ESDI hard disk $1999; 150MB SCSI tape backup $1299; monochrome VGA monitor $200, VGM-200 12-inch color VGA monitor $500, VGM-300 12-inch color VGA monitor $629; 80387-20 math coprocessor $647; MS-DOS, BASIC, and disk caching $120; OS/2 $325
WARRANTY: 12 months mail- or carry-in to Tandy Service Center or local Radio Shack store
EXTENDED WARRANTY: available
TECHNICAL SUPPORT: toll number (or local Radio Shack Consumer Electronics Center), M–F 8–5:30
OTHER SUPPORT: CIS newsletter, Tandy HQ on PC-Link
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The first affordable 800x400 PostScript® laser printer.

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No wonder our competition is fading.

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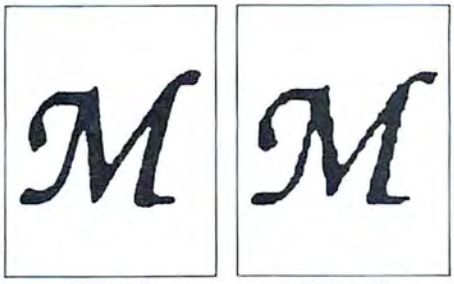
NewGen's dual-processor controller design, utilizing a 20MHz graphics RISC processor, gives us the fastest PostScript-compatible desktop laser you can buy. In fact, it will print most pages three to five times faster than the Apple LaserWriter® IINTX and blow the doors off anything else in its class.



800 x 400 300 x 300

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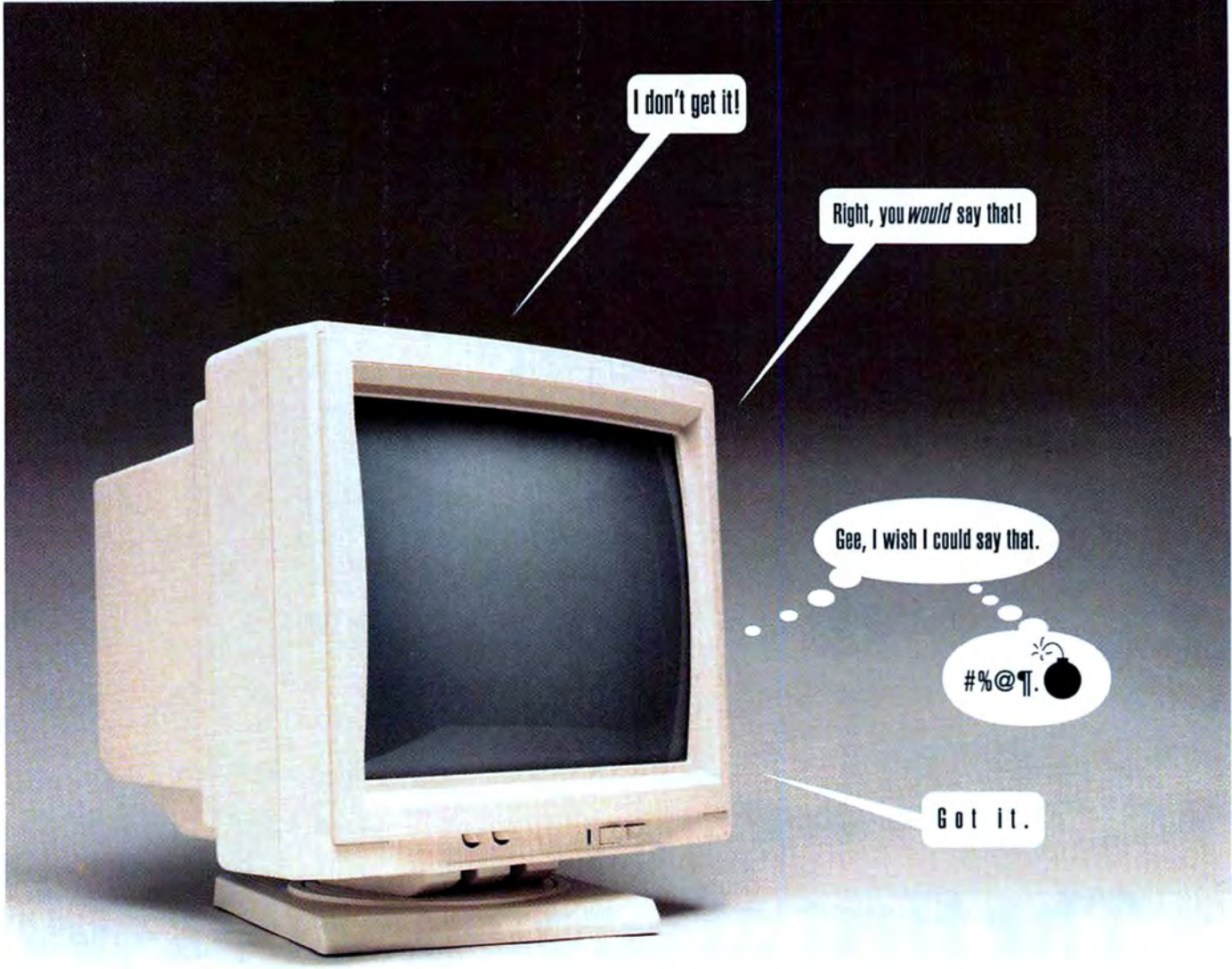
NewGen's compatible interpreter is compatible with Adobe PostScript.

Circle 159 on reader service card



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On your right, we'd like you to meet our bold new Elite/1600™ monitor, a complete ultra high resolution 20-inch monochrome display system with a 1600 x 1280 pixel resolution.

The same resolution as the Sun-4 workstation monitor. A picture so stable and flicker-free it can only be called extraordinary. For you, this means drawings that are pin-point precise and razor sharp images that are perfectly aligned.

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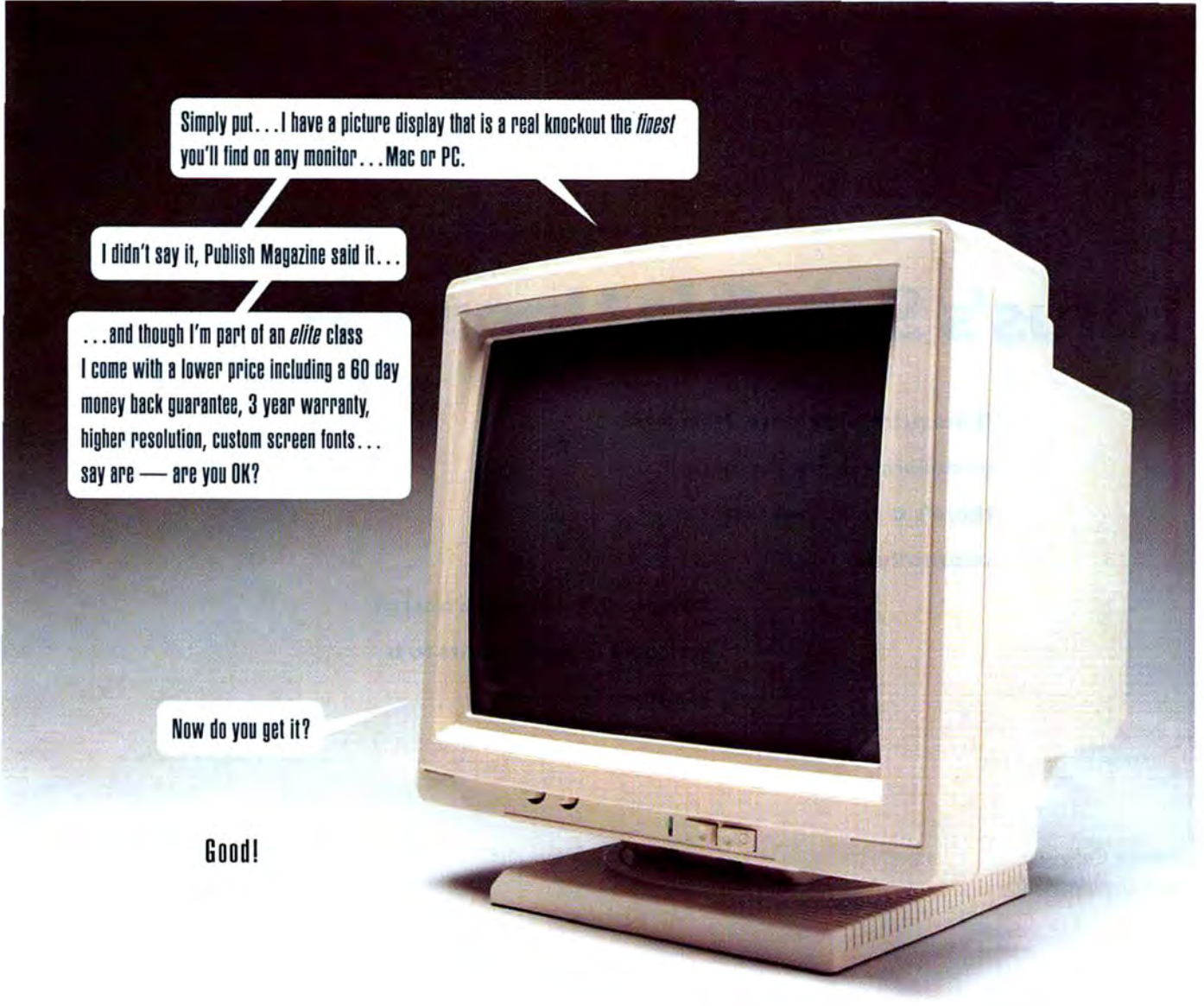

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Circle 80 on reader service card

Lotus's Sensible Upgrade

If the price of release 3—in RAM or dollars—is just too high, there's a safe, low-cost alternative.

Release 2.2 delivers a host of welcome improvements to a longtime favorite.

Steven Cobb
and Douglas Cobb

PIERRE YVES GOAVEC

Lotus's *1-2-3* release 3 offers dazzling features, but many potential users find it overly complicated and memory hungry. To avoid being marooned at the high end of the market, Lotus has introduced *1-2-3* release 2.2, a modest upgrade of release 2.01 that makes a virtue of necessity.

The new release is as easy to use as *2.01* but more versatile, offering worksheet linking, search and replace, an undo command, and minimal recalc. Moreover, it comes bundled with Funk Software's *Allways*, an excellent spreadsheet-publishing add-in. And with *2.2*'s new *setting sheets*—on-screen forms that let you view and change settings for such functions as querying, charting, and printing—it's easy to track the choices you've made throughout the program.

This spreadsheet for the rest of us needs half the RAM of release 3, costs $100 less, and runs on 8088-based machines. Although the 320K RAM requirement is 64K more than *2.01*'s, it's only 6K more if you count the included features that used to require add-ins. For many, the best feature will be compatibility: Release 2.2 uses WK1 files, not the new, incompatible WK3 format employed by release 3.

Naturally, you won't find such advanced release 3 features as multilevel worksheets, the ability to interact with external data base files, or the capability to have more than one worksheet in RAM at the same time. Furthermore, release 2.2's speed can't compare with release 3's, although it's close to *2.01*'s. But in some areas, notably setting sheets and worksheet publishing, *1-2-3* release 2.2 is actually better than release 3.

Worksheet Linking

Release 2.2's most significant enhancement is its ability to link worksheets. From a cell in the originating worksheet, you simply use the formula +<<*path\worksheet*>>*cell* (or +<<*path\worksheet*>>*rangename*) to call on data or formulas in a cell (or named range) in the target worksheet.

This approach improves vastly on release 2.01's File Xtract and File Combine commands, but linking references must stand alone—they can't be embedded in formulas or functions. Consequently, to use a value from another worksheet in a calculation, you must enter the referencing formula into a cell by itself, then reference the result of that formula within another formula.

Recovering From Disaster

Release 2.2's new single-level undo capability is welcome, but the feature can be a memory hog. Release 2.2 stores a copy of the worksheet in RAM, and pressing <Alt>-<F4> replaces the bungled version of the worksheet with the copy. However, if you don't have expanded memory, *2.2* reserves half your computer's free conventional memory for the backup copy.

As with release 3, Borland's *Quattro*, and other spreadsheets, you can toggle the undo function on and off. But for all practical purposes, you need expanded memory to use the undo capability when building worksheets of any significant size.

In one situation, the new undo feature may come in particularly handy. Incredibly, release 2.2 still doesn't prompt you to save changes in the current worksheet if you try to load another one; it simply pops up a file directory. If you accidentally overwrite a worksheet, undo will bring it back—provided you haven't pressed a key in the interim.

Macro Management and Search and Replace

The new Macro Library Manager, which lets you store macros in RAM outside the current worksheet, should please macro-happy *1-2-3* users. Storing macros in RAM has two advantages over storing them in worksheets: You don't need to keep a copy of an oft-used

FEATURES EVALUATION

The Classic Spreadsheet Gets a Needed Make-Over

1-2-3 release 2.2 lacks release 3's sizzle, but it's far more versatile than its predecessor.

● Yes ○ No ◒ Deficient
△ Limited only by available RAM

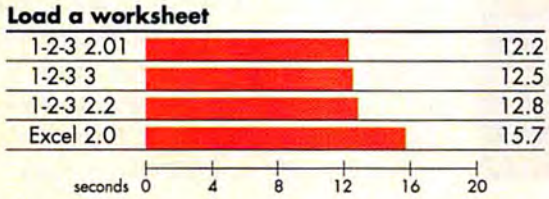
	1-2-3 2.01	1-2-3 2.2	1-2-3 3	Excel 2.1
Spreadsheet				
Worksheets per file	1	1	256	1
Windows per screen	2	2	3	△
Supports dynamically linked files	○	●	●	●
3-D capability	○	○	●	○
Saves work space	○	◒[1]	◒[1]	●
Array processing	○	○	○	●
Selects multiple ranges	◒[2]	◒[3]	◒[4]	●
Pastes range names in formulas	○	●	●	●
Undo command	○	●	●	●
Traces formula references	◒[5]	◒[5]	◒[5]	●
Cell noting	◒[6]	◒[6]	●	●
Real-time data import	◒[6]	◒[6]	○	●
Supports mouse	○	○	○	●
Formats values in color	○	●[7]	◒[8]	●
Solves simultaneous equations	○	○	○	○
Command-level password protection	●	●	●	●
Data base				
Concurrent sort keys	2	2	255	3
Column sort	○	○	○	●
Joins two data base tables	○	○	●	◒[9]
Supports calculated output fields	○	○	●	○
Provides data input form	○	○	◒[1]	●
Queries external data bases	◒[6]	◒[6]	●	◒[9]
Reads/writes DBF files	○	●	●	●
Reporting and graphs				
WYSIWYG worksheet preview	●[7]	●[7]	○	●
Multiline headers and footers	○	○	○	○
Named reports	○	○	●	○
Font styles per worksheet	8[7]	8[7]	4	4
Prints in color	○	●[7]	●	●
Background printing	○	○	●	●
Prints text and graphs together	○[7]	●[7]	●	○
Prints multiple ranges per page	○	○	●	○
Macros				
Allows separate macro worksheets	○	●	●	●
Macro keystroke recorder	◒[6]	●	●	●
User-defined functions	○	○	◒[10]	●
Step mode/trace cells option	●	●	●	●
DOS access from macro procedure	○	●	●	○
Reads/writes 1-2-3 macros	●	●	●	◒[11]

[1] Using a macro.
[2] For printing only.
[3] For printing, @SUM, and other functions.
[4] For printing, @SUM, and data base functions.
[5] Circular references only.
[6] With add-in.
[7] With included add-in, Allways.
[8] Negatives in red only.
[9] With Q+E. Relational capability is available with external data bases only.
[10] With Lotus's add-in tool kit.
[11] With translation utility.

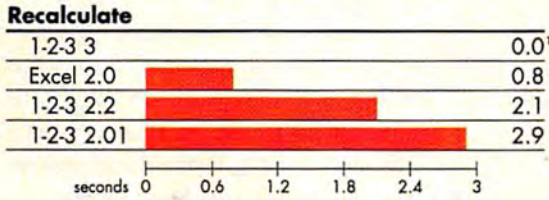
A Tune-Up, Not a Turbo Charge

The newest 1-2-3 offers faster recalculation than release 2.01, but on most other operations the two run so close you probably won't notice the difference. Both are slower than release 3 almost across the board.

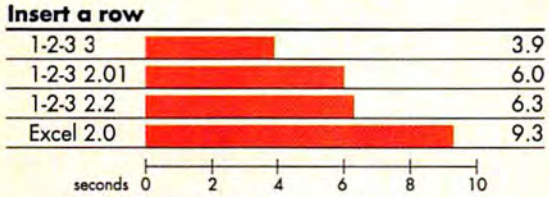
Load a worksheet



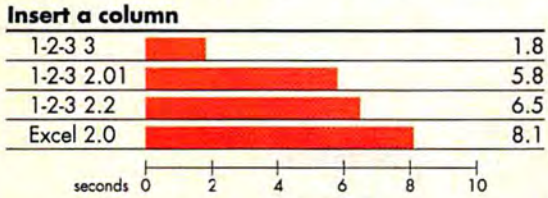
Recalculate



Insert a row

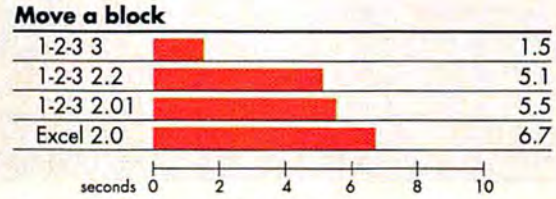


Insert a column

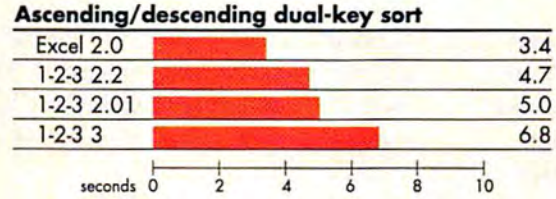


[1] Time was too fast to record.

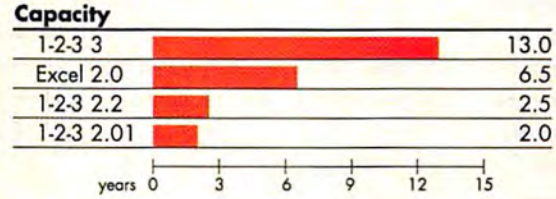
Move a block



Ascending/descending dual-key sort



Capacity



Methodology
A 16-MHz Compaq Deskpro 386S with 5MB of RAM and a 40MB hard disk was used for benchmarks. Tests were performed using a worksheet containing a three-year cash-flow model, a balance statement, an inventory, amortization schedules for the present year, a data table, and a personnel file consisting of sales, commissions, and projections. Modules were interrelated with interdependent formulas, the majority being arithmetic functions and combinations of functions. The calculation mode was set to automatic to take advantage of background and minimal recalculation schemes.

Load a worksheet
This test measured how long it took to load the test worksheet.

Recalculate
This test measured the elapsed time between entering a value in the worksheet and the return of cursor control to the user. Products with minimal recalculation capabilities scored best on this test.

Insert a row
This test measured the time it took to complete insertion of a row at the 33rd row position of the test worksheet.

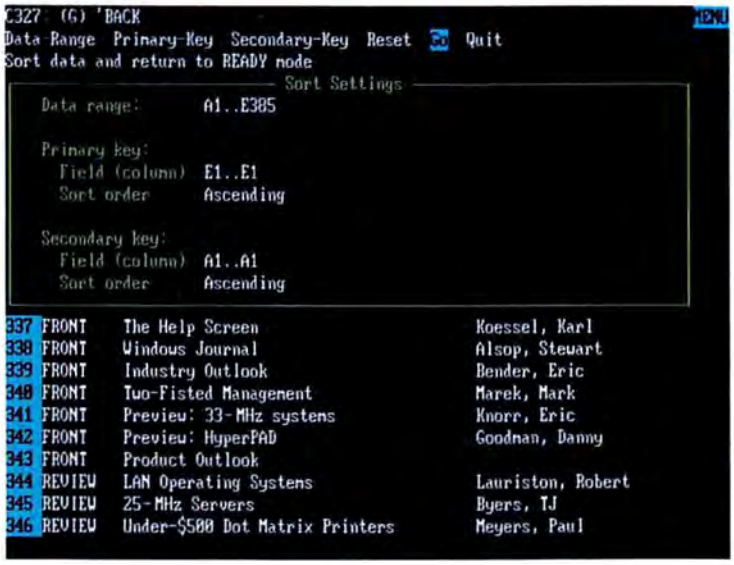
Insert a column
This test measured the time it took to complete insertion of a column at the second column position of the test worksheet.

Move a block
This test measured the time it took to move the block C1 to AR93 one column to the left on the test worksheet.

Ascending/descending dual-key sort
A block of 19 rows and 86 columns containing a list of names, commissions, and associated data was sorted according to commission rates in descending order and by name in ascending order.

Capacity
This test measured worksheet capacity by counting how many additional years' worth of data could be added to the worksheet. If an entire year could not be added, an attempt was made to add six months.

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



One of 1-2-3 release 2.2's more notable changes is the use of setting sheets, which display all the settings for a group of commands—such as a graph or data base operation—at once.

macro in every worksheet, and you can create macros that retrieve worksheets. This capability—which has been available in *Symphony* for several years—uses only about 13K of RAM.

Another long-overdue addition is the new search-and-replace feature. Release 2.2 can find and replace strings of up to 239 characters within cells that contain labels or formulas (but not values) in all or part of a worksheet.

EXECUTIVE SUMMARY

1-2-3 release 2.2

Spreadsheet

1-2-3 release 2.2 is a compact, surprisingly versatile successor to 2.01. Without overstressing your hardware, it gives you worksheet publishing, worksheet linking, undo, search and replace, and a new Macro Library Manager.

	POOR	FAIR	GOOD	EXCELLENT
Spreadsheet				●
Data base				●
Reporting and graphs				●
Macros				●
Performance				●
Overall value				●

Reader service no. 610

Advances and Limitations

The last major improvement, already offered by most of *1-2-3*'s competitors, is minimal recalc. Release 2.2 recalculates only the formulas and functions that have been affected by changes made to the worksheet since the last time it was recalculated.

Release 2.2 also offers a host of minor enhancements. You can now change the width of a designated range of columns, specify all the ranges for a chart at one time, load worksheets from the DOS command line, and use cell references as headers and footers. You'll also find several new macro commands, a backup file option, and somewhat better looking (but still limited) graphs. Unfortunately, release 2.2 still makes you use an external Printgraph program to print graphs.

1-2-3 release 2.2 may not have the power of release 3, *Excel*, *SuperCalc 5*, or *Quattro Pro*. But its modest hardware requirements, compatible file format, and commonsense improvements—not to mention spreadsheet-publishing and setting-sheet features—may well make it a more popular upgrade than release 3. ●

Douglas Cobb is president of The Cobb Group, Inc., a leading publisher of books and journals about business software. Steven Cobb is a senior author at The Cobb Group and writes extensively about spreadsheet software.

WHERE TO BUY

1-2-3 release 2.2
Lotus Development
Upgrade Center G
61 Medford St.
Somerville, MA 02143
617/623-6572
LIST PRICE: $495, upgrade $150 ($90 without Allways), free upgrade for releases bought after September 6, 1988
REQUIREMENTS: 512K, two floppy drives, DOS 2.1 or later version
TECHNICAL SUPPORT: 24-hour toll-free number for six months; after six months, unlimited, toll call, M–F 8:30–8; priority support available for a fee
OTHER SUPPORT: none

Reader service no. 610

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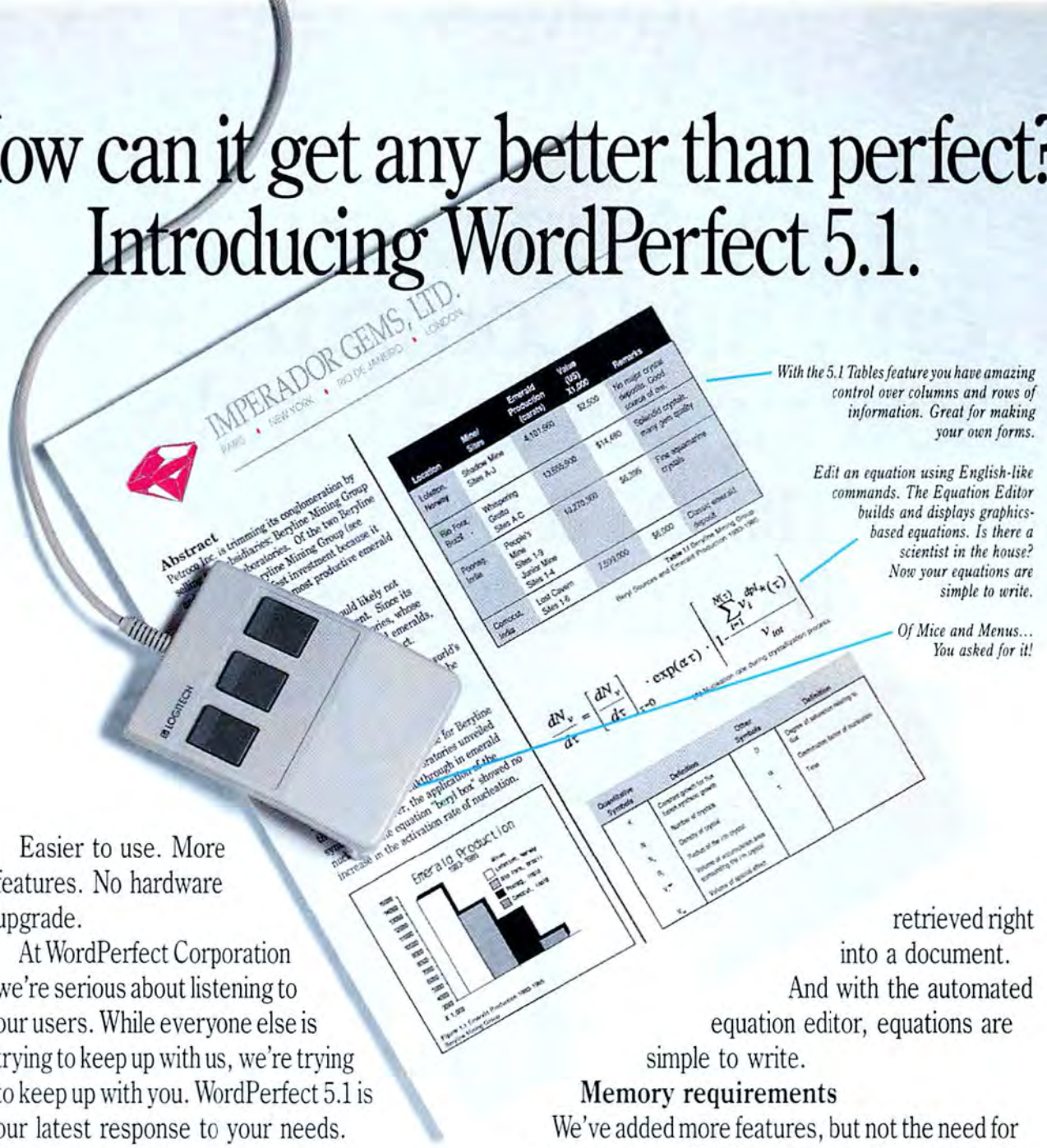

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Memory requirements

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WordPerfect
CORPORATION
1555 N. Technology Way Orem UT 84057
Telephone: 1-800-526-5069 Telex: 820618 FAX: (801) 222-4477

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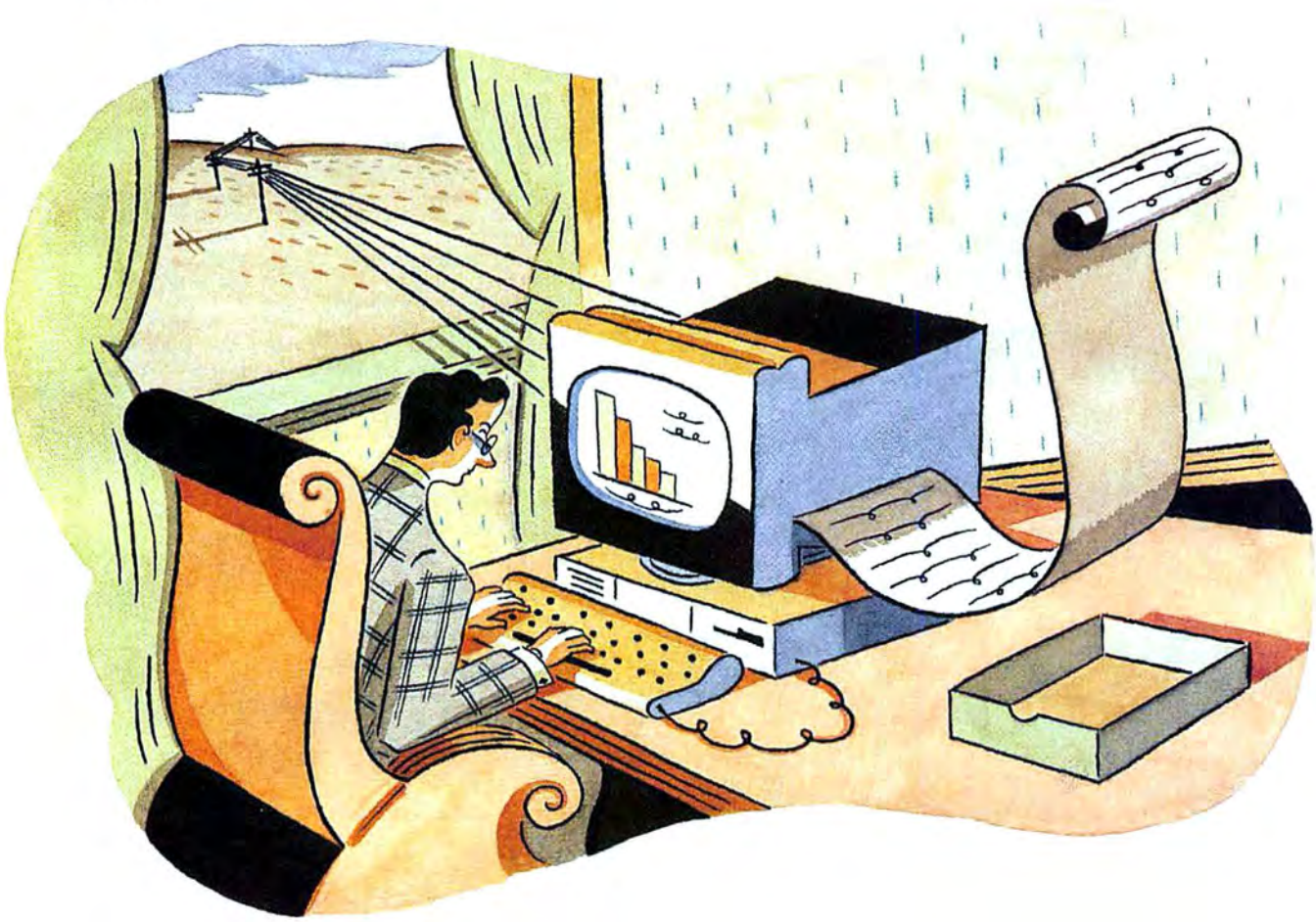
Fax Boards for Fast Times

Attracted by the promise of PC fax combos but put off by their limitations?

With unobtrusive background communications and crisp output, the latest round of fax boards may change your mind.

TJ Byers



The question is no longer, To fax or not to fax? but rather, How do I fax? These days, if you don't have access to a fax machine or PC fax board, you're out of touch.

Stand-alone fax machines are still a good choice for many—they're easy to use and share, and they have a built-in scanner and printer. PC fax boards are more difficult to use, but they're more convenient and secure, and they offer features such as scheduled transmissions that most fax machines don't provide. Most important, fax boards produce better image quality—a vital consideration now that faxes are replacing letters in business correspondence (see the sidebar "Why Not a Fax Machine?").

In the past, using a fax board meant temporarily crippling your PC. The huge TSRs that came with the boards often prevented you from running large applications during fax transfers, and when you could fax in the background, foreground performance was sluggish. Fax boards also limited which files you could fax and how faithfully you could translate the original. Support for scanners and video modes was spotty at best.

The 9600-bps fax boards reviewed here have eliminated many of these problems. Most achieve seamless background operation by relying on their own on-board coprocessors and dedicated RAM. They translate more file formats, support a wide range of scanners and displays, and offer utilities for screen and print capture that can often reproduce fonts and graphics. As a result, a fax board purchase is now much easier to justify.

This review looks at six fax boards that cost from $695 to $1095: the AT&T Fax Connection, The Complete Fax/9600, the Datacopy MicroFax, the GammaLink GammaFax CP, the Intel Connection CoProcessor, and the Panasonic FX-BM89 Plus 2. Because they're group III compatible, they can swap faxes with any fax machine or fax board.

These boards represent the high end of the fax market. If top speed and background transfers aren't important to you, you might consider 4800-bps fax boards, which cost less than $500. LAN users should check out fax gateways (see *Network Q&A* in this issue). Finally, you may want to consider the popular JT Fax 9600B; Hayes recently acquired the board from Quadram, but its new version was too late for review (see the sidebar "Hayes Jumps Into Fax").

Fax Me, Don't Tax Me

When evaluating a fax board, the key criteria are transfer speed, background performance, text quality, messaging features, and file support. Because you'll probably use a fax board every day (or even every hour), ease of use is important, too. But chances are you'll be disappointed on this score; fax boards will never equal fax machines' simplicity.

Physically installing any of the reviewed boards is fairly straightforward, and you don't have to change communications settings constantly as you do with modem software. But the daily regimen of maintaining mailing lists, setting up scheduled transmissions, and converting files is complex, and the clumsy interfaces of some boards make the process more difficult than it should be. Another drawback: Each board requires that you load a TSR for background transfers and scheduled transmissions, so you may run into RAM conflicts.

Performance Although all the reviewed boards are rated at 9600 bps, fax transfer speeds vary. In National Software Testing Laboratories' transfer tests, high-resolution faxes (198 by 198 dots per inch) and standard-resolution faxes (198 by 99 dpi) were swapped between identical boards and between each board and a Sharp fax machine. The GammaFax CP was the fastest at sending fax files, followed by the Panasonic, Intel, and AT&T boards. The AT&T Fax Connection was faster at receiving than its rivals,

MICHAEL KLEIN

FEATURES EVALUATION

PC Fax Boards: File Conversions Are Key

Because the boards' messaging features are fairly equal, file compatibility is the make-or-break buying issue. Our two Best Buys, the GammaFax CP and The Complete Fax/9600, stand out when it comes to file support.

● Yes
○ No
◒ Deficient

	AT&T Fax Connection	The Complete Fax/9600	Datacopy MicroFax	GammaLink GammaFax CP	Intel Connection CoProcessor	Panasonic FX-BM89 Plus 2
Standard features						
Price	$1295 [1]	$699	$695	$1095	$995	$599
Speaker	○	○	●	●	●	●
Install multiple boards	○	○	○	●	○	○
Works as LAN gateway	◒ [2]	○	○	● [3]	○	○
Messaging						
Mailing lists	●	●	●	●	●	●
Scheduled transfers	●	●	●	●	●	●
Automatic redial	●	●	●	●	●	●
Automatic logging	●	●	●	●	●	●
Polling	○	●	●	●	●	●
Automatic printing	● [4]	●	●	○	○	●
Automatic cover page	○	●	○	○	●	●
Proprietary 9600-bps modem	○	●	●	●	●	○
Hayes-compatible 2400-bps modem	○	● [3]	○	● [3]	● [3]	○
Hayes-compatible 1200-bps modem	○	○	●	○	○	○
TSR RAM required for background transfers	68K	57K	3K	90K	62K [5]	38K
Editing						
Scanner utility	●	●	●	●	●	●
Graphics editor	●	○	○	○	●	●
Merge fax files	●	●	○	○	○	○
Text editor	○	●	●	○	●	○
Text compression	○	○	●	●	●	●
File compatibility						
ASCII	◒ [6]	◒ [6]	◒ [6]	◒ [6]	◒ [6]	◒ [6]
PCX	○	●	●	●	◒ [6]	◒ [6]
CUT	○	●	○	●	○	○
TIFF	●	◒ [6]	●	●	○	○
IMG	○	○	●	○	○	○
MSP	○	●	○	○	○	○
AutoCAD	○	○	○	● [3,6]	○	○
Word processing text formats	◒ [6]	○	○	○	○	◒ [6]
Screen capture utility	●	●	●	○	○	●
Epson print capture utility	○	●	○	●	○	○
PostScript print capture utility	○	○	○	● [3]	○	○
CAS compatible	○	○	○	○	●	○

[1] Base price is $995, but this evaluation is based on using the optional $300 PagePower software.
[2] AT&T Starlan support only.
[3] Extra-cost option.
[4] PagePower network configuration only.
[5] Only 5K if you have an EMS 4.0 board installed.
[6] PC-to-fax conversion only; no fax-to-PC conversion.

all of which were closely bunched.

Note that the test results also include the time needed to convert a file from ASCII to fax format. The GammaLink, Intel, and Panasonic boards convert files on the fly while on line. The others convert files in a separate operation before the transfer. If you're more concerned about phone charges than convenience, the on-line times may be more important than the overall scores. Yet on-the-fly conversions are usually speedy, and you won't clutter your hard disk with fax copies of files.

The ability to transfer files while you're working in another application is crucial. To test background performance, faxes were sent and received in the background while a *1-2-3* macro ran in the foreground. Generally, background performance was superb. Transfer speed wasn't affected at all, and foreground degradation was usually slight—only the Panasonic slowed the macro seriously.

Text Quality Fax boards are gaining in popularity for one big reason—they transmit sharper-looking text and graphics, and that makes the sender look good. Because all the boards translate graphics as bit maps at the same resolutions, graphics output quality is too close to call. With text, however, variations in quality crop up because each board translates text character-by-character into its own default fax font. Standard-resolution text (the fastest mode) sent to a fax machine revealed that the AT&T Fax Connection and The Complete Fax generated the sharpest output, followed by the Intel and GammaLink boards. The Datacopy MicroFax produced the fuzziest text, but its output was still superior to that of most fax machines.

Messaging and Modems All the reviewed boards include menu-driven fax messaging software designed around a phone book–style directory. They all let you broadcast messages to everyone on a list, and they offer scheduled transmissions so you can take advantage of reduced phone rates. Five boards let users "poll" remote boards and download fax files, and allow other polling devices to download files from their board. All offer automatic redial and provide transfer logs. Each board can receive faxes automatically, and most can print them on a variety of dot matrix and laser printers as they arrive.

If you need a modem as well as a fax device, you're in luck—most of the boards let you snap on an optional Hayes-compatible 1200- or 2400-bps modem. However, you'll need your own communications software to use it. Four boards even include built-in 9600-bps V.29 modems that can be run with the fax software. The catch? You must have the same fax board on both ends. And due to the overhead of software-based error checking, the high-speed modems are often limited to 2400- or 4800-bps throughput.

From File to Fax The ability to convert a variety of PC files into fax format is paramount. All the reviewed systems can automatically convert batches of ASCII files, and two convert word processor formats, but these text conversions translate only basic

WHY NOT A FAX MACHINE?

Despite improvements in fax boards, many PC users should consider buying a stand-alone fax machine instead. Just about anyone can run a fax machine, and you get a built-in scanner and printer. To buy an equivalent PC fax system, you'd have to spend about $1000 for a scanner and hundreds more for a printer. In addition, by thumbing your nose at PC fax, you save a PC slot and have one less TSR to worry about. Finally, fax machines are usually faster than fax boards because they use a better compression algorithm.

But PC fax offers some clear advantages. You can send disk-based PC files directly, and because you can bypass the scanning step (which degrades image quality), your faxes look sharper. You also enjoy confidentiality and faster access, and you can print on laser printers.

PC fax gives you more messaging power for the money. A simple fax machine costs about $500, but a fax machine that offers polling and scheduled broadcasting will set you back from $2000 to $4000. So even if you buy a scanner and a printer, PC fax can be cheaper.

If you send a lot of paper-based faxes, a fax machine is probably the ticket. But most users will find the flexibility and quality of PC fax well worth the challenge of mastering it. —*TJB*

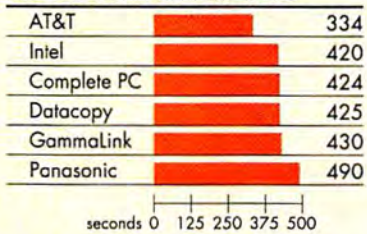
NSTL TEST REPORT

Even in the Background, These Boards Fax Fast

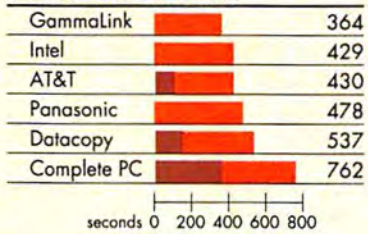
Fax transfer performance varies, with the GammaFax CP taking the top slot, but most background modes are capable. Only the Panasonic significantly slows your foreground application while you're faxing. In the transfer tests, note the difference between billable on-line time (shown by the darker shading) and total time—half the boards convert the fax file before calling.

High-Resolution Text

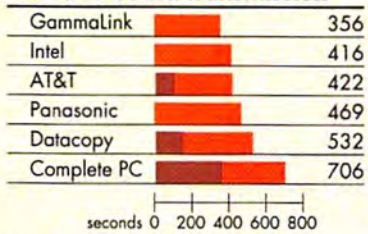
Receive from fax machine



Send to fax machine

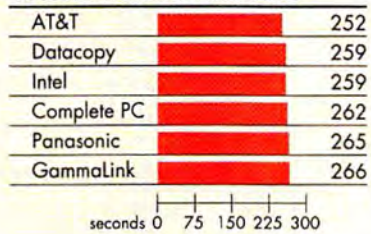


Board to board transmission

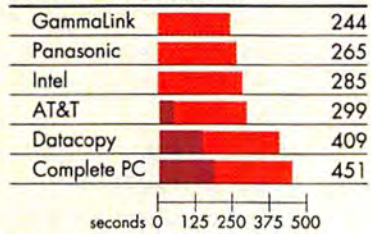


Standard-Resolution Text

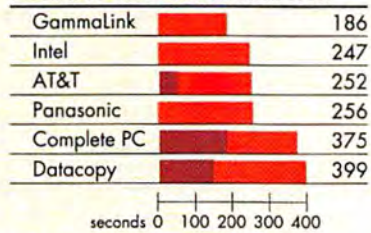
Receive from fax machine



Send to fax machine

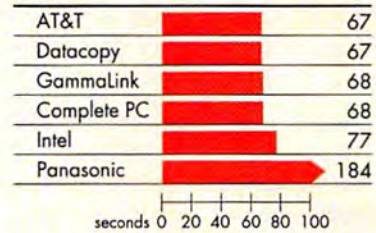


Board to board transmission

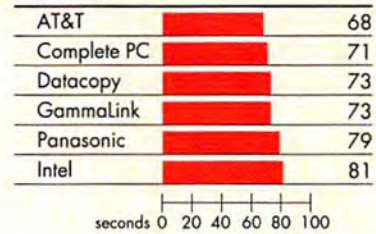


1-2-3 Macro During Background File Transfer

Send



Receive



On-line time
Off-line time (includes off-line file conversion)

Methodology
Benchmarks were performed with the fax boards installed in 12-MHz Compaq Deskpro 286 Model 20 systems equipped with 20MB hard disks. The hard disks were formatted with DOS 3.31. Systems were configured with FILES=20 and BUFFERS=25 and set up to use a 256K extended-memory disk cache.

Tests use an ASCII file of sufficient size to produce six pages of fax output after conversion. High-resolution text files are 198 by 198 dots per inch (dpi); standard-resolution text files are 198 by 99 dpi.

Receive from fax machine
A printout of the six-page text file, output on a laser printer, is sent from a Sharp FO-600 stand-alone fax machine to each of the boards in high-resolution and standard modes. The test is timed from the point the fax board answers and the transmission is started, until the fax machine disconnects.

Send to fax machine
The six-page text file is transmitted as a high- and a standard-resolution fax image to the stand-alone fax machine. The conversion time was separately measured for the AT&T, Complete PC, and DataCopy boards (all of which execute off-line conversions) and added to the on-line transmission times. The other fax boards both convert and transmit on line. Totals reflect the elapsed time between initiation of the conversion process and disconnection.

Board to board transmission
The six-page text file is transmitted as a high- and a standard-resolution fax image from a fax board installed in one system to its identical twin installed in another. Conversion time was separately measured for products that convert off line. Totals reflect the elapsed time between initiation of the conversion process and disconnection.

1-2-3 Macro During Background File Transfer
A *1-2-3* benchmark is executed while the fax boards send the six-page text file to the stand-alone fax machine and again while the fax boards receive the file from the fax machine. Files are transmitted in standard resolution. The *1-2-3* test loads *1-2-3* from the command line, automatically loads and executes a benchmark macro, returns to DOS, and records the elapsed time. The benchmark macro conducts a series of arithmetic operations on a 50 by 50 matrix. Time for the test without any background fax activity is 66 seconds.

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

formatting, not enhancements and fonts.

If you want to spice up your correspondence with graphics, you'll want graphics conversions that translate a bit map into a fax image, and vice versa. With conversions for key formats such as PCX and TIFF, you can transmit fonts and graphics created with any graphics or desktop publishing program.

Some vendors also offer screen capture utilities. Unfortunately, you can only convert a screenful at a time, resolution is limited to your video mode, and some utilities won't convert text or work with certain programs.

A better alternative: Some boards include utilities that intercept Epson or PostScript printer output and convert it to fax format, retaining fonts and/or graphics. Other boards provide discount coupons for Inset Systems' $99 *Hijaak*, which captures screen images and PCL (LaserJet) graphics output. Inset also sells a program called *Hijaak PS* that converts PostScript fonts.

Editing Tools Although not vital for most users, having a good set of editing tools is important if you send a lot of graphics or want to embellish your fax correspondence with logos and signatures.

All the vendors provide basic scanner utilities that directly control most major scanners. All let you control image brightness, contrast, and resolution and capture signatures, logos, and other images and paste them into your faxes. A few allow you to merge fax files. Three boards come with graphics editors so you can create or fine-tune images. Three packages also include simple text editors.

Of course, graphics editing, polling, and other esoteric features aren't necessary for many users. But solid performance, an accessible interface, and solid file support *are*. Here's how the boards stack up.

AT&T Fax Connection

If you're a *Windows* or Starlan user with bucks to burn, the AT&T Fax Connection is a fax fantasy. Performance and text quality are superior, and you can get a *Windows*-based presentation graphics application called *PagePower*. Unless you scan and send a lot of graphics, though, the system is overpriced.

Sans *PagePower*, the Fax Connection costs $995, but its software is so primitive that the board by itself wasn't reviewed. If you invest $300 in *PagePower*, the total cost comes to $1295—*Windows* not included. You can also use the Fax Connection as a LAN gateway on Starlan networks, as long as each user is running *PagePower*.

The Fax Connection is faster than most. Background performance was tops, and it received faxes about 25 percent faster than its rivals. Send times were respectable—on-line times were the fastest in the roundup when sending high-res faxes. The board's main flaw is that it doesn't convert outgoing files on the fly or in the background, and you can't automate the process—you have to stare at the screen while it converts a file and then select the destination and send the file. If looks count, though, you're in luck. The Fax Connection's text output is crisp and appealing.

The centerpiece of AT&T's *PagePower* software is a handy draw/chart program

HAYES JUMPS INTO FAX

Modem giant Hayes acquired the popular JT Fax line from Quadram last summer and promptly produced some updated versions. Too late for review, the $695 Hayes JT Fax 9600B was scheduled for release by late 1989. Hayes also introduced a $295 4800-bps fax board and a portable, external 4800-bps fax device that sells for $495.

The JT Fax 9600B's major enhancement over the older version is a piggyback Smartmodem 2400 modem option that will sell for $295 and should be available in the first quarter of 1990. Like its immediate Quadram predecessor, the 9600-bps JT Fax stands out as one of the few fax boards that let you pop up the entire fax program within other applications. Among other features, the board provides scheduling, broadcasting, text compression, letterhead and signature cut and paste, and on-the-fly file conversions. An Epson print capture routine redirects print files to fax format.

The Complete Fax lets you convert and send faxes while hip deep in another application.

EXECUTIVE SUMMARY

AT&T Fax Connection

9600-bps fax board

If you're a *Windows* fan and need a good draw program, the Fax Connection with AT&T's *PagePower* graphics software is the right solution. But a high price and an inconvenient conversion process disqualify it for most users.

	POOR	FAIR	GOOD	EXCELLENT
Messaging			●	
Editing				●
File support			●	
Performance				●
Text quality				●
Overall value			●	

Reader service no. 650

similar to *Windows Paint*. You also get superb scanner and modem communications modules, but the Fax Connection itself lacks a modem option.

PagePower's fax module is easy for novices to use—you point and click with a mouse to match fax files to phone numbers and perform other tasks. But the profusion of dialog boxes (numerous even by *Windows* standards) will slow down experts. There's no polling, unfortunately, and the broadcast list is limited to 20 recipients.

Editing tools are superb—you can scan in images, letterheads, and signatures and then crop, size, and retouch them. You can cut and paste with the draw module and merge up to 20 fax files.

File support is uneven. Although the Fax Connection can convert 16 word processing formats to fax format, graphics conversions are limited to TIFF. And while the screen capture utility translates text perfectly, graphics are occasionally garbled.

Combined with *PagePower*, the AT&T Fax Connection makes sense for *Windows* desktop publishers. But most users will find the price too high.

The Complete Fax/9600

The Complete Fax/9600 is the slowest unit in the roundup. But its Epson print capture utility, extensive file support, low $699 price, and friendly interface make it a Best Buy for casual users.

The Complete Fax is twice as slow as the speedy GammaFax CP when sending faxes—the result of slowpoke off-line file conversions. However, you can convert files in the background and convert and send with a single keystroke. Text output is sharp—it uses the same font as the AT&T board.

The Complete Fax's Epson print converter lets you convert and send faxes while hip deep in another application, as long as the files were created with that application. Simply press <Alt>-F, supply the file name, fax number, and other data requested by the pop-up menu, and press <F10> to redirect your next Epson print job. When you exit the application, the file is converted and sent.

To call on other functions, you must use the stand-alone fax software. The function key interface is fairly easy to use. It's centered around a logical dialing directory, and you get an on-screen function key template and context-sensitive help.

EXECUTIVE SUMMARY

The Complete Fax/9600

9600-bps fax board

BEST BUY

The Complete Fax/9600 may be slow, but its messaging and file support are excellent. With its facile interface and low price, it's a superb choice for casual users.

	POOR	FAIR	GOOD	EXCELLENT
Messaging				●
Editing			●	
File support				●
Performance	●			
Text quality				●
Overall value				●

Reader service no. 651

Messaging features are complete, and you can choose from a wide range of accessories. By adding an optional modem and a voice chip, you can upgrade the unit to the level of The Complete Communicator, the company's new $899 integrated fax, modem, and answering machine board.

There's no graphics editor, but you can scan images, merge fax files, and cut and paste. You get a simple text editor and an automatic cover sheet, and the board even has a port for The Complete Page Scanner.

File support is tops, with conversions for PCX, CUT, TIFF, and *Microsoft Paint*. The utilities for screen capture and Epson print capture snag both text and graphics but can't translate *Windows*, *Desqview*, or HGC screens.

Despite its sluggishness, The Complete Fax is a winner. If you live and die by the fax, look elsewhere, but most users will like what they see.

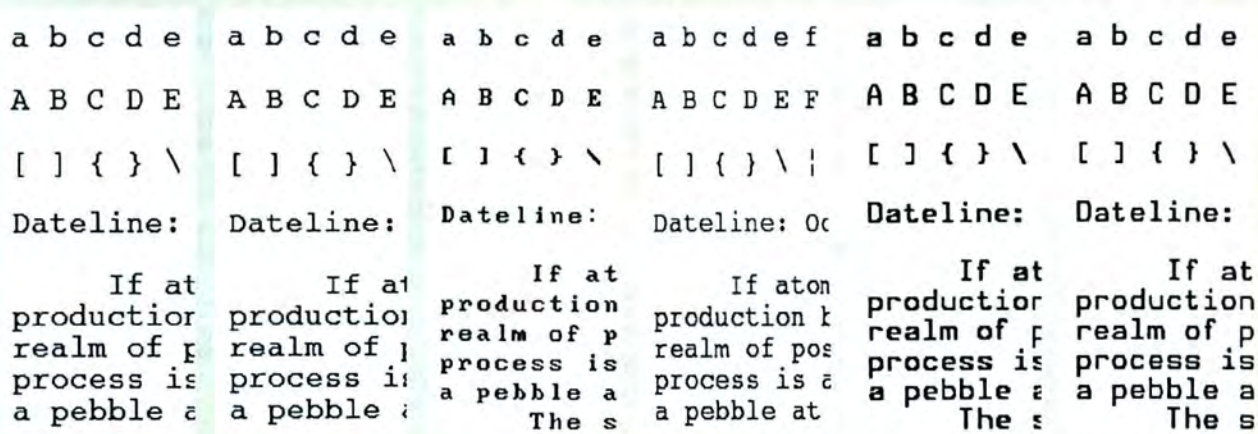
Datacopy MicroFax

The MicroFax is strong on graphics, has a built-in 1200-bps modem, and costs only $695. Better yet, its TSR consumes only 3K of RAM. But it's fairly slow and difficult to use, text quality is second-rate, and if you have more than one serial port, all but the one the MicroFax is using must be disabled. Bargain hunters are better off with The Complete Fax.

The MicroFax's background mode is efficient, but fax transfers are slower than average. The off-line conversion routine won't let you convert in the background, but you can convert and send at the press of a key. Text quality is below par—characters are blocky

With The Complete Fax/9600, you can pop up a menu inside an application and redirect print jobs to a fax file.

Face the Fax: Looks Count



How will your fax appear when it's output on a distant fax printer? All these boards provide better output than if you sent the fax with a fax machine, but some boards generate better quality text than others. In these tests, the AT&T Fax Connection and The Complete Fax/9600 took the top prize.

EXECUTIVE SUMMARY

Datacopy MicroFax

9600-bps fax board

The MicroFax costs only $695 and includes a full complement of messaging features. Slow speed, fuzzy text, and COM port restrictions, however, limit the appeal of this otherwise respectable board.

	POOR	FAIR	GOOD	EXCELLENT	
Messaging				●	
Editing			●		
File support				●	
Performance		●			
Text quality		●			
Overall value			●		

Reader service no. 652

The GammaFax CP lets you gang up to eight boards per PC to set up a fax control center.

and plagued by jagged curves.

The complete set of messaging tools includes polling and automatic printing. However, the interface is demanding—the *1-2-3*–style command line works fine, but you have to grope through a labyrinth of dialog boxes. Phone book entries are limited to 66 characters each, and all you see is a name and number.

Editing features are mediocre. There's a text editor but no graphics editing or file merge. File support is better than with most boards, and a screen capture utility expertly translates text and graphics. Unfortunately, the MicroFax's slow speed, poor image quality, difficult interface, and COM port problems outweigh its pluses.

GammaLink GammaFax CP

The fastest board in the roundup, GammaLink's GammaFax CP also provides outstanding file support and messaging features. It costs a steep $1095, but frequent faxers will find it a Best Buy.

The GammaFax CP excels at sending faxes, running almost twice as fast as the slowest units. Receive times are average, but background performance is first-rate. Text quality is shipshape—the default font is small but attractive.

Messaging features are superior, and the tiled menu interface is logical, but you'll tire of navigating the sea of menus. The hierarchy forces you to backtrack a lot—to send a file you must open the phone book to choose a number, put the phone book away, open the file menu to select files, close the file menu, and then open the send menu.

Editing features are quite limited: There's no text or graphics editor, the cut-and-paste editor is tough to master, and you can't merge fax files. You do, however, get a superb text-compression utility that squeezes 216 characters per line.

The GammaFax CP's file support is tops. It handles PCX, CUT, and TIFF conversions, and an Epson conversion routine lets you translate *Windows* files into TIFF. For an extra $145, you can buy *GammaScript*, which redirects PostScript-formatted text and graphics into high-quality fax and converts *AutoCAD* files.

Another plus: The GammaFax CP lets you gang up to eight boards per PC to set up a fax control center. If you buy the $995 *GammaNet* gateway software, you can use the boards as a LAN gateway for all major networks.

EXECUTIVE SUMMARY

GammaLink GammaFax CP

9600-bps fax board

BEST BUY

The speediest board in the roundup, the GammaFax CP also provides the best file support and the capability to gang multiple boards in a single PC. Frequent fax users will find it their Best Buy.

	POOR	FAIR	GOOD	EXCELLENT	
Messaging					●
Editing		●			
File support					●
Performance					●
Text quality				●	
Overall value					●

Reader service no. 653

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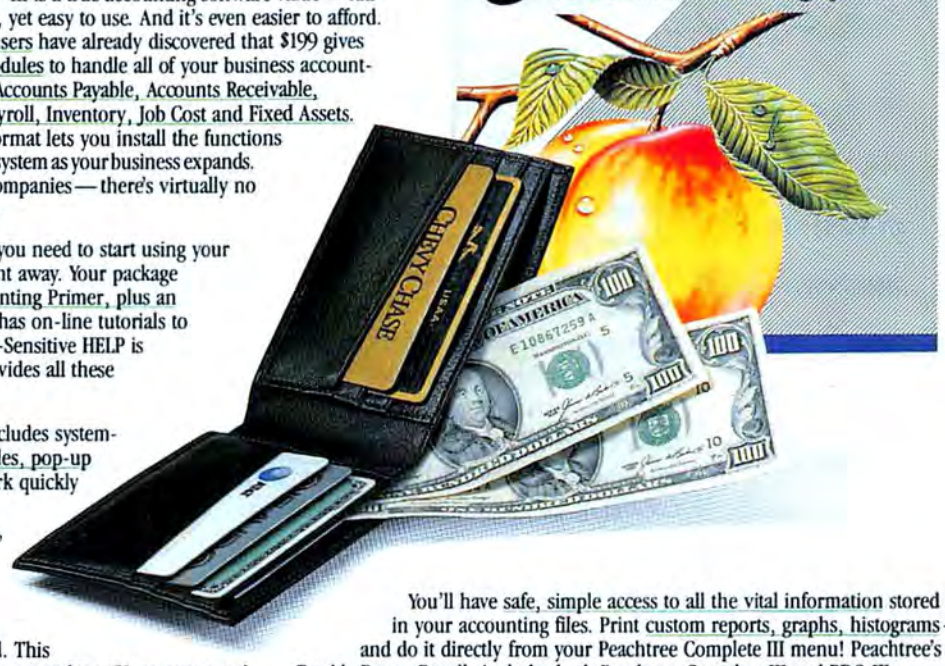

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Peachtree Software®

Circle 144 on reader service card

If you own one of the 50 or so applications that support Intel's CAS protocol, you can seamlessly access the Connection CoProcessor.

Despite its high price, the GammaFax CP merits a Best Buy. Top speed and superb messaging options deliver the goods.

Intel Connection CoProcessor

Intel's $995 Connection CoProcessor offers fast transfers and spiffy text output. The environs are friendly, and you get a five-year warranty and CAS, or Communicating Applications Specification. (CAS is a communications programming interface that lets developers add direct access to CAS fax boards from built-in menus.) The Connection CoProcessor is a good deal, but mediocre background performance and limited file conversions keep it from the top slot.

Overall performance is quite fast, but background transfers slow foreground speed by 14 percent when the board is sending a fax and by 20 percent when it's receiving. Fortunately, text output is attractive.

The streamlined interface uses a *1-2-3*–like menu paired with *Windows*-style dialog boxes. Although the board lacks automatic printing, messaging features are abundant, and the 62K TSR requirement shrinks to 5K if you have an EMS 4.0 board installed.

The Connection CoProcessor's editing tools are superior. It uses a version of Frieze as a graphics editor, and it includes a simple text editor. You can compress text and add signatures and letterheads, but you can't merge files.

On the surface, file support is tepid. There's no utility for screen capture or printer redirection, and conversions are limited to PCX. However, if you own one of the 50 or so applications that support Intel's CAS protocol, such as *Q&A* or *SideKick Plus*, you can seamlessly access the Connection CoProcessor from within the program.

The board includes a CAS program called *Send-Off* that links *1-2-3*, and you can buy another that works with *WordPerfect*. *Windows* users can buy Alien Computing's *Faxit* utility, which displays a CAS menu over any *Windows* application. Like *Send-Off* and *Faxit*, most CAS-compatible applications provide a printer redirection utility for quick file conversions.

The Connection CoProcessor is a solid deal, and it's your best bet if your programs are CAS compatible.

EXECUTIVE SUMMARY

Intel Connection CoProcessor

9600-bps fax board

Despite limited file conversions and laggard background transfers, Intel's Connection CoProcessor redeems itself with top features and a slick interface. It's your best deal if you use CAS-compatible software.

	POOR	FAIR	GOOD	EXCELLENT
Messaging				●
Editing			●	
File support		●		
Performance		●		
Text quality			●	
Overall value			●	

Reader service no. 654

Panasonic FX-BM89 Plus 2

Priced at only $599, the Panasonic FX-BM89 Plus 2 is the least expensive board in the roundup, and it's also one of the easiest to use. It's a fairly good deal for casual fax users looking for a bargain, but because of its poor background performance, frequent fax users will want to look elsewhere.

When receiving faxes, the FX-BM89 Plus 2's background mode posed no problem, but the foreground *1-2-3* macro time nearly tripled when the board was sending. Transfer speed is only average—it's faster than most when sending standard-resolution faxes, but receive times are notably slow. Text quality is generally good, but because some characters are poorly formed this category earns a fair rating overall.

The Panasonic is blessed with an easy-to-use function key interface. When sending a file, you can display the phone book and file list at the same time and easily tag files and attach them to numbers. However, the phone book capacity is low, and you can group only ten names per list. The logging feature, curiously, records phone numbers but not names.

Editing features are slightly above average. The graphics editor is based on Frieze,

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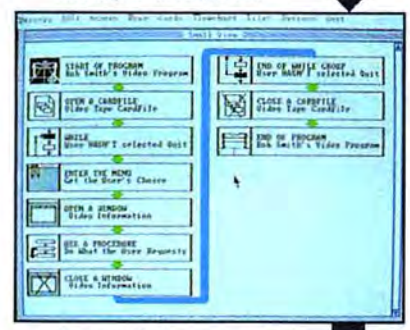

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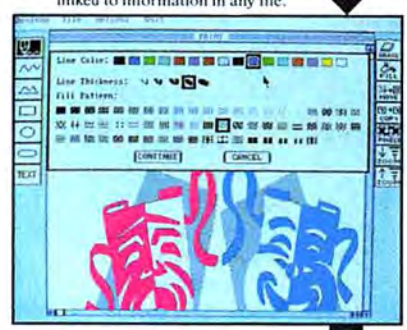

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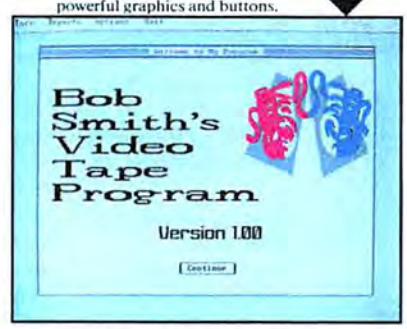

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PCW90/01

Circle 147 on reader service card

EXECUTIVE SUMMARY

Panasonic FX-BM89 Plus 2

9600-bps fax board

The bargain of the roundup, the $599 Panasonic is also easy to use. Unfortunately, slow background performance makes it unacceptable for most users.

	POOR	FAIR	GOOD	EXCELLENT
Messaging			●	
Editing				●
File support			●	
Performance		●		
Text quality			●	
Overall value			●	

Reader service no. 655

and you get text compression and an automatic cover page. You can convert 16 word processor formats, but graphics are limited to PCX. The screen utility captures graphics but not text, and only for a few applications.

The Panasonic's low price and friendly interface make it a good deal for casual users. But its torpid background performance disqualifies it for frequent fax users.

Matters of Fax

With its fast transfers and versatile features, the GammaFax CP wins a Best Buy. If the $1095 price tag is too rich for your blood, and top speed isn't crucial, check out the other Best Buy, The Complete Fax/9600. A close third place goes to the Intel Connection CoProcessor, and it's the top pick if your applications are CAS compatible. The AT&T has its niche with *Windows* users.

Fax boards have made great strides in background transfers and capture methods. However, there's still room for improvement as far as ease of use is concerned. Until then, fax machines will continue to sell like crazy. ●

TJ Byers is a contributing editor for PC World.

For more information about all products in this article, circle reader service no. 903.

WHERE TO BUY

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AT&T
1 Speedwell Ave.
Morristown, NJ 07920
800/247-1212
LIST PRICE: $995
ACCESSORIES: PagePower 2.1 $300 ($395 if purchased separately)
WARRANTY: one year parts and labor on hardware, 90 days on software
EXTENDED WARRANTY: on-site available
TECHNICAL SUPPORT: toll-free number, M–F 8–5
OTHER SUPPORT: none
Reader service no. 650

The Complete Fax/9600
The Complete PC
1983 Concourse Dr.
San Jose, CA 95131
408/434-0145
LIST PRICE: $699
ACCESSORIES: 2400-bps modem plus Bitcom software $199 ($99 with coupon); voice mail with fax forwarding $199
WARRANTY: two years parts and labor
EXTENDED WARRANTY: none
TECHNICAL SUPPORT: toll number, M–F 8:30–5:30
OTHER SUPPORT: company BBS
Reader service no. 651

Datacopy MicroFax
Datacopy
Xerox Imaging Systems
535 Oakmead Pkwy.
Sunnyvale, CA 94086
408/245-7900
LIST PRICE: $695
ACCESSORIES: none
WARRANTY: one year parts and labor
EXTENDED WARRANTY: none
TECHNICAL SUPPORT: toll-free number, M–F 8–5
OTHER SUPPORT: company BBS
Reader service no. 652

GammaLink GammaFax CP
GammaLink
2452 Embarcadero Way
Palo Alto, CA 94303
415/856-7421
LIST PRICE: $1095
ACCESSORIES: 2400-bps modem $245; GammaScript (PostScript conversion) $145 for 13 typefaces, $440 for 35 typefaces; GammaNet (LAN gateway software) $995; developers' tool kit $2500
WARRANTY: one year parts and labor
EXTENDED WARRANTY: none
TECHNICAL SUPPORT: toll number, M–F 8–5
OTHER SUPPORT: company BBS
Reader service no. 653

Hijaak, Hijaak PS
Inset Systems
71 Commerce Dr.
Brookfield, CT 06804
203/775-5866
LIST PRICE: Hijaak $149, Hijaak PS $249
TECHNICAL SUPPORT: toll-free number, M–F 9–5
OTHER SUPPORT: newsletter
Reader service no. 656

Intel Connection CoProcessor
Intel PCEO
Mail stop CO3-07
5200 N.E. Elam Young Pkwy.
Hillsboro, OR 97124-6497
800/538-3373
LIST PRICE: $995
ACCESSORIES: 2400-bps modem $295
WARRANTY: five years parts and labor
EXTENDED WARRANTY: none
TECHNICAL SUPPORT: toll-free number, M–F 7–5
OTHER SUPPORT: company BBS, CompuServe forum (GO PCEO)
Reader service no. 654

Panasonic FX-BM89 Plus 2
Panasonic Communications and Systems Co.
Division of Matsushita Electric Corp. of America
2 Panasonic Way
Secaucus, NJ 07094
800/442-4700, 201/348-7000
LIST PRICE: $599
ACCESSORIES: none
WARRANTY: one year parts and labor
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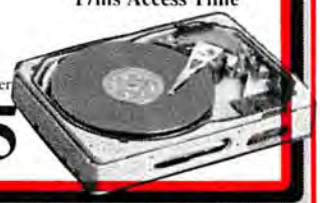

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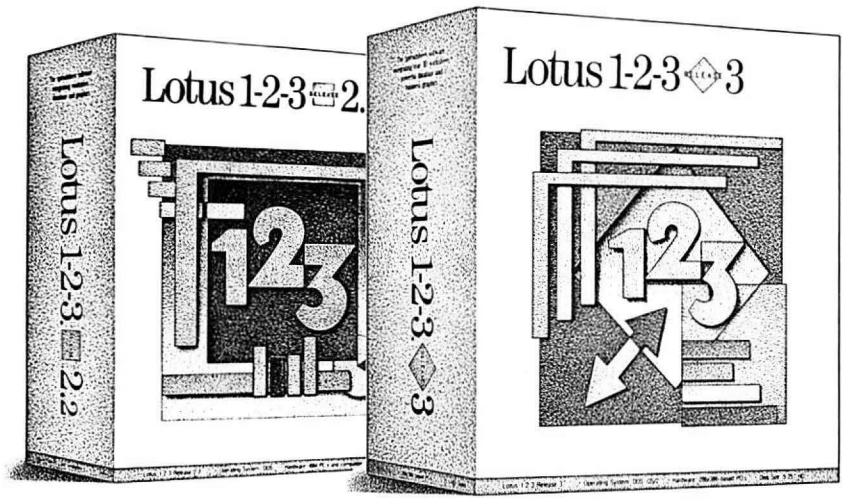

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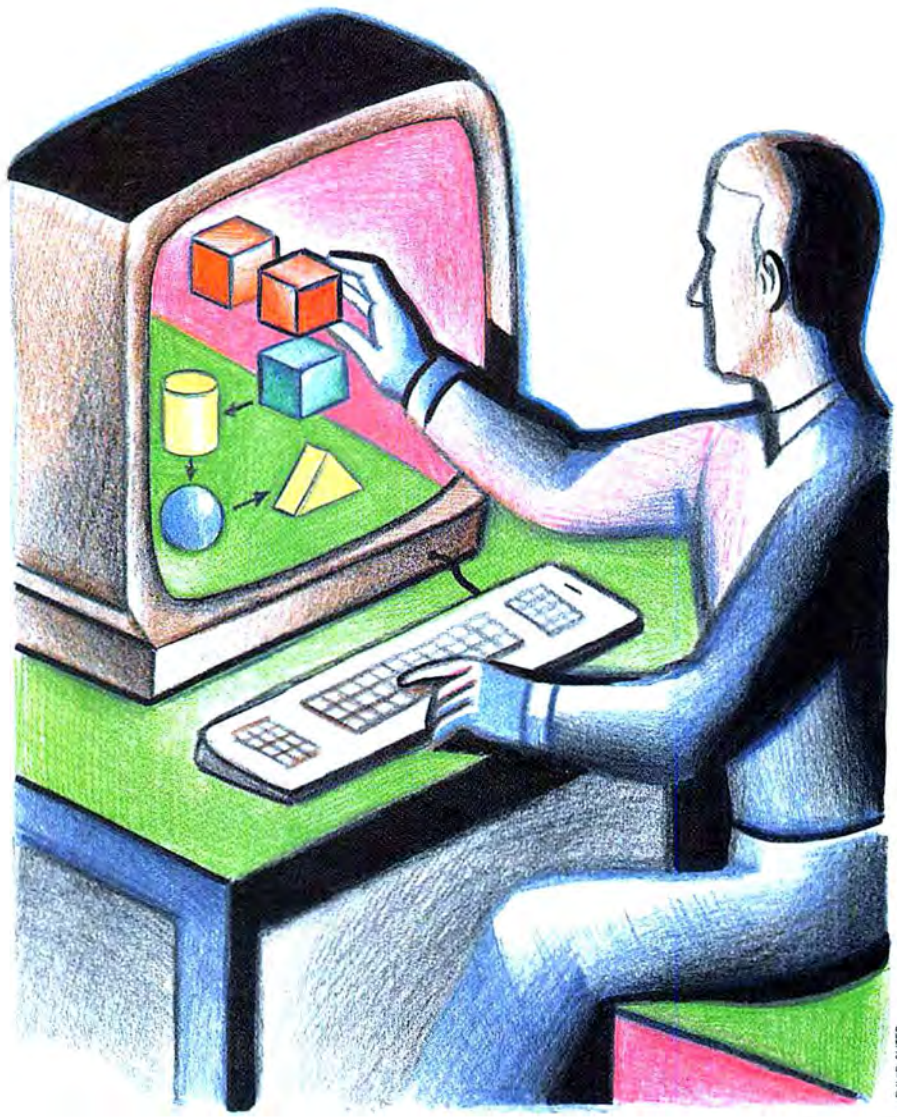

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For all PCs have brought us, they've failed in one important way. They were supposed to take computing power out of the hands of the priesthood—professional programmers—and bring it to people who knew what they wanted from computers but didn't have time for special training. But something got lost in transit.

Instead of enjoying real power and flexibility, we're stuck with narrowly defined applications—spreadsheets, word processors, data managers, graphics software—each with its own limitations and special command sets. Businesses are forced to customize off-the-shelf packages and pay steep, ongoing costs for employee training and support. And as tomorrow's PCs handle larger amounts of data faster, increasing productivity with the same old software will cost even more.

High-powered hardware and easy-to-use interfaces are just the beginning of the latest PC revolution. Smart businesses will exploit the power of these new platforms with flexible, intuitive applications that promise to put the "personal" back in personal computing.

ERIC KNORR

Breaking free of this logjam calls for a new generation of software so flexible and intuitive, mere mortals will be able to mold it and use it by themselves. Easy-to-use interfaces like those of the Macintosh, Presentation Manager, or *OfficeVision* are only the window dressing. The next era of PC productivity demands the benefits of application development without the developer. The solution is an environment that lets users create custom applications ad hoc—without writing a line of code.

HyperCard on the Mac, *HyperPAD* on the PC, and Interface Builder on the Next machine represent the best-known types of (mostly) codeless programming. Essentially, these packages enable you to assemble custom front ends from graphic objects.

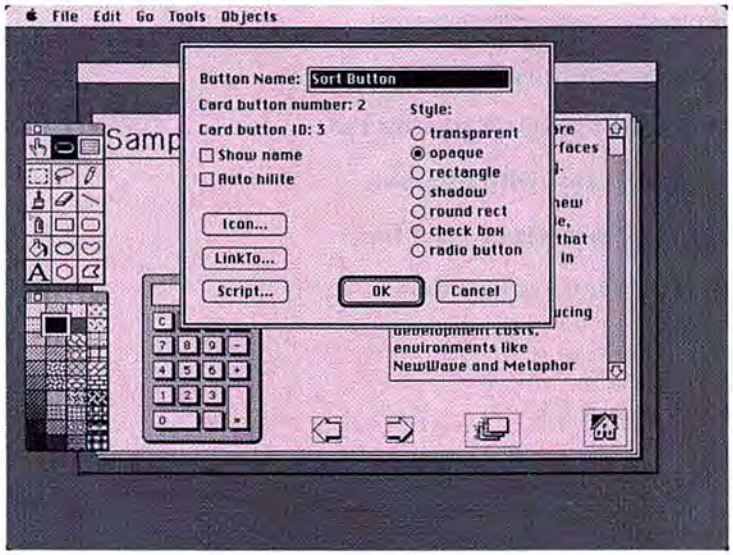
But interface builders bear little resemblance to true end-user development environments, which use an integrated set of full-blown business applications as the building blocks from which you create your own applications. Metaphor Computer's Data Interpretation System (DIS) and Hewlett-Packard's *NewWave* provide the best current examples of do-it-yourself application development environments. You simply generate and modify programs derived from such routine actions as running a data base query, crunching the results in a spreadsheet, and plotting the final data.

More than simply reducing development costs, environments like Metaphor and *NewWave* encourage flexible, creative data analysis impossible with turnkey or off-the-shelf applications. Moreover, they may attract the great mass of people for whom standard apps like *1-2-3* aren't particularly intuitive. Metaphor's chairman, Dave Liddle, states the goal for computing in the nineties succinctly: "You have to get the computing abstractions out of the way, so all the work goes into solving real problems."

PROGRAMMING WITHOUT PAIN

Codeless programming for end users derives from object-oriented programming (OOP). Designed to make life easier for programmers, OOP departs from convention by making such program elements as windows, menus, and even text editors reusable. The key concept shared by OOP and end-user application development is that program actions are always tied to data; together, the data-plus-action is known as an *object*. Instead of creating a procedure to, say, open a document, simply sending the right instruction to a document object causes it to display its contents on screen.

With *NewWave* or with Metaphor's DIS (or with the Mac, *OfficeVision*, or Presentation Manager 1.2, for that matter), an analogous object-oriented metaphor applies. When you select a document object, the document loads



HyperCard lets users build front ends by manipulating ready-made icons. Creating functional programs requires coding in the HyperTalk script language.

itself into a text editor, which in turn opens the file. No more load-program, load-file procedure; text-editing capabilities are permanently associated with all documents.

In a graphic, end-user programming environment, objects make abstract data and processes concrete and encourage interactive analysis. For example, managers can explore relationships among key indicators—competitive market information and up-to-the-minute sales figures—by simply moving and linking icons. As NCR senior vice president Tom Mays suggests, make the process fun, and productivity soars. People should be able to use business applications in "much the same way children now interact with video games."

The idea of productive play can bring not only programming but also computing to a new class of user. Rather than learn a procedure—such as a command syntax or an icon etiquette that reflects the same old program and file conventions—users can experiment with object relationships until they develop their own suite of applications that fits their work requirements precisely. Consultant Amy Wohl, president of Wohl & Associates in Bala Cynwyd, Pennsylvania, offers a simple test for such environments: "If you need to know how to use a computer to use the product, then it's a failure."

NEW COMPUTING METAPHORS

The Metaphor and *NewWave* environments share important characteristics. Both are designed to let you save user-designed applications as reusable objects (although *NewWave*'s application development features aren't yet implemented). And even though the packages differ radically in their look and feel, both use the Mac-like folder/cabinet metaphor for storing objects. In addition, the packages are intended to run in a networked environment, offering transparent access to distributed data.

Of the two environments, Metaphor is by far the most intuitive for end-user programming, despite its large-system heritage. The software is designed to run on a dedicated workstation/server combination and to hook up to large, mainframe-based SQL data bases through a gateway. The environment's applications, called *tools*, are tightly integrated, but the lack of third-party applications means you're stuck with the package's own graphics, spreadsheet, report, E-mail, and query tools.

Application development follows naturally from Metaphor's data interpretation capabilities. For example, if you've created a relational query, a graphic will appear showing the tables and fields you've selected; you can even join tables by drawing lines between them. Most users ultimately display query data in an on-screen chart to further illuminate data relationships.

Run the query, copy the data to the spreadsheet tool, then copy it to the graphics tool and distribute the results via the E-mail tool, and you have the makings of an application. When you copy data between tools, the environment's integration is so complete, it can distinguish between such information as dates, labels, and dollar amounts and automatically ensure that things end up in the right place.

To actually assemble the application—or *capsule*, as it's called in Metaphor—you move all the tools you've just used into the capsule window. You then draw arrows between those icons, indicating which way you want the data to flow. Save the capsule, and you can use it again with updated data; or modify the process via dialog boxes or by rearranging icons to produce different results. You can call capsules within capsules and even send capsules to other users via E-mail.

Currently, you can turn a dozen PCs into networked Metaphor workstations with a server/software package known as Workstation 2XP—although you'll pay a mainframe price (about $300,000). Thanks to a technology transfer agreement, however, IBM plans to incorporate at least some of the power of Metaphor's DIS in future versions of *OfficeVision* and Presentation Manager.

RIDING NEWWAVE

NewWave provides an open software architecture that runs on top of *Microsoft Windows*. It offers a Mac-like look and feel plus special application integration features lacking in *Windows;* with substantial work, any vendor with a *Windows* package can rewrite an application to exploit the extra features.

In the version of *NewWave* due for release this quarter, users will be able to build applications by recombining the features and data of both native and third-party applications. Currently, the environment comes with a single application, *NewWave Write;* according to HP, *Microsoft Excel, Graph Plus, Ami, DynaComm,* and several others will come in *NewWave* versions.

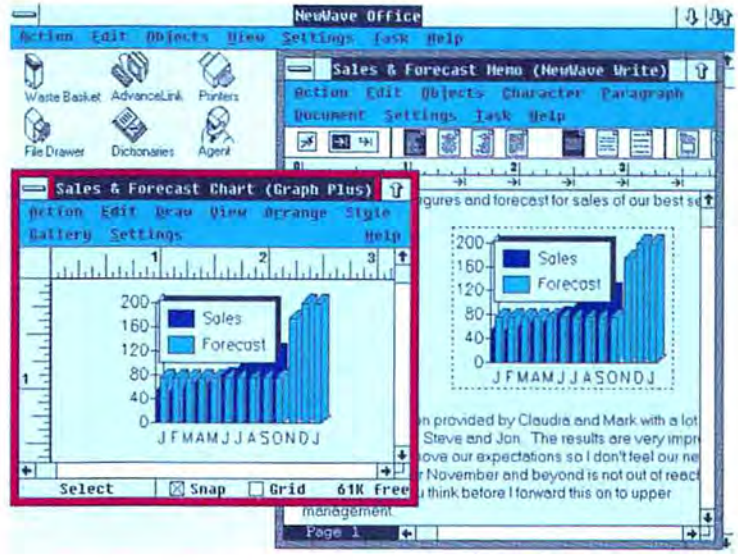
On the surface, *NewWave*'s forthcoming application development facility, called the Agent, looks even easier to use than the Metaphor DIS's. You build applications in much the same way you would record a macro; you needn't even rope icons together. A special Agent Task Calendar enables you to launch applications at specified dates and times.

The main difference between the *NewWave* and Metaphor environments lies in interobject communications. Essentially, HP has retained the idea of separate applications; to transport data between, say, a data base object and a spreadsheet object, you must go through a Clipboard facility. In contrast with Metaphor's data flow model, this method introduces a separate procedure for specifying where the data must go. And once encumbered by procedure, many of us will explore "what if" possibilities only at gunpoint.

NewWave's ease of use also declines when you try to modify a homemade application. To do so, you have to learn to program in Agent Task Language. Every application you save generates code in this BASIC-like language, and editing the code is the only way to change an application.

NewWave lets you launch and share data with plain old DOS and *Windows* applications, but with considerably less integration than *NewWave* applications offer. In addition, integrating DOS applications may involve a fairly complex setup procedure requiring knowledge of conventional file and directory structures. And when you invoke an outside application, you are forced to leave *NewWave* behind.

Ideally, software should offer both the tight integration of Metaphor and the open architecture of *NewWave.* Such an environment, of course, would demand a fresh set of standards. Stewart Alsop, editor of *P.C. Letter,* believes that industrywide support for a super-integrated, object-oriented environment is a long way off. "Full implementation will require another break with the past," says Alsop. "It's difficult enough making the change from DOS to OS/2."



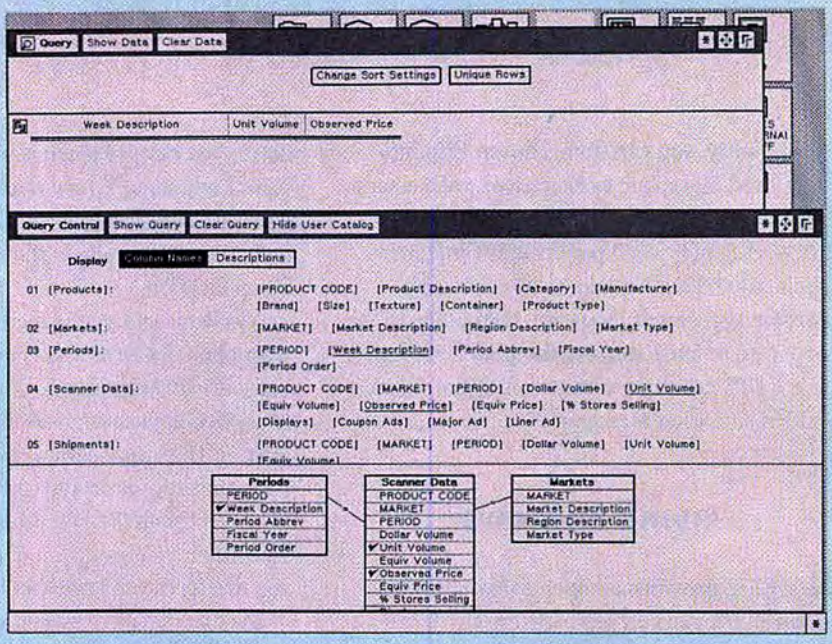
The NewWave environment, which runs on top of Windows, will soon make building custom applications as easy as recording macros.

PROGRAMMING LITE

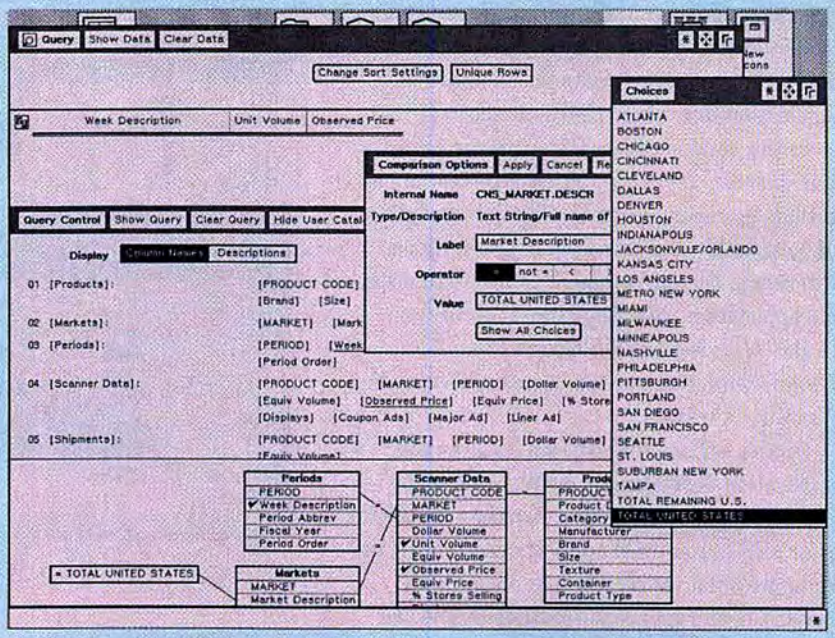
Before user-friendly programming reaches every desk, interim object-oriented solutions will abound. The ones that work across applications, such as the Macintosh's *HyperCard*

METAPHOR: FROM ACTION TO APPLICATION

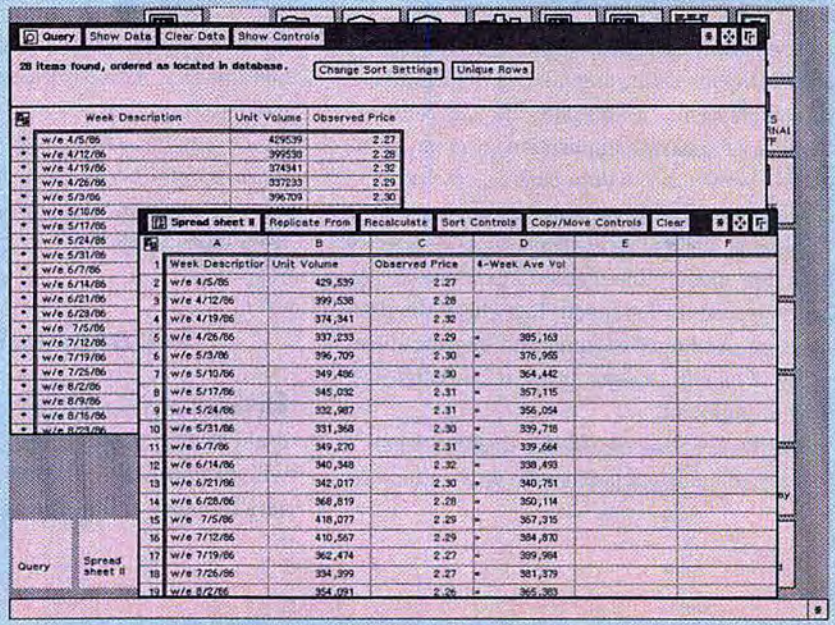
This example illustrates the power of ad hoc application building with Metaphor's Data Interpretation System (DIS). The user, a brand manager for a line of peanut butter products, has activated a DIS query tool to extract volume and pricing information from a large data base. The bottom of the screen provides a graphic display of the tables the DIS will join to retrieve the data.

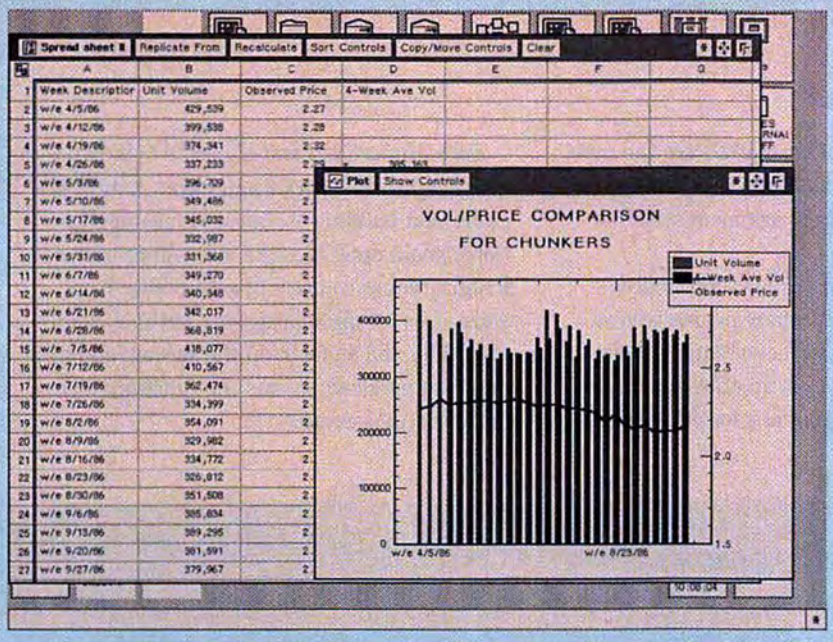


The Comparison Options window offers the brand manager a selection of operators for constraining the values of the Market Description field, and displays a list of possible values in the Choices window. This window enables the brand manager to focus on product performance by region.

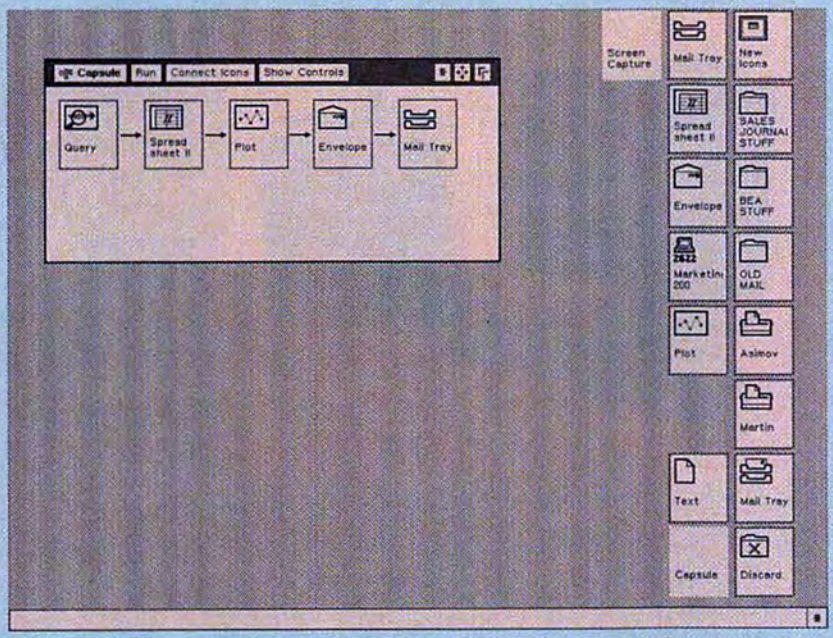


The final query results compare volume versus price over a four-and-a-half-month period. To calculate average volume, the brand manager copies the results to the spreadsheet tool. Close integration enables users to move or copy data between tools without having to specify what type of data goes where.

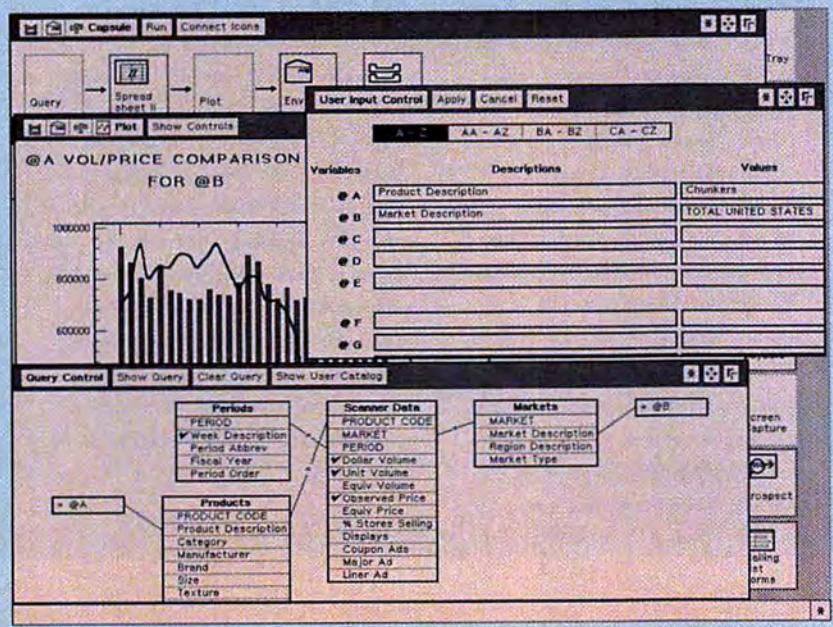




As with most DIS operations, this one ends with the plot tool, which provides a quick graphic exposition of price versus average volume. After seeing the results, the brand manager decides that this simple analysis is worth performing regularly and sharing with others in the work group. It's time to build a capsule application.



This screen shows how to create a capsule based on the previous sequence of actions. The brand manager simply moves all the tools just used into the Capsule window and links icons with arrows to show the direction of data flow. Adding the envelope and mail-tray tools enables the brand manager to distribute the final plot to others on the network.



At any time after creating a Capsule application, users can modify it with various tools, including the User Input Control window shown here. For example, users can constrain the query to specific markets and products by supplying values for @ variables the brand manager has built into the application. Finished Capsule applications are objects just like other DIS tools; users can give them long, clear-cut titles instead of file names.

and its PC equivalent *HyperPAD*, are the most interesting, because, as Alsop says, "they create an object-oriented environment within a procedural one."

HyperCard and *HyperPAD* aren't necessarily for everyone. But many people who've never programmed before can employ these program generators to set up effective front ends and turnkey applications for other users.

Both *HyperCard* and *HyperPAD* incorporate English-like script languages, and if you go beyond building the most simple applications, you'll need to write a few lines of code. Programming consists of assembling front ends piece by piece; dragging buttons, scrolling fields, and so forth on the screen; and picking from pulldown menus the functions that buttons will execute.

NEXT: THE PROGRAMMER'S DREAM MACHINE

MICHAEL GOODWIN

When Steve Jobs and the engineers at Next sat down to design their new computer, they knew users wanted applications that were both powerful and easy to use. They also knew that to deliver the goods, programmers needed fast I/O, advanced graphics, and high-speed access to large amounts of memory.

Nothing in the Next is really cutting-edge technology; but by building in advanced hardware capabilities as standard features, the designers made sure that developers can write applications to take advantage of those capabilities as a matter of course. And the results point the way toward suitable hardware platforms for tomorrow's hyper-friendly, user-programmable software.

ROBERT HOLMGREN

The Next machine and its Interface Builder (on screen) offer new horizons for developers.

Three Brains Are Better Than One

The heart of any computer is its processor, and the Next machine has three monsters: the CPU, a digital signal processor (DSP), and a math coprocessor. The CPU, a 25-MHz Motorola 68030, was chosen for its powerful features. (Jobs and his engineers might just as well have used the 80386, which has very similar features, but most of the Next crew came out of the Mac world and knew both the 803xx chip and the UNIX applications written for it like the backs of their hands.) The 68030 provides 32 address lines (so programs can use up to 4 gigabytes of CPU-speed memory) and 32 data lines (so programs can move instructions and data around that memory space fast). Currently, the machine can hold only 16MB of memory; in the near future, it should hold 64MB. However, thanks to virtual memory, programs can use the full 4 gigabytes. Several other features—like the ability to decode one instruction while fetching the next, two built-in caches, and an on-board memory manager—help make the 68030 a screamer.

The DSP, a 25-MHz Motorola DSP56001, handles the Next machine's high-quality music and sound but can also be programmed to support complicated graphics or data-intensive, real-time signal processing for scientific experiments. Processor number three, a 25-MHz Motorola 68882 math coprocessor, handles floating-point arithmetic. (While there's nothing to stop you from installing a DSP board and a math coprocessor in your PC, programmers can't *assume* their presence.)

Knowing that all three of these processors, plus 8MB of standard system memory, are present in their users' machines, developers can write complex applications that combine exceptional power with simplified user interfaces created in the NextStep environment. A program written in an object-oriented language, such as NextStep's *Objective C*, typically requires much more memory than does a program with the same functions written the old procedural way.

The most obvious use for these programs is setting up tutorials and creating disk-based publications. And as the programs' names suggest, you can turn any text in a document into a hypertext field. When a user clicks on the field, the program can summon a document that expands on that topic.

HyperPAD is also ideal for quickly setting up DOS front ends; elementary data base functions make constructing simple flat-file applications easy. No one claims, of course, that such applications tap the full power of object-oriented application development. But *HyperPAD* and *HyperCard* give you the tools to create new versions of the same old applications—or to string together, though not integrate, existing ones.

"*HyperCard* is a set of training wheels that

The Next machine's four NextBus expansion slots run at full CPU speed. One slot is taken up by the main processor board, which holds the three main processors, the support chips, the system memory, 32K of fast static RAM for disk caching and use by the DSP, and 256K of video RAM. Three slots are left open for future options like a color video adapter.

Two mass storage devices fit into the system unit. The optical drive's removeable disks provide exceptional data integrity and safety, but access time is a slow 92ms average. Still, the optical disk format makes it easier for developers to write applications for large, nonvolatile data bases. Users also can install a 660MB magnetic hard disk boasting a snappy 14ms average access time.

Often, a system's primary bottleneck is getting data and instructions into and out of memory. This job can be especially challenging for multitasking computers like the Next machine. To make things even tougher, the Next has no fewer than 11 I/O connectors to accommodate video, audio, a serial printer, an Ethernet adapter, a SCSI port, two serial ports, and the DSP adapter. To keep I/O from choking up, Next engineers built in an integrated channel processor that manages 12 dedicated DMA (direct memory access) channels for all major system peripherals—without bothering the CPU. Dedicated DMA processors are built into the channel processor.

Painting the Big Picture

Users have been pleading for ever-friendlier interfaces, which means that developers must find a way to manipulate complicated graphics and text on screen. The easiest first step is to paint the interface on a large screen—like the Next machine's 17-inch MegaPixel display, which offers a resolution of 1120 by 832, with four shades of gray.

The downside to this largesse is that every time the screen image changes, nearly 1 million pixels must be reshuffled. To speed the process, the video adapter, which is built into the motherboard, has 256K of video RAM in which to generate and update the monochrome screen display.

The Next machine uses Display PostScript, driving the screen from exactly the same bit map that Next's PostScript printer uses to print a page. The great advantage to this arrangement, known as *unified imaging*, is dynamite page preview: Both the printer controller (also built into the motherboard) and the video adapter share the same memory, enabling the Next machine to come very close to true WYSIWYG. Another plus is that programmers don't need to write separate printer and display drivers, and users don't have to pay for printer memory.

With benefits like unified imaging, multiple processors, erasable-optical storage, and the unprecedented NextStep environment as standard equipment, the Next machine may be *the* platform for tomorrow's end-user–programmable software. For now, the system's benefits will go primarily to the professional and academic software developers that Next is currently targeting. But the Next machine's many talents should encourage third parties to use NextStep to create an even more hospitable environment—one that turns every user into a programmer.

Michael Goodwin is an associate editor for PC World .

WHERE TO BUY

Next Computer
Next, Inc.
900 Chesapeake Dr.
Redwood City, CA 94063
415/780-3714
LIST PRICE: with 8MB memory, 256MB optical drive, MegaPixel display, keyboard, mouse, Mach 1.0 operating system, bundled software $9995
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WARRANTY: 90 days parts and labor
EXTENDED WARRANTY: available
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OTHER SUPPORT: dealer only
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helps you understand object orientation," says Alsop. "You begin to see how easy it is to customize your environment and to do things differently, more effectively."

ONE NEXTSTEP FOR PROGRAMKIND

The Next machine's NextStep environment furnishes an even better publicized example of object-oriented programming. NextStep is actually a professional programmer's tool rather than an end user's tool, and it requires coding in Cornerstone's *Objective C* for all but the simplest applications. Nonetheless, NextStep offers a glimpse of the shape of things to come for programming in a graphic environment.

Although the Next user interface doesn't insulate you from the directory structure (as do Metaphor, *NewWave*, and the Mac), its graphics are more impressive. All graphic objects in the environment have a drop-shadowed, 3-D look, and instead of simply pulling down

USER-FRIENDLY PROGRAMMING: THE MANAGER'S PERSPECTIVE

ERIC BENDER

It's not just technology groupies who lust for offerings like Metaphor, *NewWave*, or the Next machine and its development environment. Managers still face purchase decisions that come down to costs, benefits, risks, and support requirements, and thus they are looking for ways to lighten the burdens of training and in-house development.

Putting the power of end-user programming on the desk of someone who simply bangs out letters all day makes little sense. Instead, such flexible, powerful environments are designed to help those who access, manipulate, and act on business information do so much more quickly, directly, and productively.

Many organizations are already moving in this direction. "End users are starting to do a lot of the analysis and programming," says Judith Hurwitz, senior analyst with Patricia Seybold's Office Computing Group. She describes a gradual user emancipation in which the first step was waiting for months or years for reports from the data processing group. Next came the struggle with "fourth-generation" data base languages. At one firm where she worked, "the company sent thousands of users off to study one such language, and they totally freaked out," Hurwitz says. "You need to take a step beyond that, and that's the promise of technology like the Next machine."

Such products will let you work in "a very visual way," Hurwitz notes. "Users can look at all the data for the ramifications of different decisions. This is really continuing the revolution begun by *1-2-3*." As with *1-2-3*, she adds, some users may not know how to justify the new tool, but in time its value will become obvious.

"We're very close to doing these things on the PC level," points out Amy Wohl of Wohl & Associates. Packages such as *NewWave* and a host of upcoming *HyperCard*-like *Windows* products "show great promise of offering a *level* of programming for users," she says. Wohl stresses that she's not talking about writing software from scratch but about giving users powerful ways to organize and customize data that arrives via fairly conventional means.

Given this shiny new technology, will users waste time reinventing the wheel or playing with their new toys rather than working? Some will, says Wohl, but "that's the trade-off in giving millions of people access to a tool that many of them will find useful."

How can you cost-justify user programming? Making a conventional case for cost avoidance doesn't work so well, Wohl says: "It's really hard to prove it, and nobody believes you when you're done." She looks instead for "value-added" justifications with carefully defined, conservatively estimated benefits. Can you follow up on 20 percent more sales leads? Can you achieve higher retention of customers through better service? Can you improve the quality of goods, or the time to market? For one client, she conservatively estimates that the investment in new office technology will pay off threefold, and maybe even go several times higher. "We find management is very interested if you tell them you can *make* money," she says.

Training and support costs are historically underestimated, says Wohl; by a rough rule of thumb, true PC costs may total $10,000 per user per year. Newer technology may or may not lower the total bill. Because of greater ease of use, "it's cheaper to support people on a Mac or Next machine than on a PC," Wohl declares. But with more capable systems, "users try more ambitious applications, so your costs may be somewhat higher than expected."

Eric Bender is PC World's East Coast editor.

menus, you can drag them around on the big 16-inch screen.

NextStep's handy Interface Builder, which helps to create front ends for applications, looks very much like an end-user tool. A library called the Application Kit houses a rich set of reusable, realistic-looking graphic objects such as buttons, switches, slide controls, and framed fields and text windows. Interface Builder makes it easy to define relationships between objects—so that a button opens a window, for example—and you can even add sound effects. Once you've integrated the source code, a test mode lets you take the application for a spin.

With conventional programming, writing code for the user interface takes more time than any other development task. Interface Builder makes this job so easy that it's helping the Next machine quickly gather widespread software support.

A robust graphic environment like the Next machine's would be a perfect platform for an end-user–programmable system like Metaphor; the Next machine's digital stereo sound and triple-processor horsepower open up even more possibilities (see the sidebar "Next: The Programmer's Dream Machine"). However, like most hardware vendors, Next seems to have no intention of developing a full suite of application software, leaving such projects as end-user–programmable environments to ambitious third parties.

REACHING ESCAPE VELOCITY

Bringing more programming power to the average user is, according to consultant Wohl, "almost guaranteed to happen." And as Alsop observes, users are understandably enthusiastic about the idea that "if you use an object-oriented system, you don't have to think about organizing your computer; it organizes itself."

However, the way in which object-oriented programming reaches end users is still an open question. Pasting *HyperCard*-like functionality over today's applications is one step, and integrating them with an environment like *NewWave* is another. But for a super-integrated, open-architecture environment to emerge, the problem of industry standards must be solved. Like Alsop, Go Corporation president (and *Framework* author) Robert Carr believes the solution "will take operating environments that are willing to part with backward compatibility."

What will drive such a transition? Only industrywide recognition that you can sell just so many word processors and spreadsheets. Inflexible, horizontal business applications can't fulfill the needs of vertical markets, which continue to rely on customized software. And to attract the untapped hordes of potential users, PC software needs to offer more than a pretty interface.

Nothing less than programming power that takes the computerness out of computing will do. That requires shedding old metaphors and adopting new ones that more closely reflect the way people think and act. PCs ushered in a new era of ease of use; the next era should provide the power to whip up applications that do what we want them to do. As Carr observes, "We'll see just as much change in the nineties as we did in the eighties." ●

Eric Knorr is a senior editor for PC World.

For more information about all products in this article, circle reader service no. 902.

WHERE TO BUY

HyperCard
Apple Computer
20525 Mariani Ave.
Cupertino, CA 95014
408/996-1010
LIST PRICE: free with all Macintoshes
TECHNICAL SUPPORT: dealer only
OTHER SUPPORT: scripting manuals, user groups
Reader service no. 620

HyperPAD
Brightbill-Roberts
120 E. Washington St.
#421
Syracuse, NY 13202
315/474-3400
LIST PRICE: $99.95
REQUIREMENTS: 384K, two floppy drives, DOS 2.0 or later version
TECHNICAL SUPPORT: toll number; M–Th 9–6, F 9–5
OTHER SUPPORT: none
Reader service no. 621

NewWave
Hewlett-Packard
Personal Software Division
3410 Central Expwy.
Santa Clara, CA 95051
800/752-0900
LIST PRICE: $195
REQUIREMENTS: 4MB RAM, hard disk, Windows/286
TECHNICAL SUPPORT: toll number, M–F 8–5
OTHER SUPPORT: CompuServe forum, user group
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Workstation 2XP
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Do-It-Yourself Menus With Norton Utilities

Utilities

Need to organize and easily run your growing stable of applications? With the Norton Utilities, you can create a flexible menu system for all occasions.

Scott Spanbauer

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If you consider yourself a power PC user, or if you know your way around the DOS command line, using a menu system may seem pretty wimpy. After all, aren't menus for helpless computer illiterates who think batch files are some kind of brownie recipe?

Not necessarily. Take a stroll through your hard disk, and you'll probably find a cache of batch files you've written over the years that reconfigure your system and load applications for a variety of situations. A close inspection may also reveal some ingenious but forgotten batch files that could have boosted your productivity if you'd only remembered they existed.

A handy way to organize your batch files and programs—and run them with a single keystroke—is to create an easily expandable menu system like MENU.BAT with *The Norton Utilities Advanced Edition*'s enhanced batch language (see **LISTING 1**). With MENU.BAT you can neatly list applications, batch files, and other tasks; link them to on-screen hot keys that execute the appropriate file; display plain-English menu options and prompts; and even create submenus. Since MENU.BAT is modular, you can easily add new programs and options to the menu system.

MENU.BAT contains some typical loading schemes for *Word, 1-2-3, Windows, Procomm Plus,* and *The Norton Utilities.* If you want to take it for a quick spin, type in the listing with a word processor (changing any

```
@echo off
cls

:start
be sa reverse
be window 2,10,4,69 bol cyan on blu shadow zoom
be rowcol 3,32 "Today's Specials" bol white on blu

:main_win
be window 7,10,22,69 bol cyan on blu shadow zoom
be rowcol  9,30 "Microsoft Word      M"
be rowcol 11,30 "1-2-3               L"
be rowcol 13,30 "Windows             W"
be rowcol 15,30 "Procomm Plus        P"
be rowcol 17,30 "Norton Utilities    N"
be rowcol 19,30 "Exit to DOS         X"
be rowcol 21,33
be ask "Press a letter: " mlwpnx default=x bol
if errorlevel 6 goto exit
if errorlevel 5 goto norton
if errorlevel 4 goto pcplus
if errorlevel 3 goto windows
if errorlevel 2 goto 123
if errorlevel 1 goto word
if errorlevel 0 goto exit

:word
be rowcol 21,33
be printchar " ", 20 blu
be window 9,17,20,63 bol cyan on blu shadow zoom
be rowcol 12,25, "Open last document edited      L"
be rowcol 14,25, "Log to DOCUMENT directory      D"
be rowcol 15,25, "     and then run Word"
be rowcol 17,25, "Return to main menu            R"
be rowcol 19,38
be ask "Press L, D, or R: " ldr default=r bright
if errorlevel 3 goto main_win
if errorlevel 2 goto doc
if errorlevel 1 goto last
if errorlevel 0 goto main_win
:doc
cd\word\document
c:\word\word
goto start
:last
c:\word\word/l
goto start

:123
c:\lotus\123
goto start

:windows
be rowcol 21,33
be printchar " ", 20 blu
be window 9,17,19,63 bol cyan on blu shadow zoom
be rowcol 12,25, "Run Windows and Excel          E"
be rowcol 14,25, "Run Windows and PageMaker      P"
be rowcol 16,25, "Return to main menu            R"
be rowcol 18,38
be ask "Press E, P, or R: " epr default=r bol
if errorlevel 3 goto main_win
if errorlevel 2 goto pm
if errorlevel 1 goto excel
if errorlevel 0 goto main_win
:pm
c:\win386\win386 pm
goto start
:excel
c:\win386\win386 excel
goto start

:pcplus
be rowcol 21,33
be printchar " ", 20 blu
be window 9,17,19,63 bol cyan on blu shadow zoom
be rowcol 12,25, "Run Procomm+ with MCI script   M"
be rowcol 14,25, "Run Procomm+ without script    P"
be rowcol 16,25, "Return to main menu            R"
be rowcol 18,38
be ask "Press M, P, or R: " mpr default=r bol
if errorlevel 3 goto main_win
if errorlevel 2 goto noscript
if errorlevel 1 goto script
if errorlevel 0 goto main_win
:noscript
c:\procomm\pcplus
goto start
:script
c:\procomm\pcplus /fmcilog
goto start

:norton
c:\norton\ni
goto start

:exit
be sa bright cyan on blu/c
```

LISTING 1: MENU.BAT demonstrates The Norton Utilities Advanced Edition's Batch Enhancer language.

With Norton's batch language extender, you can create a flexible menu system for all occasions.

drive and path information to match your setup), save it as an unformatted file, and properly reference the subdirectory holding *Norton*'s BE.EXE (for batch enhancer) program in your system's PATH statement. Add to your system's CONFIG.SYS file the command DEVICE = *d*:*path*\ANSI.SYS (in which *d*:*path*\ represents the drive and subdirectory where the ANSI.SYS file is stored), enter MENU at the DOS prompt, and you're off.

Norton to the Rescue

Of course, you could build a menu system using DOS's batch language, but DOS lacks a command that lets batch files accept user input. And though you can build a stunning interface using DOS's character-based graphics, the required ANSI.SYS commands are devilishly cryptic. But *Norton*'s BE.EXE offers a wide range of easy-to-program controls over your computer console.

A number of different program options lurk within BE.EXE. BE SA (just after Screen Attributes) allows you to set foreground and background colors and intensities and switch between reverse and normal video using additional parameters. For example, BE SA REVERSE (just after the :start label near the top of MENU.BAT) places the entire screen in reverse video mode, creating a light gray background.

Another command, BE WINDOW, draws bordered boxes on the screen in the sizes and colors that you specify. Optional parameters give windows a drop shadow or an "exploding" look as they are formed on screen. BE ROWCOL moves the cursor to the *x*-*y* screen coordinates you specify and can optionally display color text at that location. A related command, BE PRINTCHAR, prints a single character, such as a space, a specified number of times, starting at the current cursor position.

Probably *Norton*'s most useful enhanced batch command is BE ASK, which prompts the user to press a key, then compares the key to a list of acceptable responses. BE ASK then passes an ERRORLEVEL value to DOS that corresponds to the keystroke's position in the list. In MENU.BAT, a series of IF statements evaluates this ERRORLEVEL value, then branches execution to the program label that executes the desired program, batch file, or DOS command.

For example, if you press M at MENU.BAT's opening menu, the command 'be ask "Press a letter: " mlwpnx' determines that *m* is the first character in the list and returns an ERRORLEVEL of 1. With this value in hand, MENU.BAT jumps to the statement 'if errorlevel 1 goto word' and branches to the :word program label. BE ASK isn't case sensitive, so you don't have to tell it to accept both *M* and *m*, a bane of user interface programming.

A MENU.BAT Walk-Through

At first glance, MENU.BAT may look long and intimidating, but it mostly follows a simple top-to-bottom flow and avoids both quirky GOTO jumps and CALLs to other batch programs. With the exception of the @ECHO OFF command on the first line, MENU.BAT should run under DOS 2.0 or later versions. With DOS versions prior to 3.3, delete the @ character.

Starting at the top, the three lines immediately following the :start label set the background display color, then draw the menu title box and text. Next, the program block starting at :main_win and ending just before :word displays the main

menu window and text, prompts the user to select a menu option, then branches to one of six corresponding labels—:word, :123, :windows, :pcplus, :norton, or :exit. Two of the labels—:123 and :norton—simply load these programs, then return to MENU.BAT's starting menu when the programs are exited. The :exit label resets your system's video attributes and clears the screen.

Three other labels—:word, :windows, and :pcplus—pop up submenus that offer additional choices. These submenus function just like the main menu (:main_win) and branch either to a task-specific label (such as :last, which loads *Word* with the /L switch) or back to :main_win. The Microsoft Word submenu can branch to :doc or :last, the Windows submenu to :pm or :excel, and the Procomm Plus submenu to :noscript or :script. As with :123 and :norton, the commands that follow these labels run programs, then return the user to MENU.BAT's main menu at the end of program execution.

To keep things running smoothly, MENU.BAT also includes some keystroke trapping. The IF ERRORLEVEL 0 statements scattered throughout MENU.BAT trap any <Esc> keystrokes, which would otherwise activate the IF ERRORLEVEL 1 branch and load *Word*. The DEFAULT= parameter in each BE ASK command defines what key value will be returned if the user presses anything other than <Enter>, <Esc>, or keys defined in the current menu's BE ASK keystroke list. If you press a key that's not listed, MENU.BAT will simply beep and wait for you to press an acceptable key.

Speedy It's Not

One drawback is that BE.EXE must be read from disk every time it's called, unlike internal DOS commands (such as DIR or COPY). So unless you're using a swift 286 or 386 system, MENU.BAT may seem a little sluggish.

You can boost operations considerably by running BE.EXE from a RAM disk. To do this, first reference the RAM disk program in your system's CONFIG.SYS file. If you use DOS's VDISK program, insert DEVICE=C:\DOS\VDISK.SYS 25 128 2 in CONFIG.SYS. This line sets aside 25K of RAM for BE.EXE, which is more than enough. To install VDISK in extended rather than conventional memory, add /E at the end of the line. Then, insert the RAM disk's drive letter either at the beginning of your PATH statement or before every call to BE.EXE in MENU.BAT (for example, E:\BE SA REVERSE). Finally, create a batch file that copies BE.EXE to the RAM disk and then runs MENU.BAT.

Some Variations on the Theme

MENU.BAT performs some fairly mundane program launching, but it could also be a great place to centralize more complex housekeeping tasks. Some applications (such as *Ventura Publisher*) require special CONFIG.SYS and AUTOEXEC.BAT setups, forcing you to juggle multiple versions of those files. You could also modify MENU.BAT to load *Windows* with different versions of WIN.INI—a wise practice, given the peculiarities of *Windows* software. Don't be afraid to experiment—an unfamiliar menu item could turn out to be your favorite dish.

TIPS & TECHNIQUES

Programming

PAL for Beginners

Paradox's PAL programming language isn't just for professional developers. This simple script enhances a query by prompting users for input.

What you need: Paradox 3.0, a printer

Borland's *Paradox* is designed so nontechnical users can get the data base information they want without resorting to programming. Sooner or later, though, most users need to learn a little Paradox Application Language (PAL) to extend queries and customize applications. PAL enables you to do things that you can't do from menus, such as add prompts for user input, control the execution of commands, and change substrings of table values.

By using PAL to prompt a user for input, you can dramatically increase the power of *Paradox* queries. For example, have you ever wished you could tell *Paradox* to use new selection criteria with an existing query? Even if you have no programming experience, you can easily learn enough PAL for this purpose.

This article shows how to create a short PAL script called BDAYLIST.SC that builds on a query you create with QBE and provides prompts for user input (see **LISTING 1**). The script prompts a user to enter two dates and queries a table called Birthday for all records of people whose birthdays fall on or between those dates. The script then displays the resulting Answer table and gives the user the option to print out the results as a report. As you create the script, you'll learn how to use PAL to define variables, display status messages on screen, use IF statements, and more. Most of these basics will work with earlier versions of *Paradox*, but the COPYREPORT and PAINTCANVAS commands are new to version 3.0.

Setting the Table

The first step is to create a small table with an alphanumeric field for a list of names, and a date field for the corresponding birthdays. Here's the drill:

1. Load *Paradox*, select *Create*, type **Birthday** at the prompt, and press **<Enter>**.

2. Enter the field name **Last Name**, tab over once, and type **A18** for an alphanumeric field that's 18 characters long.

3. Press **<Enter>** and create

```
CLEAR               ;Clear screen
CLEARALL            ;Clear work space

@ 5,0               ;Position cursor
?? "Enter a start date for birthday list: "
ACCEPT "D" PICTURE "#[#]/#[#]/##" TO startdate

@ 7,0
?? "Enter an end date for birthday list. "
ACCEPT "D" PICTURE "#[#]/#[#]/##" TO enddate

CLEAR
CURSOR OFF
@ 5,0
?? "Processing query..."

PAINTCANVAS BLINK    ;Makes dots in above message blink
     5,16,5,18       ;Defines area for blinking text

Query

 Birthday | Last Name | First Name |          Birth Date           |
          | Check     | Check      | Check >=~startdate,<=~enddate |
          |           |            |                               |
          |           |            |                               |

 Birthday | Address |
          | Check   |
          |         |
          |         |

Endquery

DO_IT!

IF ISEMPTY("Answer")
     THEN MESSAGE "No records found"
          SLEEP 2000
          CLEARALL
          QUIT
ENDIF

FIRSTSHOW   ;places Answer at top of screen

WAIT TABLE
     PROMPT "Press F1 to print or Esc to quit."
UNTIL "F1", "Esc"

IF retval = "F1"
     THEN CLEAR
          @ 5,0
          ?? "Generating report..."

          PAINTCANVAS BLINK
               5,17,5,19

          COPYREPORT "Birthday" "R" "Answer" "R"
          INSTANTREPORT
ENDIF

CLEAR
CLEARALL
MESSAGE  "Script over"
SLEEP 2000
```

LISTING 1: BDAYLIST.SC. This simple Paradox PAL script prompts users for two dates to query a table for the names of all users whose birthdays fall within a certain time period.

the **First Name** field in the same way.

4. Press **<Enter>** and type **Birth Date**, tab to the next field, and type **D** to make it a date field. If you want, you can enter more fields, such as Address and Salary.

5. Press **<F2>** to save the table structure.

6. Select *View* from the main menu, press **<Enter>**, select *Birthday* to load that table, and press **<F9>** to enter Edit mode.

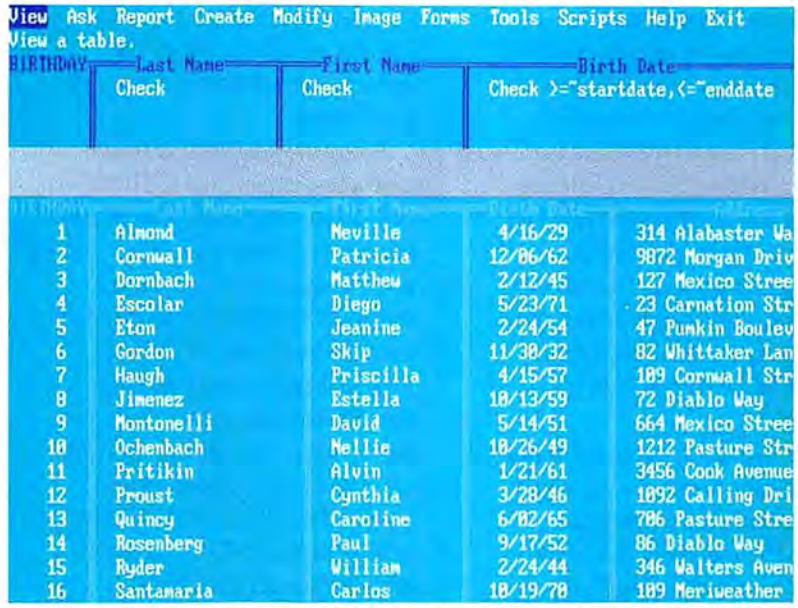
7. Enter as many names and birthdays as you want, and press **<F2>** to save the table.

Create a Query With Variables

Next, create a query that looks for records within a variable time period. From the main menu, select *Ask* (**<F10>**), enter the name of the table to be queried (**Birthday**), and type in the selection criteria shown in **SCREEN 1**. This query selects records that are both greater than or equal to (>=) the start date and less than or equal to (<=) the end date. Variable names (in this script, *startdate* and *enddate*) must start with a letter and cannot contain spaces.

When you place a variable in a query, you must precede it with a tilde (~). This tells *Paradox* that the following string is a variable and not a literal selection criterion. Be sure to checkmark all fields so the Answer table will have the same structure as the Birthday table.

When you're done, save the query to a script by pressing **<F10>** and choosing *Scripts* and then *QuerySave*. At the prompt, enter the script name **BDAYLIST** (only eight characters are allowed), and press **<Enter>**.



SCREEN 1: To query the data base shown at the bottom of the screen for birthdays that fall within a certain range, you create a query that includes variables (shown above). The query then becomes the heart of a PAL script that prompts users for the range's start and end dates.

Paradox automatically adds the .SC extension.

Building on the Query

As it stands, the query script is useless because no values have been assigned to the *startdate* and *enddate* variables. The solution is to add a few PAL commands to the script to prompt the user for the desired dates and assign them to the variables. While you're at it, you can add some flash to the screen display and have the script print out a report. First, go to the script editor:

1. Press **<F10>** and select *Scripts*.

2. Next, choose *Editor* and then *Edit*.

3. Type **BDAYLIST** at the prompt and press **<Enter>**. *Paradox* will display the query script you just created.

4. Press **<Insert>** to change to insert mode, and press **<Enter>** to create a blank line. Press **<Cursor Up>** to move to the new line.

5. Enter the PAL commands in **LISTING 1**, skipping over the query code that has already been automatically generated. Press **<F2>** to save the script.

6. To play the script, make sure your printer is on, and select Scripts and then Play. Enter the name of the script and press <Enter>.

Clear the Canvas

In **LISTING 1**, commands and functions are uppercase and listed on separate lines; a semicolon and a comment follow many commands. This format isn't required; it just makes the script easier to follow.

The first command, CLEAR, clears the screen, or "canvas" in PAL-speak. CLEARALL clears the work space, the section of RAM where *Paradox* holds tables and queries. Always clear the work space before playing a script—leftover table and query images can wreak havoc.

Define the Variables

The next section of code prompts the user for the start and end dates and assigns the entered values to the *startdate* and *enddate* variables. The @ positions the cursor at a specified row and column, in this case five lines down and flush left. The double question marks precede text you want to appear on screen; that text must be surrounded by quotes.

The ACCEPT command waits for the user to enter a value and then assigns it to a variable. ACCEPT must be followed by a data type (in this case *D* for date) that matches the value of the variable specified. The data type is enclosed in quotes to distinguish it from a variable.

The optional PICTURE keyword ensures that the user will enter the value in the right format. The format is enclosed in quotes, and in this case, it limits the user to entering numbers and slashes; the brackets indicate an optional character, so users can enter either single- or double-digit numbers for the day and month. Slashes appear automatically if the user enters two digits. You can use other keywords with ACCEPT, such as MIN (which specifies the minimum value allowed), MAX (which specifies the maximum value allowed), and DEFAULT (the default value); others are LOOKUP, which validates the entry against a specified lookup table, and REQUIRED, which indicates that the user cannot leave the value blank.

Paint the Canvas

When you play a script, *Paradox* typically blanks the screen except for a blinking cursor. If you want to distract or inform users, you can use PAL commands to paint the canvas with text while a script is playing. When the script is over, the work space appears again.

First, the CLEAR command clears the screen, and CURSOR OFF hides the cursor. The @ positions the cursor, and *??* displays a status message. Next, the PAINTCANVAS command, combined with the BLINK option, makes the dots following the "Processing query" message blink. You could also use PAINTCANVAS with display options such as INTENSE, REVERSE, or BACKGROUND or assign colors with the ATTRIBUTE option.

The numbers on the next line define the area to be painted. The first two numbers (5,16) indicate the upper left corner of the area; the second two (5,18) mark the lower right. DO_IT! simply tells *Paradox* to process the query.

IF There's No Answer

Although this listing does validate some data, there's no real error checking that would, for example, point out an end date that was earlier than the start date. It does use an IF statement, however, to check whether there are matching records.

IF is a PAL control structure that must always be used in conjunction with the keywords THEN and ENDIF. THEN indicates the commands to be executed if the conditions specified after the IF are satisfied. ENDIF marks the end of the IF statement. In this example, IF is used with the ISEMPTY() function to see if the Answer table contains any records. If the Answer table is empty, a 'No records found' message is displayed for 2 seconds. (To change the duration, just change the number following SLEEP.) Next, CLEARALL clears the work space, and the QUIT command stops the script. If the Answer table contains one or more records, the script continues on to the code following ENDIF.

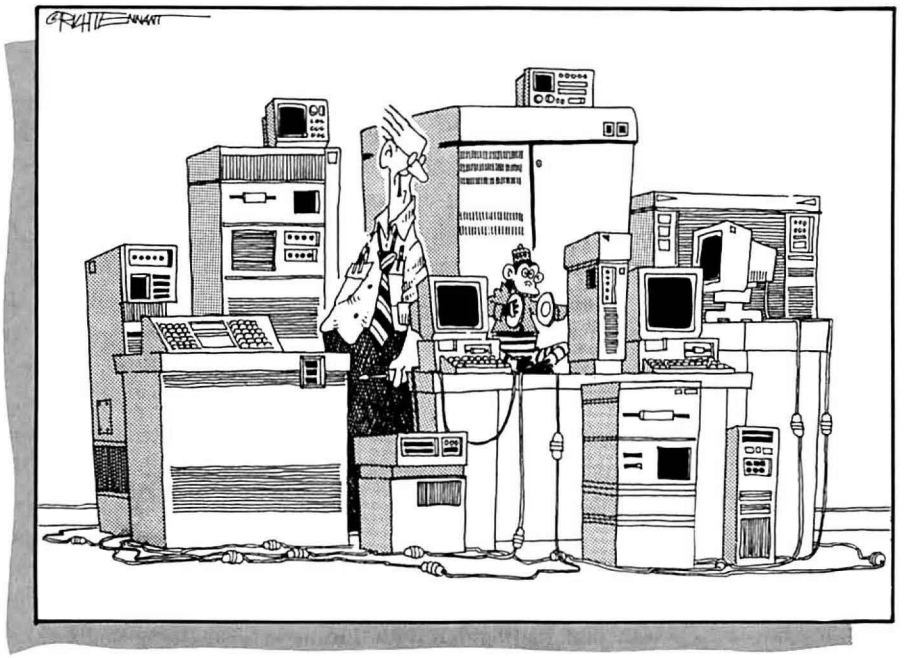
Report on the Double

The next step is to report the results of the query on screen and provide the option of printing it out. The FIRSTSHOW command displays the Answer table at the top of the screen, and the WAIT command controls the duration —it displays the Answer table until the user presses one of the keys listed after the UNTIL keyword. A PROMPT is included to cue the user.

The optional printing of the report is controlled with another IF statement. *Paradox* stores the name of the key that ends the waiting period in a special variable called retval. The IF statement tests retval to see if the user wants to print out the report. If the user presses <F1> (retval = "F1"), the script continues playing and displays a message that the report is being processed. If <Esc> is pressed, the script is done.

Next, the COPYREPORT command copies the report (R) from the Birthday table to the Answer table. COPYREPORT is an abbreviated menu command that substitutes for a string of menu selections, in this case <F10>, Tools, Copy, and Report. The table and report names must be enclosed in quotes.

Finally, the INSTANTREPORT command prints out a simple report. The final commands clear the screen and work



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space again and display a message that the script is finished.

If You Have Problems

If *Paradox* encounters a problem, a menu will appear with the choices Cancel and Debug. Choosing Debug sends you to the *Paradox* debugger. Here you can check the value of an expression, examine a script one command at a time, or pop directly into the Script editor to fix the code.

This example shows only a glimpse of PAL's power. Fortunately, you needn't be an expert programmer to use PAL to extend the power of *Paradox*.

—*Celeste Robinson*

Operating Environments

A DOS Survival Guide

The DOS command line doesn't have to be intimidating. With this handful of tips, you can turn the irascible operating system into a powerful ally.

What you need: DOS 2.1 or later version

Unlike menu-driven interfaces, the DOS command line doesn't advertise its own capabilities. And you won't get much out of IBM's documentation, which intimidates more than it informs. As a result, most PC users don't know how to tap the power of their operating system.

This article describes a few tricks that no DOS user should be without. By learning new commands and additional uses for familiar ones, you can get much more out of DOS than you may have realized was possible. Unless otherwise noted, the commands discussed here are available in DOS 2.1 and later versions.

On-Line Information

DOS's standard C> prompt isn't very illuminating, but with the PROMPT command you can create one that unearths a wealth of information. Typing PROMPT PG, for instance, changes the prompt to show the current default drive and directory, such as C:\UTIL\DOS>.

The PROMPT command uses two-character codes that begin with dollar signs, to represent variable information and characters that have special meanings in a DOS command. In the previous example, $P displays the current default path while $G adds the greater-than sign (>). Other codes include $D for the date, $T for the time, $H for backspace, and $_ to start a new line.

You can also add text to a prompt command. For instance, entering *PROMPT It is THHH on $D.$_You are in $P.$_Your wish is my command$B* produces:

It is 11:44:16 on Fri 8-25-1989.
You are in C:\UTIL.
Your wish is my command!

Most DOS users know that DIR lists the files in the current directory or, when followed by a path such as DIR \UTIL or DIR A:, in another directory. But DIR can also list just one file or, with the ? and * wild cards, files with similar names.

The question mark wild card replaces a single letter, so that DIR DA??Y.D?C would list both DANDY.DOC and DAFFY.DUC. The asterisk wild card replaces more than one character. DIR A*.DOC will list all files that begin with *A* and have the DOC file extension, while DIR STUFF.* will list those named STUFF, regardless of the extension. Need a quick list of subdirectories? Type DIR *. and DOS will display anything that lacks a file extension—typically a subdirectory name.

If your directory contains more than 22 files, some file names will scroll off the screen before you can read them. One simple solution: Type DIR /W, and the files (minus size and creation information) will be laid out across the screen in wide, five-column format. Or type DIR /P, and information will scroll up one screen at a time, pausing until you press a key. Use DIR and the redirection symbol (>), and you can forward a directory listing to a printer (by typing DIR > PRN) or to a file (by typing DIR > DIRECT.TXT).

Power Copying

With DOS 3.2 came XCOPY, which offers capabilities far beyond those of the older COPY command. With XCOPY you can copy not only a directory's files but its subdirectories and their files as well. You can also copy only recently changed files, or even use XCOPY for quick-and-dirty hard disk backups. For example, the command XCOPY C:*.* A: /S /E /M /V will take all of the files on the C: drive that have been created or

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Dr. Stephens of NASA states: "One of the things I like best [about DesignCAD 3D] is that I can pick it up and go with it." Dr. Stephens, who evaluates and recommends software for purchase by NASA, says software must meet certain criteria: "One, it must work. Two, it must be user friendly and easy to use. I push it [DesignCAD 3D] as far as I can push it. We're not using it as a toy down here, and I resent the fact that some people believe that a product's ability is substandard because of its price."

Jan Hallett, an engineer at Allied Chemicall states: "We use it extensively here and are really sold on it. Plant layouts, pipe runs, fabrications, along with a lot of other things are drawn and designed. I've got AutoCAD, but very seldom if ever use it anymore."

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DesignCAD 3-D and DesignCAD 2D are available from most retail computer stores, or you may order directly from us. If you have questions about which program to purchase please give us a call. All you need to run DesignCAD 3-D is an IBM PC or compatible computer with 640 K RAM memory and a hard disk. Both products support most graphics cards, printers, plotters and digitizers. Free Information and a demo disk are available .

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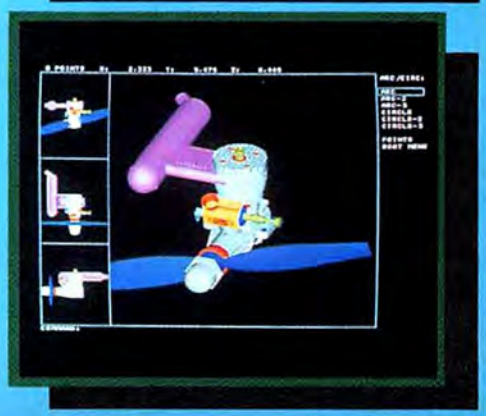

changed since the last backup and copy them to matching subdirectories on drive A:.

What's the secret? The /S switch directs XCOPY to copy from the source directory and all subdirectories beneath it. Since the source is C:*.*, every directory on C: that isn't empty is copied. The /E switch, which can be used only with /S, copies empty subdirectories as well, allowing you to back up your entire disk structure.

But how does XCOPY know which files are new or recently changed? Each file's directory listing has an archive bit, and when a file is created or edited, DOS turns this bit on. With the /M switch activated, XCOPY will copy only files with an "On" archive bit. Files that haven't changed since the last backup are therefore skipped. After each file is copied, the bit is turned off.

If XCOPY fills up the floppy disk in drive A: before all the source files are copied, XCOPY displays a 'Disk full' error message and terminates without prompting you for another floppy. You can run XCOPY again with the same parameters, and it will pick up where it left off, since /M turns off the archive bit only after an entire file is copied.

Other XCOPY parameters include /D:*mm dd yy*, which backs up only files created or edited on or after a specific date; and /A, which, like /M, copies only archived files but doesn't turn the archive bit off.

Simple Diagnostics

Typing the CHKDSK command at the DOS prompt gives you a quick report on the state of your disk and RAM. The first part of the report notes the disk storage consumed by hidden files, directories, user files, and bad sectors and calculates remaining free space. The second part notes total and free *conventional* memory. Alas, CHKDSK won't calculate expanded or extended memory—you'll need a utility like Norton's SI.EXE for that.

But CHKDSK can catch—and sometimes correct—certain file allocation errors. If running CHKDSK elicits a message like '3 lost clusters found in 3 chains. Convert lost chains to files? (Y/N)?', your file allocation table is unsure whether certain disk sectors are assigned to a file or not. Perversely, pressing Y at this point won't fix the problem. To correct the errors, you must type CHKDSK /F (for "fix"), wait for the error message again, and then press Y. The lost clusters will be pulled into files named FILE0001.CHK, FILE0002.CHK, and so on, and saved in your root directory. These files may contain important data, but they will more likely hold the remnants of deleted files.

Another DOS command, COMP, compares files of the same size to see if they are identical. If you type COMP C:JAN.REP A:FEB.REP, the contents of the two files are checked, byte by byte. The first ten mismatched bytes are reported; after that, COMP doesn't look for any more.

You can use wild cards to compare groups of files. COMP *.REP *.BAK will compare JAN.REP with JAN.BAK, FEB.REP with FEB.BAK, and so on. COMP *.* C: will compare all the files in the current default directory with any identically named files found on drive A:. Not all vendors include COMP with their versions of DOS. Those that don't usually include a similar utility called FC (File Compare).

XCOPY, CHKDSK, and COMP are external DOS commands, meaning they aren't built into DOS but exist as separate executable files. Make sure that you copy these files from your original DOS disks into your system's \DOS subdirectory and reference C:\DOS in your AUTOEXEC.BAT file's PATH statement so DOS can always find them.

If you thumb through the DOS manual or one of the many books available on DOS, you'll be amazed at how much power is at your fingertips. DOS may not tell you much, but below its inscrutable surface lie many powerful tools. —*Lincoln Spector*

Word Processing

Two-Fisted Macro Management

Did you know that WordPerfect supports two-keystroke macros? Here's how to put more than 1300 keyboard shortcuts at your fingertips.

What you need: WordPerfect 5.0 or a later version

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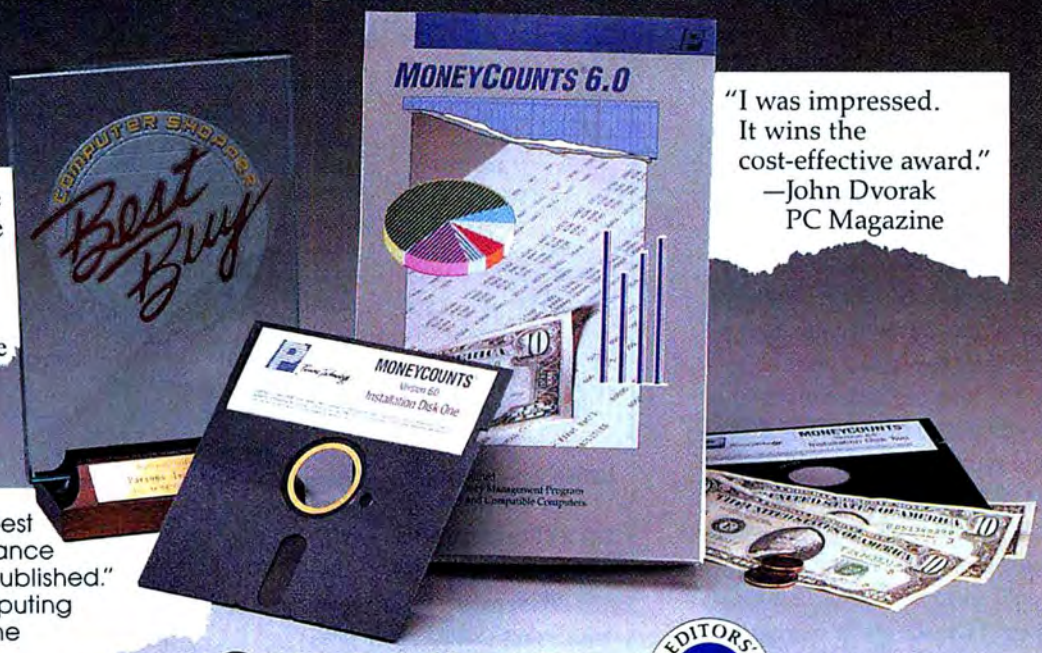

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your *WordPerfect* macros, you must resort to "named" macros—separate files that are run by pressing <Alt>-<F10>, typing a file name, and pressing <Enter>. But with a special "prefix" keyboard macro, you can avoid this drudgery and run more than 50 named macros with just two keystrokes.

For instance, you can assign a prefix macro to <Alt>-X that lets you run a macro named XP.WPM by pressing <Alt>-XP. (If you want to run existing named macros with this scheme, you'll naturally have to rename them.) Create prefix macros for each letter of the alphabet, and you could have thousands of two-key macros at your fingertips. You could assign all your print macros to <Alt>-P*key* combinations, formatting macros to <Alt>-F*key*, and so on. Better still, a prefix macro can also prevent other macros from running in a menu or some other place where they could produce unintended results.

This article explains how to create a prefix macro that uses <Alt>-X*key* combinations to call other macros. You'll discover how a macro can test *WordPerfect*'s current state and react appropriately, then wait for a single keystroke and take a specific action. Even if you don't need two-key macros, these techniques will help you build safer and more powerful macros.

Creating a Prefix Macro

Because prefix macros rely heavily on macro commands, you must write them with the macro editor rather than by recording keystrokes. But since the editor works only with macros that have already been created, you must first go through the motions of recording an empty macro. To create a prefix macro:

1. Turn on the macro recorder with **<Ctrl>-<F10>**, then press **<Alt>-X** to identify the macro.
2. At the 'Description:' prompt, name the macro **Alt-X Prefix Macro** and press **<Enter>**.
3. When the blinking 'Macro Def' message appears, press **<Ctrl>-<F10>** to stop recording and save the empty macro.
4. To enter the macro editor, press **<Ctrl>-<F10>** and **<Alt>-X**, then select 'Edit' and 'Action'.

Notice that *WordPerfect* has already inserted the {DISPLAY OFF} command into the macro. This is intended to speed up macro playback by skipping screen rewrites, but since this macro doesn't rewrite screens, the command has no use. Furthermore, it can wipe out existing prompts. Press **<Delete>** to delete it.

The complete macro is shown in **LISTING 1**. To create the first line:

1. Press **<Ctrl>-<Page Up>** to display the Macro Command menu. (*WordPerfect*'s macro commands can't be entered directly but must be inserted from this menu.)
2. Press **I** to highlight {IF} and **<Enter>** to insert the command.
3. Press **<Ctrl>-<Page Up>**, type **ST**, and press **<Enter>** to insert the {STATE} command, then enter the command's parameters, **&4~**. A macro's parameters must always end with a tilde (~).

If you wish to include a comment, press <Tab>, insert the comment command ({;}) from the Macro command menu, type your comment, and enter a tilde.

During macro playback, tabs and carriage returns are ignored, so you can use them to make macros easier to read and edit. Spaces, however, are inserted into your text during playback. If you want a tab or return to be inserted into the text, type <Ctrl>-V<Tab> or <Ctrl>-V<Enter>.

Type the rest of the macro as it appears in **LISTING 1**, using the Macro Command menu for the {QUIT}, {GO}, {END IF}, {LABEL}, {CHAR}, and {NEST} commands. Insert the {VAR 1} identifier by typing **<Ctrl>-V <Alt>-1**. To exit the editor and save the macro, press **<F7>** twice.

```
{IF}{STATE}&4~      {;}If at an editing screen...~
   {IF}{STATE}&8~     {;}If at alternate editing screen~
      {BELL}        {;}Beep on error~
      {QUIT}        {;}Abort macro~
   {END IF}         {;}Close nested if routine~
   {GO}get mac~     {;}Go to routine named "get mac"~
{END IF}            {;}Close main if routine~
{BELL}              {;}Beep on error~
{QUIT}              {;}abort macro~

{LABEL}get mac~     {;}Routine for running named macro~
{CHAR}1~~           {;}Store keystroke~
{NEST}X{VAR 1}~     {;}Run the macro stored in Variable 1~
```

LISTING 1: Use this WordPerfect macro to call other macros easily.

STATE Your Location

The first nine lines of the prefix macro ensure that named macros will run only from the main editing screen, where you write and edit documents. The last

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three lines pause the macro for input and call a named macro. The {STATE} command is crucial, because it can test *WordPerfect*'s current condition; several {STATE} commands can be combined to refine a macro's tasks, making {STATE} a useful (if overly complicated) tool.

In this example, the {IF}{STATE}&4~ line determines if you are at an editing screen. If you are at a menu, the spell checker, or anything but an editing screen, the macro goes directly to the {BELL} and {QUIT} commands, beeps the computer's speaker, and aborts the macro.

If {STATE}&4 tests true, the command {IF}{STATE}&8~ checks whether you are in a secondary editing screen, such as a header or footnote. If so, the macro again beeps and aborts. (If you want to run named macros from secondary editing screens as well as the main one, eliminate lines 2 through 5 from this macro.)

If {STATE}&4 is true and {STATE}&8 false, you are at the main editing screen and {GO}get mac~ takes over, directing the prefix macro to skip {BELL} and {QUIT} and branch to the {LABEL}get mac~ command.

Grabbing the Keystroke

Assured that *WordPerfect* is at the main editing screen, the prefix macro is now ready to accept a keystroke and call a named macro. The {CHAR} command waits for you to press a key, then stores that keystroke to the numbered variable—in this case, variable 1—that is identified before the first tilde. To add an on-screen prompt, merely type text between the two tildes.

The {NEST} command's job is to call named macros—in this case, X{VAR 1}. Thus, to run named macros XS.WPM and X1.WPM, you just type <Alt>-XS and <Alt>-X1. If you type <Alt>-X1 and X1.WPM doesn't exist, *WordPerfect* will display an error message.

WordPerfect macros can do a good deal more than call other *WordPerfect* macros. By creating macros that can test their environment and respond to commands, you can make *WordPerfect* more powerful, easier to use, and less prone to unpleasant surprises. —*George R. Beinhorn*

Scott Spanbauer is a former PC World *editor and the managing editor of* Connect *magazine. Celeste Robinson is assistant manager of the product support department for Borland's* Paradox. *Lincoln Spector is an assistant editor for* PC World, *and George Beinhorn is a frequent contributor to* PC World.

USER GROUP TIPS

Helpful hints from members of the nation's user groups

Even Safer Saves in 1-2-3

If a *1-2-3* Save macro is run on a new, unnamed worksheet, it will overwrite the first data file in the directory. Claude Delphia's tip, "Safe Saves With *1-2-3* Macros" (*User Group Tips*, August 1989), suggested placing a blank file named !.WK1 in your data directory as a safety measure.

To expand on this suggestion, I advise making !.WK1 a read-only file. When your macro tries to write over !.WK1, *1-2-3* will produce an error message.

If you have DOS 3.0 or a later version, you can change !.WK1 to a read-only file by entering ATTRIB +R !.WK1 at the DOS prompt while in your data subdirectory. Attribute-changing utilities are also found in such packages as *The Norton Utilities* and *PC Tools Deluxe.*

Darrel Booth
Cincinnati PC Users Group

WordPerfect Searches Spreadsheets Data Bases

The Word Search feature on *WordPerfect 5.0*'s List Files screen doesn't restrict itself to *WordPerfect* files. It will examine files in just about any format, including DBF and WK1, for the word or phrase you specify.

From within the *WordPerfect 5.0* List Files screen, select Word Search, then Entire Doc. Type your search string and then press <Enter>. These searches are not case sensitive, so it doesn't matter whether you use upper- or lowercase letters. *WordPerfect* will mark with an asterisk the files that contain your search string.

Doug Russell
Pinellas IBM-PC Users Group

Your BASIC Alarm Clock

If you download data from the other side of the country, you may want your communications program to load and dial at 11 p.m., when telephone rates are lower. With the help of a simple BASIC program, you can set up

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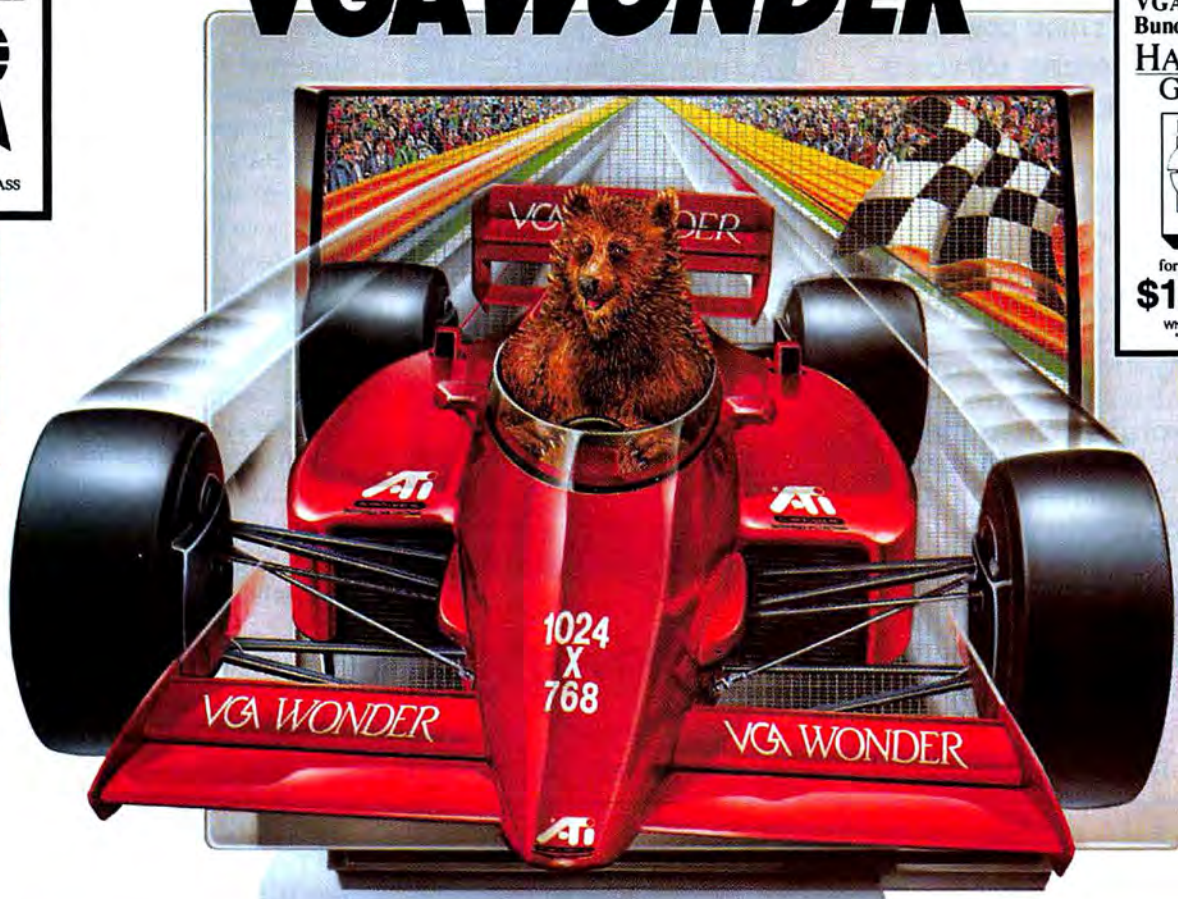

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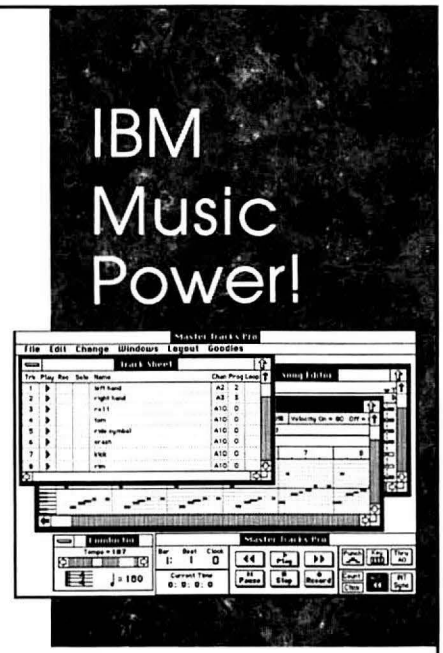

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your computer to perform a given action at a particular time.

Create the following two-line BASIC program, calling it WAIT.BAS:

```
100 if left$(time$,5)<>"23:00"
    then goto 100
200 system
```

The string "23:00" is 11 p.m. on a 24-hour clock. To set your alarm for a different time, change the string appropriately.

Create a batch file called DELAY.BAT, whose first line is BASICA WAIT. (Depending on your version of DOS, you may need to use BASIC or GWBASIC instead of BASICA.) Finish the batch file with the commands that you want your computer to perform at 11 p.m.

At the end of your work day, simply run DELAY.BAT. You must be in the same directory as WAIT.BAS, and both DELAY.BAT and your BASIC program must be either in that directory or in a directory listed in your path. As long as it is not 11 p.m., line 100 of WAIT.BAS repeats itself continuously. When the specified time is reached, line 200 passes control back to the system. The batch file then continues, downloading data or whatever else you may want it to do in the middle of the night.

Gary Oppenheimer
NYPC Users Group

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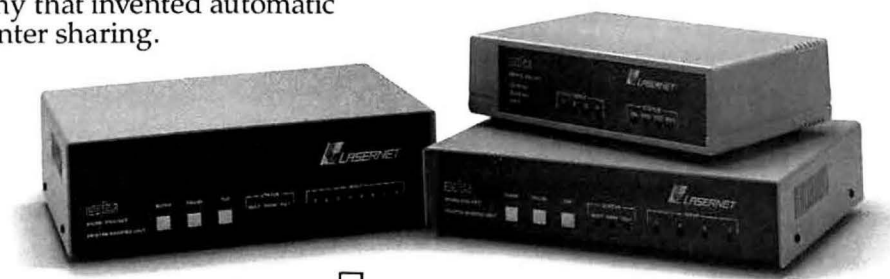

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5120 VGA Card ..... 189.

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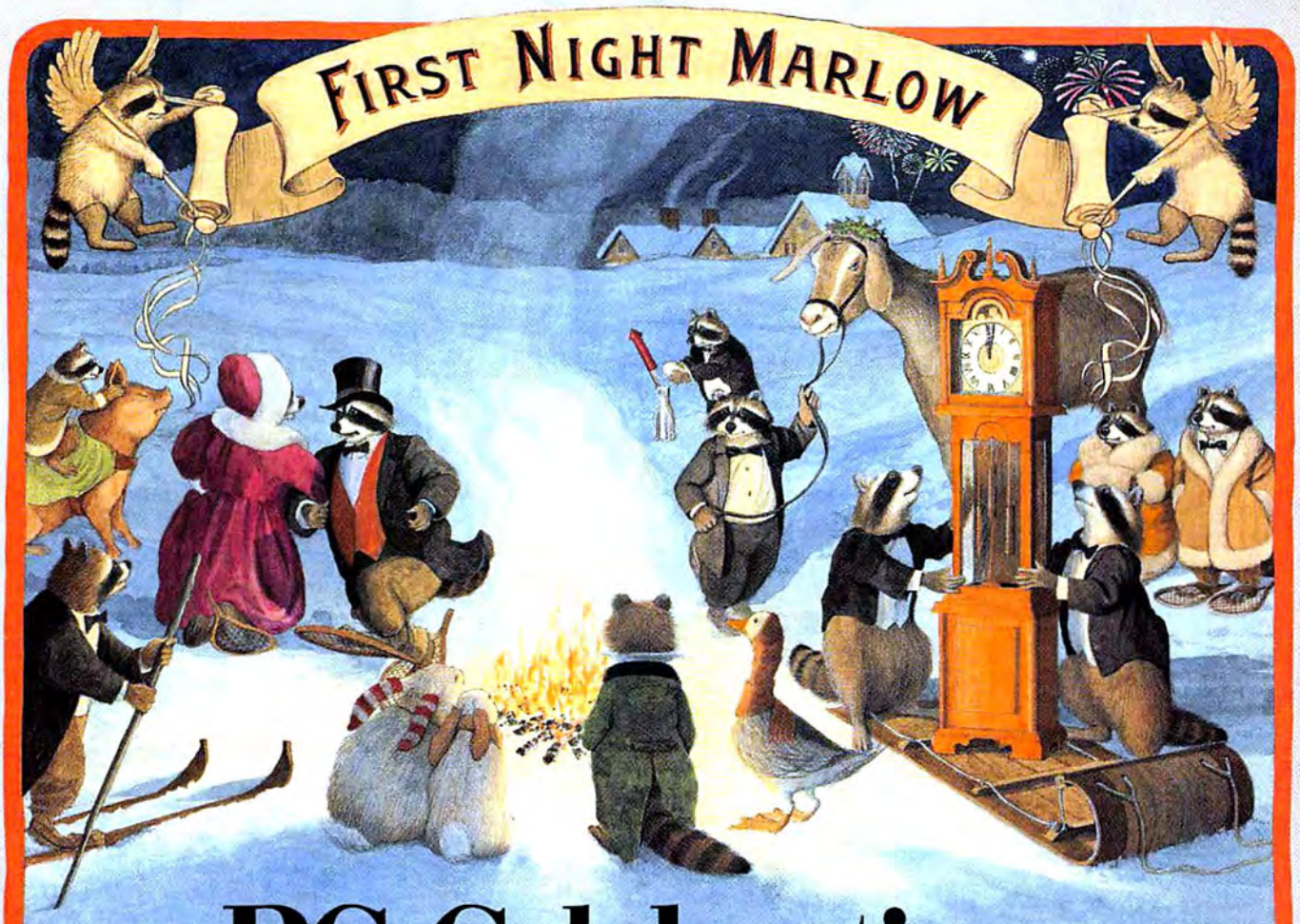

PC Celebration.

Furrier & Jive.
(Or, welcome back to the gay nineties.)

People are always asking if the celebrated rural outpost of Marlow, NH (pop. 561, Car. Rt. Sort 03456), is really ready for the '90s. Ready???! Why, if you give us a few minutes to hitch up the horses, light the oil lamps, pop open the parasols, and set a few bonfires, we'll make Currier and Ives look like Bert and Ernie. You see, even though our picture postcard town now has more printers than people, we still know the traditional way to ring out the old and ring in the new.

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So, ring it in here!

Mountain Computer ... 1 year

2917	40-60 Meg Internal Tape Drive	$379.
5502	80-152M Ext. Tape Drive	759.
5500	80-152M Int. Tape Drive	629.
6153	DC2120 Cartridge *(5 pack)*	135.
5190	DC2000 Pre-formatted Cartridges *ea.*	35.

Pacific Rim ... 1 year

5010	1.2 Meg External *(for PS/2's)*	215.
5011	360k External 5¼" Drive	179.

Plus Development ... 2 years

3105	Hardcard 20 Meg *(49 ms)*	549.
3106	Hardcard 40 Meg *(28 ms)*	699.

Seagate ... 1 year

FREE PCTV® Hard Drive Installation Tape with purchase of 20, 30 or 40 Meg Seagate drive for the IBM PC (not for AT). Beta or VHS.

2285	20 Meg Internal Hard Drive ST225 *(w/controller and cables, 65 ms)*	289.
2286	30 Meg Internal Hard Drive ST238 *(w/controller and cables, 65 ms)*	299.
4554	40 Meg Int. HD ST251-1 (28 ms)	359.
2287	40 Meg Int. HD for PC ST251-1 *(w/controller and cables, 28 ms)*	429.
4624	80 Meg Int. HD ST4096 (28 ms)	619.

MicroSpeed ... 1 year

PC-TRAC Trackball–Small and lightweight, self-adjusting resolution from 50 to 1000 dpi. *PC-TRAC serial.* . $75. *PC-TRAC bus.* . $85.

FastTRAP–Trackball with a Trackwheel provides third axis pointing capability. *FastTRAP serial* . $99. *FastTRAP bus* . $109.

TEAC ... 1 year

4950	PC, XT 360k Drive *(5¼")*	79.
4951	720k Drive *(specify XT or AT, 3½")*	79.
4670	1.44 Meg Drive for XT *(3½")*	99.
4326	1.44 Meg Drive for AT *(includes Bastech software utilities, 3½" copy prot.)*	119.

Toshiba ... 1 year

3649	AT 1.2 Meg Drive *(5¼")*	99.
4755	AT 1.44 Meg Drive *(3½", includes Bastech software utilities)*	119.

MISCELLANEOUS

CompuServe

1676	CompuServe Information Service	24.

Cables ... lifetime

1019	Smartmodem-to-AT cable *(10 feet)*	15.
5511	Right Angle Printer cable *(6 feet)*	15.
1050	Parallel Printer cable *(15 feet)*	19.

DISKS

All disks have a lifetime warranty.

5¼" DS/DD Disks *(360k)*

3291	Sony *(10 disks per box)*	$12.
2789	Maxell MD2-D *(10 disks per box)*	13.
4192	Verbatim Datalife *(10 disks per box)*	13.

5¼" DS/High Density Disks *(1.2 Meg)*

3770	Verbatim Datalife *(10 disks per box)*	19.
3292	Sony *(10 disks per box)*	19.
2790	Maxell MD2-HD *(10 disks per box)*	19.

Practical Peripherals ... 5 years

2400SA MNP–Has brought affordability to the world of hardware-based MNP level 5 error-free data transmission. Also supports 100% Hayes compatible 2400 bps standard communications . . . . . $209.

PC Globe ... NCP

☐*PC Globe 3.0*–Integrated package of maps, graphics, and data providing an instant, detailed profile of 177 countries. Export graphics to programs such as WordPerfect, Ventura, PageMaker, and Lotus 1-2-3. . $39.

3½" DS/DD Diskettes *(720k)*

3297	Sony *(10 disks per box)*	14.
3772	Verbatim *(10 disks per box)*	15.
2792	Maxell *(10 disks per box)*	15.

3½" DS/High-Density Diskettes *(1.44 Meg)*

3298	Sony *(10 disks per box)*	29.
3773	Verbatim *(10 disks per box)*	29.
2793	Maxell *(10 disks per box)*	29.

MEMORY

3248	256k DRAMs *(120 nanosecond)*	call
4366	1 Meg x 9 SIMMs *(100 nanosecond)*	call
5510	1 Meg x 9 SIMMs *(80 nanosecond)*	call
5746	1 Meg Chips *(80 nanosecond)*	call

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☐*Harvard Graphics 2.13*–Be "free and easy" with the industry's best-selling presentation graphics package. Now with a coupon for free drawing accessory (normally $149 List). Graphically the best choice . . . . . $339.

SHIPPING

Note: Accounts on net terms pay actual shipping.

Continental US:

- For monitors, printers, Bernoulli Boxes, computers, hard drives, and power backups, pay actual charges. Call for UPS 2nd-Day & Next-Day-Air.
- For all other items, add $3 per order to cover UPS Shipping. For such items, we automatically use UPS 2nd-Day-Air at no extra charge if you are more than 2 days from us by UPS ground.

Hawaii:

- For monitors, printers, Bernoulli Boxes, computers, hard drives, and power backups, actual UPS Blue charge will be added. For all other items, add $3 per order.

Alaska and outside Continental US:

- Call 603/446-3383 for information.

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Samna ... NCP

■*Ami Professional 1.0*–Windows-based word processor for high-powered office automation tasks. Includes mail merge, macros, thesaurus, professionally designed style sheets, and integrated drawing and charting capabilities. . **$319.**

Intel ... 5 years

4696	2400B Internal Modem	159.
2352	2400B Internal Modem 2 *(for PS/2)*	249.
5119	2400 Baud External Modem	179.
2346	Inboard 386/PC w/1 Meg	579.
4266	Above Board Plus 512k	419.
4267	Above Board Plus I/O 512k	449.
5336	Above Board Plus 8 2 Meg	699.
5342	Above Board Plus 8 I/O 2 Meg	739.
4272	Above Board 2 Plus 512k	469.
4275	Connection Coprocessor	769.
	MATH COPROCESSORS	
2370	80287-8 *(for 8 MHz 80286 CPU's)*	199.
2369	80287-10 *(for PS/2 Models 50 & 60)*	229.
4750	80387SX *(for 80386SX CPU's)*	309.
2371	80387 *(for 16 MHz 80386 CPU's)*	349.
2372	80387-20 *(for 20 MHz 80386 CPU's)*	399.

Kensington Microware ... 1 year

2582	Masterpiece Plus	109.
5697	Expert Mouse *(Trackball for PS/2)*	115.

Key tronic ... 3 years

4518	101 Plus Keyboard	99.

Kraft ... 5 years

5801	New Game Adapter *(2 game ports)*	27.
5800	3 button Thunder Joystick	29.
5802	Trackball	69.

Logitech ... limited lifetime

5464	Series 2 Mouse *(C9 for PS/2's)*	65.
5151	HiREZ Mouse *(C9)*	79.
6029	Trackman *(Trackball) serial* 85. *bus*	89.
4297	ScanMan Plus *(hand scanner)*	185.

Magnavox ... 2 years

5990	13" VGA Monitor *(CM9032)(1 yr. wrnty.)*	349.
4761	13" VGA Monitor *(9CM062)*	389.

Micron Technology ... 2 years

5818	Beyond 640 EMS Board 1 MB *(exp. to 8 MB w/daughter card)*	369.
5821	Beyond EX Extended Memory Board 2 MB *(exp. to 4 MB w/daughter card)*	599.
6005	Ascend Memory Board for Compaq *(4 Meg)*	729.

Microsoft ... lifetime

2897	Mouse with Paintbrush	109.
2898	Mouse with Windows 286 2.1	139.

MicroSpeed ... 1 year

6007	PC-TRAC Trackball *serial* $75. *bus*	$85.
6010	FastTRAP 3D Trackball *serial* 99. *bus*	109.

Mouse Systems ... lifetime

5994	OmniMouse II w/PC Paint Plus	49.
5845	White Mouse *(bus or serial)*	69.
5997	Trackball *serial* 75. *bus*	85.
4306	PC Mouse II w/PC Paint +	89.

NEC ... 2 years

4799	Multisync 2A *(VGA Monitor)*	499.
5085	Multisync 3-D Monitor	689.

Orchid Technologies ... 4 years

3069	Tiny Turbo 286 *(accelerator board)*	219.
5105	ProDesigner VGA Plus *(800 x 600)*	249.

PC Power & Cooling Sys. ... 1 yr

REPLACEMENT POWER SUPPLIES

3202	Turbo Cool 150 *(25° - 40° cooler)*	129.
3205	Turbo Cool 250 *(25° - 30° cooler)*	169.
3200	Silencer 150 *(84% noise reduction)*	115.

Practical Peripherals ... 5 years

3101	1200 Baud Internal Modem	69.
3100	1200 Baud External Modem *(mini)*	77.

Intel ... 5 years

2400 bps Modems–Reliable connections, 100% Hayes compatibility, and a great price.

2400EX (external) ..... **$179.**
2400B Classic (internal) ..... **$159.**
2400B Modem 2 (internal microchannel) ... **$249.**

3103	2400 Baud Internal Modem	139.
3102	2400 Baud External Modem	179.
5285	2400 Baud Ext. MNP Modem *(Lev. 5)*	209.
4542	2400 Baud Internal Modem for PS/2	229.

Safe Power Systems ... 2 years

4561	Safe 250W *(standby power bkup)*	249.
4562	Safe 425W *(standby power bkup)*	369.

SOTA Technology ... 2 years

5107	Floppy Drive Controller *(S/P)*	99.
5111	SOTA 286i-12 *(12 MHz accelerator)*	299.
5402	SOTA 386i-16 *(16 MHz accelerator)*	419.

Targus ... lifetime

4899	Nylon Laptop carrying case	55.
4901	Premier leather carrying case	199.

1-800/243-8088

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6 Mill Street
Marlow, NH 03456
SALES 603/446-7721 **FAX** 603/446-7791

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☐*Air Transport Pilot*–Fly a Boeing 737, 747, 767 or Airbus A300 airliner. Includes 350 U.S. cities, automatic weather generation, Air Traffic Control feedback, airborne traffic, multiple flight modes, and more ..... **$33.**

TheComplete PC ... 2 years

5598	TheComplete Half Pg. Scanner 400	189.
4887	TheComplete FAX 9600	429.
5140	TheComplete Page Scanner	549.

Toshiba ... 1 year

3684	T1000 Laptop *(80C88, 6.4 lbs.)*	669.
4958	T1600 Laptop *(12 MHz, 20 Meg)*	3249.

Tripp Lite ... 2 years

6019	LS 600 Line Stabilizer	85.

Video 7 ... 7 years

3778	VEGA VGA	259.
5883	1024i VGA *(includes 512k)*	289.

DRIVES

IOMEGA ... 1 year

5116	Bernoulli II Single 44 Meg Internal	995.
5117	Bernoulli II Dual 44 Meg External	1969.
5113	44 Meg Cartridge Tripak *(5¼")*	249.
2499	PC2 Card *(controller required)*	169.
2500	PC2B Card *(bootable card)*	229.

Konami/Ultra Software ...CP

They're here! Those pizza-craving good guys, the Teenage Mutant Ninja Turtles. Battle the bad guys easily with the new Kraft ThunderStick.

☐*Ninja Turtles with Kraft ThunderStick* ..... **$54.**

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Circle 148 on reader service card

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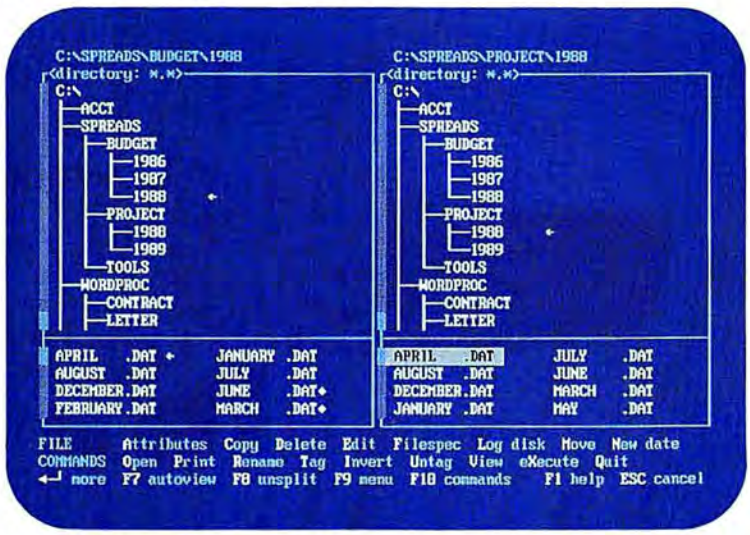

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CONSUMER WATCH

Advice and information for the computer consumer

Need some assistance? Here's a potpourri of unique sources of help from Consumer Watch's mailbag.

Anita Amirrezvani

Resources for the Smart Shopper

What can you do to protect your computer after the warranty expires? How can you tap into your fax machine's powers to get quicker product support? How can disabled people learn about new computer technologies in the comfort of their own homes? Read on for the answers to these questions, and more.

Help for Broken or Stolen Products

If you purchase hardware with your credit card and it breaks or gets stolen after the warranty expires, you may not be out of luck. Several major card issuers —American Express, Chase Manhattan Visa, and Citibank Classic Visa and MasterCard— offer extended warranties and free insurance when you purchase items with their cards.

All three companies offer insurance against loss, theft, damage, or breakage for 90 days from the date of purchase. All three also double the manufacturer's original warranty on any purchase for an additional period of up to one year. A 9-month warranty, for example, would be good for 18 months; a two-year warranty, for three years. Be sure to keep copies of the original warranty and the store receipt.

Sound like a good deal? It certainly is, but be aware that if you buy computers through the mail, these protections may not apply. Bank card companies provide extended protection only on products that carry the manufacturer's original warranty. If you purchase a Compaq or an IBM computer through the mail, you forfeit the original warranty because neither company authorizes mail-order businesses to sell their products. In such cases, bank card companies won't provide extended protection.

And there's another major catch—Citibank and Chase Manhattan don't offer these benefits to corporate cardholders. So if you have both a corporate and a personal card, use the personal card to take advantage of the extra protections, or don't leave home without American Express.

Help for Fax Users, Part One

Tired of being bombarded with junk fax mail? New legislation may soon make such marketing campaigns illegal. Last year, after the Connecticut legislature approved a bill outlawing unsolicited fax messages, the bill was sent to Governor William A. O'Neill for approval. The governor hadn't quite decided whether to sign it when a torrent of fax messages began pouring in from members of the National Fax User's Committee, an industry group in California. According to press officer Jackie Barron, the governor's fax machine was jammed with lobbying letters for two-and-a-half days, prompting the governor to declare the lobbying campaign "misdirected and ill conceived."

It just so happened that severe rains had hit Connecticut at the same time, and flood warnings were being issued throughout the state. But as a result of the fax campaign, an emergency services office was unable to get through to the governor. "The lobbying campaign pointed out quite graphically why the bill could be useful," says Barron. It was signed just a few days later.

(continues)

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dBASE is ten times more prevalent than any other PC data base, according to this survey of 175 large organizations. But its star status may not be long-lived. User satisfaction ratings placed *dBASE* at the bottom of the list, while easy-to-use programs like *Q&A* and *Paradox* did best.

Managers' future buying plans may reflect concerns about ease of use as well as uncertainty about *dBASE*'s future. More than 80 percent of the surveyed companies that use *Paradox* said they will continue to buy it, compared to only 52 percent for *dBASE*.

Source: International Data Corporation. From a survey conducted in May 1989 of 175 large organizations, each with at least 50 PCs.

The state of Maryland approved a similar bill, with a stiffer penalty of up to $1000 for each violation. In California, Governor George Deukmejian vetoed a proposed fax bill, but more legislation may be in the works.

Help for Fax Users, Part Two

Junk fax may be common, but so is the proliferation of useful services for fax owners. Intel PCEO, which makes the AboveBoard, the Connection CoProcessor, and several math coprocessors, has made it easy to get product information and technical support by fax.

If you need product information, simply dial the FaxBack Information Service at 503/629-7576, enter your fax number, and request a directory of products. Once you receive it (by fax, of course), you can order product spec sheets simply by calling back and entering the appropriate code numbers on a touch-tone phone.

If you've already bought a product from Intel PCEO (which, incidentally, does not make Intel's microprocessor line), you can get product support by sending a fax to 800/458-6231. The product-support team will respond either by fax or by phone, so be sure to include both numbers.

Help for the Disabled

Howard Silverman describes himself as a computer professional and hobbyist, but he has trouble getting to user group meetings. That's because he uses a motorized wheelchair, and meetings aren't always accessible. Not too long ago, Silverman decided to help others in similar situations by creating a new special interest group (SIG) under the auspices of the New York PC Users' Group. The Disabilities and Computers SIG is like most other SIGs, with one major advantage: The meetings are accessible to people who lack mobility. All you have to do is dial a phone number while the monthly meeting is in session, and you'll be hooked in through a teleconferencing device that allows you to both listen to and talk with other participants.

"As far as I'm concerned, the computer is the great equalizer," says Silverman, who describes the SIG's goal as helping disabled people become more productive using computer technology. For more information, contact Howard Silverman at CompuServe 76702,400, or leave a message on his voice mail at 212/533-NYPC. Users with modems can also tap into a related conference called DISCOM on the NYPC Users' Group BBS at 212/983-4337. Finally, users who want to participate in the SIG's meetings can dial the teleconferencing number, 212/793-4130, but check on the date and time of the meeting first.

Help for Laptop Users and the Visually Impaired

Ken Skier's new word processing software, *Eye Relief*, is especially designed for laptop users and for the millions of Americans who have trouble seeing. Skier says that the idea grew out of the success of a $40 utility, *No-Squint Laptop Cursor*, which was created for laptop users but then enthusiastically adopted by visually impaired people who work on PCs.

Eye Relief is a full-fledged word processing program that allows users to make text up to five times bigger than normal and to control the amount of space between lines and letters. The text in menus, dialog boxes, *(continues)*

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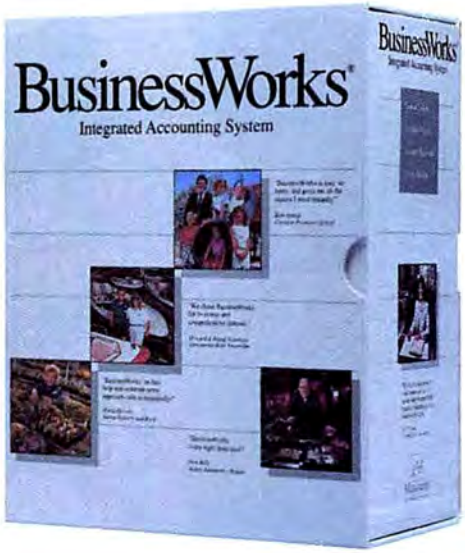

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and on-screen messages is large, and fonts have been engineered for readability. Text files can be printed in normal-size type or, if you have a laser printer, in enlarged type.

Like most other midrange word processors, *Eye Relief* offers basic word processing functions but lacks fancy formatting features such as footnoting, an outliner, and the ability to embed graphics. According to the vendor, *Eye Relief* will work on a single-floppy PC but requires CGA, EGA, or VGA graphics and 512K of RAM. A free demo disk is available; contact SkiSoft Publishing Corp., 1644 Massachusetts Ave. #79, Lexington, MA 02173; 800/456-8465, 617/863-1876.

SHOP TALK

Separated at Birth?

I am an architect and computer hobbyist living in Sweden. I use *AutoCAD* at the office, and I have also tested *Dynaperspective, ModelMate,* and *Generic CADD 3D.* But I had an unpleasant surprise: *ModelMate* and *Generic CADD* seem to be the same program. I feel that it is the company's duty to inform the buyer about this relationship, especially since *Generic CADD* costs $300. I wrote to Generic Software asking for my money back, but I received no answer.

Traian Mushetesco
Uppsala, Sweden

Editor's note: Consumer Watch *contacted Generic Software and confirmed that* Generic CADD *and* ModelMate *are indeed based on the same core;* Generic CADD *has extra functions. A representative for Generic Software promised that Mr. Mushetesco would get his money back upon returning the software.*

Left High and Dry

Two years ago I purchased a 20MB hard disk and hard disk management software from MegaMedia Software Company in Clearwater, Florida. The software has performed flawlessly in optimizing the disk and enhancing storage. Now the problem: The software has a copy-protection scheme. During the installation process, it was necessary to call MegaMedia and obtain eight code letters in order to proceed. *(continues)*

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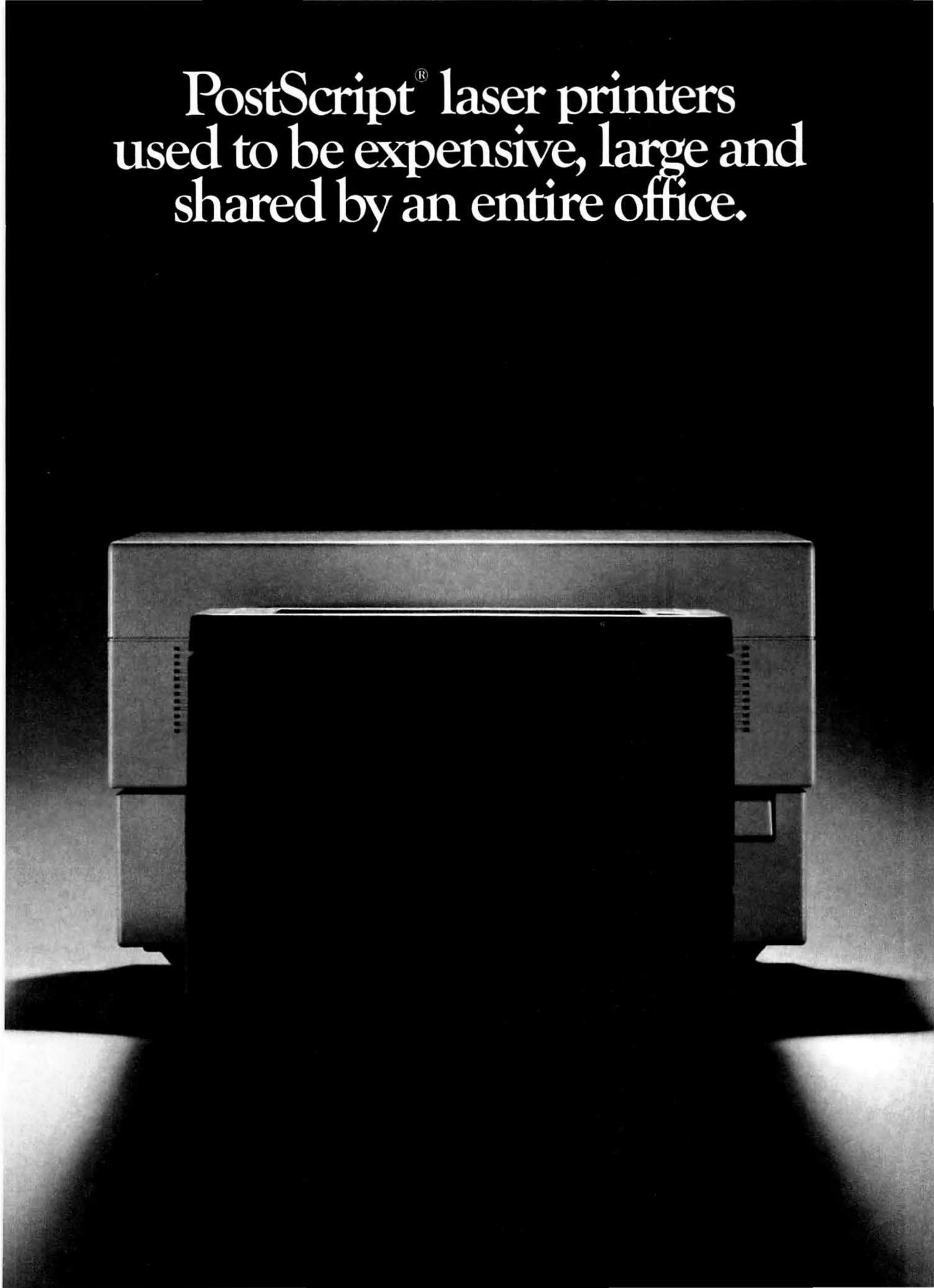
PostScript® laser printers used to be expensive, large and shared by an entire office.



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The protection scheme is random, so each time you reinstall the software on a new hard disk, you need new code letters.

When I installed the software, I asked MegaMedia what would happen if they went out of business. They stated that they didn't plan on going out of business any time soon, but if it happened, they would send a hard copy of all the code sequences to all registered customers.

Well, now I have a new system, and when I tried to call the company, I found that all the phone numbers had been disconnected. I would appreciate your help in tracking down someone who can provide the codes.

H. D. Taunton
Las Vegas, Nevada

Editor's note: Consumer Watch *managed to find one of the former owners, but without any helpful results. The owner said the codes weren't available and referred us to a former MegaMedia employee who was thought to have a copy of the software used to generate the codes. So far, we have been unable to reach him.*

For years, PC World *has agitated against copy protection, and we feel that this type of situation proves us right. But users also have to take a stand by refusing to buy copy-protected software.*

Amstrad Parts in Transit

After my Amstrad color monitor stopped working, I took the computer to an Amstrad service center in Minnesota. I was informed a few days later that a board had been replaced and that the monitor was operating properly. But after I drove 2½ hours to pick up the computer, the display failed to work right.

Over the next three months, parts of my PC were floating around the local service center and somewhere in Texas as well. Since I purchased the computer, I have been without it for a total of six months.

Kenneth N. Land
Red Wing, Minnesota

Amstrad responds: Amstrad authorizes independent dealers and service centers to sell and service our products, and we feel it is important for them to represent Amstrad in a positive way. *(continues)*

Circle 217 on reader service card

Circle 304 on reader service card

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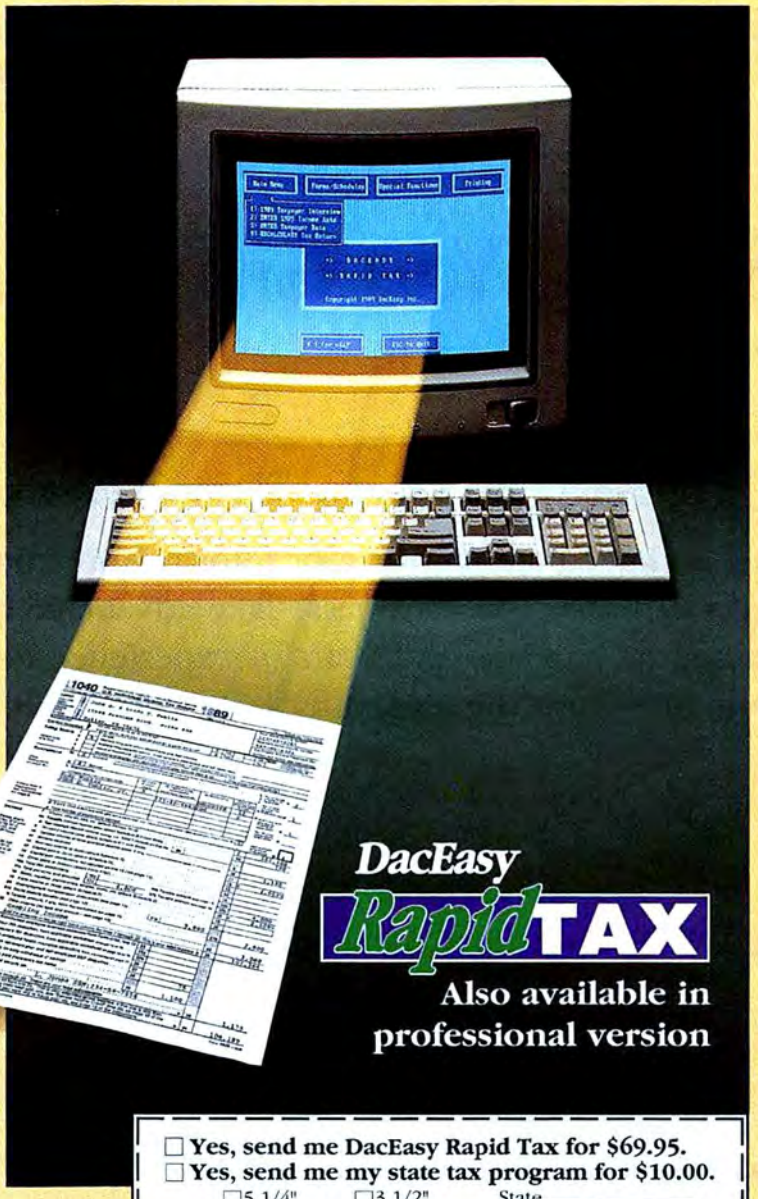

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Paul Mace
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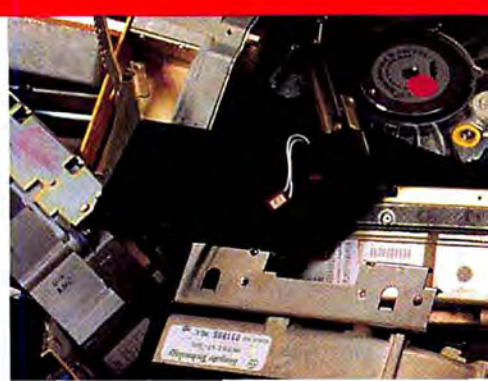
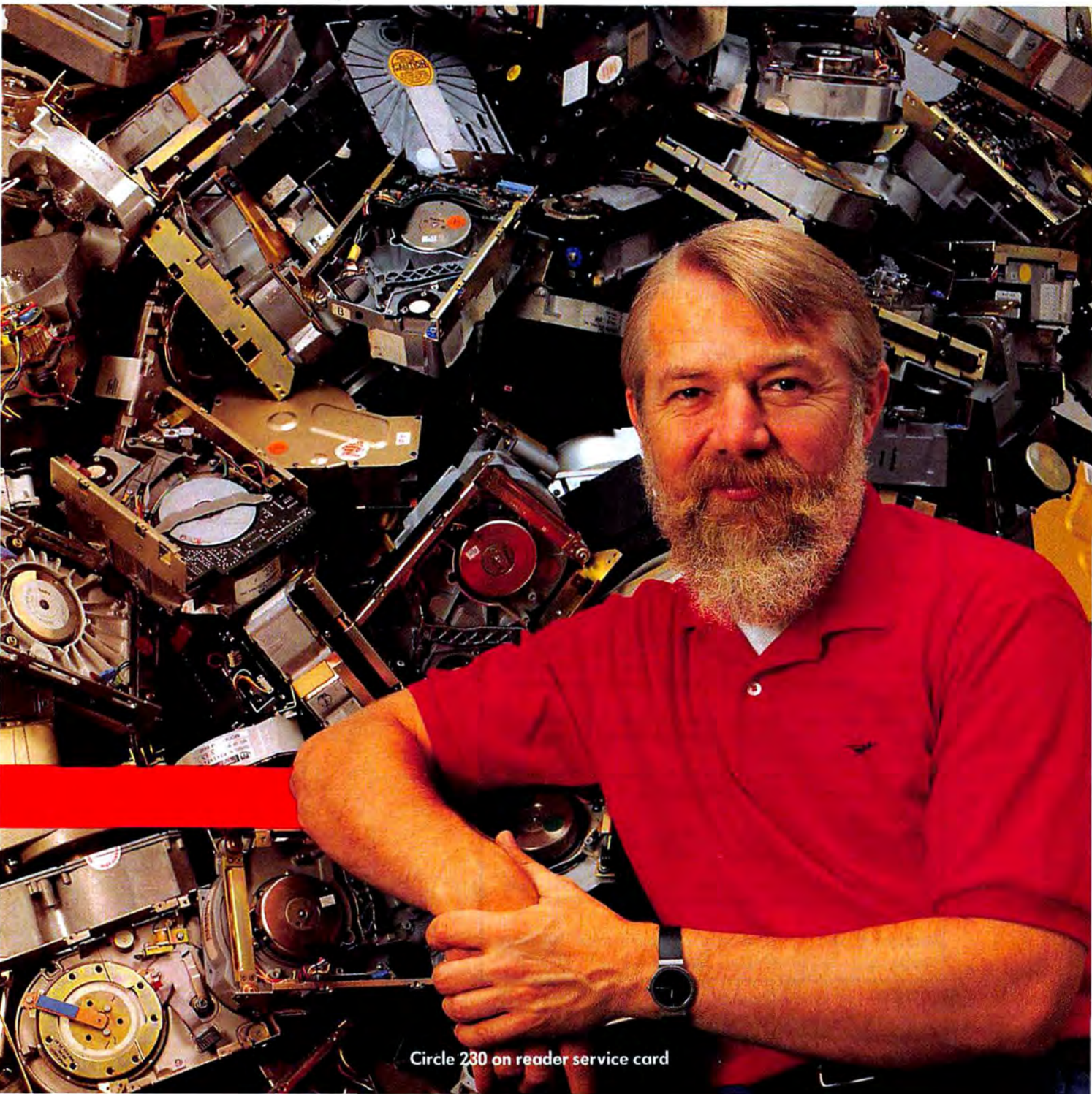


in This Picture?

- ☐ Year-end divisional sales spreadsheets?
- ☐ Inventory records?
- ☐ Annual marketing budgets?
- ☐ The man who wrote the book on data recovery!



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Circle 31 on reader service card

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Max R. Friz
Technical Services Manager

Take action! If you've got a complaint or a compliment, send it to Consumer Watch. *We'll follow up and publish letters with the broadest interest. For more information, see How to Contact PC World, page 4.* ●

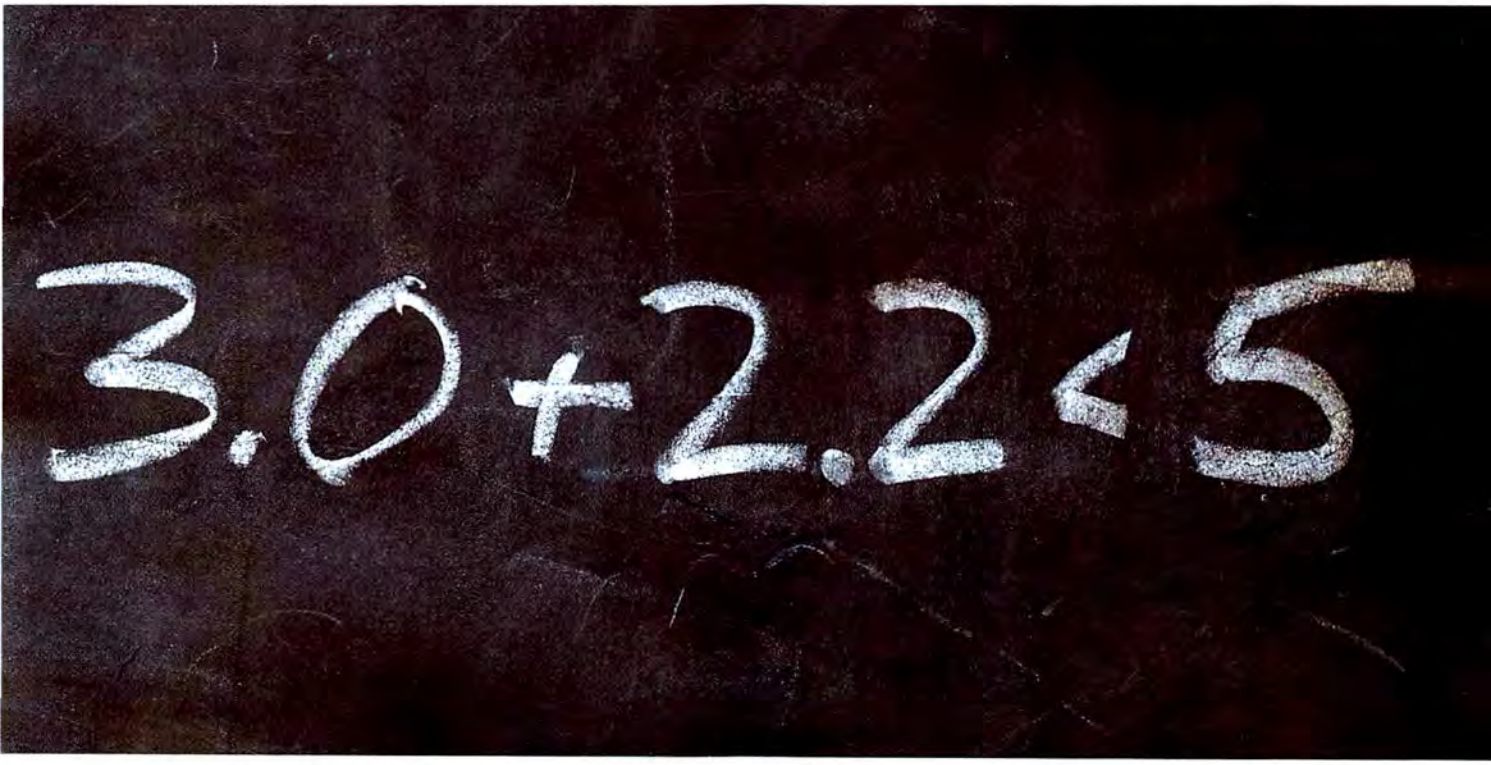
POWER TIP NO. 83

More Conventional Memory in Windows

If you are running a *Windows* application that wants more conventional memory than you can give it, try loading *Windows* with the /N parameter, as in WIN /N for *Windows/286* and WIN386 /N for *Windows/386*. This disables *Windows'* use of expanded memory, freeing the conventional memory that would be required to support expanded memory. *Windows* applications that use expanded memory themselves, such as *Excel* and *Adobe Illustrator*, will still have access to it. The ability to run multiple applications above 640K, however, will be lost.

Robert Luhn
Senior Editor

For More And More Users, The Latest From Lotus Doesn't Add Up.



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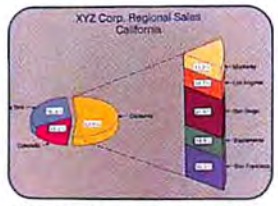

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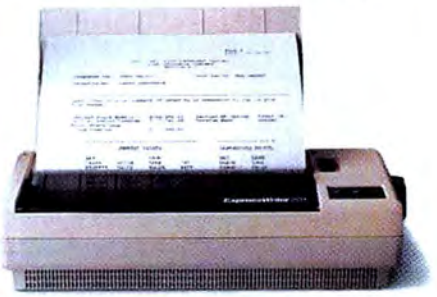

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STAR-DOT-STAR *.*

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Reverse dBASE names with a single command, patch underline searches in Turbo Pascal's editor, repeat DOS commands with different parameters, spell-check WordStar documents, back up by date, set WordPerfect's default drive, and tame wild C listings.

Edited by Tom Swan

Revisiting Reverse

In "dBASE Name Games" [*Star-Dot-Star*, September 1989], the 23-line REVERSE.PRG reverses names stored in last-name-first order. I use an easier single-command method [see **FIGURE 1**] to accomplish the same task directly from the *dBASE* dot prompt. The command assumes there is a comma and one space between the last and first names. If there is no space, change +2 to +1.

Marc W. Lowenthal
New York, New York

Editor's note: I modified Mr. Lowenthal's command by adding a FOR clause at the end. With that addition, the command will skip names that have the first name first, and you can execute the command on a data base repeatedly without affecting previously processed names. Although you can type the command directly from the dot prompt, it's easier if you store the text in a file named REV2-.PRG, which allows you to run it by typing DO REV2. If you issue the complete command from the dot prompt, enter it all on one line. In a PRG file, you can break the command into multiple lines as long as all but the last line end with a semicolon.

In Search of Underlines

In search-and-replace operations, *Turbo Pascal*'s editor considers the underline to be a word separator, like the space, rather than a character. Therefore, if you have variables or other identifiers named, for example, Test and Test_1, you cannot globally change the first without changing the second. Programmers usually would prefer not to change the identifier with the underline.

To make the editor recognize Test_1 as a whole word, run PATCHER.PAS [see **LISTING 1**]. The program changes a byte in a special 256-byte ASCII table that classifies characters for search operations according to this scheme:

08 punctuation
09 controls and extended ASCII
10–16 lowercase alpha
30–36 uppercase alpha
47 digits
88 space

As far as I can tell, the range of values for uppercase and lowercase letters allows Soundex searching (by sound) as well as normal operation. I don't know if it's possible to enable this search mode, however.

Kim Kokkonen
Scotts Valley, California

Editor's note: PATCHER works only on Turbo Pascal *version 5.5 and requires the TURBO.EXE file to be in the current directory. For safety's sake, keep an unmodified backup copy of that file. Type the program into the (continues)*

```
replace all name with ;
trim(substr(name,at(",",name)+2,len(name)))+;
" "+left(name,at(",",name)-1) for ","$name
```

FIGURE 1: This command reverses names in a dBASE data file.

ANTHONY RUSSO

```
program patcher;
const errorMessage =
 'Wrong ver. or already done';
var f : file;
    w : word;
begin {patcher}
 assign( f, 'TURBO.EXE' );
 reset( f, 1 );
 seek( f, $20A22 );
 blockread( f, w, 2 );
 if w = $0808 then begin
  w := $0847;
  seek( f, $20A22 );
  blockwrite( f, w, 2 );
writeln('TURBO.EXE modified');
  end else
  writeln( errorMessage );
 close( f );
 if ioResult <> 0
 then writeln( errorMessage );
end. {Patcher}
```

LISTING 1: PATCHER.PAS patches Turbo Pascal 5.5, making underlines significant characters for search-and-replace operations.

editor, and run it by selecting Run from the Run menu or pressing <Ctrl>-<F9>. When the program is finished, quit to DOS. The next time you run the compiler, it won't consider an underline to be a word separator in search-and-replace operations.

Keystroke Recycler

Do you waste time typing the same DOS command over and over with different parameters? If so, REPEAT.BAT [see **LISTING 2**] can speed your work by repeating DOS commands with a different parameter at each repetition.

To use the batch file, type REPEAT followed by a command and a list of parameters. For example, enter REPEAT DIR *.EXE *.COM for a directory listing of EXE and then of COM files.

REPEAT starts by storing a command in a temporary environment variable called CMD. The looping portion of the batch file first echoes the command, then issues it with the second parameter. The SHIFT command moves each parameter up one position, so that %3 becomes %2 for the next loop. The batch file terminates when it runs out of parameters. If you enter REPEAT with no parameters, the batch file displays brief instructions.

Arik Baratz
Hadera, Israel

Editor's note: I keep finding new uses for this keystroke repeater. For example, to copy all PAS, INC, and TXT files from drive A: to my hard drive, I type from the destination directory REPEAT COPY A:.PAS A:*.INC A:*.TXT. Or, to delete BAK and OLD files from the current directory, I type REPEAT DEL *.BAK *.OLD. Handy!*

Take It From the Top

WordStar's spelling checker (found in versions 4.0 and later) looks for misspelled words from the cursor position to the end of a document. But if you forget to go to the top of the file before starting a spell check, you'll skip any misspelled words above the cursor. I fixed the problem with a macro. Now, when I press <Esc>C, the macro automatically positions the cursor at the first character in the document and then checks spelling from top to bottom.

While designing this and other macros, I've also discovered a helpful trick for editing macro text in version 4.0. In the macro editor or at any other prompt, press <Ctrl>-R, and *WordStar* will display the latest response to that prompt. You can then adjust macro descriptions, definitions, and other settings with the usual *WordStar* editing commands. Versions 5.0 and later don't have this feature because the latest response comes up automatically.

Peter G. Higbee
Franconia, New Hampshire

Editor's note: Creating the macro is a straightforward process: Press **<Esc>?** *to enter the macro editor and a letter to identify the macro. Enter a macro description, such as 'Check Spelling', and press* **<Enter>**. *In the definition box, type, without spaces,* **<Ctrl>-P<Ctrl>-QR<Ctrl>-P<Ctrl>-QL**. *The result on screen will be ^QR^QL. Press* **<Enter><Enter>** **Y** *to exit and save the macro.*

```
echo off
if "%1"=="" goto instruct
if "%2"=="" goto instruct
set cmd=%1
:docmd
echo %cmd% %2
%cmd% %2
shift
if not "%2" == "" goto docmd
goto end
:instruct
echo Error: Missing parameters
echo Use:
echo REPEAT cmd param [param...]
:End
set cmd=
```

LISTING 2: REPEAT.BAT repeats a DOS command with different parameters.

Back-Dated Backups

Having accidentally erased several updated files, I devised a DOS 3.3 batch-file system that copies onto floppies selected files

(continues)

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Circle 133 on reader service card

DEVELOPER'S TOOLBOX

I Can C Clearly Now

If you've ever tried to decipher an uncommented C listing, you know why C is known as a "write-only" language. Because of its cryptic look and feel, C code often seems about as readable as Byron to a beagle.

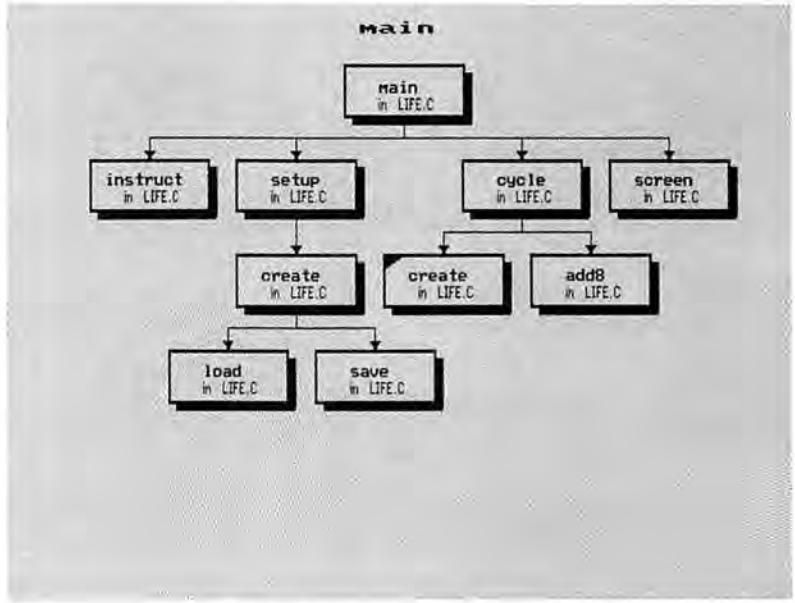
But I'm finally getting a collar around that problem with *Clear+ for C*. This talented program from Clear Software brings undisciplined C listings into line with easy-to-read flowcharts, diagrams, and cross-references—just what I need to help me document my growing kennel of pet C programs. The product supports *Microsoft C*, *QuickC*, and *Turbo C*, but a Generic option should also work with most other C compilers. A similar product is available for *dBASE* programmers.

Unlike other source-code organizers, *Clear+* creates true graphics output—so for best results, you'll need a graphics monitor and printer. The printed output is perfectly readable even on my faithful, if somewhat aged, Epson FX-1050. If your system can't display graphics, you can still print them on most dot matrix printers or on an HP LaserJet. *Clear+* handles large graphs by printing multiple pages keyed by letter, as with hardware schematics, so you can match up partner pages. (Two minor gripes: The program insists on printing blank pages of a multipage set, and under *PolyShell*, unless *Clear+*'s directory is in a PATH command, the program must be started from a batch file. Clear Software promises to fix these small blemishes in a future release, as well as to add a printout previewer.)

Clear+ is also a knockout tool for debugging and prototyping. While developing code, I can display a tree graph of the program's modules showing multiple-file relationships, which allows me to track the code's layout visually as it grows. When I finish a module, I then create flowcharts to double-check the program's logic. *Clear+* prints line numbers inside flowchart symbols, making it easy to match program structure with associated C statements. A handy trace command lets me scoot from node to node to examine the far reaches of large flowcharts.

If a flowchart grows too unwieldy, *Clear+*'s reduction algorithms can limit a graph to function calls and logic statements, showing a more concise view of the code flow. Other options compress and rotate graph symbols to pack additional information on screen and reduce printing time.

Clear+ can also print, as text rather than graphics, detailed source-code listings and function prototype lists, plus cross-references, which document how many times a routine is called and from where—a feature that is useful for spotting uncalled deadwood functions as well. It can also print selected functions rather than an entire file.



A Clear+ tree chart shows relationships among multiple C source-code files.

Using *Clear+* is like having a faithful companion at my side. Despite its pedigree price, *Clear+* clearly stands out among source-code utilities as a C programmer's best friend.

I welcome your comments. My MCI Mail handle is TSWAN; my CompuServe ID is 73627,3241. —*Tom Swan*

WHERE TO BUY

Clear+ for C,
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TECHNICAL SUPPORT: unlimited free support, toll number, M–F 9–6
OTHER SUPPORT: none
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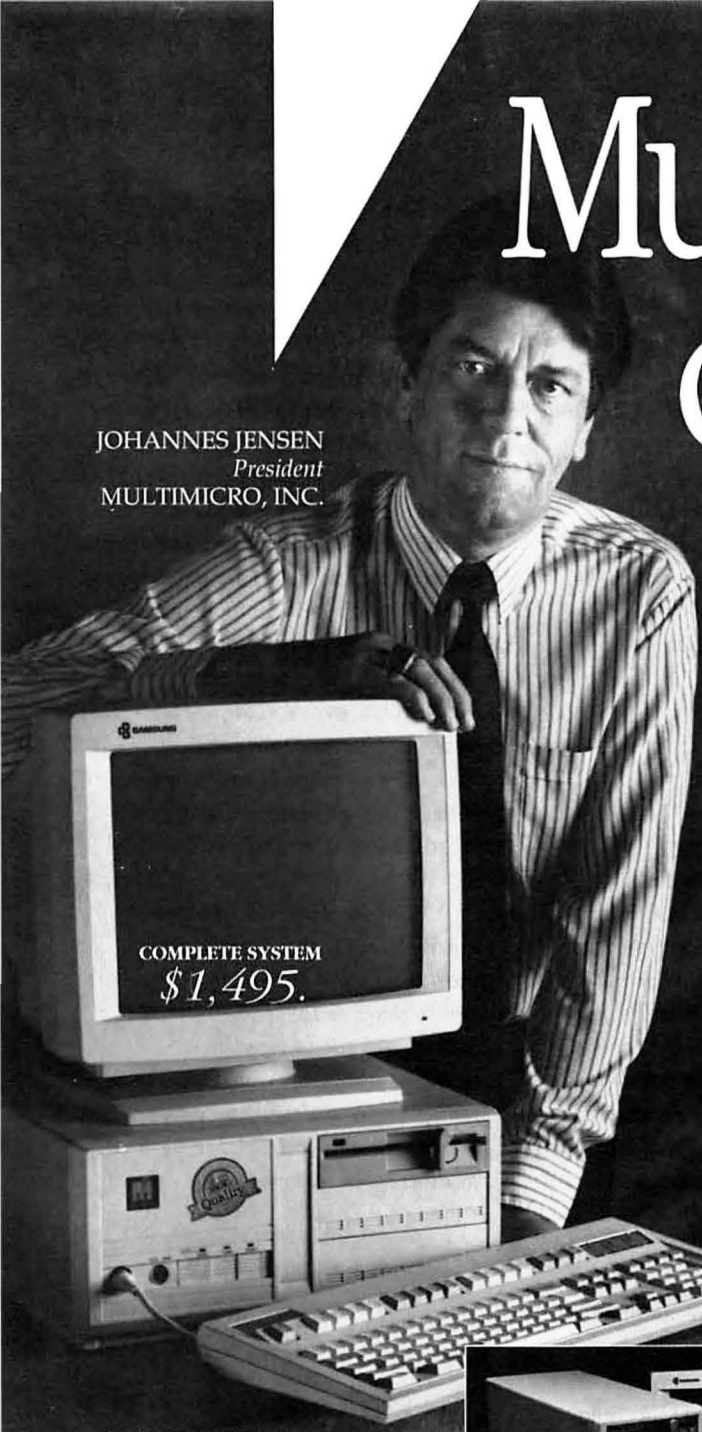
Multiple choice.



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with dates later than that of the most recent backup.

Before using the batch files, create a file named BACKDATE.BAT by entering **ECHO. | MORE | DATE> \BACKDATE.BAT.** That inserts a string similar to 'Current date is Sat 9-16-1989' into the file. When that string is executed as if it were a DOS command, it calls CURRENT.BAT [see **LISTING 3**], passing the date to it as a parameter. CURRENT.BAT uses the date in the /D option for one or more XCOPY commands.

Terry M. Tom
Monterey Park, California

```
xcopy \*.* a:\ /d:%4
xcopy \word\*.* a:\word /d:%4
xcopy \123\*.* a:\123 /d:%4 /s
```

LISTING 3: Replace the directory names in this CURRENT.BAT sample with your own directories to back them up.

Editor's note: Although several excellent commercial backup programs are available—for example, my favorite, Fifth Generation's FastBack*—Mr. Tom's clever batch-file technique solved a sticky problem they couldn't. Because* FastBack *resets the archive bit of a backed-up file name, I couldn't, until trying the method described here, make a second fail-safe copy of the same files without copying them manually—a tedious job at best.*

*When creating CURRENT.BAT, use the names of the directories you want to back up in place of the sample names printed here. If you wish, you can back up all your directories with one XCOPY command: XCOPY *.* A:\ /S /D /%4.*

Execute BACKUP.BAT [see **LISTING 4***] to perform a backup.*

```
echo off
echo Insert fresh backup disk into drive A:
pause
call backdate.bat
echo | more | date > backdate.bat
```

LISTING 4: BACKUP.BAT starts backing up your recent files onto freshly formatted disks.

Be sure to use a freshly formatted floppy. Note: XCOPY doesn't prompt you for additional disks; you won't be able to back up more than a single floppy's worth at a time.

No-Fault Driving in WordPerfect

Our medical library prohibits unauthorized storage of files on our hard drive to conserve dwindling space. Patrons are supposed to store their *WordPerfect* files on floppies in A:, but, needless to say, this rule is not always followed. Because we regularly erase unwanted files from our hard drive to save room, we sometimes erase patrons' files accidentally.

I found a way to fix the problem with a macro that automatically switches the default drive to A:. Now when patrons run *WordPerfect*, they are more likely to save their work where it's secure.

Douglas F. Hasty
Winston-Salem, North Carolina

Editor's note: To create the macro, start WordPerfect 5.0. *Press* **<Ctrl>-<F10>** *to turn on the macro recorder. Type* **Dir** *for the macro name, and press* **<Enter>**; *type* **Change Default Drive** *for the macro description, and press* **<Enter>** *again. You should see a flashing 'Macro Def' at the bottom left corner of your display.*

Next, press **<F5> = A: <Enter> <Enter>** *to begin recording the macro's keystrokes. This displays the List Files screen. To leave that screen and record your exit in the macro, press* **<F1>**. *Next, press* **<Ctrl>-<F10>** *again to end macro recording. Finally, create the batch file in* **LISTING 5,** *which assumes that* WordPerfect *is stored in C:\WP50.*

When you start WordPerfect *via WPA.BAT, the /M command runs the Dir macro, which changes the default drive. If the batch file is run when drive A: is empty,* WordPerfect *will produce an error message. When you quit to DOS, the default drive is restored to C:.*

```
echo off
c:
cd \wp50
wp /m-dir
c:
cd \
```

LISTING 5: WPA.BAT starts WordPerfect and runs a macro to change the default drive to A:.

Tom Swan is the author of Mastering Turbo Pascal 5.5 *(Howard W. Sams and Co., Indianapolis, Indiana, 1989).*

Share your tips and discoveries with PC World *readers; see How to Contact PC World, page 4.* ●

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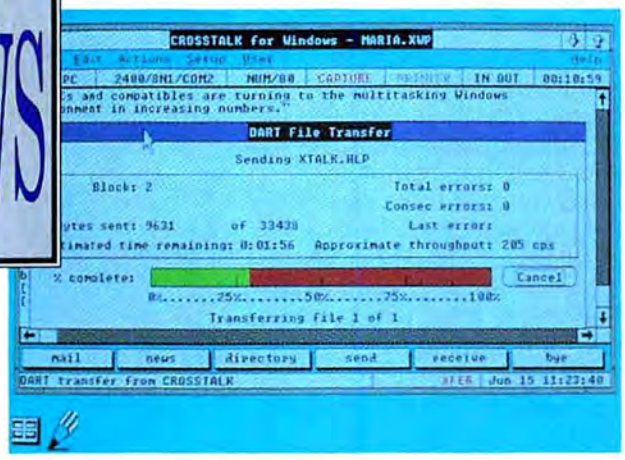

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Compaq introd

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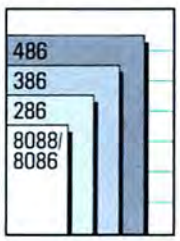

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The Intel 25-MHz 486 microprocessor is the heart of the system. Its breakthrough design integrates the processor with a numeric coprocessor (to speed number crunching) and an 8-Kbyte cache (to reduce wait states).

To boost performance further, Compaq added a second-level cache memory controller with 128 Kbytes of high-speed static RAM. Combined with interleaved memory architecture, it lets your data fly between the microprocessor and memory.

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The COMPAQ DESKPRO 486/25 is open for customization. Four megabytes of memory are standard, so you can run applications under MS OS/2 Version 1.2, MS-DOS or UNIX operating systems. If you need more, you can expand memory up to 100 megabytes using a separate high-speed 32-bit memory slot. That leaves up to seven EISA slots free for your choice of expansion boards.

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For one.

drives (the 650- and 320-MB models have fast 1:1 interleave and ESDI controllers).

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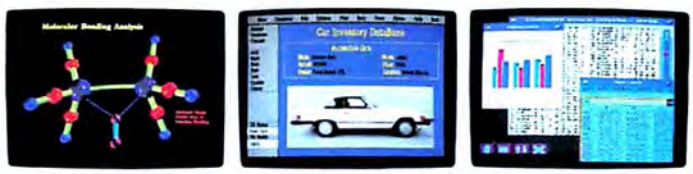
Compaq didn't stop there. Accelerated VGA graphics are built in, giving you a crisp, colorful display and freeing an expansion slot.



You can run the most complex CAD/CAM/CAE, scientific and business applications faster than ever before.

The system even has a socket for an optional Weitek 4167 coprocessor to blaze through calculations.

The COMPAQ DESKPRO 486/25. It's sure to bring a little thunder to your office.

Now for the

In September 1986, Compaq introduced a personal computer that changed people's ideas about what a PC could do.

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Once again, Compaq has expanded the role of the PC—to meet the most demanding needs of both single and multiple users. And once again, Compaq has pushed out the envelope of technology to deliver new levels of performance and expandability, without sacrificing compatibility.

sonic boom.

These new computers were designed from a simple observation: People use computers differently. One user using a PC has different needs than a group working together on a network or multiuser system.

The COMPAQ DESKPRO 486/25 is for the individual whose job depends on a PC. It was designed from the ground up to unleash the power of the evolutionary new Intel 25-MHz 486 microprocessor.

The COMPAQ SYSTEMPRO delivers an unprecedented combination of system performance and expandability to networks and multiuser systems. Its breakthrough design gives users the flexibility to work with both 33-MHz 386 and future 33-MHz 486 technology. It also provides the unmatched capability to work with multiple processors.

Inside both you'll find advances like cache memory designs that boost processor performance. Extended Industry Standard Architecture *(Extended ISA* or *EISA)* that accelerates input/output performance while maintaining compatibility. New drive and controller technology that increases fixed disk performance and reliability. And that's just the beginning of this story.

that will have busi
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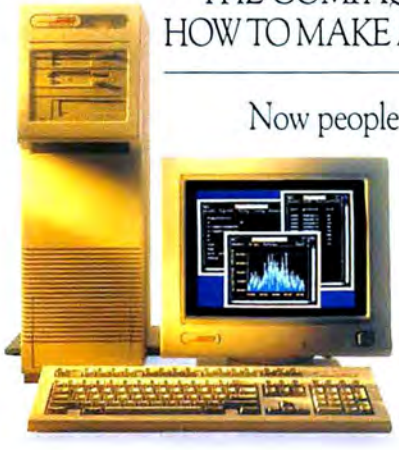

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ness booming.

Inside, you'll find a series of technological breakthroughs.

The first is a flexible system processor design that lets you work with both 33-MHz 386 and future 33-MHz 486 technology.

Initial models offer a 386/33 system processor that employs a 386 microprocessor optimized with a 64-Kbyte cache memory design and a socket for optional coprocessors. This drives software more than twice as fast as the IBM PS/2 Model 80, and surpasses most minicomputers.

Computing potential can be increased up to four times by adding a second system processor. You can use two 386 processors now. Or work with a 386 and a 486, or two 486 processors in the future. So your investment is protected.

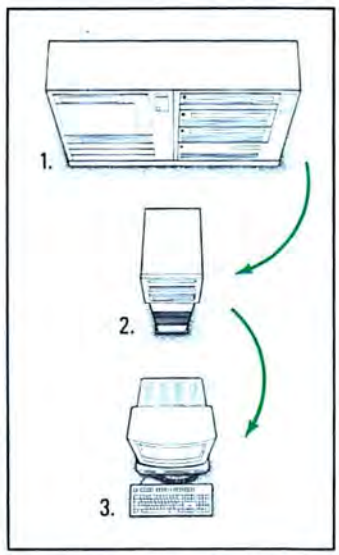
The multiple system processors are integrated into COMPAQ Flex/MP Architecture, which combines a separate processor/memory bus with the EISA I/O bus.

EISA delivers the fastest I/O performance, which is critical for data sharing.

You can add up to six 32-bit network interface controllers for maximum server throughput. And you're ensured compatibility with 8-, 16- and 32-bit boards.

Users gain nearly instant access to fixed disk data with innovative drive array technology that transfers data up to four times faster than nonarrayed drives. It also supports the most comprehensive range of data protection features.

The COMPAQ LAN MANAGER 386/486 optimizes the COMPAQ SYSTEMPRO for use in OS/2-based networks.



The COMPAQ SYSTEMPRO is a powerful network server and mainframe gateway, giving users the fastest access to departmental and mainframe data.

As you add more users and more complex applications, the COMPAQ SYSTEMPRO grows right along with you. It's the first PC to actually increase in performance when you add options like system processors or drive arrays.

It grows in other ways that are simply amazing. You can expand the 4 megabytes of standard RAM to 256 megabytes, use up to 11 expansion boards, work with 11 storage options and store up to 4.28 gigabytes of data.

You're also free to work in your choice of network and multiuser operating system. This includes Novell NetWare 386, SCO UNIX System V/386, new COMPAQ LAN MANAGER 386/486 and others.

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NETWORK Q&A

Tips and strategies for departmental networking

Why buy fax machines or single-user boards when a fax gateway can handle your LAN users' needs?

David Ferris

Q. *Our 29-person department uses one very overtaxed fax machine. We were thinking of buying some single-user fax boards to reduce the load, but since we're on a LAN, would it be wiser to buy a fax gateway that everyone can share?*

Dwayne Mikulski
New York City

A. Chances are you should go with a fax gateway. It's more convenient and often cheaper than sprinkling fax machines and boards around the office (see "Fax Boards for Fast Times" in this issue for a review of single-user fax boards).

Fax gateways (also known as fax servers) are fax boards combined with special software that all network users share. The board is placed on a networked PC that also houses a LAN adapter. The software queues outgoing faxes and routes incoming faxes.

On each PC, users run standalone or RAM-resident fax messaging software provided by the gateway vendor. In some cases, they can (or must) use LAN E-mail software. For outgoing faxes, users specify a disk file and a phone number, or redirect print output using a TSR. The file is converted to fax and transferred to the fax gateway's send queue, which operates much like a print queue. Each fax waits its turn or until a specified time and is then sent over the phone lines.

Some gateways also support scanners so you can scan paper documents into fax files.

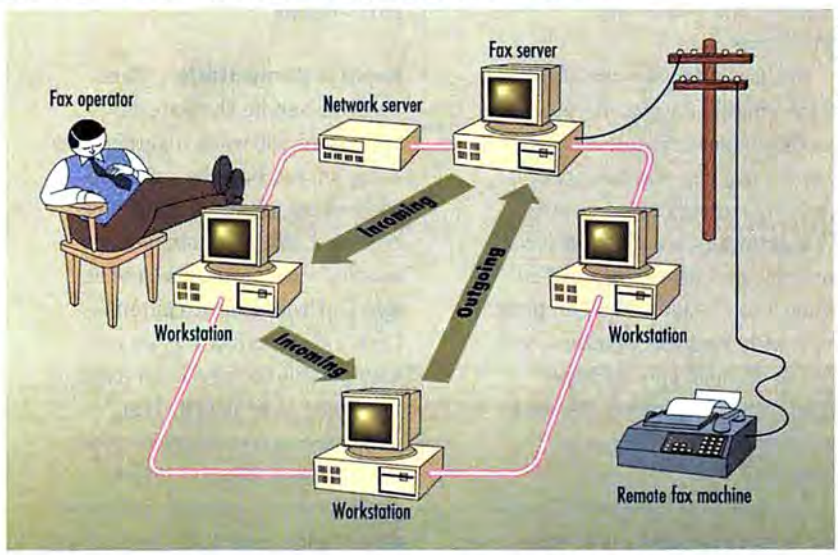
An incoming fax is either printed out automatically or passed to a queue. And here's the bottleneck: With most gateways, a fax operator (often the LAN administrator) must view the cover page to determine the recipient before routing the fax (see **FIGURE 1**).

You should probably dedicate one PC to fax duties to avoid the possibility of deleting an incoming fax by accidentally rebooting the PC. If necessary, though, you can use the PC for other tasks or place the fax gateway on your file server. If the fax board contains its own coprocessor (and most do), an XT will do fine

(continues)

ANTHONY RUSSO

Fax Gateway Routing Still a Problem



MATTHEW NIELSEN

FIGURE 1: Fax gateways let any LAN user send a fax with strict confidentiality. However, with most gateways, an operator must view the cover page of incoming faxes in order to route them to their recipients.

as a gateway machine. Whatever you use needs plenty of storage —each fax page consumes between 30K and 60K of disk space. Some gateways store faxes on the file server; others use the gateway PC.

Gateways Versus Fax Machines and Boards

In choosing a fax technology, examine cost relative to the number of users. Fax gateways typically cost $4000 (about $2000 for the gateway board and software plus the cost of the gateway PC and network adapter). Compare this to $500 to $1000 for a single-user fax board and $500 to $4000 for a fax machine. If only a few users need fax, it's cheaper to buy a few single-user boards or fax machines, but if you have five to ten frequent users, a fax gateway should pay off.

Fax machines are usually easier to use and install than PC-based fax. Because they have a scanner and printer built in, they're especially suitable for offices that fax a lot of paper. To scan paper documents into PC fax, you need to buy a $1000 scanner and master its intricacies.

But fax gateways beat fax machines in other ways. If you're sending faxes created on a PC, you bypass the scanning process, thus improving output quality. Fax gateways are also more convenient, and users are notified when a fax is sent. You can print on a wide range of printers, and you don't need special paper. Also, you can upgrade the gateway simply by adding new software.

It's true that compared to single-user fax boards, gateways are slow. Transfer speed is comparable, but if traffic is heavy, faxes often must wait in line before being sent. And with most fax gateways, you have to wait until an operator routes incoming faxes.

Still, fax gateways have the edge. Buying a gateway is usually cheaper than buying a board for every user, and you can send and receive faxes 24 hours a day, even when networked PCs are turned off. Also, you don't use up an expansion slot in each PC, and with central storage, you can save the PCs from drowning in fax files.

Fax Gateway Buying Guide

When evaluating fax gateways such as Alcom's EasyGate LAN-Fax, GammaLink's GammaNet, OAZ's NetFax Manager, and Interpreter's Facsimile Server, you'll consider many of the same criteria that you'd weigh when buying a single-user board. You'll judge features such as file compatibility, screen capture options, messaging, and performance. However, you'll also examine capabilities such as mail routing and notification. Here are some things to consider before you buy.

Keep It Compatible Most vendors bundle the gateway board and software together, but some let you buy the software separately. Most gateways use high-end, 9600-bps single-user boards, such as Intel's Connection CoProcessor or GammaLink's GammaFax CP, so you may be able to recycle an existing single-user board. If so, make sure it's compatible with the gateway software. Also, check that the gateway software works with your LAN operating system.

Incoming Fax Distribution Most fax gateways require an operator to route incoming faxes. However, OAZ's gateway routes faxes automatically, as long as they're sent by another OAZ. Interpreter promises that by early 1990, its Facsimile Server will be able to route faxes automatically from any source.

Notification Gateways vary in their capability to inform users of a fax's progress. Some let users view the queue and delete an outgoing fax. Most notify users when a fax is sent, and some return the fax if it can't be delivered.

Integration With LAN E-Mail If you have a LAN E-mail program, you can probably use it for fax as well. (In the case of Alcom's gateway, no user software is provided, so you *must* use LAN E-mail.) E-mail packages such as *cc:Mail*, *Higgins*, and *The Network Courier* let you send faxes—but only via a specific third-party gateway sold by the E-mail vendor. Some gateways work only with LAN E-mail packages that use the MHS (Message Handling Service) standard common on *NetWare* LANs. Over the next two years, expect fax gateways and LAN E-mail packages to support the X.400 communications standard.

Although using a LAN E-mail program as a front end is more convenient than learning and using two programs, there's often a trade-off in functionality. For example, some E-mail fax interfaces won't let you receive faxes, and some can't convert graphics. Some lack notification or scheduled transmission op-

(continues)

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tions. You're often better off using the fax vendor's software.

Fax/Modem Capability
Some fax gateways, such as Alcom's EasyGate LANFax, provide a modem gateway option so LAN users can send binary files via services such as MCI Mail. Some fax board manufacturers provide Hayes-compatible piggyback modems as options. With other boards, you have to buy a third-party modem.

Expandability Gateways such as GammaNet let you add multiple fax boards to the gateway PC to provide simultaneous transmissions via multiple lines. The software automatically routes faxes to the next available board, thus improving performance.

Fax Gateway Sans PC
Castelle sells a unique gateway called the FaxPress—a standalone unit measuring only 11 by 11 by 3 inches that doesn't require a PC. You simply cable it up to your LAN, and it stores faxes on your file server. With its megabytes of internal RAM, it's quite fast, and given that you don't need to buy a gateway PC, the $4000 price is competitive.

Because fax gateways are so new, they have a lot of rough edges. But despite some flaws, they're an investment that can pay off quickly.

WHERE TO BUY

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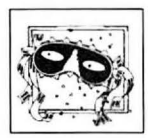
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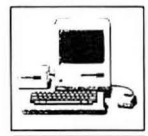
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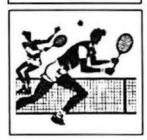
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David Ferris is the president of Ferris Networks, a San Francisco–based PC dealer specializing in networks.

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POWER TIP NO. 84

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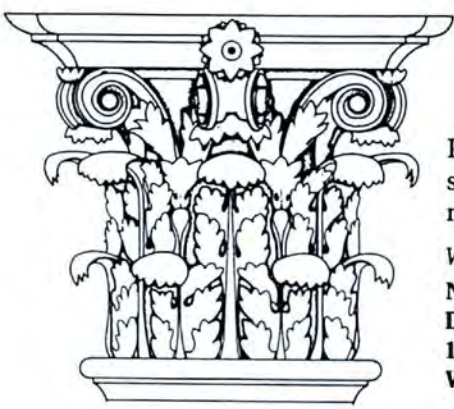

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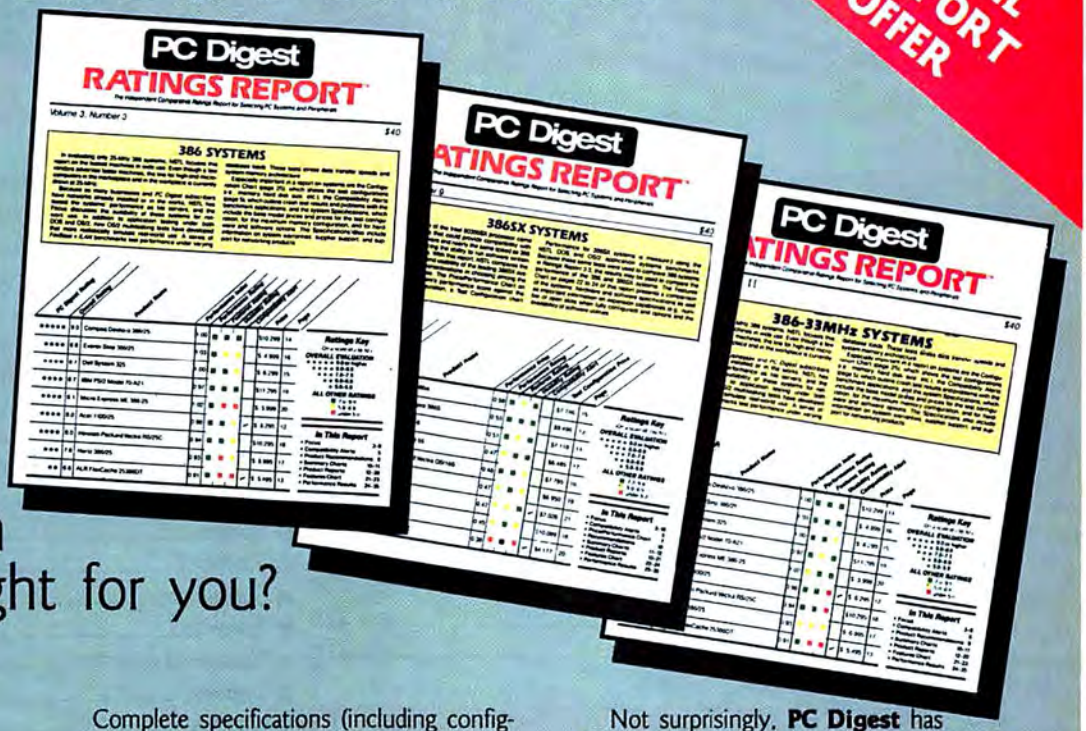

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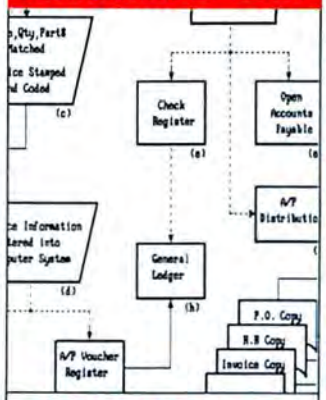

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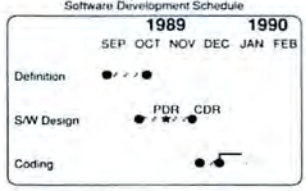

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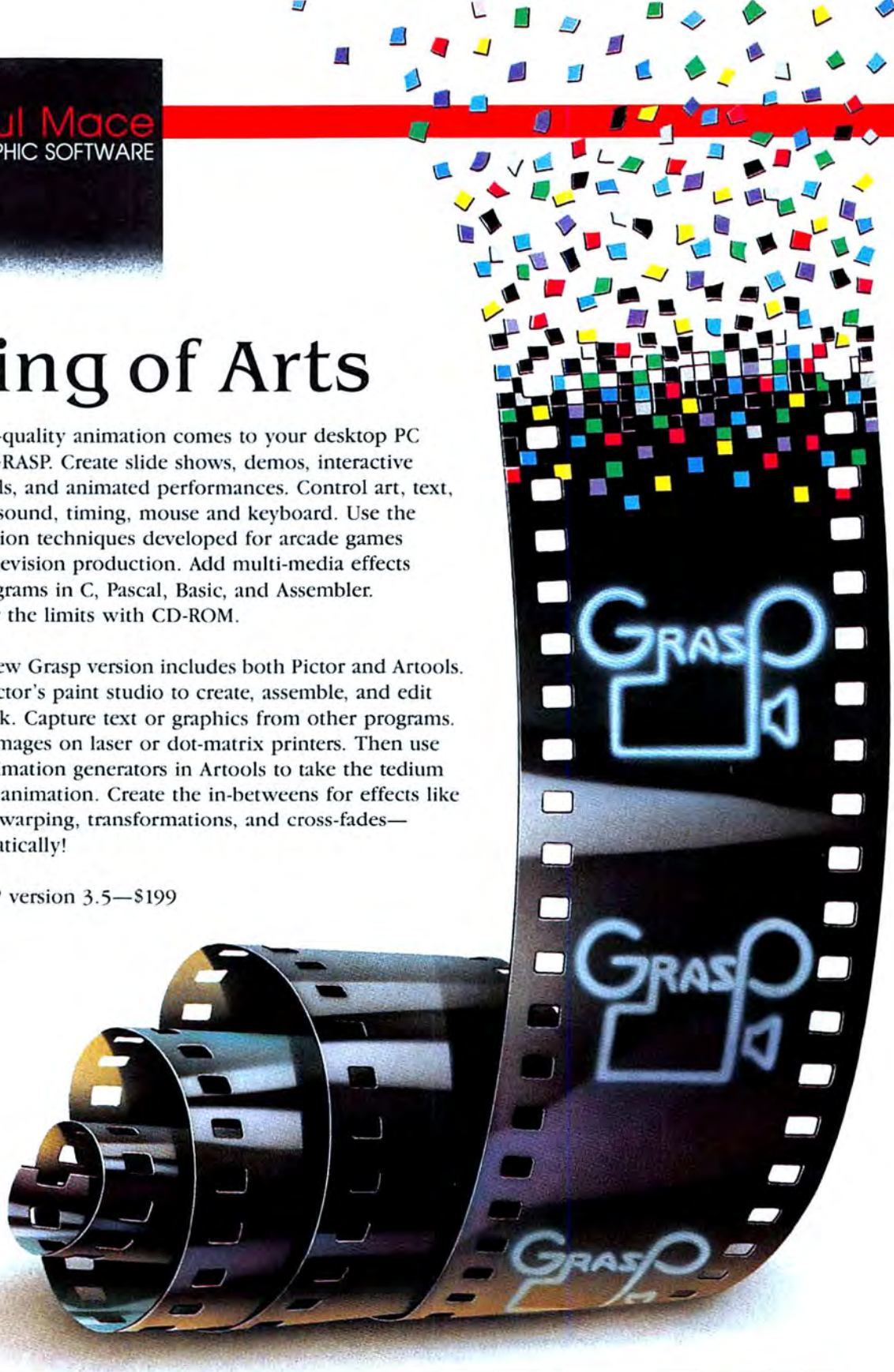

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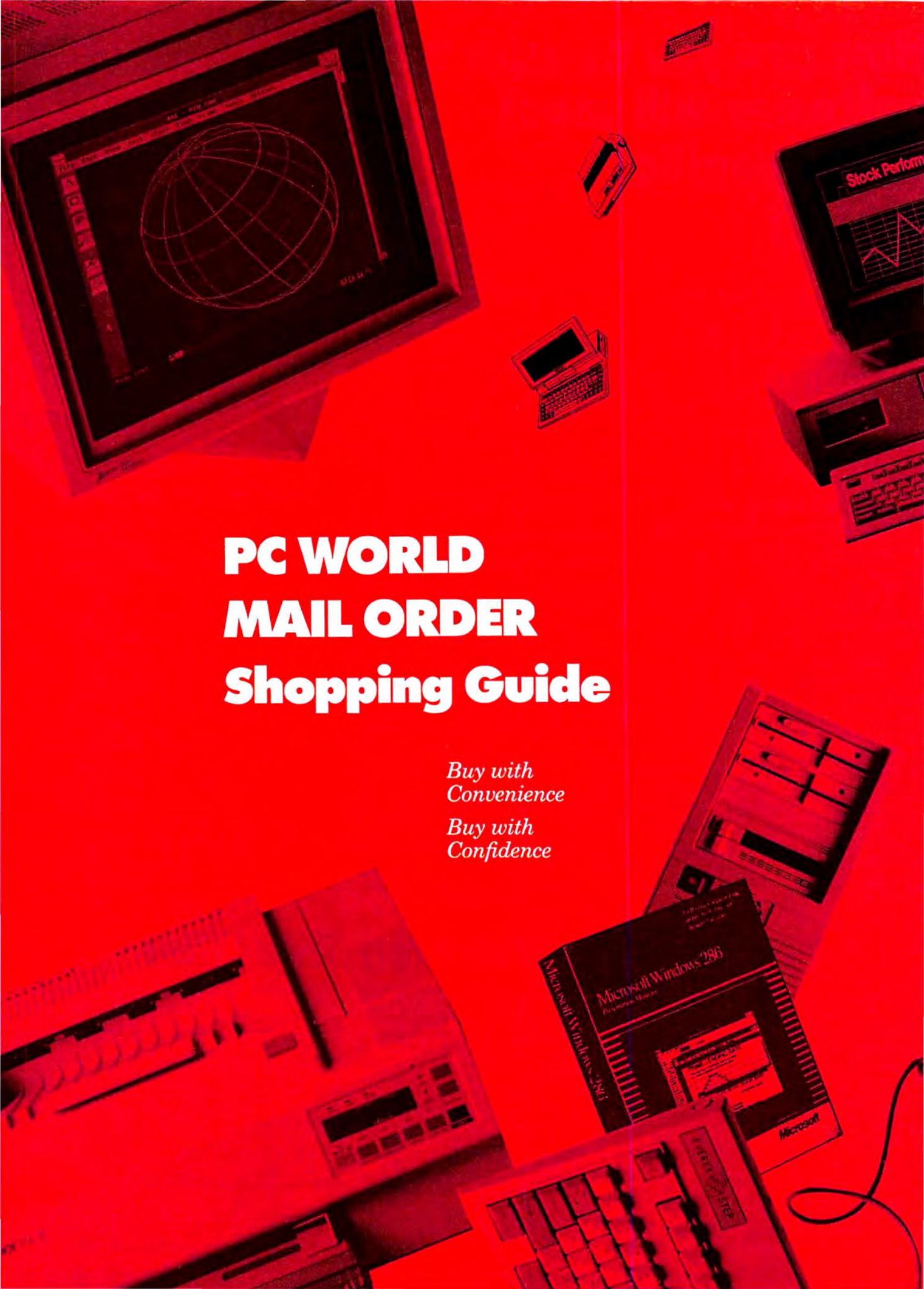

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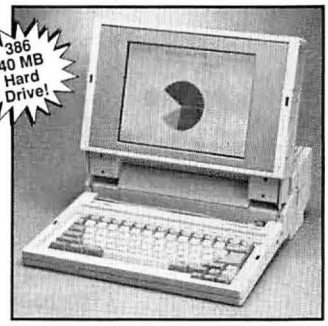

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$1195 Includes 640K, Monitor & 40mb Hard Drive

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- 40mb Hard Disk with Controller
- High Resolution Amber Monitor
- Phoenix BIOS
- Monochrome Graphics Card
- 101 Key Enhanced Keyboard with tactile click
- Parallel & Serial Ports
- Clock Calendar
- 1.2mb Floppy Disk Drive
- 5 Drive Bays
- 8 Expansion Slots
- Security Lock
- Utility Software
- 80287 Coprocessor Option
- 200 Watt Power Supply
- Call for other Options

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80mb 28ms Drive	Add:$400
CGA Color	Add:$170
EGA Color	Add:$350
16 Bit VGA Color	Add:$450

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$1595 Includes 1mb Ram, Monitor & 40mb Hard Drive

Check Our Standard Features

- 16mhz 80286
- 1mb Memory
- 40mb Hard Disk with Controller
- High Resolution Amber Monitor
- Phoenix BIOS
- Monochrome Graphics Card
- 101 Key Enhanced Keyboard with tactile click
- Parallel & Serial Ports
- Clock Calendar
- 1.2mb Floppy Disk Drive
- 5 Drive Bays
- 8 Expansion Slots
- Security Lock
- 80287 Coprocessor Option
- 200 Watt Power Supply
- Call for other Options

OPTIONS

64mb 22ms Drive	Add:$200
80mb 28ms Drive	Add:$400
CGA Color	Add:$170
EGA Color	Add:$350
16 Bit VGA Color	Add:$450

FASTDATA 386^{20D}

$1995 Includes 1mb Ram, Monitor & 40mb Hard Drive.

Check Our Standard Features

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- 40mb Hard Disk with Controller
- High Resolution Amber Monitor
- Phoenix BIOS
- 101 Key Enhanced Keyboard with tactile click
- Parallel & Serial Ports
- Clock Calendar
- 1.2mb Floppy Disk Drive
- 5 Drive Bays
- 8 Expansion Slots
- Security Lock
- 80387 Coprocessor Option
- 200 Watt Power Supply
- Tower & 25mhz Options

OPTIONS

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CGA Color	Add:$170
EGA Color	Add:$350
16 Bit VGA Color	Add:$450

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Citizen GSX140	325
Diconix	
150 Plus	315
Epson	Call
Fujitsu	
DL3400	519
NEC	
P2200XE	309
P5200	495
P5300	659
LC890	Call
Okidata	
182 Turbo	225
320 (IBM)	335
390 (IBM)	469
393 (IBM)	999
Panasonic	
KXP1180	175
KXP1191	225
KXP1124	297
KXP1524	535
KXP1624	429
KXP1695	Call
KXP4450	Call
Star	
NX1000-II	167
NX2410	279
Toshiba	
P321SL	429
P341SL	599
P351SX	929

LAPTOPS

Megahertz Modems	
2400B Most Toshiba	149
2400B NEC, Epson Mitsubishi or Zenith	189
Mitsubishi	Call
NEC MultiSpeed's	Call
Toshiba	
T1000	639
T1000 768k Card	259
T1200F	1349
T1200FB Backlit	1449
T1200HB Backlit	1949
T1600	Call
T5200/100mb	5495

BOARDS

ATI	
2400 ETC Int.	147
VGA Wonder 256	259
VGA Wonder 512	309
Everex	
1200B Int Modem	59
2400B Int Modem	109
EGA Card	79
Genoa	
Super EGA Hi-Res	139
Super VGA #5300	199
Super VGA #5400	255
FastData *(satisfaction gauranteed)*	
16 Bit VGA 256	129
2400B Int. Modem	85
CGA or MGP Card	35
Parallel/Serial/Game Card	35
XT 1.44 Floppy Controller	35
Hercules Graphic Card +	169
Intel	
8087-2	115
80287-10	209
80387-20	369
80387-SX	Call
Orchid	
ProDesigner	229
ProDesigner Plus	319
Tiny Turbo 286	207
Paradise	
Autoswitch 480	85
VGA Plus	155
VGA 1024 256K	209
VGA 1024 512K	269
Practical Peripherals	
1200B Int Modem	59
2400B Int Modem	129
Prometheus	
Promodem 1200B Int.	49
Promodem 2400B Int.	99
Promodem 2400G Ext.	Call
The Complete PC	
Answering Machine	209
Hand Scanner 400	139
USRobotics	
2400 Baud Internal	119
2400 Baud External	149
Video 7	
VGA 1024i 256K	215
VGA 1024i 512K	255
Vega VGA	179
V-RAM VGA 512K	399

MONITORS

Magnavox	Call
Mitsubishi	
1410 EGA	325
3465 (1024x768 int)	699
Diamond Scan 1381	479
NEC	
Multisync 2a	489
Multisync GS 2a	199
Multisync 3d	645
Multisync 4d/5d	Call
Princeton	
Max15	237
Ultrasync 12"	479
Ultrasync 14"	519
Ultra 16	835
Seiko	
CM1440	565
CM1450	Call
Sony	
1304 Multiscan	655
Zenith 1490	595

DISK DRIVES

Colorado	
Jumbo 40-120mb Int. Tape	269
Conner	Call
Miniscribe	Call
Mitsubishi	
60MB AT MR535	379
Seagate	
20MB XT Kit #225	239
30MB XT Kit #238	249
40MB AT #251-1	319
65MB AT #277R-1	365
80MB AT #4096	559
Toshiba	
360K Floppy	69
720K 3.5" Floppy	69
1.2MB 5.25" Floppy	79
1.44MB 3.5" Floppy	79

Call On Non-Listed Items

SOFTWARE

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Clipper	399
DataEase	449
dBase IV	439
dBXL Diamond	129
Foxbase Plus	185
Paradox	419
Q & A	Call
RapidFile	179
Rbase for DOS	397
Reflex	159

Desktop Publishing

Byline	175
GEM Desktop Pub.	159
Pagemaker	479
PFS:First Publisher	69
Publisher's Paintbrush	149
Ventura	Call

Financial

Bedford Integr. Acct.	133
DAC Accounting	Call
DAC Payroll	Call
Dollars & Sense	Call
Managing Your Money	113
Peachtree Complete II	139
Peachtree with Data Query	219

Graphics

Corel Draw	309
Deluxe Paint II	45
First Graphics	Call
Freelance Plus	307
GEM Artline	269
Generic Cadd Level 3	149
Harvard Graphics	255
Perspective Jr.	69

Integrated

First Choice	Call
Works	89
Windows 286	59
Windows 386	117

Mice

Keytronics Professional	75
Logitech C7 Serial	59
Logitech HiRes C9 Bus	69
Logitech HiRes C9 Serial	75
Logitech Trackman	75
Microsoft Serial or Bus	94
Microsoft W/ Windows 286	129
PC Mouse II Serial or Bus	79

Power Protection

Curtis Ruby Plus	59
Datasheild 100	57

Programming

Macro Assembler	89
Norton Guides (Specify)	58
Turbo Assembler/Debugger	87
Turbo Basic	60
Turbo C	90
Turbo Pascal	90
Quick Basic	60
Quick C	60
Quick Pascal	60

Spreadsheets

Allways	79
Excel	Call
Lotus 2.2 or 3.0	319
Lucid 3-D	53
Quattro	Call

Utilities

CoreFast	60
Carbon Copy Plus	104
Desklink	95
Desqview	68
Desqview386	99
Direct Access	46
Fastback Plus	97
Formtool	54
Formfiller	85
Laplink Plus	59
Laplink III	75
MS-Dos 4.01	79
Mace Utilities	53
Norton Advanced	79
PC Tools Deluxe	69
ProComm Plus	48
SideKick Plus	119
Sideways	37
Super PC Kwik	43
XTree Pro	67

Word Processors

Ami	115
GEM First Word Plus	57
Grammatik IV	49
IBM DisplayWrite 4	229
Manuscript	Call
Multimate 4.0	267
Professional Write	137
Rightwriter	45
Sprint	117
Word 5.0	Call
Word Perfect	215
Word Perfect Library	59
WordStar Prof. 5.5	189

SPECIALS

Panasonic KX-P1124

$295

The Panasonic KX-P1124 combines 24 dot matrix printing with Panasonic quality and features. It comes standard with 4 fonts & 6 pitches - all adjustable from the front control panel.

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$219

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- SERIAL/PARALLEL/GAME PORTS
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- 1 YEAR WARRANTY

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ST138	28MS	32MEG	$279.	$329.
ST251	28MS	42MEG	$329.	$389.
ST151	24MS	42MEG	$379.	$439.
ST4096	28MS	80MEG	$559.	$609.
ALL DRIVES				
ST225R	70MS	21MEG	$189.	$239.
ST238R	65MS	32MEG	$219.	$269.
ST138R	28MS	32MEG	$259.	**$309.**
ST250R	70MS	42MEG	$279.	$339.
ST157R	28MS	49MEG	$369.	**$419.**
ST277R	28MS	64MEG	$379.	$439.
SCSI DRIVES				
ST138N	28MS	32MEG	$349.	$399.
ST157N	28MS	49MEG	$439.	$489.
ST177N	24MS	60MEG	$559.	$609.
ST1096N	24MS	83MEG	$799.	$849.

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M8425	65MS	21MEG	$189.	**$239**
M3650	45MS	42MEG	$299.	$359.
M3053	25MS	44MEG	$409.	$469.
M3085	25MS	71MEG	$579.	$629.
ALL DRIVES				
M8225	45MS	21MEG	$189.	$239.
M8438	65MS	32MEG	$229.	**$269.**
M8450	45MS	40MEG	$269.	$319.
M3675	45MS	64MEG	$329.	**$389.**

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PRINTERS

PANASONIC

KXP 4450 (Lazer printer)	$1339.
KXP 1180	179.
KXP 11911	235.
KXP 3131	299.
KXP 1124	319.
KXP 1592	388.
KXP 1595	429.
KXP 1524	545.

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FX 850
FX 1050
LQ 500
LQ 850
LQ 1050
LQ 2550
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LQ 510

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120	189.
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180	219.
182+	228.
183	249.
320	337.
321	464.
390	465.
391	639.
393	989.
393C (color)	1099.
Lazer 6	1349.

MONITORS

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Multisync IIA 14"	$499.
Multsync IIID 14"	659.
Multsync Plus 14"	889.
Multisync XL 19"	2149.

MITSUBISHI

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Diamodscan	499.

PRINCETON GRAPHICS

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Ultra 16	879.

SAMSUNG

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EGA	339.
Multisync	429.

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FX 850 264 CPS, 54 NLQ	339
FX 1050 264 CPS, 54 NLQ	439
LQ 510 225 CPS, 75 NLQ	339
LQ 850 330 CPS, 88 NLQ	509
LQ 950 330 CPS, 88 NLQ	519
LQ 1050 330 CPS, 88 NLQ	719
LQ 2550 400 CPS, 108 NLQ	899

OKIDATA

182 Plus 180 CPS, 30 NLQ	229
320/321 300 CPS, 62 NLQ	339/469
390 270 CPS, 90 NLQ	459
391 270 CPS, 90 NLQ	639
393 450 CPS, 120 NLQ	989

TOSHIBA

321 LS 216 CPS, 72 NLQ	439
351 SX 350 CPS, 100 NLQ	939
341 SL 216 CPS, 72 NLQ	589
311 EXPRESS	379
Page Laser 12	2595

NEC

2200 170 CPS, 55 NLQ	329
5200 265 CPS, 90 NLQ	495
5300 265 CPS, 90 NLQ	669
LC890	3195

PANASONIC

1124 160 CPS, 53 NLQ	329
1180 192 CPS, 38 NLQ	185
1191 240 CPS, 48 NLQ	229
1959 290 CPS, 51 NLQ	449
3131 17 CPS	315
Laser KX4450	1399

HEWLETT-PACKARD

Laser Series II	1689
Laser II D	2895
Laser II P	CALL!
Desk Jet/Desk Jet Plus	579/739
Pacific Data 1 mb/2 mb	279/359
Pacific Data 25-N-1	279
Pacific Page	459
Intel Visual Edge	469
Plotter in a cartridge	239
Headlines in a cartridge	265

CANON

Bubble Jet 130	719
LPB89 III	1795
LPB 4	949

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Novell SFT Neware V. 2.15	2639
Novell ELS Level I 4 User	429
Novell ELS Level II 8 User	949
Novell Netpro	1095
NE 1000	179
NE 2000	209
ARC Net PC 130	135
ARC Net PC 130 E	165
ARC Net Active Hub/Pass.Hub	289/72
ARC Net PC 500FS	419
ARC Net PC 500WS	279
Western Digital Ethernet Card	229
Thomas Conrad 16 port.hub	625
Thomas Conrad 8 port.hub	349

INPUT DEVICES

Microsoft Mouse w/windows	$145
Microsoft Mouse w/PC paint brush	109
Mousesystems Mouse	89
Logitech Series 9 Serial	75
Logitech Series 9 Bus	85
Logitch Scan Man	189
Summasketch 12x12	369
Summasketch 12x18	599
Kurta 12x12	325

SOFTWARE

Lotus 1-2-3 ver. 2.01	$299
Lotus 1-2-3 ver. 3.0/2.2	329
Lotus Networker	1595
Lotus Symphony ver. 2.0	419
D Base IV ver. 1.0	449
Multimate Advantage II	269
Framework III	449
Paradox ver. 3.0	449
Enable o/a	419
Foxbase Plus single user ver. 2.10	189
Microsoft Word ver. 5.0	219
Microsoft PC Excel ver. 2.1	305
Clipper	419
Peachtree II	149
Harvard Graphics ver. 2.12	279
Professional Write ver. 2.1	149
Professional File ver. 2.0	179
Q & A ver. 3.0	209
Wordperfect ver. 5.0	229
Worstar ver. 5.5	209
Wordstar 2K Plus Rel. 3	269
Clarion Pro Developer	389

MODEMS

Everex 1200 int.	$89
Everex 2400 int/ext	129/199
Hayes 1200B/2400B	199/249
Hayes 1200/2400 ext.	289/339
Practical Peripherals half card 2400 w/Procomm	129
US Robotics 2400/9600	149/619
Supra Modem 2400 int/ext	99/119
Megahertz 24 for Zenith	169
Megahertz 24 for Toshiba	179

FAX

Quadfax 96	$279
Toshiba 3300	839
Toshiba 3600	1025
Toshiba 3700 EN	1189
Sharp 300/330	725/989
Sharp UX 180	699

MONITORS

NEC

Multisync II A	$499
Multisync III D	649
Multisync 4D/5D	1150/2350

CTX

CGA	$259
EGA	359
VGA	369

PRINCETON

MAX 12	$149
Ultrasync 12"	499
Ultra 14	529
Ultra 16	869

MITSUBISHI

1410C 14" EGA	$349
Diamond Scan	499
HL 6605 16"	1225
HL 3905 20"	1625
HL 6905 20"	2050

MAGNAVOX

Amber 776	$89
RGB80 8762	249
EGA 9CM053	359

ZENITH

1490	$629

COMPATIBLE

10 MHZ TURBO

1 floppy, 640K, AT style keyboard, monographics card, mono monitor ... $699
Color System add $150 w/20 mb
add $249, w/30 mb add $269

386 12 MHZ

1 mb Ram, 1.2 floppy ... $895

386 20 MHZ

1 mb Ram, 1.2 floppy ... $1595

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4 mb Ram, 1.2 floppy ... $2795

386 33 CACHE

4 mb Ram, 1.2 floppy ... $3395

386 20 MHZ PORTABLE

1 mb Ram, 40 meg hd. ... $2799

AST

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1.2 floppy ... $1269
AST Premium 386 Model 300C 20 mhz, 1.2 floppy, 1 mb, DOS keyboard ... $2650

All AST computers carry a 1 year warranty

COMPAQ

386 20 E 40 mb.	$4395
110 mb.	4995
286 Desk Pro 12 mhz	1540
286E Model 40/100	2450/2995
Compaq II Model IV	2879
Compaq Port. 386 Model 40/100	5080/5795
Compaq III 20/40	3595/4069
Compaq 386-S Model 1/40	2350/3049
Compaq 386-25 110/300	6529/8695
Compaq SLT w/20 mb	3895
Compaq SLT w/40 mb	4349

IBM

PERSONAL SYSTEM/2

Model 30 286 20/30	$1775/1915
Model 50-30/60	2229/2595
Model 55 SX 30/60	2879/3119
Model 70 Portable 60/120	5585/5995
Model 70 - 60/120	3795/4639
Model 80 - 40/70	4385/4825
Model 80 - 300	7999

LAPTOPS

Toshiba 1000	$639
Toshiba 1200	1849
Toshiba 1200F	1395
Toshiba 3100E	2749
Toshiba 1600	3250
T3200/T5100	3395/4239
Toshiba 5200 40/100	4999/5389
Zenith Super Sport 20 mb	2299
Zenith Super Sport 286 20 mb	3025
Panasonic CF 150	645

TAPE DRIVES

Archives 40 mb int.	$299
Archives FT 60 int. or ext. w/card	579
Archives VP 150 int. w/card	949

GRAPHIC CARDS

ATI Wonder EGA 800	$175
ATI VGA 256K/512K	269/339
Everex Micro Enhancer	125
Genoa 4880	139
Genoa 5100	189
Genoa 5300	199
Genoa 5400	269
Hercules Graphics Card	179
Hercules InColor	209
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Orchid 800 VGA	159
Orchid Pro Designer w/256K	239
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Pardise Auto Switch 480	115
Paradise VGA Plus	199
Paradise VGA Professional	299
Vega Deluxe	199
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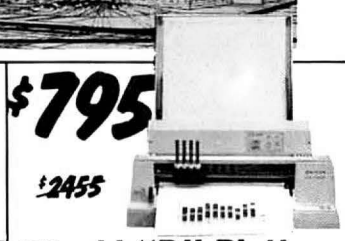

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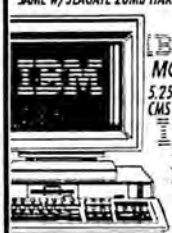

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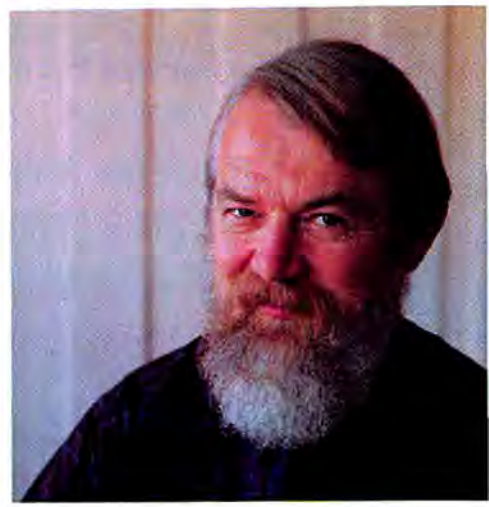


Paul Mace

Task by task, men and women are examining how to apply personal computer technology to the workplace. The first three jobs to fall were written correspondence, bean counting, and record keeping. Staying in touch with people, money, and where the goods went are the main tasks of great commercial civilizations, and the personal computer has proven conceptually ideal for managing such work.

Word processing is better than typing, electronic spreadsheets better than hand calculation, and electronic data bases better than manila folders—and each of these is so much better that it constitutes a revolutionary advance. The writer, the accountant, the office worker can get more work done for the same effort, or the same work for less.

While all three jobs can be handled on a single personal computer, this is not one revolution but several. The PC is the tool that made each possible, but it is not a revolution in itself—at least not yet. And insisting on that vision is what confuses people these days about what comes next.

Word processing is a perfect example. Technical advances in software and increases in microprocessor power have fine-tuned the word processing potential, but eight years ago I could compose and print on my Tandy Model III with *Scripsit* and a daisy wheel printer as fast as I can today with a 386 PC, *Word*, and a laser printer. The routine is slicker today, but twice as expensive for the same quality.

While an "ideal" like word processing can be fine-tuned, it cannot be doubled or tripled in power every two years. The power of the revolution comes from the successful application of the concept of the personal computer to the task of written correspondence—not from further marvels of fabrication at Intel and Motorola.

What faster silicon and more memory do promise is that jobs for which the personal computer has been less than ideal become ripe for revolution. With AT machines, computer typesetting and page layout restructured the publishing industry. Serious CAD/CAM with PCs is a reality with the 386 and VGA and should take solid hold with the 486 and extended VGA.

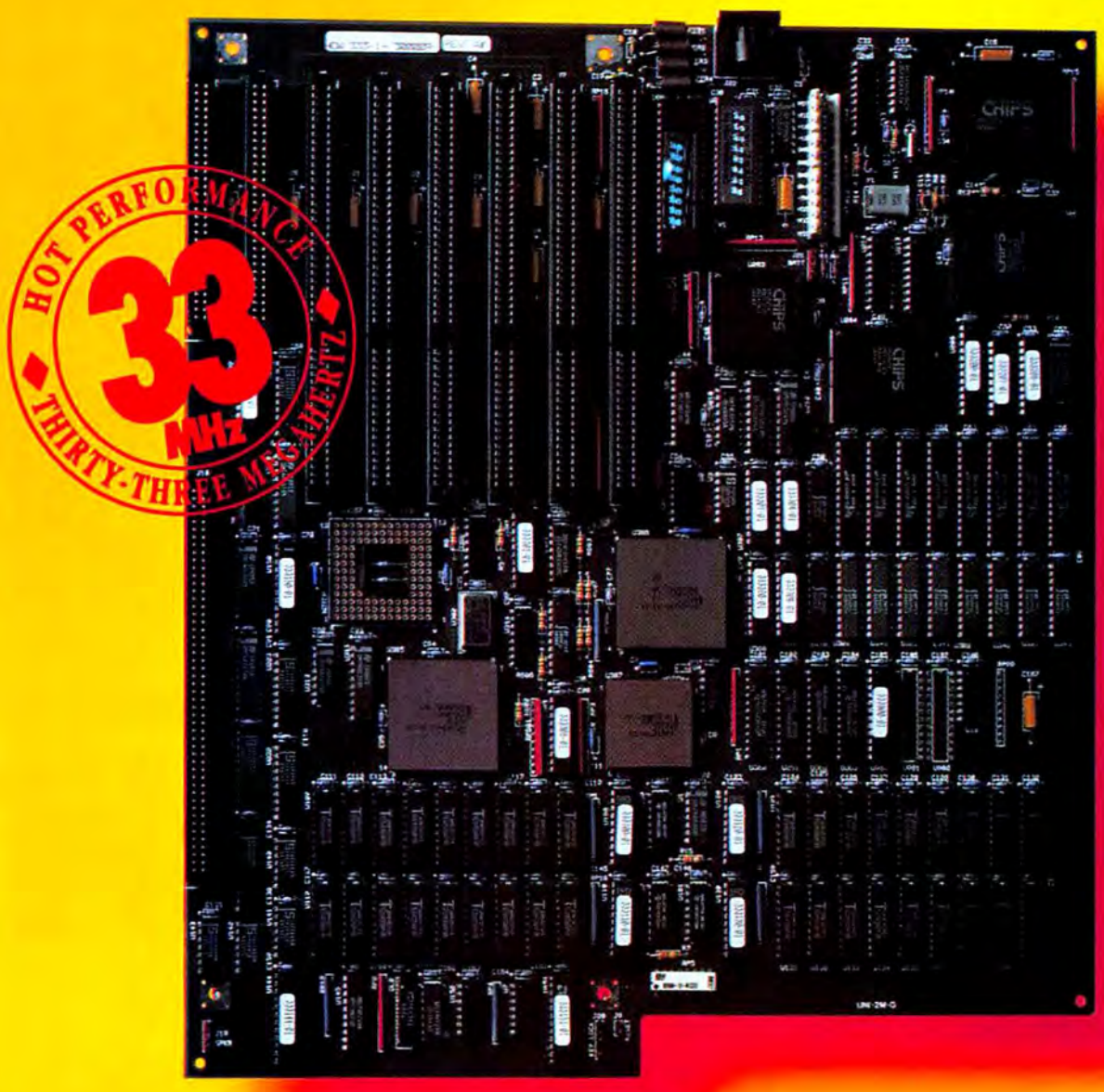
Lack of standards currently throttles telecommunications, but electronic mail is a revolution in waiting, one that will privatize the postal system overnight without Congress lifting a finger. Then there's what we loosely call "connectivity": the idea of the personal computer as electronic Super Glue, "tying it all together" so we can make sense of what we're doing, whatever that is.

And that's the point—redefining our work and ourselves will result in many more revolutions. That revolutionary process is not taking place at Intel, Microsoft, or IBM but in the working world, where each day people independently conceive new applications for their personal computers.

Just as we see the steam engine as an essential element of the Industrial Revolution, we may, at some future point, see the computer itself as some unitary ideal that encompasses our changing times. But a revolution is not a thing, it is a change in attitude, and the next one begins with you. ●

Paul Mace is the author of The Mace Utilities.

ROBERT JAFFE



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