Advanced Users Quiz

PC WORLD

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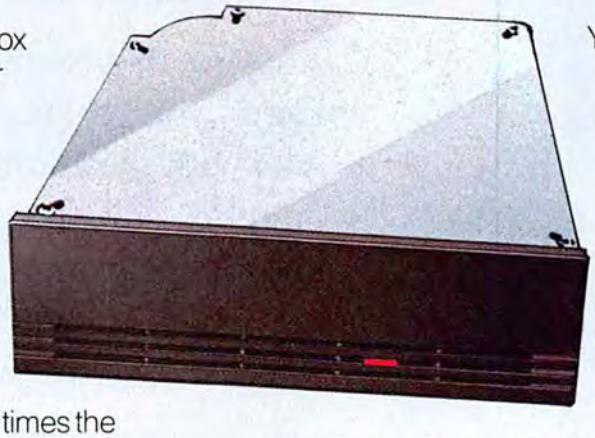

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The Comprehensive Guide to IBM Personal Computers and Compatibles
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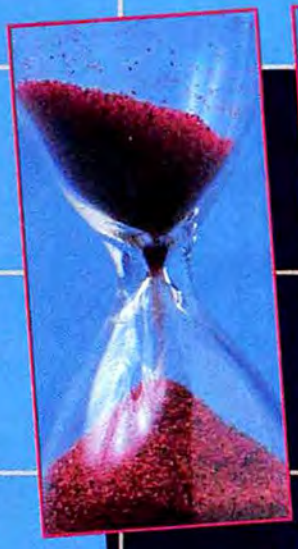

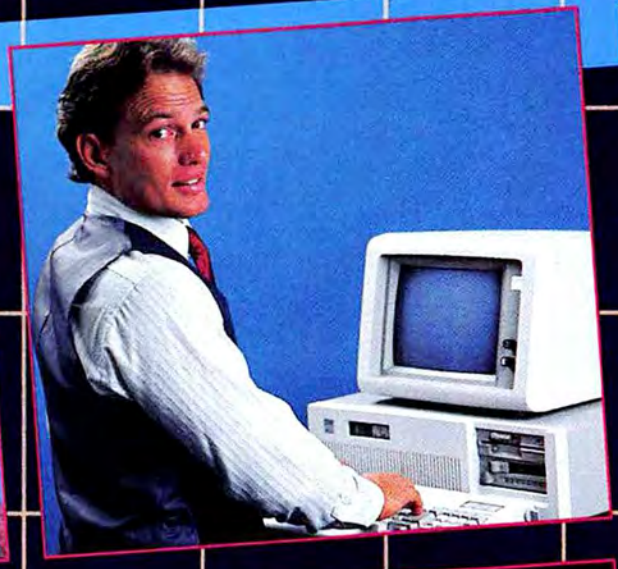

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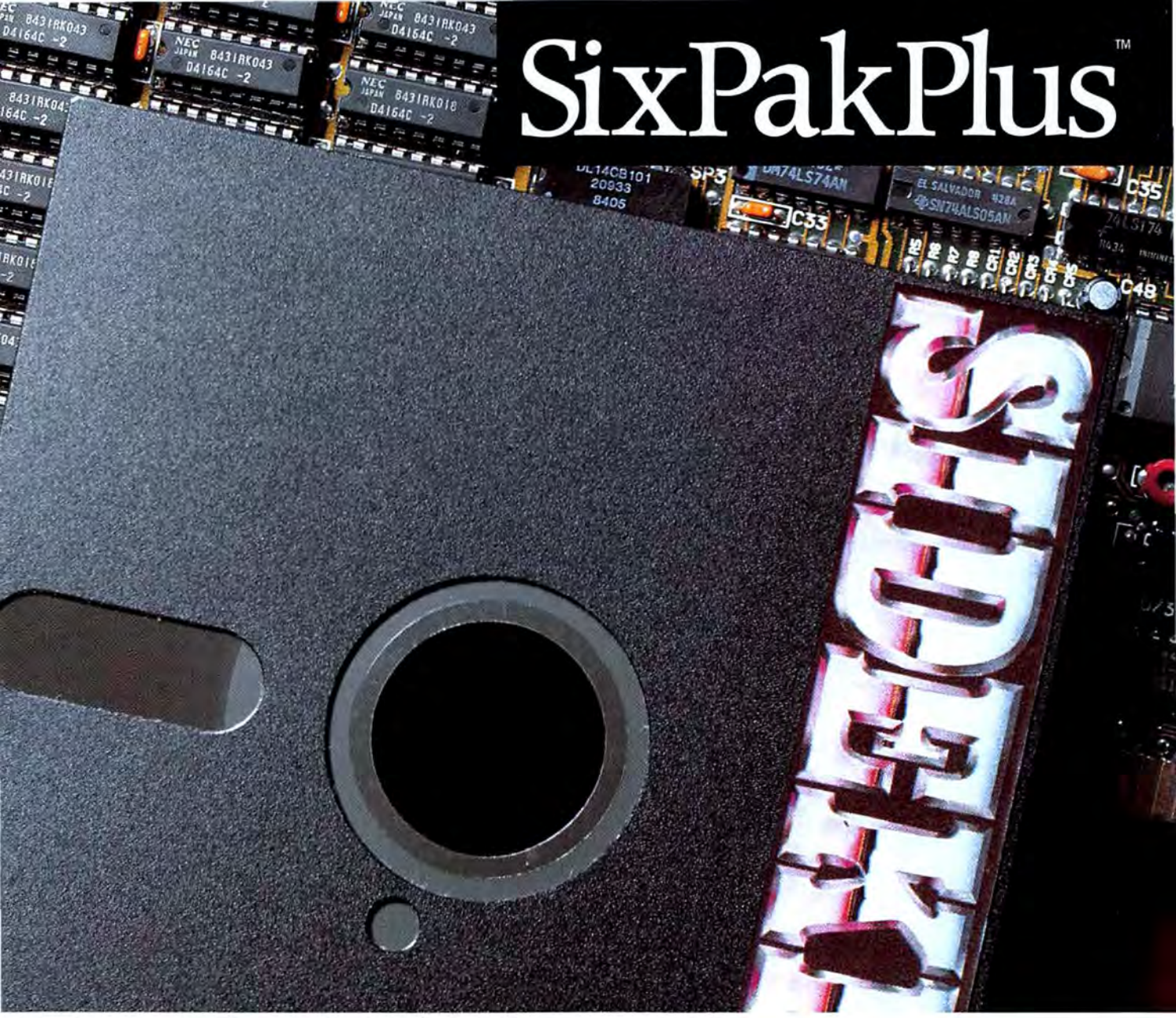

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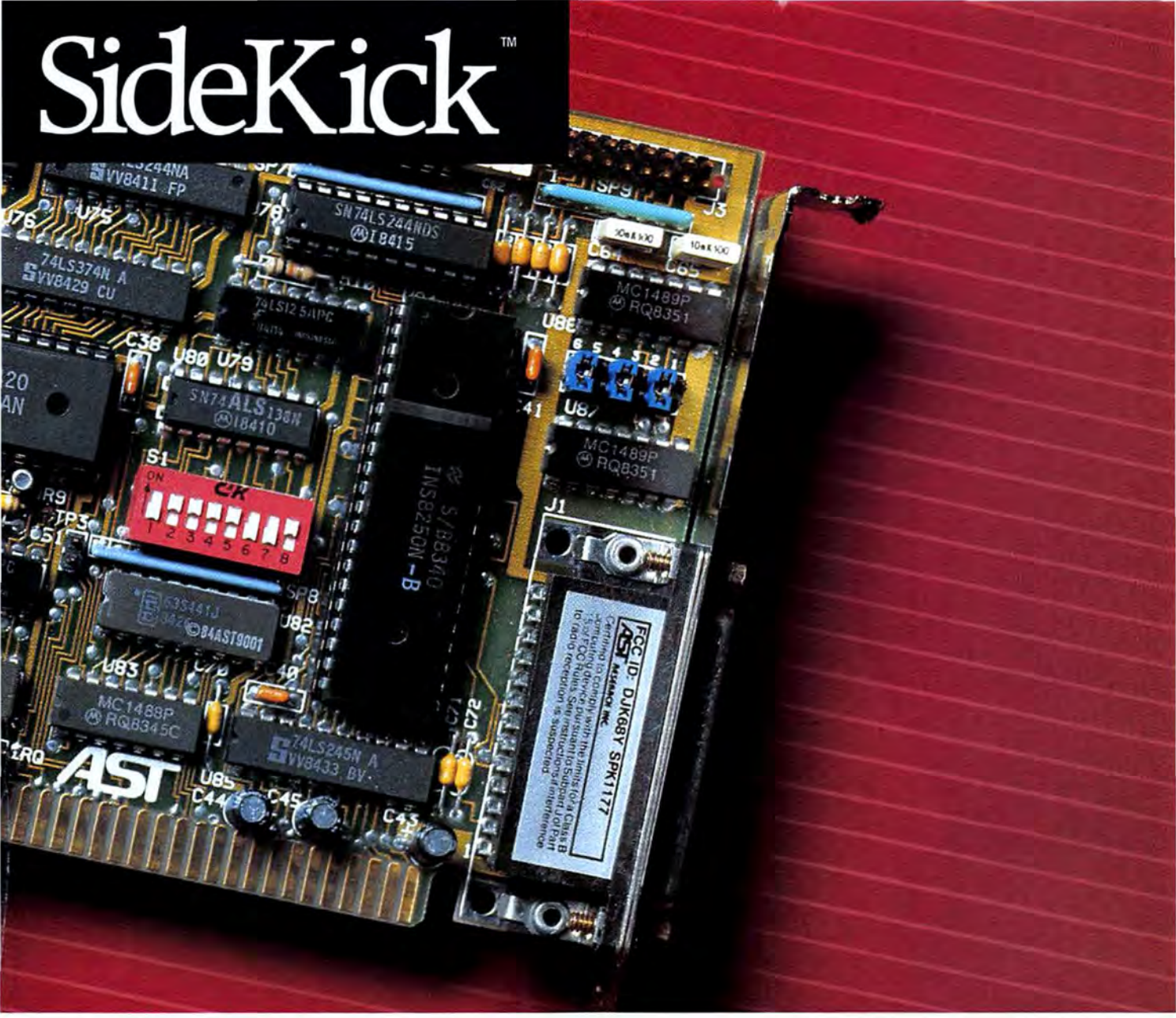

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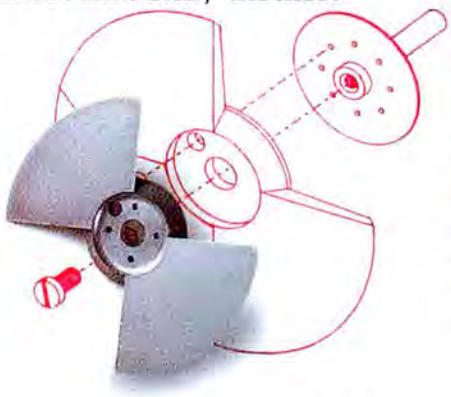

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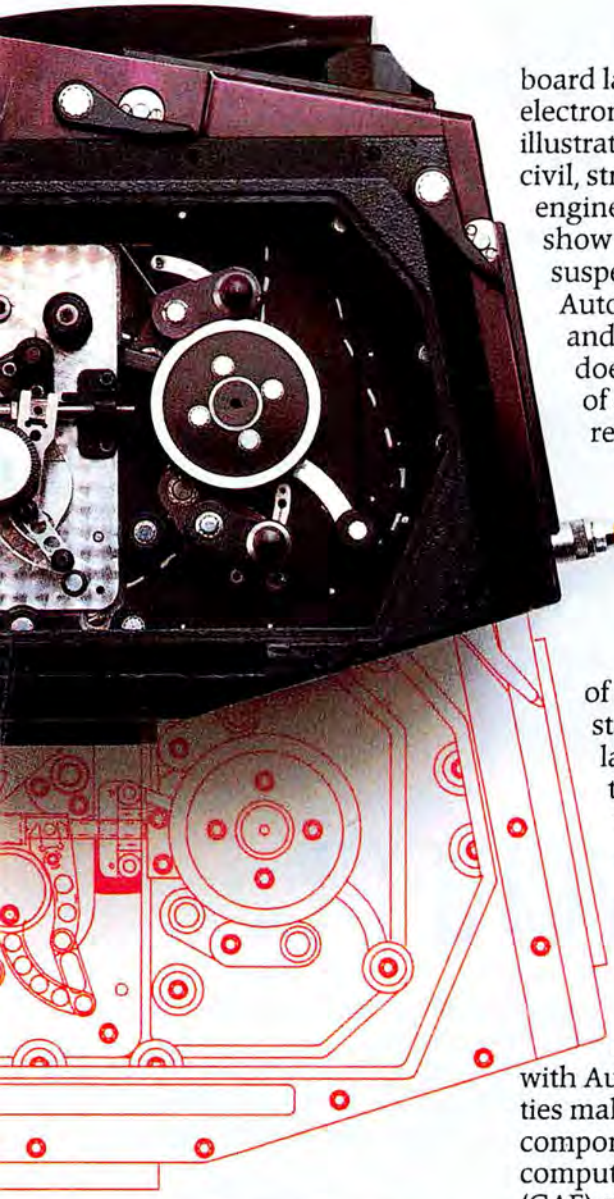

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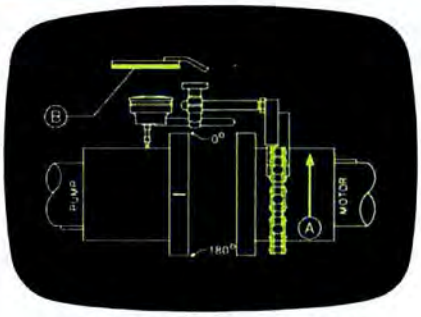

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David Bunnell

Testing Your Computer Skills

The making of an advanced user and some thoughts on how you can become one of the technology tamers

When I met *PC World*'s Technical Editor, Karl Koessel, in 1981, he was a cab driver who just happened to own one of the first Radio Shack TRS-80s.

I was an editor for a microcomputer book publishing company at the time–and we just happened to need someone to evaluate a TRS-80 book we were planning to publish. We didn't know any TRS-80 experts, so we asked Karl if he could do the job. His expertise surpassed all our expectations, and we contracted with him to work on other TRS-80 books. Before long Karl was our resident TRS-80 guru. Over the years Karl's computer wizardry has expanded to encompass almost any personal computer made. He is one of the most knowledgeable "PC people" I know. Not only is he an excellent source of information–invariably we all turn to him for advice on how to customize a system or maximize its power–but he also has a variety of interesting opinions about the future of the personal computer industry and where all this technology is leading us.

Although Karl began computing at age 10, he has no formal computer training; his office walls are not papered with computer science degrees. However, his knowledge of personal computing equals or exceeds that of most "experts" who have classy computer science credentials. One fascinating aspect of the personal computing industry is that whether you acquire your skills from courses at UC Berkeley or from religiously reading copies of *Creative Computing* isn't as important as your performance.

There is more than one road to microdom. We are all pathfinders struggling to control a machine that is evolving exponentially. The PCs we use today will be archaic in five years; the software we use today will be a joke in less than two. Different PC users develop their own means of dealing with the machine. Some learn only as much as they have to. Others, like Karl, thrive on garnering as much knowledge of the machine as possible.

(continues)

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And now IDEA offers four new software packages for the Minicomm:

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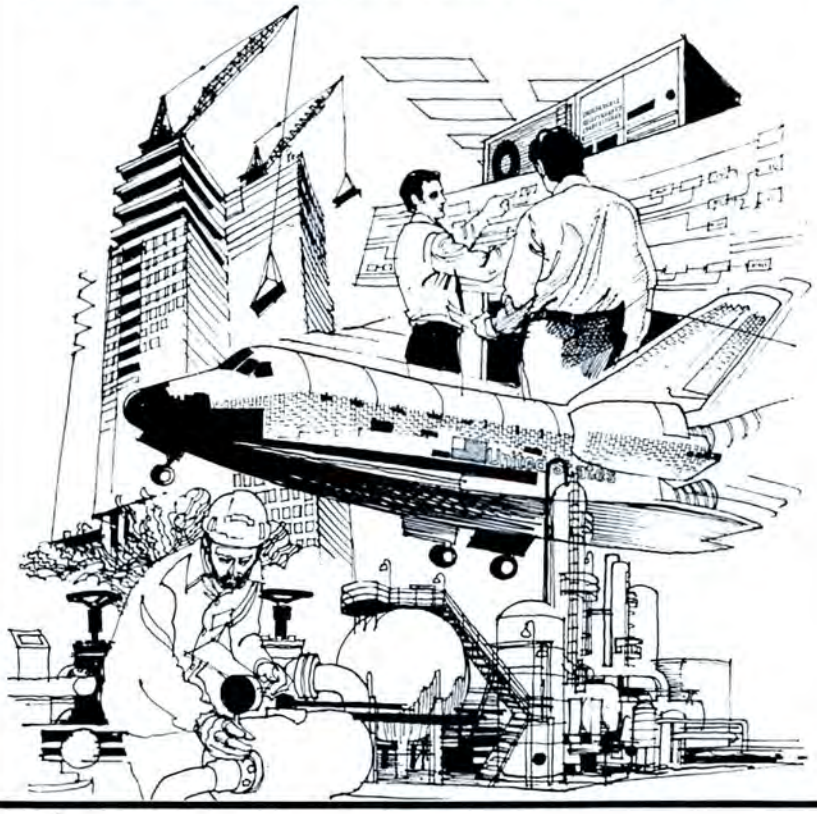

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This special issue is a salute to those of our readers who have learned how to tame the PC pachyderm and teach it to dance: the advanced users. Those of us who are still feeding it peanuts regard the PC tamers' success with admiration. (Yes, I still run to Karl for advice on hard disks.)

Unfortunately, in our search to find new PC converts we forget the voraciousness of our advanced users, sometimes leaving them uncomfortably unsatisfied with our "getting started" fare. Therefore we present this *Official Advanced Guide*, a whole issue full of beef for the hungry users who are no longer teething. The articles are geared toward getting the maximum amount of power and profitability out of your PC.

Here's a taste of the offerings contained in this special issue. "Inside Modems" looks at the best internal 1200-bps modems around. These expansion boards not only conserve endangered desk space but minimize cable chaos, and they are perfect for transportable computers. "COBOL Comeback" examines the resurgence of this mainframe workhorse on the PC and highlights four of the top compilers. "Advanced Screening" pinpoints the picks in high-resolution alternative displays for lap-

(continues)

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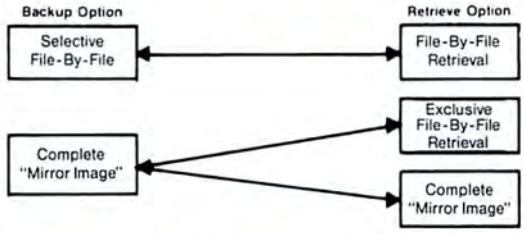

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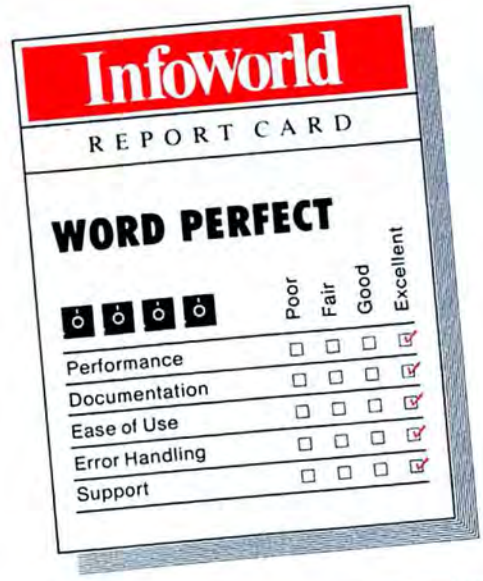

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- Supports Average, Last Purchase, And Standard Costing Methods • Physical Inventory
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- Automatic Changing Of Costing Methods
- Time And Product Inventory
- 3 Year Product History In Units, Dollars, Cost, And Profits
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- Automatic Interfacing With General Ledger, Payables, And Inventory

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Deref	13	13	–
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(1) **Computer Language,** Feb., 1985, pp.73-102. Reprinted by permission.

The Eco-C88 compiler is a full K&R C compiler that supports all data types and operators (except bit fields). Now look at the other features we offer:

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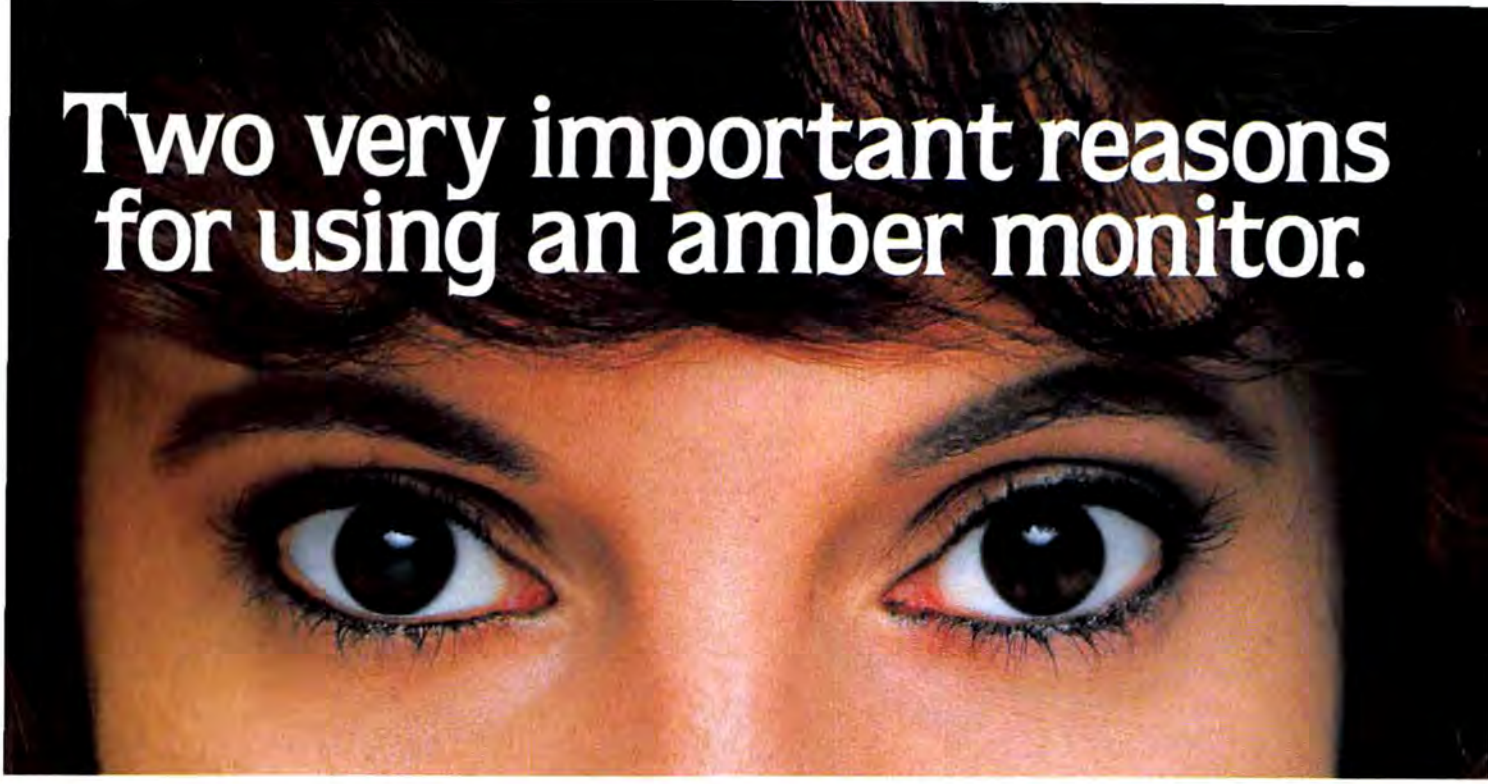
size computers. The pièce de résistance is the "PC World Advanced Users Quiz," a test of skill, knowledge, and intellectual stamina cooked up by the editors of *PC World*. Although most of the questions measure your familiarity with the PC and computing concepts, some teasers require your mental detective work. Good luck!

We apologize if this *Advanced Guide* is a bit beyond the comprehension of our new and intermediate users. If you are not on the same level as this issue, browse through it anyway–you may find it interesting, and it may inspire you to develop your PC expertise.

For our advanced readers, we hope this issue helps secure our technical base. We also hope we've managed to keep up with you and that you haven't shot off into the PC ozone. If you have, *Dr. Dobb's Journal* may be your last resort. However, we're proud of this issue and feel it has a lot to offer.



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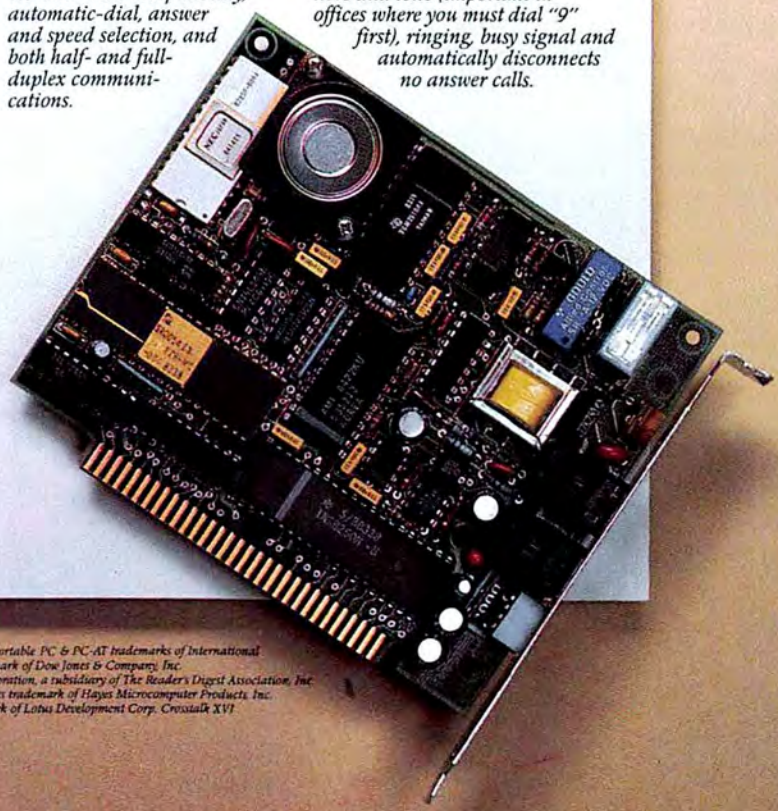

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REMark: The Rise and Fall of a Maverick

With the departure of the PC's founder and leading light, IBM has returned to business as usual.

Brian Jeffrey

Don who? Remember Don Estridge? The guy who used to head up IBM's Entry Systems Division (ESD)? It was Philip "Don" Estridge, perhaps more than any other individual, who put IBM in the personal computer business to stay. For more than three years, as he peddled his smile around trade shows and granted interviews to the press, he seemed proof that stodgy old IBM could show the same nimble, entrepreneurial footwork as the smaller, younger firms that had grown up with the personal computer marketplace.

Estridge was offbeat by IBM standards. His division relied on developers and suppliers, sold its wares through retailers, even farmed out the manufacture of its various products. More than that, however, he ran his own show within IBM, and few had that opportunity.

Estridge's rise in IBM was mercurial, and his PCs turned in a performance that had IBM's number crunchers cheering when revenues and earnings were announced. In three years, profits from PC sales had propelled IBM's start-up endeavor into a more than $5 billion international operation. In retrospect, Estridge and ESD had more in common with their competitors in the personal computer business than they did with IBM brass in Armonk.

And suddenly, last March, it was over; there was even a touch of Greek tragedy about it. ESD had suffered failures born of overconfidence and sloppy planning. PCjr. The Portable PC. The Cluster Kit. The PC Network. The PC AT's 20MB hard disk drive. The Software Showcase. *TopView.* By the end of 1984 Estridge and the rest of ESD found themselves apologizing profusely and often.

Estridge's nemesis arrived in the person of John Akers, newly appointed IBM chairman—only a little older than Estridge and, like him, a company veteran. Akers, unquestionably an organization man, loomed as the leader IBM was grooming for the next decade. He became president in 1983, CEO in 1984, chairman in 1985. Akers had helped found ESD in

(continues)

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As a manager, you know the key to a successful project is good planning. You can't afford to overlook critical costs and deadlines.

COMPREHENSIVE PROJECT MANAGEMENT

The Project Scheduler Network will help you meet deadlines and beat cost targets using effective project scheduling, resource planning, costing, and status tracking.

Advanced screen graphics. Produce Network diagrams, Gantt charts, and color graphs to provide the concise information you need for timely decision making.

Work Breakdown Structure (WBS). Organize project activities to produce summary level schedules and reports. Multiple projects can be integrated to present project level schedules and total resource utilization.

Baseline schedules. Save them to compare with current schedules for schedule tracking. Actual, original plan, and current plan costs can be graphically compared for cost tracking.

Comprehensive report generator. Simplify communications with management by synthesizing project information into presentation-quality hardcopy reports and graphs.

SCHEDULE WITH THE CLICK OF A BUTTON

The Project Scheduler Network provides the most advanced software technology available. Start with our mouse-controlled menus to select spreadsheet-style input templates to enter your project data.

Graphically build your dependency Network with only a "click of a button." Zoom to view the Network at selectable resolution levels. Now use the mouse to edit the Network to your satisfaction.

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FEATURES

- Critical Path Method
- Network Analysis
- Gantt Chart
- Work Breakdown Structure (subtasks)
- Multiple Project Integration
- Tracking with Baseline Schedule and Complete Status
- Resource Scheduling
- Financial Planning and Tracking
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- Mouse (Microsoft compatible)
- Two disk drives (one double-sided)
- IBM or HP plotter optional

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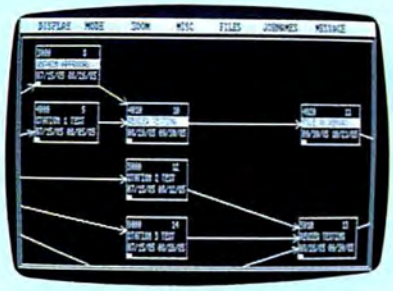
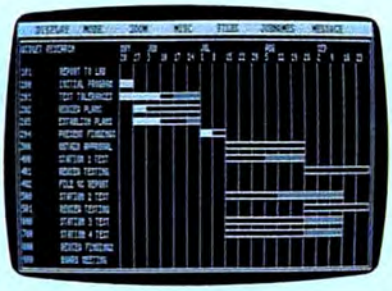
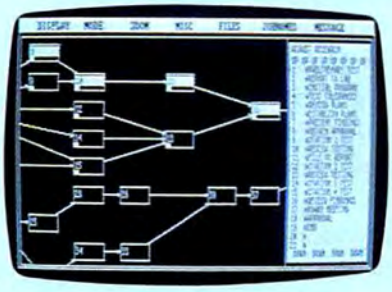


Network (4x4 Zoom Mode)

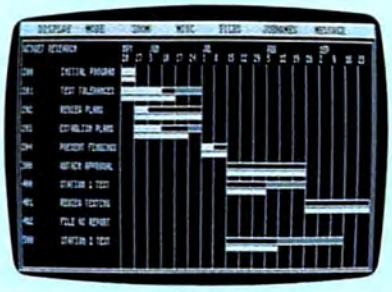


Gantt Chart

Job Data Entry Screen

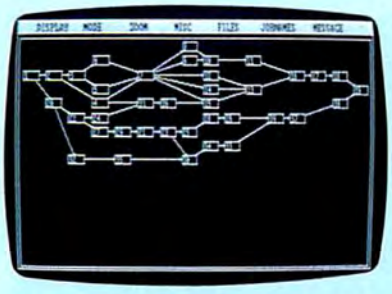


Network (8x8 Zoom Mode) with Job Names

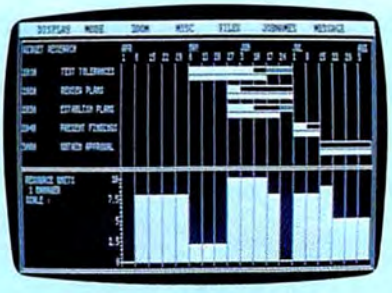


Gantt Chart with Base Schedule

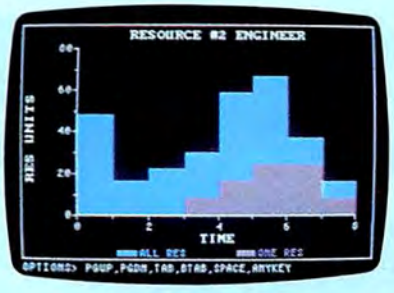
Resource Data Entry Screen



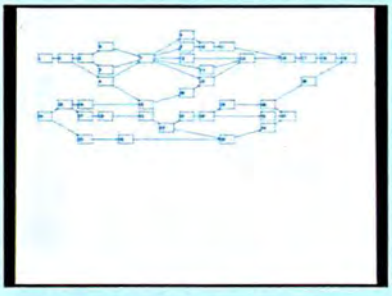
Network (16x16 Zoom Mode)



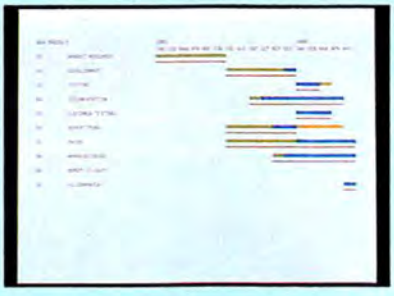
Gantt Chart with Histogram



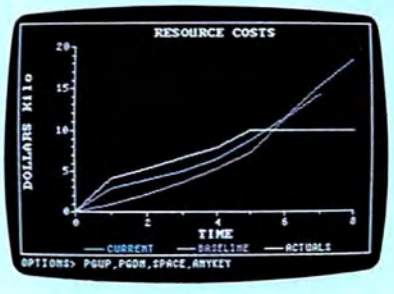
Resource Histogram



Network Plot (draft copy)



Gantt Chart Plot



Financial Line Graph

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1980 but by 1984 was on a mission to dismantle it. For Akers, the time for an "intrapreneurial" approach to personal computing had passed. PCs were an established arena of IBM business, so it became fitting to treat them as such.

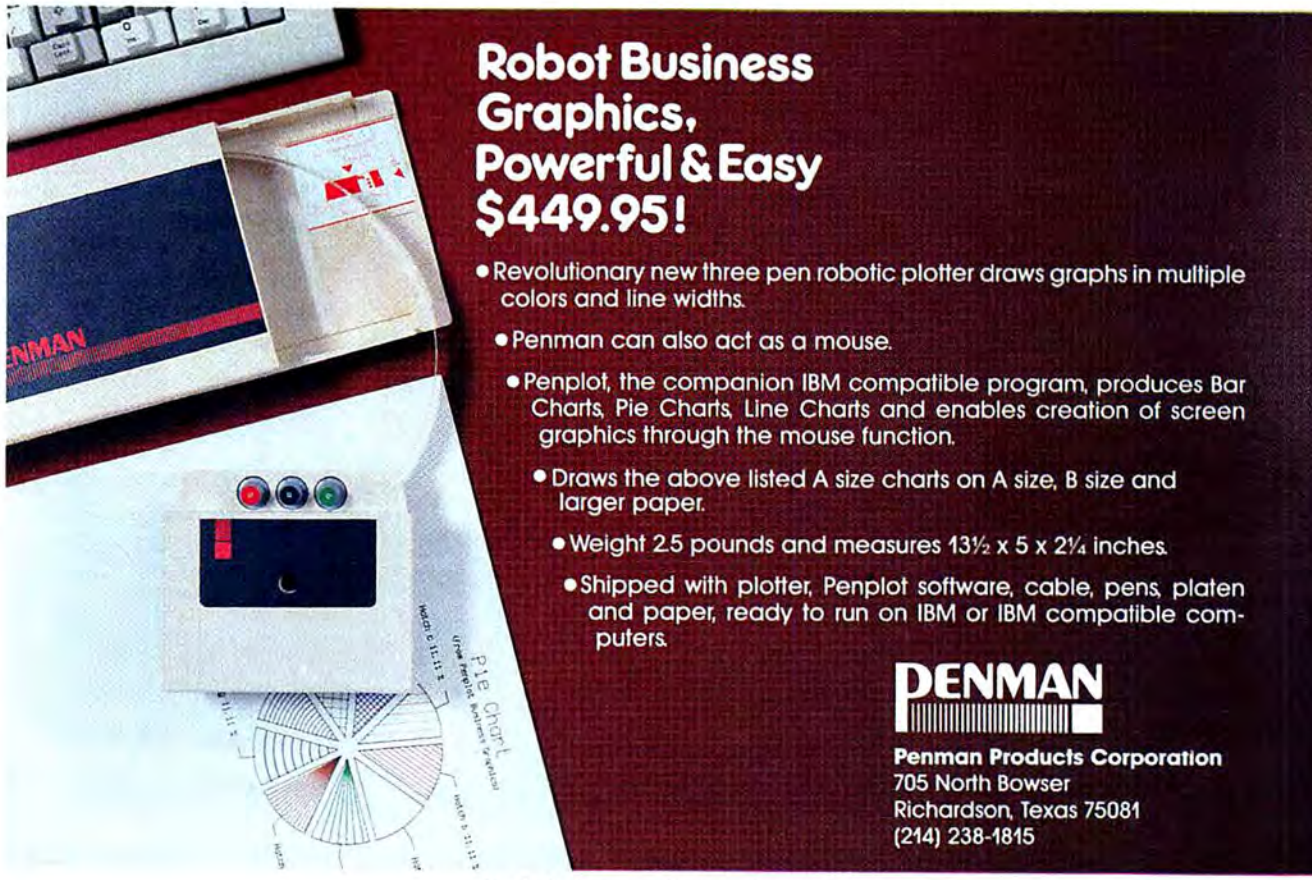
The renegades of Boca Raton had played havoc with IBM planning. Their dealers had undercut all of IBM's direct sales forces and dispatched the IBM Product Centers to never-never land. Their office automation strategy ran through a Cuisinart the efforts of other IBM units to develop a coherent scenario for large end users. ESD undercut IBM's minicomputer business and insisted on procuring its own local area network, called (what else?) the PC Network–which didn't make it any easier for IBM proper to construct a more comprehensive token ring network.

When Estridge's people were delivering, IBM's corporate chieftains had left them alone. As 1984 drew to a close and the list of ESD failures and gaffes continued to swell, ESD's protectors at IBM corporate began to defect. Estridge could count a fair number of critics within IBM even when he had ESD humming, and now the piper had to be paid.

In August 1984 a new IBM unit assumed responsibility for supporting PCs in IBM office environments. Another new unit, Information Programming Services, took charge of PC software. The PC Network was then shuffled to a group empowered to coordinate LAN strategy. In January 1985 IBM stripped PC dealer marketing from ESD and awarded it to the National Distribution Division, a New Jersey-based conglomerate that also runs third-party distribution programs, Product Centers, and direct mail marketing. Suddenly Estridge was invisible, and new faces began to emerge whenever IBM had something to say about the PC.

By March of this year, Estridge was gone from ESD, bumped up to corporate headquarters at Armonk to oversee worldwide manufacturing. On paper, it was a promotion. In practice, it wasn't, and IBM insiders knew it. Faced with a public relations disaster if Estridge were to quit, IBM cooked him up a high-level job. His salary

(continues)



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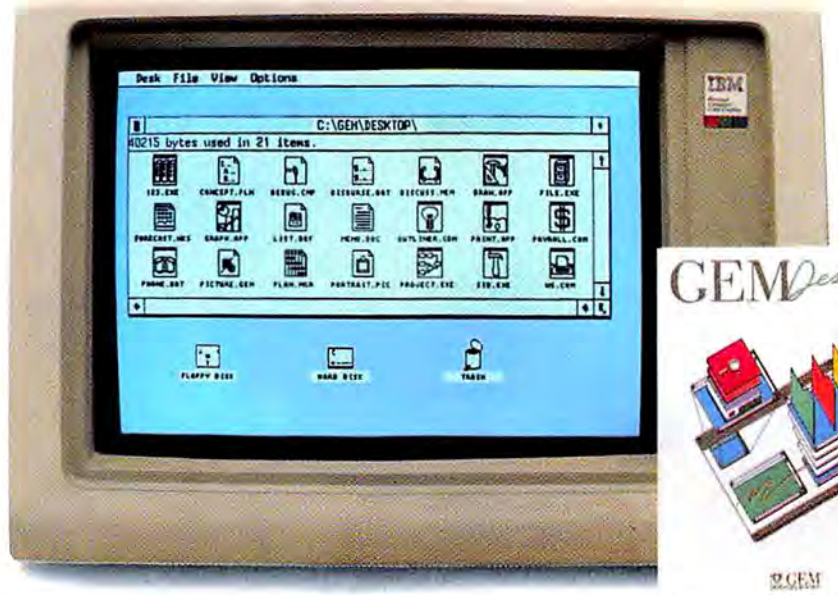

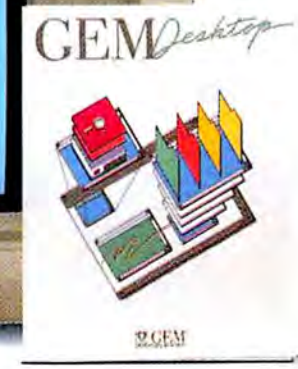

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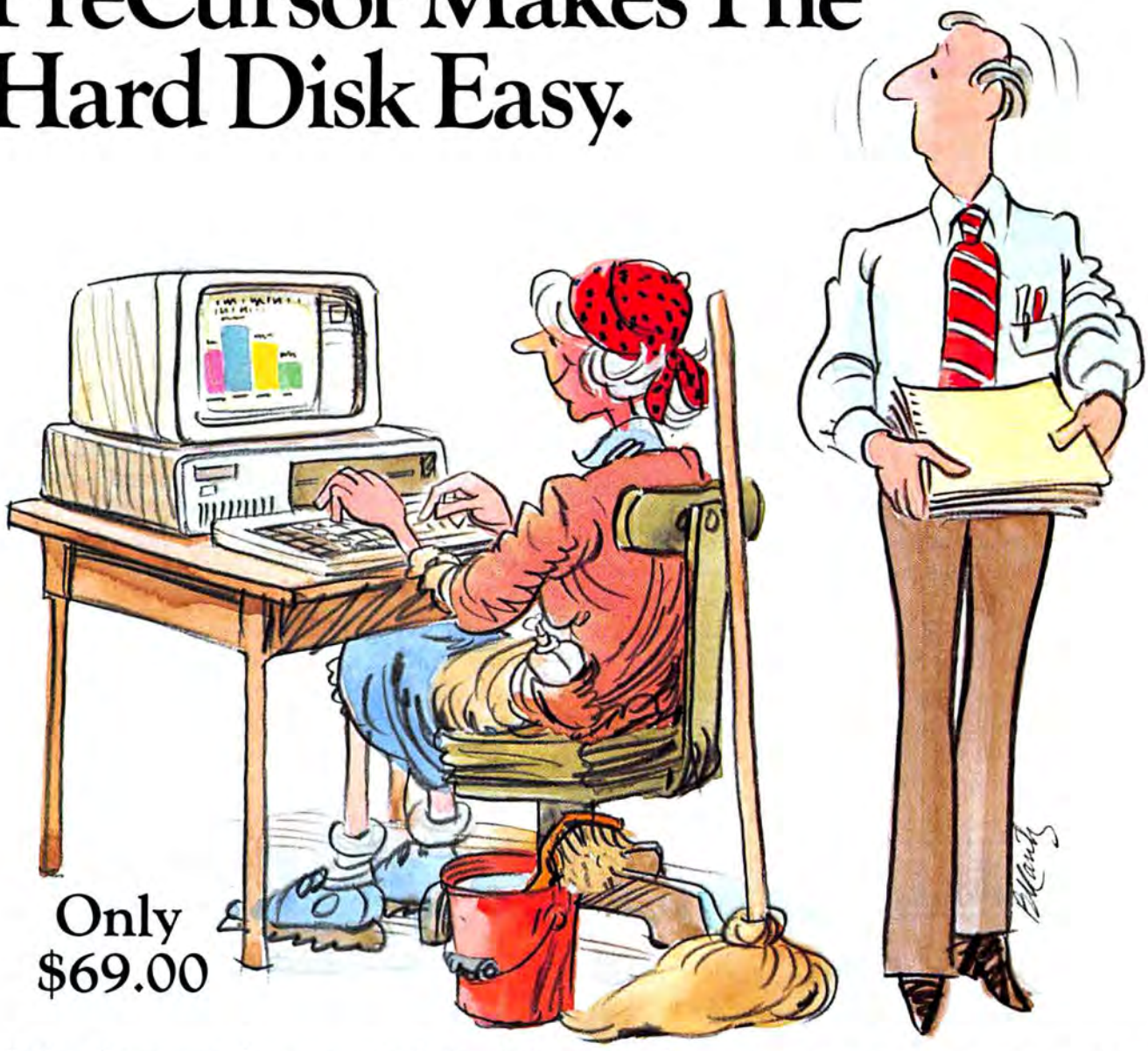

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rose, his perks no doubt increased, but at Armonk he became one of 20 decision makers. At IBM, manufacturing decisions are made several years ahead–and by committee. Estridge could exercise only a fraction of the real authority he had possessed at ESD.

ESD employees gave Estridge standing ovations as he toured division facilities on a farewell trip, and then they began musing about what would happen next. Estridge's successor, Bill Lowe, is known as a good administrator, a "chain-of-command guy," as one IBM staffer put it. The consensus is that IBM corporate is going to have a much bigger hand in IBM's PC business now; headquarters has been talking about things like integrated voice/data workstations, intelligent terminals, micro-minicomputers, OEMs. They haven't been talking personal computers, and they certainly aren't talking about entrepreneurship.

Sometime during the transition, Don Estridge cleaned out his office in Boca Raton. There, he had kept a large gray stuffed elephant, outfitted with pink ballet shoes–his symbol that the new, entrepreneurial IBM was tantamount to an elephant dancing. The fleet-footed pachyderm wasn't needed up in Armonk.

Estridge's departure signaled the end of an era. IBM had proved, ultimately, that it hadn't really changed. The company was centralizing again, and top management was yanking away the reins of control; the chain of command was being firmly reestablished. Big changes, changes toward conservatism, are afoot in IBM's PC business–the kind of changes old-line IBMers have been demanding for years.

Estridge and his team have much to recall and to savor. After all, they fueled the personal computer revolution and sparked their own small revolution in a traditionally sluggish and bureaucratic company. But then, revolutions have a nasty way of devouring those who incite them.

Brian Jeffrey is director of research for the International Technology Group, a Palo Alto, California-based firm that specializes in the monitoring and analysis of IBM.

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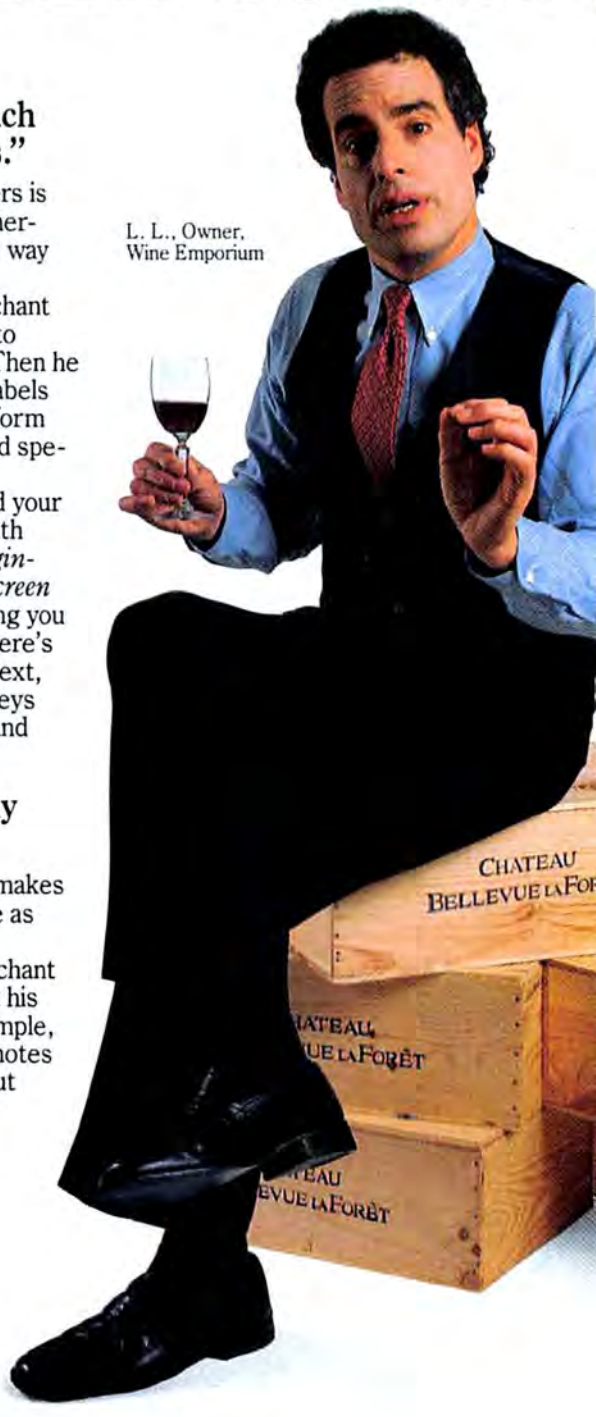

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Conversation With a Coho

A new twist on an old fable: it's a fish-eat-fish world and companies big and small are the bait.

Last January a peculiar article appeared in the *Washington Post*. On the surface it's about coho salmon, but I think that it's an allegory about the microcomputer world.

Researchers in Canada discovered that the coho salmon has two genetically distinct types of males.

Here's the meat of the article: "In most animal species, there is one basic form of female and one basic form of male. Not so among the salmon fishes. Evolution has given the coho salmon two kinds of males that differ markedly in form and behavior. One weighs eight to ten times as much as the other and takes half again as long to reach maturity. The two use completely different strategies for gaining access to the species' one kind of female. The big red-colored males, called hooknoses because of the shape of their snouts, fight one another to achieve classical hierarchy. The top-ranked male gets the female. The little silver-colored males, called jacks, have more ordinary snouts and gain their mating opportunities by hiding among the rocks until they can sneak into the females' nests while the big males are busy fighting. These differences have been known for some years by fish biologists, who have also seen the same differences among the chinook, or king, salmon.

"Scientists have generally assumed that the little males were pathological in developing sexual maturity while still so small. The jacks' practice of sneaking their mating opportunities was presumed simply to be making the best of a bad situation.

"Now a Canadian biologist [Mart R. Gross] has found evidence that the two kinds of males are about equally successful in reproducing. This, along with another study finding that the differences between the two kinds of males is hereditary, indicates that evolution has produced two different but equally stable strategies for the survival of males within a single species."

Does this story ring a few bells and toot a few whistles? Is it possible that the evolution of fish spe-

(continues)

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cies with two types of males competing for one type of female is a phenomenon mirrored in the business world? The females represent the customer, the buyer—the cash. The males represent companies of contrasting style and size. One group is the big and the powerful, the IBMs, the Digital Equipments, the Wangs. The other group is the clone makers, the peripheral makers, the nimble small-fry that always seem so pathetic in comparison to the big boys.

I wondered what could we learn from these fish and visited my friend, the Berkeley professor, in his laboratory high in the Berkeley hills. The professor had developed some electronic gear that allowed me to converse with the coho. I arranged to have both a hooknose and a jack in the lab in two separate tanks. The conversation was quite revealing.

First I talked to the hooknose, the big fish. I asked him if he was familiar with the little jack fish. "Yeah, those pip-squeaks that hang around all the time," he said. "Yeah, I'm familiar with them. They're useful and we welcome them. Although I'm not really sure how they survive, they help us."

"They help you?" I queried.

"Yeah, somehow. We've got these herds, I'd guess you'd call 'em, of female fish, and some of them can't be part of our harems, and the little fish somehow keep them from straying too far away. The little fish are kind of like sheepdogs."

"Are you aware that the jacks are mating with the female salmon? They're male salmon, just like you."

(continues)

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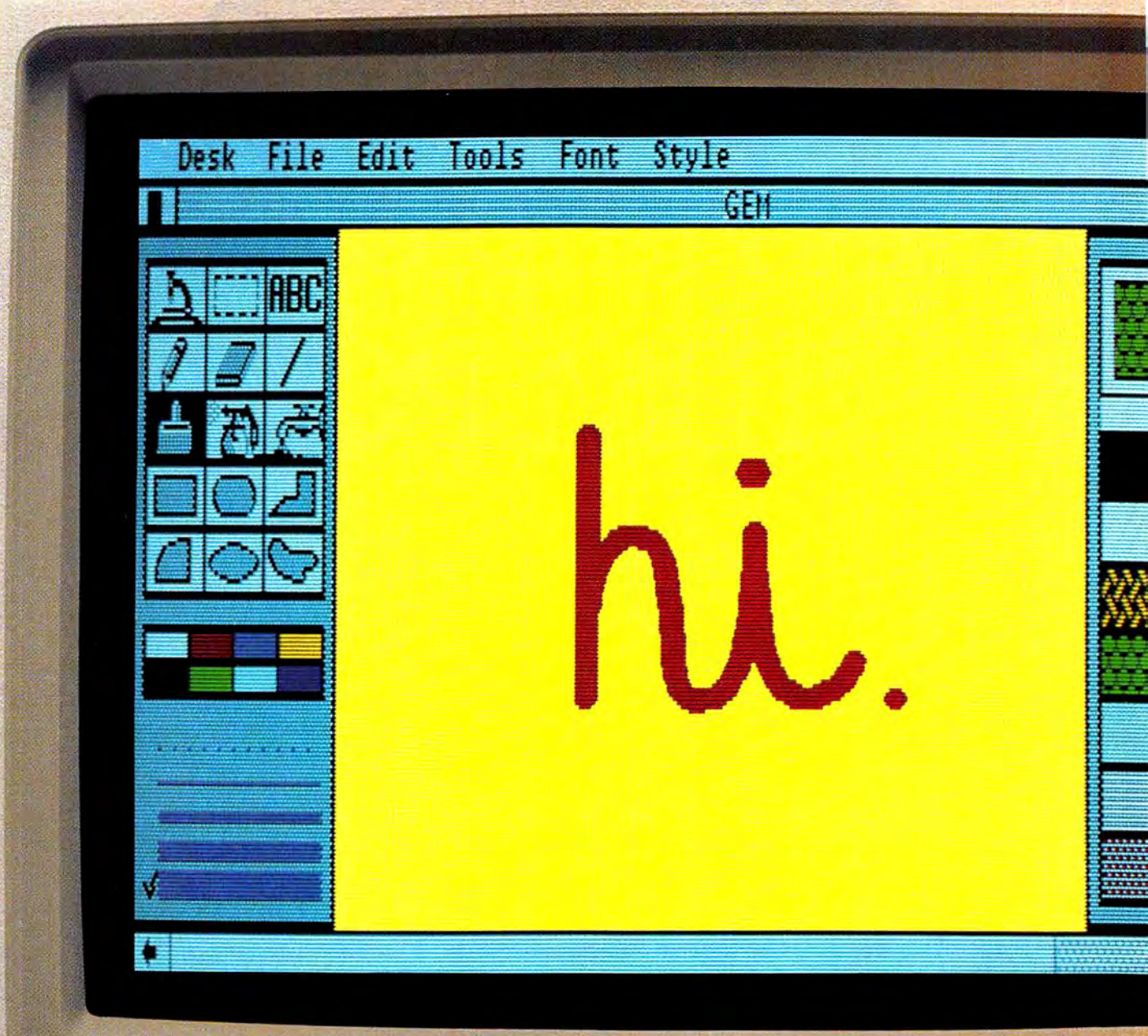

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"Those wimps! Give me a break." The hooknose angrily sloshed the water at the thought of it. "Don't be silly. Do they look or act like me? Do they want to fight among the great hooknoses? Of course not. They simply help the stragglers. I have no idea what breed of fish they are. Surely they aren't great salmon." The fish laughed an inimitable fish cackle.

So I went over to the jack fish and quizzed him. I asked him his purpose in life and his relationship to the hooknose.

"Ah yes, the hooknose. Big and dumb. I could be a hooknose if I wanted. Yup, no doubt about that. I just don't want to be, that's why I'm not. You get big like that and you lose control of the harem and other big hooknoses want to fight you all the time. We jacks believe in cooperation. We have all kinds of associations, for example. Lots of clubs where we exchange ideas and help each other. We also like to help the female who doesn't want to be dependent on the hooknose."

"I see that you realize you're a salmon just like the hooknose. The hooknose doesn't see it that way. Also you say that you can become a hooknose. According to recent studies you can never be a hooknose."

"Yeah sure. Look, I'm no different than the hooknose. I just don't eat as much. It's a known fact that we can become big hooknoses anytime. Ask any jack and he'll tell you the same. It's just that we choose not to. We can do a better job than the hooknose if we stay

(continues)

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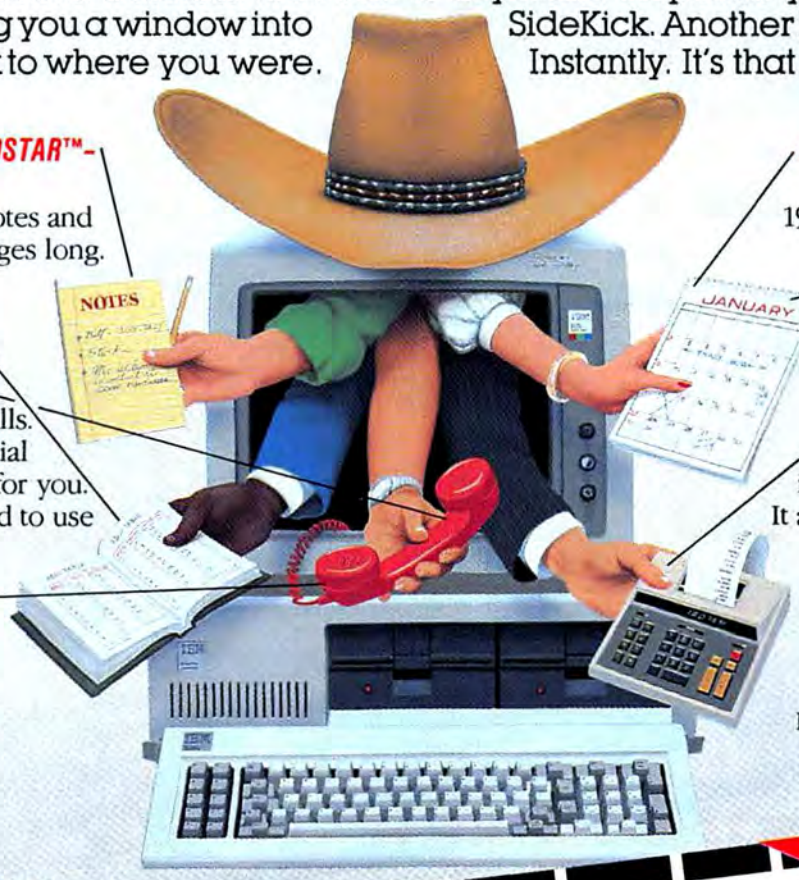

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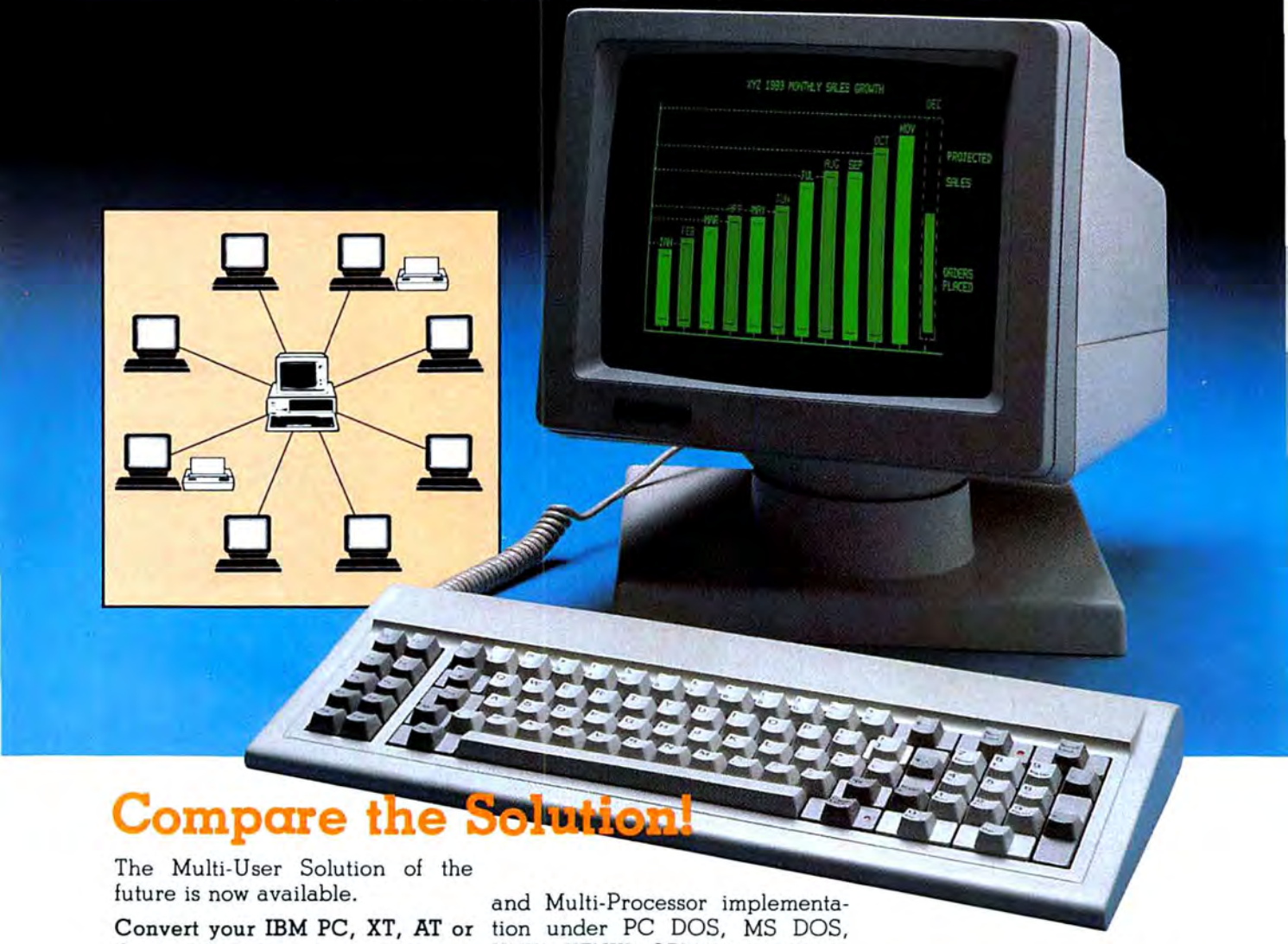

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small. As far as the hooknose thinking that we're not as good as it is: what do you expect? They are fish who have become ruthless and unfeeling. Look at the way they fight with each other."

So I put both fish in the same tank to see what would happen. The hooknose paid little attention to the jack. The jack skittered around nervously. "Boy I'll bet that big slob would like to destroy me," the jack mumbled to himself.

I asked both fish why females liked them. "Because I'm the meanest of the mean," said the hooknose. "I can outswim and outfight and outfox any other hooknose within ten miles. I can handle 100 females."

"Females like me because I give them special attention. One at a time," said the jack. "Most of the female fish aren't impressed by the hooknose. Most of them would rather not be in a harem, except for the females who are insecure."

Meanwhile the hooknose was still extolling his big fish bravado. "I'm so mean that even bears fear me." He laughed. "Watch this!"

Before I could stop him, the big salmon leaped into the air, dove back into the tank, and in a split second ate the jack fish! "Am I some kinda fish?" he said.

He looked around the tank and said, "Hey! Where'd the little guy go?"

John C. Dvorak is a writer and editor in Berkeley, California. He recently edited Dell Publishing's Dvorak's Instant Expert Series, *and his columns are featured in the* San Francisco Examiner *and* Infoworld.

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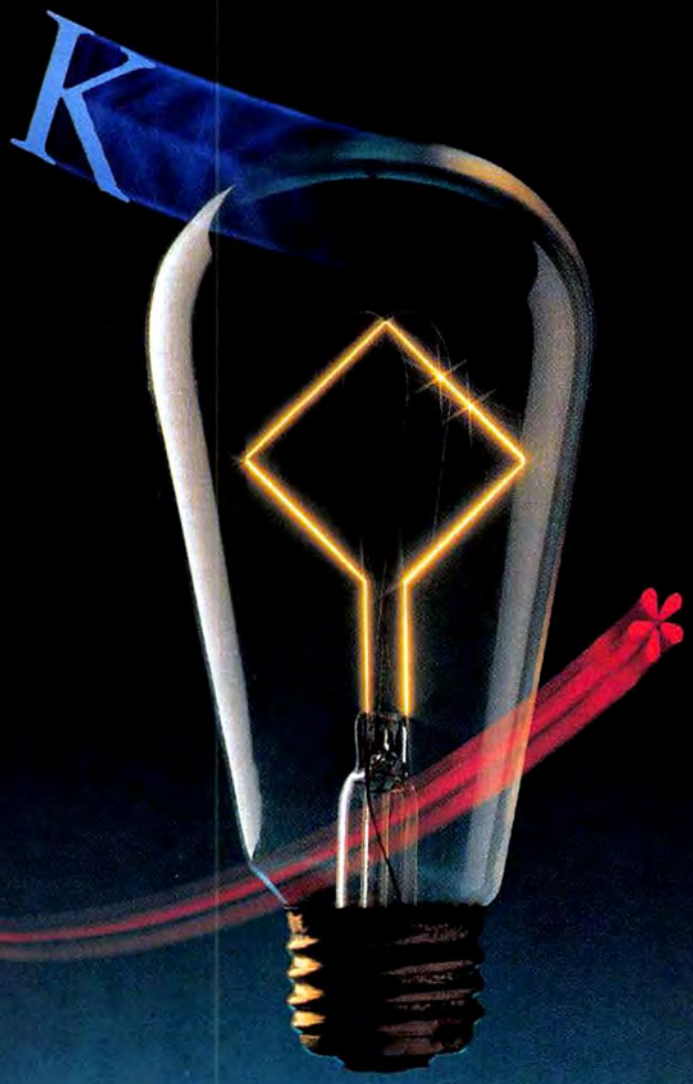

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Letters

Reactions and responses from the PC World community

What Price Glory?

In the February issue of *PC World* ["Adding Up the Costs," *PC World View*], the management consulting firm of Schonfeld & Associates claims IBM will spend $1.3 billion in 1985 for television, radio, print, and direct mail advertising.

We consider IBM advertising expenditures to be confidential and do not make those figures public. I can, however, say that $1.3 billion is an absolutely ridiculous overestimate. Such an amount would make our advertising expenditures about half a billion dollars greater than those of Procter & Gamble, which is by most estimates the nation's largest advertiser.

Charles Francis
Director of Advertising
IBM
Armonk, New York

Schonfeld & Associates stands by its projection for IBM's 1985 advertising expenditures. But according to the Television Bureau of Advertising in New York, IBM's 1984 outlay for TV ads promoting computer hardware and software totaled $58 million, with an additional $1 million for its product centers. Adscope, *an advertising industry trade publication, reports that IBM spent $17 million for advertising in business and industry journals last year. –Ed.*

Park Your Portable

Edward Fischer's article, "The Practical Portable" [*PCW*, April 1985], omits an important warning: Before transporting any machine with a hard disk, always run a utility program to "park" the drive head. This is true even if the computer is merely being moved across a room. Failure to park the read/write head can mean permanent data loss should the head come in contact with the platter. The parking procedure moves the head away from the data area of the platter; if the computer receives a jolt, there is a reasonable chance that your data will survive intact.

Software to park IBM's hard disk is supplied on the Diagnostics disk; third-party drives usually come with a disk containing a utility for parking. Some hard disk machines park the head automatically when the power is shut off, but these are rare.

Randy Peck
Bell, California

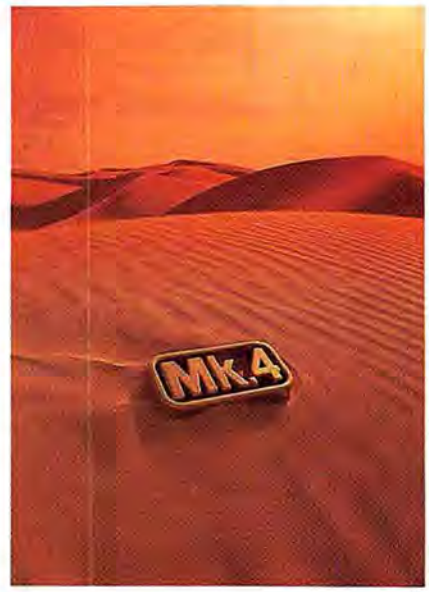
Thanks for pointing out the oversight. As you mention, parking the read/write head is good practice regardless of the length of your journey. Incidentally, portables equipped with hard disks that automatically park the head are becoming even rarer. Effective last December, the Compaq-Plus no longer comes with an automatic head-parking capability. The company says it's convinced that each hard disk's triple shock mounting is adequate to protect the platter and prevent data loss. –Ed.

Accountants Accountable?

Regarding Robert Leach's reply to James Spinelli [*Letters*, *PCW*, April 1985]: Mr. Leach and the rest of the accounting profession are kidding themselves if they believe that the client decides what computer hardware or software to buy.

When advising clients on the implementation of computer systems, accounting firms follow cer-

New Generation Communications



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tain procedures designed to document their activities and protect them from liability. Inherent in those procedures is a bias toward the most conservative alternatives–a bias that tends to rule out products from new or very small companies in favor of those from established suppliers (like IBM).

When auditing a client for whom it has made purchase and installation recommendations, the firm is in the position of reviewing its own work. I don't see how an auditor's independence can fail to be compromised.

While Mr. Spinelli's evaluation of Arthur Andersen's marketing strategy may be a little harsh, his criticism has merit. Mr. Leach, on the other hand, needs to descend from his ivory tower and recognize that along with the authoritative image Arthur Andersen and the other Big Eight firms have worked so hard to promote comes a disproportionate amount of power to influence the public and its perceptions of the computer industry.

Eric Weiss
Akron, Ohio

Focus on Focus

I found your misleading description of *PC/Focus* in *PC World*'s February issue ["A New Focus on Data Management"] a cause for amazement and concern. I've participated in an evaluation of Focus as a replacement for COBOL on a large corporation's mainframe system. We encountered so much difficulty that we were forced to hire a veteran Focus programmer. I've recently spent some time looking at *PC/Focus* and to my dismay found it almost exactly like mainframe Focus.

PC/Focus is poorly documented, ambiguous, and confusing. It is certainly not easy for the novice to master. To become proficient with the program you must work with someone who already knows it. The manual is disorganized almost to the point of uselessness.

"I'm having that printed right now."

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Through omission, your article implies that *PC/Focus* on a stand-alone PC is adequate for business applications. My experience has shown that the costs for initial acquisition and training can only be justified in a multiuser environment. Stand-alone projects are generally not sophisticated enough to take advantage of the program's complex data structures.

There's usually an immediate wave of interest in any product reviewed in your magazine, and I expect to see an epidemic of *PC/Focus*-itis.

Mark Gerow
Palo Alto, California

My article ran in the "State of the Art" section and was not a product review. Accordingly, I concentrated on the conceptual advances inherent in PC/Focus *and other fourth-generation systems.*

I concur with Mr. Gerow that PC/Focus *is flawed, but I don't accept many of his conclusions. As my article made clear, it is true that* PC/Focus *is poorly documented. Its "confusing" and "ambiguous" nature can be attributed to both the poor documentation and some programming quirks.*

The ease-of-use issue is interesting. As the article states, a casual programmer may have difficulty setting up a PC/Focus *data base and data entry system; indeed, a professional may be required. What Mr. Gerow overlooks is that a data management system's main day-to-day function is report creation—and that is where* PC/Focus *shines. Virtually anyone can spend a few hours learning the program's TableTalk feature and then be able to create reports that would normally take a* dBASE II *programmer several days to code.*

The similarity of PC/Focus *to mainframe Focus that so dismays Mr. Gerow has been a major boon to the many corporations that already use mainframe Focus and do not need to retrain programmers to write PC applications. FileTalk and TableTalk, both part of* PC/Focus *but not yet part of mainframe Focus, demonstrate that Information Builders is attempting to tailor its product to the PC market.*

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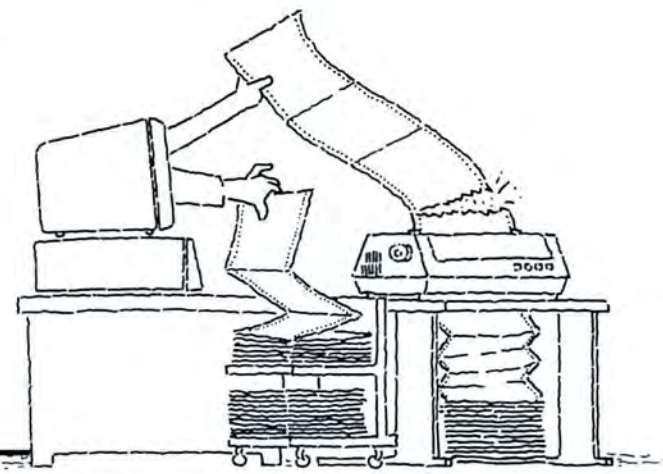

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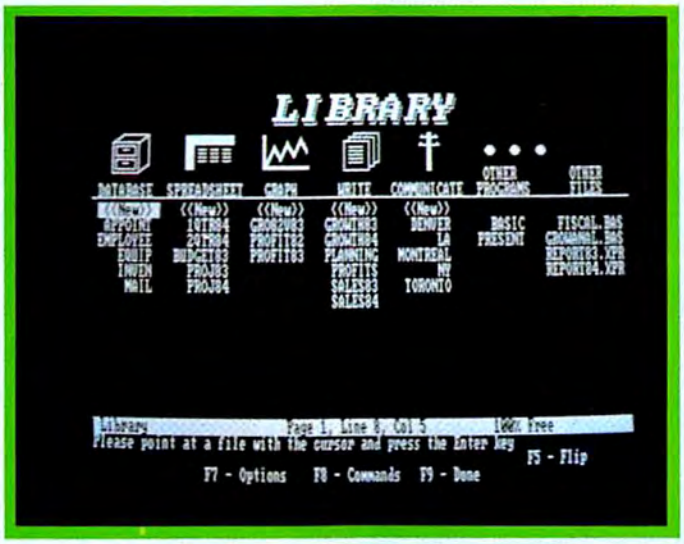

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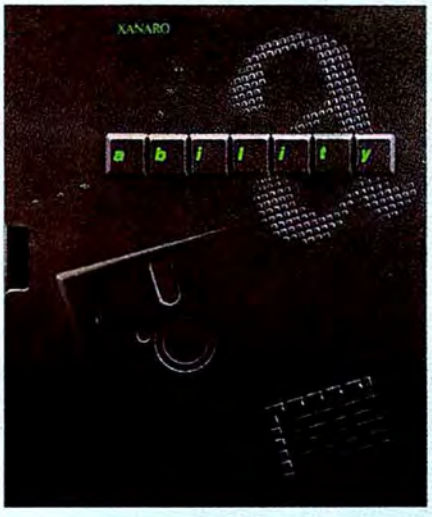

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Finally, I never intended to imply that every small business should buy PC/Focus. *Neither do I regard Focus as the ultimate fourth-generation language. But I stand by my contention that fourth-generation languages are the data processing workhorses of the future and that* PC/Focus *is an extremely powerful product with a few unsettling idiosyncracies and a terrible manual. –Warren Sirota*

The Lonely LAN

In "Six Leading LANs" [*PCW*, February 1985] why was there no mention of NBI's Multinet? It is a proven, top-rated system, offering features and capabilities unmatched by most LANs.

James Lee
Cleveland, Ohio

The article in question focused on a select handful of the approximately 225 local area networks now on the market. Each of the six LANs reviewed is an entry-level offering from a market leader in the PC-based LAN field, and each company boasts an installed base of networks. The selection was not intended to be comprehensive but rather to offer PC World's *assessment of products from a half dozen major players. –Ed.*

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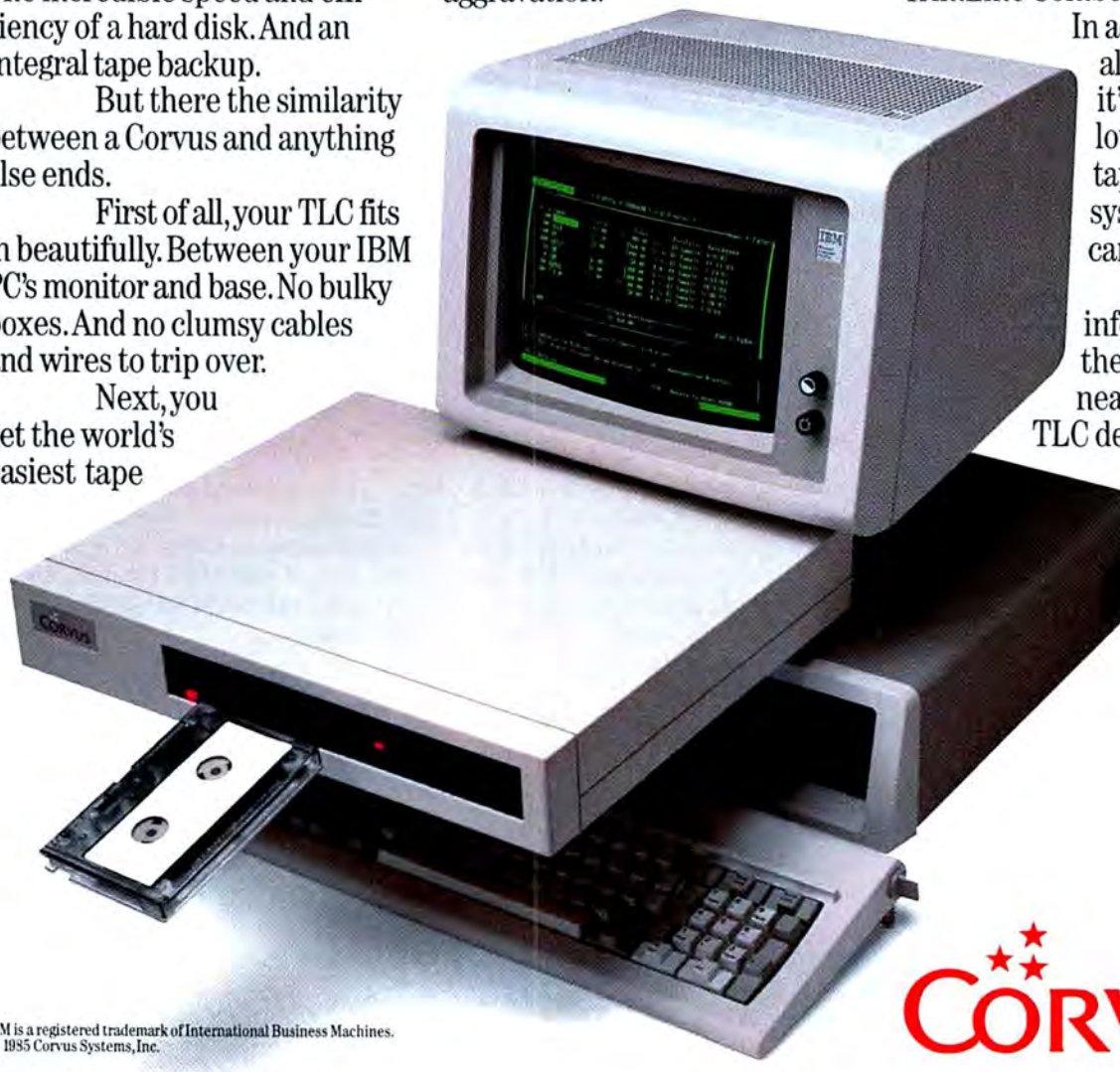

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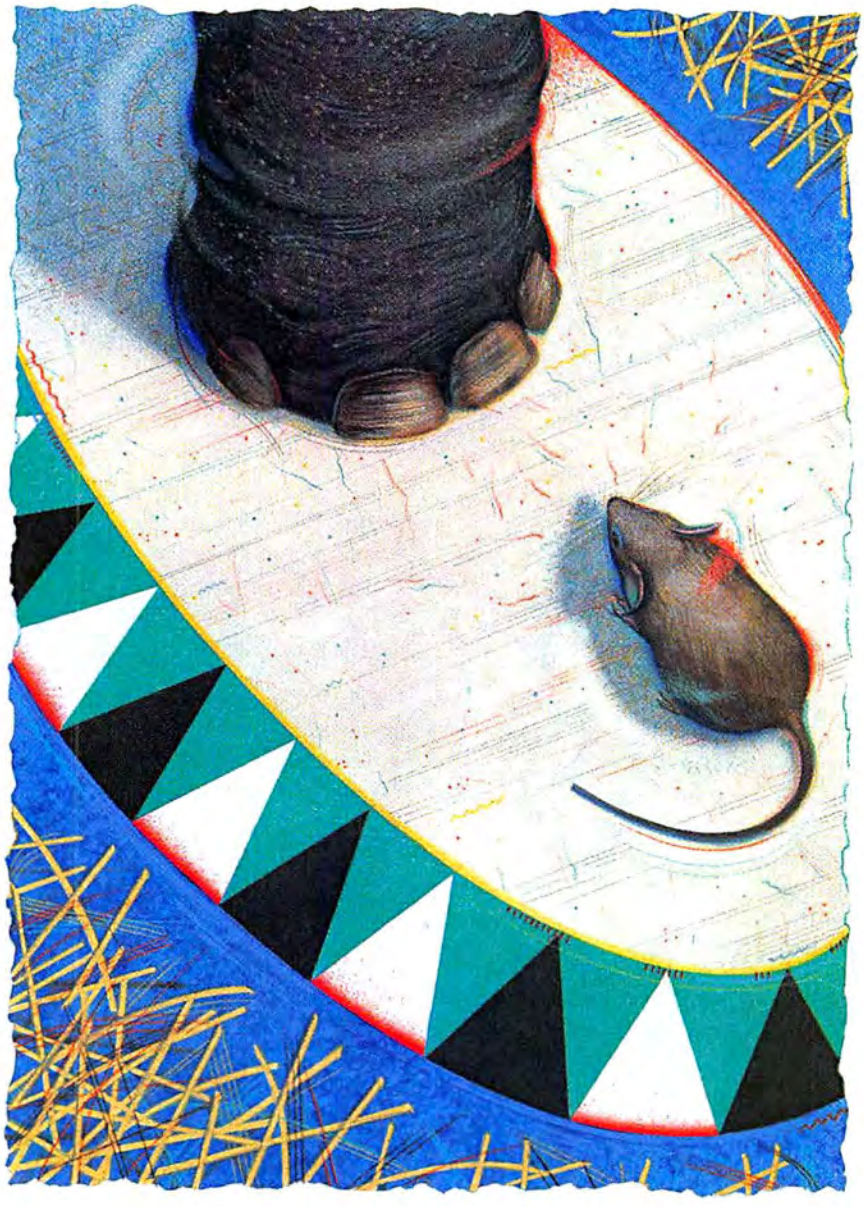
Me and My Shadow

Compaq is successfully vying with AT&T for the affections of corporate buyers who'd rather not try IBM.



It just may evolve into a rite of spring.

Twice now, AT&T and Compaq have unveiled major, strikingly similar products within hours of each other. This past March, AT&T's UNIX PC and Compaq's TeleCompaq said hello to the world virtually in unison. Both products marry the computer to the telephone in quest of an elusive, but supposedly lucrative, market for integrated voice/data (IVD) capability.

PC World View *reports new developments in computer technology, items of interest to computer enthusiasts, and the most significant and enticing insights about industry trends and personalities. We've reserved the "Grapevine" section of this column for industry reports that are still at the speculative stage.*
–Ken Greenberg

View

News and notes for the computing community

This funny coincidence reminded me that it's been a year since last summer's opening skirmish, which began a tendentious and expensive campaign to supply the corporate exception to IBM. Last month Compaq's Deskpro and AT&T's PC 6300 marked their first birthdays on dealer shelves and executive desk tops.

As fiscal realities whittle down the number of manufacturers in IBM's ring, and as Fortune 500 buyers line up behind the few viable alternatives to the PC, the XT, and the AT, these two disparate contenders find themselves squaring off aggressively. Based on the available evidence, round one clearly went to the upstart from Texas.

This is a tale of two machines, one market–albeit two sometimes indistinguishable machines. Ticking inside both the Deskpro and the PC 6300 is Intel's 8086 CPU; both computers support text and graphics on the same monitor; both occupy the same niche as high-performance alternatives a step above the PC and the XT and a step below the AT. The two are similarly priced; the Deskpro ranges from $2495 to $7195, the PC 6300, from $2745 to $6170. Even marketing ploys for the two machines strike similar chords: some dealers who carry both have priced and promoted them as if they were interchangeable. And in paired promotional tactics, AT&T gave its top dealer free tickets and an expenses-paid jaunt to the Super Bowl; Compaq delivered a BMW 325E sedan to its favorite retailer.

But sales figures tell all. By December 31, the Deskpro was outselling the PC 6300 by 1.5 to 1. AT&T had reportedly projected first-year sales of 250,000 units; carve that down by a factor of 10 and you're close. The former Ma Bell shipped some 29,000 units, according to Dataquest, a San Jose-based market research firm. On the other hand, Dataquest reports, Compaq exceeded its 40,000-unit goal by 2000 machines. And Dataquest's preliminary figures indicate the trend will continue this year, with Compaq selling 167,000 machines to AT&T's 87,000. (The Dataquest estimate does not take into account the market's response to Compaq's new 286 family.)

The crucial distinction between AT&T and Compaq is marketing. Compaq is good at it, AT&T isn't–at least not yet. Compaq sells computers exclusively through the dealer channel. AT&T uses both dealers and direct sales, which compete with each other but, if delicately balanced, can offer a double whammy in revenues. While AT&T bungled the balancing act, Compaq courted dealers, found out what they ate for lunch, considered their every need–and offered irresistible margins. Everyone knows AT&T, but name recognition must be attached to something; Compaq's blossoming recognition counted for a great deal more than three initials with no track record in personal computing.

Most observers initially expected a clash of the titans rather than a sideshow of elephant versus mouse. AT&T, $33 billion strong, seemed primed to go head-to-head

(continues)

Me and My Shadow
(continued)

against IBM, at $46 billion and counting. "Here's a company that can afford to sit there and blow money all day long," says Dataquest analyst Peter Teige. Indeed, AT&T bought its way into the personal computer business through 25 percent ownership of Ing. C. Olivetti & Company, manufacturer of the PC 6300. But Teige and other analysts are still wondering whether AT&T's conservative management style is sufficiently fast and flexible to succeed in the personal computer business.

Compaq benefited from a quick start. At COMDEX Fall, Compaq president Rod Canion estimated Deskpro sales at 5000 per month, and product marketing vice president Mike Swavely reported counting 800 dealers the day the Deskpro was announced. That's substantially more than the 97 Teige tallied for AT&T on release day. AT&T has since cranked up to 900 dealers, a number it hopes to increase to 2000 by year's end. Compaq dealers reportedly now exceed 1000.

Part of the initial problem was AT&T's approach. Jan Lewis, senior analyst for the market research firm InfoCorp, recalls a major dealer who expressed interest in the PC 6300 and was subsequently deluged with 17 forms inquiring why he was worthy of carrying the machine. Seymour Merrin, chairman of Connecticut-based ComputerWorks, offers a somewhat different lament: "No one bothered to come by and talk to me. AT&T's marketing act is not together. It has no real commitment to the dealer channel. You can trust Compaq." Businessland cofounder Enzo Torresi says his firm looked at the PC 6300 when it was introduced but backed off because the AT&T machine seemed superfluous. Dealers also are irked by the discounts AT&T offers large corporate customers through its direct sales force. These reductions range from 10 percent with the purchase of 5 to 9 machines, to 40 percent for 1000 machines or more.

Evidence indicates, however, that AT&T has begun to catch on to the dealer side of the equation; recent reports suggest margins may have crept above those of Compaq and IBM. That trend tends to confirm suspicions that AT&T is dead serious about the MS-DOS marketplace. Based on figures from Adscope of Goldendale, Washington, which tracks computer-oriented advertising, during the last half of 1984 AT&T spent $4.3 million in print advertising for the PC 6300, compared with Compaq's $1.4 million for the Deskpro. But the big bucks wound up on the tube. In its first deregulated year AT&T peeled off nearly $27 million for television ads, ranking as 1984's third-highest spender in the computer sweepstakes (behind IBM and Apple). Compaq placed eighth, dishing out $9 million, according to the Television Bureau of Advertising.

In AT&T's brash ad campaign launching the PC 6300, the machine is plopped in the middle of a game board, and the adjoining text celebrates the telecommunications king's century-long tradition. Are we playing monopoly? It's not clear. "Now the game begins," AT&T informs consumers. Someone should remind AT&T that no one's starting from scratch in this game. *–Jane Ferguson*

Postscript: *PC World* Technical Editor Karl Koessel recently endured that post-AT&T-dissection ritual of obtaining telephone service from a Baby Bell and a telephone from what's left of Mother. Koessel wasn't surprised to see AT&T staffers plunking away on NCR hardware, but he raised an eyebrow–and a smile–at Pacific Bell employees equipped with PCs ... from IBM.

Rubbing Two Chips Together

When you're a Boy Scout and you're camping out under the stars on a cold night, there's nothing quite like the glow of a warm CRT to take the chill off the evening. Assuming you're supported by plenty of floppy disks and a surge protector, you can brave the elements with ease–and earn that merit badge in computing.

Twenty San Francisco Bay Area Boy Scouts embarked on precisely that quest a short while back, converting the roof of a 45-story Financial District skyscraper into a high-tech bivouac dubbed Skycamp. The three-day foray into the urban wilderness ranged from the traditional–cooking, pitching tents–to the esoteric–meteorology, astronomy, communications. Training Works, an arm of ComputerLand San Francisco, developed the Scouts' computing regimen. These hardy would-be hackers received a smattering of computer history, architecture, and languages and topped off their research with exercises in programming. Thirteen Scouts ultimately descended with merit badges in hand.

Next thing you know, SYSOPs will be angling for Scout Master.

Grapevine

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Spreadsheeting

Just when you thought you were safe from compatibles, workalikes, and copycats, it's time to gird yourself for a new round of cheap (but potentially worthwhile) imitations. It's the summer of *1-2-3* clones, so be on the lookout for releases from the aforementioned Paperback Software and Borland International. At under $100 each, these packages may force even 47th St. Photo to duck.

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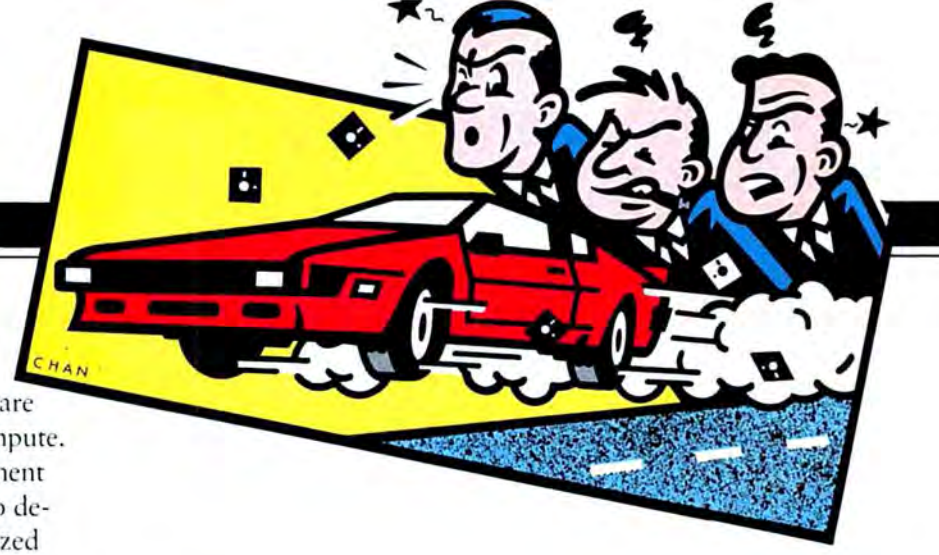
Jr Redux

According to a technical writer we know who possesses impeccable connections with IBM, PCjr production will resume eventually, although the machine will probably be sold under a different guise. This information meshes nicely with a report that layoffs at Teledyne–actual manufacturer of the late, lamented Jr–were not as extensive in the Jr division as was first reported.

It seems that a number of companies that had ordered the Jr in bulk were particularly irked by the machine's abrupt cancellation; they promptly received assurances from IBM that Jr would rise again.



Honk if You Love Lotus

The best-laid plans of software companies don't always compute.

Last year Lotus Development ran a promotional contest to determine which of its authorized dealers could sell the most copies of *1-2-3*, the company's popular spreadsheet program. The prize, appropriately enough, was the company's wire-wheeled namesake, a crimson Lotus coupe.

The results confirmed that New York City's 47th St. Computer, a division of 47th St. Photo, had moved more copies of *1-2-3* than any dealer in the country. Imagine Lotus's surprise when the largely mail-order concern turned out to be a sometime participant in the notorious "gray market"—that netherworld between authorized distribution and outright bootlegging where discounts are deep enough to give software developers gastric upset. According to a spokesperson for 47th St. Photo, Lotus delivered the car anyway, quietly consigning its faux pas to history. Lotus declined comment on the episode.

Last we checked, 47th St. Photo, which has slid in and out of the gray market, has apparently again gone gray. The company's frequent spreads in the *New York Times* advertise *1-2-3* at a "special" undisclosed price.

OptionWare's Oops

"Never," says Murphy of Murphy's Law, "write anything down that might go into a 'Pearl Harbor file.'"

Someone should have whispered that to the earnest programmers at OptionWare. The company's product line includes roughly 60 *1-2-3* templates on everything from budgets to sales. If the prospect of using *1-2-3* fills you with fear and trembling, OptionWare's just the ticket: it tames Lotus effectively (see *From the Software Shelf* in this issue).

During the course of ripping through *1-2-3*, the OptionWare developers compiled a lengthy list of Lotus offenses—and left it on a demo disk under the file name Wishlist. That disk recently found its way, innocently enough, to *PC World*.

The OptionWare litany includes detailed recommendations for exterminating bugs and enhancing *1-2-3*'s data functions, graphics, programming, and macro capabilities. It's just a shame the folks at OptionWare neglected, in a few places, to heed their own advice.

Item one: OptionWare sincerely wants *1-2-3* to be able to export records to another source, such as a data base; *1-2-3* can import data, of course. OptionWare can do neither.

Item two: OptionWare would like the capability of reassigning <F1>, the *1-2-3* help key, to be its own help facility; pending that, OptionWare opted to drop *1-2-3*'s help menus but didn't bother to replace them with adequate help screens of its own.

Item three: OptionWare would like Lotus to expand the means of defining the dimensions of a worksheet (to print in segments, for example). OptionWare, however, wasn't able to overcome this deficit; its templates lack a meaningful way of eluding the web of macros that form the foundation of the program. Accessing portions of a worksheet directly can't be done without invalidating the macros themselves.

In hindsight, a Range Erase might have been a prudent fate for Wishlist.

The Big Fix?

Are the big boys of computer retailing purposely bypassing products from software vendors whose pricing they consider too low?

Adam Osborne is miffed. Packages from Paperback Software International (PSI), Osborne's latest venture, aren't showing up on ComputerLand's shelves, and he's making his gripe public. He claims that the mammoth chain's corporate office has snubbed PSI's product line because its price range—$19.95 to $69.95—is "too low to fit into their current marketing plan."

Ron Ogg, PSI's executive vice president, suggests the move is part of a trend that tends to shut out bargain-basement vendors. (Bookstores are PSI's preferred channel of distribution.) Retail profitability appears to be the key issue. "Major retail chains like ComputerLand don't want to carry low-priced, high-quality software that might compete with a similar but higher-priced product," Ogg says. He reports that Entre Computer Centers and Businessland have likewise given Paperback's products a cool reception.

PSI isn't alone. Borland International, which has made a bundle selling lots of product for not a lot of money, has experienced similar difficulty in distributing its popular line to some major chains. According to a Borland insider who asked not to be identified, "We were surprised that ComputerLand, Businessland, and some of the other big chains were reluctant to deal with us on the corporate level. But most stores are used to getting incredible markups on high-priced software. With us, they feel they're not making the profit they should be."

ComputerLand says its decision not to carry PSI stems from the product line's content, not its cost. Dianne Douglas, ComputerLand's manager of public relations, doesn't dispute PSI's contention that its products don't jibe with the chain's marketing strategy. "Pricing is not the issue," she says. "From a business standpoint we see no reason to add PSI, because its products contain no significant features to distinguish them from packages we already carry." At the same time, Douglas notes that ComputerLand's buyers "disagree with the concept of PSI and feel that the company cannot compete successfully with our existing products." ComputerLand does, however, stock *SideKick*, Borland's runaway hit.

At Businessland, corporate communications director Susie Crocker acknowledges that her company stocks neither Borland nor Paperback products. "Every product we carry is evaluated by the same criteria—and price is not one of the factors we consider," Crocker explains.

For Robin Tygh, Borland's director of corporate communications, this current tiff illuminates the larger issue of how—and at what level—software should be priced. "Since we've been dealing with ComputerLand for some time now, pricing is no longer an issue," she says, "although it was early on. Our products weren't taken seriously because they were priced low. We think there's an inkling of a trend here: software prices are starting to come down."

Buyer prepare. —*Wes Nihei*

An Altered Mindset: Too Much, Too Soon?

It was supposed to be the definitive graphics engine, the perfect marriage of PC compatibility and cutting-edge technology. Born about the same time as the Mac, it shared magazine covers with Apple's pride, got great press, even won a home in New York's Museum of Modern Art–and then all but disappeared.

It was and still is the Mindset PC. When Mindset Corporation priced its machine well above the less artistically endowed competition, it bet on the importance of graphics in the PC marketplace–and lost. The Sunnyvale, California, company recently reorganized, cut its 67-member staff by half, and, in the words of company spokesperson Chris Berg, "scaled back our expectations."

According to Berg, Mindset relied on the imminent introduction of products like *Microsoft Windows* to spotlight the machine's graphics capabilities; the Mindset can handle the graphics needs of windowing programs with speed and grace. But *Windows* isn't out yet, and the crowd awaiting the fireworks has given up and gone home. Berg also notes that soon after the product's introduction in March 1984, "market positions changed considerably. The supply of IBM PCs swelled tremendously, and it became very tough for a non-brand-name machine to succeed" (see *Compatibles Update*, *PCW*, March 1985).

As Mindset's sagging fiscal posture became public, industry scuttlebutt hinted at a possible reunion with Atari, the firm from which Mindset cofounders Roger Badertscher and Bruce Irvine hailed. Word was that Atari chief Jack Tramiel would acquire Mindset–perhaps to counter Commodore's dazzling-but-unseen Amiga–but merger talks ultimately fizzled. In the absence of a buy-out, Mindset went back to its marketing drawing board.

The Mindset PC was originally sold alongside other PC compatibles in 120 outlets nationwide, with CompuShop a major retail vendor. Mindset also wooed ComputerLand franchisees and won shelf space at a few southern California stores. But shelf space wasn't enough: most dealers had neither the time nor the expertise to show the computer's capabilities to best advantage. Mindset's new policy, based on what Berg calls "natural selection," is to remove the machine from retail channels and concentrate exclusively on the only outlets where it has sold well–value-added resellers (VARs) catering to vertical markets.

"Our typical buyer wasn't the kind of person who would walk into a computer store," says Berg. Mindset customers were interested in graphics, not computers, and the machine's PC compatibility was "tertiary in importance" to its potential market. (In hindsight, Mindset's refusal to tailor its machine to the business graphics market may have been its downfall. One of this year's hot items–the VideoShow 150, a dedicated computer that excels at presentation graphics–is aimed straight at the hearts and aesthetics of the Fortune 500; see "Show Business," *PCW*, June 1985.)

Instead of stressing its product's kinship with the PC, the company intends to cultivate a following by playing up features like the computer's sophisticated video production system. Berg cites design departments in universities and CAD (computer-aided design) markets as possible founts of interest.

Is the design-and-draw market sufficient for the Mindset? Berg thinks so. "We have a much smaller organization to support," he says wistfully. *–Darcy DiNucci*

Jane Ferguson is a stringer for Time *magazine and a regular contributor to* PC World. *Darcy DiNucci is Assistant Editor for* PC World, *and Wes Nihei is Editorial Assistant for the magazine.*

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The Help Screen

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This month: fixing the 'ANSI.SYSSI.SYS' error, handling simultaneously OPEN BASIC files, patching WordStar for COM2:, linear programming packages, and a correction of April's discussion on transferring worksheet ranges.

Karl Koessel

ANSI Systemic

Q. I'm interested in using WordStar *on my Key Tronic keyboard, which follows the Dvorak layout. I am, however, having difficulty accomplishing the ANSI.SYS keyboard redefinition as described in your January 1985 column. I believe I have accurately followed the directions to construct the CONFIG.SYS file; I've also COMPared the original ANSI.SYS file on my DOS disk with the copy on the disk I am using. But when I boot that disk, the message 'Bad or missing ANSI.SYSSI.SYS' appears at the top of my screen. The command* TYPE CONFIG.SYS *displays the line 'DEVICE = ANSI.SYS', so I don't understand why I'm receiving this error message. Any ideas?*

Maureen McClennan
San Francisco, California

A. Both DOS 2.00 and DOS 2.10 contain a bug that prevents them from finding a device driver file if an end-of-file marker (^Z) immediately follows the driver's file name in the CONFIG.SYS file. When using the command *COPY CON CONFIG.SYS* or *COPY CONFIG.SYS + CON* to create a CONFIG.SYS file for these versions of DOS, remember to press the <*Space*> bar or the <*Enter*> key after entering the line *DEVICE = ANSI.SYS* but before pressing <*F6*>. This ^Z bug has been eliminated from DOS 3.00. To fix your CONFIG.SYS file so DOS 2.00 or 2.10 can read the driver's file name, place your disk in drive A: and type **COPY CONFIG.SYS + CON,** press **< Enter >** twice, press **< F6 >**, and press **< Enter >** once more. Reboot the PC, and the ANSI.SYS driver will be installed.

If you're curious about reassigning <Ctrl> key combinations, you may be interested in a note I received from C. J. Puotinen, author of *The Last Word on WordStar, Using the IBM PC: WordStar,* and *Using the IBM PC: MultiMate* (Holt, Rinehart & Winston, New York, 1984). Ms. Puotinen reports testing several Dvorak conversion programs and finds PC-Pedal from Brown & Company to be an elegant solution ($59.95, P.O. Box 2443, South Hamilton, MA 01982, 617/468-7464). She describes PC-Pedal as "a foot pedal/software combination that allows the <Ctrl> key (or any other state key, such as the <Shift> key or the <Alt> key) to be activated with one's foot. For fast typists using any keyboard with any program, the foot control is a timesaver; for *WordStar* users, who must depress the <Ctrl> key with every letter-key command, it's especially convenient."

BASIC Switches and Concurrently OPEN Files

Q. My problem concerns a batch file that calls a BASIC program. Here's a portion of that batch file:

```
⋮
SORT /+15 <A:SUBCEN.DAT
 > B:BAIN.DAT
BASICA BARPT
SORT /+73 <B:BAOUT.DAT
 >B:CASE.DAT
BASICA /F:7/S:512 CASRPT
⋮
```

The batch file works fine until it encounters that last line. Isn't it possible to call a BASIC program from DOS, as shown in the second line, and still use the BASIC

(continues)

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Circle 223 on reader service card

switches /F *(to set the maximum number of files that may be OPEN simultaneously) and* /S *(to set the file buffer size to match the maximum record length the BASIC program uses)?*

James V. Maier
Charleston, West Virginia

A. You can use BASIC's switches and a file name with the DOS commands BASIC or BASICA, but the name of the BASIC program you're calling must be the second parameter on the DOS command line. The last line of your batch file excerpt should read

BASICA CASRPT /F:7/S:512

You can also include *<stdin* and *>stdout* redirection when calling a BASIC program with switches. Unlike the first line of your batch file excerpt, however, the redirection parameters in a BASIC call must precede the switch parameters.

You will also need to include the line *FILES = 11* in your CONFIG.SYS file. The FILES = *x* parameter sets the number of simultaneously OPEN files by reserving enough RAM for *x* file handles. (When a program wants to use a file, that file is assigned a handle. All file accesses—reads, writes, and closes—can then be performed by telling DOS which file handle to use. But because DOS uses three file handles for *stdin, stdout, stderr, stdaux*, and *stdprn*, and BASIC uses one more file handle for the LOAD, SAVE, CHAIN, NAME, and MERGE commands, the FILES = parameter in the CONFIG.SYS file must be set to exceed by four the number in BASIC's /F: switch.

WordStar Seeks Port

Q. *I recently added a Hayes Smartmodem 1200B internal modem board to my PC. I'm using the modem primarily to communicate with my bank. The bank's software requires that the modem be addressed as COM1:. Before I bought the modem board I was using* WordStar *3.3 to run a Canon AP 300 typewriter from a serial port designated as COM1:. I switched my system's serial port to be COM2: and changed my AUTOEXEC.BAT file's printer port reassignment command to* MODE LPT1: = COM2:80,6,P. *Now, however, I find that* WordStar *does not print on the Canon AP 300. The problem seems to lie with* WordStar *rather than with the hardware, because both <Shift>-<PrtSc> and BASIC print to the typewriter. How can I get* WordStar *to print through COM2:?*

The Rev. John Mariano
Jamaica, New York

A. With a bit of tinkering, *WordStar* will print through COM2:. *WordStar*'s program file, WS.COM, contains two bytes that determine the serial port for print-

(continues)

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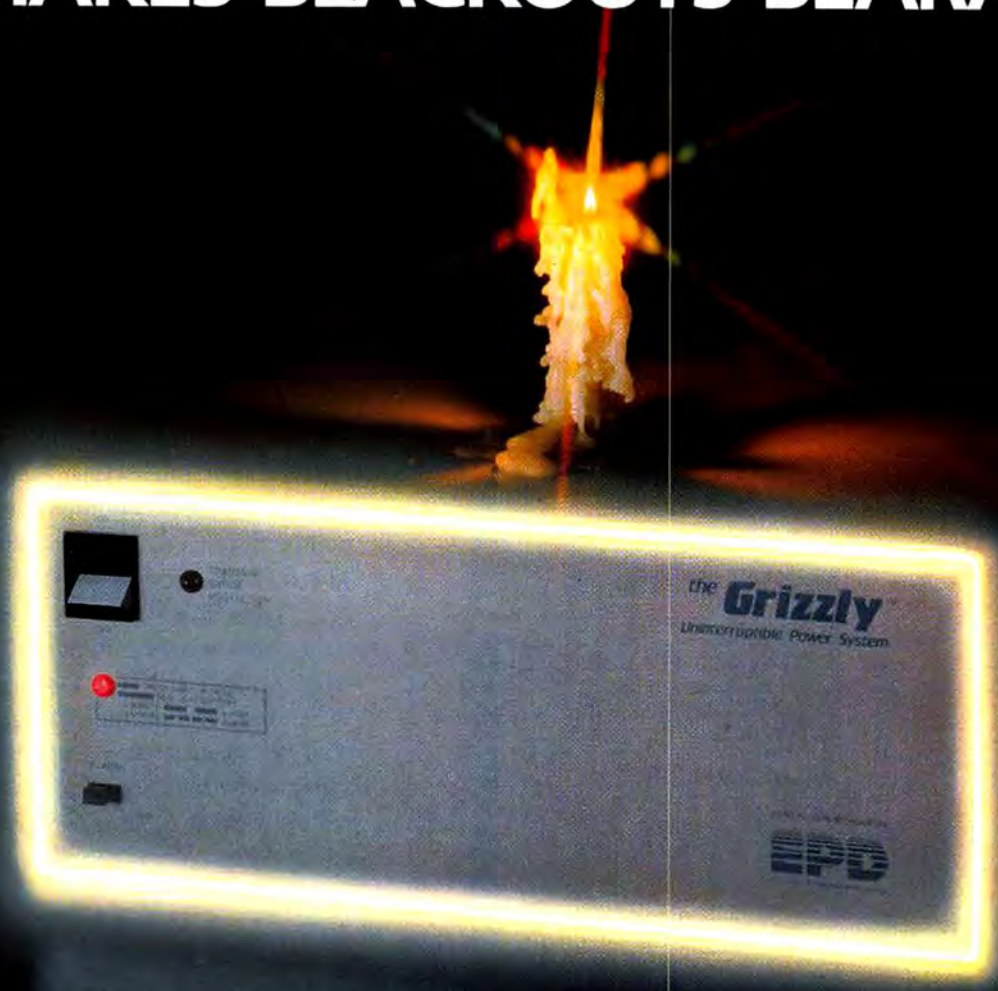

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ing. You simply need to change the 0 (for COM1:) in each of these bytes to a 1 (for COM2:). To do so, place a copy of DEBUG.COM (the original of which can be found on the DOS *Supplemental Programs* disk) in drive A: and a copy of your *WordStar* disk in drive B:. (Using a copy is advisable because you may one day need the original to print through COM1:.) Type **A:DEBUG B:WS.COM <Enter>**. When you see a hyphen, DEBUG's prompt, type **E81E <Enter>**. A string of numbers ending in '00.' will be displayed. Type **1 <Enter>**. The DEBUG prompt will reappear. Type **E833 <Enter>**. Another string of numbers ending in '00.' will be displayed. Type **1 <Enter>**. When the prompt appears again, type **W <Enter> Q <Enter>**. This patched version of *WordStar* will now print to your typewriter on COM2:.

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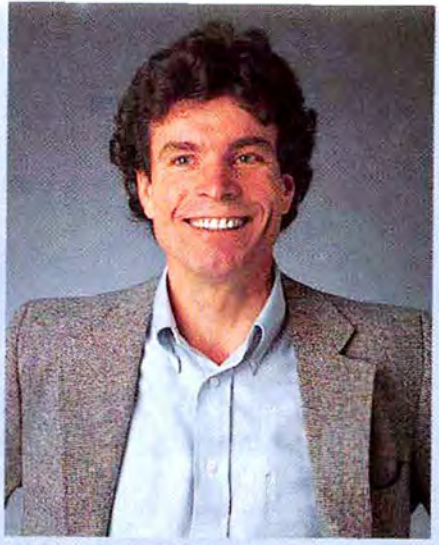

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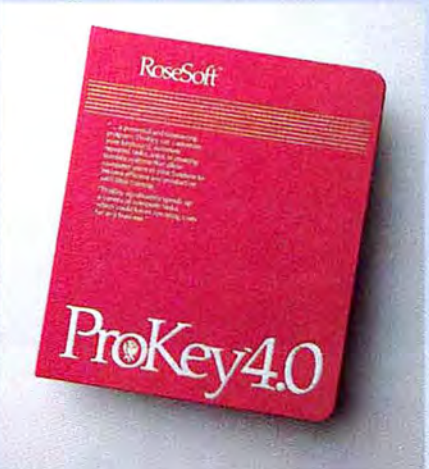

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Valued Correction

Several sharp-eyed readers noted that the procedure described in April's column for copying a range from one *1-2-3* worksheet to another left something to be desired (see "Transferring Worksheet Ranges," *The Help Screen, PCW*, April 1985). If the range to be copied contains worksheet formulas, these formulas–rather than their

(continues)

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INTRODUCING 5

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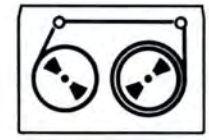
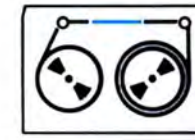


Without PC/T, you have to rewrite the entire 60 MB cartridge each time you make a single change.



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Circle 294 on reader service card

current values—are transferred to the second worksheet. This does not solve the problem of transferring *values*.

Richard Bellin of Washington, D.C., offers the best solution. "The answer, of course, is to use the */File Combine Add* command," Bellin writes. "Because this command adds the value of the cells from the first worksheet to whatever is in the target cells in the second worksheet, it's a good idea to preface this command with a */Range Erase*, just to make sure that the cells in the second worksheet are empty."

To amend the procedure described in the April column, edit the macro for worksheet TWO to read

```
{goto}C22~
'/reC22..C72~
'/fcanTRANSFER LIST~
ONE~
{calc}
```

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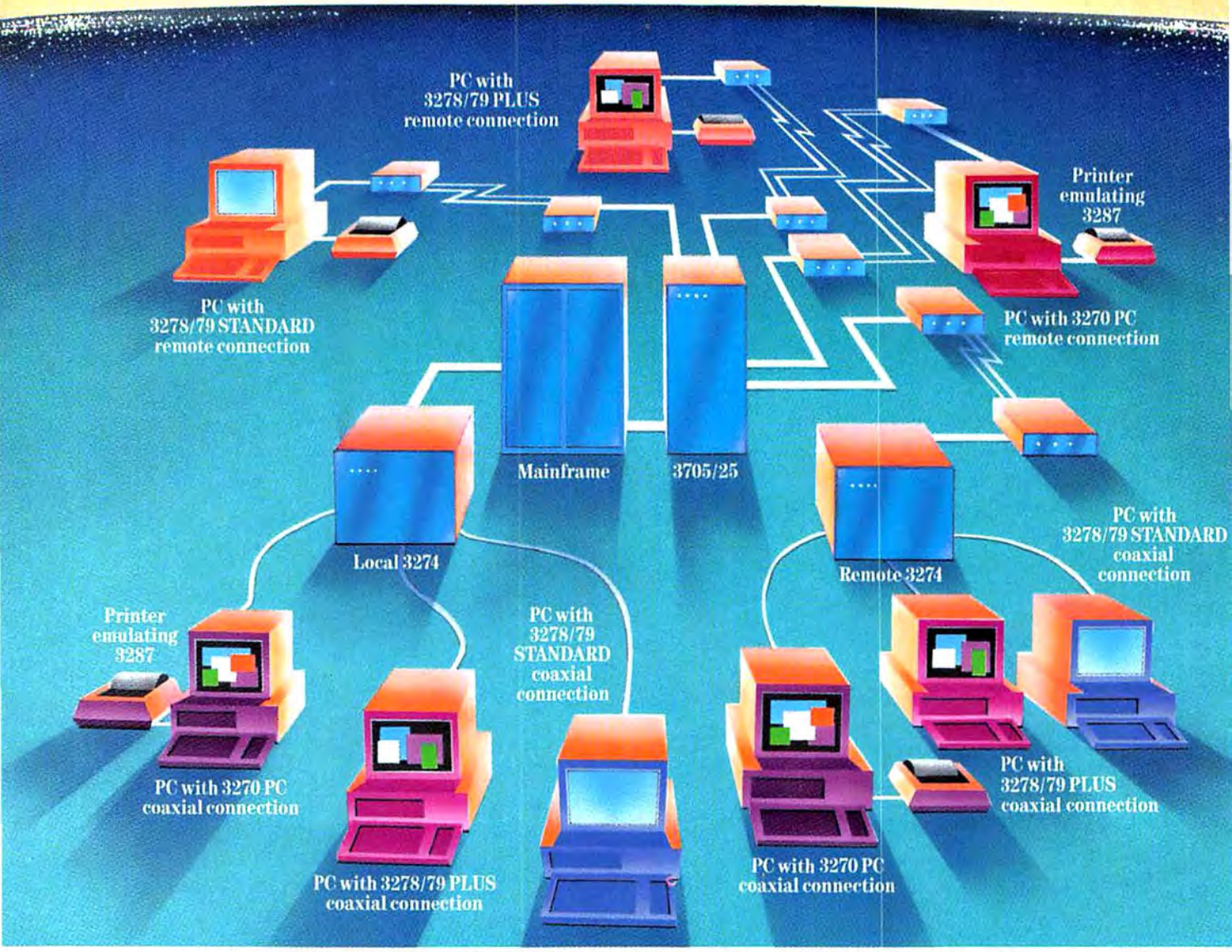

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From the Software Shelf

PC World offers first impressions of recent software releases

This month we delve into the splendors of tax preparation, learn to draw pretty pictures, boost WordStar's function key macros, and turn the PC into a high-class Selectric.

Edited by Darcy DiNucci

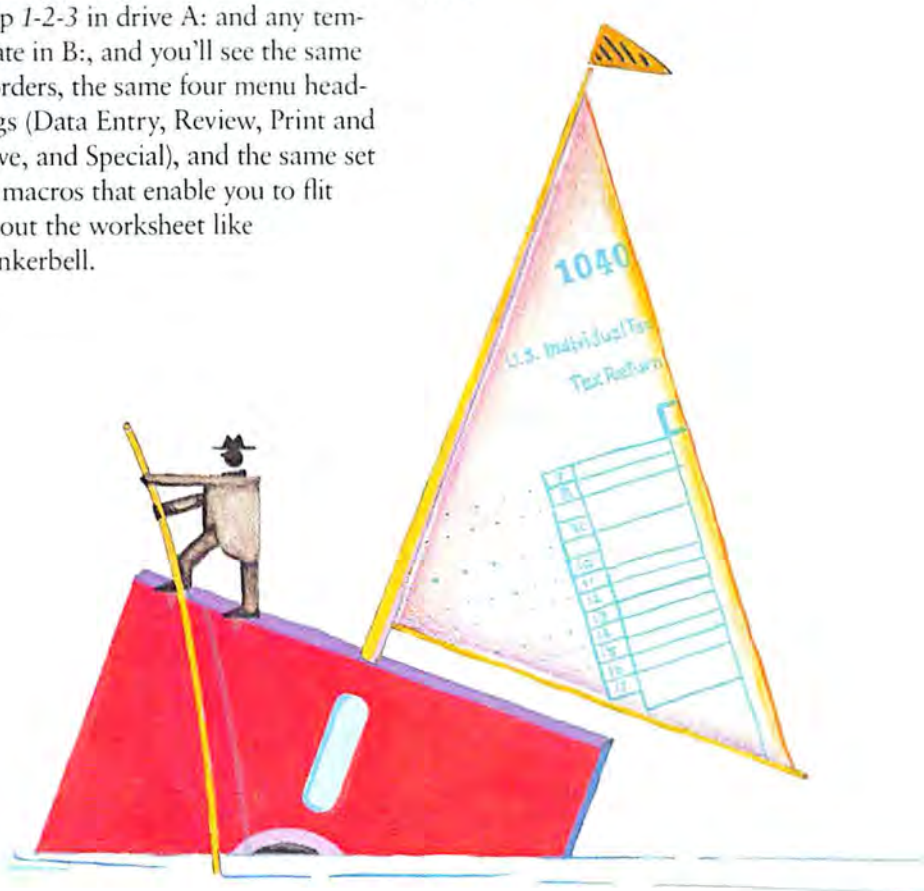
Personal Income Tax

April 15 is old news, but for some of us the panic lingers. If you were able to cajole the IRS into delaying the day of reckoning until August 15, listen up. OptionWare has a nifty little template that just might make income tax preparation—Uncle Sam's way of adding insult to injury—considerably less onerous.

OptionWare is in the business of domesticating *1-2-3* by providing spreadsheet users, particularly neophytes, with useful canned applications. At last count, the company's library of *1-2-3* templates topped 60, grouped according to such genera as financial statistics, sales and marketing, budget preparation, cash and asset management, and personnel maintenance.

OptionWare programs are appealingly simple and consistent. Pop *1-2-3* in drive A: and any template in B:, and you'll see the same borders, the same four menu headings (Data Entry, Review, Print and Save, and Special), and the same set of macros that enable you to flit about the worksheet like Tinkerbell.

Lacking a leakproof tax shelter and having no stomach for a face-off with an IRS auditor, I found the OptionWare *Personal Income Tax* template reassuring. Its prodigious appetite for RAM—a minimum of 512K, including room for *1-2-3*—signifies that buried within the template are the voluminous 1984 tax tables. More visible is an amalgam of IRS forms and schedules seamlessly linked to one another. *Personal Income Tax*, I surmised, was cognizant of the fine print and assorted tax arcana that I, working alone, would invariably miss. As I gently fed it data, the template completed Forms 1040, 2210, and 6251 and Schedules A, B, C, D, and G. A program supplement includes Schedule E and Forms 2106, 2241, and 5695. For forms and schedules not fully provided, such as Schedule W, *Personal Income Tax* uses "calculation screens" to generate totals.



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Depending upon your patience, you can opt for either Full Tax, a meticulous guide through 45 separate tax categories, or Quick Tax, a 1040 estimator that doubles as an informal tax planner. Since completing an electronic form is no more thrilling than filling out its printed counterpart, both modules enable you to plug numbers into a series of blanks and let OptionWare put the figures where they belong. Full Tax and Quick Tax do not share data.

Both components provide superb summary screens, encapsulating at a glance your debt to Uncle Sam. Included are income summaries (total, adjusted, taxable, tax due), income breakdown, itemized deductions by category, and income averaging. Should you want to analyze the benefits of, say, income averaging, you can turn to *Personal Income Tax*'s graphing component—a snappy way to produce bar charts and line graphs without ever touching *1-2-3*'s Graph command.

You can print likenesses of IRS forms on plain paper or roll the genuine articles through your printer. (Watch out, though—*Personal Income Tax* truncates words on some printers.) If you'd prefer not to load the entire 231K template file, you can use regular *1-2-3* commands to extract chunks for printing.

Now the bad news. The flip side of OptionWare's "no training, no programming, no trauma" approach is, well, no fun. *Personal Income Tax* does indeed harness the

power of *1-2-3*, but with some restrictions. If you know *1-2-3* like your old neighborhood, the OptionWare series may be frustrating now and then. The OptionWare roadway is littered with admonishments. "Nonexpert" users are advised not to tinker with titles, headings, formulas, macros, protected cells, or any other grown-up toys.

The landscape outside the template is not a pretty sight; if you'd rather your data input screens not mingle with macro code, don't scroll right or left. Should your prompt disappear—as it inevitably, inexplicably will—you'll drop effluvia into your work area. You'll want to clean up the mess, of course, but leaving the command line often means temporarily disabling *Personal Income Tax*'s macros.

Context-sensitive on-line help would certainly be a plus, but given the size of the tax preparation file, there's probably no room. A separate file provides a credible template overview, but it's perfunctory at best.

Personal Income Tax sets aside three blank worksheet screens, but a good deal of data consolidation will still have to be done outside the program. If you're interested in feeding *Personal Income Tax* a separately prepared *1-2-3* worksheet of itemized deductions, prepare for indigestion—it won't work.

Need help with the local revenuers? Dig out your Casio. *Personal Income Tax* doesn't do state taxes, but the company promises to release an update for the 1985 federal tax year if you're good enough to register your program.

I've got just one other beef with the template: I didn't like the results one bit. And don't tell me that isn't a software problem. *—Ken Greenberg*

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203/243-5554
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ProType

At *PC World* seven editors have PCs but share one typewriter. When I joined the staff, I quickly discovered that addressing a single envelope on the typewriter involved SALT-level negotiations and more than a modicum of patience. Since getting my hands on the Selectric is akin to getting Springsteen tickets at the door, I turned to my PC and printer. I knew that printing out my four lines would involve performing any number of software gymnastics with *WordStar*. Fortunately, *ProType* from Photon Software arrived just before insanity set in.

(continues)

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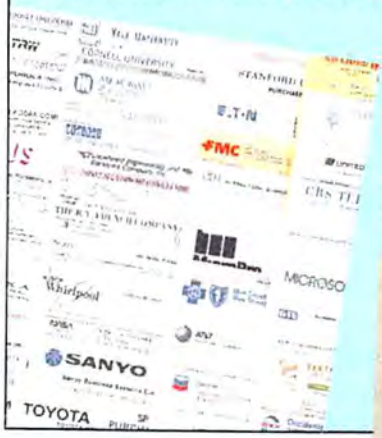

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DOES WORKING ON LOTUS 1-2-3 MAKE YOU SEE RED?

Granted, Lotus 1-2-3™ can be a fast spreadsheet.

Except when you first buy it, take out the five floppy disks, study the manual to figure out which ones do what, put the plastic doo-hickey over the keyboard, and begin reading about all the installation procedures you need to get the thing up and running.

Or if you never make a circular calculation (any simultaneous equation, even something as simple as "bonus equals 10% of profit after bonus") when doing a complicated spreadsheet.

By the time 1-2-3 calculates it correctly, you may have retired.

Or if you'd like to plot your data with a single keystroke, because it can take several minutes (including a disk change) just to start the process.

Or if you'd like to quickly create a file directory under program control. 1-2-3 can't do that at all.

What's the point of all this?

We'd like you to go down to your software dealer and see a new product called SuperCalc® 3 Release 2, which, unlike Lotus 1-2-3, does all of the above.

Along with a larger spreadsheet. Vastly superior graphics. Incredible speed (that becomes even faster when used with the 8087 or 80287 math co-processors, which 1-2-3 doesn't support). And more.

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All on one disk that you can run right out of the box. (Our lawyers want you to know we include an additional file disk. Which also contains the popular printing program Sideways,™ so you'll never have to cut and paste wide printed reports together again. Unless you use 1-2-3.)

For more information on SuperCalc3 Release 2, call Terry Smith at 1-800-645-3003. Or even better, go take a look.

After you do, one thing should become obvious.

What are you waiting for?

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Circle 823 on reader service card

How Do I Choose the Right Personal Computer Monitor?

ProType is a memory-resident utility that temporarily turns your PC into a typewriter. Unlike other such programs, *ProType* can cohabit with *SideKick*, *ProKey*, and other comrades-in-RAM.

Tapping <Alt> twice displays *ProType*'s *1-2-3*-style command line that offers access to Edit, Type, and Form modes; cut-and-paste, font selection, print, and erase functions; and insert and word-wrap toggles. On-screen help is available, and, for stickier problems, a toll-free number is provided.

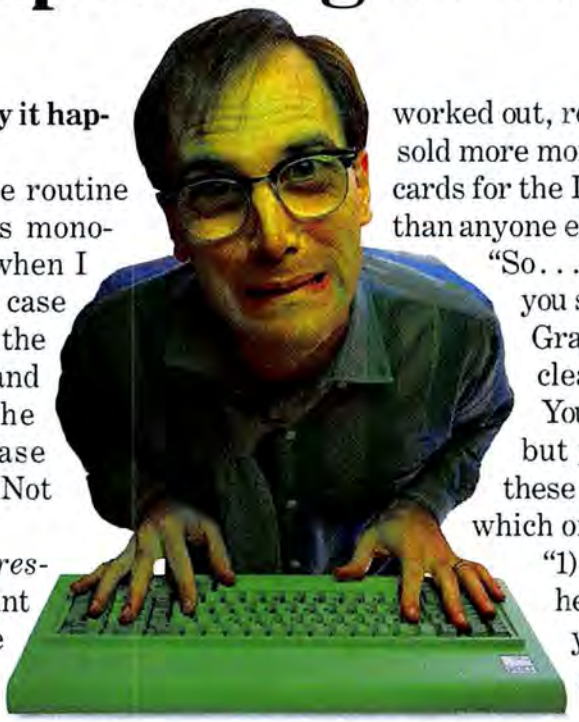
I turn to Edit mode when I need to compose a memo that must be distributed at a meeting that started 10 minutes ago. Within any program I simply pop up *ProType*'s composition window and enter an entire short document (up to 90 lines), then send it to the printer. Though the available editing functions are rudimentary, they're handy in a pinch.

Type mode operates like a memory typewriter; text is sent to the printer each time you press <Enter>. Unlike a typewriter, Type mode does not permit underlined text; as with some word processors, backspacing deletes text.

ProType's cut-and-paste function makes easy work of printing any section of currently displayed text produced by a word processor, a spreadsheet, a data base manager, or another application. Choose the Cut-and-Paste command, mark the text you want to print, paste it into *ProType*'s composition window, and send it to the printer. The same task in *WordStar* entails marking a block, writing it to a new file, saving the current docu-

(continues)

If you don't have a Hercules Graphics Card, you could end up looking like this:



"I know, because one day it happened to me . . .

"I was running some routine tests on a non-Hercules monochrome graphics card when I was struck by a severe case of *low resolutionitis*. I'm the president of Hercules and that's me exhibiting the symptoms of the disease in its advanced stages. Not a pretty sight, is it?

"What causes *low resolutionitis?* Experts point to ordinary monochrome graphics cards with coarse, hard-to-read graphics. A bad case of eyestrain may develop if action is not taken immediately.

"Fortunately for me, a Hercules Graphics Card was nearby. A quick change brought soothing 720 x 348 graphics. That's twice the resolution of ordinary 640 x 200 graphics cards.

"Which means better graphics for Lotus™ 1-2-3™, Symphony™, Framework™, pfs:Graph,® Microsoft® Chart and Word, SuperCalc3™, AutoCad™, and dozens of other programs.

"Including Microsoft Flight Simulator, now Hercules compatible!

"Oh, and don't forget that a parallel printer port is standard on the Hercules Graphics Card, not an extra cost option.

"Now, if you're worried about buying a new product that hasn't had all the bugs worked out, relax. Hercules has sold more monochrome graphics cards for the IBM® PC,XT™ and AT™ than anyone else in the world.

"So . . . you're convinced that you should buy a Hercules Graphics Card. Now, steer clear of cheap imitations. You may save a few bucks, but you won't get all of these five essential features which only Hercules has:

"1) A safety switch that helps prevent damage to your monitor, 2) the ability to keep a Hercules Color Card in your system, 3) the ability to use the PC's BASIC to do graphics, 4) a Hercules designed chip that eliminates 30% of the parts that can go wrong, and 5) a two year warranty, because we think reliability is something you should deliver and not just talk about."

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Circle 77 on reader service card

ment, and then printing the new file. Since *ProType* captures data from the PC's video buffer, no file conversions are necessary, and of course, nothing is truly cut out of the original file.

The Form mode is designed to help you fit information into the blanks on printed forms. If any task can send you running to a typewriter, this is it. Form mode is *ProType*'s trickiest function, but with the help of the manual, I quickly mastered the creation of fields–a process that defines screen areas that correspond to the spaces in a form. Positioning a form in the printer so that fields defined on screen match up with those on paper takes more practice. Once a form template is created, however, it can be saved for future use.

There's no arguing that word processors are great time-savers, but often the procedures that handle large tasks with speed and elegance get in the way when all you need to do is print an envelope or a short note. *ProType* is a real boon for those tasks that tempt you to turn to a typewriter. And at $119.95 it costs less than an extra typewriter for the department.
–*May Sui*

ProType
Photon Software
636 120th Ave. NE
Bellevue, WA 98005
206/451-8272
List price: $119.95
Requirements: 35K, one disk drive
Not copy protected

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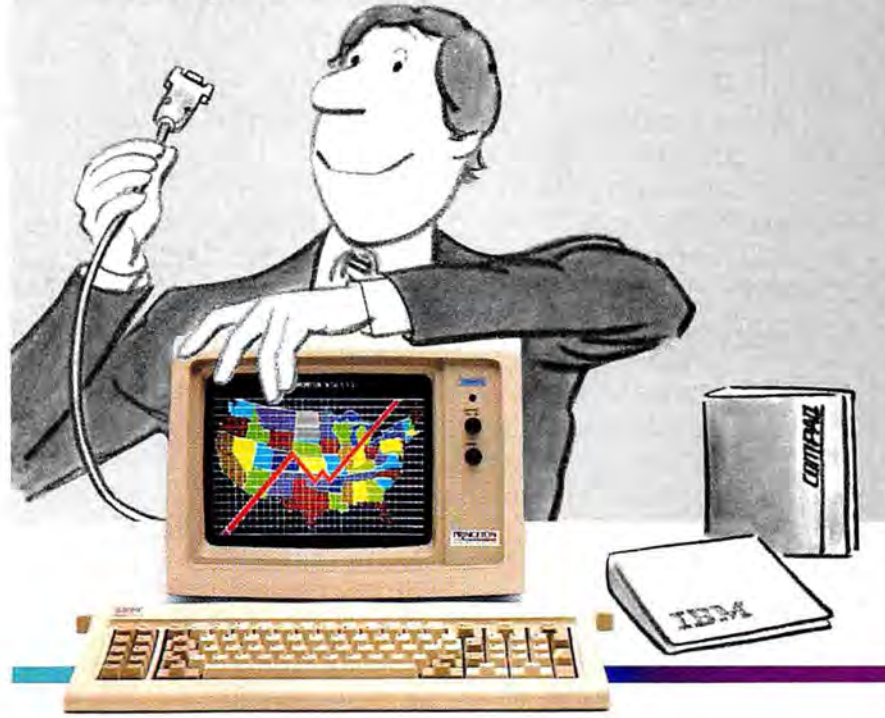
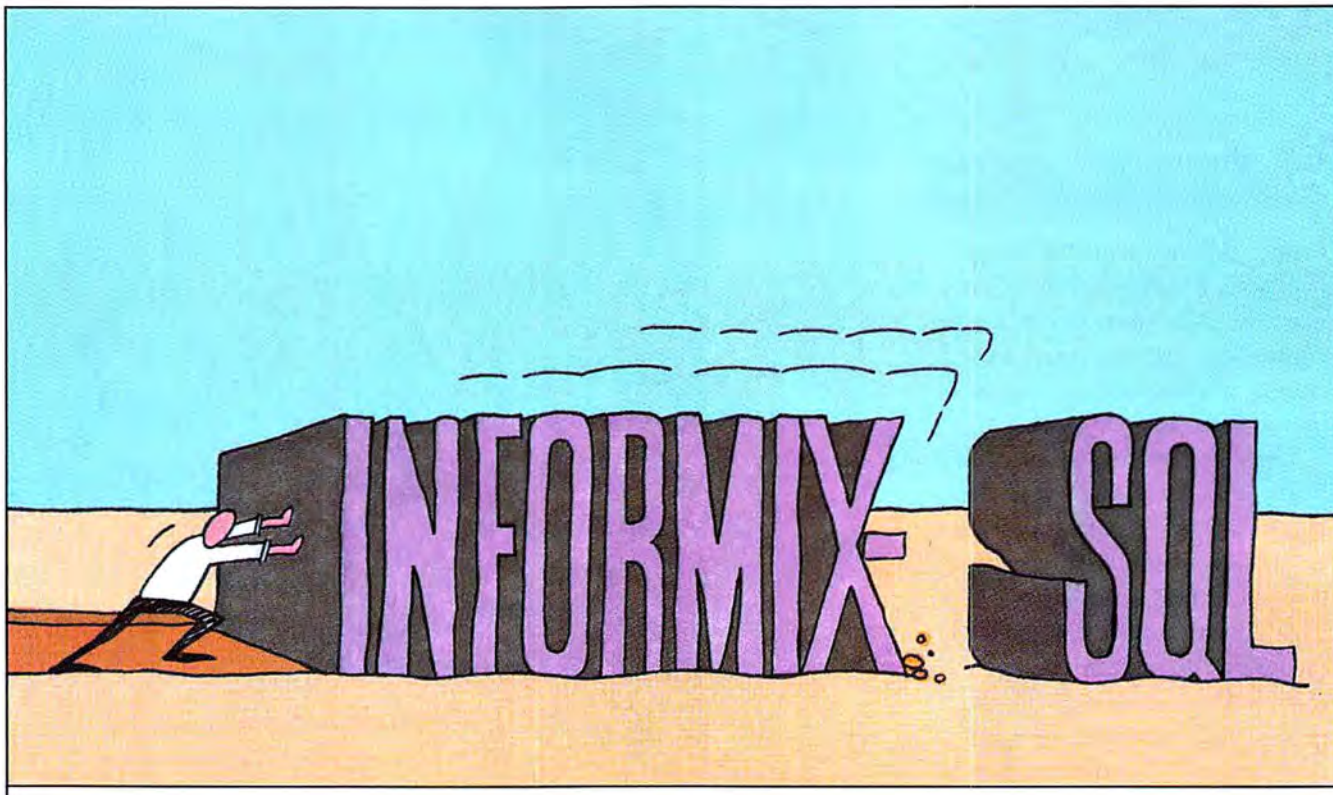
Will It Work with My PC?

Before you can experience the full capabilities a high performance monitor offers, it has to work with your personal computer. That's why Princeton Graphic Systems makes high resolution monitors compatible with most popular brands of personal computers. IBM, Compaq, Corona, Apple and more. But we go one step further. By paying close attention to ergonomic detail, we make Princeton Graphic Systems monitors compatible with you, the computer system user. . .





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Draw-It

I recently reviewed *PC Paintbrush* and *PC Paint*, two trickles in the flood of PC painting programs (see "Icon Painting," *PCW*, June 1985). Both are clearly inspired by *MacPaint*, using pull-down menus, icons, and a mouse instead of the keyboard to choose program functions. These programs make freehand drawing a breeze and can also enhance graphs imported from other programs such as *1-2-3*.

Draw-It from Paperback Software International (PSI) is yet another painting program, though it doesn't run in the same crowd as other Mac-inspired applications. Instead of pointing to icons, you select functions from a command line similar to *1-2-3*'s–an approach that is perhaps less desirable for beginners but nonetheless quick and easy. (The PC's function keys provide a shortcut to program commands.) Another difference is that the program uses the arrow keys instead of a mouse for moving the cursor–a tedious process at best. PSI claims that the Mouse Systems Mouse works with *Draw-It* functions, though the configuration process involves some extra steps. *Draw-It*'s most significant difference is its price–it's only $29.95.

(continues)

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Take a close-up look at the display. Bright, crisp characters and sharp, colorful graphics mean you're getting a high-quality image. The kind of image that comes with every Princeton Graphic Systems' monitor. Because Princeton Graphic Systems combines flicker-free technology, a fine dot pitch, and a nonglare screen to give you an image that *PC World's* World Class Survey rates number 1 . . .

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Circle 688 on reader service card

Those who like to cut a wild and colorful swath will find *Draw-It*'s lack of freehand drawing functions a bit disappointing. Your artistic creations are limited to combinations of straight lines, boxes, ovals, circles, and arcs. *Draw-It* also allows you to generate boxes by entering their dimensions expressed in pixels. To make up for its lack of drawing functions, the program handily generates line, pie, and bar charts from *x* and *y* values you supply in a table format.

Draw-It images are limited to medium resolution. The program offers three palettes of three colors each and a choice of one of eight background colors in either normal or bright intensity. *Draw-It* provides 11 patterns that can fill the entire screen or any area enclosed by a rectangular window—making it hard to fill a circle. Unfortunately, only pattern names, not the patterns themselves, are displayed when you make a selection; the pattern is displayed only after it has been selected. *Draw-It* features eight text fonts and lets you enter text vertically or horizontally when labeling graphs.

After using a window to define the area of a picture you want to edit, you can copy or move it quickly to another part of the screen. Other options allow you to zoom in for detail work and to outline a figure. *Draw-It* also offers a Scale function, which shrinks or enlarges a picture, and a Rotate

(continues)

How About Dependability?

You rely on your personal computer system to help get your work done. That's why it's important to choose a monitor built for reliability. Princeton Graphic Systems monitors are built under the highest quality control standards, backed by a full one-year warranty and supported by a nationwide service network.* The result: monitors that perform when you need them, day in and day out . . .

*Bell & Howell, Xerox, MAI Sorbus Service and Princeton Graphic Systems.

function, which turns it by any degree. Most programs rotate only in 90-degree increments. Two other unusual *Draw-It* features are Step-size and Reflect. With the former you can draw with variously spaced dotted lines; with Reflect, drawn lines are instantly mirrored to create symmetrical figures.

PSI claims that *Draw-It*'s Save-Screen program lets you import and enhance any medium-resolution graphics screens produced by another program. You can also import numeric data from PSI's *Number Works* spreadsheet, *1-2-3*, or any ASCII file to create graphs with *Draw-It*.

Draw-It's price, excellent documentation, and on-screen help make it enticing for graphics beginners. It offers bargain-basement drawing and graphing tools with a few pleasant and not-so-pleasant surprises. If you aspire to greater artistic heights on the PC, however, dig down deep and spring for a more sophisticated painting program. *–Christine Whyte*

Draw-It
Paperback Software International
2612 Eighth St.
Berkeley, CA 94710
415/644-8249
List price: $29.95
Requirements: 192K, one disk drive, graphics monitor
Copy protected; unprotected disk available to registered owners for $10

Starplus

WordStar's labyrinth of commands is both a joy and a frustration. It's a pleasure when the familiar question, "Can *WordStar* do this?" is answered in the affirmative by your office computer guru. But *WordStar* has 134 commands, initiated with as many different key combinations, and it's almost impossible to remember them all. Not having the time or the patience to continually refer to *WordStar*'s manual or to study its terse help menus, most users eventually settle into a comfortable but limited functional rut, learning and remembering only those commands they need to get by. But with *Starplus* from Apeiron Software, you need not waste the versatility and power of this ubiquitous word processing tool.

Starplus is a memory-resident utility program designed to organize *WordStar*'s hidden powers and place them only a pinky away. The program redefines the PC's function keys with macros that provide single-key access to 60 *WordStar* procedures. With one keystroke, for example, you can center text, mark a sentence, reform a paragraph, or save a file. *Starplus* resides amiably with *SideKick* and *ProKey*. It works with all versions of *WordStar* but not with *WordStar 2000*.

Starplus groups *WordStar*'s commands into Help, Print, Block, Onscreen, Quick, Edit, and File templates. Each template is composed of ten commands, each assigned to a function key. (The exceptions are Edit, Print, and Block, which take up two templates.) *Starplus* displays the current list of template commands at *WordStar's* 25th line. You can load different templates either by pressing <F1>, which displays a command menu of all available templates, or by pressing <Alt>-J for help, <Alt>-K for block, and so on.

Most *Starplus* macros execute only a single *WordStar* operation. For example, from the Edit template you can choose to delete text from the cursor to the end or beginning of a line, center text, scroll up or down, set margins, or reform paragraphs. However, *Starplus* occasionally uses ingenuity in combining commands; the Block templates, for instance, include macros that mark a paragraph, a sentence, a line, or a word with a single keystroke. Since *Starplus* works so intimately with *WordStar*, it shares some of its limitations. Marking a paragraph, for instance, relies on a search (<Ctrl>-Q F) for two carriage returns (^N^N). If your text is double-spaced, the macro will mark only to the end of the current line.

(continues)

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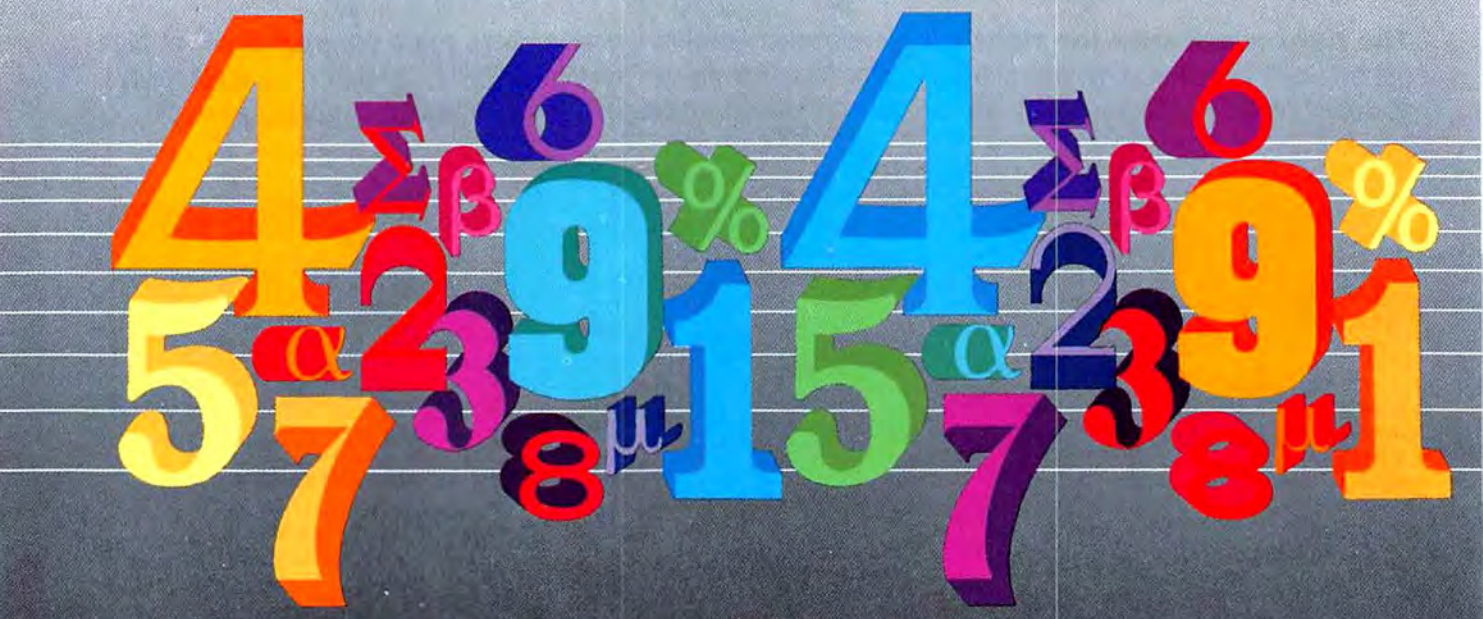

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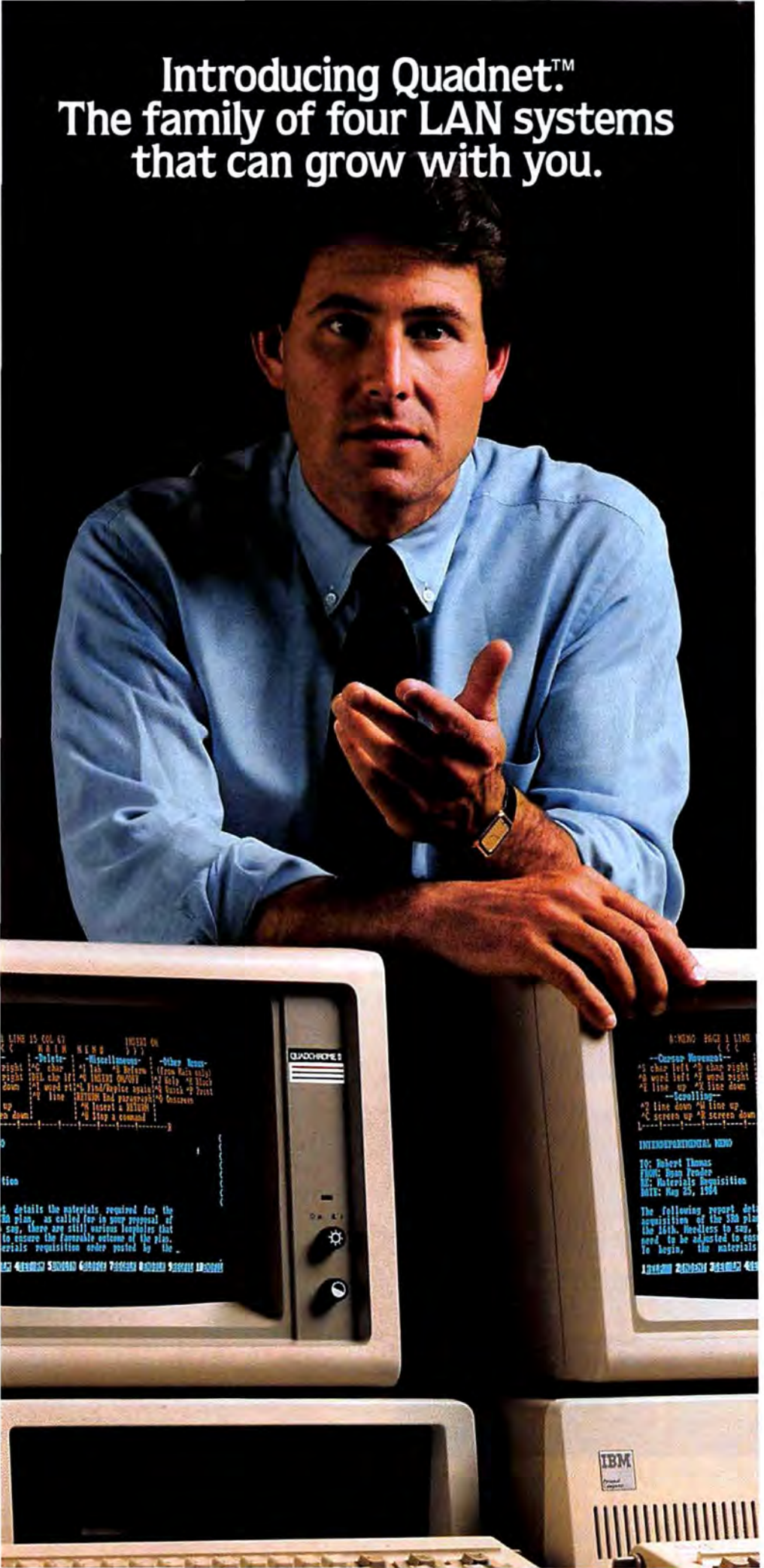

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Some other handy *Starplus* features include on-screen <CapsLock> and <NumLock> indicators and a two-key toggle that changes the 25th line to display the *WordStar* functions assigned to the templates. *Starplus* doesn't obviate traditional *WordStar* <Ctrl>-key combinations; you can utilize them and the function keys defined by *Starplus* to create a personal word processing style that's comfortable. You may find, for example, that pressing <Enter> to insert a hard carriage return is faster than using <F4> in the *Starplus* Edit template.

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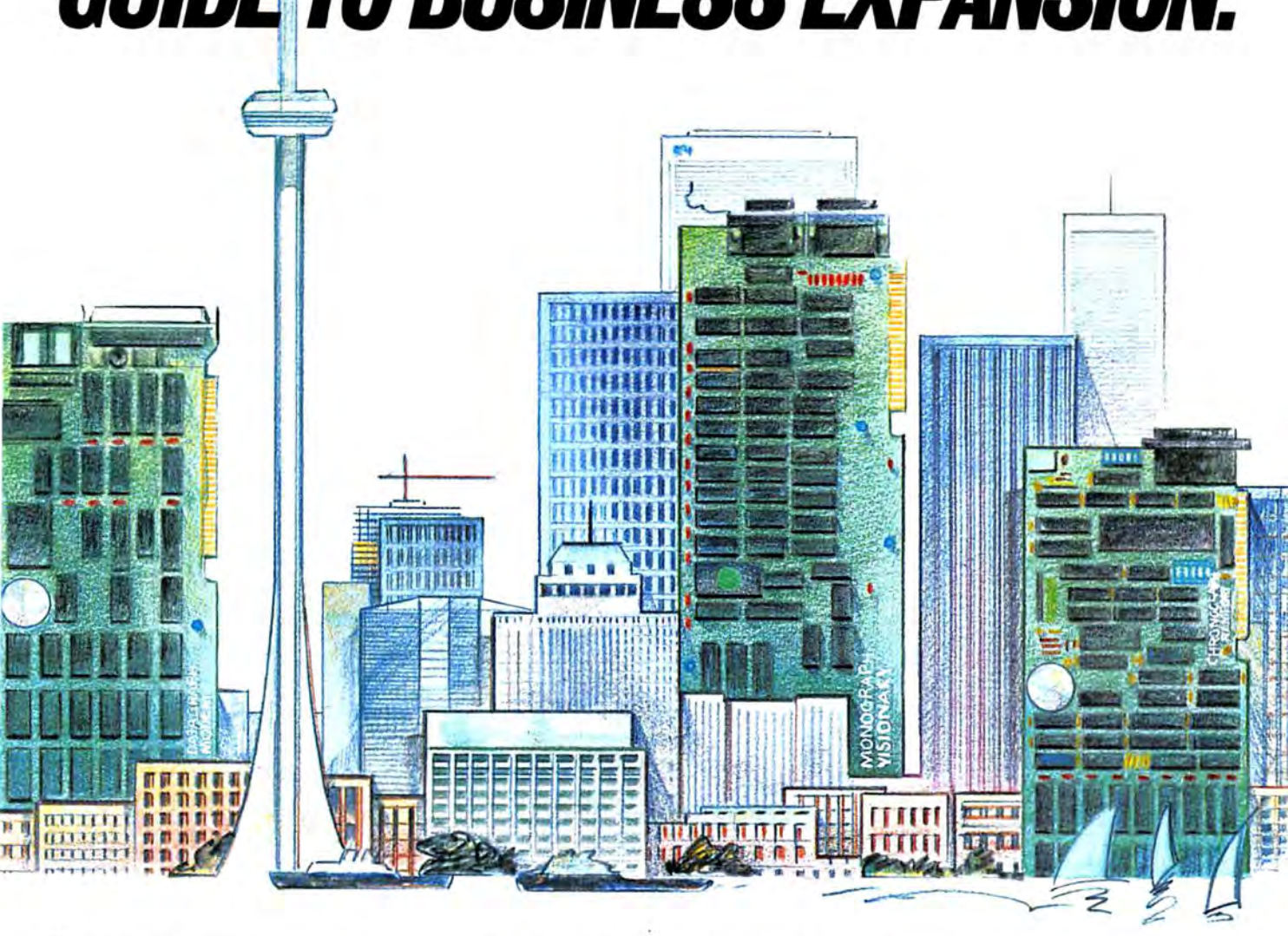

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132 COLUMN

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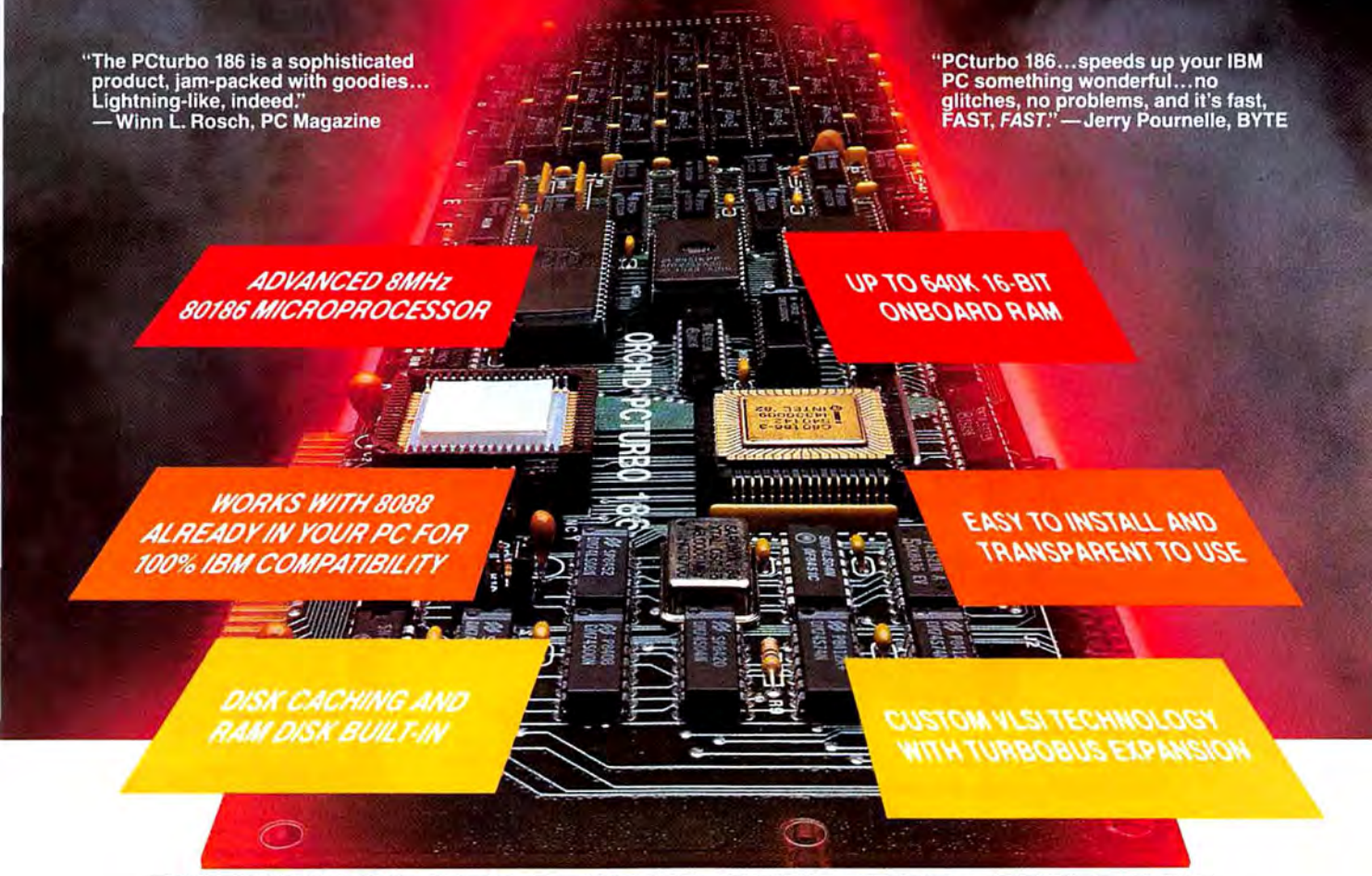

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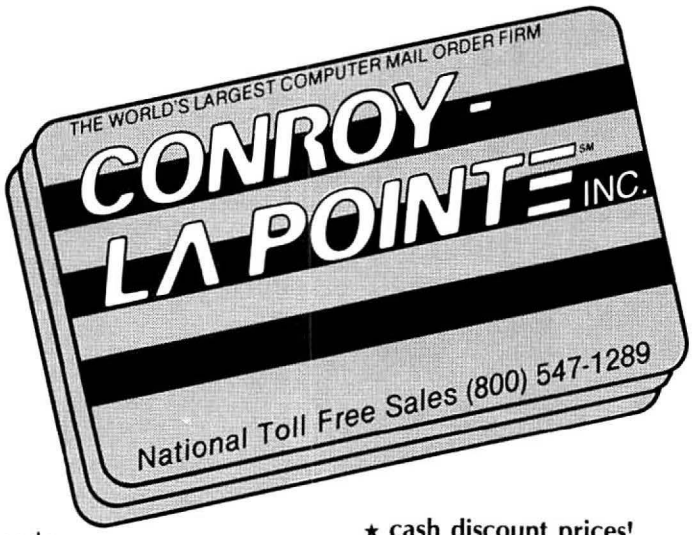

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DOW JONES, Investment Evaluator	$ 149	$ 97
Market Manager Plus	$ 249	$ 159
Market Analyzer or Market Microscope	$ 349	$ 219
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FOX & GELLER, Quickcode III	$ 295	$ 185
HARVARD, Total Project Manager	$ 495	$ 295
HOWARDSOFT, Tax Preparer '85	$ 295	$ 195
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Sales Edge or Management Edge, ea.	$ 250	$ 159
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Symphony	$ 695	$ 449
MDBS, Knowledgeman	$ 500	$ 275
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WordStar Professional, 4 Pak	$ 495	$ 265
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InfoStar Plus (+ Starburst)	$ 595	$ 315
Correct Star	$ 145	$ 77
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Peach Pak (GL/AR/AP)	$ 395	$ 219
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Using Symphony	$ 20	$ 15
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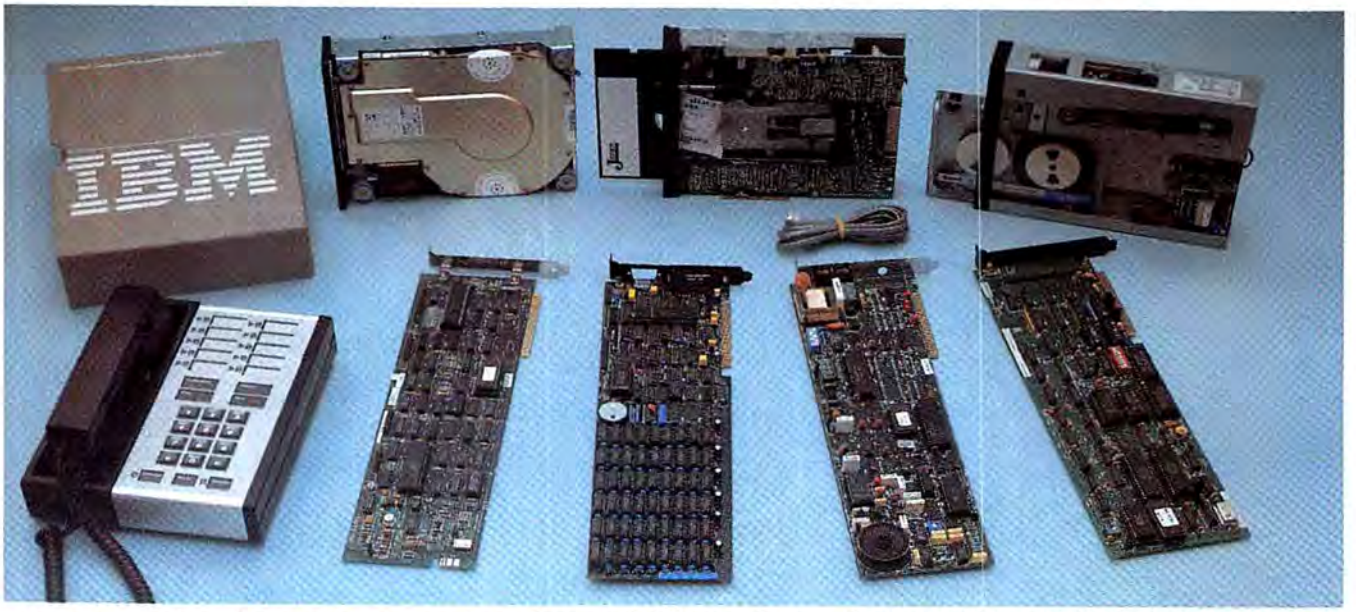

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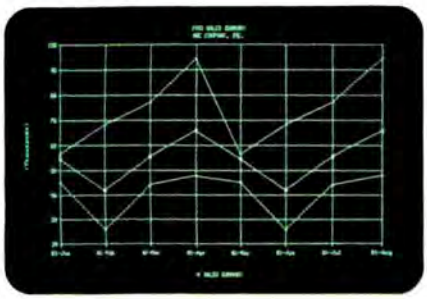

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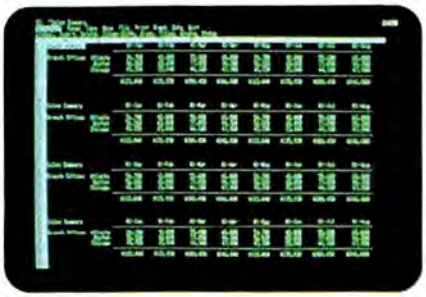

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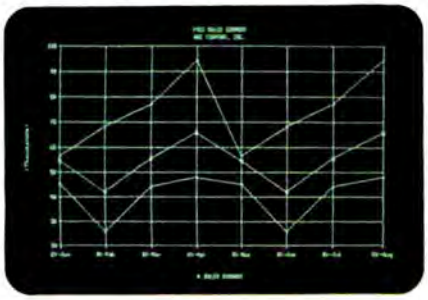

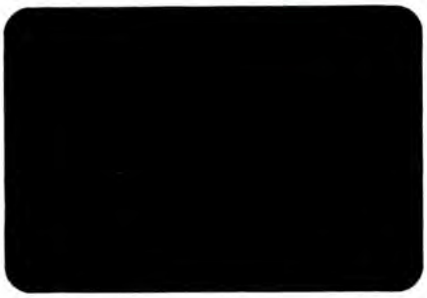

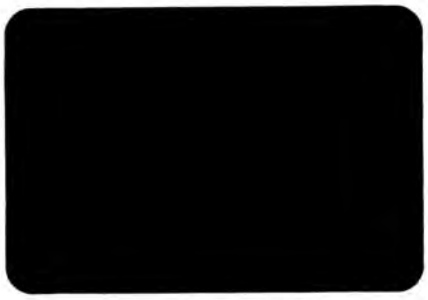

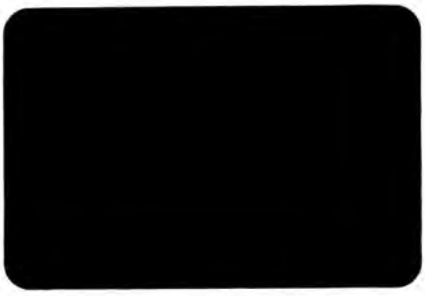

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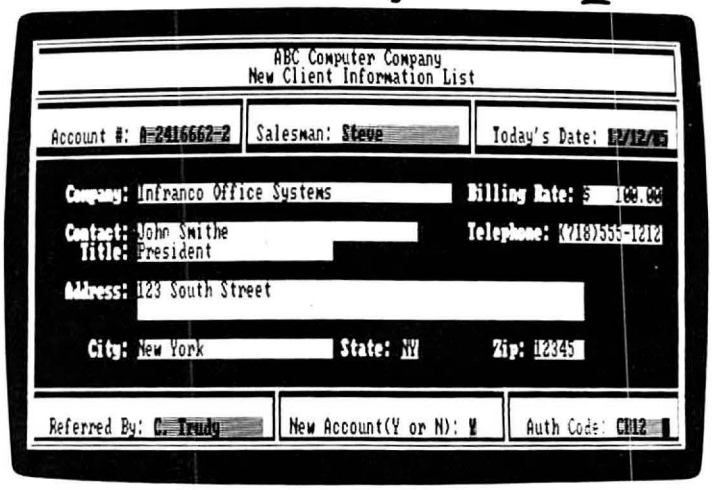

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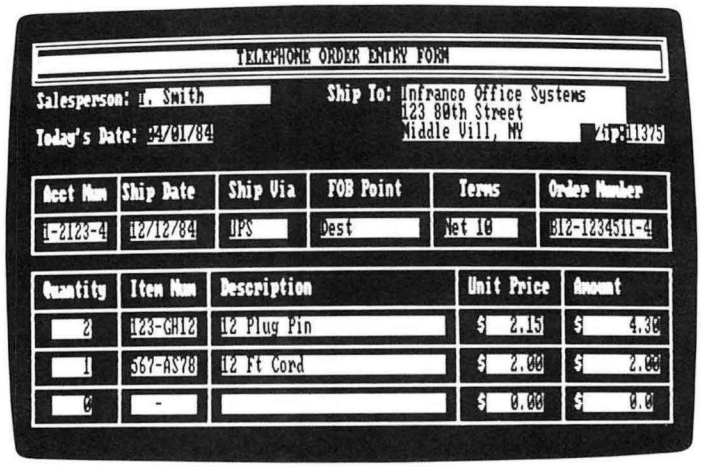

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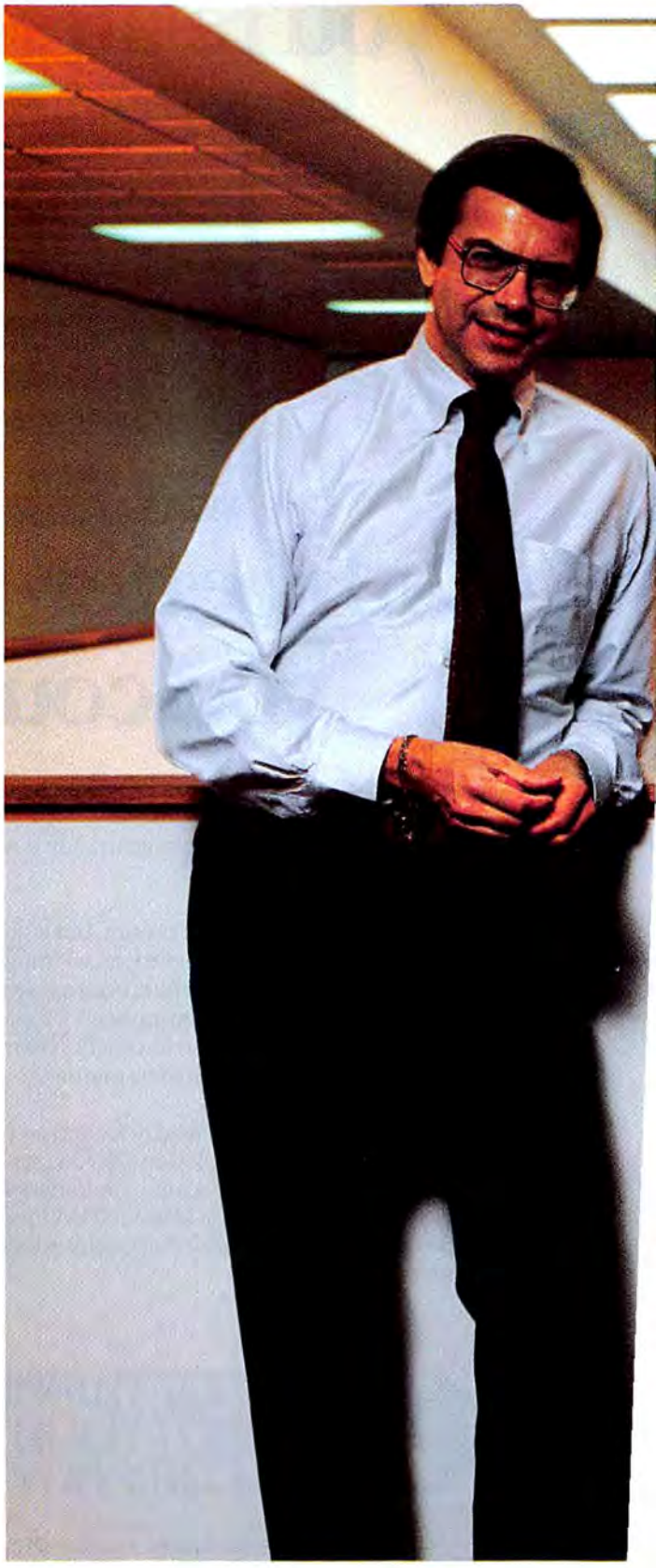
The DOS Drivers



DOS 3.10 is barely out the door, but the crew from Bellevue is already hard at work on a sophisticated successor. PC World talks with Microsoft about networks, operating systems, and the feasibility of doing several things at once.

Edited by Ken Greenberg

If Microsoft were sustained solely by its role as provider of the PC's operating system, its plate would be filled to overflowing. But the ubiquitous Bellevue, Washington-based firm has taken on the trappings of a software conglomerate, expanding its library of applications, languages, and system software at a rapid clip. Microsoft's public profile, for better or worse, is exhibiting a similar growth spurt. Within the first few months of this year the company released a new version of *Word*; prepared to unwrap *Excel,* an integrated spreadsheet for the Macintosh, and *Access,* its communications package for MS-DOS; beat the drum for *Windows,* its desktop integrator; announced that a new release of Xenix would support UNIX System V; and ushered MS Networks and DOS 3.10 into the often cruel world of local area networking.

The Microsoft triumvirate stee
the course of DOS: Bill Gates,
flanked by Jon Shirley (left) an
Steve Ballmer

Where DOS is concerned, however, it's back to Microsoft's bread and butter. DOS's next incarnation has already achieved a certain mythic status. Sight unseen, DOS 4.00 is the business world's answer to UNIX: certainly multitasking, possibly multiuser, probably a good deal friendlier than its predecessors–and capable of making full use of a new generation of hardware.

Microsoft is just as earnestly attempting to translate its single-user operating system prowess into the local area networking (LAN) realm. The company developed networking protocols with IBM for IBM's PC Network. But shunning favoritism toward Big Blue, Microsoft was on hand for the debut of AT&T's UNIX PC, championing its own role as software supplier to the new multiuser kid on the block. (For a handy glossary of LAN lingo, see the sidebar "The New Communications Vernacular.")

Amid all this hubbub, *PC World* Editor Harry Miller, Associate Editor Ken Greenberg, and Technical Editor Karl Koessel recently traveled to Seattle to discuss the future of DOS, networking, and the nature of standards with Microsoft Chairman and CEO Bill Gates, President Jon Shirley, Systems Software Vice President Steve Ballmer, and Network Product Managers Bruce Phillips and Dave Melin. The following is an edited version of that conversation.

PCW: Bill, in the two years since our last interview, the industry has endured one upheaval after another. A great deal of what you predicted then has reached fruition. Where do you see things headed today, particularly with regard to local area networking? And what's likely to happen beyond that?

Gates: Networking is now falling into place. A lot of people are creating different transport systems using different wiring schemes. But when it comes to a standard that software developers can use to code network applications, I feel pretty secure there'll be fairly uniform support for the work we've done with IBM and others. Our short-term agenda is to get these networking products established and develop applications to take advantage of them.

Meanwhile, the hardware continues to evolve. Microsoft has focused a huge percentage of its efforts on Intel architectures. We even have our people working on as yet unreleased Intel architectures. We're going to get the DOS world to take full advantage of the 80286 CPU, and that's a real challenge. Obviously, people are expecting that the next major release of DOS will mesh with the 80286. We're using the PC AT as a development machine because it can run both Xenix and DOS. The way we're evolving Microsoft Networks, we'll be able to link DOS and Xenix machines together.

PCW: Now all we need are Xenix applications.

Gates: Right. We're working with the application developers to build that library. But we think DOS will continue to be dominant, even on the AT. Obviously, there are some trade-offs between networking and multiuser systems, and we're pushing both. We think there's room for both, at least in the next two or three years. That's particularly true because of the split in the Intel chip. If you want to use the 80286's protected mode, you're going to need Xenix. When you want to use the other mode, you're clearly going to be pushing DOS. On top of that, IBM has limited the number of simultaneous users the AT will support, but that's not really an embedded restriction, so the educational process with this new CPU is going to take a while.

PCW: You're suggesting that the next version of DOS will permit multitasking. Where the PC is concerned, aren't you still stuck with a chip that has some severe limitations? There is, after all, only so much you can do with the 8088 . . .

Gates: What are the limitations of the 8088? True, it's not superfast, but multitasking could allow you to overlap memory segments and switch back and forth between tasks very easily. The 8088 is limited to 1 MB of RAM, of which 640K is hard-coded address space. 640K is an interesting limitation. Today, every application opts for all the memory it thinks it might need on the premise that if it doesn't grab it now, it'll never get it. And memory can't be swapped out, in some cases. I think it's inappropriate to have a multitasking operating system that doesn't have a very strong memory manager–one capable of moving things around and dynamically swapping things out.

If we do future versions of DOS right, we won't require every piece of DOS to be resident in RAM, as it has been in the past. We've had a fairly monolithic architecture, and it's served us well, but our vision now is a workstation on every desk. And we've decided that the vast majority of those workstations are

'The vast majority of those workstations are going to be based on MS-DOS and Intel's architecture. That's why it's up to DOS to be everything you're ever going to want in an operating system.' —Bill Gates

going to be based on MS-DOS and Intel's architecture. That's why it's up to DOS to be everything you're ever going to want in an operating system. We need a more flexible basic architecture. Just going in and sticking a little scheduler in DOS isn't enough.

Shirley: We see multitasking as the key to networking. The only practical way to run a network server and have it also be a workstation is with a multitasking operating system.

Ballmer: In addition, people want more memory at their disposal so they can run the basic core programs—an operating system, a desktop utility, a network operating system, a print spooler, an application program or two. Our future objective with MS-DOS is to get around the 640K address space limitation, put in protection, put in multitasking, and build a friendly interface.

We'll have to get around the 640K problem in one of two ways: either by managing memory better so we use the 640K more efficiently or by taking advantage of more memory in the system. Or we've got to be able to do both.

PCW: Care to speculate about a timetable or a priority scheme for this assignment?

Ballmer: We tend to work on projects one piece at a time, get them done, and ship them. DOS 2.00 had hard disk and large-file system support. We took another step with networking in 3.10.

Now we need to take another small step rather than resolving all of these problems in one fell swoop. Doing something about multitasking and managing memory is a practical problem that we can work on in a bite-size chunk. Perhaps after that we can attack protection, and after that, the problem of addressing more than 640K of memory.

It's important for DOS to take advantage of the 286 as soon as we can make that happen, but it's ridiculous to think that DOS would need to address 16MB of memory if it were single-tasking. My view of the world is that most DOS users want big Lotus spreadsheets but not 16MB Lotus spreadsheets. If you don't have multitasking, you probably don't need to address all the memory in the machine, and if you do multitasking, you'd better do memory management or address all the memory you've got.

PCW: What about ensuring data integrity in a multitasking environment?

Shirley: You can never guarantee data integrity in an unprotected memory environment, but you do everything you can. The greatest risk of corrupting data comes from applications that do strange things. Some applications, for example, control memory, which they really shouldn't do. For some time now, we've been giving our ISVs [independent software vendors] information about what our future DOS will and won't allow.

PCW: Will new versions of DOS be sculpted for the 80286 rather than for the 8088/8086?

Shirley: No. DOS will still be an operating system that runs on the 8086 and its equivalents. The problem with running on the protected side of the 286 is that it's a different processor in those circumstances. Ideally, you want an operating system to run on that side of the CPU and you want it to run all the existing software, but Intel didn't make the chip that

way. Can it be done? Nobody is absolutely sure at this point. But we believe there's a solution to the problem–to actually use the protected side with an MS-DOS operating system and maintain compatibility–that will be a fairly long-term solution and have both hardware and software implications.

Our relationship with Intel over the past couple of years has become extremely close. We can now offer key input into the company's design decisions so that they understand the effects hardware choices have on software.

PCW: There's some confusion, even among sophisticated users, about just where the concepts multiuser *and* multitasking *part company. A machine that can do one would seem capable of the other. What distinctions is Microsoft making, and which approach has the momentum?*

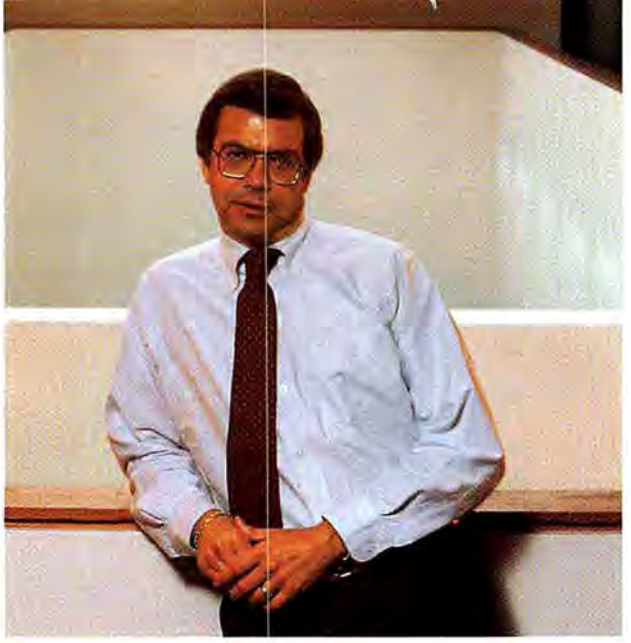
Shirley: We feel the single-user networked machine running under a multitasking operating system will be a much more popular environment, perhaps by a ratio of 10 to 1, than the multiuser environment.

That's where Microsoft Networks, the core software of the IBM PC Network system, comes in. The important point about MS Networks, as an extension of DOS, is that the same application will run on both MS Net and IBM's PC Network. All the high level protocols and commands are the same. DOS 3.10 contains all the hooks, if you will, for the network environment.

DOS 3.10 not only allows you to run old applications on the network, it enables you to run applications that were written for DOS 1.00, which didn't understand hierarchical file structures. We built commands into DOS 3.10 that allow you to tell the operating system to send an application program's request for a file to a given server, and you can embed in that information as long a set of directory instructions as you want.

We believe that networking will be extremely popular during the next couple of years, and that somewhere around 40 percent of all personal computers will end up on a network. I haven't talked to any large account customers who don't want to do that–they're just reluctant to put out the money until they know where things are going to settle down.

Melin: Technically, MS Net includes a dedicated file server, the redirector [which arbitrates user requests on the network], and, in DOS 3.10, an ability to use the file share included in DOS 3.00. IBM bought the three pieces but elected to do its own, nondedicated server.



'We believe that networking will be extremely popular during the next couple of years, and that somewhere around 40 percent of all personal computers will end up on a network.' –Jon Shirley

PCW: Otherwise the IBM PC Network and MS Net are fundamentally the same system?

Melin: The three key interfaces in both network products run together. The most important interface is the DOS system call interface. That is identical in both products. There's also an interface to the so-called device driver BIOS level. The other major interface lies between the redirector and file servers.

PCW: Are other local area network companies now buying the Microsoft redirector?

Ballmer: Yes, although they may be writing their own file servers. We essentially see four businesses in the network area: boards or hardware, which includes device drivers; network operating systems; servers; and applications, such as electronic mail. We're not in all four by any stretch of the imagination, and there will be those for whom other file servers would be more appropriate than ours.

Before Microsoft Networks, there was no standard set of network operating system protocols. Anybody who wanted to enter the network business had to offer both the redirector and the server, combined. The redirector is worthless without a server, but now a network supplier can pick and choose to some extent. I encourage ISVs to write file servers. I'm now working with other LAN companies interested in getting file servers and print servers going on top of our core product.

PCW: You have a server, but you're not necessarily insistent on that product. Why not?

Phillips: We supplied a sample transport and a dedicated server with Microsoft Networks, not because we think those are our mainline products, but because we couldn't very well give our OEMs only one piece, which they would be unable to run on anything. We're trying to encourage them to build their own transports and servers–just use our operating system, because that's the business we're in. We view the server as an application on top of the operating system rather than as a part of it.

PCW: In your view, what is holding up development of a truly effective nondedicated server?

Melin: A multitasking version of DOS. It will support an effective nondedicated server. Until then, when you try to squeeze an extra task out of a system that isn't designed for it, you wind up with a kludge. That can also create havoc for you on future releases.

I think there are two advantages to a nondedicated server: It reduces the cost of small networks, and it provides a mechanism for direct peer-to-peer file sharing. But for serious information sharing, a dedicated server is a must. I just don't see network users patiently waiting while the guy with the nondedicated server plays *Flight Simulator*.

PCW: In that case, no custom-built server or transport will cause incompatibilities with MS Net, as long as it doesn't interfere with the network operating system?

Melin: That's right.

PCW: But if Sytek, IBM's supplier for the PC Network, doesn't formally support MS Net, how is it that MS Net supports the Sytek board?

Phillips: The product supports IBM's network board. I can't speak for Sytek's own boards at this point because they're not the same, but Microsoft Networks will run fine over the IBM board. We use them here in precisely that way.

PCW: There's some intelligence, the Net BIOS, on that board, but doesn't it get in the way?

Phillips: There's no problem whatsoever. Anything written for the rules that MS Networks provides will run on IBM's PC Network.

PCW: During the process of developing either MS Net or the PC Network, did you work with Sytek at all?

Phillips: No.

PCW: Novell, which aspires to be the Microsoft of the network operating system world, recently introduced a product that emulates the MS Net redirector. Who else do you foresee making a splash in the LAN software marketplace?

Melin: As you are aware, networking companies such as 3Com and Ungerman-Bass have already announced products based on Microsoft Networks.

As others pull their plans together, I think you'll see various networking products providing a range of services, all using at least the Microsoft redirector. The best part is, if these people are careful, their solutions will run the applications developed for the IBM PC Network without any modification.

Microsoft is in the business of selling operating systems software, in this case, a network operating system. I think the networking community now realizes we are not competing with the total network supplier.

I think this gives Novell an opportunity because both the PC Network and MS Networks will help expand the network business far beyond what it's been. Novell is one of the premier server-oriented companies in the marketplace. Combining our products with theirs gives them a great opportunity to build very powerful servers for the high-end market.

Phillips: One advantage that will help Microsoft Networks create a standard is its user interface–moving from network to network, you see the same thing. Today, in switching from Omninet to EtherSeries or whatever, you start from scratch. With our product, starting over is no longer an issue. For every network licensing the product, your files are good, the way you operate the commands are the same, everything you do is the same.

The New Communications Vernacular

Mark Hall

Like any burgeoning technology, local area networking comes with its own exacting jargon. Here's a brief glossary to help you navigate the networking shoals.

Server. A computer, connected to a local area network, that is designated for a specialized function such as handling print requests or managing files.

Dedicated server. A server that is committed exclusively to network tasks and is unavailable as a terminal for local processing. A *nondedicated* server performs its network function and is also available as a workstation.

File server. A program or device that controls a user's access to data on a file-by-file basis. If a user has been granted read and write access to a file, he or she can read from and write to that file regardless of which network disk the file resides on.

Disk server. A device that controls a user's access to data on a volume-by-volume basis. A volume is a portion of a hard disk that acts as if it were an independent disk drive. If a user has been granted access to a volume, he or she can use any file in that volume.

Dynamic linking. The process of joining Xenix routines to a DOS application. This process occurs when the DOS application is loaded; the Xenix routines then translate DOS calls into Xenix calls.

Gateway. An intelligent network device that enables one network (e.g., 3Com EtherSeries) to communicate with a different network (e.g., IBM PC Network).

PCW: Do you think we're going to see vendors encountering the same sort of compatibility problems that some experienced with MS-DOS? Suppose they buy the net operating system from you, then embellish it for a given hardware configuration . . . ?

Phillips: People can make changes. Some have licenses that give them access to source code. If people don't want to implement our interrupt calls, they'll encounter problems with IBM's net.

Melin: Microsoft Networks is an open system. We publish the DOS interface. Everyone knows what the interrupt calls are. You could skip using our redirector and do your own thing. But it's a funny business to be in because you're always chasing after Microsoft's and IBM's next release. Why reinvent the wheel?

What people are buying is not a board—they're buying functionality. When it comes to other network standards, of course, Microsoft Networks doesn't even attempt to standardize anything that a protocol like Ethernet standardizes. They're two different worlds.

PCW: Will there be a real problem generating application software for networks from the ISVs' point of view? I'm thinking about a certain lack of incentive in multiple-use situations, combined with a supposed absence of clear standards.

Multitasking. Describes the ability of an operating system to appear to execute numerous requests for the CPU simultaneously. Multitasking capabilities can be found in single-user as well as multiuser systems.

Multiuser. A type of system–using a single CPU or multiple CPUs in a single box–that can be shared by two or more workstations. An appropriate operating system must be installed to arbitrate requests from system users.

Network operating system. An OS capable of recognizing multiple users, servers, printers, and other devices. The OS must also be able to protect user files from unauthorized or unintentional use. A network OS enables workstations to access the resources of the network.

Node. A point on the network to which one or more resources–such as a disk server, printer, or workstation–is attached.

Redirector. A portion of Microsoft Networks that recognizes a user's DOS 3.10 command as a network request and executes the request at the appropriate resource.

Transparent. The way in which DOS commands and function calls invoke the network operating system without the user's awareness.

Transport. In DOS 3.10, the network board and the low-level communications protocols that it uses to prepare data for transmission over the network.

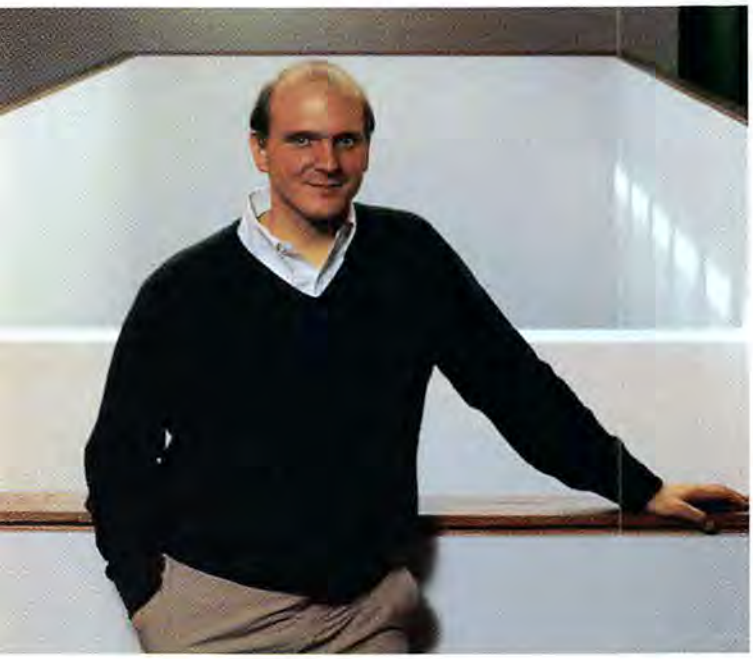
Workstation. At its most rudimentary level, a display terminal and an input device. In most cases, however, it is likely to be an intelligent terminal such as a PC.

Phillips: I'd say the real problem is the shortage of networks. If you really want to get somebody interested in product development, you must have a decent-size market. There are two ways to do that–either you build it and then people get behind it, or, if your name's IBM or Apple, people trust that you'll make one, even if it's not there initially. Until now, no big manufacturer has gotten behind LANs. None of the little guys, the 3Coms and the Corvuses, has been prosperous enough to lure a company like Lotus or Ashton-Tate into really getting serious about a mail package. None has been able to get dealers interested in stocking its stuff and having that broad distribution.

When it comes to network applications, we're encouraging all our ISVs to forget about the network hardware. That's what Microsoft Networks is all about. It makes itself transparent to applications whether they are working locally or across the network. Applications written to follow the rules will run on *all* networks supporting Microsoft Networks.

Melin: It's the operating system level that we want most of the applications to write to. We will provide the transparent distribution of those operating system functions through MS Networks.

PCW: A number of single-user applications will run on local area networks, but ideally you're looking for true multiuser applications. Where are they apt to come from?



'In unit volumes I expect DOS to outsell Xenix 10 to 1. These volumes make advances in the DOS world a little higher priority than they are in the Xenix world, but I always want to keep Xenix compatible with DOS.' –Steve Ballmer

Gates: I see several sources for those applications. The most obvious is DOS vendors moving up, which will primarily involve productivity software. And 300 or 400 companies are standing by, ready to catch this UNIX wave. A few dozen have done their applications with the right types of multiuser locking facilities built in. Most of the software houses doing vertical applications really want to support multiple users. A lot of people also involved with minicomputer architectures will now see that micros are sophisticated enough for them to modify their vertical applications.

PCW: Is Microsoft going to get into network applications?

Gates: Sure. You'll see a couple of pretty obvious applications designed strictly for the network as well as other applications that will be able to take advantage of the network over time. To date, most of what's been done has come from transport vendors doing the generic sort of network applications, and that doesn't make sense. You want somebody who really understands the IBM approach to gateways and who really knows how to use MS Net.

Shirley: We will also have language products designed to use the network's record-locking capability, which older applications can still access in the file-lock mode. The file lock is set from DOS, but if you want record locking, the application has to tell the system to lock a record, and that's normally done through a language. COBOL already incorporates this as a function.

Ballmer: Multiuser packages that run on systems like Xenix–mail, shared data bases, and so on–will soon be moving onto the network, which is essentially a multiuser system. I believe there will also be a new class of network applications that we haven't seen before–things that actually allow multiple users to participate collectively to get one job done, or that allow applications to be distributed across machines.

PCW: Does all this network activity have the potential, at least in the short run, of undercutting Xenix, your product, and UNIX in general?

Ballmer: Maybe, but on the other hand, multiuser systems will be participating in the network as well. We'll have networks that can have single-user or multiuser nodes on them, so four people get one processor, while someone else gets his or her own. You'll be able to choose the configuration you want. And multiuser nodes will, of course, be fairly good for servers as well. When we get to multitasking DOS, you'll be able to create tasks in other machines just as easily as you can create them in your own.

PCW: Does MS Net offer much hope for those of us who'd like to get different operating systems on a network talking to each other?

Phillips: We have standardized peer-to-peer protocol for operating systems. We now know the protocol in which one operating system will talk to another. It's when two operating systems talk to each other that we want to have a standard protocol so that communications can be replicated and become transparent. For example, we worked with Intel to extend the DOS-to-DOS protocols to cover DOS-to-Xenix communications.

PCW: What can we look for in future releases of MS Net?

Shirley: We'll want to do lots of things, particularly in the area of improving software performance. Most people concentrate on the performance of the wire, yet a variety of wires each yields exactly the same throughput on an identical system loaded with the identical software. That's because the bottleneck's the software, not the hardware. You have to add an awful lot of nodes to a high-speed network before you start to bring the thing down. Additionally, the operating system will have to accommodate changes as we go to multitasking. That will make a tremendous performance difference.

PCW: Short of multitasking DOS, is there a way that MS Net and Xenix–a proven commodity in the multitasking world–can get together?

Ballmer: We would like to allow Xenix to somehow run DOS applications and eventually, using facilities that we have built into Xenix and could put into MS-DOS, we can get applications that are binary compatible between Xenix and MS-DOS–assuming the developer is willing to obey certain rules. Perhaps nobody will choose to do that, but at least we should provide such a path. It depends upon a function we call dynamic linking, which allows you to bring in library service routines and link them with an application or with the operating system at run time. We have some DOS cross-development utilities that we bundle with Xenix today that let you write a program under Xenix, relink it under Xenix, and come out with a DOS binary. If DOS could relink that program itself at run time, we'd have this kind of compatibility, but we're not there yet.

In unit volumes I expect DOS to outsell Xenix 10 to 1. These volumes make advances in the DOS world a little higher priority than they are in the Xenix world, but I always want to keep Xenix compatible with DOS. When I do networking in Xenix, if I can't talk to a DOS file server, it's a joke, so in that sense, DOS will lead Xenix. Xenix is good, it serves an important part of the market, but it's not the high-unit volume part of the market.

PCW: MS-DOS compatibility continues to thrive, despite the slowdown in market growth. Is there a certain kind of inertia in the marketplace that may be good for the consumer but might make things tricky when moving new technology into the pipeline?

Gates: Sure, there's inertia. It's big stuff. More software is being written today for MS-DOS than has ever been written for any environment at any time, and it keeps growing every day. It makes the definition of compatibility very complicated. Being innovative in DOS while maintaining compatibility is incredibly difficult. We sit here and talk about ways that interfaces have been used beyond their intended specs–and whether or not we should preserve those interfaces. Our job is to combine innovation and compatibility. And it means DOS release cycles are hard to do in less than a year because there's so much compatibility testing that's got to occur.

PCW: Some hardware companies don't share Microsoft's reverence for compatibility. Can the impetus for maintaining operating system compatibility keep pace with those pressures?

Gates: I'm totally a believer that by following the Intel path and our path for DOS over the next three years, we will maintain compatibility and that the process is worth it every step of the way. And I'm convinced that totally incompatible approaches are not so dramatically better that they justify giving up that investment. At best, they're only marginally better–the code's a little smaller, but who cares? Is it fun to worry about those things? DOS is a unique product: more people test it than write it. But it's all worth it. It means you don't start over every time.

Ken Greenberg is an Associate Editor for PC World.

The PC World Advanced Users Quiz

Pit your experience, knowledge, and perseverence against PC World's editors in this go-for-broke quiz—and discover your PC IQ.

Are you an advanced user of either the PC or a compatible machine? Being an advanced user doesn't necessarily mean you program for a living or are permanently stooped from soldering together an Altair in 1975. What it does mean is that you are thoroughly familiar with the PC and its major peripherals and application programs. If you bought a computer kit in the seventies and successfully (or unsuccessfully) put it together, you are probably an advanced user and then some. If you regularly use *dBASE II*'s command language, *WordStar* patches, and *1-2-3* macros, you undoubtedly qualify. And if you drag a machine home every weekend and spend more time with it than with your spouse, you are well on your way. But how do you know for sure?

The quiz that follows can help you judge where you stand in the pantheon of PC knowledge. Compiled by the editors of *PC World*, this 60-question test touches on PC *mirabilia* ranging from RAM to telecommunications. If you answer 55 to 60 questions correctly, consider yourself advanced and start talking to humans again; if you score 50 to 55, you are almost advanced but should nevertheless renew your *PC World* subscription; if you score 45 to 50, you are getting close—renew that subscription and pick up a copy of *The Fully Powered PC* from PC World Books. If you tag 40 to 45 correct answers, you are an intermediate user and moving up; 20 to 40 correct answers indicates you are beyond the novice stage. A score below 20 means you show promise but should probably pick up some back issues of *PC World*.

If you don't rank in the upper echelon of PC users, don't despair. Making the perilous journey from beginning to advanced takes time, experience, and a knack for enduring confusing user manuals and obdurate hardware and software. If nothing else, we hope this test informs and entertains you, and more important, spurs you to explore the heights (and pitfalls) of using the PC. Remember that this is a self-test. You'll find the answers on page 229. Please don't mail us your completed quiz for grading. If you have comments about the "PC World Advanced Users Quiz," please write to *Letters*, care of *PC World*.

Quiz

Choose the single best answer.

1 The default disk drive is

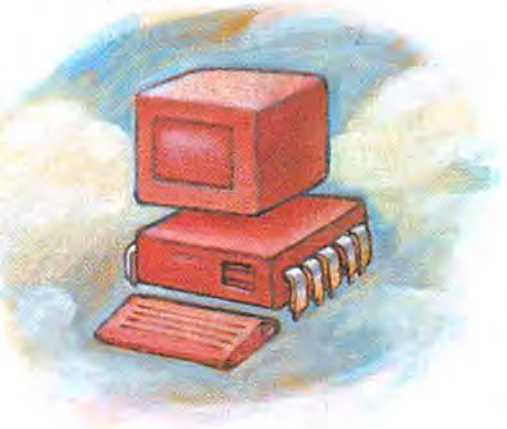
a. the one that usually breaks
b. the one on the left
c. the drive where a system disk resides
d. the drive DOS assumes you meant

2 Which of the following cannot be run from *WordStar's* Opening menu?

a. CHKDSK
b. FORMAT
c. internal DOS commands
d. BASIC programs

3 The PC AT uses which microprocessor(s)?

a. 8086-2
b. 8286
c. 80286
d. 80287
e. b, c
f. c, d



4 Pressing <Ctrl> and <NumLock> usually

a. breaks a program and returns control to DOS
b. makes the computer pause
c. provides hands-on anesthetizing

d. downsteps the PC's power rating
e. none of the above

5 64K is the same as

a. 65,536 bytes
b. 64,000 bytes
c. 6400 bytes
d. 2 kilos

6 A serial port is to a parallel port as

a. 1 byte is to 1 bit
b. 1 parity bit is to 1 stop bit
c. 8 bits are to 1 byte
d. 1 bit is to 1 byte

7 *WordStar's* cursor control diamond is

a. old hat
b. a girl's best friend
c. E, S, D, X
d. A, E, C, F

8 How can you quickly determine the dimensions of a *1-2-3* worksheet?

a. Look at the disk directory.
b. Use the /dimss macro.
c. Use <Home>, <End>-<Home>.
d. Use <End>, <Ctrl>-<CursorDown>-<CursorRight>-<CursorLeft>.

9 The difference between an interpreter and a compiler is

a. an interpreter can accommodate several high-level languages, while a compiler can deal with only one
b. an interpreter translates program instructions as the program runs; a compiler translates the entire program before it is run
c. interpreters are confined to BASIC
d. an interpreter can address only 64K memory segments; a compiler knows no limits

10 The bootstrap loader is

a. a cowboy's shoehorn
b. IBM's utility for loading the BASIC interpreter
c. the BIOS ROM routine that loads DOS
d. the PC's power-on diagnostic

11 How much random access memory can the PC's 8088 microprocessor address directly?

a. 640K
b. 64K
c. 1Mb
d. 3 gigabytes

(continues)

12 How do you copy files to another disk on a single drive system?

a. COPY A:*.* B:
b. DISKCOPY A: B:
c. COPY *.* A: B:
d. COPY *.* B:

13 Spooling permits you to

a. dump a screen display to disk
b. print a file while working on another
c. leave your modem unattended
d. use *WordStar*'s mail merge facility

14 How many pixels make up the PC's monochrome display?

a. 252,000
b. 128,000
c. 64,000
d. 320,000
e. none of the above

15 What's the difference between baud and bits per second?

a. *Baud* describes transmitted data; *bits per second* refers to received data.
b. *Bits per second* is a valid measurement only after the data leaves the computer; *baud* must be used for internal data transfer.
c. *Baud* means bytes per second.
d. *Bits per second* is the number of binary digits (0s and 1s) transmitted per second; *baud* is the number of signal events transmitted per second.

16 An interrupt can be issued by

a. DOS
b. an application program
c. a user from the keyboard
d. the microprocessor
e. all of the above
f. b, c, d

17 DEBUG is

a. an assembler
b. a way to "patch" programs
c. an external DOS command
d. all of the above
e. a, b

18 A node is any PC

a. connected to a mainframe
b. on a local area network
c. involved in a multiuser environment
d. manufactured before 1982
e. a, b, c
f. a, c

19 What's the difference between *multiuser* and *multitasking?*

a. A multiuser environment is hardware-based; multitasking is accomplished via software.
b. Multitasking offers file- and record-level locking.
c. Multiuser is sequential; multitasking is simultaneous.
d. Multiuser partitions one or more processors for use by more than one person; multitasking lets a single processor keep many tasks active at the same time.
e. About $3000.

20 What are ASCII and EBCDIC?

a. chip manufacturers
b. signals that respectively mean "ready to send" and "ready to receive"
c. code systems that represent data characters
d. proposed graphics standards
e. ancient Greek heroes

21 The DOS command DIR/P

a. displays lengthy directory listings one screen at a time
b. scrolls through a list of path names
c. displays all print files
d. changes the default drive to P:

22 The two hidden DOS files are

a. IBMBIO.COM and IBMDOS.COM
b. BIO.EXE and DOS.EXE
c. DOS.COM and BIO.COM
d. IBMDOS.EXE and IBMBIO.COM
e. DB.COOPER and JD.SALINGER

23 Terminal emulation programs allow a PC to

a. send data from a mainframe to a microcomputer
b. upload files to a host system
c. act like a specific type of terminal
d. bypass encryption techniques by emulating the data patterns of the transmitting device

24 CHKDSK *.* indicates

a. whether a disk has bad sectors
b. whether files have not been closed
c. whether files reside in the same volume
d. whether files are contiguous
e. a, b
f. a, d

25 The difference between DELeting and ERASEing a file in DOS is that

a. DEL removes all contiguous sectors
b. ERASE updates FAT
c. an ERASE is permanent
d. none

26 Multiuser computers can be designed

a. with a single CPU shared by multiple dumb terminals
b. with multiple CPUs, one for each terminal, sharing a common bus
c. with a single CPU shared by diskless workstations
d. all of the above

27 On a PC, how many 64K-bit RAM chips make up 512K?

a. 64
b. 72
c. 36
d. 16

28 In a hierarchical data base, you can expect to find

a. a many-to-one relationship
b. data organized into parent-child relationships
c. an abundance of key fields, set forth in tables
d. a, b
e. b, c

29 What is the PC's upper character set used for?

a. character graphics
b. freehand drawing
c. alphanumeric strings
d. Pascal programming
e. breaking and entering

30 A DOS device driver is

a. any application program that sends output to a printer or plotter
b. the 8088 CPU
c. a software program added to DOS that accommodates a specific peripheral device
d. a slave processor dedicated to input/output operations that aids the 8088 in speeding up printer operation

31 Which is the faster method for locating a name, address, or zip code in a *dBASE II* data base?

a. index
b. sort
c. neither; index and sort are the same function

32 CMOS

a. always hangs from the north side of a tree
b. stands for Character Matrix Optimized Storage
c. is an inexpensive, reductive thermocouple used in the PC's power supply
d. none of the above

33 Which ASCII character produces a face in the IBM character set?

a. 5
b. 6
c. 1
d. 2

(continues)

34 **In the Open Systems Interconnect (OSI) model, the user interface is part of the application layer, while the presentation layer**

a. is buried beneath the topology layer
b. governs data interpretation
c. permits error recovery
d. establishes a session-level standard

35 **The *1-2-3* command /frmacros~/wwv**

a. loads a worksheet called *macros* and creates a vertical window at the cursor position
b. saves a file called *macros*, widens the window, and views a graph
c. views a graph called *macros*
d. finds the next occurrence of the word *macros*
e. links two spreadsheets

36 **The difference between a disk server and a file server lies in**

a. the disk server's ability to provide record locking
b. the file server's ability to perform data encryption
c. the file server's ability to regulate access to files
d. the disk server's ability to overlap hard disk sectors

37 **Which of the following is not a valid set of communications parameters?**

a. 600 baud, no parity, 8 data bits, 1 stop bit
b. 9600 baud, even parity, 7 data bits, 1 stop bit
c. 4800 baud, even parity, 8 data bits, 1 stop bit
d. 19200 baud, space parity, 7 data bits, 1 stop bit

38 **<Ctrl>-L issued in a *WordStar* document**

a. sometimes repeats the last <Ctrl>-Q F, a find command
b. deactivates word wrap
c. sets the help level
d. splits the screen into windows

39 **HOWBIG.TXT contains 2295 bytes, as shown by DOS's DIR command. What determines how much disk space DOS allocates to the file?**

a. whether the disk is formatted as a system disk
b. the cluster size
c. the location of the file in the file allocation table
d. whether the file is located on a RAM disk

40 **When two users in a multiuser environment access the same data at the same time, the data is at risk unless**

a. data security protocols are followed
b. the network operating system provides record locking
c. both the network operating system and the application program provide file protection
d. the application program includes "hooks" for record locking and privacy
e. the application program is also multitasking

41 **Broadband differs from baseband in that**

a. broadband supports frequencies in two directions, baseband in only one
b. broadband supports simultaneous multiple signals, baseband supports only one signal at a time
c. broadband relies on thick coaxial cable, baseband on twisted pair wire
d. broadband dictates a ring topology, baseband a star

42 A linker

a. daisy-chains PCs together in a network
b. lumps several *1-2-3* worksheets into a master worksheet for sorting purposes
c. combines object code files into an executable program file
d. bypasses switch settings on the PC's motherboard

43 CSMA/CD, an access technique used in many local area networks, stands for

a. collision system media access with carrier detection
b. carrier system media access with collision determination
c. carrier sense multiple access with collision detection
d. computer system method avoidance with collective diffidence

44 A bubble sort is

a. the same as a key-field sort
b. faster than a partition sort
c. an algorithm for sorting elements of a file
d. an algorithm particularly useful in sorting large files

45 Asynchronous communications programs used with modems for the PC control data flow via

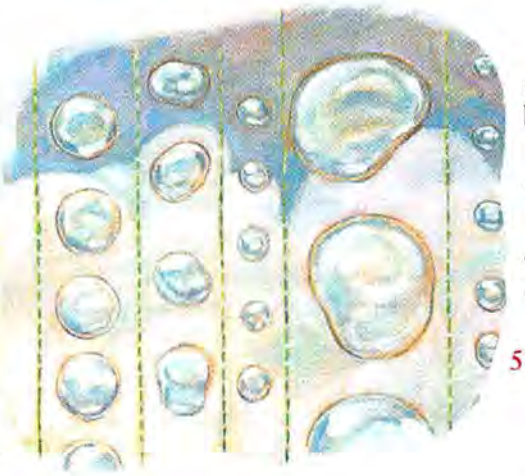
a. parity
b. XON/XOFF
c. XOR/XOFF
d. CSMA/CD

46 The <F4> key in *1-2-3*

a. defines a relative cell address as an absolute address
b. recalculates all values
c. invokes a \X macro
d. quickly locates circular references
e. exits to DOS

47 ACK/NAK refers to

a. a native instruction in 8088 assembly language
b. acknowledgement of a transmitted message
c. acceptable/not acceptable memory test
d. a keyboard interrupt
e. Ogden Nash doggerel



48 Modems employ three methods for modulating the sine waves (which represent data) sent over a telephone line. The three modulation techniques are

a. asynchronous, bisynchronous, and synchronous
b. frequency, amplitude, and phase
c. high-bit, low-bit, or no-bit
d. none of the above

49 What does *DIP* stand for?

a. dual in-line package
b. duplex integrated program
c. Diablo Inkjet Printer
d. data interchange protocol
e. none of the above

50 A program called TEST.EXE is stored in the \util subdirectory of your hard disk (designated C:). When the program runs and control returns to DOS, you are prompted to 'Insert COMMAND-.COM disk in drive A'. Which of the following DOS commands executed before TEST runs would prevent your having to place a disk in drive A:?

a. PATH C:\;C:\UTIL
b. COPY A:COMMAND.COM C:\UTIL
c. RENAME TEST.EXE TEST.COM
d. ASSIGN A = C
e. none of the above

51 How is bank switching distinguished from virtual memory?

a. Bank switching swaps separate banks of RAM into and out of the same addresses; virtual memory swaps data between RAM and disk storage.
b. Bank switching reallocates disk sectors; virtual memory deals with presized data frames.

(continues)

c. Bank switching requires access to mainframe memory.
d. Bank switching is a sophisticated financial management strategy that takes advantage of varying interest rates.
e. Virtual memory does not count in Trivial Pursuit.

52 **Which term does not belong?**

a. GET
b. PUT
c. DIM
d. SUM
e. FILES

53 **To calculate parity you**

a. add the number of bits—the 0s and the 1s—in a 7-bit ASCII character as decimal numbers
b. add the value of the 7-bit ASCII character as binary numbers
c. add the number of bits in a 7-bit ASCII character and square the sum.
d. don't—parity is too complex for the advanced user

54 **MYSTERY.DOC is 28,050 bytes long according to the disk directory. But when you try to edit the file with *WordStar,* the file appears to contain only three lines of text. What might explain the discrepancy?**

a. More than 64 files are on the disk.
b. A Control Z character is in the file.
c. Graphics characters are in the file.
d. You are using incompatible versions of DOS.

55 **AX, the Accumulator, refers to**

a. an 8088 internal register used for word-size operations
b. a BASIC function that accumulates and stores string values
c. a tape backup file system
d. Arnold Schwartzenegger's next film

56 **A cross-assembler is**

a. a utility that notes where variables are used throughout a program
b. a program that runs on one microprocessor and generates machine language code for another
c. a program that links modules of assembly language code and generates appropriate microprocessor-specific subroutines
d. a utility that translates assembly language programs into BASIC

57 **What's the difference between nested and recursive subroutines?**

a. Nested subroutines are static; recursive subroutines are altered by others.
b. *Nested* means one within another; recursive subroutines call themselves.
c. Nested subroutines are restricted to FOR loops.
d. Nested subroutines are illegal in BASIC.

58 **A virtual field is**

a. a data base construct that helps the prototyping process
b. a means of defining a field that isn't stored in a data base as such
c. effectively the same as a key field
d. a record used to set up a data base
e. Candlestick Park

59 **The nonmaskable interrupt is**

a. an interrupt you can't override
b. an interrupt you can override
c. the same as an error message
d. an interrupt found only in BASICA

60 **Cell A3 in a *1-2-3* worksheet contains the formula A1/A2. Which formula effectively tests whether cell A3 contains the value 3/7?**

a. @IF(@ABS(A3-3/7)<.0001,1,0)
b. @IF(A3=3/7,1,0)
c. @IF(@INT(A3)=@INT(3/7),1,0)

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- ✓dBase III 1.1 .... call
- ✓Framework 1.1 .... call

Best Programs
- ✓Personal Finance Programs 1.1 .... 65.
- ✓PC/Professional Finance Program II 3.0 149.
- ✓PC/Fixed Asset System 3.0 .... 329.
- ✓PC/Tax Cut *(for 1984 taxes)* .... special
- ✓PC/Personnel (Level 1) 3.0 .... 279.
- ✓PC/Personnel (Level 2) 3.0 .... 419.
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- ✓Turbo 8087 3.0 w/BCD .... 72.
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- ✓Graphics Toolbox 1.0 .... 30.
- ✓Turbo Tutor 1.0 .... 19.
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- ✓Volkswriter Scientific 1.0 .... 289.

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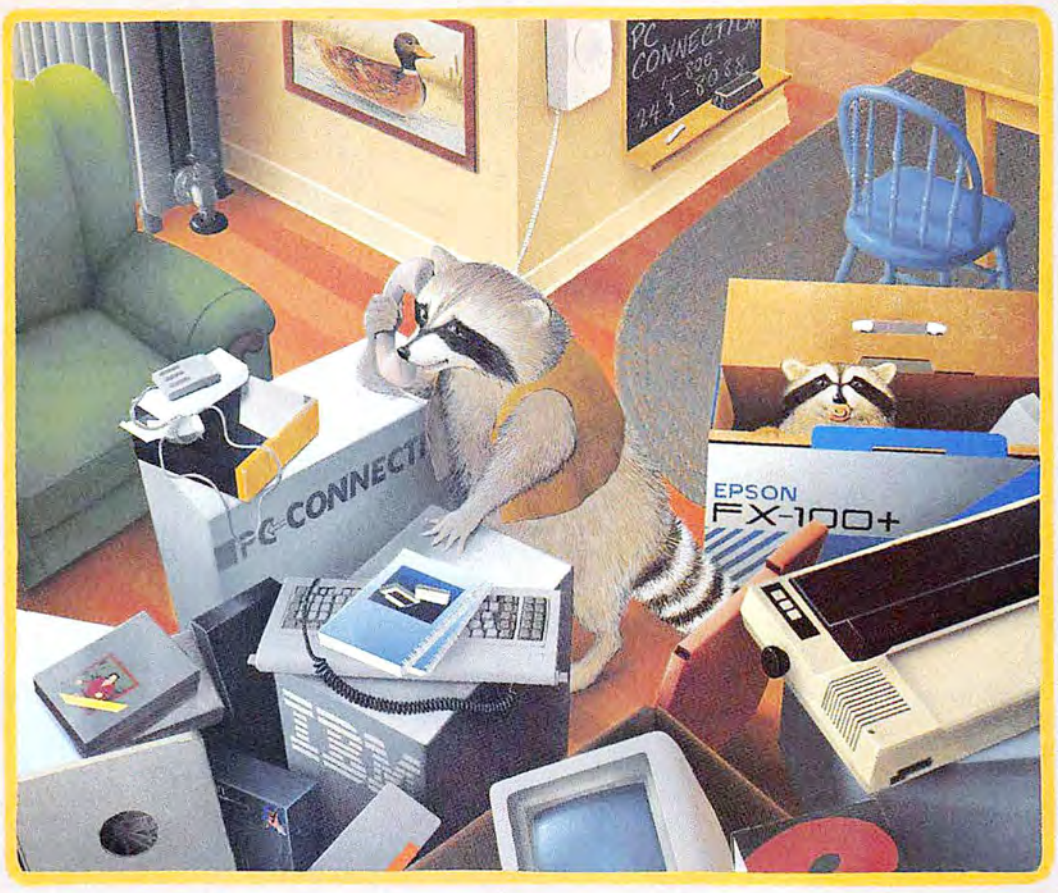

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Enchanter *(standard)* ... 25.
the Witness *(standard)* ... 25.
Planetfall *(standard)* ... 25.
Cutthroat *(standard)* ... 25.
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Suspect *(advanced)* ... 29.
Deadline *(expert)* ... 33.
Starcross *(expert)* ... 33.
Suspended *(expert)* ... 33.
Invisiclues (hint booklets) are available for most Infocom games. Specify game. 7.
Microsoft
Flight Simulator ... 35.
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Ultima III ... 39.
PCSoftware
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Championship Blackjack ... 23.
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All AST Boards come with SuperDrive, SuperSpool, and one year warranty.
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MegaPlus II 64k upgradeable to 256k (or more with MegaPak) with clock calendar and serial port *(parallel, game, or second serial port optional)* ... 249.
MegaPak 128k *(not upgradeable)* ... 209.
MegaPak 256k ... 339.
I/O Plus II with clock calendar and serial port *(parallel, game, or second serial port optional)* ... 125.
Parallel, Game, or second Serial Port *for any AST board (specify board)* ... 35.
Connectall *connector bracket (PC only)* 19.
AST-5251-12 ... 529.
AST-5251-11 ... 709.
AST-3780 ... 589.
Reach Modem *(half card 300/1200 baud internal modem includes Crosstalk XVI)* 389.
Advantage 128k ... 399.
Amdek
Video 300G monitor *(green)* ... 139.
Video 300A monitor *(amber)* ... 149.
Video 310A monitor *(amber)* ... 179.
Color 600 - RGB monitor ... 399.
Color 700 - RGB monitor ... 439.
Compucable
Plastic Keyboard & Drive Cover Set ... 17.
IBM Mono Screen Enhancement ... 17.
Printer to IBM Cable *(specify printer)* ... 27.
Smartmodem to IBM Cable ... 25.
Comrex
Comrex 420 printer (417 cps draft mode, 100 cps letter quality) ... call
Curtis
STANDS
PC Pedestal *(for IBM Mono or Color)* ... 39.
PGS or Quadchrome Adapter for above 9.
Low Profile Tilt and Swivel Pedestal ... 37.
AD-2 Adapter for Portables ... 15.
System Stand ... 19.
Static Mat ... 27.
CABLES
Extension Cables for IBM Mono Display 33.
Keyboard Extension Cable *(3 to 9 feet)* 27.
AC Plug Adapter *(any monitor to your PC)* 8.
SURGE SUPPRESSORS
All surge suppressors have an on/off switch.
Diamond *(6 outlets)* ... 33.
Emerald *(6 outlets; 6 ft cord)* ... 43.
Sapphire *(3 outlets; EMI/RFI filtered)* ... 53.
Ruby *(6 outlets; EMI/RFI filtered; 6 ft cord)* 63.
Epson
All Epson printers have built in graphics capability. In addition, the "Plus" printers can print in near letter quality (NLQ) with the addition of the NLQ parallel or serial option.

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ter back-up.

- LX-80 *(replaces RX-80 - includes NLQ)* call
- RX-100 call
- FX-80 Plus call
- FX-100 Plus call
- JX-80 call
- LQ-1500 *(letter quality dot matrix)* call
- *Printer to IBM Cable (specify printer)* 27.

FTG Data
- Light Pen (Push Tip) 195.
- Demo Disk Set for Light Pen 39.

Hayes
- Smartmodem 300 149.
- Smartmodem 1200 429.
- Smartmodem 1200B *(w/Smartcom II)* 369.
- Smartmodem 2400 call
- Smartcom II 2.1 89.
- *Compucable's Smartmodem-to-IBM Cable* 25.

Hercules Computer
- Hercules Graphics Card *(parallel port)* 309.
- Hercules Color Card *(parallel port)* 169.
- Graph-X Software 42.

Kensington Microware
- Masterpiece 97.

key tronic
- Deluxe keyboard (KB 5151) 169.

Kraft
- Joystick 35.

Maynard Electronics
- Floppy Drive Controller 119.

Mouse Systems
- PC Mouse (w/software, pad, & PC Paint) 139.

NEC
- Pinwriter P2-3 *(IBM, 80 column)* 559.
- Pinwriter P3-3 *(IBM, 132 column)* 759.
- Spinwriter 2050 *(3550's little brother)* 679.
- Spinwriter 3550 *(IBM-PC compatible)* 1099.
- Spinwriter 8850 *(IBM-PC compatible)* 1489.

Orchid Technologies

All Orchid Boards come with PCnet Drive (Ram disk), PCnet spool (print spooling), disk caching & partitioning.

Blossom 64k upgradeable to 384k, with clock calendar, serial and parallel port 229.

PCnet Daughter Board (piggybacks to Blossom) with version 3.0 networking software call

PCnet Blossom 64k Blossom Board with the Daughter Board installed call

PC Turbo 186 w/128k call
- PC Net *(stand alone card)* call

Paladin - See VisiCorp

Paradise Systems
- Modular Graphics Card 275.
- Multidisplay Card 289.
- 5-Pack (0K expandable to 384k) w/clock and serial port 169.

Princeton Graphics
- HX-12 RGB monitor *(690 x 240)* call
- MAX-12 Amber monochrome monitor call
- SR-12 RGB monitor 690 x 480 call
- Scan Doubler Board for SR-12 call

Quadram

Quadboard 64k expandable to 384k, with clock calendar, parallel, serial & game port, I/O bracket, and Quadmaster software special
- Microfazer Printer Buffer (parallel) w/copy MP 64 (64k) *upgradeable to 512k* 159.
- Quadcolor I 197.
- Quadchrome RGB Monitor 469.
- Quadchrome II 449.

SMA (Systems Management)

PC-Documate Keyboard Templates *available for:*

DOS/Basic 1.1	Supercalc 3
DOS/Basic 2.0-2.1	Wordstar
Lotus 1-2-3	Turbo Pascal
Symphony	WordPerfect
Multiplan (IBM)	dBase II
Multiplan (Microsoft)	dBase III
Peachtext 5000	Framework
Easywriter II	Multimate
Volkswriter Deluxe	*each* 12.

Toshiba
- P351 printer call
- P1340 printer call

VisiCorp
- Visi Mouse *(2 button Mouse Systems mouse, PC Paint & pop-up menu software)* special

WICO
- Joystick 35.

DRIVES

All floppy drives are completely pre-tested and are supplied with a printout of the test results. They are shipped with complete step by step installation instructions. Drives are 320k/360k.

Control Data (CDC)

(5¼") *half-height drive (DS,DD)* special

(5¼") *full-height drive (DS,DD)* special

Free mounting bracket with each pair of half-heights.

IOMEGA
- Bernoulli Box 20 Meg $2549.
- 10 Meg cartridge 48.

Maynard Electronics

Internal Hard Disk (10 Meg) with WS-1 Controller 797.

Internal Hard Disk (10 Meg) with WS-2 Controller 969.

Tandon

TM 100-2 (5¼") *full-height drive (DS,DD)* 109.

10 Meg Internal hard drive w/controller (complete package) special

TEAC

FD-55B (5¼") *half-height drive (DS,DD)* 109.

Free mounting bracket with each pair of half-heights.

MEMORY

64k Memory Upgrade Set for IBM-PC or XT system board 12.

64k Memory Upgrade Set for any memory board *specify make of board* 12.

Install memory upgrades & run diagnostics *at time of board purchase only* 10.

DISKS

Fuji
- Disks for IBM-AT (96 TPI) *Box of 10* 39.

MAXELL
- Disks for IBM-AT (96 TPI) *Box of 10* 45.

Verbatim

Datalife Disks SS/DD *Box of 10* 21.
- Datalife Disks DS/DD *Box of 10* 25.
- Disk Drive Analyzer 19.
- **Flip Sort** *(holds 75 disks)* 19.

INFORMATION SERVICES

Compuserve
- Compuserve Information Service *(includes subscription, manual, 5 hours of connect time, monthly publications)* 19.

Source Telecomputing
- The Source *(subscription & manual)* 39.

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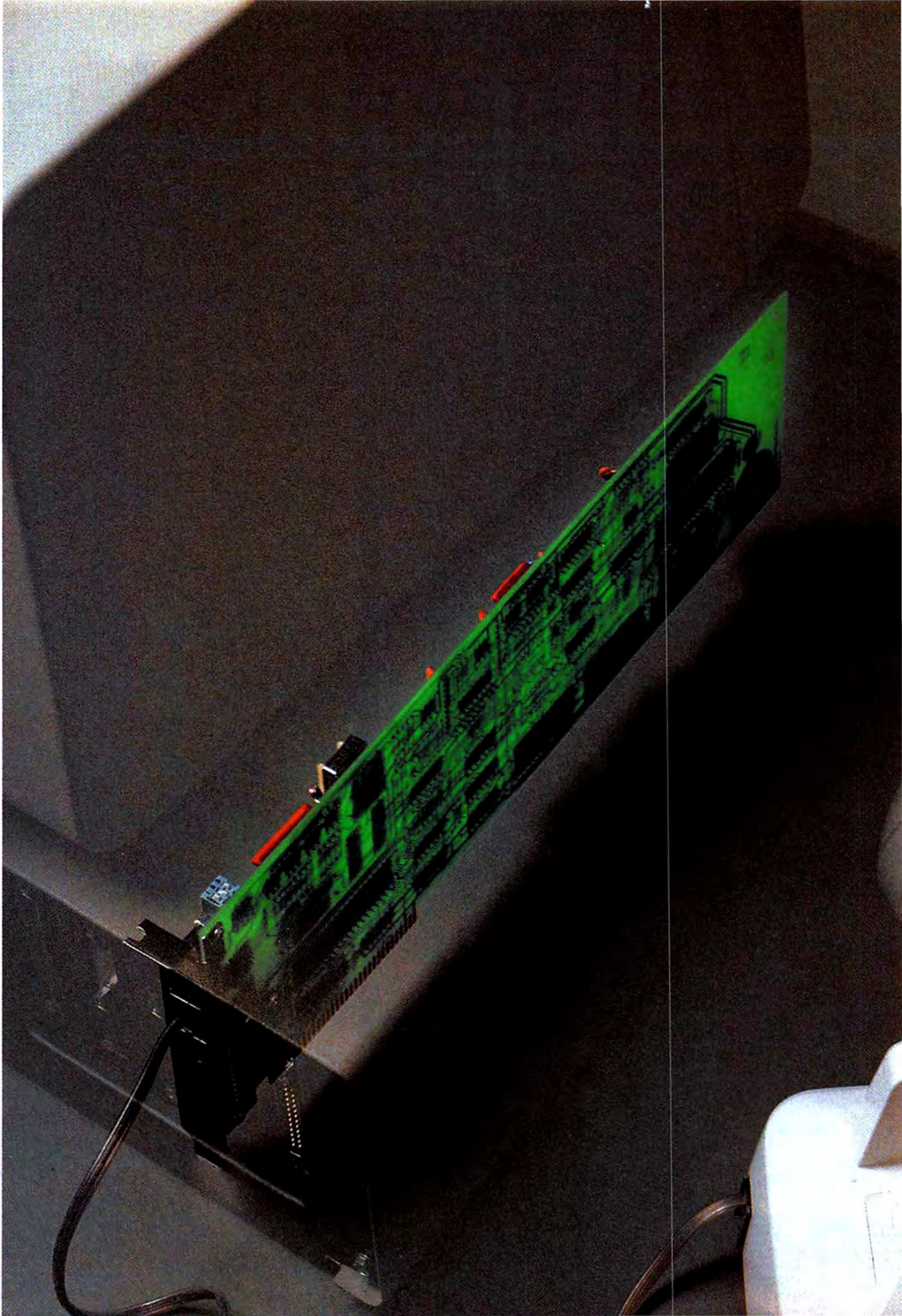


Inside Modems

Modems that slip into your PC are crowding the market, but problems of incompatibility and unreliable high-speed transmissions plague some entrants.

Larry Jordan and Jan van der Eijk

That first move into data communications takes you directly into the thick of the modem marketplace, where you'll be assaulted with choices about everything from speed to cost. However, your most crucial decision lurks in a simple guise: Should you buy an external modem or an internal modem? The characteristics of the former are well known (see "The Modem Market," *PCW,* Vol. 1, No. 8). Internal modems, however, bring with them an entourage of possibilities and pitfalls not associated with their desktop cousins.

In the early days of personal computing, only 300-bps modems were available. Back in those olden times, modems were relatively expensive external devices that only a few computer-savvy individuals dared to use. Today, data transmission rates for PC modems have skyrocketed, usable communications programs have arrived, prices have fallen, and board-level products abound. The seven 1200-bps modem boards tested here represent only a sample of the devices that fit nicely into an IBM PC, XT, AT, or compatible.

Like desktop modems, modem boards translate a computer's digital data signals into analog frequencies that can be transmitted across normal telephone lines. Another modem at the receiving end converts the analog signals back to digital form for use by the receiving computer. Modem speeds vary, but 300 bps and 1200 bps predominate–although 2400-bps units are becoming more available.

The 1200-bps modems discussed here have some common characteristics. All PC modems, for example, require special communications software to provide easy access to other PCs and the huge number of computer bulletin boards, on-line data services, and company mainframes. Since Hayes modems dominate the market (more than 50 percent according to market analysts at Future Computing of Dallas, Texas), PC modems usually employ the Hayes command set and are often referred to as "Hayes compatible." These commands let users change certain modem functions such as waiting time for dial tones. As a result of this de facto standard, most communications software houses use the Hayes command set in their products.

For that same reason, the Hayes 1200B internal modem is used in this article as a standard against which the other products are measured. But be careful. Timing differences in a manufacturer's modem chip can corrupt compatibility. A program that runs beautifully on one modem may not work at all on an-

Table 1: Modem characteristics

Modem Feature	Qubie' PC212A 1200	Cermetek Info-Mate 212PC	Microcom Era 2	Bizcomp Intelli-modem XL	IDEA-Comm 1200	Novation Smart-Cat Plus	AST Reach!	Hayes 1200B
Command capability:								
Manufacturer-specific		•		•				
Hayes command set	•		•	•	•	•	•	•
Modem type:								
Short expansion board		•					•	
Long expansion board	•		•	•	•	•		•
Line monitors speaker:								
Uses PC speaker						•		
Provides a speaker	•		•	•	•		•	•
None		•						
Telephone:								
Telephone set	•	•	•	•	•	•	•	•
Handset				•				
Switch control:								
Manual switch	•			•	•		•	•
Software switch	•	•	•	•	•	•	•	•
Dial types available:								
Pulse (rotary)	•	•	•	•	•	•	•	•
Touch-tone	•	•	•	•	•	•	•	•
Adaptive		•				•		
Dialing modes:								
Keyboard input	•	•	•	•	•	•	•	•
Modem directory		•						
Automatic dial design:								
Redials busy number		•						
Redials last number	•	•	•	•	•	•	•	•
Links other numbers		•				•		
Tone recognition:								
First dial tone		•		•	•	•	•	
Second dial tone		•		•	•	•	•	
Busy signal		•		•	•	•	•	
Dead line		•			•	•		
Blind dial	•	•	•	•	•	•	•	•

other. For example, with many software packages you can press a function key to disconnect the modem from an on-line service, but the timing sequence in the modem chip might not register the command properly. Thus, you may think you've logged off a system or closed a phone connection when the link actually remains open.

Table 1 illustrates the specific features of the internal modems discussed in this article.

Each of the seven modems requires an expansion slot and a standard RJ11 telephone wall jack for connection to a telephone system; each includes a communications program.

All modems reviewed comply with the Bell 103, 113, and 212A protocols to send asynchronous data. That is, the modems transmit characters in an irregular pattern, using start and stop bits to define the length of each burst of data.

We put these seven modems through a series of tests that included connecting them to an electronic mail program on a minicomputer, sending files to a remote PC, and linking them to on-line services such as MCI Mail and The Source. The modems were tested at both 300 bps and 1200 bps. Ease of installation and quality of documentation were also factors in our evaluation. But before making any selection, consider the words of a wise old race driver: "One man's Ferrari is another man's jalopy." The same maxim applies to modems.

AST Reach!

Noted for making multifunction boards, AST Research generates a significant amount of its revenues from PC communications products. Its Reach! half-board modem is a welcome solution to users of the XT and the Portable PC, who need all the full-length expansion slots they can get. This modem is compatible with most features of the Hayes Smartmodem 1200B, and it fits in the IBM Portable PC slots. The latest version of *Crosstalk XVI* is bundled with it.

One appealing feature of the Reach! is the accessibility of its DIP switches at the PC's backplane. Many communications programs differ in the switch settings they require; the Reach!'s switch design eliminates the loathsome task of opening and closing the PC's enclosure each time you change communications programs. While the Reach!'s documentation won't win a Pulitzer, it is adequate. Only 65 pages focus on the modem itself. Most of the manual is dedicated to explaining the use of *Crosstalk*. This emphasis seems unnecessary, since Microstuf, *Crosstalk*'s manufacturer, provides ample documentation, and users may choose other communications programs instead. During our tests, the Reach! modem did just fine with *PC-Talk III*.

The Era 2 responds to all of the Hayes Smartmodem commands. However, Microcom fully expects that you will use its own software.

The board appears well made with no loose wires or uneven soldering. The modem responded well to all Hayes commands and provided excellent line noise filtering. The Reach! modem does, however, have two shortcomings. Its speaker volume control must be adjusted with a screwdriver–a tedious task if the back of your system unit is not easily accessible. An outside volume-control knob would have added a crowning touch to an otherwise excellent modem. A less serious flaw is that the user manual comes on loose-leaf paper without a binder.

Era 2

Microcom is making a name for itself in the arena of communications protocols. Its MNP (Microcom Network Protocol) has attracted considerable interest among microcomputer manufacturers and long-haul data networks such as Telenet (see "The Microcom Agreement," *PCW*, Vol. 2, No. 5). But Microcom also has a bread-and-butter modem, the Era 2–a combination hardware/software package whose software works only with the accompanying hardware. The modem is one of the best Hayes Smartmodem 1200B clones tested. Because the software is written exclusively for the Era 2, it takes full advantage of the

modem, using menus and simple commands to set parameters. Another Era 2 advantage is the size of its line monitor speaker. Microcom uses a thin metallic speaker on the Era 2, which fits better in an XT than does the thicker, standard speaker Hayes uses in the 1200B.

With both *PC-Talk III* and *Telios* communications software, the Era 2 communicates easily with remote systems. During tests, the modem transmitted files and sent mail with no problems or need to retransmit. The Era 2 responds to all Hayes Smartmodem commands. The only problem in using these commands is the lack of relevant documentation in Microcom's manual. Microcom fully expects that you will use its own software even though Hayes command recognition is available. The only communications package that refused to work with the Era 2 was the RBBS-PC bulletin board system, a popular public domain program used on many community and private computer bulletin board services (BBSs). The Era 2 would not answer incoming telephone calls when operating under the RBBS program.

The Era 2's typeset manual is easy to read and contains excellent modem installation advice. The program documentation will appear familiar to users of the *IBM Personal Communication Manager*– Microcom also wrote that software.

IDEAComm 1200

Like AST, IDEAssociates sells a wide variety of enhancement products for IBM PCs and compatibles. Communications, however, is the company's strength; IDEAssociates supplies local area networks and terminal emulation boards as well as modems. The IDEAComm internal modem will warble a tune to indicate when it is properly installed and ready to go. Our model ran through the standard tests and had no problem making connections at 300 bps. However, at 1200 bps, while sending a file to a remote PC and while attempting to send electronic mail to a remote host computer, the IDEAComm sent 8-bit graphics characters to the screen so fast that the tests had to be stopped. The screen filled with gibberish because (at least on the unit we tested) the IDEAComm modem does an inadequate job of filtering telephone noise at high speeds. At higher speeds, noise on telephone lines has traditionally created havoc with modem output because the bandwidth on the copper wires is not designed to handle high-speed data without sophisticated filtering.

Included with this modem is the IDEAComm communications software. It supports the standard XMODEM file transfer protocol and has a dialing directory to store 70 characters in the logon sequence. In auto-answer mode, the IDEAComm modem allows remote users to upload and download files and leave up to 15 messages.

Info-Mate 212PC

Cermetek has made its name in the communications market quietly by providing modems for other manufacturers to resell. These OEM relationships have served the company well in its venture into the PC internal modem market. Cermetek's Info-Mate is well designed, expertly fabricated, and nicely packaged. Installation instructions are readable and easy to follow, with the exception of some indistinct photographs that proved of no help at all.

The screen filled with gibberish because the IDEAComm modem does an inadequate job of filtering telephone noise at high speeds.

The modem design employs very large scale integration (VLSI) chips. VLSI lets Cermetek pack the power of 1200 bps into a half-length modem board. The Info-Mate contains two modular telephone cable connections and an auxiliary RS-232C port. Modem jumpers are provided to switch between telephone communications and RS-232C digital communications. A second telephone connection port allows you to monitor the progress of a session or place a phone call manually. The modem comes configured as COM1: but is easily changed to COM2: using small cap-type jumpers.

The Info-Mate is one of the few modems on the market that does not use the Hayes command set. It comes with its own software, Modem-Mate. In our tests, the software did not respond properly when used to communicate with *PC-Talk III* on the other end of a transmission. The Info-Mate can be used with a modified version of *Crosstalk XVI;* that seems to be the software of choice for this modem, especially since Modem-Mate provides only a crude directory for telephone numbers, lacks the ability to use batch mode operations, and has no facility for script files such as those available in *Crosstalk* and other popular communications programs.

A couple of minor problems arose with the Cermetek modem. It has no line monitor speaker, and the dialing response result codes are cryptic. Without an aural monitor a user has to be cognizant of exactly what is happening on the screen. It takes some practice to make calls and to understand what the on-screen signals mean once a call is initiated. In addition, the modem's auxiliary RS-232C port does not support a ring-detect signal, not a problem if the port is used only for direct connection to a host computer. But operating an external modem from the port with bulletin board software, for example, requires the ring-detect signal.

Intellimodem XL

Bizcomp is the company that started the intelligent modem industry. Mike Eaton, Bizcomp's president, holds the patent for intelligent modems, and it is his technique that has been licensed by Hayes. The Intellimodem XL is a full-featured board that allows easy switching between voice and data communications. The voice-call capabilities are an asset to anyone who makes frequent telephone calls to a small group of people. Three telephone connection ports are provided on the back of the board. After connecting the modem to the PC, you can connect a telephone handset to the modem and make or receive voice calls independent of the computer when data calls are not in progress. If you don't have a dedicated line for your modem, this capability spares you from constantly having to plug in and unplug the phone. A special command mutes the modem so it won't transmit its high-pitched signal during voice calls.

The Intellimodem XL package includes *Intelli-Soft Plus* communications software, which takes full advantage of the modem's voice call capabilities but does not measure up to *PC-Talk III* and *Crosstalk* in file-transfer and data communications features.

The tests uncovered problems with the Intellimodem. First, the board's default setting is for COM2:. Most modem manufacturers use COM1:, and the majority of communications software packages expect COM1:. Second, the Intellimodem XL locked up several times when used with a Hayes-compatible terminal emulation software package. The hang-up turned out to be a modem timing problem during initial connection with the remote host.

Without an aural monitor a user has to be cognizant of exactly what is happening on the screen.

On the plus side, the manual is first-class, except for slight disorganization in the sections that cover linking to the major nationwide data networks. This deficiency could prove a problem for users not familiar with the complexities of data communications.

Qubie' PC212A/1200

Qubie's plug-in modem was one of the first internal 1200-bps units containing ROM-based emulation of the popular Hayes Smartmodem command set. Hayes compatibility combined with the modem's low list price (approximately two-thirds of the Hayes Smartmodem price) created an immediate demand for the Qubie'. Many initial buyers were disappointed, however, when they found that the Qubie' emulated the Hayes standard but not its high-quality construction and components.

Early Qubie' buyers suffered through a variety of problems ranging from improperly manufactured expansion-slot plugs to inadequate telephone-line noise filters. Users had to file down the modem's bus connector before it would slide into a PC slot. Some Qubie' buyers found that file transfers at 1200 bps using the XMODEM file transfer protocol were almost impossible due to inadequate noise filtering in the modem hardware.

Qubie' has corrected most of the problems that surfaced in early versions of its modem while keeping the list price low. The modem uses all the Hayes 1200B commands and interacts easily with *PC-Talk III*, which is included in the package. The Qubie' works nicely with a wide variety of remote data bases and PC-to-PC file transfer programs.

Despite these improvements, the Qubie' modem has a few lingering flaws. First, it sends 8-bit graphics characters (square root signs, brackets, and other symbols not in the transmitted text) to the screen when receiving data from a remote system. Second, the modem's default switches are set for auto-answer, an irritant to people who call while the modem is connected to the voice telephone line. Third, the modem's retaining bracket does not slide properly into an XT and must be twisted in order to fit. Finally, the Qubie' speaker's volume control is inaccessible from outside the PC system unit.

Smart-Cat Plus

Novation provides a full line of modem products for the IBM PC. The Smart-Cat Plus package contains an excellent installation and operations manual with ample illustrations for the hardware novice.

The modem comes with *Mite* communications software but operates equally well with several other programs. *Mite* supports both the XMODEM and CLINK file transfer protocols. In addition to a full Hayes Smartmodem command set, the Smart-Cat includes additional commands for such feats as dialing an alternate number when the first number is busy and determining whether pulse or touch-tone dialing is required.

Unlike the other modems reviewed, the Novation unit relies on the PC speaker for sound feedback during telephone dialing. The pair of jumper wires that connect the modem board to the PC speaker are too short, requiring that the modem be placed in an expansion slot close to the speaker in the PC or the XT. To connect the Smart-Cat Plus to an AT speaker, you must remove the disk controller to access the speaker connections on the motherboard. In the Compaq the speaker is so far from the expansion slots that the line monitor cannot be used at all.

Qubie' has corrected most of the problems that surfaced in early versions of its modem while keeping the list price low.

Making the Connection

After taking these modems for a ride, we can recommend no single device as a dream modem. If price is the absolute criterion, the Qubie' has to be the answer. If sophisticated file-transfer capabilities are a must, the Era 2 is the standout. But if you're looking for a modem that best mimics the popular Hayes modem, go with the Bizcomp or AST products.

Other relevant issues lie beyond the scope of this review. Two of the modems—the AST and IDEAssociates products—are designed to work in tandem with the companies' other PC enhancements. IDEAssociates, for example, uses its modem with its terminal emulation board. In a corporate environment, that compatibility could be of greater value than low price or Hayes compatibility.

One more point needs considering before you buy an internal modem for your PC: Do you really want to fill an expansion slot with a modem? Desktop modems, although usually more expensive, are less hassle and won't interfere later if you want to add another enhancement to your PC's bus. Study your environment and consider your requirements carefully.

Larry Jordan and Jan van der Eijk are freelance writers and communications and networking consultants with NUS Corporation of Gaithersburg, Maryland, and are the coauthors of the TCOMM unattended communications software package. Larry Jordan coauthored the book Communications and Networking for the IBM PC *(Robert J. Brady Company, Bowie, MD, 1983).*

AST Reach!
AST Research, Inc.
2121 Alton Ave.
Irvine, CA 92714
714/863-1333
List price: $549

Era 2
Microcom, Inc.
1400A Providence Hwy.
Norwood, MA 02062
617/762-9310
List price: $499

IDEAComm 1200
IDEAssociates, Inc.
35 Dunham Rd.
Billerica, MA 01821
617/663-6878
List price: $495

Info-Mate 212PC
Cermetek Microelectronics, Inc.
1308 Borregas Ave.
Sunnyvale, CA 94088
408/752-5000
List price: $149

Intellimodem XL
Bizcomp
532 Weddell Dr.
Sunnyvale, CA 94089
408/733-7800
List price: $549

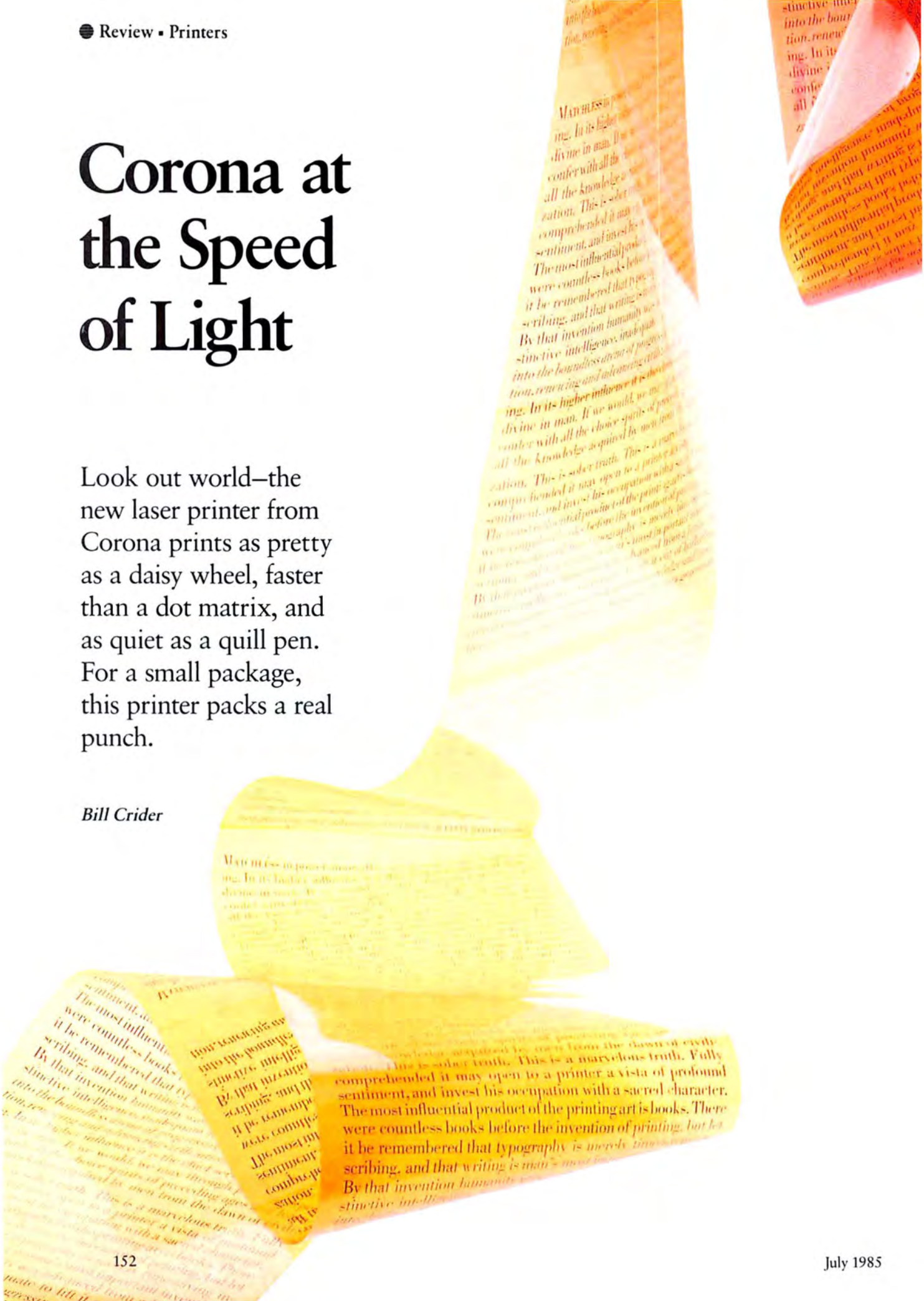
PC212A/1200
Qubie'
4809 Calle Alto
Camarillo, CA 93010
805/482-9829
List price: $399

Smart-Cat Plus
Novation, Inc.
20409 Prairie St.
Box 2875
Chatsworth, CA 91311
800/423-5419, 818/996-5060
California
List price: $499

Corona at the Speed of Light

Look out world—the new laser printer from Corona prints as pretty as a daisy wheel, faster than a dot matrix, and as quiet as a quill pen. For a small package, this printer packs a real punch.

Bill Crider



It took years, but finally, after a long period of denial, I have faced facts: I am a technology junkie. Like all computer lovers in the early stages of addiction, I felt a surge of excitement at the sight of each new product. I was overwhelmed by bidirectional printing, giddy with joy over daisy wheels, and ecstatic at my first sight of a color printer. But inevitably, exposure to so many marvels left me jaded: These days I am bored by the merely innovative or the simply novel, and palled by products whose only boast is that they are cheaper and faster than the last model. Like any computer junkie, I require ever-larger doses of technological wizardry to satisfy my electronic addiction.

But incredible as it may seem, I have found something that satiates, at least temporarily, my craving for innovation–the Corona LP-300 Laser Printer.

Until last year, many people scoffed at predictions of laser printers for microcomputers. The cheapest laser printer on the market up to that time cost at least $10,000, with prices of over $50,000 much more common. Only large companies with heavy needs for high-speed, high-quality printing could justify such a tab. But the confluence of photocopying and electronics technologies brought new possibilities for laser printer design, and in 1984 the Canon Laser Printer Engine was born. The machine, which is similar to the Canon copier engine, was available in large quantities for the astonishingly low price of $1000. Vendors who bought engines could add printed circuit boards, software, and a computer interface to create laser printers.

The first company to market a printer based on the Canon engine was Hewlett-Packard. Its LaserJet printer was released amid much hoopla last year. The Corona LP-300, first shipped in January 1985, is the second of the breed.

Why would anyone want a laser printer? The reasons are numerous, but they can be summed up in three *q*'s: quick, quiet, and quality.

Don't Make Light of Laser Printing

Compared with other types of printers, laser printers are *fast*. Daisy wheel printers generally produce 20 to 80 characters per second (cps). Dot matrix printers zip along at 80 to 240 cps. Ink jet and thermal printers occasionally achieve 200 cps. But the Canon engine can in theory print up to 8 pages a minute–or over 468 characters per second. (With 1-inch margins, each page has 54 lines with 65 characters per line; multiplying by 8 pages and dividing by 60 seconds yields 468 characters per second.) Timing tests clocked the Corona at speeds ranging from 5.5 to 7.5 pages per minute, or 322 to 439 characters per second. The differences in speed seem to be a function of the program in use. *WordStar* prints slower than *MultiMate*, for example.

The Corona's speed also varies according to the kind of document being output. Because the first page takes longer than subsequent pages, the speed advantage of the laser printer over other printers is

Table 1: Noise level comparison

	dBA
Quiet conversation	50
Corona LP-300 at 3 feet	55
Normal conversation	62
Fujitsu SP830 at 3 feet	70
Okidata 2410 at 3 feet	75
Vacuum cleaner at 3 feet	80
Auto horn at 3 feet	100

more marked for longer documents. Figure 1 compares the Corona printer to tractor-feed dot matrix printers, daisy wheel printers, and the HP LaserJet. As the results show, the Corona and the HP are comparable in speed for short documents, but the HP machine is significantly faster for long documents. Although these figures result from tests that involved no font changes within documents, separate tests show that even a page with 60 typeface changes prints as quickly on the laser printer as the same page with no typeface changes.

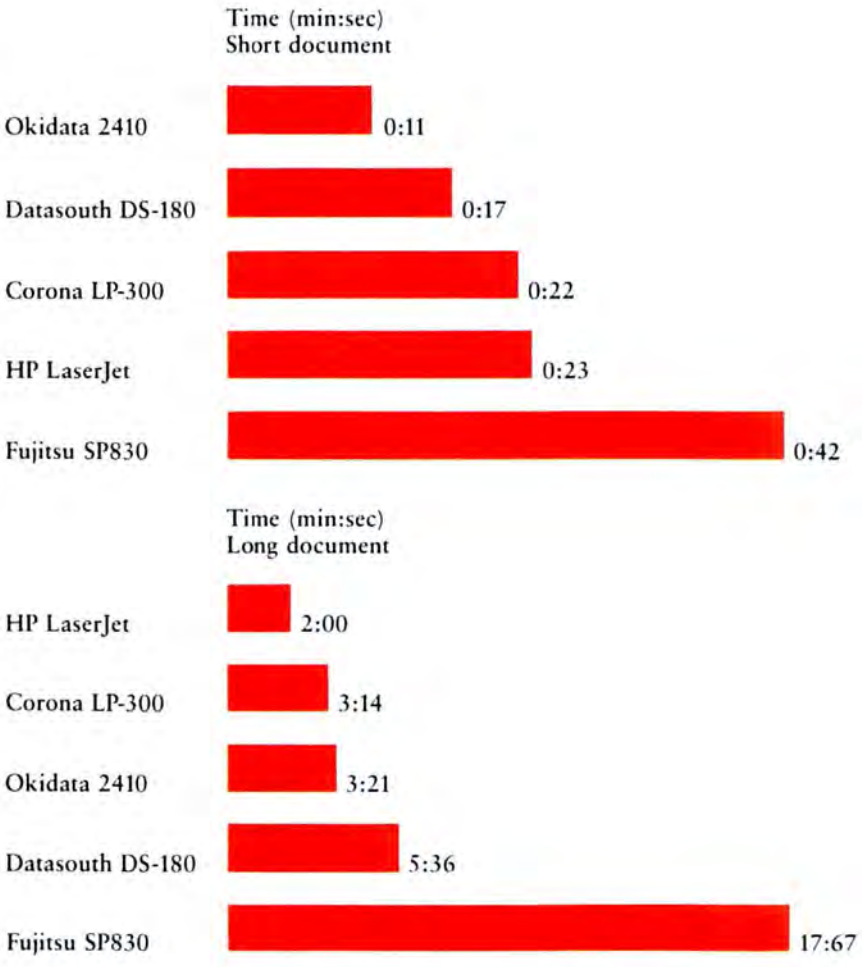


Figure 1: Speed comparison for the Corona LP-300 laser printer; the Hewlett-Packard LaserJet laser printer; a high-speed dot matrix printer (Okidata 2410, $2475); a medium-speed dot matrix printer (Datasouth DS-180, $1395); and a daisy wheel printer (Fujitsu SP830, $2295). The long document is 600 lines; the short document is 25 lines.

Quiet Is Golden

For many offices, the quiet operation of the Corona could be the primary reason for buying it. If you have ever worked in an office with a printer banging away on your neighbor's desk, you will appreciate the Corona's hushed performance. Table 1 compares the Corona's sound level to that of other printers. When the Corona is just sitting there, its fan makes a whisper quieter than that of the fan in an IBM PC. When the printer is working, it is scarcely louder. To simulate the sound of the Corona laser printer in operation, flip the pages of this magazine. The loudest noise produced by the printer is the "swish" of the paper being picked up.

Denser Is Better

Another reason to buy a laser printer is print quality. Because the Canon engine can print 90,000 dots to a square inch (300 by 300), the Corona printer produces letter images comparable to those produced by a daisy wheel printer using a carbon ribbon.

For many companies, output of that quality is adequate for low-end typesetting needs. A laser printer's ability to produce a variety of proportionally spaced fonts in multiple sizes makes it a likely candidate for memos, reports, newsletters, and the myriad of other documents any company creates.

Further Features

Beside the three *q*'s, the Corona has other attractive features. It is very easy to use. The toner comes in a cartridge that simply slides into place, and the paper loads in a cassette, as with a photocopier. Unfortunately, the tray holds only 100 sheets, but you do have the flexibility of choosing letter- or legal-size paper, making overhead transparencies, or using your letterhead. No more threading pin-feed paper under a desk or a printer stand. No more hassle with high-priced cut-sheet feeders.

Figure 2 compares the operating costs of the Corona and a daisy wheel printer. Not reflected in these figures is the time saved (and the frustration avoided) due to the ease of operating the laser printer. Of course, if you use the printer for some of the low-end typesetting work that you would previously have sent out to a type shop, the savings are tremendous.

Another benefit is that a laser printer can sit on any small table or desk. It does not need a paper slot, and it can sit very close to the wall because the paper comes out in front. You can set the Corona on top of a small file cabinet and have drawer space below, instead of stacks of paper.

Meeting the Competition Head On

So what? you may be thinking. All these advantages are also true of the Hewlett-Packard LaserJet. What makes the Corona better? In comparing the market newcomer with the original, the Corona stands out in two ways: price and software.

At $3495 for the LaserJet and $3395 for the Corona, the initial cost of the two printers is close. Each printer comes with one toner cartridge–extras cost $99 and are interchangeable (unfortunately, Canon Copier toner cartridges don't fit). The small difference in

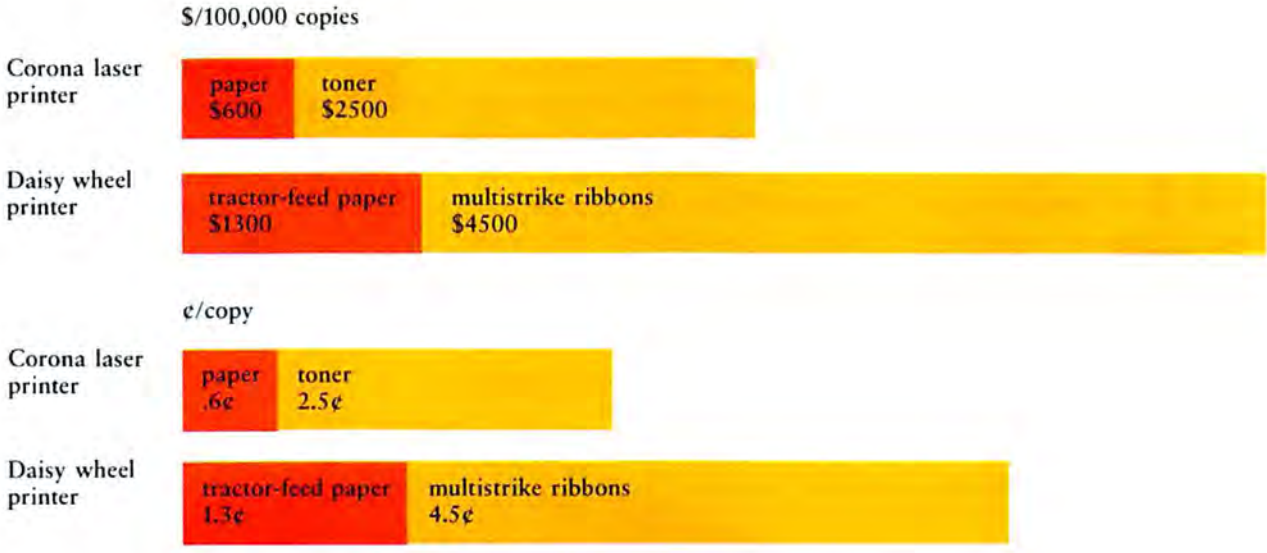


Figure 2: Cost of operations for the Corona laser printer and a daisy wheel printer. Maintenance costs and power usage are not included. The figures are based on 1500 characters per average page (30 lines, 50 characters per line); 6,000,000 characters per toner cartridge at $100 each; and 500,000 characters per multistrike ribbon at $15 each.

initial price is obviously intended to give Corona a slight edge without sacrificing profits.

But when you include the cost of fonts, the Corona has a significant price advantage over the HP. The LaserJet's fonts are stored in cartridges that plug easily into the front of the machine. Two fonts reside in the machine, and five or six are included on each cartridge.

Unlike the LaserJet, the Corona lets you decide which fonts you want mixed; you don't have to accept the mix provided on a cartridge.

Cartridges cost over $200 each. The Corona, on the other hand, stores its fonts as software on disk. You could, for example, reserve a hard disk subdirectory for the fonts. Several companies are selling the fonts five to a disk, for about $50 per disk. You can load whichever fonts you want into RAM, as long as all of them fit into 64K. This translates into four to six fonts on line at any time, and you can increase the number of on-line fonts by eliminating characters using a font editor. Unlike the LaserJet, the Corona lets you decide which fonts you want mixed; you don't have to accept the mix provided on a cartridge. Figure 3 shows some of the fonts available at the time this article was written.

Fonts are usually loaded from DOS, outside your application program. However, they can be loaded from within an application if it has a command to run an external program (such as the RUN command in *dBASE III* or the R choice on the opening menu in *WordStar*). To load a font, you use the LPMODE.COM program provided with the printer.

Because they are software, the Corona fonts can be edited. *Poems Font Editor* by Poems Software and *FontGen* by VS Software enable you to change the fonts included with the machine or to create your own fonts. Figure 4 shows some variations created with *FontGen* from a single Corona font. You can change the size of letters, create an italic or bold effect, or alter letter shapes by using *FontGen* to edit the bit map. You can even produce special symbols.

Another good use of a font editor is to fit more fonts into memory. For example, if you use a large font only for uppercase headlines, you could delete all its lowercase letters and graphics characters. This would reduce by more than half the RAM required to store the font, creating space for ten or more fonts in memory.

The 64K used for storing fonts is part of the computer's main RAM. The Corona interface board contains an additional 64K RAM, but this is used as a rotating buffer in which the printer holds a page image before putting it on paper. The interface board takes up one long slot in the PC and provides the port used by the Corona printer.

Graphics

In its graphics capabilities, the Corona printer completely outclasses its competition (see Figure 5 for an example of the Corona's graphics). The HP LaserJet has only rudimentary graphics

features, requiring you to specify the bit pattern of a graphics image as strings of characters.

To create an image on the HP LaserJet, you must convert each line of the picture into binary data, where 0s represent spaces and 1s represent dots. A byte, or character, contains eight bits, so each character you send will cause eight dots to be printed. For example, the tilde character (~) is 01111110 in binary, so when you send a tilde to the printer it causes a space, six dots, and another space to be printed. A series of tildes creates a dashed line. You can use this method to create various graphics, but it is obviously impractical for printing graphics in a document.

Epson Emulation

The Corona has two graphics modes: Epson emulation and a native command set. In the Epson emulation mode, almost all the graphics programs that work with the Epson MX, FX, and RX printers also work with the Corona. The only common denominator I could find for those that did not work is their use of "handshaking"—they not only send information to the printer but also expect to receive information back from it. Those programs are not compatible because the Corona does not perform the same kind of handshaking as the Epson. You should test any programs that are especially important to you.

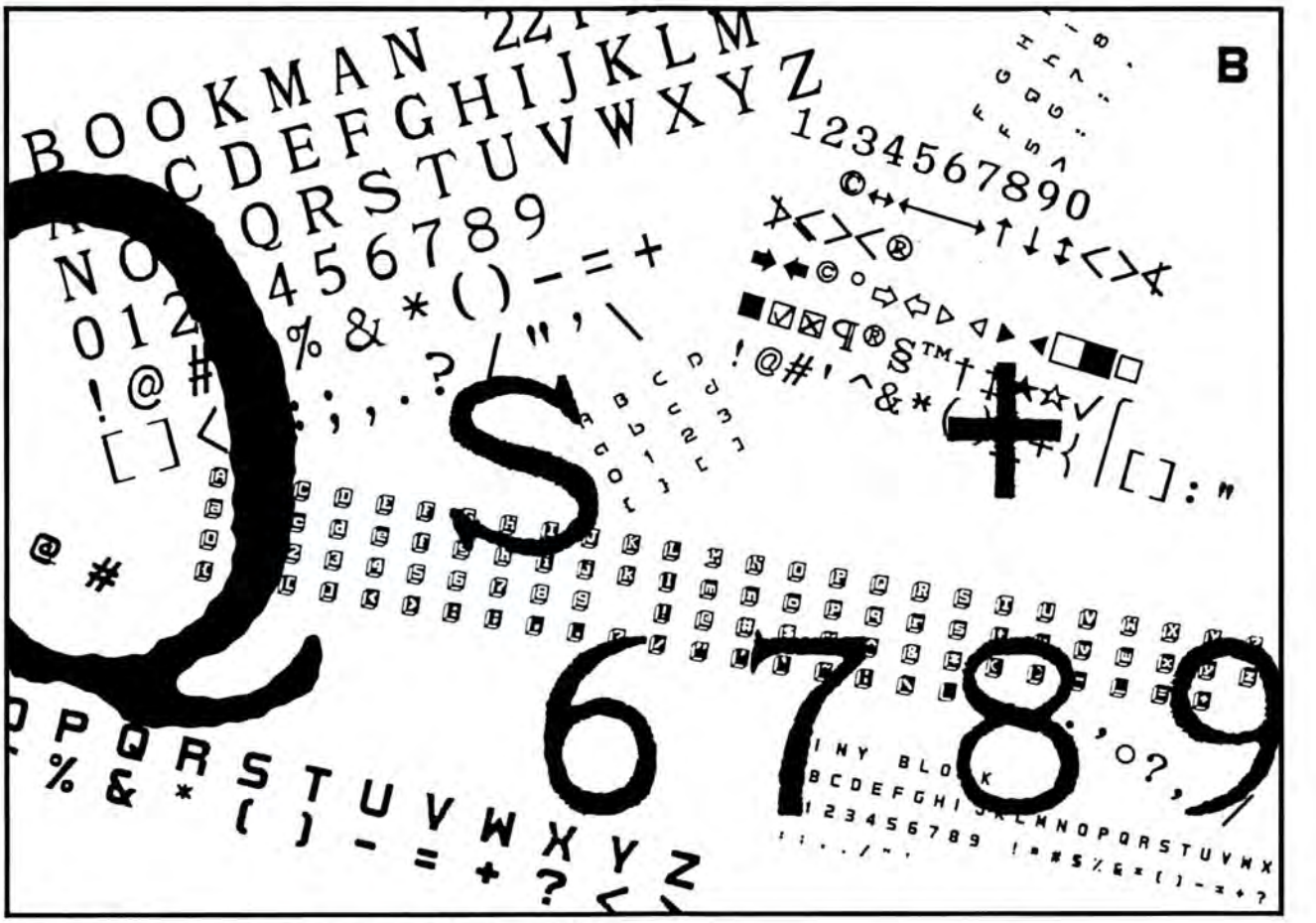


Figure 3: A representative sample of fonts available from VS Software for the Corona laser printer

All the BASIC programs tested appeared to work perfectly, with one minor qualification. The Corona does not commit anything to paper until it finds a formfeed in the data flow. In text mode the printer generates its own formfeeds when necessary, but not in graphics mode. Its print buffer simply sits there collecting data until a formfeed (ASCII character 12) arrives. If you send more data than the buffer can hold, the first data sent can be lost. When you finally send a formfeed to the printer, the only output will be the last information sent to the buffer. Maximum buffer size is 64K, but some graphics programs send more information than that at a time. Using a print spooler does not seem to help.

Speaking of spoolers, note that you must load memory-resident programs (such as spoolers, RAM disks, and "pop-up" aids) *before* you load the Corona fonts. Unless the fonts are the last memory-resident program loaded, they may corrupt other memory-resident programs.

One nice feature of Epson emulation is that DOS's GRAPHICS-.COM utility works. With GRAPHICS.COM you can use <PrtSc> to produce a high-resolution printout of a graphics screen. Corona Data Systems is currently working on Diablo 630 emulation.

Native Graphics

The Corona's native graphics are not as easy to use as Epson emulation but provide added flexibility. You must load a graphics image into memory before you can print it. First load it onto the screen, then specify the video RAM as the memory location. Three native commands are used for printing graphics. *@showc* prints graphics immediately, wherever the command happens to be on the page. *@showb* lets you specify the placement of graphics on the page. *@showa*, the most complicated of these three commands, uses hexadecimal notation and can print inverse images and locate images in memory other than the video buffer.

The syntax for the simplest command is

@showc *MMap Screen SrcXb,SrcYb SrcXe,SrcYe Xmag,Ymag;*

MMap is the memory map to use (for the IBM PC, an *MMap* of 3 refers to 320- by 200-pixel graphics, an *MMap* of 4 refers to 640-by-200 graphics). *Screen* refers to the screens used in BASICA (a *Screen* of 1 refers to medium resolution, a *Screen* of 2 refers to high resolution). *SrcXb* and *SrcYb* are the beginning *x*-*y* coordinates on the screen, and *SrcXe* and *SrcYe* the ending *x*-*y* coordinates. *Xmag* and *Ymag* are numbers from 1 to 4 that indicate the amount of magnification for each axis.

For example, *@showc 3 1 0,0 319,199 3,4;* means "Print the image found at the medium-resolution graphics buffer, starting with the first pixel and ending with the last one. Magnify the *x* axis three times and the *y* axis four times."

```
This is the Courier 9 font.
This is a bold version of Courier 9.
This line shows Courier 9 in slanted form.
This is the same font, reduced by 25%.
This is the same font, enlarged 50%.
```

Figure 4: Modifications of a Corona font created with FontGen

Figure 6 shows a *Framework* screen printed using the native graphics commands.

The last native graphics command is *@MMap,* which allows you to redefine the memory maps used, in case you do not want to store the image in one of the video buffers. If you do not define your own memory maps, *MMap* and *Screen* in the *@showc* command will both refer to the same parameter. If you define your own memory map with *@MMap, @MMap* will specify the location of the data, and *Screen* will specify the resolution of the data.

Using *@showa* and *@MMap* together is an exciting application of graphics. The Corona allows you to print text and graphics on the same page, with the text receiving priority over the graphics if they fall on the same part of the page. Using these two commands, you can create a form on a page as a graphics image and then print the data into the form as text. In such a case, you could get your data from a spreadsheet or a data base–your monthly invoice information, for example. It could be printed on regular paper but look as if it were on a preprinted form.

The Corona allows you to print text and graphics on the same page, with the text receiving priority over the graphics if they fall on the same part of the page.

Text Mode Programming

Several word processors–*WordStar, MultiMate,* and *Palantir*–have drivers that allow you to switch easily between fonts without using the Corona's command sequences.

If your word processor does not have a driver for the Corona, you can send commands to the printer in text mode. Each command is simply inserted into the text. When you print the file, the commands are executed and not printed. Each command begins with an "@" and ends with a semicolon. For example, *@FONT COURR9; @LH 50; @TBORDER 300; @LBORDER 300; @PWIDTH 1950;* sets the font to Courier 9-point, the line spacing to six lines per inch ($^{50}/_{300}$, or ⅙ inch per line), and the top, left, and right margins to 1 inch. *@RESET;* resets all print characteristics to their defaults. Other commands set the bottom margin and tabs, perform vertical tabbing and superscript and subscript rolls, change the command definition characters "@" and ";" to other characters of your choosing, set the number of copies per page, and print graphics.

Mighty Macros

Corona command sequences, though easy to remember, can become tediously long. To eliminate the typing of long command sequences, Corona has implemented the use of macros. A macro is a shorthand command that takes the place of a longer series of commands. You can define up to 99 macros, each of which can be up to 512 bytes long.

To define a macro, use the *@MACRO nn "@string;";* command, where *nn* is the macro number to be defined, and *string* is the command string to be executed. For example, you could define the command sequence given earlier as a macro like this:

```
@MACRO 01 "@FONT
  COURR9;@LH 50;
  @TBORDER 300;
  @LBORDER 300;
  @PWIDTH 1950;";
```

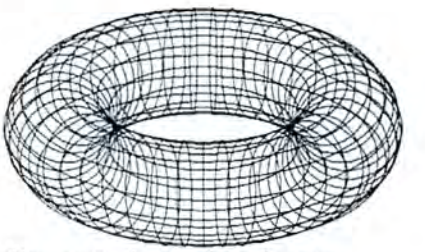


Figure 5: A graphics image printed using the Corona native graphics commands

If you include all your macros in the AUTOEXEC.BAT file, you can set the font, the line height, and the borders by simply including the command *<Esc>^01* in your text. Note that the "^" in this command is the caret (Shift-6), not the <Ctrl> key. Also note that to use macros, you must either have a word processor that supports use of the <Esc> key or use a keyboard macro processor, such as *ProKey* or *SmartKey,* that will enable you to assign strings of characters to individual keys.

Besides making font changes faster, macros enable untrained users to operate the laser printer. Only one person in an office needs to learn the laser commands–the rest of the office can use the macros.

The Battle of the Beams

Will the Corona LP-300 kayo the HP LaserJet in the battle of the laser beams? Possibly, but not probably. The Corona has significant features on its side, including superior graphics and font-handling capabilities, but as noted, the HP is faster, at least for long documents. In addition, Hewlett-Packard has megabucks for marketing and advertising, plus the advantage of having been on the market several months longer than the Corona. A head start is hard to beat. At this time far more software programs have been modified to support the HP LaserJet than the Corona. Moreover, Corona is throwing punches at a moving target. Technology doesn't stand still, and HP may soon improve its machine to make it more competitive. At this point, though, the Corona is still the best value for the money.

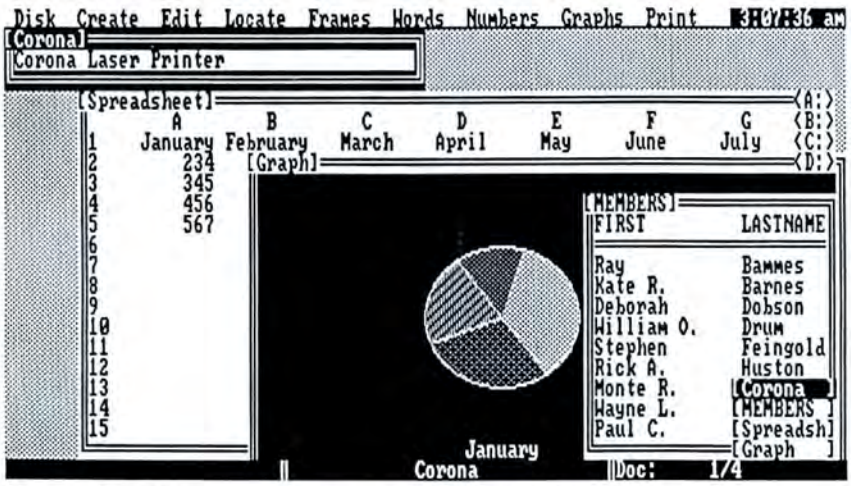


Figure 6: A Framework screen printed using the Corona native graphics commands

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Corona LP-300 Laser Printer
Corona Data Systems
275 E. Hillcrest Dr.
Thousand Oaks, CA 91360
805/495-5800
List price: $3395
Requirements: 256K (512K recommended for graphics), long expansion slot

The Poems Font Editor
Poems Software
509 Marin St.
Thousand Oaks, CA 91360
805/373-1919
List price: $499
Requirements: 192K, graphics board and monitor

FontGen
VS Software
2101 S. Broadway
Little Rock, AR 72206
501/376-2083
List price: $250
Requirements: 320K

Better and True BASICs

Two fresh versions of the BASIC programming language breathe new life into the old workhorse, providing improved structure and capacity. One even does away with line numbers!

Donald P. George

BASIC is the language that computer experts love to hate. Although it predates the microcomputer that spawned its popularity and international exposure, BASIC continues to be a viable and important language for tens of thousands of seasoned and novice computer users.

Notwithstanding its obvious popularity, the common microcomputer versions of BASIC (including IBM's PC BASIC, aka Microsoft's GW BASIC) have many drawbacks that have precluded their selection for ambitious programming assignments. Recently, in answer to the language's deficiencies, several vendors have begun providing "new and improved" versions of BASIC.

Two such products are True BASIC, from True BASIC Inc., distributed by Addison-Wesley Publishing, and BetterBASIC, from Summit Software Technology. This review compares the products with each other and with the current "standard" in the world of PCs, IBM's Advanced BASIC (BASICA).

BASIC Limitations

These new products were designed to correct the aforementioned deficiencies in microcomputer implementations of BASIC and to add power and versatility to the language. As we shall see, each product approaches these tasks from a very different perspective.

One prominent shortcoming of BASICA is its required use of line numbers. Line numbers are awkward at best, and when used in conjunction with the GOTO verb, they often lead to a complex and convoluted logic referred to as "spaghetti code." This coding style is nearly impossible to understand, debug, or modify, and it is one of the reasons for BASIC's poor reputation among computer scientists, professional programmers, and other demanding users.

Other favorite targets for improvement are BASICA's notoriously slow execution (when not compiled) and its lack of support for all available memory. BASICA supports a maximum program size of only 64K on a PC, a severe restriction for a machine that can support 640K of memory. BASICA also lacks several useful block control structures, provisions for local variables, the ability to create and invoke separate procedures easily, and an advanced program debugging capability.

True BASIC

True BASIC is brought to you by the same people who invented the BASIC language. In the early sixties, Professors John Kemeny and Thomas Kurtz invented BASIC as part of a larger project

to make computers available to the students at Dartmouth College. Their work with the language would probably have gone unnoticed by the world at large but for the arrival of the microcomputer. Due to its utility and simple design, BASIC was implemented on most of the early microcomputers and on virtually every personal computer since.

Since the first microcomputer versions of BASIC were written for extremely modest machines, only a small subset of the mainframe language could be used. But even after personal computers gained power, many limitations of these "small versions" of the language were retained. True BASIC Inc. is dedicated to promulgating the "true" version of the BASIC language intended by the original authors. True BASIC is not an extension of BASICA but a brand-new and extremely elegant implementation of BASIC.

The True BASIC Environment

When you invoke True BASIC, you are greeted with a split-screen display (see Screen 1). The bottom few lines of the screen form the history window, used to enter language commands and to display program output. The remainder of the screen forms the editing window, in which you display and edit your program. The sizes of these two areas are modifiable. The ability to create and control windows on the screen is an intrinsic part of True BASIC.

To create True BASIC code you press a function key to take control of the editing window, then start keying in your program. At any point you can RUN your program, whereupon True BASIC performs a syntax check of the code, converts it into an intermediate form for faster execution (a process called semi- or incremental compilation), and executes the converted code. By examining every line of code during compilation, True BASIC detects syntax errors before execution and generates clear diagnostic messages to tell you of any problems. With this system, it is impossible for a syntax error to remain buried in the code waiting to be discovered at some uncertain future time—a common occurrence with BASICA. True BASIC allows the compiled code to be saved to disk.

A full-screen editor built into the product is always available. Since True BASIC does not use line numbers, its editor is quite different from (and superior to) the editor included with BASICA. True BASIC's editor supports such common text processing commands as block move, copy, and delete as well as find, change, and change-verify commands. It even supports a limited undo function. True BASIC also includes a powerful built-in key macro capability. You can assign a string of charac-

```
o !.....................................................
o ! COUNT WORDS IN A STRING SUBROUTINE.
o !.....................................................
o SUB COUNT_WORDS(TEXT$,TALLY)
o LET POINTER = 1
o LET TEXT$ = TRIM$(TEXT$)
o DO
o   LET POINTER = POS(TEXT$, " ",POINTER)
o   IF POINTER <> 0 THEN
o      LET POINTER = POINTER + 1
o      LET TALLY = TALLY + 1
o   ELSE
o      EXIT DO
o   END IF
o LOOP
o LET TALLY = TALLY + 1
o END SUB
-------------------------------------------------------
True Basic here.
Version 1.00
Copyright (c) 1985 by True BASIC, INC.
Published by Addison-Wesley Publishing Company, Inc.
Ok. OLD WORDCNT
```

Screen 1: The True BASIC environment. The top window displays the code to be edited; the history window below accepts language commands and displays program output.

ters to almost any <Alt>-key or <Ctrl>-key sequence; key definitions can be saved and retrieved from disk.

The True BASIC Language

True BASIC is an easy-to-use, straightforward, and powerful implementation of the BASIC language. Although it is a complete rewrite of what we commonly think of as BASIC, many of this language's statements are virtually identical to BASICA's, so you will quickly feel at home.

True BASIC supports string variables of up to 32,768 characters and numeric variables with a default of 14 digits of precision. On a computer equipped with an 8087 coprocessor, True BASIC automatically uses the coprocessor's power to do floating-point calculations with increased speed and precision. The product supports a complete set of matrix functions for array manipulation, including matrix READs, PRINTs, INPUTs, assignment statements, and arithmetic.

True BASIC's support for graphics on the PC is easier to understand, more complete, more flexible, and more portable than the graphics support available with BASICA. Points, lines, circles, and text are displayed based on the coordinates you specify—you do not reference the screen in terms of pixels. The product supports animation and full-color displays.

It is impossible for a syntax error to remain buried in the code waiting to be discovered at some uncertain future time.

True BASIC is especially strong in its implementation of structured programming constructs, including DO-WHILE, DO-UNTIL, SELECT CASE, and IF THEN ENDIF (see Figure 1). It allows the definition of internal and external subroutines, functions with formal call parameters, and local or global variables. True BASIC also supports the simple creation and use of library files. (A library file is a collection of ready-to-use, precompiled subroutines and functions.) All you have to do is name the library files and make them available to your executing program.

While some of these features may sound complex, True BASIC is easy to work with and operates like the BASIC you're used to. The program's marvelous documentation (a user tutorial and a technical reference manual) minimizes any confusion you might experience in trying out True BASIC's many advanced features.

BetterBASIC	True BASIC
FOR ... NEXT	FOR ... NEXT
DO ... REPEAT	DO ... LOOP
WHILE ... REPEAT	DO WHILE ... LOOP
DO UNTIL ... REPEAT	DO UNTIL ... LOOP
DO ... REPEAT IF	DO LOOP ... UNTIL
DO IF REPEAT IF	DO WHILE ... LOOP UNTIL
DO n TIMES ... REPEAT	IF THEN ... ENDIF
DO IF ... REPEAT	IF THEN ... ELSE ... ENDIF
	IF THEN ... ELSEIF ... ELSE ... ENDIF
	SELECT CASE ... END SELECT

Figure 1: Block control structures. True BASIC provides a greater variety of constructs than BetterBASIC and implements them well.

BetterBASIC

Summit Software Technology used BASICA as its model to build BetterBASIC. BetterBASIC is an elaborate extension of BASICA, with many restrictions removed and a vast number of language extensions added.

BetterBASIC is a highly modular system. When started, it reads a configuration file and brings into memory only those modules you have requested; you need not load program support for language features you are not using. For example, if you have a monochrome display, you can avoid the overhead of the system code that sup-

Byte. Whole numbers between 0 and 255. Requires 1 byte of storage.

Integer. Whole numbers between -32,768 and 32,767. Requires 2 bytes of storage.

Real. Floating-point numbers between .1E-254 and 9.999..E+253. Requires [2 + (precision/2)] bytes of storage.

Named constants. A named data item whose value can be referenced but not changed in the program.

Pointer. A data item that can be "set" to point to another data item of the same type.

Record. A named collection of data items of any type (including other records).

Figure 2: BetterBASIC supports more data types than BASICA or True BASIC.

```
SUB EDIT_DATE(MM,DD,YY)

IF MM < 1 or MM > 12 THEN
   LET ERROR_MSG$ = "invalid month"
   EXIT SUB
END IF

IF DD < 1 or DD > 31 THEN
   LET ERROR_MSG$ = "invalid day"
   EXIT SUB
END IF

IF YY < 80 THEN
   LET ERROR_MSG$ = "invalid year"
   EXIT SUB
END IF
END SUB

!--------------------------------
! Main Program
!--------------------------------
DO
  PRINT "Enter Month, Day, Year";
  INPUT MO,DA,YR
  LET ERROR_MSG$ = ""
  CALL EDIT_DATE(MO,DA,YR)
  PRINT ERROR_MSG$
LOOP
END
```

Listing 1: True BASIC program structure

ports BetterBASIC's graphics functions. BetterBASIC enables you to add your own modules to the load list and actually create your own custom version of the BetterBASIC language.

The BetterBASIC Environment

Like True BASIC, BetterBASIC is an incremental compiler. Unlike True BASIC, BetterBASIC compiles each line as it is entered rather than when the RUN command is executed. If you make a syntax error, you will find out as soon as you press the <Enter> key; BetterBASIC will display an error message and indicate which part of the statement is at fault.

BetterBASIC comes with a BCD (binary coded decimal) math package to perform floating-point calculations. This technique eliminates rounding errors and permits absolute control over numeric precision; you declare the precision as part of the configuration file. Any precision between 4 and 24 digits is supported.

Summit Software also markets a separate math package that makes use of the 8087 coprocessor. To use this package, simply change the line in the configuration file that declares which math module is to be used when the program is invoked. This user control is another example of the flexibility afforded by BetterBASIC's modular approach.

BetterBASIC's operation is based on the somewhat foreign concept of a "workspace." A workspace is a self-contained area of memory composed of some BASIC code–normally one routine or procedure–and all the variables

referenced by that code. These variables are, by definition, local to the workspace. When BetterBASIC is first invoked, you are positioned in the main workspace. You can create and move to new workspaces by using commands unique to BetterBASIC.

The BetterBASIC Language

While producing clear advantages, Summit Software's decision to model BetterBASIC on BASICA has resulted in some trade-offs. The most serious is that BetterBASIC still requires line numbers. This restriction is somewhat mitigated by the availability of a range of structured constructs such as DO-END-DO, DO-REPEAT, and DO-IF-REPEAT (see Figure 1). Although each line of these constructs must have a line number, BetterBASIC will not allow a branch into the middle of one of these structures. Another helpful feature is that each workspace uses its own set of line numbers. Nonetheless, such numbers are a carryover from a more primitive past; requiring them was an unfortunate design decision that detracts from the ease of use and the utility of the product.

Another weakness is the built-in editor, essentially a clone of the editor built into BASICA. The editor does not support such useful features as block copy and move, global find, or global change. Since users tend to spend a great deal of time working with the editor, the lack of these extended features is disappointing.

On the positive side, BetterBASIC supports a rich set of data types (see Figure 2). Unlike BASICA or True BASIC, BetterBASIC requires that the data type of every variable be explicitly declared. The product supports a correspondingly large selection of declared data types including BYTE, INTEGER, REAL, STRING, BYTE ARRAY, REAL ARRAY, and STRING ARRAY.

Although you can change code with the built-in editor, you cannot change a data item declaration once you have made it. This serious deficiency can be circumvented only by an awkward and time-consuming procedure. For example, suppose you define an item as INTEGER when you mean it to be REAL. To correct this error, you must do the following:

1. Save the program in ASCII format using a version of the LIST command.
2. Exit BetterBASIC and load some other text editor that can handle regular ASCII files.
3. Edit the program file with the text editor and change the declaration statement from INTEGER to REAL.
4. Reload BetterBASIC, then LOAD the modified ASCII program code.

When learning the language, you are likely to make declaration errors with some frequency. Having to go through the error-correction procedure multiple times can be extremely annoying.

The BetterBASIC language itself supports the majority of the verbs included in BASICA, and their op-

```
PROCEDURE: Edit_date

    INTEGER ARG: Mo,Da,Yr
    STRING ARG: Error_msg$/VAR
      10 DO IF Mo < 1 OR Mo > 12
      20   Error_msg$ = "invalid month"
      30   EXIT 2 LEVELS
      40 END DO

      50 DO IF Da < 1 OR Da > 31
      60   Error_msg$ = "invalid day"
      70   EXIT 2 LEVELS
      80 END DO

      90 DO IF Yr < 80
     100   Error_msg$ = "invalid year"
     110 END DO
END PROCEDURE


'MAIN Program:

STRING: Error_msg$[16]
REAL: Mm,Dd,Yy
   10 INPUT "Enter month, day, and year"; Mm,Dd,Yy
   20 Error_msg$ = ""
   30 Edit_date Mm Dd Yy Error_msg$
   40 PRINT Error_msg$
   50 GOTO 10
```

Listing 2: BetterBASIC program structure

Converting to True BASIC or BetterBASIC From BASICA

Both BetterBASIC and True BASIC are more suited to writing code from scratch than to acting as drivers for code written in BASICA. However, to some extent, they both can serve the latter purpose. Of the two, BetterBASIC is much more compatible with BASICA code, a natural result of Summit Software Technology's decision to model BetterBASIC after BASICA. With both BetterBASIC and True BASIC, you will want to change your converted code to take advantage of the new features offered.

For True BASIC the areas of concern are:

- LET is required on all assignment statements.
- The END statement is required in all programs.
- Multiple statements on a line are not supported.
- Spaces between keywords are required.
- (!) is used as a comment character, not (').
- Numeric variable type codes are not used (%,!,#).
- Floating-point numbers are rounded (not truncated) to integers, when required.
- LEFT$, MID$, and RIGHT$ are not directly supported (though you can write them as functions).
- Graphics code will probably have to be rewritten.
- File I/O is considerably different and will have to be rewritten.
- Communications ports are not supported. You will have to write such code in assembler and call it from the True BASIC program.

For BetterBASIC the areas of concern are:

- You must explicitly declare all variables with the appropriate declaration statement.
- File I/O is considerably different and will have to be rewritten.
- There are a few minor verb differences.

eration is essentially unchanged. However, because of the complex way the language extensions were implemented by Summit Software Technology, most new users will still face a substantial learning curve.

True BASIC Versus BetterBASIC

Though these products are worlds apart in their approach to the problems of BASIC, they are surprisingly close in the features they offer. As you can see in Listings 1 and 2, the coding structure of the two products is also similar. Both support all available memory, up to 640K. Each program offers a useful range of block control structures, though True BASIC offers the richer set.

Both products provide for the definition of local variables. In BetterBASIC, local variables are the default. In True BASIC, variables are local only if the procedure in which they are used is defined after the required main program END statement.

The True BASIC and BetterBASIC languages have been designed for ease in coding separate routines or procedures, and both allow procedures to be invoked simply. They support the passing of data to and from the procedure as parameters. BetterBASIC is more sophisticated in this respect, allowing a greater degree of control over the process. Unfortunately, neither product features an improved debugging capability, a serious omission.

As for the speed of the executing code, neither program is going to give assembly language, Turbo Pascal, or any good C compiler a run for its money. Table 1 shows the results of calculation speed

tests. The sieve of Eratosthenes (a program that finds and counts prime numbers from 2 to *n*) was used as a benchmark. Table 2 shows the results of a screen update speed comparison. The program used simply prints a full line of characters to the screen. In those simple benchmark tests, True BASIC was the hands-down winner. It performed as much as 3.62 times faster than BetterBASIC in the calculating test (1.99 times faster than BASICA) and as much as 1.92 times faster than BetterBASIC in the screen update test (2.48 times faster than BASICA). That BetterBASIC, though semicompiled, is actually slower than BASICA in doing calculations is not a surprise. BetterBASIC's BCD math package offers control over precision at the cost of speed.

The contrast between the two sets of documentation is striking. The BetterBASIC manual is huge (over 700 pages), sprawling, not well organized, and unremittingly technical–on the whole, it's poor. The True BASIC manuals, in contrast, are simply outstanding, rivaling any other language manual for any other software product.

Because of its modular nature, BetterBASIC is the more flexible of the two programs, allowing, for example, a choice of math modules. BetterBASIC is designed to accommodate new modules when they become available. This facility is similar, but superior, to the library support offered by True BASIC. True BASIC does, however, support matrix manipulation directly with several new MAT verbs and offers superior graphics support.

Table 1: Calculation speed comparison

Calculate primes	2-100	2-1000	2-10,000
BASICA	2.64 seconds	19.44 seconds	191.90 seconds
True BASIC	1.32 seconds	9.18 seconds	77.45 seconds
BetterBASIC	2.53 seconds	26.81 seconds	280.16 seconds

Table 2: Screen update speed comparison

Print to screen	10 lines	100 lines	1000 lines
BASICA	1.53 seconds	14.45 seconds	143.35 seconds
True BASIC	.77 seconds	8.68 seconds	90.41 seconds
BetterBASIC	1.48 seconds	13.62 seconds	135.33 seconds

In the END

Both these products improve the BASIC language, eliminating many shortcomings and adding power. BetterBASIC is slightly more powerful than True BASIC, but it is also more complicated. True BASIC is easy to use and manages to add power without increasing complexity, a difficult trick. BetterBASIC clearly excels in flexibility and extendability. It is more compatible with old BASICA programs than True BASIC is, though both products attempt to support the older verb constructs.

For clarity, speed, ease of use, and graphics, it's True BASIC. For flexibility and greater compatibility with BASICA, choose BetterBASIC. Both have much to offer to the majority of BASIC programmers.

Donald P. George is project manager for training/information systems at a large insurance company in Los Angeles.

True BASIC, version 1.0
Addison-Wesley Publishing Co., Inc.
Jacob Way
Reading, MA 01867
617/944-3700
List price: $149.90
Requirements: 192K, one disk drive, DOS 2.00 or later version

BetterBASIC, version 1.1
Summit Software Technology
P.O. Box 99 Babson Park
Wellesley, MA 02157
617/235-0729
List price: $199, 8087 math module $99, run-time module $250
Requirements: 192K, one disk drive

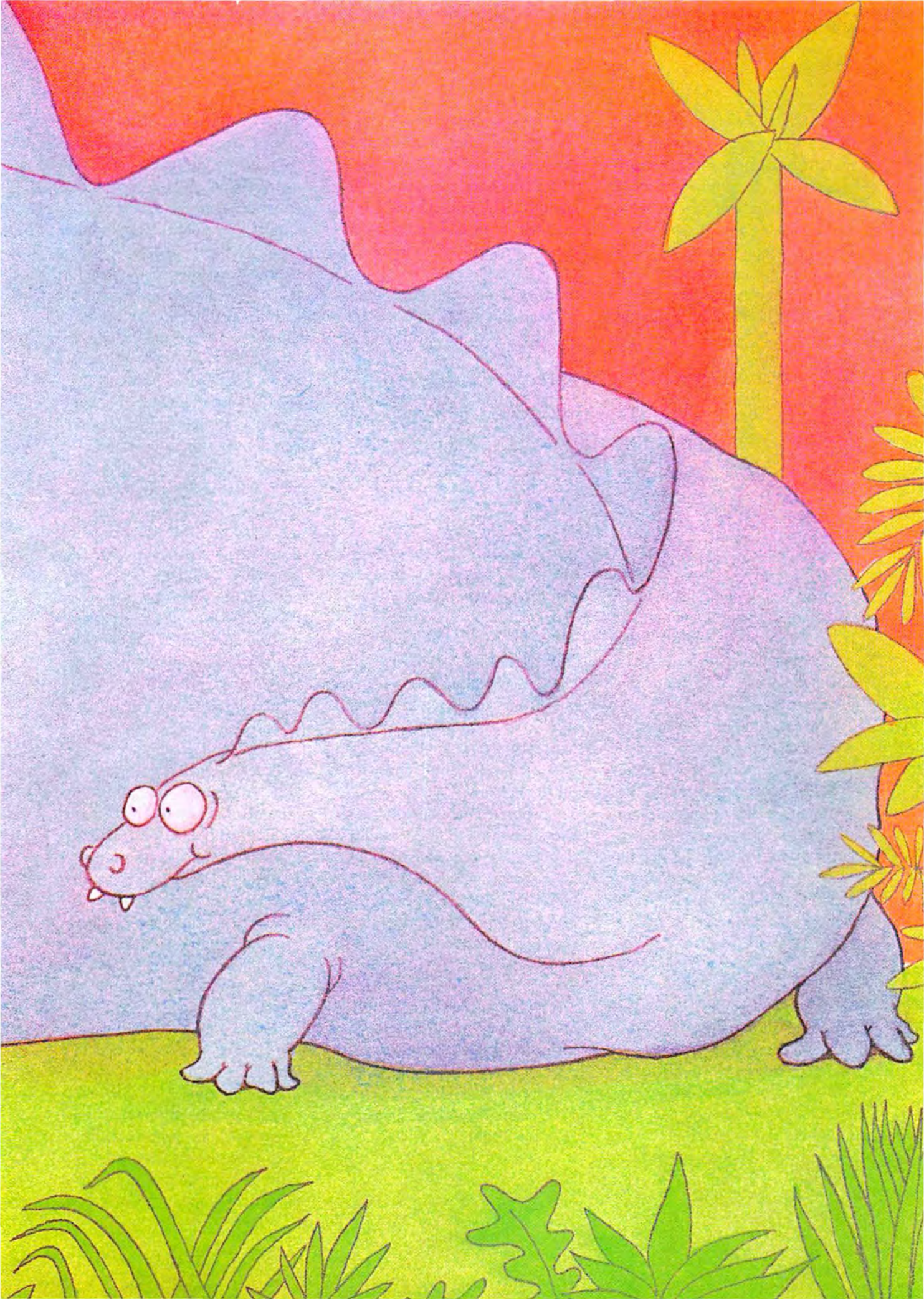
COBOL Comeback

As the PC and its descendents take the business computing reins from mini and mainframe computers, COBOL is suddenly in vogue. PC World evaluates four top compilers.

Marilyn Z. Smith

COBOL is often seen as a latter-day Latin, a dead language shackled to ancient mainframe computers that spew out junk mail and regularly gobble up Social Security checks. The reality, of course, is quite different. In data processing departments around the world, COBOL–the Common Business Oriented Language–has been the high-level language of choice for over 20 years, and for good reason.

As one of the first languages standardized by the American National Standards Institute (ANSI),



COBOL was aimed at simplifying business programming while simultaneously imposing structure on what had been a haphazard and mind-numbing process. Buzzwords such as *portable* and *English-like*, frequently tossed around in press releases and computer magazines, got their start with COBOL. COBOL programs use intelligible phrases such as ADD OVERTIME TO GROSS PAY, define common file formats (random, indexed, sequential), and reference routines by name instead of by line number–features that whelps such as BASIC are only beginning to incorporate.

In data processing departments around the world, COBOL has been the high-level language of choice for over 20 years, and for good reason.

COBOL takes on jobs ranging from accounting to order entry to report generation. Though hardly exotic applications, these are the bread and butter of business computing. Thus, it's no shock to discover that an estimated $50 billion worth of COBOL programs are currently used worldwide–nearly 60 percent of all large system applications.

Enter the PC

So why is COBOL grappling for recognition on the PC? For most PC users, BASIC reigns supreme by dint of its simplicity and cost. For professional programmers, languages such as C and FORTH offer greater flexibility or superior speed. Girth is a factor, too: A single mainframe COBOL source code program can easily tip the scales at 160K.

But times and machines have changed. The millions of PCs finding their way into large and small corporations alike are not necessarily 8088-based, dual floppy drive machines. Hard disk storage is cheap and plentiful; powerful processing, in the form of 8086 and 80286 machines such as the Compaq Deskpro and Deskpro 286, the Kaypro 286i, the ITT Xtra XP, and the PC AT, makes COBOL not only viable but appealing–appealing enough, apparently, to have spurred such personal computing stalwarts as Microsoft and Digital Research into releasing COBOL compilers for the PC.

Corporate America and Uncle Sam, pressured to find PC solutions and to keep budgets in line, are discovering that COBOL's portability makes moving existing applications from larger machines to the PC a cost-effective alternative to developing programs from scratch. Retraining is minimized as well, because PC and mainframe COBOL programs adhere to the same standard. If nothing else, programmers writing for the PC will appreciate COBOL's interactive debugging and PC-specific development tools.

COBOL à la PC

COBOL comes in several flavors: high, high-intermediate, low-intermediate, and low, with high embracing the entire language, and the rest, in descending order, smaller subsets. Nearly a dozen COBOL compilers of varying levels and capabilities are available for the PC. The representative sample reviewed here includes a mix of low- and high-level COBOL compilers produced by IBM, Digital Research, mbp, and Micro Focus. Untangling the relationships between these and other system language companies takes a bit of doing. IBM COBOL was developed by Microsoft but is marketed by IBM. Micro Focus developed both Level II COBOL (marketed by Digital Research) and enhanced Professional COBOL, which differ radically in performance. mbp COBOL from Mathematischer Beratungs-und Programmierungsdienst of West Germany is unrelated to any of the others.

COBOL Basics

In the best of all programming worlds, a well-implemented COBOL compiler does a complete job throughout the programming process: Catching and correcting errors is easy, compiles are comparatively fast, and the resulting program executes efficiently. While finding the perfect compiler is unlikely, certain design facets should be considered. How a COBOL compiler transforms source code into executable machine language can affect program development, compile time, the quality of the resulting machine language code, and execution. Both mbp and Professional COBOL compile programs into directly executable machine code.

Table 1: COBOL comparisons on an XT

	Level II COBOL	mbp COBOL	IBM COBOL	Professional COBOL
Version	2.1	7.04	1.0	USV 1/1-85
Level	high-intermediate	low-intermediate	low-intermediate	high
Memory required	192K	192K	64K	256K
Size of compiler code	190K	1.5MB	180K	700K
Compile speed (lines per minute)	200-300	100-150	200-300	150-200
Checker speed				450-800
Execution speed	fair	good	poor	good
Produces executable machine language	no	yes	no	yes
Error messages	poor	good	poor	poor
Interactive debugging	yes[1]	yes	no	yes
Sort utility	yes	yes	no	yes
Ease of use	fair	fair	fair	good
Documentation	fair	fair	poor	good
Price	$700	$750	$700	$3000

[1]This option costs an additional $800.

While the generated code is usually fast, it's hardly compact, because it includes library routines for I/O and other data processing tasks. The compiler itself is also likely to take up a fair amount of disk space.

IBM COBOL and Level II take a different tack, compiling source code into an intermediate language, which must be run through each package's respective interpreter. Like a BASIC interpreter, COBOL interpreters execute one line of code at a time. In this environment compiling is relatively speedy, but this gain is at the expense of execution speed; a program may run 50 to 400 percent slower than a fully compiled peer. Realizing this, Digital Research recently released version 3.0, which compiles into native 8088/8086 code.

Keep in mind that none of these compilers can generate object code exceeding 64K. Programs above that limit must be rewritten using overlay files. Since the PC and, of course, the AT offer more than sufficient memory, this limitation is not easily justified. Keep a sharp lookout for new versions of these and other compilers that overcome the restriction.

Consider other features as well: What level of COBOL does the compiler support? (Is it high enough to make mainframe COBOL conversions relatively simple?) Are error messages easy to decipher, or is 'END OF SENTENCE SHOULD PRECEDE 01' the compiler's idea of clarity? Can you interactively debug a program as it runs? Is it easy to change a compiler's program listing options and memory and storage settings? Is the compiler geared to the PC,

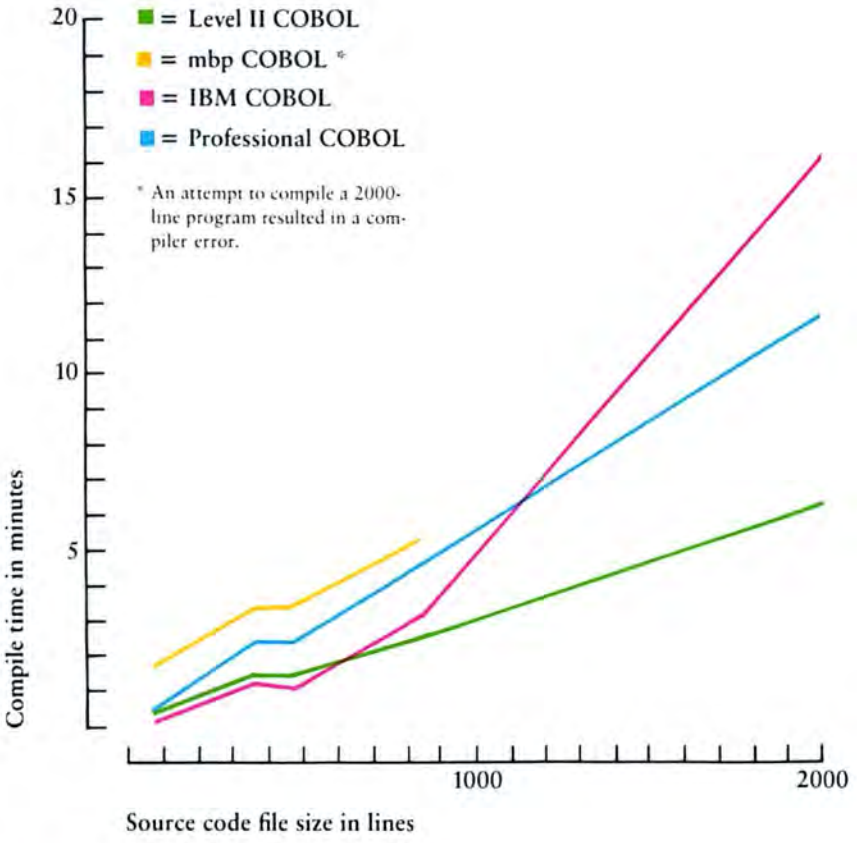


Figure 1: Compile times on the XT

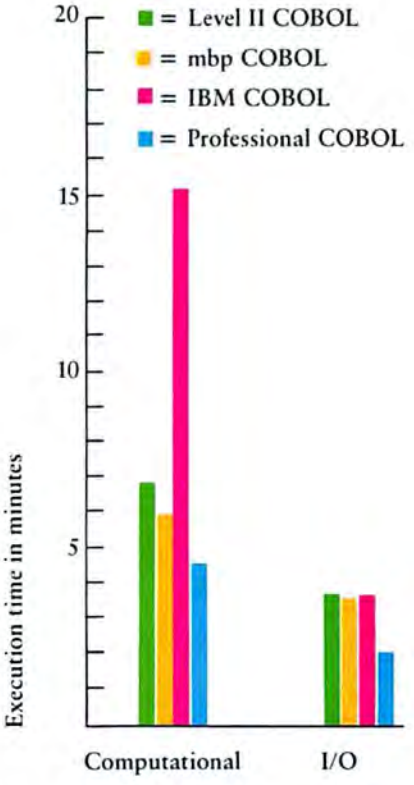


Figure 2: Histogram of execution time for computational- and I/O-intensive programs

taking advantage of its function keys, full-screen input/output, and other unique hardware features (see Table 1)?

Setting Up the Test

One lesson is clear from using all the compilers reviewed: Unless you're an accomplished disk juggler, it's advisable to run these compilers on a hard disk system. Compile and execution tests for this review were conducted on an XT with 384K.

To test compiler speed and the efficiency of generated code, programmers traditionally use the sieve of Eratosthenes, a prime number calculation algorithm. Although the sieve provides performance data, it hardly qualifies as a typical COBOL application.

In an attempt to replicate real world conditions, I wrote programs aimed at testing each compiler's speed in computation, file updating, input/output, and branching. The computational program prodded each compiler to add, subtract, multiply, and divide numbers in various ways allowed by the language. Another program reflected the major function of order-entry systems–the constant updating of a master file with transaction files. Because this process is at the core of many business and accounting applications, any COBOL compiler worth its bits should perform it with ease. The file updating program was also geared to test the compiler's ability to move data to and from a hard disk. The results are not absolutes, of course; some compilers show wide variation in performance depending on the type and size of the program used.

From Compile to Execution

When comparing compile times, remember that IBM COBOL and Level II COBOL produce an intermediate language, which generally results in relatively speedy compile times and rather slow execution. With mbp COBOL the reverse is

true, and Professional COBOL's speed depends on which option you choose, the checker or the compiler. The checker produces an intermediate language that can be either run, albeit slowly, or further compiled into tight, rapid code. The checker is used mostly for efficiently developing and debugging programs.

In general, the tests confirmed that program size affects compiler performance, while program type (computation- versus I/O-intensive) has a direct effect on the execution speed of the resulting object code (see Figures 1 and 2). Though Professional COBOL's compile times are roughly average, the generated code easily beats all contenders. On an AT, all compile and execution times would be at least twice as fast.

If storage is at a premium, remember that COBOL programs are particularly disk hungry. Directly executable COBOL code usually consumes a fair amount of disk space; interpreted code is more streamlined. For example, the same 370-line I/O-oriented program run through each compiler produces object code files ranging in size from 4.6K to 28.5K (see Table 2).

Level II COBOL, Version 2.1

Level II COBOL is a high-intermediate compiler that is complete enough to run mainframe programs easily with minor modification. Most of the changes required are in the Environment Division, which defines file characteristics. The compiler allows you to dynamically assign file names at execution so that programs can use more than one data file at a time.

While Level II COBOL offers some interesting un-COBOL-like features—such as the use of lowercase source code and PEEK and POKE—the compiler is no great friend of the programmer. Error messages dumped to the screen en masse are not particularly lucid and, worse still, are not linked to lines where the errors occurred. Given COBOL's fussiness about syntax—misplaced hyphens have caused more than one computer science student to change majors—this flaw assumes significant proportions when it's time to debug a program.

Fortunately, two optional (read extra cost) packages for Level II ease the programmer's task. The Animator provides interactive debugging; a forms utility lets you create custom data entry and output screens. The process is straightforward: Simply fill a blank screen with the titles you desire, identify numeric and alphanumeric fields with 9s and Xs as you would in PICTURE statements, mark fields for display attributes (blinking, underline, inverse video), and save the screen. The forms utility automatically generates the appropriate DATA and PROCEDURE division statements, which can then be incorporated into a program. Like all the compilers reviewed save IBM COBOL, Level II comes with a sort utility—an attractive feature when you consider that a healthy percentage of all COBOL operations involve sorting.

Level II comes with a concise COBOL syntax pocket reference, plus *Operations*, *Getting Started*, and *Reference* guides. Though clearly written, the manuals lack sufficient examples of COBOL in action, are not typeset, and are poorly indexed. Unlike other compiler manuals, which are organized by division, Level II's documentation follows mainframe conventions, listing statements by function. This may or may not be a help, depending on your experience with COBOL.

Of special note for Level II COBOL fans is the recent release of version 3.0. Developed jointly by Micro Focus and Digital Research, version 3.0 differs radically from its immediate predecessor. For starters, the new version is a high-level compiler that converts COBOL code into directly ex-

Table 2: A 370-line COBOL program compiled

Compiler	Object code size
Level II, version 2.1	4.6K
mbp COBOL, version 7.04	28.5K
IBM COBOL, version 1.0	18.4K
Professional COBOL, USV 1/1-85	
Checker	4.4K
Compiler	7.7K
.COM file	54K[1]

[1]The Professional COBOL compiler can "build" a file that will run outside the Professional COBOL environment on any 8088 MS-DOS machine. The extra bulk is due primarily to MS-DOS-specific library routines.

ecutable machine code. Preliminary testing indicates that version 3.0 compiles as slowly as mbp COBOL but produces faster-excuting machine code. A forms utility is now included, but Digital Research has mysteriously dropped the interactive debugging feature—a serious miscalculation.

mbp, Version 7.04

Though mbp is a low-intermediate COBOL compiler, for some reason it soaks up more disk space than all the other compilers combined. But it includes enhancements that make programming less of a chore. A forms utility lets you format data entry and output screens. Screen design is not particularly easy, however, and mbp perversely fails to allow the creation of numeric fields with dollar signs. Considering COBOL's dominance in the business world, this omission is glaring indeed, but the manufacturer claims it will be corrected in a forthcoming version.

mbp's interactive debugging feature is a mix of good and bad. The debugger interactively traces a program's execution and displays identified variables. However, it doesn't display the program on screen, forcing you to keep a printout of the source code handy while debugging. Thankfully, the compiler's error messages are understandable and identified by line number; but instead of being displayed, they are stored in a listing file after every compile. As a result, time and disk space are wasted as you continually create the file and then view it with a text editor or a word processor.

mbp does offer some attractive run-time features. Subscripts are automatically checked. If the program references code outside of an array, execution stops before useless output is generated. Like Level II COBOL, mbp also allows you to assign a number of data files to a program at execution time.

My major complaint with mbp COBOL is its snail-like compiles. A typical 500-line program takes nearly 5 minutes—twice as long as IBM COBOL and Level II COBOL and five times longer than Professional COBOL. Worse, you cannot compile programs approaching 2000 lines. My attempt to do so resulted in an I/O error. If you want to grow old at your terminal, mbp is your package.

Like its mainframe antecedents, mbp's manual is written in the stilted prose professional programmers are accustomed to. And like most of the compiler manuals reviewed, it lacks clear and useful examples.

IBM COBOL, Version 1.0

COBOL as a language seems to inspire grandiosity, but IBM (with substantial help from its friends in Bellevue, Washington) has put foward a relatively agile low-intermediate compiler. It's not the fastest of the lot, but its compile speed is acceptable, particularly with I/O-intensive programs. As Figure 2 illustrates, however, the IBM package falls down in a crucial area: computation speed.

Not surprisingly, the IBM compiler was designed with the PC firmly in mind. The compiler accepts lowercase input, provides for full-screen input and output, and allows programs to access the PC's function keys. Error messages are displayed as a program compiles and are matched to the appropriate line numbers. But the messages themselves are sometimes maddeningly vague. In one instance, the compiler blithely noted 'STATEMENT TOO LONG OR INCOMPLETE'. I finally had to create a separate program module containing the misguided statement and experiment with it until the error made itself clear.

The compiler's static debugging approach—you must decide before compiling which data names to display or procedures to trace—will probably send the most phlegmatic programmer into cat fits. There's no real way to modify values or the flow of execution as a program runs.

In the area of documentation, the vague plague dominates. The IBM COBOL manuals are particularly sketchy on important compiler specifics. For example, you are not told how the SELECT statement defines a file name or how to install the compiler on a hard disk. By running several programs I accidentally discovered some important, undocumented limitations—notably, those imposed on the number of variables and operations that a COMPUTE statement can contain and the level of nested PERFORMs. These restrictions may be beneficial, since the programmer is prevented from writing unduly complicated—and error-prone—programs.

Professional COBOL, USV 1/1-85

Professional COBOL is the only high-level compiler reviewed and, fittingly, is the most capable at converting mainframe COBOL programs for use on the PC. Micro Focus's compiler includes a

number of features that usually cost extra, which justifies the package's $3000 price tag. In this case the cost is worth it.

Professional COBOL comes not only with competent documentation but with a full assortment of program development tools, including full-screen editing, a sort utility, a forms generator, interactive debugging, and a checker compiler that examines program syntax before debugging occurs. The package is also rather independently minded, allowing you to turn a source code listing into a .COM file that will run outside of the Professional COBOL environment.

As a complete package, Professional COBOL is, to use the hackneyed phrase, user-friendly. The PC's function keys are tied to compiler functions and identified at the bottom of the screen. In-context, on-line help is also available, though this is probably unnecessary for most COBOL programmers. Once you load the compiler, you can edit, create I/O screens, check program syntax, debug interactively, or compile. As the checker runs, source code scrolls by on the screen. If a program error comes to light, an error message is displayed. You can choose to continue the check or fix the problem on the spot—an approach similar to Turbo Pascal's.

In all respects, Professional COBOL is a worthy product, assuming your bank account can withstand the strain. The checker is fast, the compiler produces speedy 8088/8086 machine code, and the interactive debugger is useful and powerful. With the latter, as the program scrolls by, you can direct the compiler to single-step through each instruction. When execution ceases, you can examine variable values and change them by either entering the data name or pointing at the variable with the cursor. You can also change the order in which statements are executed.

Creating I/O screens with Professional COBOL is similar to using the forms facility with Level II COBOL. You type in the screen you want, set fields for alphanumeric and numeric data, and select video attributes for each field. Unlike mbp, Professional COBOL permits all kinds of PICTURE editing.

The Winners' Circle

I found it hard to dislike Professional COBOL; it is clearly the best of the compilers evaluated. It manages to pack the entire ANSI COBOL language into 700K and yet match or outperform its competitors. It also takes into account the wear and tear most COBOL programmers experience. No compiler is perfect, but this one comes close.

All these compilers are undergoing revision, adding new features and cleaning up annoying or potentially disastrous flaws. Other COBOL compilers for the PC are also appearing on the scene, from small and large companies alike. The PC COBOL wars, it appears, are just starting to heat up.

Marilyn Smith is a performance analyst, a computer consultant, and the author of five computer science programming textbooks.

IBM COBOL, version 1.0
IBM
IBM Personal Computer
P.O. Box 2910
Delray Beach, FL 33444
800/447-4700
List price: $700
Requirements: 64K, two disk drives (hard disk recommended)

Level II COBOL, version 2.1 and 3.0
Digital Research
P.O. Box DRI
Monterey, CA 93942
800/382-1800, 408/649-3896
List price: version 2.1 $700, forms utility $200, Animator $800; version 3.0 (with display manager and access manager) $700
Requirements: 256K, two disk drives (hard disk recommended)

mbp COBOL Compiler, version 7.04
mbp Software & Systems Technology, Inc.
1131 Harbor Bay Pkwy.
Alameda, CA 94501
415/632-1555
List price: $750
Requirements: 128K, two disk drives (hard disk recommended)

Professional COBOL, USV 1/1-85
Micro Focus
2465 E. Bayshore Rd. #400
Palo Alto, CA 94303
415/856-4161
List price: $3000
Requirements: 256K, two disk drives (hard disk recommended)

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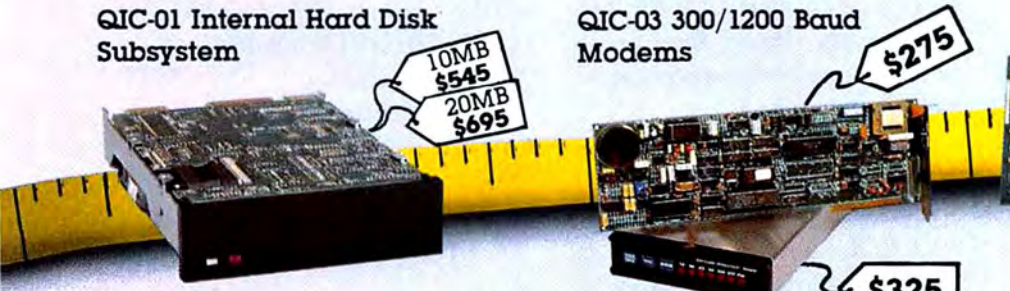

This low power Microscience subsystem comes complete with controller, cables, drive, easy instructions. Fits inside your floppy slot. Compatible with DOS 2.0, 2.1, and 3.0 without any patches. 33 MB half-height with controller, $1,295 ... 20 MB Drive for the PC AT, $895. Mounting hardware for Compaq is available. External 10 MB $795, external 20 MB $995.

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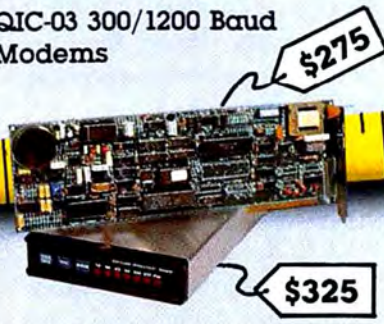

Our modems are fully Hayes compatible with features such as low heat dissipation, low power consumption, software volume control for the speaker, and large-scale-integration "Modem on a chip" for high reliability. It also comes with communications software which lets you emulate VT100 or IBM 3101.
External $325, Internal $275.

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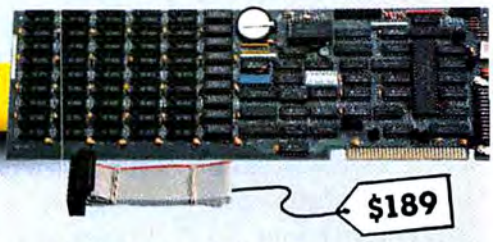
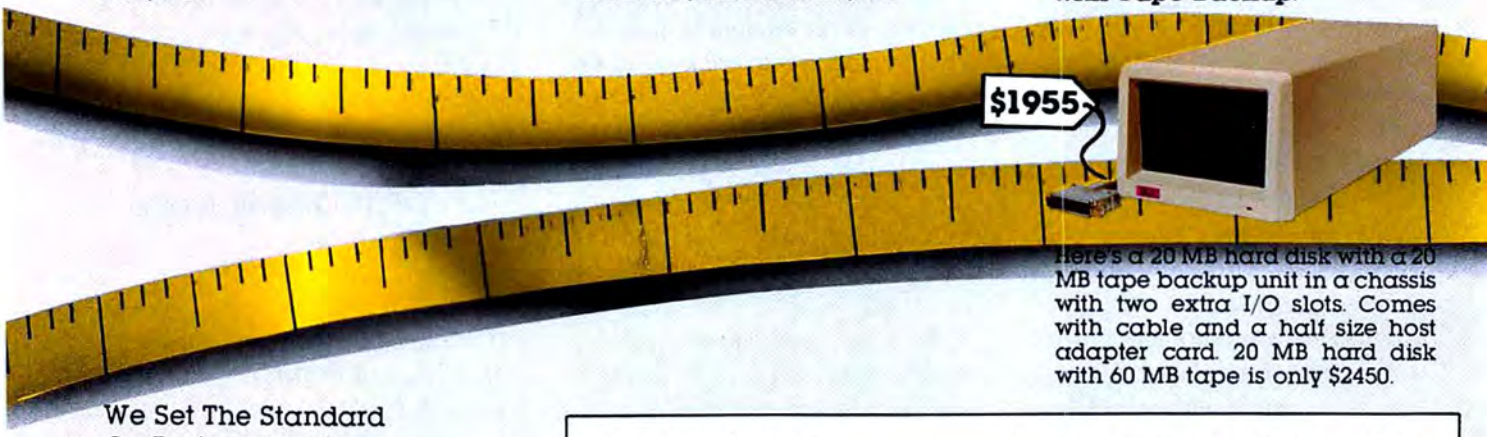


It gives you more than just added memory. It gives you **reliable** memory expansion (up to 384K), a serial port, a parallel port, a game port, and a battery back-up clock calendar. Includes RAM disk, print spooler, and clock utilities. (The 64K RAM set is only $15.)

QIC-2020 External Hard Disk with Tape Backup.



Here's a 20 MB hard disk with a 20 MB tape backup unit in a chassis with two extra I/O slots. Comes with cable and a half size host adapter card. 20 MB hard disk with 60 MB tape is only $2450.

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Graphics Boards

Hercules, Color	$185
Hercules Compatible, Mono	$245
Paradise Graphics	$295
Everex Graphics Edge	$295

Back-up Tape Subsystems

45 MB Internal Streaming Tape for AT	$895
45 MB Internal/External Streaming Tape for PC XT	$950/$1195
20 MB Internal/External Streaming Cassette	$695/$895
Expansion Chassis with I/O Slots	$695
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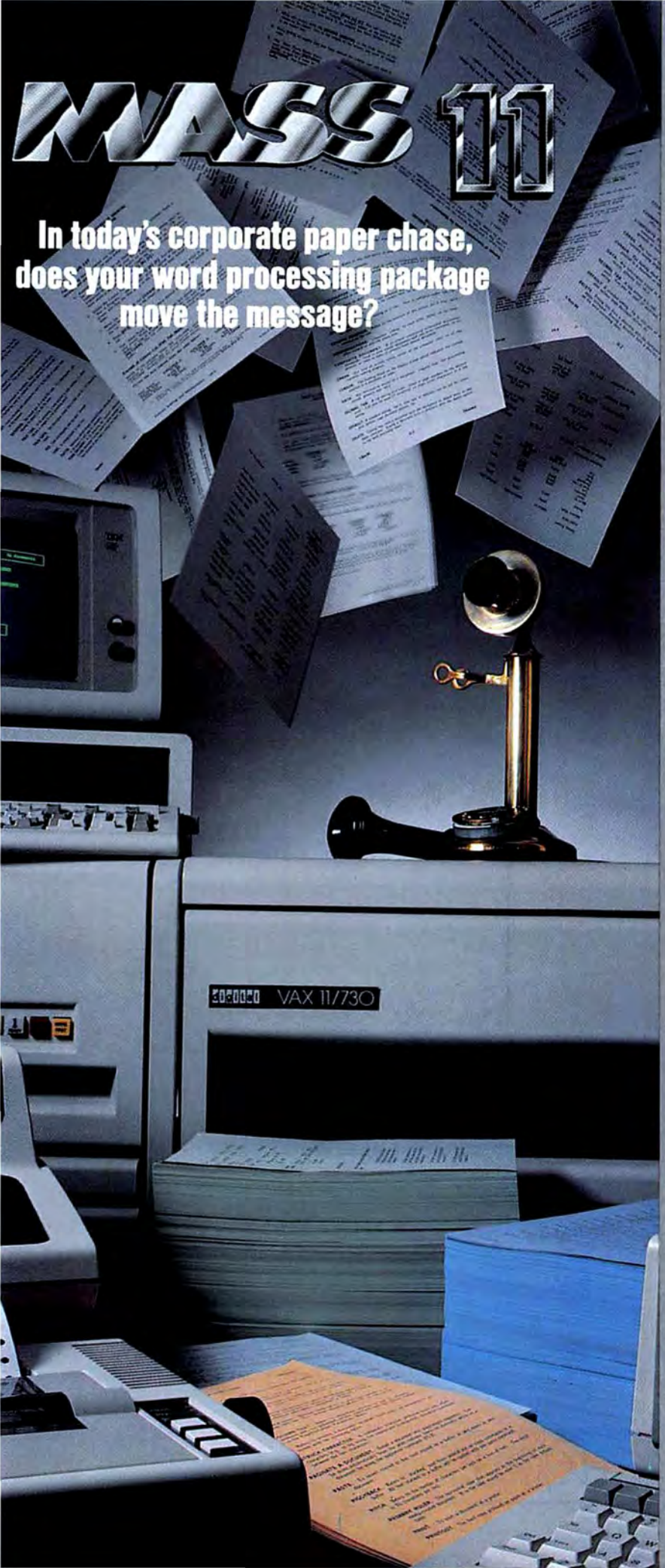

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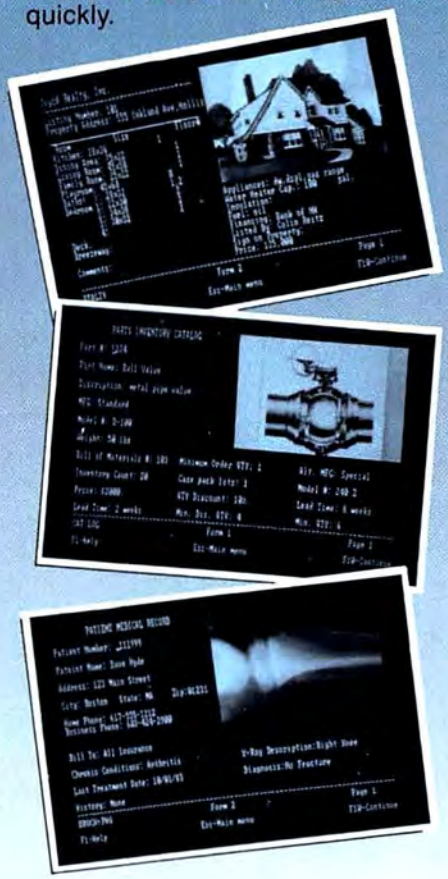

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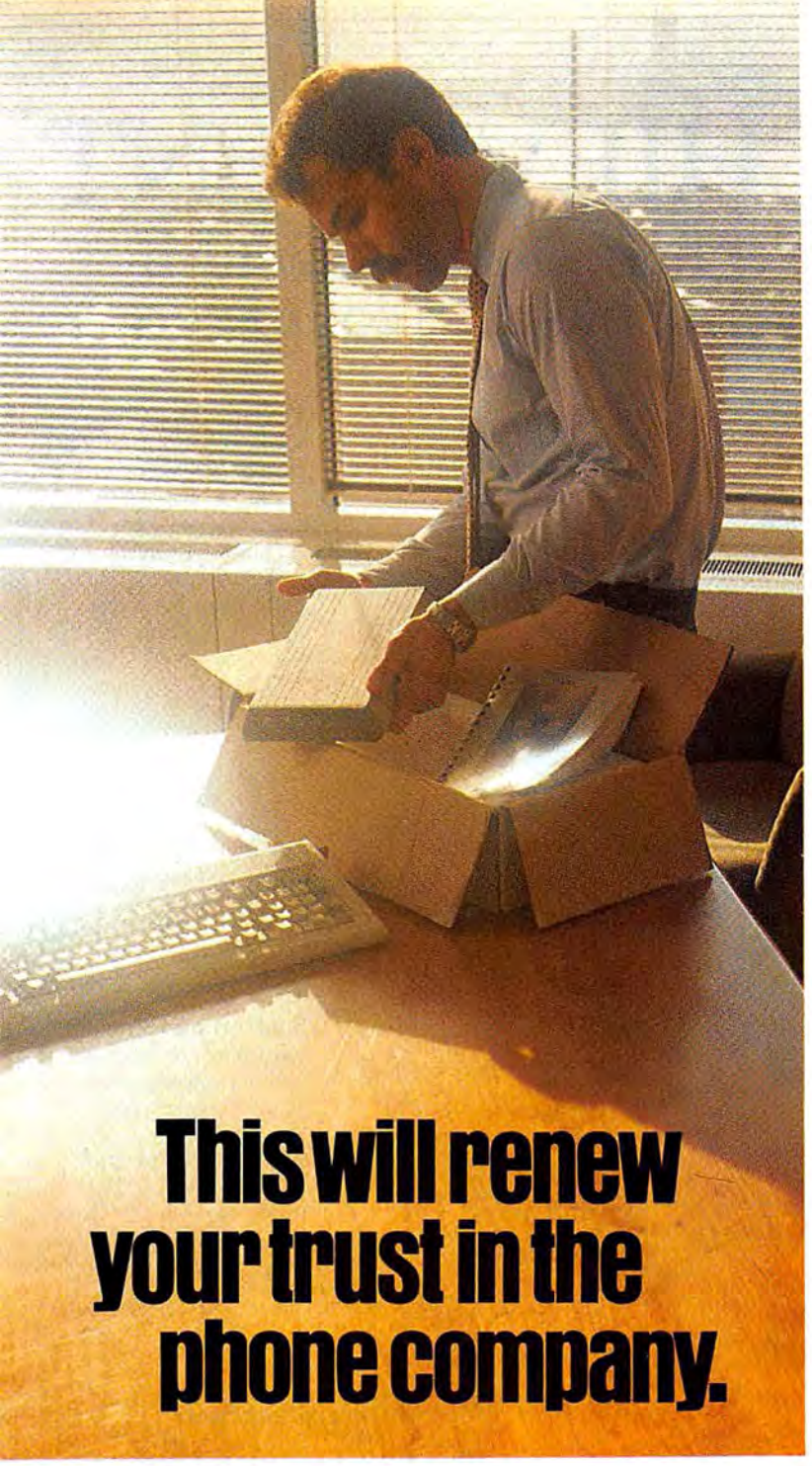

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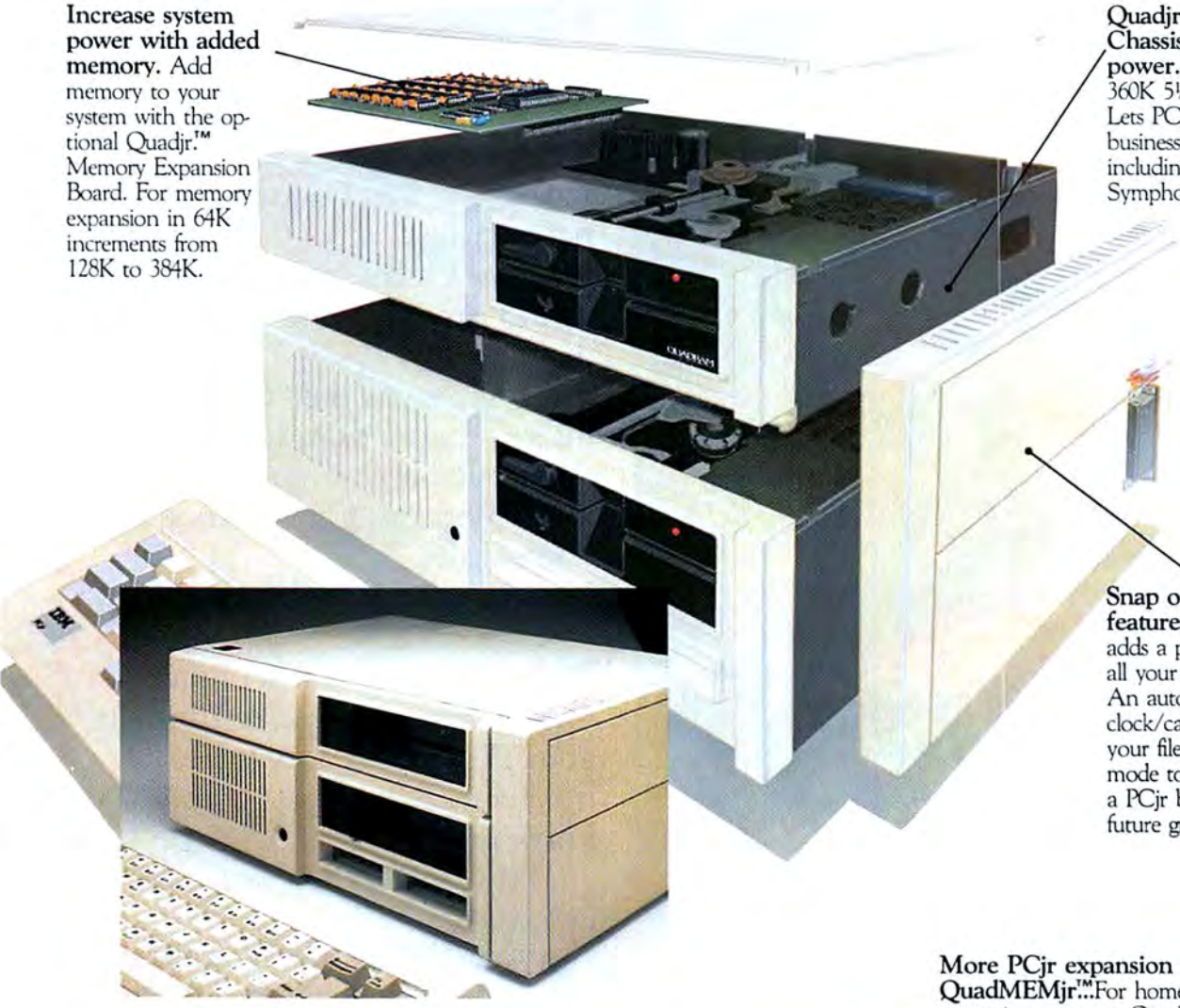

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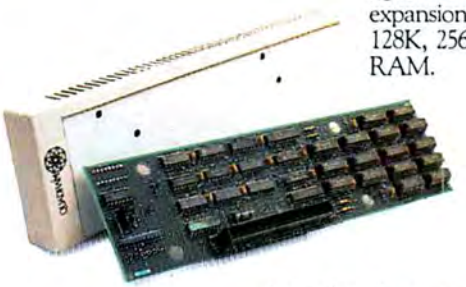

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PCjr WORLD

July 1985
The PCjr Magazine

After the Fall: The PCjr Survival Kit

Helpful advice for finding PCjr software, peripherals, service, and support

The PCjr Survival Kit

Hugh Delehanty

On March 19, 1985, IBM dealt the lethal blow to its deteriorating reputation for infallibility in marketing. Industry insiders may have anticipated IBM's announcement to end production of PCjr, but numerous dealers and Jr owners reacted with shock and bewilderment. Dealers began to slash prices, while concerned Jr owners deluged bulletin boards with pleas for help. A CompuServe message reflects one owner's reaction: "Will those of you who purchased a Jr, TI-99, Edsel, or mood ring please advise—what do we buy next?"

Racore Corporation, a manufacturer of add-ons for Jr, was inundated with hundreds of phone inquiries from angry Jr owners. Many of them had purchased a Jr at Christmastime, when the price had dropped to around $800, and were barely acquainted with their new computers when they heard the news.

In its official statement IBM explained that it wasn't "pulling the plug" on Jr but was merely stopping production because inventory was sufficient to meet demand. Displaying surprising sensitivity to Jr owners' feelings of abandonment—or viewed cynically, to its public image—IBM in April placed ¾-page newspaper ads quoting Mark Twain's wry rejoinder: "The reports of my death are greatly exaggerated." The ad continued, "If you own a PCjr you can be sure it is still a well-cared-for member of the IBM PC family."

In the same ad IBM promised to provide parts, service, and support for at least five years, presumably through IBM Product Centers and, on a voluntary basis, through authorized dealers. In a separate interview, an IBM representative said that production of Jr ROM cartridges would continue for an indeterminate period.

If you own a Jr you're probably skeptical about official rhetoric and want to know what's in store for your computer. The important issues are how Jr's demise will affect the quality of service and technical support from both IBM and authorized dealers, how long the supply of IBM and third-party software and peripherals will last, and—plainly speaking—whether in two or three years Jr will become as obsolete as the Timex Sinclair or the Texas Instruments TI-99. For the time being you can rest assured that the Jr remains a useful home computer, but be aware of problems that lie ahead.

The Software Solution

As a Jr owner you may be concerned that software for your computer will become unavailable. After production on the TI-99 ended last year, new software for it stopped appearing within two or three months. Unlike the TI-99, however, the Jr shares the PC's operating system and can run an estimated 70 to 80 percent of PC programs. Those that Jr can't run either require too much memory or, like the PC version of *1-2-3*, try to address video memory directly rather than accessing the display via DOS function calls.

Although IBM intends to continue producing its current line of ROM cartridges, including Cartridge BASIC, it does not plan to develop or market new ones. Third-party suppliers say they too are unlikely to release new cartridges, and some industry analysts speculate that the current supply may not last long. Dealers interviewed wouldn't predict how long their inventories might last, but you should consider buying soon any popular cartridge programs such as *1-2-3* or Andrew Tobias's *Managing Your Money*.

Purchasing Peripherals

If you plan to use Jr primarily for recreation or education, you needn't worry about the availability of peripherals that expand memory or disk storage capacity. But if you bought Jr to "grow with you" as your need for computing power increases, take heed: If your Jr doesn't grow up fast, it may well become mired in a state of arrested development.

IBM claims it will continue to manufacture existing Jr peripherals, such as the PCjr 128K Memory Expansion Attachment, in limited numbers, but again won't say for how long. Development of new peripherals is unlikely. In any case, IBM's current prices are higher than those of comparable units from other manufacturers. To boost a 128K Jr to 512K with IBM add-ons, you must pay $325 each for three PCjr 128K Memory Expansion Attachments and $125 for an additional power supply—a total of $1100. (Keep in mind that all prices quoted in this article were current as of press time.)

By contrast, for only $840 you can combine Tecmar's $395 jrCaptain—which has 128K, a parallel printer port, a clock/calendar, and a power supply—with Tecmar's $445 jrCadet 256K memory expansion board. Some authorized dealers sell this combination for $550 to $650.

Racore Corporation has a $675 Drive Two Enhancement Package with a memory expansion slot, a power supply, a parallel port, a clock/calendar, and a second disk drive. (Note that the combination of IBM add-ons mentioned previously does not include these last three items.) The total cost of the Drive Two package purchased with Racore's $403, 384K Memory Expansion Package is $1078. One dealer offers the same combination for $830, so you can find bargains if you shop around.

The big question is, how long will these units be available? Tecmar president Marty Alpert says the company plans to continue producing all its Jr peripherals as long as Jr is selling. For other manufacturers, including Legacy Technologies, continued production depends on authorized dealers' willingness to stock their products.

In the weeks following IBM's announcement, many dealers unloaded their stocks of peripherals at cut-rate prices and did not reorder. "Our strategy," says Racore president Rod Crisp, "is to convince dealers that strong demand for PCjr products will continue. Customer interest is high, but most would-be buyers can't find the products in the stores." An alternative for some manufacturers has been to sell their inventories to mail-order houses.

Service With a Smile?

Obtaining basic repairs for Jr shouldn't be a major problem—at least for the present. According to industry analyst Brian Jeffrey of International Technology Group, IBM's track record for servicing discontinued products is good for the first year or two, but after that finding service becomes more time-consuming and difficult.

The majority of Jrs were purchased after August 1984. These units carry a 12-month parts-and-service warranty that IBM and its dealers will honor. But you may need to act soon to add a year to your warranty with IBM's extended service agreement. By purchasing this agreement before the warranty expires, you'll pay substantially less than if you buy a separate agreement after the warranty runs out (see "Totally Unwarranted," *PCW*, Vol. 2, No. 9).

If purchased while the warranty is in effect, the extended service agreement includes on-site service by IBM technicians. The cost is $78 a year for a 128K Jr with a color monitor and one disk drive. An additional $8 covers on-site repairs on a PC Compact Printer for the Jr for the duration of the warranty period.

If the agreement is purchased after the warranty expires, service on the same Jr costs $172.50 a year for on-site repairs and $97 a year if you bring the computer to an IBM Product Center. On-site printer service costs $18 annually, and carry-in service costs $11.

IBM claims it will supply major Jr parts, such as monitors and motherboards, for another five years. An IBM spokesperson also explained that Teledyne of Los Angeles (which built the Jr for IBM) was no longer IBM's major source of Jr components; consequently, the springtime layoffs at that company did not imply a potential parts shortage. Teledyne could not be reached for comment, and IBM declined to identify the new source of Jr components.

Prices for IBM service on other peripherals, such as the Memory Expansion Attachments or power supply units, were not available at press time. IBM will not service peripherals from other manufacturers, such as Tecmar or Racore. Racore provides factory service for products under warranty if you buy them via mail order or if the dealer who sold you the product no longer provides service. Under warranty or not, Tecmar Jr add-ons are repaired only at the Tecmar factory, even when purchased through a dealer.

Authorized Jr dealers sell second-year service agreements for 128K Jrs with a color monitor, but the cost may be higher than IBM's. Prices vary among dealers; one ComputerLand store charges $196 for on-site repairs and $112 for carry-in service. In addition, before selling a service agreement that store requires a $35 maintenance checkup. One Sears store provides carry-in service for $143 a year but includes the prerequisite checkup free.

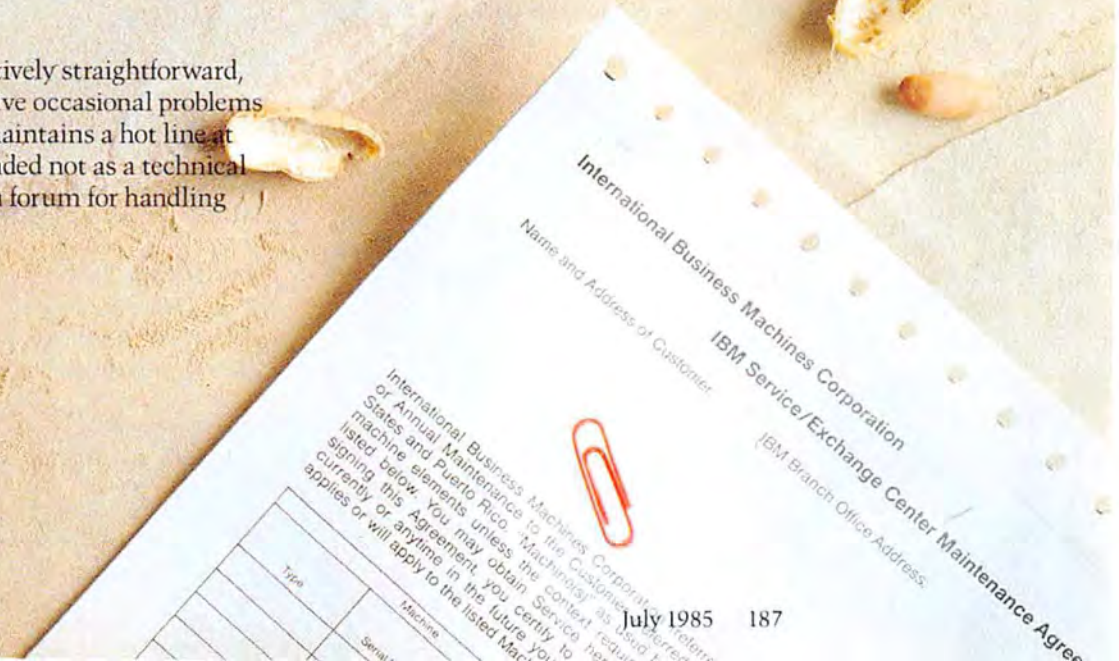
Since few authorized dealers have in-house technicians trained to repair the Jr, they usually replace any damaged part with a new one and send the old one to IBM to be rebuilt. But since most dealers keep only a small inventory of Jr parts on hand, you may have to wait a few days while they order a part from IBM.

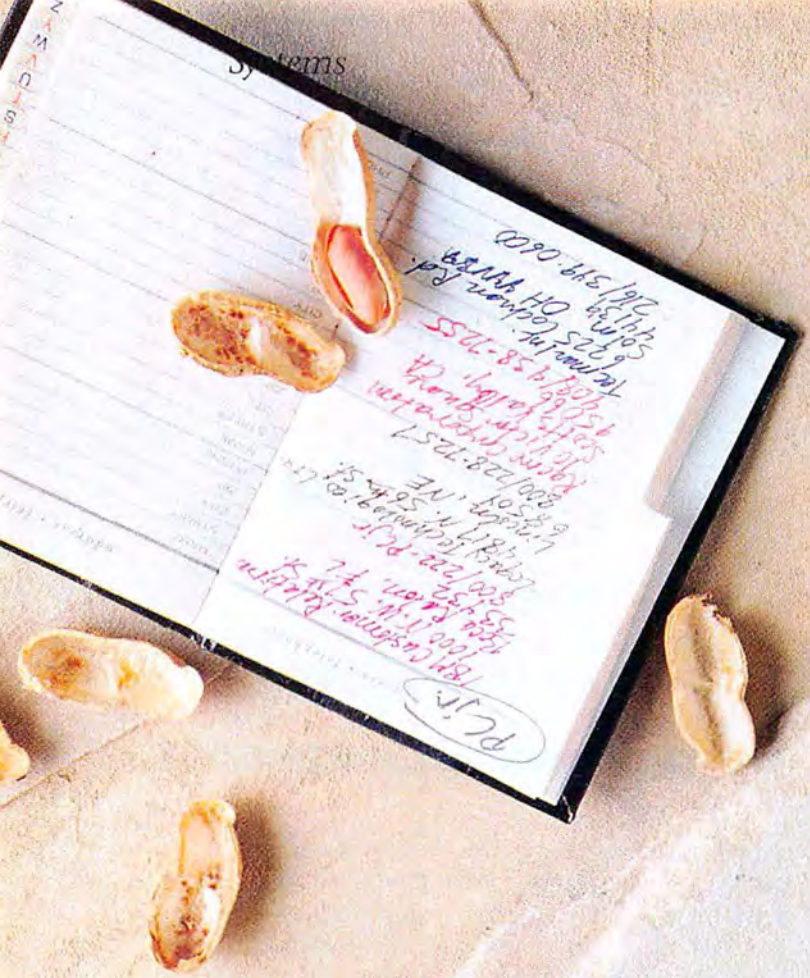
Finding Answers

Obtaining repairs on Jr is relatively straightforward, but finding information to solve occasional problems may be more difficult. IBM maintains a hot line at 800/222-PCJR, which is intended not as a technical support service but rather as a forum for handling simple questions from new users. Based on recent experience, you may have to wait for half an hour before someone answers your queries. According to IBM, the primary line of support should be the authorized dealers, but again, few of them employ technicians who are knowledgeable about the Jr.

If you can't find adequate support from IBM or a dealer, it may be wise to join a local user group to glean tips from other owners.

If you can't find adequate support from IBM or a dealer, it may be wise to join a local user group to glean tips from other owners. At the time of Jr's demise, relatively few such groups existed; most of those were special-interest committees attached to larger IBM PC user groups. In the last few months, however, Jr owners in several cities have started full-fledged Jr user groups as a source of support and, to an extent, solace. As one owner put it, "We're talking about a big investment when you've bought a Jr. The only place to turn now for help is a user group." To find one in your area, contact the local IBM PC user group.





Milestones in PCjr History

November 1983:
IBM introduces the Jr, code-named the Peanut during development. The Jr comes in two versions: a 64K entry-level model, at $699, that runs only ROM cartridge programs; and a $1295 enhanced model with 128K and one disk drive. Reviewers criticize Jr's Chiclet-style keyboard, its limited memory, and its weak power supply, which makes expansion difficult.

January 1984:
After an unexplained production delay that causes Jr to miss the crucial Christmas selling season, IBM begins shipping the machine to dealers.

April 1984:
IBM unveils a color monitor for Jr and launches a $40 million advertising campaign but quickly reduces ad expenditures when Jr sales remain sluggish.

June 1984:
To stimulate sales, IBM drops the price of the entry model to $599 and reduces the enhanced model to $999.

July 1984:
IBM announces several improvements for Jr, including a more traditional keyboard, a speech synthesizer attachment, a power supply unit, and 128K Memory Expansion Attachments, which boost RAM to 512K. Reviews are generally favorable.

August 1984:
IBM inaugurates a massive pre-Christmas promotional campaign, estimated by one analyst at $120 million. The campaign includes an advertising program, several direct-mail promotions, special rebates for dealers, and a 12-month warranty for Jr.

October 1984:
During the final quarter authorized dealers drop prices to about $800 for a 128K Jr with a color monitor, and sales soar. Dataquest estimates quarterly sales of 200,000–80 percent of the year's total. Dataquest also estimates per-unit production and marketing costs at $887.

January 31, 1985:
IBM Jr promotions end, and the price of a 128K Jr with a color monitor floats back up to the $1400 range. Sales slump accordingly.

March 19, 1985:
IBM announces plans to cease production of the Jr in April.

Wrapping Up

Reports have circulated suggesting that IBM may unload its remaining inventory of Jrs, perhaps by dumping them on a major broker or large department store chain like K-Mart. A few weeks after Jr's demise, some authorized dealers reduced their inventories by selling a 128K Jr with a color monitor for as little as $795. Some analysts expect dealers' prices to drop to $500 or less, so this could be your chance for a great bargain.

Despite the uncertainty surrounding the Jr, one fact is clear. If IBM plans to reenter the low-end market, it will have to polish its tarnished image among first-time computer buyers. As one frustrated Jr owner said, "I'm going to think twice before I buy from IBM again."

Hugh Delehanty is a freelance writer living in San Francisco.

IBM
Customer Relations
1000 N.W. 51st St.
Boca Raton, FL 33432
800/222-PCJR

Legacy Technologies, Ltd.
4817 N. 56th St.
Lincoln, NE 68504
800/228-7257, 402/466-8108

Racore Corp.
10 Victor Square
Scotts Valley, CA 95066
408/438-7255

Tecmar Inc.
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216/349-0600

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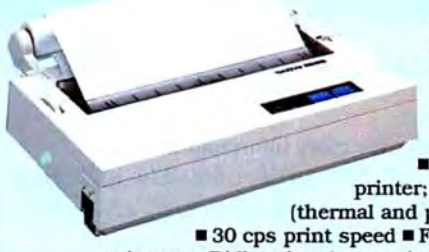

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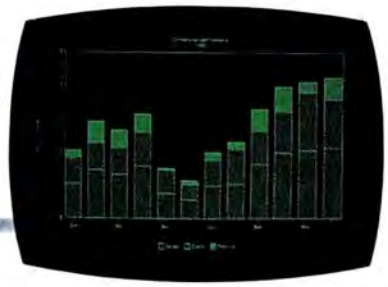

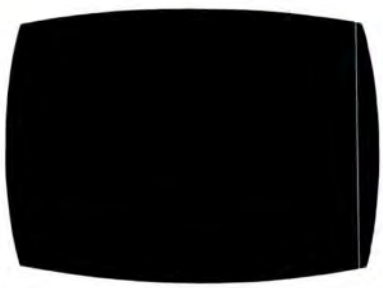

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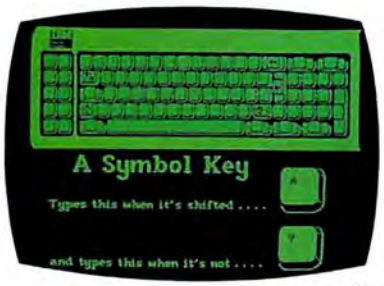

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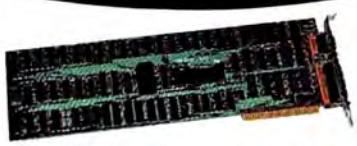

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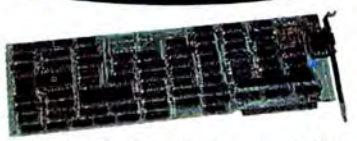

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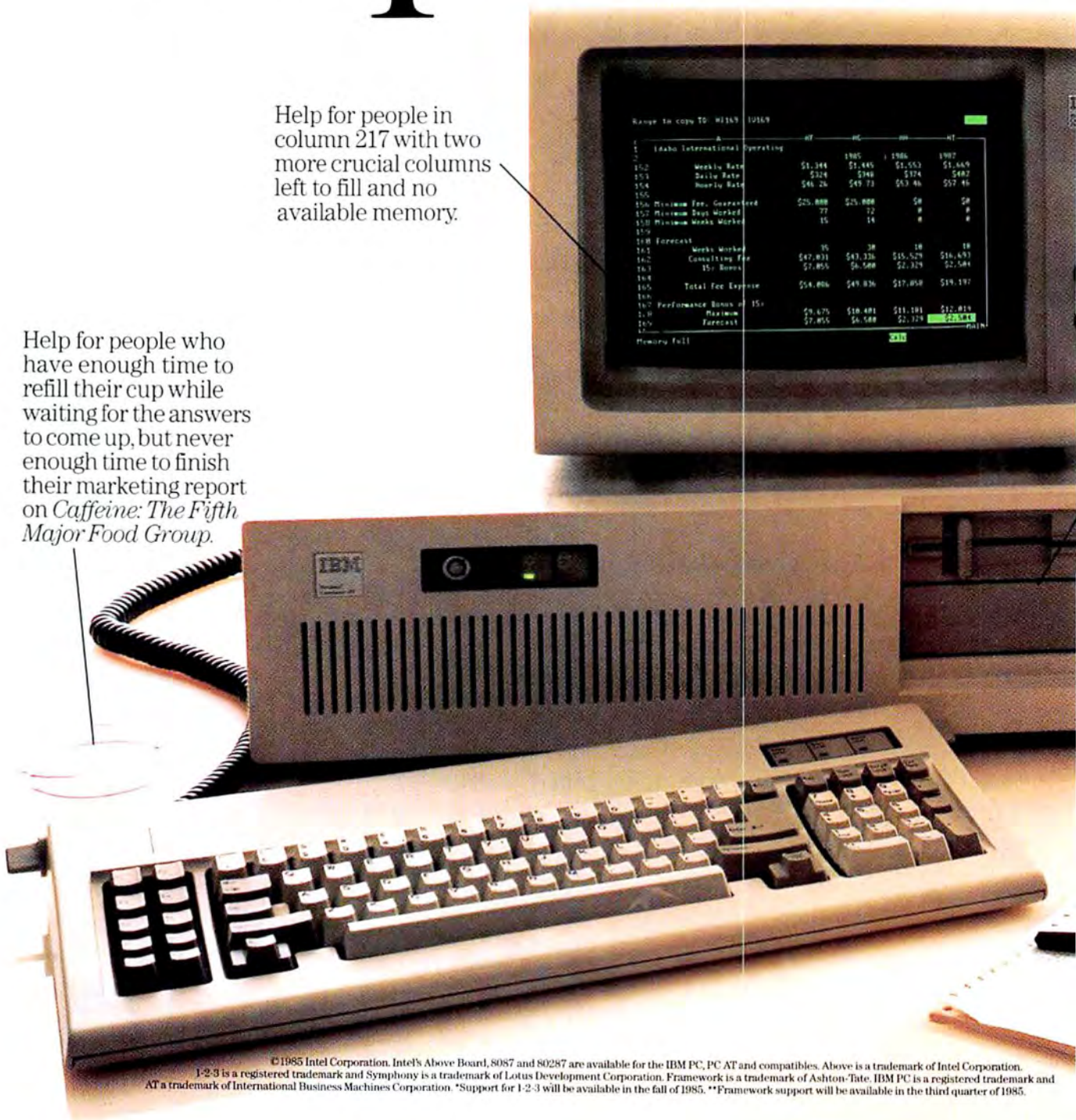

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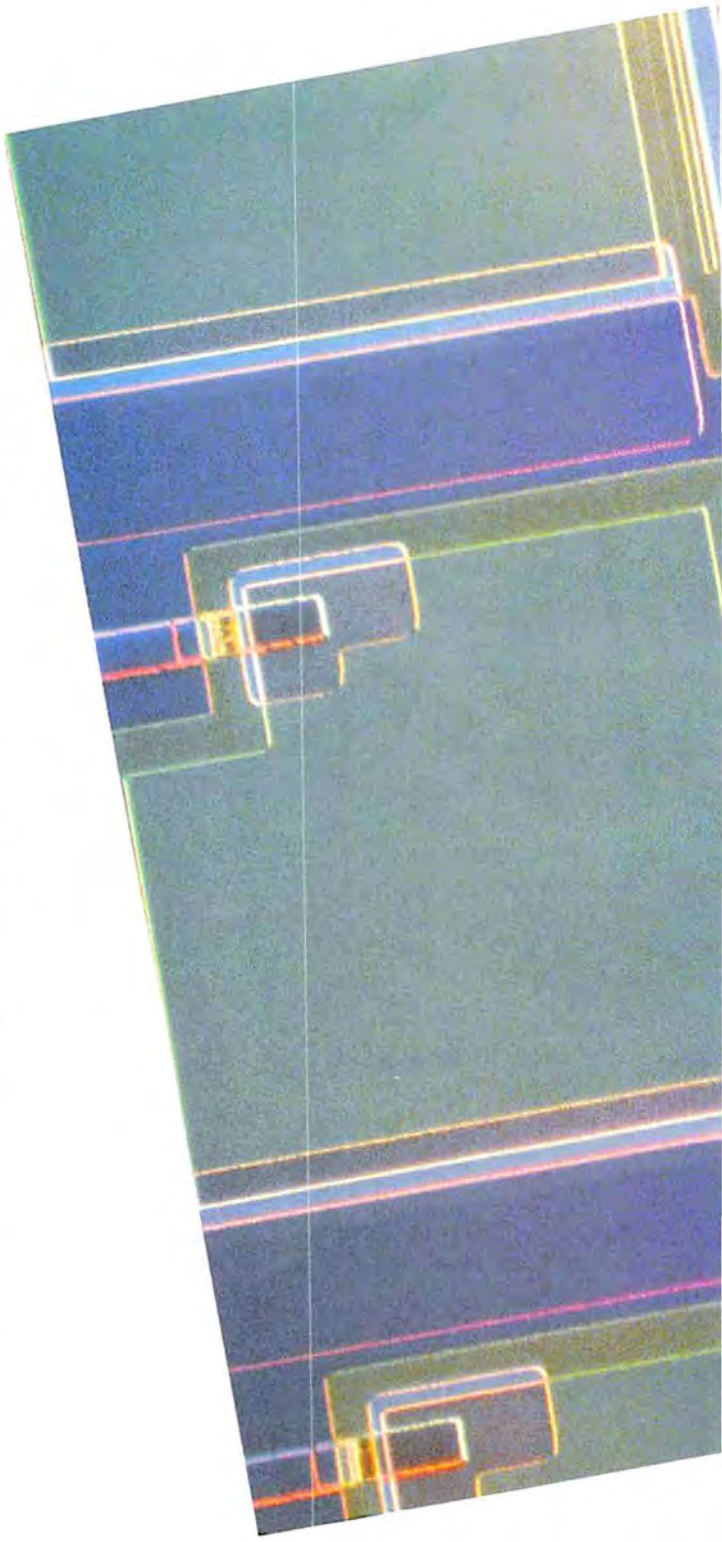
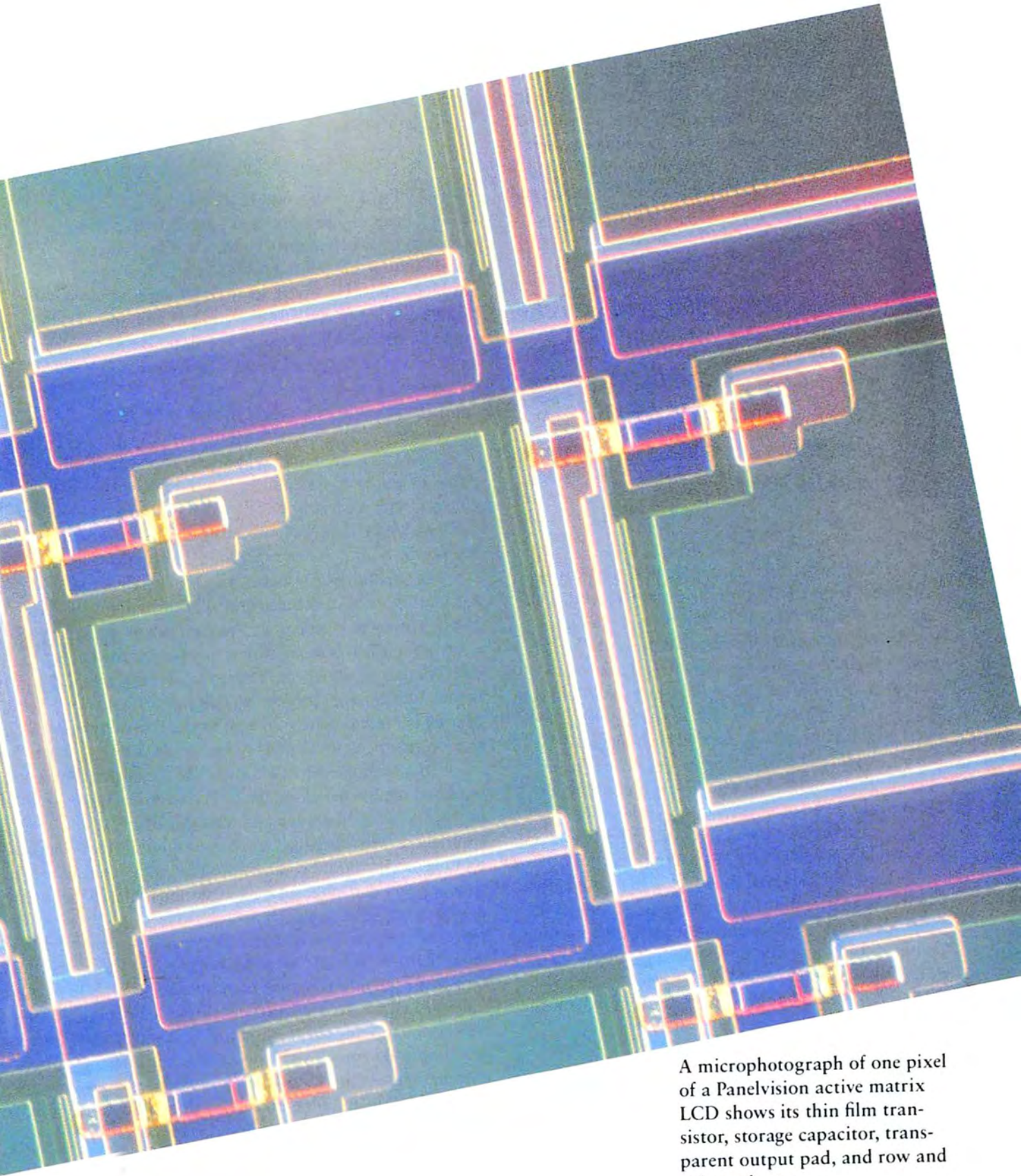


Spurred by projections of a soaring market for portables, developers of flat screens race to introduce a display that is truly portable and–more important–readable.

Janet Goldenberg and Karl Koessel

As the personal computer shrinks ever smaller, its monitor is like the taunting smile on the Cheshire cat–the most stubbornly corporeal part of a vanishing frame. Either slim and compact but impossible to read or so big or power hungry that true portability is impractical, this component has kept the portables market from achieving its promise.

But potential buyers of portables are knocking at the door: Dataquest, the San Jose-based market research firm, predicts that by 1989 mobile machines will make up 30 percent of all personal computers shipped. Behind their respective doors, manufacturers are struggling to make their displays bigger, flatter, and more legible. More than a dozen lap-size computers now boast flat-panel displays, and according to a study by Arthur D. Little, a research firm based in Cambridge, Massachusetts, demand for these screens is expected to triple in the next two years, fueling a market worth $4.2 billion by 1992.



A microphotograph of one pixel of a Panelvision active matrix LCD shows its thin film transistor, storage capacitor, transparent output pad, and row and column buses.

Currently, some ten major flat-panel technologies, at various levels of promise and development, have their sights on the information display market–a field that includes screens not only for portable computers but also for desktops, instrument panels, and TVs. Of these technologies, only four–liquid crystal display (LCD), plasma, electroluminescent (EL), and flat cathode-ray tube (CRT)–have evolved far enough to be viable. And even these have far to go before they match the standard CRT's all-around quality.

Developers of flat-screen technologies struggle with what seem to be mutually exclusive goals. The longed-for display should be portable, readable, and PC-compatible.

Developers of flat-screen technologies struggle with what seem to be mutually exclusive goals. The longed-for display should be portable–both lightweight and sufficiently frugal with power to be run from a battery. It must be readable–legible in less than perfect light. It must be PC compatible–offering 80-column by 25-line text and at least 640-by 200-pixel graphics, preferably on a 12-inch diagonal screen. And it must be inexpensive–as cheap as or cheaper than a CRT. But available screens that are lightweight and consume relatively little power require special lighting conditions for legibility and are hard to implement in very large monitors.

Table 1 shows how each technology currently stands in the race toward the major goals. None so far is successful on all counts, but each has its strong points and is improving rapidly.

While market analysts can't yet say which flat screen–if any–might dislodge the CRT from its niche as the display of choice, they agree that the next few years will present a "marketing window" through which emerging technologies can pass if they offer a special advantage of high resolution, legibility, portability, or price.

LCDs: Lower-Class Displays?

Cheap, lightweight, and miserly with power, LCDs most closely approach the ideal for battery-powered, portable display applications. But major problems must be solved before these screens can become sufficiently vivid for the computing public. For one, the conventional "twisted nematic" LCD screens now in widest distribution can't be viewed at angles greater than 30 degrees from straight-on. What's more, their contrast is worse than that of cheap newsprint.

All LCDs are based on liquids whose molecules share an ability to line up like iron filings when charged with a certain level of voltage (referred to as the *threshold voltage*). Viewed through polarizers that encase the liquid, the energized crystals appear dark.

In small displays such as those in watches and calculators, each of the elements that form numbers can be connected directly to a power source so that controlling them is straightforward. But for the larger displays that personal computers require, this method is too cumbersome. Instead, a technique called *multiplexing* is used to deliver current to discrete points on the screen–the equivalent of pixels on a CRT.

In a multiplexed LCD, small lines of current are switched on and off along the screen's vertical and horizontal axes, like warp and weft threads. At the spot where two "threads" meet, their combined current excites the liquid crystals into lining up, and this spot appears dark, like an intersection in a plaid. To display a full screen of such intersections simultaneously is no simple matter, however, because if more than one pair of "threads" is excited at the same time, some junctions may darken unexpectedly. Multiplexed LCDs solve this problem through a complex electrical dance in which *x*-*y* pairs are stimulated one at a time and kept active by periodic refreshments of current. This method, however, is lumberingly slow, and because the impulses travel not along wires but through an excitable soup of liquid crystals, some current always bleeds into surrounding areas. This muddies contrast and blurs a high-resolution display.

Table 1: Flat display wish list

	LCD				Plasma		EL	CRT
	Twisted nematic	Cholesteric field	Supertwisted birefringence	Active matrix	AC plasma	DC plasma	ACTFEL	Flat CRT
Lightweight enough to be carried easily	●	●	●	●	○	●	●	○
Low enough power consumption to be battery operable	●	●	●	●	○	●	○	○
High enough contrast to be read under various lighting conditions and at various viewing angles	○	●	●	●	●	●	●	●
Good graphics resolution	○	●	○	●	●	●	●	○
Practical in sizes suitable for computer screens	●	●	●	○	●	●	●	●
High-speed display	○	○	○	●	○	○	○	●
Color support	○	○	○	●	○	○	○	○
Reasonable cost	●	●	●	●	○	○	○	●

● = has reached acceptable standards
● = getting close
○ = major hurdle

But change is afoot. Several new LCD technologies on the verge of production promise dramatic improvements within the next year or so, such as viewing angles of up to 70 degrees and contrast ratios of 10 to 1—nearly three times the contrast of a conventional LCD. Most of the improvements depend on new varieties of liquid crystal molecules, which align themselves more densely in response to electrical current, thus appearing darker.

One of the most promising of these developments is the *cholesteric field effect*, developed by Crystalvision of Sunnyvale, California. Now at the prototype stage, this method arranges the molecules in spiraling layers, like receipts on a spindle near a restaurant's cash register. Another promising technique is *supertwisted birefringence,* invented by Brown Boveri Research Laboratories of Switzerland. The molecules used with this technique twist 270 degrees instead of the 90 degrees common with twisted nematic displays. Both technologies offer three times the contrast of traditional LCDs. The cholesteric field effect offers resolution that equals or exceeds that of a CRT.

Also auspicious, although several years away, is the *guest-host* display, in which a dye injected into the liquid crystal medium becomes visible only when the crystal layers are at proper angles to one another. This technique eliminates the need for polarizers, the costliest element of the LCD assembly.

Toward Active Matrix LCDs

While most researchers have hunted for more effective liquid crystal compounds, some scientists in the United States and Japan have sought to restructure the way on/off signals are delivered to each pixel. One such approach, called *active matrix*, may be the ultimate answer to the LCD's woes (see Figure 1). The active matrix LCD, developed in the 1970s by Westinghouse and pioneered by Panelvision of Pittsburgh, Pennsylvania, consists of a grid of thousands of small transistor-capacitor pairs deposited on thin film, like components of an enormously magnified silicon chip. But instead of storing bits of data, each transistor functions as a pixel, darkening when current is applied and "remembering" its on or off status until a screenful of information has unfurled. Since each pixel is isolated electrically, the display is faster and crisper, potentially capable of CRT-level resolution. And because performance does not diminish as size increases, the screens could theoretically be made quite large.

Though 8- by 5-inch prototypes of active matrix displays have intrigued computer manufacturers, screens of even this size are proving difficult to mass-produce because of problems in etching large sheets of transistors. Consequently, this technology isn't expected at the forefront for another three to five years.

However, active matrix displays have already cut through the color barrier. Last year Japan's Epson introduced a 2-inch active matrix color TV of impressive brightness and resolution. Called the Elf, it is unquestionably the forerunner of larger LCD color displays.

Some analysts think that no matter how much LCDs improve, they will never measure up to their brighter, more glamorous light-emitting cousins. "LCDs will never achieve the 'viewability' standards they need for universal acceptance," says Christopher King, executive vice president of Planar Systems, a developer of electroluminescent technology. "Though LCDs will always enjoy the advantage of using less power, they have no sex appeal, as glowing screens do. You still feel like you're looking at an Etch-a-Sketch." But because they are cheaper to make, King sees LCDs dominating the home computer market while professionally oriented computers move toward plasma and EL.

Plasma

The oldest and most highly evolved of the flat-screen technologies, AC plasma panels use a grid of conductors to excite a neon-based gas mixture. Pixels are created at points where the conductors intersect. One advantage to plasma is that images remain intact without constant refreshment of current, reducing the number of electronic components needed to drive them.

A more visible asset is that the screens can be made very large—at least a meter across, with stunning resolution. When introduced at COMDEX in 1982, IBM's model 581 plasma monitor for mainframes dazzled crowds with its 11- by 17-inch, 750,000-pixel screen displaying 64 lines of 160 characters. The 3295 Plasma Monitor, a recently announced PC version of this product, offers similar size and clarity. But at a cost of $3695 and a weight of 50 pounds, it's an unlikely mate for portable computers. Though IBM has been a major figure in plasma research, industry watchers predict it won't put all its money in the plasma bank when the lap-size market takes off.

However, thanks to new Japanese breakthroughs in DC plasma, a related technology, plasma screens are now leaner and trimmer than ever and promise to be a major force in the portables market. In March, Sweden's giant Ericsson Information Systems launched the 14-pound, $2995 Ergo-Screen

Portable, whose central attraction is a lightweight plasma monitor. The monitor's 640- by 400-pixel, 2000-character display is only slightly smaller than that of a 12-inch CRT. However, the screen's 100-watt power requirement makes battery operation unfeasible.

'Though LCDs will always enjoy the advantage of using less power, they have no sex appeal. You still feel like you're looking at an Etch-a-Sketch.'

In developing the new machine, Ericsson designers questioned the mystique of battery-powered portability. "We did a lot of research on using a screen that's truly portable," says Jonas Akerman, product manager of the new Ericsson portable. "We found that businesspeople don't so much work on airplanes or trains as they carry their computers from the office to a hotel, a home, or another office. We decided we'd rather give them a screen they could really see."

GRiD Systems' new GRiDCase 3 (see Figure 2), based on a DC plasma display from another, unnamed manufacturer, has somehow captured the best of both worlds. It operates on a rechargeable internal battery for up to 2 hours, although it will run more practically on AC current. The entire system weighs 12 pounds and displays the same information as the Ericsson on a screen of about half the area—and it does so with greater clarity. If you don't care to pay $4350 for this deluxe model, two otherwise identical units with LCD screen options are offered for $2975 and $3150.

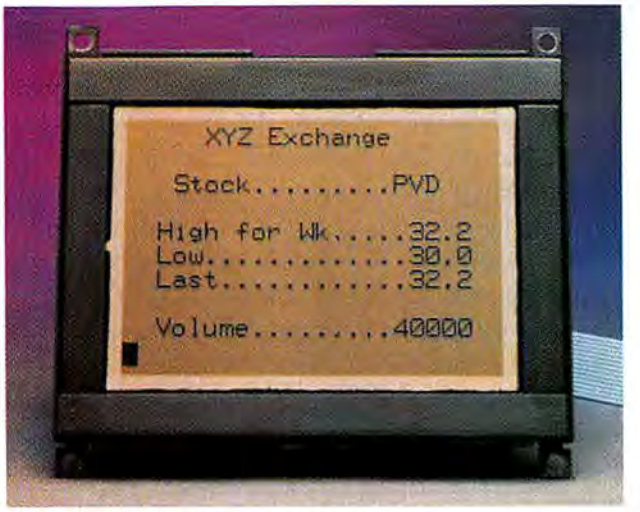


Figure 1: Panelvision's MiniGraphic active matrix display shows one of the most promising LCD technologies. Active matrix LCDs have high contrast and resolution but are hard to manufacture in computer display sizes.

Figure 2: GRiD system's GRiDCase 3 flaunts a "sexy" plasma display. New technologies are bringing plasma displays within reach of their most elusive goals: lighter weight and lower power consumption.

Electroluminescence: Plasma's Bright Challenger

Though somewhat less prominent lately, EL displays may well overtake plasma by the end of the decade. Planar Systems' Christopher King contends that EL displays will ultimately be more portable than plasma because they weigh less, are more rugged, and will eventually produce better resolution using less power.

The predominant EL display is called *AC thin film*, or ACTFEL. In this type of display a layer of phosphor (material that glows when energy is applied) is deposited between clear glass panels. Points on the surface are addressed by a matrix of conductors much like those of a plasma screen. The image is a high-resolution, luminous amber. At present the high voltage these units require restricts them to AC power, but more efficient driver electronics may allow them to appear in battery-powered portables before long. To date, the GriD Compass and the Hewlett-Packard Integral PC, a UNIX machine, are among the few computers to use these relatively expensive displays (Planar supplies them for some $800 each). But according to King, costs will drop substantially within several years. Because EL screens can't be made as large as plasma screens, however, they will probably not grab as large a share of the desktop market.

Flat CRTs: On the Horizon?

Apart from their bulk and possible radiation hazard, CRTs remain the best and most cost-effective computer displays. Last year Sony announced progress in reducing at least the bulk. Intead of beaming electrons outward from a central point behind the screen, as standard CRTs do, Sony's 4-inch flat CRT sprays them across the screen from a low angle, like a sunset over the ocean. The unit is just an eighth as deep as a conventional CRT and uses only one-third the power. Though heftier than some flat screens and lacking the average CRT's resolution, flat CRTs may eventually appear in more portables.

Long Shots and Hybrids

Further down the evolutionary pike, three Japanese manufacturers—Futaba, NEC, and Ise—are pursuing another type of display, based on *vacuum fluorescent* (VF) technology. As in CRTs, electrons stimulate dots of phosphor encased in a vacuum. When voltage reaches certain thresholds, the dots glow in one or more colors. Because of resolution problems, VF displays have so far been confined to cars and small consumer items, but advances in addressing methods are producing TV-quality resolution, with commercial application predicted by 1987.

Two lesser-known technologies show promise if current obstacles can be overcome: the *electrochromic* display, developed by Sharp, Seiko, Exxon Office Systems, and others; and the *electrophoretic* display. The electrochromic display uses a layer of salts or metal oxides that change hue as different voltages are applied. As yet, these materials can't be satisfactorily addressed as a matrix, so computer-size screens are impractical. Electrophoretic displays use a thin film of negatively charged dyes that move toward or away from oppositely charged, transparent plates of the screen. The dye particles are visible only when adhering to the front face, and they remain visible even after the power is shut off. Unstable materials and the unlikelihood of achieving full color have inhibited this research.

Perhaps the ultimate victor in the marketplace will be a hybrid of two or more technologies. Morrow Designs recently added an EL-like backlight to improve the contrast of its LCD Pivot portable, an enhancement somewhat sabotaged by the LCD's poor resolution. Active matrix technology, currently applied to LCD materials, could eventually drive a plasma display, bringing improvements in brightness and clarity. PlasmaGraphics, a New Jersey firm, recently introduced a 7.2- by 3.7-inch, 130,000-pixel

panel that combines the best features of AC and DC plasma and is brighter than either. Other researchers see a future in marrying VF or plasma displays to CRTs to obtain bigger, flatter, brighter screens with better resolution. One CRT-plasma crossbreed has been made that measures 50 inches diagonally—the very model of hybrid vigor.

Instead of beaming electrons outward from a central point behind the screen, as standard CRTs do, Sony's 4-inch flat CRT sprays them across the screen from a low angle, like a sunset over the ocean.

Several other developments, still at the early research stage, hint at an imminent shake-up not just in computer displays but in the entire information/communications industry. At this year's conference of the Society for Information Display, Matsushita engineers described a very large, high-contrast, continuous LCD made by joining small panels together. With improvement, this creation might be used for huge TV screens and animated billboards. And 3-D panels for computer modeling or videoconferencing could be created by stacking LCDs in layers.

For the more immediate future, market analyst Kenneth Lim of Dataquest sees the steady trickle of new technologies broadening into a river of new products. "I don't think they'll all appear at the same time, and they'll come out at different price and performance levels that may not compete directly with one another," he suggests.

Should you delay buying a portable in the hope of dramatic improvements soon? If you have no pressing need for a portable computer, you might want to wait until the products themselves convince you it's time to buy. You won't see 12-inch color LCDs or battery-powered EL screens very soon, but they're in the works. Lim gives this advice: "Anyone buying a portable computer now should not ask, Is this machine going to have an obsolete display? but, Does it do useful work, and will it pay itself off before the next generation comes out?" ●

Janet Goldenberg is a freelance writer in San Francisco. Karl Koessel is the Technical Editor at PC World.

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Using Framework doesn't necessarily mean forgoing your tried and true stand-alone programs. With Framework's DOS window and a FRED program, you can have integration your way.

William Urschel

Familiarity sometimes breeds devotion. Witness the success of *WordStar*. It isn't the Gucci of word processors, but like an old shoe, it's comfortable, it gets you there, and it does things many programs can't. The same can be said for *PC-Talk III*, *dBASE II*, and a host of other software veterans. With the arrival of integrated upstarts such as *Framework*, *Symphony*, and *Electric Desk*, the user's life took a turn for the better. Common applications–word processing, spreadsheets, data management, graphics, and communications–all work in the same environment, sharing commands and data. Disk swapping and data conversions are reduced or eliminated. And once you master one application or module, you can move on to others with relative ease.

But even the most accomplished integrated programs stumble in one area or another. *Symphony* devotees admit its word processor is second-rate; *Framework*'s data base is fast but is limited to a meager 700 records. Unfortunately, with most integrated programs what you buy is what you're stuck with.

Not so with *Framework*. Not only can *Framework* use data files produced by external programs, it can actually run those programs without straying far from its convenient desktop. This partnership gives you the best of both worlds, combining the special talents of your stand-alone program with the coherence and speed of *Framework*. You can achieve this level of integration in two ways. One method uses *Framework*'s DOS window, a Disk menu option that lets you slip into DOS, run external programs, and then return to *Framework*. The other approach brings an outsider more intimately into the *Framework* environment with the aid of a FRED program. Under FRED's aegis, for example, *WordStar* can appear in *Framework*'s Disk menu and be run from the desktop. Best of all, you need not quit Framework (and later reload it) to use an external program. While this isn't the highest form of integration, it bridges a gap few other integrated programs can.

DOS in a Window

The simplest way to run an external program with *Framework* is through a special frame called a DOS window. The only requirement is that COMMAND.COM be present on *Framework*'s second program disk, in drive A:. To open a DOS window, select an existing text frame, or create a new text frame with the Empty/Word Frame command from the Create menu. (*Framework* asks for confirmation before proceeding, however, because it empties the frame's contents.) Open the Disk menu and choose DOS Access; the drive spins for a second, and the A> prompt appears.

For all intents and purposes you are now in DOS. You can use COPY, DIR, FORMAT, CHKDSK, and other DOS commands or slip a program disk into drive A: and run it. (When using a memory-resident program, such as *SideKick*, you must load that program first and then load *Framework*.) Typing *EXIT* at the DOS prompt returns control to the *Framework* desktop.

Although using a DOS window is simple, you must bear a few rules in mind. Once you enter a DOS window, you cannot enlarge or zoom a frame with *Framework* commands. If you want to dedicate the entire screen to DOS or an application, you must create a frame and press <*F9*> (Zoom) to enlarge it before selecting the DOS Access option. Memory is also a limiting factor: *Framework*, all the frames currently on the desktop, and the external application being run must fit into available memory. A realistic minimum is 384K. If you come up short, one quick remedy is to close unnecessary frames on the desktop and store them to disk.

Memory is a limiting factor: Framework, *all the frames currently on the desktop, and the external application being run must fit into available memory.*

Like *TopView*, *Microsoft Windows*, and similarly dedicated software integrators, *Framework* is most hospitable to programs that use DOS for screen display. Programs that ignore DOS and write directly to the screen, such as *1-2-3* or *WordStar*, cannot reside with other frames on the desktop and will monopolize the entire screen. Such programs yield control to *Framework* only when the DOS window is closed.

Once you have closed the DOS window, the result of your work can be imported to *Framework* in two ways. If the external program produces ASCII files–minus control characters and other program-specific impedimenta–merely load the desired file like any other *Framework* file. *WordStar*, *1-2-3*, *dBASE II*, or DIF formatted files can be converted with one of *Framework*'s utility programs. Be aware that no single *Framework* frame can exceed 32K; *Framework* automatically stores imported data in a number of 8K child frames, which are contained in a parent frame.

A more convenient, albeit limited, method is to funnel data contained in the video buffer to *Framework*. The default buffer setting is either 2K or 4K, depending on the version of *Framework*. You can increase the buffer size up to 32K simply by changing the value at the DOS ACCESS line in *Framework*'s CONFIG.FW file. The next time *Framework* is run, the buffer will reflect the new setting. Because data sent to the screen is always in ASCII form, grabbing data in this manner eliminates file conversion problems. This data transfer method won't work with unrepentant programs such as *1-2-3* and *WordStar* that eschew DOS's display routines and put nothing in the buffer.

The Frame Game

Though the DOS window provides ersatz integration, a relatively short FRED program written using the @RUN function can turn stand-alone programs into members of an extended family. While such integration is hardly seamless, the external program can occupy the desktop, appear in menus, and conveniently run within *Framework*.

The obvious example of this approach is *Mite, Framework*'s communications module. *Framework* was not designed with communications in mind, but Lotus Development's release of *Symphony* spurred Ashton-Tate to match its competitor. Instead of reprogramming *Framework*, Ashton-Tate bought the rights to *Mite*, an existing stand-alone telecommunications program, and stitched it onto *Framework* with a FRED program.

Attaching a program with FRED has distinct advantages. For example, if you are not using *Mite*, you can remove it from the desktop and emancipate some memory. More important, if you want to use another telecommunications program–*PC-Talk III* because you know and love it, *Crosstalk* for its superior scripting abilities–you can simply replace *Mite*.

Though you needn't be a programming expert to use this technique, it helps to understand how FRED links *Mite* to *Framework*. Installing *Mite* involves running the INSTCOM.BAT file on *Framework*'s first program disk. The file directs *Framework*'s configuration file, CONFIG.FW, to insert the

```
;UTIL.FW. FRED comments are always preceded by a semicolon.

@if(@memavail < 20000,
    @list(
        @prompt("Insufficient memory for external programs "),
        @return(0))),

@echo(#off),

@set(UTIL.System_drive, "A:"),


@local(original_selection),
original_selection := @setselection("UTIL"),

@performkeys("{scroll-lock}"),
@if(@setselection = "UTIL",
    @list(
        @echo(#on),
        @prompt("  Run the external programs though the DISK menu "),
        @return(0))),

@UTIL.Alternatives Menu,

; exit
@iserr(@setselection(original_selection)),
@echo(#on)
```

Listing 1: The FRED program UTIL.FW incorporates external programs into Framework. This portion of code is contained in the UTIL frame.

label 'Telecommunications' in place of 'Utilities' at the Disk menu, and to load the FRED program UTIL.FW. When you select 'Telecommunications' the UTIL.FW menu is displayed. Choosing 'Mite Main Menu' directs UTIL.FW to load and run *Mite*. When the *Mite* session ends, control returns to UTIL.FW; from this point you can return to the *Framework* desktop.

The FRED program in this article (see Listings 1, 2, and 3) grafts *WordStar* and *PC-Talk* onto *Framework* in much the same way UTIL.FW links *Mite*. Since UTIL.FW is the only FRED program name the *Framework* Disk menu recognizes, remember to name this FRED program UTIL.FW and give the *Mite* version of UTIL.FW the name UTIL.BAK.

FRED Frame by Frame

Integrating *WordStar* and *PC-Talk III* with *Framework* uses six frames (see Figure 1). The parent, or containing, frame labeled UTIL holds two child frames, Alternatives Menu and System Drive. The Alternatives Menu frame in turn contains the frames called PC-Talk III, WordStar, and Return to Framework, which house appropriate swatches of FRED code. The System Drive frame, which is referenced by UTIL.FW, contains the letter (and path, if necessary) of the drive where external programs are stored.

Like any *Framework* formula, the UTIL.FW code is entered at the frame border (see Listing 1). From a blank *Framework* desktop, issue **< Ctrl > -C < Enter >** to create an empty frame; type **UTIL** and press **< Enter >**. This operation labels the frame. To label other frames–WordStar, PC-Talk III and so on–follow the same procedure. To enter the FRED code contained in the border of UTIL, press **< F2 >** (formula edit) and then **< F9 >** (zoom). This sends the cursor to the edit line at the bottom of the frame and expands the line to fill the screen. After you've typed in the code, press **< Esc >** to end the session and return the UTIL frame to the screen. Save the frame on *Framework*'s system disk number two. (For further information on frames and *Framework*, see "Framework: Simplicity and Synergy" and "Frame by Frame," *PCW*, Vol. 2, No. 12.)

To create the Alternatives Menu frame and the System Drive frame within UTIL, press **< GrayPlus >** and repeat the sequence for creating a new frame. Type in the formula **@menu(Alternatives Menu)** in the Al-

Listing 2: This FRED program in the border of the PC-Talk III frame calls PC-Talk III from the Framework desktop.

```
; PC-Talk III

@local(output, echo, command, error_code),

command := System_drive & "PC-Talk.EXE ",

;run PC-TALK III

@isabend(#false),
error_code := @run(output, command),

@if(error_code = 2,
    @list(
        echo := @echo(#on),
        @beep,
        @eraseprompt,
        @prompt("Program file " & command & " not found.
           (Hit any key to continue)"),
        @nextkey,
        @echo(echo),
        @return(0),
    @if(@and(error_code <> 0, error_code <> 2),
    @list(
        echo := @echo(#on),
        @beep,
        @eraseprompt,
        @prompt("Operating System Error Code " &
           @integer(error_code) & " using "
           & command & "     (hit any key to continue)"),
        @nextkey,
        @echo(echo)),
@return(0))
```

```
; WordStar

@local(output, echo, command, error_code),

command := System_drive & "WS.COM ",

;run WordStar

@isabend(#false),
.
.
.

        @nextkey,
        @echo(echo)),
@return(0))
```

Listing 3: This program in the border of the WordStar frame is identical to Listing 2, except for program references to WordStar.

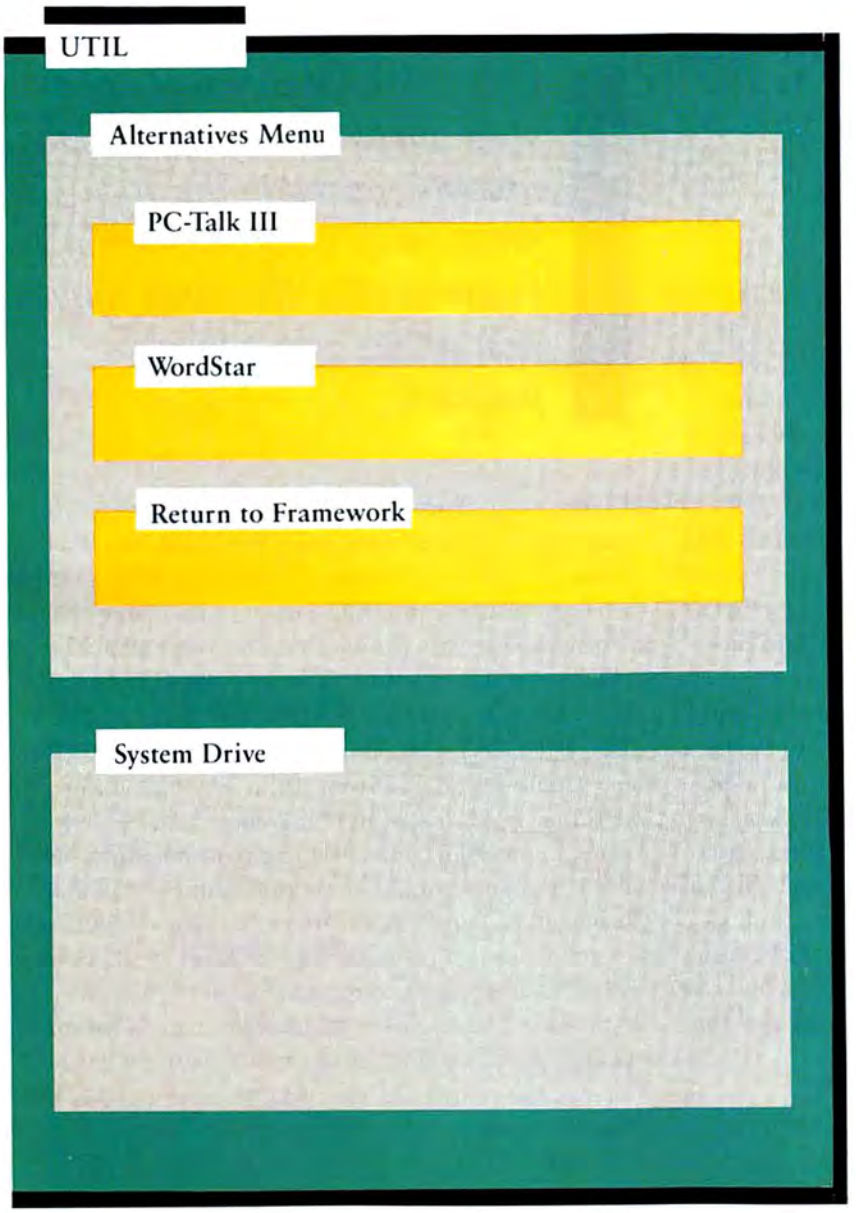

Figure 1: In Framework, frames contain other frames. UTIL is the master frame that contains all others as well as portions of the FRED program. Alternatives Menu and System Drive frames are siblings; the former holds three frames, which contain FRED programs and text; the latter holds the disk drive reference.

ternatives Menu frame border; inside the System Drive frame, simply type **A:**. The process for creating the PC-Talk III, WordStar, and Return to Framework frames within the Alternatives Menu frame is the same. Since the code for the PC-Talk III and WordStar frames is nearly the same (see Listings 2 and 3), you can save time by typing in the code for one frame and copying it to the other, changing only the name of the program referenced and the one-line prompt. For the Return to Framework frame, simply enter the formula **@quitmenu**.

The only text that actually resides inside these three frames is program prompts. Type each of the following prompts into its related frame: **Place the PC-Talk III program disk in drive A:**, **Place the WordStar program disk in drive A:**, and **Resume working on the Framework desktop**. Again, remember that formulas and FRED programs are entered in the frame border; data occupies the frame.

Code by Any Other Name

The FRED code that ties *WordStar* and *PC-Talk III* to *Framework* is relatively uncomplicated. The first four lines of code in Listing 1 determine whether your PC has sufficient memory to store the *Framework* desktop while running an external program. Subsequent code turns off screen echo, sets the default drive to A:, tracks the original frame (UTIL), and shields the program from *Framework*'s RECALC command. This last action provides consistency, since it forces all external programs to run from the Disk Menu. Not surprisingly, **@UTIL.Alternatives menu** displays the Alternatives menu.

In Listings 2 and 3, the first two lines of code identify the external program being run and the local variables (output, echo, command, and error code) defined for that frame. The remainder of the code is primarily an error-trapping routine that checks for absent files and an unreadable program disk. The latter condition may be caused by a disk that is unformatted, damaged, or formatted by another operating system. When an error occurs, the PC beeps, an error message pops up, and control returns to the desktop.

Using WordStar and PC-Talk III

When you select 'Telecommunications' or 'Utilities' from the Disk menu, the Alternatives menu appears. Depending on your program choice, you are asked to insert a *PC-Talk III* or *WordStar* disk into drive A:. This disk swapping is eliminated if you place the external programs and COMMAND.COM on the same disk and set the overlay option in CONFIG.FW to *true*, or if you store all the programs on a hard disk.

Since *PC-Talk III* generates clean ASCII files, *Framework* can use its output directly. *PC-Talk III*'s parameter files, .DEF, .KEY, and .DIR, are manipulated within *PC-Talk III* and are not dealt with by UTIL. Using *WordStar* from *Framework* takes a bit more effort. Documents created in the document mode (D) contain *WordStar*'s notorious 8th bit, hard carriage returns, and other hidden formatting characters and must pass through *Framework*'s *WordStar* conversion utility before they are palatable. This utility is actually two files, WS2FW.FW and WS2FW.COM. On a dual floppy system, the .COM file should reside on drive A:, the .FW file on the desktop. Files created in nondocument mode (N) pose no problems. However, control characters and dot commands should be stripped out beforehand, using either *WordStar*'s search and replace function or a public domain program such as WS-DOS.BAS (see WS-DOS.BAS in *Listings* at the back of this issue). Note that *Framework* sets the right margin for imported *WordStar* documents at 165; you can easily change the setting with the Margin command at the Words menu.

Using WordStar *from* Framework *takes a bit of effort. Documents created in the document mode must pass through* Framework's WordStar *conversion utility before they are palatable.*

Passing data from *Framework* to an external program requires the services of the 'Write DOS Text' option from the Disk menu. This program transforms *Framework*'s native file format into ASCII.

Fine Tuning

As noted, to access *WordStar* or *PC-Talk III* you must select either 'Telecommunications' (if you previously installed *Mite*) or 'Utilities'. To create a more appropriate listing on the Disk menu, open CONFIG.FW (stored on system disk number 2), and scroll to the fourth line from the bottom of the listing. At UTIL_NAME, replace 'Telecommunications' with a label such as 'External Programs', close the frame, and save CONFIG.FW. Since *Framework* allows a program option to be selected by typing its first letter, make sure this label doesn't conflict with others in the menu.

At some point, you will undoubtedly want to tie other programs to *Framework*. The tinkering involved is modest; copy the contents of either the PC-Talk III or WordStar frame into an empty frame, and insert the program file name in the second line of code. Thus, to add *WordPerfect* to *Framework*, you would type *command := System_drive &* *"WP.EXE"*,. Naturally, you should change menus and comment lines to reflect the new program.

You can further streamline this ad hoc form of integration by automating certain functions with FRED. You could, for example, rig *Framework*'s conversion programs to automatically transform *WordStar* files after a *WordStar* session. While you'll never achieve seamless integration with FRED, you can conveniently use *Framework* with all the programs in your library—and keep your costly software investments working.

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Framework
Ashton-Tate
10150 W. Jefferson Blvd.
Culver City, CA 90230
213/204-5570
List price: $695
Requirements: 256K (384K with Mite), two disk drives

Transfer of Power

Keys to Simplicity
Menu-Making Tips
Status Conscious
Forever Making Menus

If you've tricked up your favorite application program with batch files and keyboard macros, Keyworks menus will take your handiwork another step. With this new keyboard enhancer you can convert customizations into a turnkey system and pass that power on.

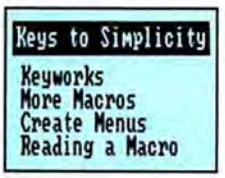
Harry Miller

If you've been computing for a while, you've probably received kudos for some particularly elegant shortcut, followed by a respectful, How'd you do that? There's an excellent chance that you "did that" with a keyboard macro, sometimes in combination with a batch file. And although such tools make complex routines look easy, the glamour disappears when you explain that to protect the contents of a work file on a RAM disk, for example, you press <Alt>-<F9>, invoking a macro that jumps to the beginning of the file, marks the block beginning, jumps to the end of the file, marks the block end, saves the marked block as a file called Temp on the floppy drive, and returns the cursor to where you were editing last. So while the macro reduces 30 or more keystrokes to 2, explaining or documenting its operation is often just too much trouble. Until now, only you have been able to tap the power of your software; features that others would find useful lay hidden behind your idiosyncratic tinkering.

Keys to Simplicity

To date, only one keyboard macro program enables you to share the sophisticated simplicity that you've worked so hard to develop: *Keyworks*, from Alpha Software. The program lets you create descriptions up to 20 characters long of the macros at your disposal, then helps you build pop-up lists or moving-bar menus of those descriptions. As in all keyboard enhancers, macros can call other macros, and menus can call other menus. *Keyworks* also enables you to create pop-up text windows that can be used as context-sensitive help screens (see Screen 1) or to instruct others in program fundamentals (see Screen 2). Listing 1 contains the macros that created Screens 1 and 2.

Keyworks extends the maximum number of macros beyond the usual mix of keys and key combinations. You can create additional macros numbered 1 to 255, which carry their numbers as individual IDs. It is possible to invoke them by pressing <Alt> and typing the appropriate number on the numeric keypad; in actual use, however, these macros will most likely be displayed in a menu or called by another macro. The use of numbered macros leaves the simpler key combinations free for macros you define "on the fly" within an application program. You can record macros by using a Learn mode, in which *Keyworks* remembers keystrokes as you enter them, or you can create macros in the program's pop-up macro editor.



The ability to create menus whose entries describe and invoke these macros (along with help screens that explain the macros) enables you to fashion complex systems of macros and batch files that any user can control with a simple moving-bar menu.

Reading a Macro

Keyworks macros are stored as straight ASCII files and can thus be edited with any text editor. Each macro takes the form

{{*macro id*}<*description*>
... *keystrokes* ...

The double opening curly brackets signify the beginning of a *Keyworks* macro, the angle brackets delimit the description, and the keystrokes to be played back follow the angle bracket that closes the description.

Special keys or keystroke combinations are delimited by opening and closing curly brackets, as in {AltF1}, {CapF1}, or {CtrlPgDn}. *Keyworks* command words, such as {Menu}, {Text}, {Clear}, and {Bell}, are also set off by curly brackets.

Text contained between two delimiting {Text} commands will be displayed in a text window. Macro IDs contained between two {Menu} commands will be displayed in a pop-up menu along with their corresponding descriptions. An {Idoff} command between {Menu} commands causes the menu to display only the descriptions.

Menu-Making Tips

Keyworks enables you to play programmer without requiring you to mine the computer's resources at the bits and bytes level. Although the application program does the real work, your macro system is likely to get most of the credit. Simple as macro creation may be, it's still good practice to follow some conservative and efficient programming techniques.

In developing a turnkey system, take a top-down approach. Define the largest, most general function of the system first, then develop the collection of tasks that will perform that function. Finally, fill in the blanks by determining how each task will be accomplished.

Start creating your system by thinking of it in three phases: input, manipulation, and output. That is, determine how the data should be entered, what the system should do with the data, and what form the reports should take.

Create the menus before you create the macros that execute the menu options. You can use *stub* text in a text window macro to convey something like, This part of the system's not ready yet. I reserve {255} for that purpose (see Screen 3 and Listing 2)and begin each system by assigning {255} to every menu choice, but any number will do. This approach enables you to create and test each macro in turn until all menu options work.

Delay installation of the {Idoff} commands until the system is almost complete. Displaying macro IDs on the menus makes editing and debugging the macro file that much easier.

As you create and edit the system, keep the macro IDs in order. I prefer the following sequence: function keys, <Alt>-function keys, shifted ({Cap}) function keys, <Ctrl>-function keys, <Alt>-key, <Ctrl>-key, and finally numbered macros, but feel free to use any order you like. A logical order simplifies accessing macros when using the List Macros function, which displays a menu of all macro key assignments according to their order in the macro file. A consistent sequence also allows you to use the List Macros window as a cross-reference to the macro file. For example, you may need to know whether you've already created a macro for <Alt>-A, or whether the macro you want is <Alt>-M or <Alt>-N. Order is a boon to macro file editing as well.

In each submenu, create a means of returning to the main menu or the next highest menu. That way, any user will easily be able to maneuver through the menu tree you've created. You can simply include the macro ID of the higher-level menu as a selection on the submenu. In our example later on, the Edit menu includes macro ID {10} as a way of returning to the main menu.

You can also choose a macro from a moving-bar menu by typing the first letter of your selection. Write your menu descriptions accordingly, ensuring that items on any given menu have

```
{{100}<Call me for help    >{Text}{1,1,4,60}{Clear}Yes, you
 really are hopelessly lost.\Call Harry at x 275 and he'll
help you straighten it out.{Text}{FixPause}{1}{Restore}

{{101}<Damned if you do... >{Text}{1,1,3,60}{Clear}Press an
y key to format hard disk\{Text}{FixPause}{1}{Restore}
```

Listing 1: Macros to create text windows for customized help screens or instructions

```
{{255}<Stub       >{Text}{1,1,3,60}Harry sez:  Sor
ry, this feature's not here yet{Text}
```

Listing 2: A text macro can be used to display dummy text during system development.

```
Yes, you really are hopelessly lost.
Call Harry at x 275 and he'll help you straighten it out.
```

Screen 1: A text window macro can be used for context-sensitive help.

```
Press any key to format hard disk
```

Screen 2: Text windows can also provide customized instruction windows.

```
Harry sez:  Sorry, this feature's not here yet
```

Screen 3: Stub, or dummy, text can be defined as the result of any macro that is still under development.

unique first letters. If choices begin with the same letter, *Keyworks* will invoke the macro for the choice listed first.

At the same time, make every effort to order choices logically. One suggestion is to list the more frequently used options higher on the menu. Alternatively, you might want to place commonly used macros at the bottom of a very long menu, taking advantage of the revolving nature of *Keyworks* menus (when you move the bar to the bottom of a menu, it jumps to the top).

Creating macros or parts of macros using the Learn mode (by selecting 'Record a Macro' from the *Keyworks* menu) may prove to be a real time-saver. The program's built-in editor makes it easy to construct new macros from existing ones. You might use a standing macro ID, such as {254}, to test part of a macro; once you've got that segment working smoothly, use the editor to copy it where you want it.

Status Conscious

PC World's article-status tracking procedure illustrates some simple techniques you can use to create a turnkey system. Manuscripts are monitored via a *1-2-3* spreadsheet according to author, editor, section, and so on. Each article's progress is tracked throughout the editing process. In the planning stage, features tend to be shifted according to pending issues; those changes must be reflected on the spreadsheet. Each article is allocated a certain amount of space, and illustrations are noted on the spreadsheet and coordinated with the art department.

This tracking application involves functions that can be separated into five menus, unified by a main menu (see Figure 1). The Main Status menu, summoned with {AltF10}, can call the Edit, Cosmetics, Reports, or Disk Access menus, or it can bypass them all and jump directly to data entry. The Main Status menu macro (see Listing 3) includes the macro IDs of the submenus. The specification {2,5} immediately after the first {Menu} command tells *Keyworks* to display the Main Status menu starting at row 2, column 5 of the screen. The {Title} command dis-

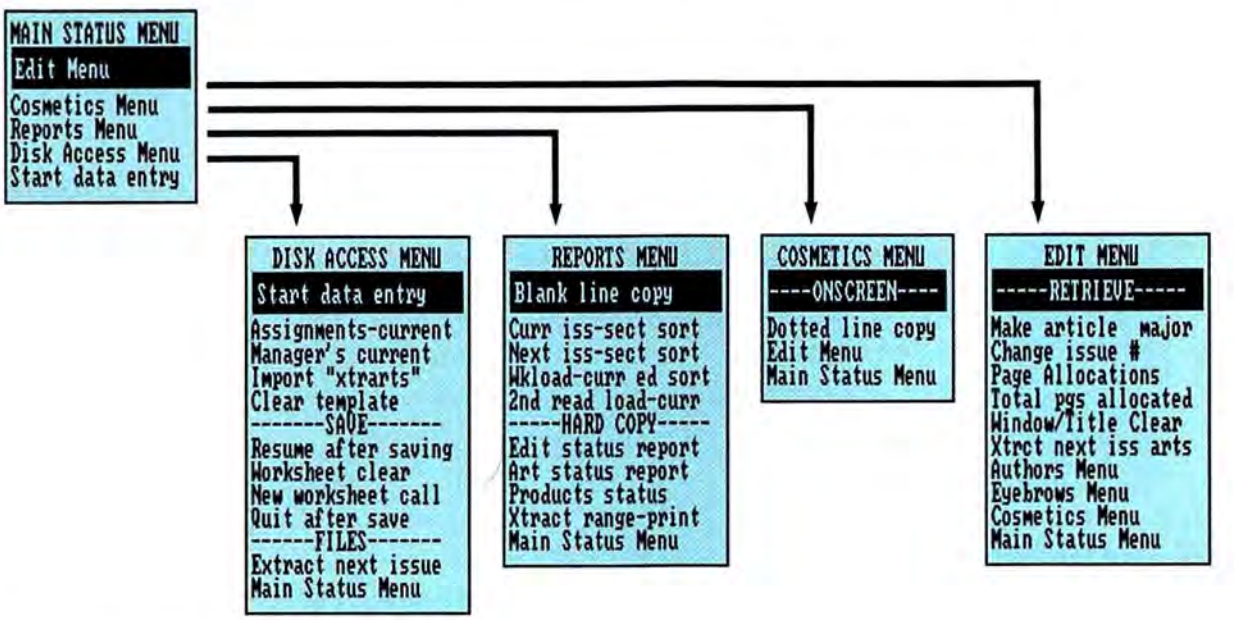


Figure 1: The status-tracking system menu tree. Notice that each subsidiary menu (Edit, Cosmetics, Reports, and Disk Access) has a selection that returns the user to the main menu.

plays the text that comes between it and the backslash as a menu title. Menus can also have footers.

The five <Alt>-key macros in Listing 3 enable you to access submenus directly by pressing <Alt> and the first letter of the menu selection. You could eliminate these five macros by using a text editor to search and replace every occurrence of numbered macro IDs with <Alt>-*initial letter* once the system is complete. However, cross-referencing by numbers in the system development phase is much easier.

Menu macros can provide consistent data entry, a practice of particular importance with data that is subject to searches or sorts. Screen 4 lists the first names of some regular *PC World* authors according to the format used on the magazine's status sheets. When one of these names is selected, the macro responds by typing out the full name (see Listing 4).

Screen 4: Consistent data entry is assured when the desired text is selected from a menu.

```
{{AltF10}<Main Status Menu     >{10}

{{10}<Main Status Menu     >{Menu}{2,5}{IdOff}{Title}MAIN ST
ATUS MENU\{2,8,9,3}{Menu}

{{2}<Edit Menu             >{Menu}{2,25}{IdOff}{Title}EDIT ME
NU\{30,20,24,25,28,26,27}{AltA}{AltW}{Al tC}{10}{Menu}

{{3}<Disk Access Menu      >{Menu}{2,55}{IdOff}{Title}DISK AC
CESS MENU\{160,161,162,163,164,168,169,170,17 1,172,175,176,10}
{Menu}

{{8}<Cosmetics Menu        >{Menu}{2,55}{IdOff}{Title}COSMETI
CS MENU\{100,103,106,2,10}{Menu}

{{9}<Reports Menu          >{Menu}{2,35}{IdOff}{Title}REPORTS
 MENU\{130,131,132,133,134,140,141,142,1 43,144,10}{Menu}

{{AltC}<Cosmetics Menu       >{8}
{{AltD}<Disk Access Menu     >{3}
{{AltE}<Edit Menu            >{2}
{{AltM}<Main Status Menu     >{10}
{{AltR}<Reports Menu         >{9}
```

Listing 3: Macros to create the menus in Figure 1. When a macro ID is listed between {Menu} commands, the corresponding description appears as a choice on the menu.

```
{{AltA}<Authors Menu         >{Menu}{IdOff}{Title}AUTHORS ME
NU\{200,201,202,203,204,205,206,207,208, 220,2,10}{Menu}

{{200}<Harry                 >Miller, Harry{Enter}

{{201}<Ken                   >Greenberg, Ken{Enter}

{{202}<Robert                >Luhn, Robert{Enter}

{{203}<Karl                  >Koessel, Karl{Enter}

{{204}<Darcy                 >DiNucci, Darcy{Enter}

{{205}<Cindy                 >Hamburger, Cindy{Enter}

{{206}<Mark                  >Hall, Mark{Enter}

{{207}<Wes                   >Nihei, Wes{Enter}

{{208}<Christine             >Whyte, Christine{Enter}

{{220}<More authors          >{Menu}{IdOff}{Title}MORE AUTHOR
S MENU\{214,218,219,2,10}{AltA}{Menu}
```

Listing 4: Macros for the Authors menu. The text following the description will be typed out in response to a menu selection.

Branching

You can embed a small menu within a text window and simulate a branching effect based on the user's choice (see Screen 5). In our example, the text window prompts the user to verify the cursor's position; if the cursor is not in position, the menu provides an option to cancel the current macro. In Listing 5, note the relative screen positions of the text macro ({20}) and the menu macro that it calls ({21}).

The Proceed option starts the execution of macro {22}. In this case, the macro marks as a lead story the magazine article whose title is at the cursor position. The macro edits the title cell (by adding five asterisks to the title), then moves to the right to edit the formula that converts disk file size (in kilobytes) to an approximate page length. (After invoking <F2>, *1-2-3*'s edit key, the macro backspaces three times and inserts the digits 600 in place of the previous number.)

You can rely on this same branching technique to provide more detailed instructions for complex menus or to map a multitude of paths anywhere in the system.

```
{{20}<Make article  major >{Text}{1,4,7,60}Be sure that the
 cursor is in the Title field\Then press the [Enter] key\\I
f the cursor is not in the Title field,\select "Cancel"\\{Text}
{21}
{{21}<                      >{Menu}{3,48}{IdOff}{22,23}{Menu}
{{22}<Proceed               >{F2}*****{Enter}{Rght}{Rght}{Rght}
{Rght}{Rght}{Rght}{Rght}{Rght}{F2}{BkSp} {BkSp}{BkSp}600{Enter}
{{23}<Cancel                >{PgDn}{PgUp}
```

Listing 5: Macro to create Screen 5. Macro {20} creates the text window and calls macro {21} to create the menu within it. Macros {22} and {23} are the actions that result from the menu selections.

```
Be sure that the cursor is in the Title field
Then press the [Enter] key

If the cursor is not in the Title field,
select "Cancel"
                                  Proceed
                                  Cancel
```

Screen 5: A small menu positioned within a text window provides a simple user interface for a branching decision point.

```
{{100}<Blank line copy      >{110}{101}
{{101}<                     >{Menu}{3,48}{IdOff}{102,23}{Menu}
{{102}<Proceed              >/cBLANKLINE{Enter}{Enter}
{{103}<Dotted line copy     >{110}{104}
{{104}<                     >{Menu}{3,48}{IdOff}{105,23}{Menu}
{{105}<Proceed              >/cDOTLINE{Enter}{Enter}
{{110}<Text prompt          >{Text}{1,4,7,60}Be sure that th
e cursor is in column A\Then press the [Enter] key\\If the
cursor is not in column A,\select "Cancel"\\{Text}
{{23}<Cancel                >{PgDn}{PgUp}
```

Listing 6: Macro {110} is called by both {100} and {103} to avoid duplication.

```
Be sure that the cursor is in column A
Then press the [Enter] key

If the cursor is not in column A,
select "Cancel"
                                  Proceed
                                  Cancel
```

Screen 6: Macros {100} and {103} both call macro {110}, which displays this text window. Then different macros are called to display the small menu within the text window. Although the menus look the same, the results of a Proceed choice will differ.

Nesting

Because one macro can call another macro (or for that matter, any number of macros), a macro can serve as a subroutine for any other macro in the file. You can even develop a standard library of macro subroutines and store them in a separate disk file. The library can then be copied into (*appended to*, in *Keyworks* jargon) any macro file.

Listing 6 illustrates the simplest way to nest macros and avoid retyping text for a text window. Macro {110} generates the same menu text whether you copy a blank formatted line or a dotted line; similarly, selecting Cancel ({23}) as a response to either text prompt invokes the same result. In addition, the Cancel macro is identical to the branching example used earlier in this article.

Macros {100} and {103}, which copy a blank line and a dotted line, respectively, both call macro {110} to display the text screen first (see Screen 6). The difference lies in the results of a Proceed selection ({102} copies a blank formatted line, while {105} copies a dotted line).

Reports on the Run

Maintaining macros that are independent of a given worksheet—unlike the *1-2-3* practice of creating worksheet-dependent macros—enables you to save and load several worksheets with a single macro. In Listing 7, macro {143} saves the worksheet in its

```
{{143}<Products status     >{169}{F5}sect{Enter}/wdc{Enter}
{Rght}{Rght}/wdc{Rght}{Rght}{Rght}{Rght} {Rght}{Rght}{Rght}{Rght}
{Rght}{Rght}{Rght}{Rght}{Rght}{Rght}{Rgh t}{Rght}{Rght}{Rght}
{Enter}/pprPRODSTAT{Enter}oml10{Enter}mr 232{Enter}s\015{Enter}
qagpq/wey/fr{Lft}{Enter}

{{169}<Resume after saving >/fs{Enter}r{Enter}
```

Listing 7: Macro {143} saves the current worksheet, deletes a large group of columns, prints the resulting range, and reloads the worksheet as it was before the columns were deleted.

Listing 8a: DOS.KW

```
{{1}<System Main Menu    >cd\{Enter}{AltF10}

{{AltF10}<System Main Menu    >{Menu}{IdOff}{100,101,102}
{Menu}

{{100}<1-2-3 status sheets >stat123{Enter}

{{101}<1-2-3               >load123{Enter}

{{102}<WordStar            >c:{Enter}cd\text{Enter}ws{Enter}D

{{103}<PC-Talk             >c:{Enter}cd\talk{Enter}pc-talk{Enter}
{Enter}{AltD}
```

Listing 8b: LOAD123.BAT

```
keyworks lotus.kw{1}
```

Listing 8c: LOTUS.KW

```
{{1}<Start 1-2-3        >a:123{Enter}{Enter}/fr
```

Listing 8d: STAT123.BAT

```
keyworks status.kw{1}
```

Listing 8e: STATUS.KW

```
{{1}<Start 1-2-3 Status>a:123{Enter}{Enter}/fdC:\STATUS{Enter}/fr
```

Listing 8a-e: Macros {100} and {101} in file DOS.KW call batch files that load new macro files and immediately execute macro {1} in either file. Macro {1} loads 1-2-3 and executes the appropriate program commands to select files or to change directions and then select files.

current form, then deletes several columns to create a greatly condensed print range. The macro's next set of *1-2-3* commands specifies the left and right margins and the printer setup string and prints the range. The macro then erases the altered worksheet and retrieves the last file saved; the macro's movement of the cursor to the left from the File Retrieve file list highlights the last file saved.

DOS-Level Start-Up

Once you've got your system working smoothly, you can jazz it up (or make it foolproof) by calling the application program from a DOS-level *Keyworks* menu (see Screen 7). Such menus are particularly useful in moving through subdirectories on a hard disk and enable you to jump right into an application, bypassing opening logo screens.

Notice that in the macro file DOS.KW (see Listings 8a, 8b, 8c, 8d, and 8e) the *PC-Talk* macro includes an extra {Enter} to bypass the opening logo screen and an {AltD} to call up the dialing directory. Thus, when you select *PC-Talk*, the macro situates you directly at that spot in the program where you'll begin working. The *1-2-3* macros employ similar commands. One menu choice simply loads *1-2-3;* the other loads *1-2-3* and switches default directories.

```
1-2-3 Status Sheets
1-2-3
WordStar
PC-Talk
```

Screen 7: A simplified DOS-level menu. Any selection will bypass any opening logo screens.

Forever Making Menus

As you can see, creating menu-driven systems is relatively easy; the pop-up, moving-bar menu is generally unobtrusive; and the program's potential for helping you help other PC users is great. While this article focuses on transferring your expertise to others, don't minimize the program's potential for making your own computing environment more pleasant. Don't like the command structure of an otherwise useful program? No problem—make a menu. Have a system of codes to remember? Same advice. Any further questions? Just follow the instructions in Screen 2. ●

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The Fully Powered PC

The batch processing language within DOS can no longer be shrugged off as too primitive to be of much use. Here's a guide to its most impressive capabilities.

Burton L. Alperson, Andrew Fluegelman, and Lawrence J. Magid

When DOS 2.00 was introduced, many people thought its advantages over earlier DOS versions applied only to users with hard disks. They were wrong. DOS 2.00 also offers a quantum leap in batch processing capability. The newest versions of DOS provide extra flexibility in the use of replaceable parameters and the abilities to branch, loop, and call subroutines within batch files. Suddenly, batch files can turn programming somersaults.

Batch Files With a Difference

The purpose of batch files is to automate commonly used procedures. But often you may want to modify the way a procedure works at the time you call its batch file. For this contingency, DOS provides *replaceable parameters*. When you create a batch file that will have variable information, simply use a replaceable parameter variable at each point where such information will be needed. Replaceable parameter variables consist of a single percent sign and an integer (%0 through %9). When you execute the batch file, any words you type on the command line following the batch file name will be substituted for those variables.

DOS assigns the value of each replaceable parameter in sequence, according to the position of the words on the command line. The name of the batch file, the first word on the command line, is

used as the value for parameter %0. The next word on the command line is the value for replaceable parameter %1; the next is the value for replaceable parameter %2, and so on.

Consider the word processing batch file GO.BAT in Listing 1. It includes the replaceable parameter %1 in two lines: the line that calls a directory and the line that calls *WordStar*. If you were to invoke this file by typing *GO DOCUMENT.DOC*, the parameter DOCUMENT.DOC would be substituted for each %1, and the batch file would behave accordingly. Thus, the line 'DIR B:%1/W' would be interpreted by DOS as DIR B:DOCUMENT.DOC/W, which asks DOS to search for the file DOCUMENT.DOC. The line 'A:WS %1' would be interpreted by DOS as A:WS DOCUMENT.DOC. By *WordStar* convention, the command WS *filename* loads *WordStar* and then opens the specified file. *WordStar* would therefore bypass its opening menu and go immediately into document mode with the file DOCUMENT.DOC in place for editing.

Shifting Assignments

Before DOS 2.00, you were restricted to ten replaceable parameters per batch file. With the introduction of the SHIFT command, DOS 2.00 removed the ten-parameter restriction. Now the only limitation on the number of parameters is that they all fit on a logical command line. (A logical command line includes everything you type from the DOS prompt through the carriage return and may be as long as 127 characters.)

The SHIFT command can come to the rescue in DOS 2.00 by setting up a queue program without the limitations imposed by the PRINT command.

Imagine a command line with 14 elements:

A>*command w1 w2 w3 w4 w5 w6 w7 w8 w9 w10 w11 w12 w13*

You still have only ten replaceable parameter variables available, %0 through %9. The first ten words on the command line (the command itself and *w1* through *w9*) are assigned to those variables. The SHIFT command does not increase the number of variables; but each time you use it, the variable assignments are "bumped over" one position. With the first SHIFT command, the variables %0 through %9 are reassigned the values *w1* through *w10*, respectively. The value originally assigned to %0 is bumped off. Use the SHIFT command again, and the variables %0 through %9 acquire the values *w2* through *w11*.

However, the true value of the SHIFT command goes beyond getting more replaceable parameter values from the command line. The following application shows how useful SHIFT can be.

SHIFT Into Print Queuing

DOS 2.00 provides a PRINT command to set up a print queue (a series of files to be sent to the printer), but the command has at least two serious problems. First, the queue created by PRINT is limited to 10 files. Second, the

```
ECHO OFF
CLS
ECHO WORD PROCESSING UTILITY
ECHO Insert your data disk in drive B:
PAUSE
DIR B:%1/W
ECHO Make sure your file is on this disk.
PAUSE
CLS
CHKDSK B:
ECHO Is there enough work space?  Change the disk if necessary.
PAUSE
B:
A:WS %1
A:
```

Listing 1: GO.BAT

PRINT command does not recognize path names. Consequently, all the files to be printed must be in the same directory, and you have to print from that directory. (DOS 3.00's PRINT command does not have those limitations. The optional /Q: command enables you to specify the number of files—up to 32—that the queue will hold. The PRINT command in DOS 3.00 also recognizes path names.)

QUE.BAT, the batch file in Listing 2, shows how the SHIFT command can come to the rescue in DOS 2.00 by setting up a queue program (in this case called QUE.BAT) without the limitations imposed by the PRINT command. QUE.BAT is invoked with the following syntax:

QUE *filename1 filename2 filename3* ...

This batch file allows you to queue up to 62 files, depending on the length of the file names. The printout of each file begins on a new page with a header consisting of the file name and a line of hyphens.

The first two lines of QUE.BAT turn off the echo and clear the screen. The fourth line, 'A:BASICA A:FORMFEED', makes use of a simple BASIC program called FORMFEED.BAS to start the file on a new page. FORMFEED.BAS consists of the line

10 LPRINT CHR$(12);:SYSTEM

'ECHO PRINTING FILE %1' displays the name of the file currently being printed. The next three lines send output to the printer: the first sends the current file name; the second sends a line of hyphens, which is part of the header; and the third TYPEs the file's contents. All output is redirected to the printer with '>PRN'. By using the TYPE command instead of PRINT, QUE-.BAT allows you to use path names freely in file names specified as replaceable parameter values for QUE.BAT.

The ':PRINT' and 'IF NOT ZIP= =ZIP%1 GOTO PRINT' lines in QUE.BAT will be discussed later. These lines determine whether more files must be printed. If not, the batch file terminates.

It is the SHIFT command, however, that really makes this batch file work. The first time through the batch file, the value of %1 is *filename1;* all references to %1 use that value. But before the procedure in the batch file repeats, the SHIFT command is invoked, causing all references to %1 to use the value *filename2*. The third time through the batch file, %1 takes on the value *filename3*, and so on. Thus, the SHIFT command allows the batch file to pick up each file name on the command line with the use of a single DOS variable.

Branching

Another important programming feature that DOS 2.00 adds to batch processing is branching. Normally the execution of a batch file flows from the first to the last statement in the file. With branching, however, you can redirect the flow.

Branches can be conditional or unconditional. An unconditional branch uses the syntax GOTO *la-*

```
ECHO OFF
CLS
:PRINT
A:BASICA A:FORMFEED
ECHO PRINTING FILE %1
ECHO %1 >PRN
ECHO ------------------------------------------------------------>PRN
TYPE %1 >PRN
SHIFT
IF NOT ZIP==ZIP%1 GOTO PRINT
A:BASICA A:FORMFEED
```

Listing 2: QUE.BAT

bel. GOTO transfers control to the line containing the next executable command following *label*. The label can be any string of up to eight characters, prefixed by a colon. The label line can include other words; however, the label must be the first word on the line.

The conditional branch allows the batch file to choose between actions, depending on whether a certain condition is met. The command uses the syntax

IF [NOT] *condition command*

The *condition* parameter names any of three conditions for testing. It can test whether or not two string values are the same (IF [NOT] *string1* = = *string2 command*). It can test for the existence of a file (IF [NOT] EXIST *filespec command*). Finally, *condition* can test for an exit code, a new capability of DOS 2.00 (IF [NOT] ERRORLEVEL *number command*). When a program terminates, it can set a numerical value, called an exit code, that indicates the manner in which the program terminated. By checking this value with ERRORLEVEL, you can test whether the previous program terminated successfully or with an error. Although this test is potentially useful, the only programs in DOS 2.00 that produce exit codes are BACKUP and RESTORE. Unless your application involves these two commands or sets its own exit codes, ERRORLEVEL is of limited value.

The EXIST *filename* test is crippled by the exclusion of DOS 2.00 path names from the *filename* parameter. The specified file must be in the default directory or it will not be found. This limitation has been eliminated in DOS 3.00. However, even the weak IF commands of DOS 2.00 add substantially to your control over batch operations.

You can intermix DOS command line variables and the item variable of the FOR command in batch files.

The QUE.BAT batch file in Listing 2 would not work if it weren't possible to branch within the batch file. The critical line is the conditional branch instruction 'IF NOT ZIP = = ZIP%1 GOTO PRINT'. Each time the batch file reaches this point, it tests whether the string 'ZIP' is the same as the string 'ZIP%1'. If the value of %1 is *filename1*, the line finds that 'ZIP' does not equal 'ZIP*filename1*'. Consequently, control is transferred to the next executable line after the label ':PRINT', and the file is printed. The SHIFT command bumps the assignment of %1 to the next value, *filename2*. The test is then performed again, with the same outcome.

Finally, no file names remain on the command line. At this point the test finds that 'ZIP = = ZIP%1', because %1 has no assigned value. Therefore, the GOTO command is not executed, and control passes to the next line. A final formfeed is sent to the printer, and the batch file terminates.

'ZIP' is used as part of the string test because batch file conditional commands cannot compare a string to a null value. Some character or characters must be included, and the arbitrary choice ZIP is as good as any other. Also note that the replaceable variable is placed on the right side of the double equal signs. This prevents the errant behavior that occurs when the right string matches the beginning of the left string but is shorter.

Looping

The DOS 2.00 batch language also allows you to generate batch file loops. This means that, within certain limits, you can have the batch file recycle the same command with different arguments. To do this, use the syntax

FOR %%*variable* IN (*set*) DO *command*

The DOS manual tells you, "The %%*variable* is sequentially set to

each member of *set*, and then the *command* is evaluated and executed." You may find it more helpful to think of the command as follows: FOR each item IN (this collection of items) DO the action specified in the command using the items appropriately. For example, if you had to back up three files in a financial program, and you wanted to copy those files from drive A: to drive B: with a batch file, you could use the command

```
FOR %%Z IN (TRNS.DOC
   CHKS.DAT DEPS.LST) DO
   COPY A:%%Z B:
```

%%Z is a variable whose value is set sequentially to each name in the collection of items. The batch file would operate once as though instructed to COPY A:TRNS-.DOC B:. It would then operate as though instructed to COPY A:CHKS.DAT B:. Finally, it would act as though instructed to COPY A:DEPS.LST B:. Since no items would remain in the set at this point, the loop would terminate.

Listing 3 shows how the FOR command can keep track of files within the complex directory structure that is possible in DOS 2.00. For example, if you invoke this batch file, DIRALL.BAT, with the command *DIRALL *.BAT*, the batch file checks each of the 14 subdirectories listed in the FOR commands, as well as the root directories of drives A: and C:, and reports to the printer the existence of each batch file. These reports will be arranged within each of the 16 subdirectories and the 2 root directories. You would have to type 18 DIR commands, 1 for each directory, to duplicate the behavior of the single command DIRALL.

DIRALL.BAT shows that you can intermix DOS command line variables (replaceable parameters) and the item variable of the FOR command in batch files. The FOR command's item variables are identified with a double percent sign and an alphanumeric character (%%0 through %%9 and %%A through %%Z). The FOR command can also be used from the command line, in which case you must change the double percent signs preceding the letter variable to a single percent sign. For example, at the command line you would type *FOR %Z IN (A:\ B:\) DO DIR %Z* to display the root directories of drives A: and B:.

Batch File Subroutines

One of the most powerful techniques employed in programming is the subroutine, a program statement or set of statements that accomplishes a specific task. Batch files have always been able to call other batch files into execution. Normally, however, the second batch file does not return control to the first. Although the capability is not well documented in the DOS manual, in versions of DOS later than 2.00, a batch file itself can be a subroutine and can be invoked at any time by calling it with an instruction in another batch file. Once it has accomplished its task, the subroutine batch file automatically returns control to the next instruction in the calling batch file.

The technique is simple. You call for the batch file subroutine with the syntax

```
ECHO OFF
CD\
A:BASICA A:FORMFEED
FOR %%A IN (COM COMPILER CSU EDISK FLOPPY) DO DIR %%A\%1 >PRN
FOR %%A IN (FOOD GRAPH IPM MONEY MSTOOLS) DO DIR %%A\%1 >PRN
FOR %%A IN (MSWORD POWERBOO SSDB STAT TEST) DO DIR %%A\%1 >PRN
FOR %%A IN (WP A: C:) DO DIR %%A\%1 >PRN
A:BASICA A:FORMFEED
CLS
ECHO -
ECHO DONE
```

Listing 3: DIRALL.BAT

COMMAND/C *filespec* [%# . . . %#]
COMMAND/C is the subroutine call (equivalent to GOSUB in several computer languages). *Filespec* lists the drive, the path, and the name of the batch file you want to use as a subroutine; %# . . . %# are the values for any replaceable parameters in the subroutine. The only special attribute of the subroutine batch file is that it must contain the word EXIT as its last command. This command is the equivalent of RETURN in many computer languages and is responsible for returning control to the parent batch file.

You could, for example, set up an AUTOEXEC.BAT file to perform three tasks: setting up the clock, setting up the monitor, and setting up the printer. If each of these tasks were a subroutine, your AUTOEXEC.BAT file would consist of only three major instructions. You would set up the file as follows:

```
ECHO OFF
CLS
COMMAND/C SETCLOCK
ECHO OFF
CLS
COMMAND/C SETMON
ECHO OFF
CLS
COMMAND/C SETPRINT
```

The three files serving as batch subroutines would be

SETCLOCK.BAT:

```
ECHO OFF
CLS
SETCLOCK
EXIT
```

SETMODE.BAT:

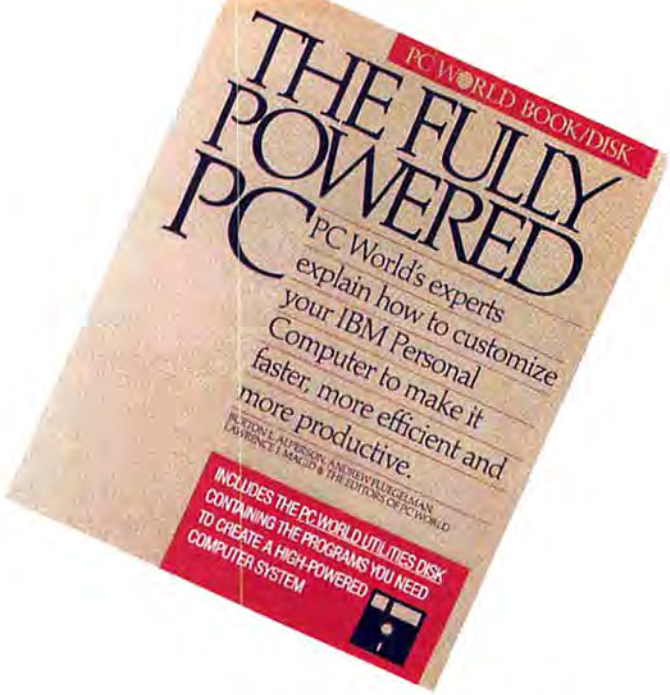
```
ECHO OFF
CLS
MODE 40,R
EXIT
```

and SETPRINT.BAT:

```
ECHO OFF
CLS
MODE COM1:96,N,8,1,P
MODE LPT1: = COM1
EXIT
```

As in other languages, you can "nest" batch file subroutines; that is, one subroutine can call another, which can call another, and so on. But be careful; each level of nesting will cost you 3K of RAM. Also remember that DOS always turns on the echo at the beginning of any batch file. To keep the echo off, begin each batch file with the command ECHO OFF. Unfortunately, this command, like the first command of all batch files, is displayed. But it disappears almost immediately if you follow it with a CLS command.

The AUTOEXEC.BAT file shown earlier is too simple to be of much use, but it illustrates the techniques to use for more complex subroutine operations. By using batch file subroutines you can easily maintain and modify batch files of great complexity.



This technique also reduces debugging problems dramatically by locating instructions in well-defined modules, and it enables you to write the instructions for a commonly used procedure only once and then call the routine from any batch file.

With the refinements of version 2.00, DOS's easy-to-use batch processing has become a powerful programming language. Its looping, branching, and variable capabilities don't rival those of C, but you may find they give you the power to control many tasks without leaving DOS; a 2-minute batch file might just do the job.

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The PC World Advanced Users Quiz

Answers

1. **d.**

2. **c.** Selecting *R* from *WordStar*'s opening menu permits you to run external DOS commands such as FORMAT, most BASIC programs, and most .COM and .EXE files. But internal commands such as DIR cannot be accessed.

3. **f.** The 8086-2 doesn't exist—you might have confused it with the faster 8088-2 microprocessor used in many PC compatibles. 8286 is a deliberate misprint designed to catch lazy eyes. The 80286 is the AT's CPU, while the 80287 is an optional coprocessor used for high-speed math calculations.

4. **b.**

5. **a.** 1K is not 1000 bytes, but rather, 1024 bytes. Thus 64K is actually 64 x 1024 bytes, or 65,536 bytes.

6. **d.** Serial ports transmit data 1 bit at a time; parallel ports, 1 byte at a time.

7. **c.** The diamond harks back to the days when *WordStar* was used on personal computers that lacked separate cursor control keys.

8. **c.**

9. **b.**

10. **c.** When the PC is switched on, the 8088 microprocessor executes the power-on diagnostics routine in the BIOS ROM, then the bootstrap loader, which tells the computer to load the disk operating system, or DOS.

11. **b.** The 8088 can directly address only one 64K segment of RAM at a time. The 8088 lacks a 20-bit address register; it must compute addresses using two 16-bit registers. Note also that while the 8088 can address 1MB, not all of it can be written to. ROM chips on the motherboard holding the BIOS and BASIC, as well as those on boards controlling peripherals, have addresses in this "memory map."

12. **a.** DOS will prompt you to remove the original disk from drive A: and replace it with the destination disk. This is almost a trick question, since COPY *.* B: would work—assuming your single drive was designated A:. But 'tain't always so. If you chose *d*, give yourself half a point.

13. **b.**

14. **a.** 252,000, based on the 720- by 350-pixel resolution of the PC's monochrome screen.

15. **d.**

16. **e.**

17. **d.** DEBUG is considered to be a modest assembler as well as a means of patching programs.

18. **e.**

19. **d.**

20. **c.** EBCDIC's roots trace back to early IBM mainframes, so it uses 8 bits to represent a character; the 7-bit ASCII scheme was originally developed for data communications and later adopted by mini and microcomputer vendors.

21. **a.**

22. **a.** IBMBIO.COM and IBMDOS.COM are two players in the DOS quartet, the other two being the boot record and COMMAND.COM. IBMDOS.COM handles file management routines and a variety of other functions

for application programs. IBMBIO.COM provides an interface to ROM BIOS device routines. Neither appears in a directory, and they cannot be altered or accidentally deleted.

23. c. Terminal emulation is often confused with host/microcomputer file transfer systems. True terminal emulation allows a PC to view and sometimes manipulate host data but does not allow it to save host data to disk.

24. f. With *.* appended to CHKDSK, you not only discover bad disk sectors but whether a file is noncontiguous–whether its components are stored in discrete areas of a disk. Such files take longer to read. You can speed disk access by first copying frequently used files onto a new disk. These files are stored contiguously and thus are read off the disk more quickly.

25. d. DEL and ERASE are different names for the same function.

26. d.

27. b. Each 64K bank of eight chips uses an additional chip dedicated to parity checking. PC-compatible computers that don't check for parity need only 64 chips.

28. d. Hierarchical data bases organize data according to many-to-one and parent-child relationships–a distinctly different method from the tabular and key-field approach common in relational data bases. The hierarchical structure tends to conserve RAM.

29. a. The PC's upper character set–codes 129 to 255 inclusive–contains a range of foreign language and mathematical symbols, double lines, bars, and other critters you don't find in the ASCII set.

30. c.

31. a. When you index a data base on a key field, such as name, address, or zip, only the data within the key field is indexed, creating a new file with the extension .NDX. Indexing allows you to locate records on a floppy disk within 2 seconds, typically, with the Find command. The Sort command creates an ordered copy of the entire data base and thus is slower.

32. d. CMOS stands for Complementary Metal Oxide Semiconductor. This semiconductor fabrication process makes everything from memory chips and microprocessors smaller, cooler, and more efficient. CMOS chips are found in digital watches, the PCjr's keyboard, and a number of lap-size computers.

33. c, d. This is a trick question–there are actually two faces in the IBM character set. Both *c* and *d* are correct. If you picked both, give yourself two points.

34. b. The OSI model defines seven layers of communications protocols; each successive layer is insulated from the details of those below. Accordingly, networks can be built from individually implemented layers. The presentation layer governs data interpretation, format, and code transformation, and it lies below the application layer.

35. a. The equivalent command sequence would be */File Retrieve* **Macros < Enter >** */Worksheet Window Vertical.*

36. c. A file server regulates access to files; a disk server regulates access to portions of a shared hard disk but offers little in the way of protection and no record protection.

37. c. Since ASCII code uses 7 bits, parity employs the 8th bit (which can be odd or even) for error-checking routines. If you specify no parity, the bit can be used to increase the number of transmitted characters. Otherwise, you can use only 7 data bits.

38. a. Issued within a document, <Ctrl>-L repeats either <Crtl>-Q F, the find command, or <Ctrl>-Q A, the search and replace command, whichever was used last. From the main menu, the command simply changes the logged disk drive.

39. b. A cluster is the smallest allocatable disk space. On a double-sided floppy disk, a cluster is two sectors, or 1024 bytes. Thus if you save a file only 8 bytes long, it will consume 1K of disk space. Hard disks often use 4K clusters.

40. c. A network operating system may include various data protection "hooks." Unless the application program takes advantage of these hooks, data remains vulnerable.

41. b. Broadband supports a wider bandwidth than baseband (or voice grade) channels and can handle multiple and higher-speed data transmission.

42. c.

43. c. CSMA/CD is only one LAN access mechanism. It is a random contention method in which each device competes for access to network resources. In contrast, the token passing method is deterministic; an electronic "token" is passed to devices in the network in a predetermined order.

44. c. A bubble sort is a common algorithm used to order files that consist of relatively few elements. It relies on a series of comparisons and swaps in which the successive elements of lower value rise like bubbles to the top.

45. b. XON/XOFF is a technique that informs a transmitting device whether the receiving device is ready to accept data. It is similar to the process of stopping and starting a scrolling screen with <Ctrl>-S (XOFF) and <Ctrl>-Q (XON).

46. a. <F4>, invoked while you're pointing to a cell or range address during formula entry, defines a cell address as mixed (that is, absolute row and relative column or vice versa) or absolute.

47. b.

48. b.

49. a. DIP is the centipede-like configuration common to all the chips in a standard PC. By contrast, the PC AT's 80286 CPU is a square, leadless package that sports contacts (instead of pins) on not two but all four sides.

50. d. Some programs, including .EXE programs produced by the BASIC compiler, look to drive A: to reload COMMAND.COM when they exit to DOS. Issuing the command *ASSIGN A = C* forces the computer to look for DOS on drive C:.

51. a.

52. d. The others are BASIC commands. SUM is used by a number of other programs, such as *1-2-3*.

53. a. For example, the letter Z in 7-bit ASCII is represented as 1011010; the sum of these numbers is 4. If even parity is used, the telecommunications program makes the 8th bit a 0; if parity is odd, a 1 is added to make the value odd. The program at the other end always strips away this 8th bit.

54. b. The Control Z character (ASCII 26) is used by DOS to indicate the end of a file. Most text editors recognize this end-of-file marker and will treat the first Control Z they encounter in a file as the end of a file. If a Control Z were embedded in the middle of a file, you would not be able to edit past it, even though the file held more characters.

55. a.

56. b. For example, you can run a cross-assembler for the 68000 microprocessor on the PC AT and generate 68000 assembly language code.

57. b.

58. b. A virtual field's value is based on other fields. For example, the sum of ten accounts payable fields could be a virtual field.

59. b. The NMI has highest priority, is reserved for parity errors, and cannot generally be disabled. However, you can disable the NMI by writing 0 to the port A0.

60. a. The formula in *b* appears correct, but it won't yield proper results. *1-2-3* stores the values of formulas and calculations in a binary form that is only an approximation of their true decimal value. For this reason, testing for exact equality fails under some circumstances, such as when cell A1 contains 3 and cell A2 contains 7. The formula in *a* tests whether the difference between the formula value and the calculated value is smaller than .0001, a trivial amount.

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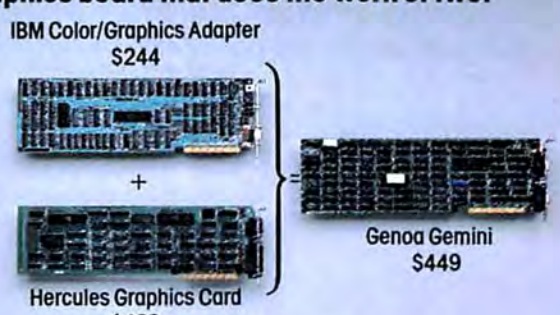

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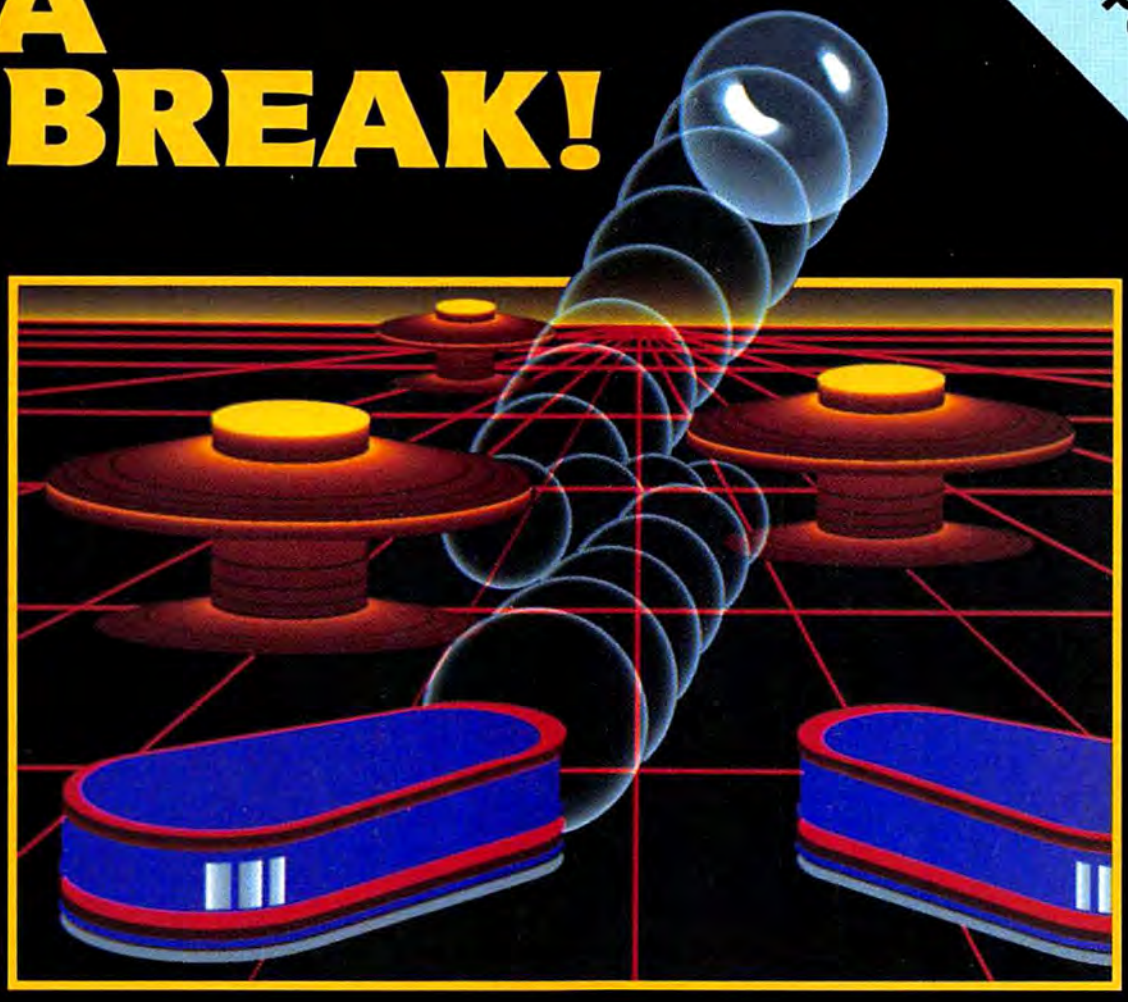

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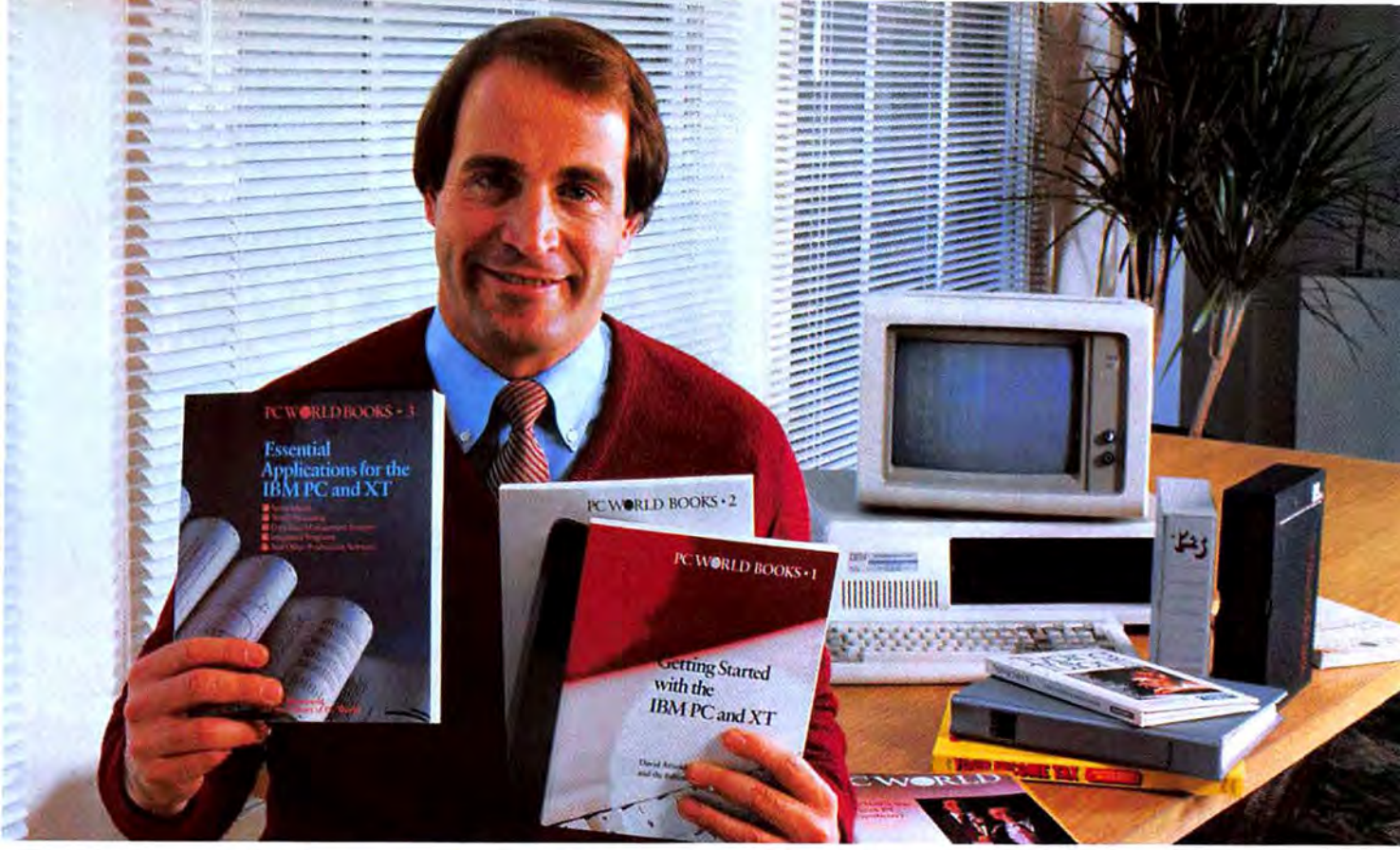

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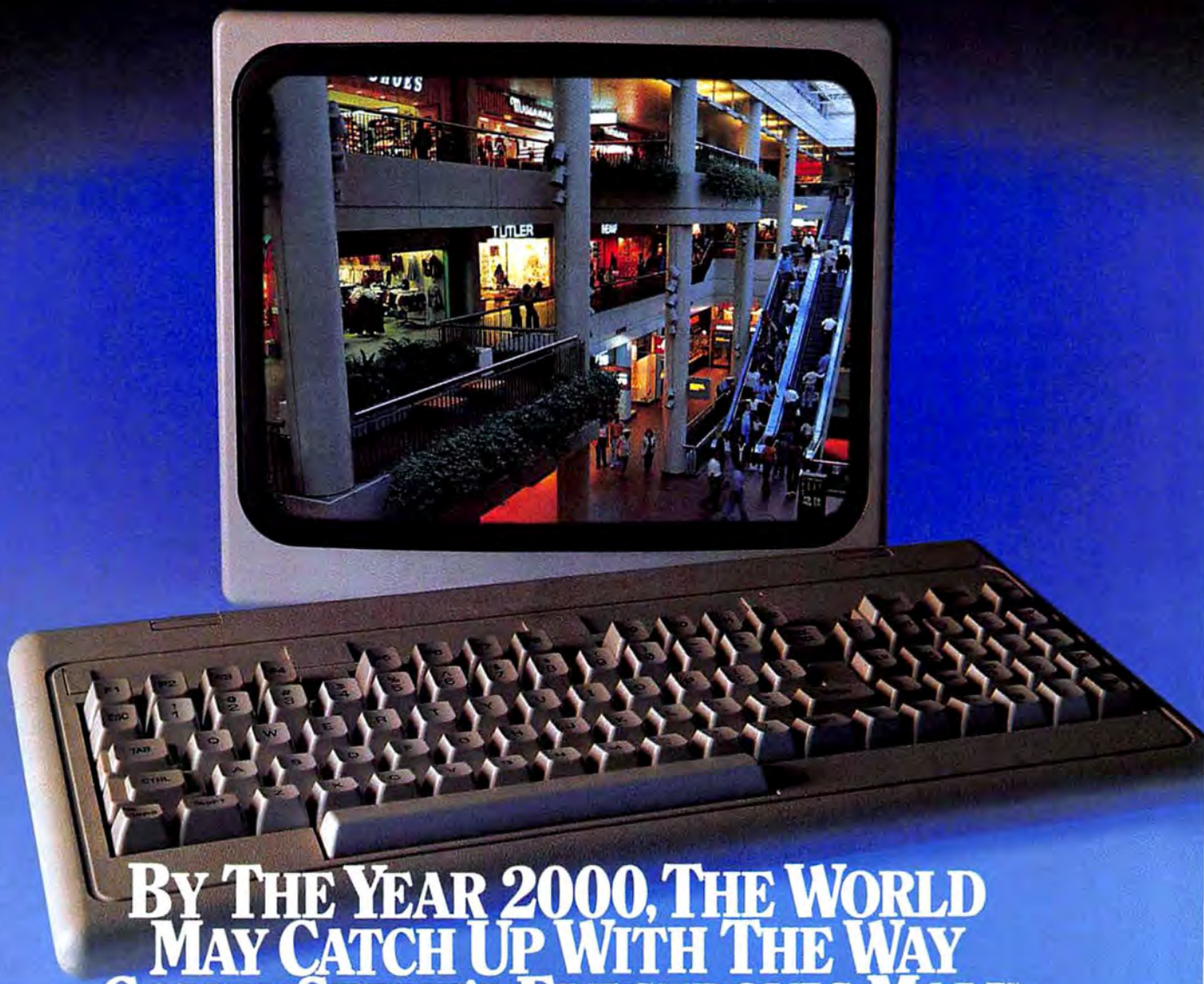

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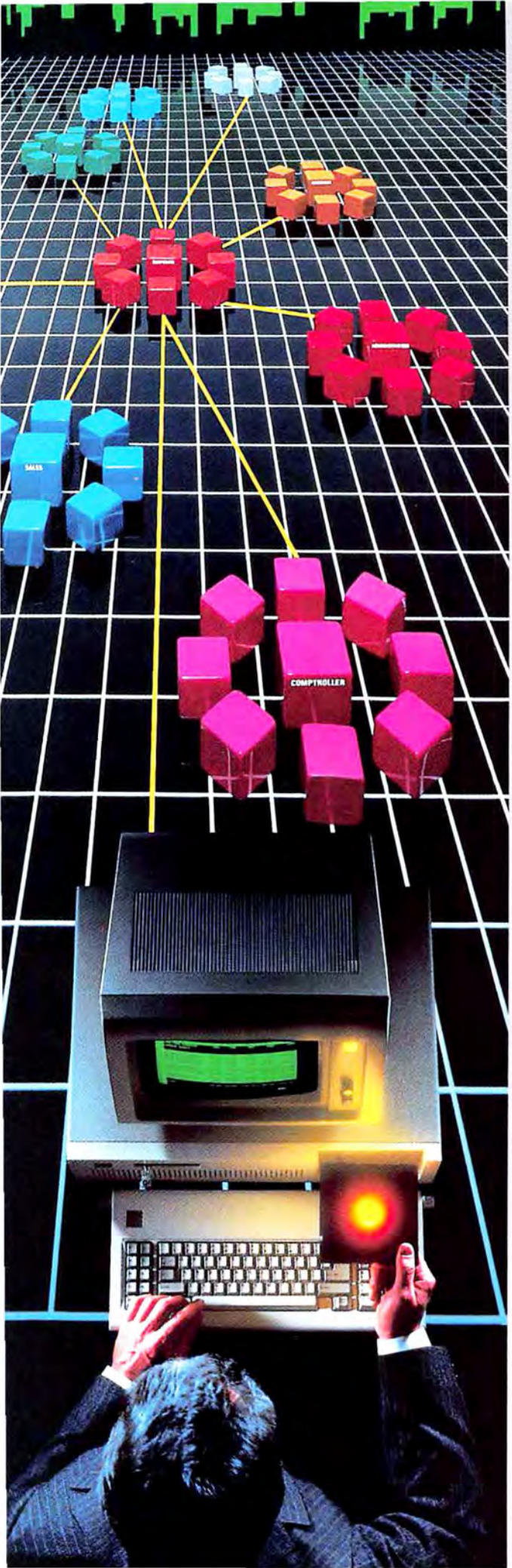

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Edited by Steven Cook

1-2-3 Subdirectory Menu

The *1-2-3* worksheet in DIRMENU.WKS provides an alternative to the method given for setting the LOTUS default directory in "Automatic 1-2-3 Subdirectories" [*.*, *PCW*, January 1985]. DIRMENU dispenses with the task of creating and saving separate copies of the 123.CNF file for each subdirectory. It also eliminates the file copying that takes place every time LOTUS is loaded under the previously given method. Instead, only one small worksheet needs to be kept in the *1-2-3* subdirectory.

Follow these steps to create the worksheet:

1. Start *1-2-3* and set the */Worksheet Global Default Directory* to the drive and directory from which *1-2-3* boots, then Update and Quit from this menu.

2. Type a list of the subdirectories you will want to access in column A, one per cell. Use */Worksheet Column-Width Set* to adjust for long directory names.

3. Type the macro command labels as shown in cells B1, B2, and B4. The empty B3 cell will automatically be filled in when the menu is used.

4. Now use */Range Name Create* to name the macro \0 (the autoexecute macro) and assign it the cell range B1..B4. Use */Range Name Create* again to name \R, another keyboard macro that references the same cell range.

5. Finally, use */File Save* to store this as the automatic-loading worksheet by giving it the name **AUTO123**.

Now whenever *1-2-3* is started, this worksheet will appear on screen and act like a pull-down menu. You simply point with the cursor to the desired directory and press <Enter>. If you select an invalid directory (one that no longer exists, for example), an error message to that effect will appear. You can then press <Esc> and use <Alt>-R (Restart) to pick another directory from the menu.

To add, delete, or edit directories in the menu, simply start *1-2-3*, press <Ctrl>-<Break>, and make the necessary changes. You can use the Data Sort commands to keep the list in column A neatly sorted. When done making changes, issue the */File Save Replace* command before pressing <Alt>-R to test the new menu.

Arman D. Tookmanian, Jr.
Dover, New Jersey

Make a Date

In a *1-2-3* worksheet the usual method for creating a column of dates that are an equal number of days apart is to use a formula and the Copy command. An easier way is to issue the */Data Fill* command. When it prompts for a Start value, type **@DATE**(*yy,mm,dd*), where *yy, mm,* and *dd* represent the year, month, and day you wish to begin the list with. In response to the Step prompt, type the number of days you want for the interval between the dates, then enter **100000** as the Stop value. When the list of values is complete, use the */Range Format Date* command to select a date format.

Since I often want to display dates in a month-day format, which *1-2-3* does not offer, I put @MONTH( ) and @DAY( ) formulas in adjacent columns and separate them with a column of hyphens to create the desired format. For example, if column A contains a list of dates created

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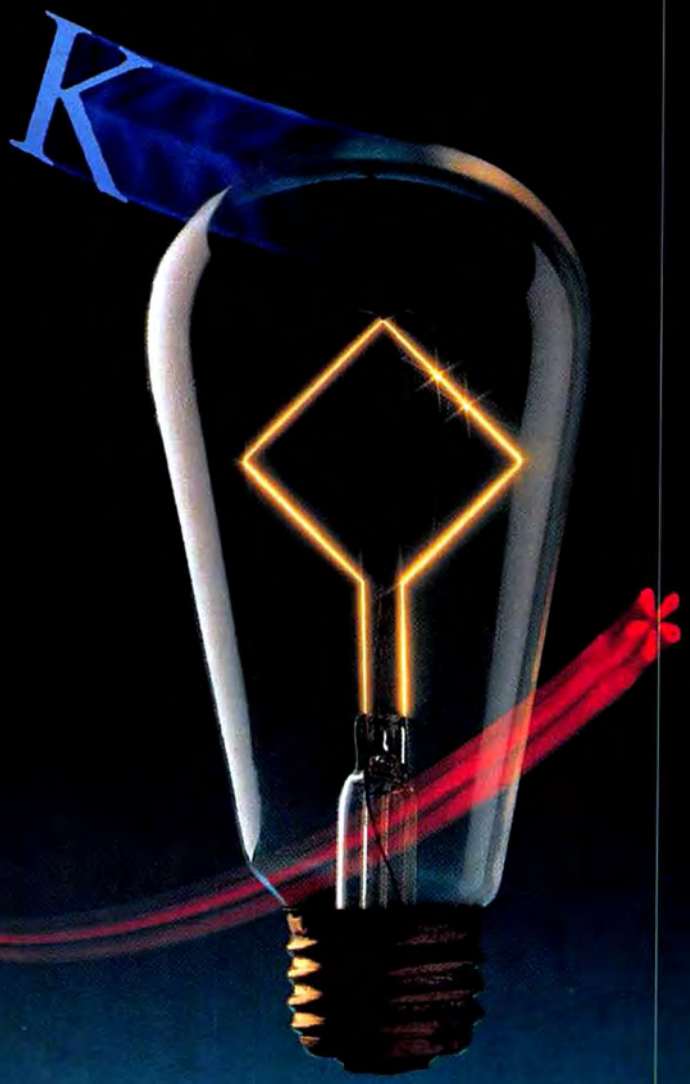

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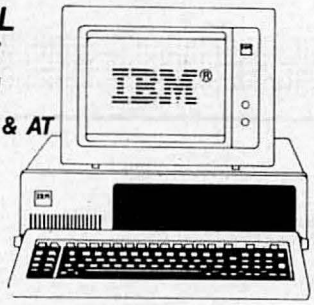

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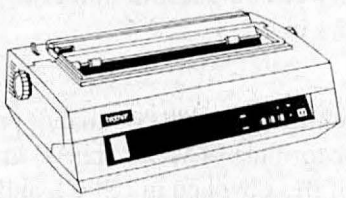

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```
                A                          B

1   A:\                          {Home}{?}/C~B3~
2   B:\                          /WGDD{Esc}
3   C:\
4   C:\LOTUS                     ~Q/WEY
5   C:\LOTUS\BALANCE
6   C:\LOTUS\DATABASE
7   C:\LOTUS\DBASE2
8   C:\LOTUS\DBASE2\IMPORTS
9   C:\LOTUS\INCOME
10  C:\LOTUS\MISC
11  C:\LOTUS\WKS
12  ETC.
13  etc.
```

DIRMENU.WKS: Automatic subdirectory menu for 1-2-3

```
    A            B           C        D         E        F        G        H

1   Enter data   1           2        3         4        6        8        9
2   Data Entry   End         Down     PageDown  Left     Right    Up       PageUp
3   {?}~         /xm         {down}   {pgdn}    {left}   {right}  {up}     {pgup}
4   /xmCURSOR~   DIRECTION   /xm      /xm       /xm      /xm      /xm      /xm
5                ~           CURSOR   CURSOR    CURSOR   CURSOR   CURSOR   CURSOR
6                            ~        ~         ~        ~        ~        ~
7
8              2           4        6         8
9               Down        Left     Right     Up
10              {end}       {end}    {end}     {end}
11              {down}      {left}   {right}   {up}
12              /xm         /xm      /xm       /xm
13              CURSOR      CURSOR   CURSOR    CURSOR
14              ~           ~        ~         ~
```

KEYMAC: Macro to alternate between cursor and numeric keys in 1-2-3

with the Data Fill command, put the formula @MONTH(A1) in cell B1, a hyphen in cell C1, and @DAY(A1) in cell D1, then copy B1..D1 down the column and set the column widths to fit the data.

Merdin Criddle
Aptos, California

NumLock Key in 1-2-3

A question in *The Help Screen* ["1-2-3 and the PC's Number Pad," *PCW*, March 1985] prompts me to offer this solution to the problem of using the PC's numeric keypad with *1-2-3*. Many of the worksheets I've developed have required the abilities to move the cursor to random cells and to enter values at those locations. To accomplish both, I put the keypad numbers into a macro that uses a "sticky" menu as shown in KEYMAC.

With <NumLock> on, this macro causes the number keys to move the cursor in the usual manner until the <Enter> key is pressed. After that, the number keys enter numbers until the <Enter> key is pressed again;

(continues)

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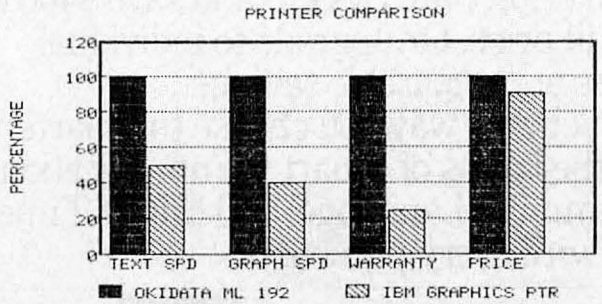

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CORRESPONDENCE QUALITY	**YES**	**NO**
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BIDIRECTIONAL GRAPHICS	YES	NO
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CUT SHEET FEEDER	OPTIONAL	NO
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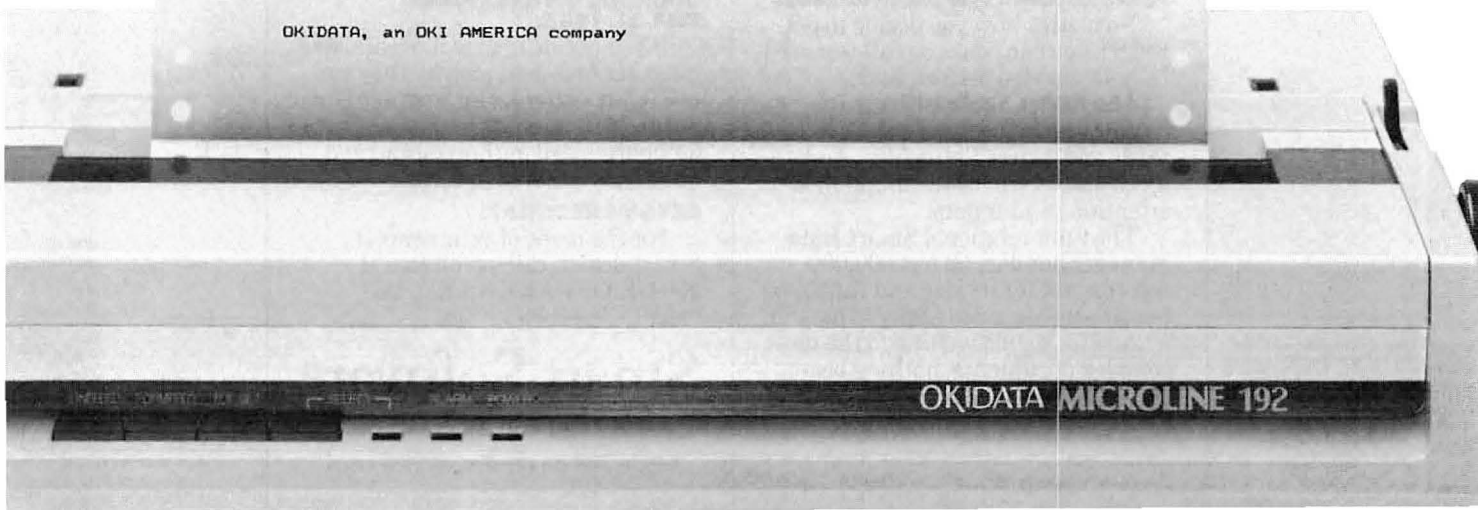

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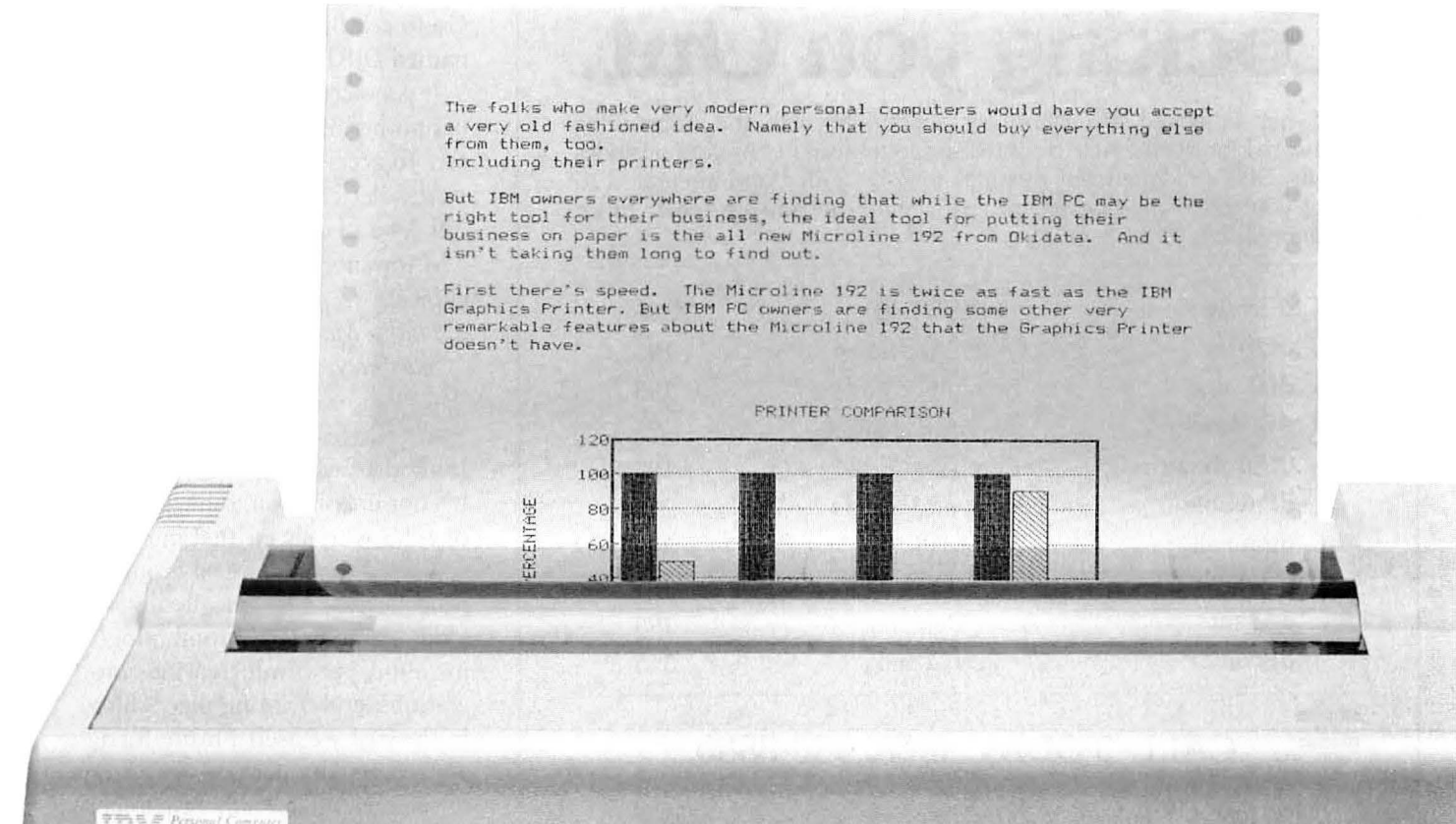

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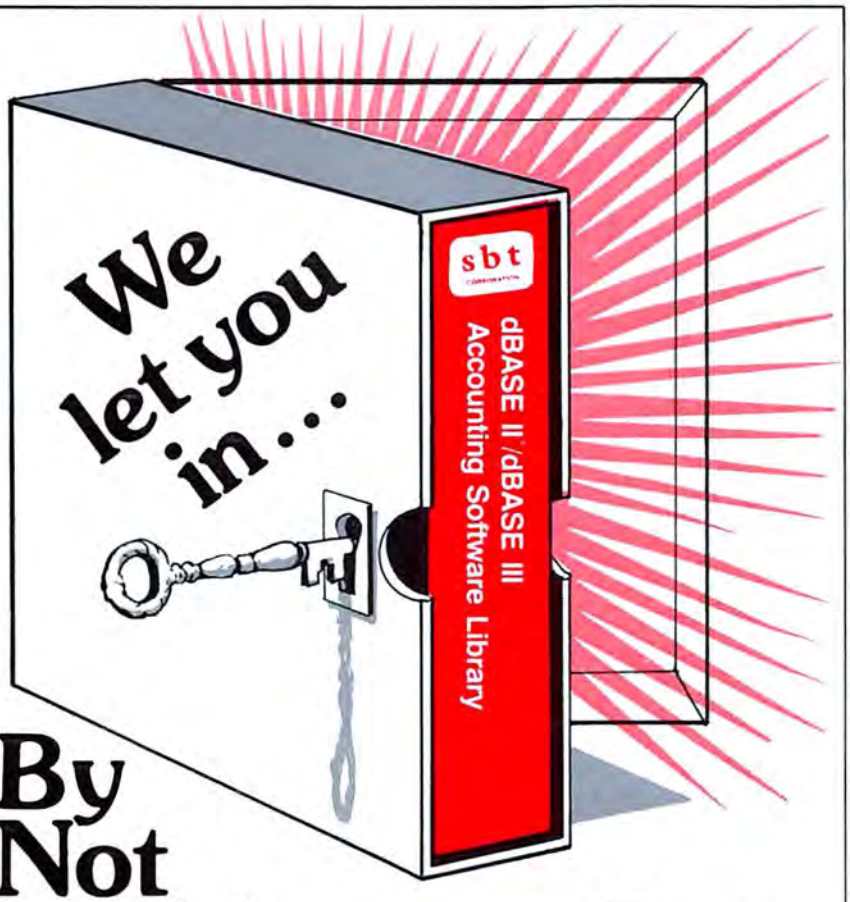

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then the keys switch back to controlling the cursor. The only way to escape the macro is to press <Ctrl>-<Break>. However, if you are willing to give up one of the cursor movements, you can substitute another command to return you to a previous menu.

To create the macro, type in the cell values as shown. Note that the numeric digits must be entered as labels. Move the cursor to cell A1 and create a range named CURSOR. (You can make just cell A1 the range, but if the range covers the entire macro you can easily copy the macro to other worksheets using the File Combine Copy Named Range command.) Go to cell B8 and create a range named DIRECTION.

If you access this macro by way of another menu, then you're all set. To access the macro with an <Alt>-letter combination, go to cell A4 and create a range named \M (or another letter of your choice).

Phillip Martin
Salisbury, North Carolina

Linked 1-2-3 Worksheets

It's not uncommon to have a series of *1-2-3* worksheets that must be subjected to an identical group of procedures. This typically involves loading a template, "combining-in" a file, performing various operations, and printing the result. In the past we used a brute-force approach: An operator sat in front of the computer, loaded each file, and started a macro to perform the desired steps. That process was repeated for each file until the entire set had been processed.

(continues)

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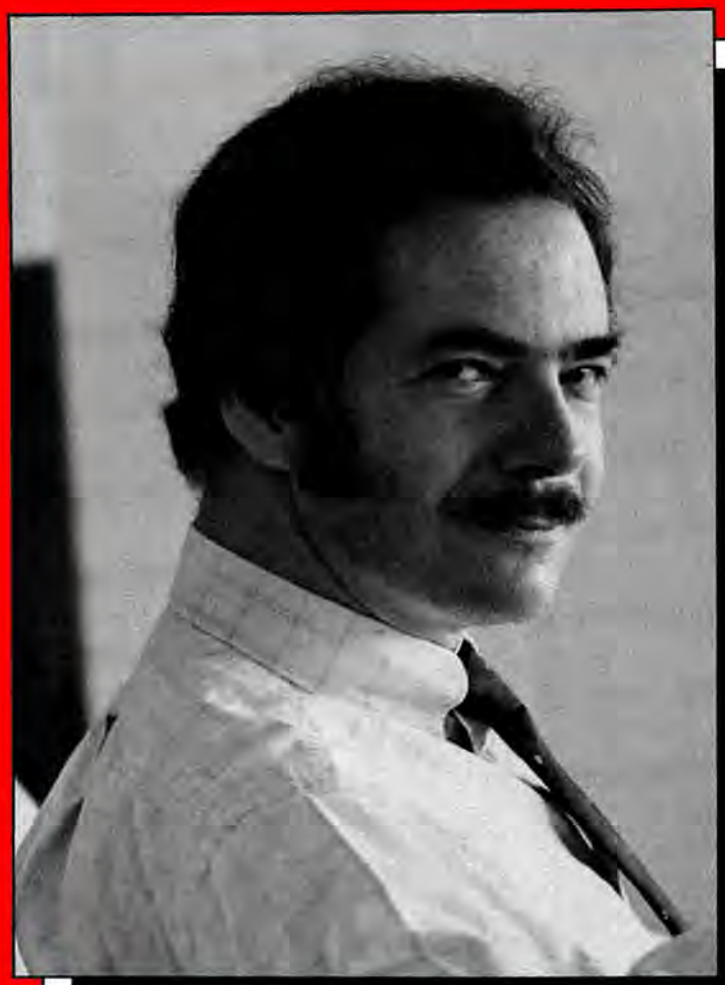

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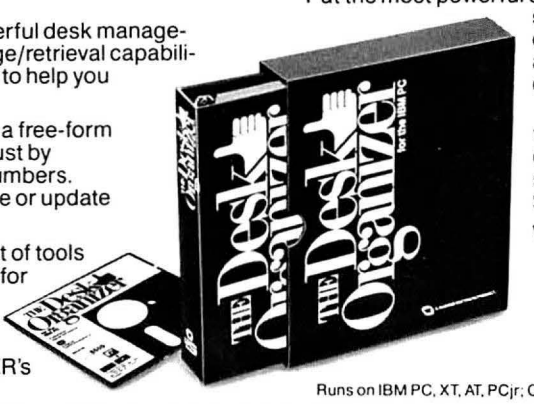

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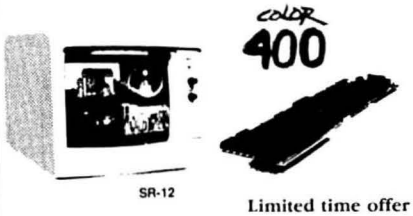

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```
PARAMETERS ROW,STRING
WIDTH=80
R=ROW()
C=COL()
@ ROW,0+(WIDTH-(LEN(STRING)))/2 SAY STRING
@ R,C SAY ''
```

CENTER.PRG: dBASE III program to center a line of text

```
PARAMETERS ROW,STRING
WIDTH=80
R=ROW()
C=COL()
@ ROW,0+(WIDTH-(LEN(STRING))) SAY STRING
@ R,C SAY ''
```

RIGHT.PRG: dBASE III program to right-justify a line of text

Today, all our files contain a small macro named \0 at cell B1 (any cell will do). The macro consists of {GoTo}B2~/FCCEzero~, and cell B2 is blank. An empty worksheet named Zero is kept in each subdirectory.

The effect of the macro is to combine the worksheet Zero below the autoexecuting macro every time the worksheet is loaded. Usually Zero is empty and the macro stops. To perform a series of operations on a group of worksheets, we just put the appropriate macro into cell A1 of Zero to initiate the sequence for each worksheet.

This allows a worksheet to pass macro keystrokes to another file, a feature not otherwise available in *1-2-3*. In addition, the File Extract command can put keystrokes into Zero that cause it to retrieve the next worksheet in sequence.

Jan Card
Hamilton, Bermuda

dBASE III to Symphony

Many people making the transition from *dBASE II* and *1-2-3* to *dBASE III* and *Symphony* have probably run into the same problem I did: Converting data from *dBASE III* to *Symphony* is not nearly as easy as converting from *dBASE II* to *1-2-3*.

My solution is as follows: First, run *dBASE III* and USE or SELECT a data file, then use the command **COPY FILE** *filename*.**DBF TO** *filename*.**EXE DELIMITED** to create a file *Symphony* can read. Quit *dBASE III* and start *Symphony*. From the Services menu (<F9>) select File Import Structured, and then enter the name of the file created in the prior step.

One last note: All the fields in the *dBASE III* file will be imported. I save time by using *dBASE III* to eliminate the fields I will not need before importing the

(continues)

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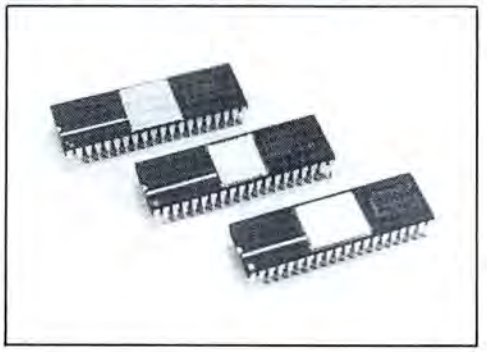

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file with *Symphony*. To do this, either modify the structure of the data base file before copying it or copy only the selected fields.

Jeff Wimer
Albany, Oregon

dBASE III Lines Up

The *dBASE III* routines CENTER.PRG and RIGHT.PRG will center or right-justify a line of text sent to the printer or the screen.

The first line of each routine establishes the parameters to be passed when the program is called. The next line sets the width of the output device, and the two lines after that preserve the cursor position when the routine is called. The last line restores the cursor to its previous location.

To use these routines type **DO CENTER WITH** *row, string* or **DO RIGHT WITH** *row, string*, where *row* is set to the desired line and *string* is the text to center or right-justify.

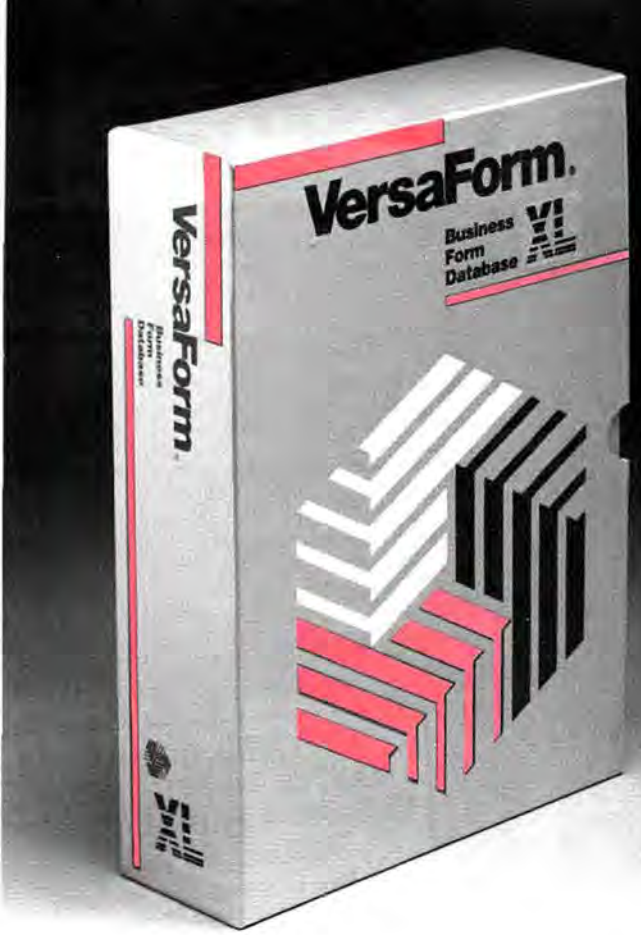
Dan Domzalski
Buffalo Grove, Illinois

dBASE III Timer

dBASE III has several functions and field types not available in *dBASE II*. We have done some investigation into the new TIME( ) function and the new DATE( ) fields.

The TIME( ) function can be used to set up a timer, as shown in TIMER.PRG. This small program can be run from within *dBASE III*. Type **START = TIME( ) < Enter >** to begin timing; type **END = TIME( ) < Enter >** to indicate the end of

(continues)



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TEAR AND COMPARE!

```
* Assumes calling program executes:
*     START = TIME()
*     END = TIME()
*     prior to DO TIMER
* by IE Cooper & SP Dodd  03/06/85
*
SET TALK OFF
STORE .T. TO GONOGO
DO WHILE GONOGO
HOUR1 = VAL(START)
HOUR2 = VAL(END)
MIN1 = VAL(SUBSTR(START,4,2))
MIN2 = VAL(SUBSTR(END,4,2))
SEC1 = VAL(SUBSTR(START,7,2))
SEC2 = VAL(SUBSTR(END,7,2))
*
ELAPHR = HOUR2 - HOUR1
*
IF MIN2 > MIN1
    ELAPMIN = MIN2 - MIN1
ELSE
    ELAPMIN = 60 - MIN1 + MIN2
    ELAPHR = ELAPHR - 1
ENDIF
IF SEC2 > SEC1
    ELAPSEC = SEC2 - SEC1
ELSE
    ELAPSEC = 60 - SEC1 + SEC2
    ELAPMIN = ELAPMIN - 1
ENDIF
ELAPSE = STR(ELAPHR,2) + ":" + STR(ELAPMIN,2) + ":" + STR(ELAPSEC,2)
DDAY = CDOW(DATE()) + ":  "
DDATE = CMONTH(DATE()) + STR(DAY(DATE()),3) + "," + STR(YEAR(DATE()),5)
HDR = DDAY + DDATE
CLEAR
@ 3,10 SAY HDR
@ 5,10 SAY "Elapsed time was "
@ 5,28 SAY ELAPSE
STORE .F. TO GONOGO
ENDDO
```

TIMER.PRG: Timing program for dBASE III

the interval to be measured. The command DO TIMER will execute the program, which will clear the screen and display the date and the elapsed time in a 'Saturday: March 16, 1985' format.

By issuing the DO TIMER command at various points, START can be stated once and END stated several times to time several different aspects of a program.

Irv Cooper
LaGrange, Illinois

Editor's note: This might come in handy for keeping track of business versus personal use of your computer, for tax purposes.

SideKick Trick

I have version 1.1 of *SideKick* and wished to place the Help file, SK.HLP, on my drive C: RAM disk. Unfortunately, *SideKick* insisted on looking for SK.HLP on drive A:. After some trial and error I found the following solution.

Evidently, *SideKick* looks for its help file on whichever disk drive was the default drive when the

(continues)

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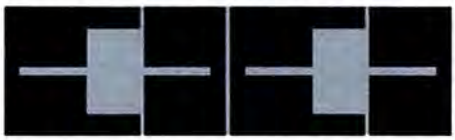

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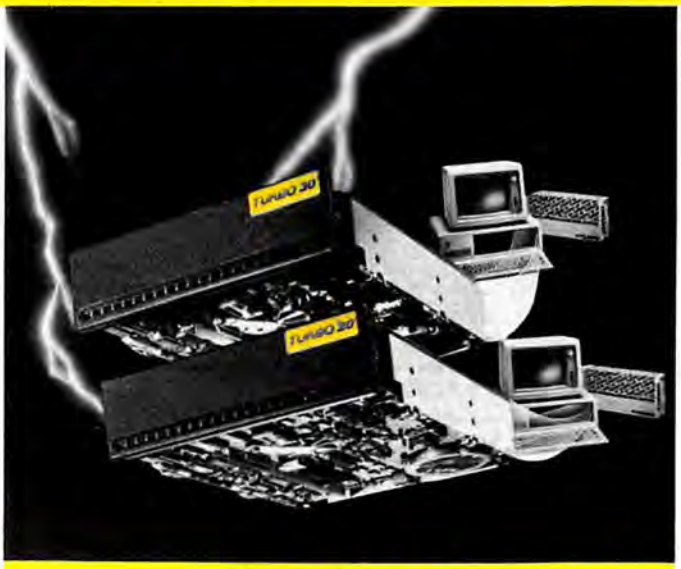

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program was run. Thus, to force *SideKick* to look to drive C:, I use the following commands:

```
copy sk.hlp c:
c:
a:sk
```

Bruce Niebuhr
Galveston, Texas

To default no:

```
A>debug b:turbo.com  < Enter >
-a2cee  < Enter >
xxxx:2CEE ret  < Enter >
xxxx:2CEF  < Enter >
-w  < Enter >
Writing 8E80 bytes
-q < Enter >
A>
```

To default yes:

```
A>debug b:turbo.com  < Enter >
-a2cee  < Enter >
xxxx:2CEE jmp 2d0b  < Enter >
xxxx:2CF0  < Enter >
-w < Enter >
Writing 8E80 bytes
-q < Enter >
A>
```

TURBOPAT: Patches to eliminate the 'Include error messages?' prompt

Turbo Tip

The patches in TURBOPAT eliminate the need to enter *Y* or *N* to the question 'Include error messages?' at the beginning of Turbo Pascal, version 2.0. To apply the patches, make a copy of TURBO.COM and place it in drive B:, then put DOS in drive A: and type in the lines as shown, replacing the CALL 01B4 instruction at address 2CEE with RETURN or JUMP, as appropriate.

(continues)

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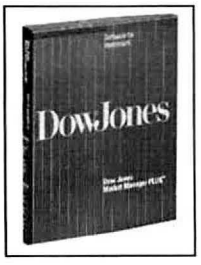

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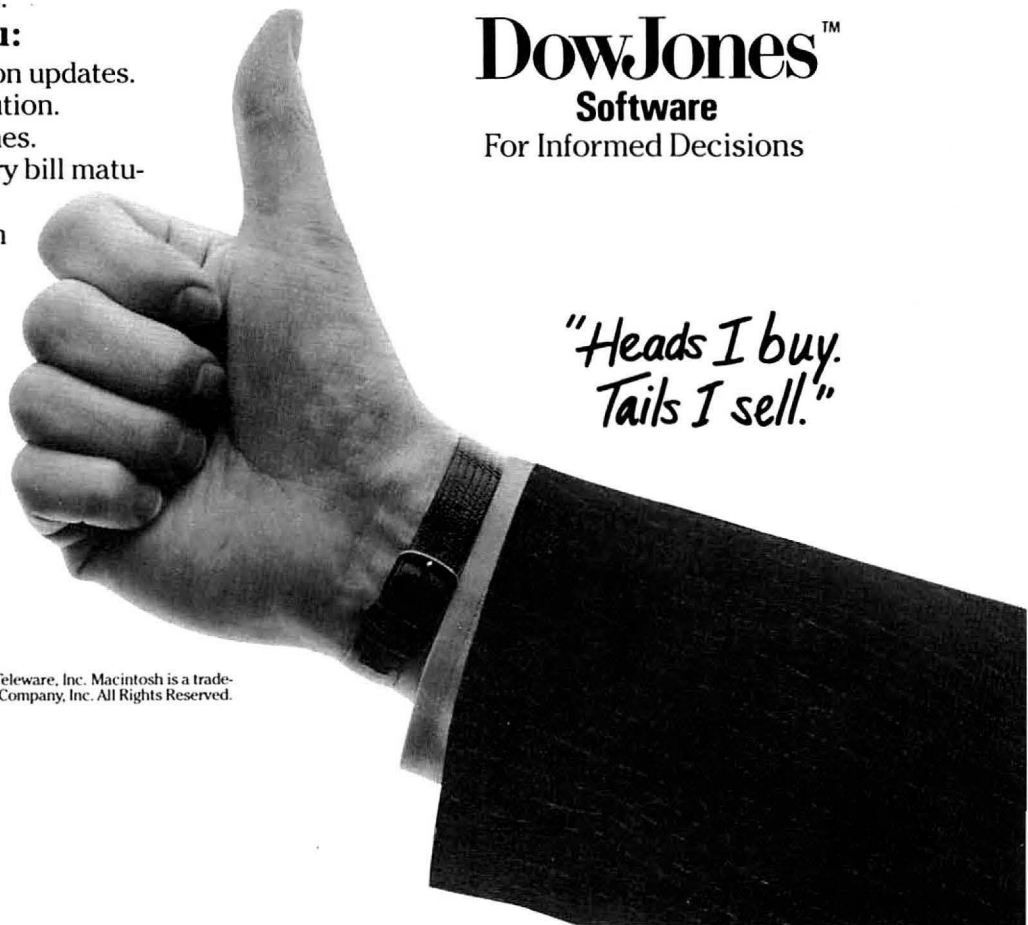

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```
10 ' CMDFIX.BAS
20 ' Creates CMDFIX.COM
30 '
40 DRIVE$ = "C"
50 ADDR$ = "0939"
60 CLS : LOCATE 12,1,1
70 PRINT "Press any key to create CMDFIX.COM: ";
80 IF INPUT$(1) = CHR$(27) THEN END
90 OPEN "CMDFIX.COM" AS #1 LEN=1 : FIELD 1,1 AS B$
100 LP=11 : GOSUB 170
110 A$=HEX$(ASC(DRIVE$)) : GOSUB 190
120 LP=2 : GOSUB 170
130 A$=RIGHT$(ADDR$,2) : GOSUB 190
140 A$=LEFT$(ADDR$,2) : GOSUB 190
150 LP=2 : GOSUB 170
160 CLOSE : PRINT : PRINT "CMDFIX.COM has been created." : END
170 FOR I=1 TO LP : GOSUB 180 : NEXT : RETURN
180 READ A$ : GOSUB 190 : RETURN
190 LSET B$=CHR$(VAL("&h"+A$)) : PUT 1 : RETURN
200 DATA 31,C0,8E,C0,26,A1,86,00,8E,C0,B0
210 DATA 26,A2
220 DATA CD,20
```

CMDFIX.BAS: Patch to make DOS look for COMMAND.COM on a different drive

Although I have tested these patches on my system, I can't guarantee that they do not cause any side effects, so don't modify your only copy of TURBO.COM.

Kenneth Leo
San Francisco, California

Command Redirection

If your PC has an add-on hard disk drive or a RAM disk, you may have wished for a way to make DOS reload COMMAND.COM from a disk other than the one used to boot the computer. One popular technique is to load a secondary copy of COMMAND.COM, but that wastes more than 17K of memory.

A better way is simply to tell DOS which drive to use. The program CMDFIX.BAS creates CMDFIX.COM, a program that does just that. As shown here, the program causes DOS to reload COMMAND.COM from drive C:, but you can change the letter in line 40 to refer to any drive you wish.

To create CMDFIX.COM, load BASIC, then type in CMDFIX.BAS. Make sure the drive letter in line 40 is the one you want, then type **RUN** and press **< Enter >**. To use CMDFIX.COM, simply execute it whenever you start the computer, and DOS will always look to the selected drive to find COMMAND.COM. (Remember to put a copy of COMMAND.COM in that drive.)

This version of CMDFIX works with PC-DOS, version 2.10. It may also work with other versions of MS-DOS, but I cannot guarantee it. The following steps—for readers

(continues)

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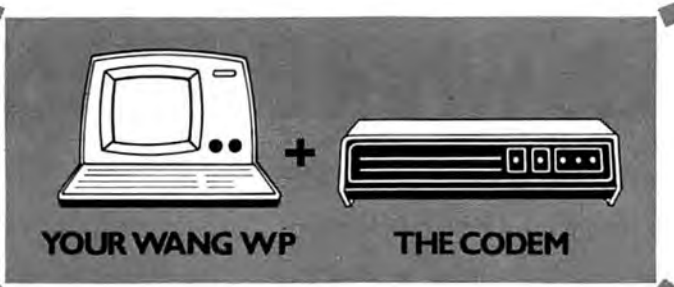

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Circle 287 on reader service card

who are inclined to experiment at their own risk—describe how to modify the program for use with different versions of DOS.

First, start DEBUG, then enter the command **D0:86 L2 < Enter >**. DEBUG will display several values, including two that are 2 characters long and separated by a space. Those two values point to the DOS kernel. Write them down in reverse order; that is, write the second value first. For example, if the values are 63 and 25, write 2563.

Next, type the command **S***xxyy* **:0 FEF0"A:\COMMAND.COM" < Enter >**, where *xxyy* represents the 4-digit value you recorded in the previous step. Be sure to type the command exactly as shown, including using capital letters within the quotation marks.

DEBUG will respond with a list of memory addresses. The first line of the list is the address of the location to modify. Write down the last 4 digits of that address exactly as they appear. For example, if the first line reads 2563:0939, write 0939.

Substitute that number for the 4-digit value in line 50 of CMDFIX.BAS, then run the program to create your customized version of CMDFIX.COM.

Since this technique modifies DOS each time you start the computer, you can run a "pure" version of DOS anytime by just restarting the computer and not running CMDFIX.COM.

Eric Mintz
New York, New York

Editor's note: This patch is not necessary for DOS 3.00. SET COMSPEC=C:\COMMAND.COM *works for this version of DOS.*

Printer Resets Removed

You may have noticed that when compiled BASIC programs run, they reset the printer to its power-on defaults. This is a real nuisance

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when you want special printer settings to remain in effect while the compiled BASIC program executes.

The steps presented here describe how to eliminate those pesky printer reset commands from compiled BASIC programs. Remember to make a backup copy of each program before you try to modify it. Never modify your only copy of a program; you might not be able to restore it if you make a mistake.

First, copy the program onto a blank disk and rename it so that the extension is something other than .EXE. The command **COPY** *filename*.**EXE B:*.TMP** < **Enter** > will perform both actions at once.

Next, put a copy of the DEBUG program from the DOS Supplemental Programs disk into drive A:, and use it to load the renamed program with the command **DEBUG B:***filename*.**TMP** < **Enter** > . DEBUG will display a hyphen prompt when it starts.

Then use DEBUG to search for the offending instructions, MOV AH,01 and INT 17. To do this, type the command **S 100 FFFF B4 01 CD 17** < **Enter** > . DEBUG will display the location of the stored printer reset command.

To eliminate the printer reset command, type the command **E** *xxxx:yyyy* **B4 02** < **Enter** > , replacing *xxxx:yyyy* with the contents of the line displayed during the prior step. For example, if DEBUG had displayed 4356:3A27, you would type *E 4356:3A27 B4 02 <Enter>*.

Finally, save the modified program by typing **W** and then pressing < **Enter** > . Exit DEBUG by typing **Q** and pressing < **Enter** > , then rename the file so its extension is once again .EXE by issuing the command **REN B:***filename*.**TMP *.EXE.**

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(continues)

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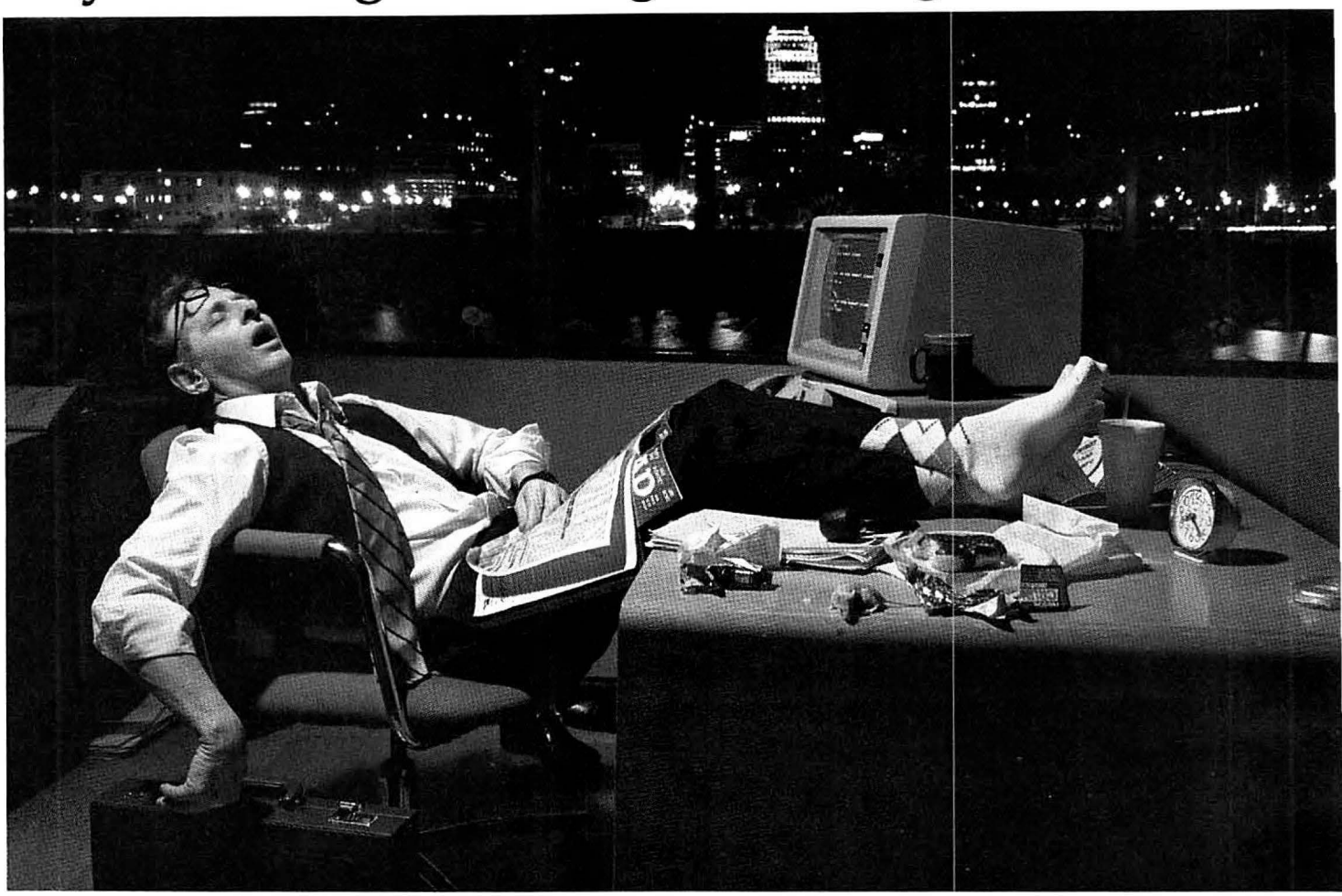

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in effect until you decide to turn them off.

Michael Cook
Vilas, North Carolina

Editor's note: You can use the same technique to take care of almost any program that resets the printer, including BASIC and BASICA, versions 1.0 and 1.1. (BASIC 2.00 and later versions do not reset the printer.) This patch replaces the printer reset command with a request for printer status.

Format Fix Fixed

An error in the FORMATFIX2 patch for DOS 2.10 [*.*, *PCW*, March 1985] causes the program to return the message 'Invalid drive specification' regardless of the drive specified. The correct patch for the DOS 2.10 version of FORMAT.COM is E191 EB D8 90 90 90.

Bill Myers
Huntington Woods, Michigan

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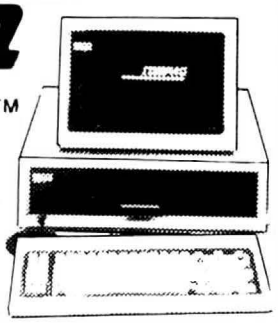

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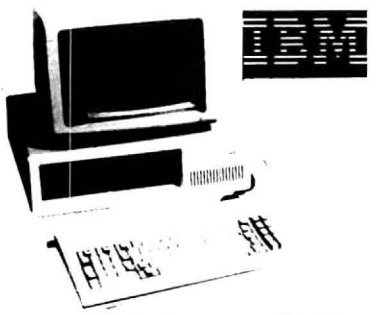

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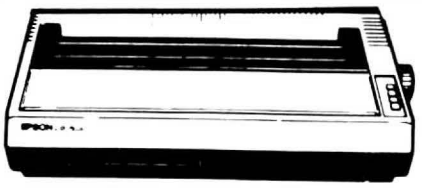

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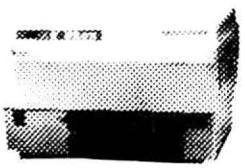

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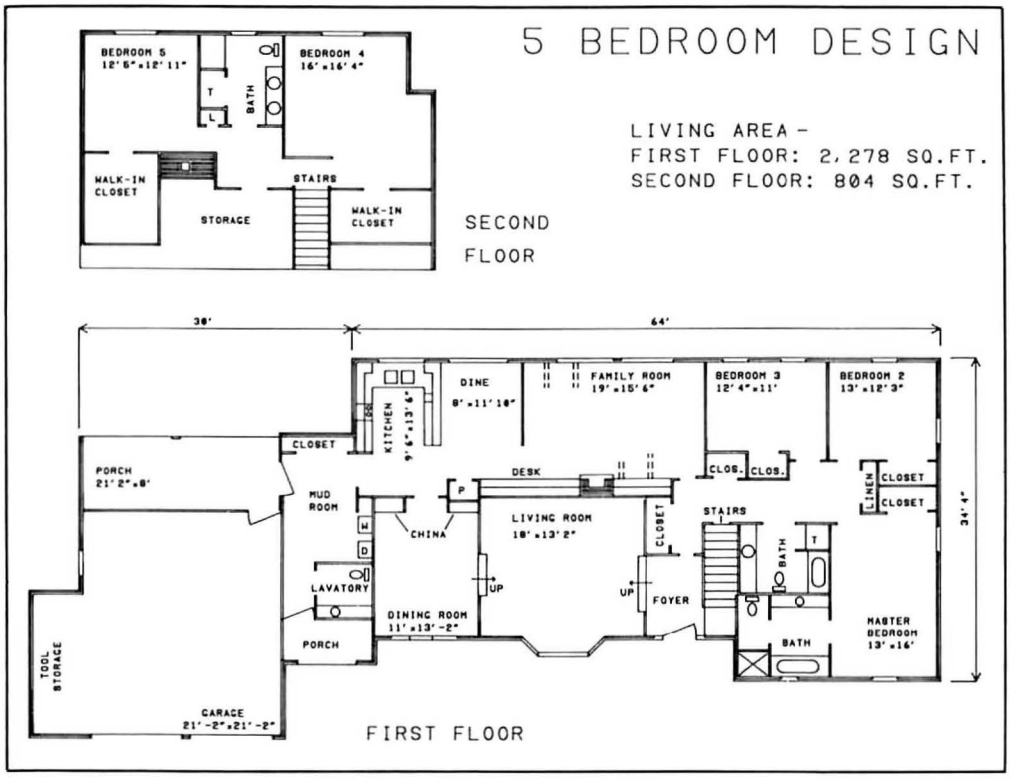

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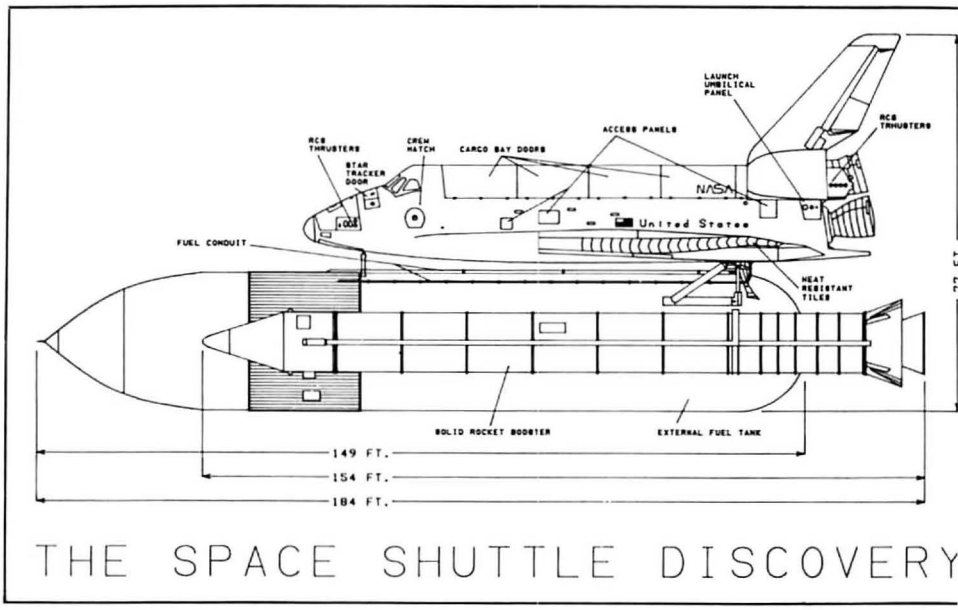

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Listings

Example programs from the articles in this issue

```
2 ' WS-DOS.BAS
4 ' by Andrew Fluegelman
6 ' Copyright 1983, The Headlands Press, Inc.
8 '
10 DEFINT A-Z:ON ERROR GOTO 9000
15 A=0:A$="":L$=""
20 CRLF$=CHR$(13)+CHR$(10):HBLF$=CHR$(141)+CHR$(10)'hard & soft CR/LF
25 SP$=CHR$(32):TB$=CHR$(9)'space & tab
30 SH$=CHR$(31):PB$=CHR$(20)'soft hyphen & placebo
35 DT=19:DIM D$(19):FOR P=1 TO DT:READ D$(P):NEXT'read dot commands
40 EN=4:DIM EN(4),ENO$(4),ENC$(4),MRK(4)'dim & read enhancement symbols
45 FOR P=1 TO EN:READ EN(P),ENO$(P),ENC$(P):MRK(P)=0:NEXT
100 KEY OFF:CLS
105 PRINT"          ==== CONVERT ====
110 PRINT
115 PRINT"            1 - DOS to WS
117 PRINT"            2 - Double spaced DOS to WS
120 PRINT"            3 - WS to DOS
900 PRINT"            x - exit
905 PRINT
910 LOCATE ,10:PRINT"Choose:";
915 INPUT"",Q$:IF Q$="X" OR Q$="x" THEN SYSTEM
920 ON VAL(Q$) GOTO 1000,1000,2000
925 BEEP:GOTO 100
930 '
1000 CLS
1005 PRINT"           === DOS-to-WORDSTAR CONVERTER ==="
1010 PRINT
1015 PRINT"This routine will convert a standard DOS file into the format
1020 PRINT"  required by WordStar for paragraph reforming by converting
1025 PRINT"  'hard' carriage returns (ASCII 13) into 'soft' CRs (ASCII 141).
1030 PRINT"If the file contains blank lines between paragraphs or indented
1035 PRINT"   paragraphs, hard returns will preserved at each paragraph end.
1040 PRINT
1045 GOSUB 8000:IF FL$="" THEN 100
1050 PRINT:PRINT"Conversion in progress...";
1055 IF EOF(1) THEN 8045 ELSE LINE INPUT #1,L$
1060 IF EOF(1) THEN PRINT #2,L$+CRLF$;:GOTO 8045
1065 LINE INPUT #1,A$
1070 IF A$="" THEN 1086 'test for blank line
1075 BL=0':IF LEFT$(A$,2)=SP$+SP$ THEN 1090 'test for indent
1080 'IF LEFT$(A$,1)=TB$ THEN 1090 'also test for tab
1085 PRINT #2,L$+HBLF$;:L$=A$:GOTO 1060 'write line with soft CR
1086 IF VAL(Q$)=2 THEN BL=BL+1:IF BL<2 THEN 1060 'double spaced copy paragraphs
1090 PRINT #2,L$+CRLF$;:L$=A$:PRINT PB$;:GOTO 1060 'write line and hard CR
1095 '
2000 CLS
2005 PRINT"           === WORDSTAR-to-DOS CONVERTER ==="
2010 PRINT
2015 PRINT"This routine converts a WordStar 'document' file
2020 PRINT"  into standard DOS format.  All 'high-bit' characters
2025 PRINT"  are converted to their 'low-bit' equivalents.
2030 PRINT"All 'soft' hyphens are stripped, except that any hyphens
2035 PRINT"  at the ends of lines are retained.
2040 PRINT
2045 PRINT"You can either strip or retain lines that contain dot commands.
2050 PRINT"As another option, you can either strip all print enhancements
2055 PRINT"  or replace certain enhancement codes as follows:
2060 PRINT
2065 PRINT"    underline (^S) becomes  << ... >>
2070 PRINT"     boldface (^B) becomes <<< ... >>>
2075 PRINT"  superscript (^T) becomes  <^ ... ^>
2080 PRINT"    subscript (^V) becomes  <_ ... _>
2085 PRINT
2090 PRINT:INPUT"Strip or Retain dot commands (s/r):",Q$
2095 IF Q$="S" OR Q$="s" THEN STRIPDOT=-1 ELSE STRIPDOT=0
```

(continues)

Fraternizing With Framework
From page 206
WS-DOS.BAS

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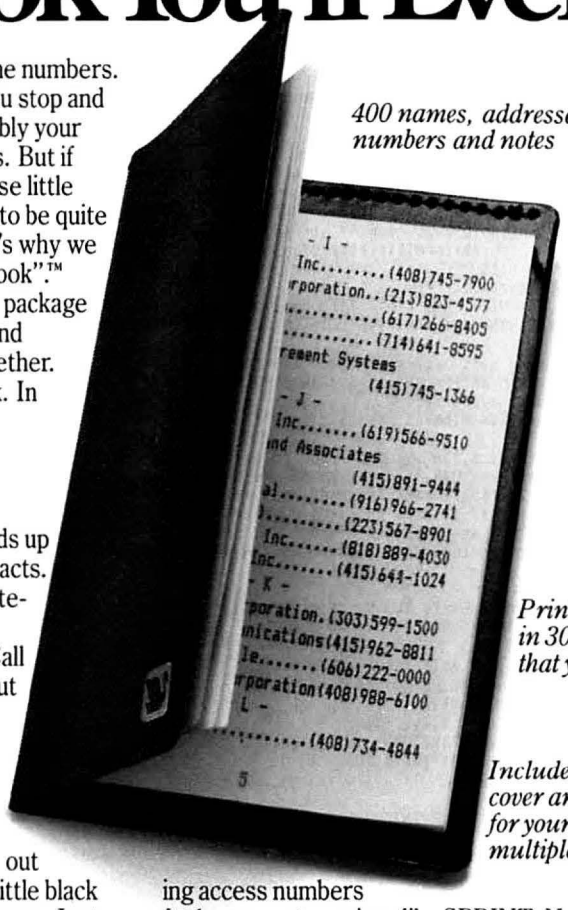

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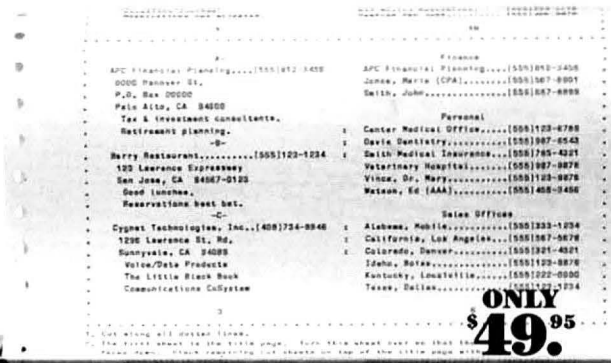

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Circle 473 on reader service card

Fraternizing With Framework, From page 206, WS-DOS.BAS

```
2100 INPUT"Strip or Replace print enhancements (s/r):",Q$
2105 IF Q$="R" OR Q$="r" THEN ENHANCE=-1 ELSE ENHANCE=0
2110 GOSUB 8000:IF FL$="" THEN 100
2115 PRINT:PRINT"Conversion in progress...";
2120 L$=""
2125 IF EOF(1) THEN 8045 ELSE A$=INPUT$(1,#1):A=ASC(A$):IF A>30 AND A<128 THEN L$=L$+A$:
     GOTO 2125 'soft hyphen or normal ASCII, proceed
2130 IF A>127 THEN A=A-128:A$=CHR$(A) 'convert to low-bit character
2135 IF A>31 THEN L$=L$+A$:GOTO 2125 'now if normal ASCII, proceed
2140 IF A=13 THEN GOSUB 2170:A$=INPUT$(1,#1):GOTO 2120'eol, process & remove LF
2145 IF NOT ENHANCE THEN 2125
2150 ' deal with enhancements
2155 FOR P=1 TO EN:IF A<>EN(P) THEN 2165 'find special characters
2160 IF MRK(P) THEN L$=L$+ENC$(P):MRK(P)=0 ELSE L$=L$+ENO$(P):MRK(P)=-1'convert
2165 NEXT:GOTO 2125
2170 ' subroutine to strip soft hyphens and dot commands
2175 P=INSTR(L$,SH$):IF P=0 OR P>=LEN(L$)-1 THEN 2180 ELSE L$=LEFT$(L$,P-1)+RIGHT$(L$,LEN(L$)-P):
     GOTO 2175 'strip soft hyphens...
2180 IF RIGHT$(L$,1)=SH$ THEN MID$(L$,LEN(L$),1)="-" 'except at eol
2185 '
2190 IF STRIPDOT AND (LEFT$(L$,1)=".") THEN 2200 'possible dot command?
2195 PRINT #2,L$:PRINT PB$;:RETURN 'write line to disk
2200 B$=MID$(L$,2,1):A=ASC(B$):IF A>64 AND A<91 THEN A=A+32:B$=CHR$(A)
2205 C$=MID$(L$,3,1):A=ASC(C$):IF A>64 AND A<91 THEN A=A+32:C$=CHR$(A)
2210 DUMP=0:FOR P=1 TO DT:IF B$+C$=D$(P) THEN DUMP=-1 'search for dot cmds.
2215 NEXT:IF DUMP THEN RETURN ELSE GOTO 2195 'dump line if dot command
2220 '
8000 ' File specs
8005 INPUT"File to convert:",FL$:IF FL$="" THEN RETURN
8010 IF LEFT$(FL$,1)="?" THEN GOSUB 8035:GOTO 8005
8015 OPEN FL$ FOR INPUT AS #1
8020 INPUT"Convert to file:",FL$:IF FL$="" THEN 8005
8025 IF LEFT$(FL$,1)="?" THEN GOSUB 8035:GOTO 8020
8030 OPEN FL$ FOR OUTPUT AS #2:RETURN
8035 IF FL$>"?" THEN FL$=MID$(FL$,2,1)+":"
8040 PRINT:FILES FL$+"*.*":PRINT:RETURN
8045 CLOSE:BEEP:PRINT:PRINT"Done!":GOTO 105
8050 '
9000 ' Error Trapping
9005 IF ERL=8015 THEN CLOSE:BEEP:PRINT"===Filespec error===":RESUME 8005
9010 IF ERL=8030 THEN CLOSE 2:BEEP:PRINT"===Filespec error===":RESUME 8020
9015 IF ERL=8040 THEN CLOSE:BEEP:PRINT"===Disk Not Ready===":RESUME 8005
9020 ON ERROR GOTO 0
9025 '
10000 DATA bp,uj,po,cw,ig,cp,fc,fm,he,hm,lh,mb,mt,pa,op,pn,pc,sr,pl
10005 DATA 19,"<<",">>"
10010 DATA 2,"<<<",">>>"
10015 DATA 22,"< "," >"
10020 DATA 20,"<^","^>"
```

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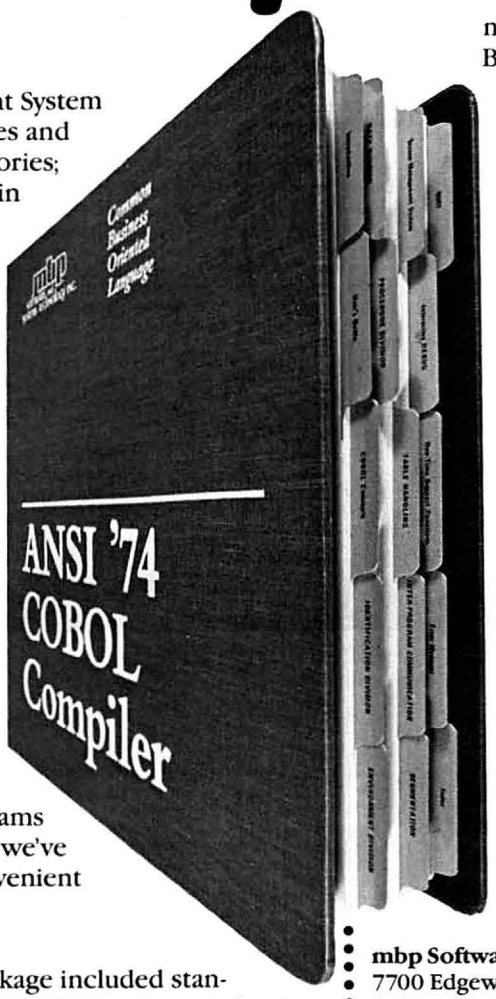

GIBSON MIX Benchmark Results
Calculated S-Profile
(Representative COBOL statement mix)
Execution time ratio

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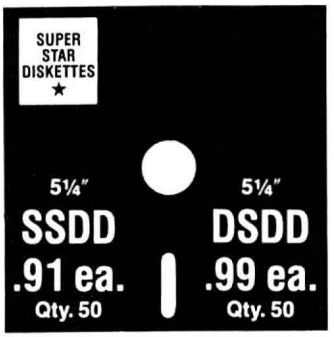

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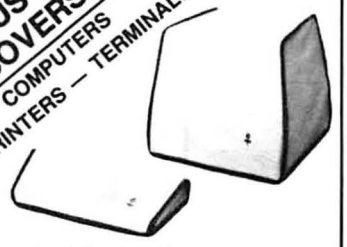

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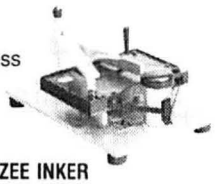

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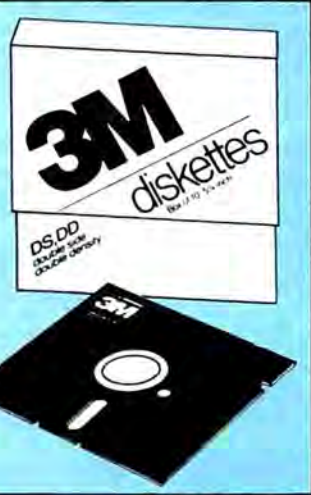

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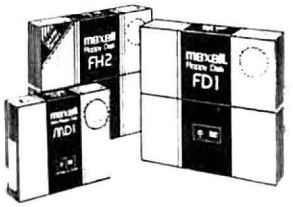

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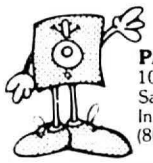

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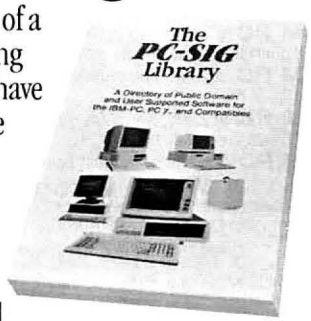

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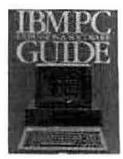

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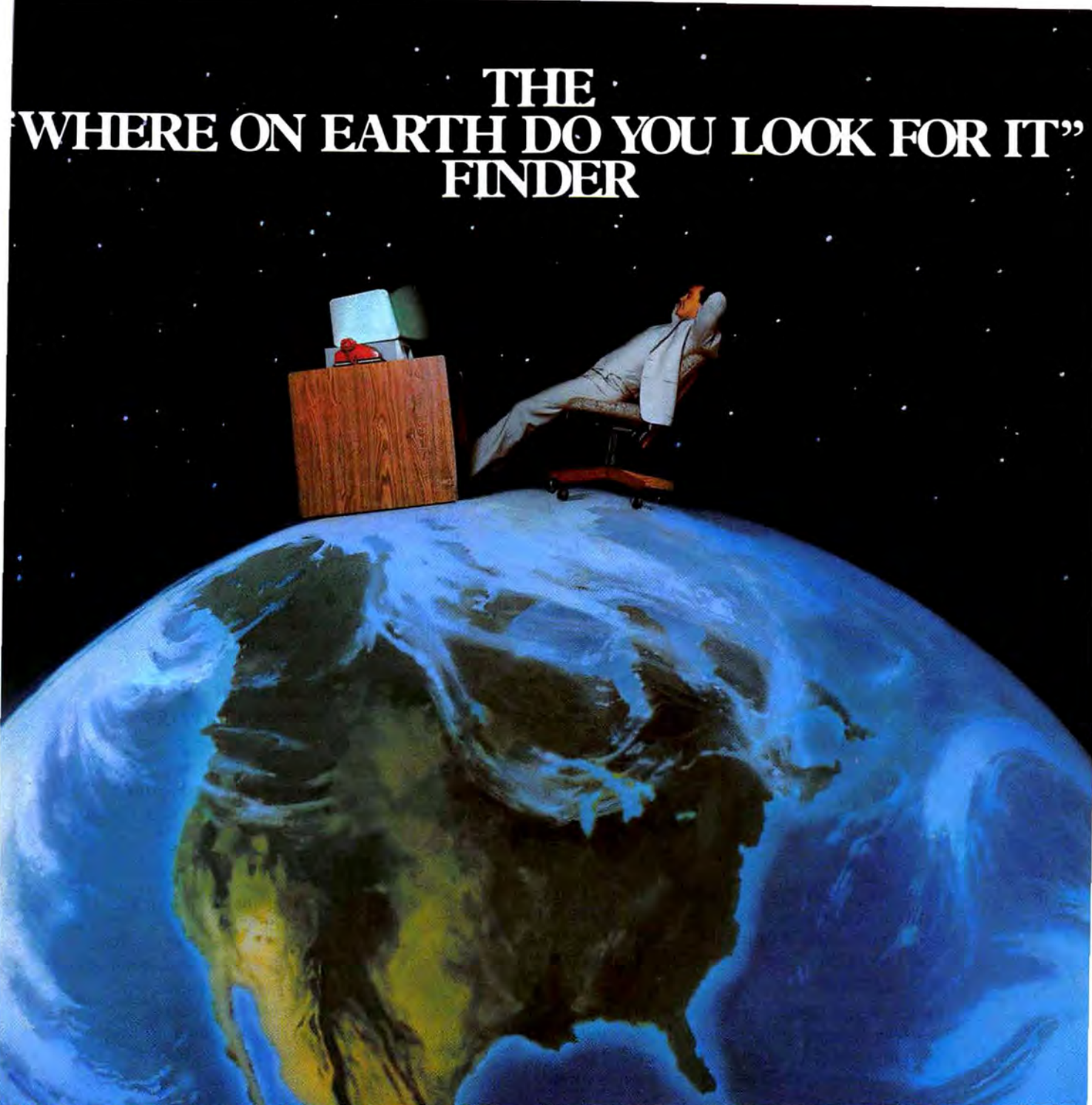

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All of the elements of the Macintosh Office will be on display. The 512K Macintosh, the LaserWriter, and AppleTalk™, as well as *Jazz*™ from Lotus, are just a few of the products you'll get to see.

The Macworld Exposition has a targeted schedule designed to fit your busy schedule. As a dealer, a distributor, a retailer, a business user, or an educator, the three-day conference and exposition is designed for you.

Day one is for dealers, distributors, retailers, and other third-party vendors to talk to Apple and the 100+ exhibiting companies about their products.

Days two and three are specifically geared for people interested in the Macintosh as a tool for business and anyone else interested in the Mac.

Who should attend?

Industry: Dealers, distributors, retailers, wholesalers, manufacturers, systems houses, consultants, technical programmers, all other ISOs
Business: CEOs, presidents, vice presidents, managers, comptrollers, owners/partners
Professionals: Doctors, nurses, bankers, lawyers, engineers, stockbrokers, real estate and insurance agents, CPAs, consultants
Education: Administrators, faculty, students

Here's a look at some of the conference sessions designed for you:

- The Outlook for the Mac in the Office
- Developing Software for the Macintosh
- How to Start and Survive in Business with a Macintosh
- Maximizing MacPaint®
- The Mac Clinic
- A Guide to Better Business Graphics
- Maximizing MacWrite®
- Database Management on the Macintosh
- Getting the Most out of Spreadsheet Programs
- How to Get Your Programs Published
- What's Available in Mac Software
- File Management Tips and Techniques
- Maximizing Macintosh Disk Storage
- The Mac in the Classroom
- The Mac in Higher Education
- Developing University Courseware with a Macintosh

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:he Macintosh™

Here are some of the companies who will be showing Macintosh products:

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Apple Computer, Inc.
Applied Logic Systems
Apropos Software, Inc.
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Assimilation, Inc.
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MACWORLD EXPOSITION
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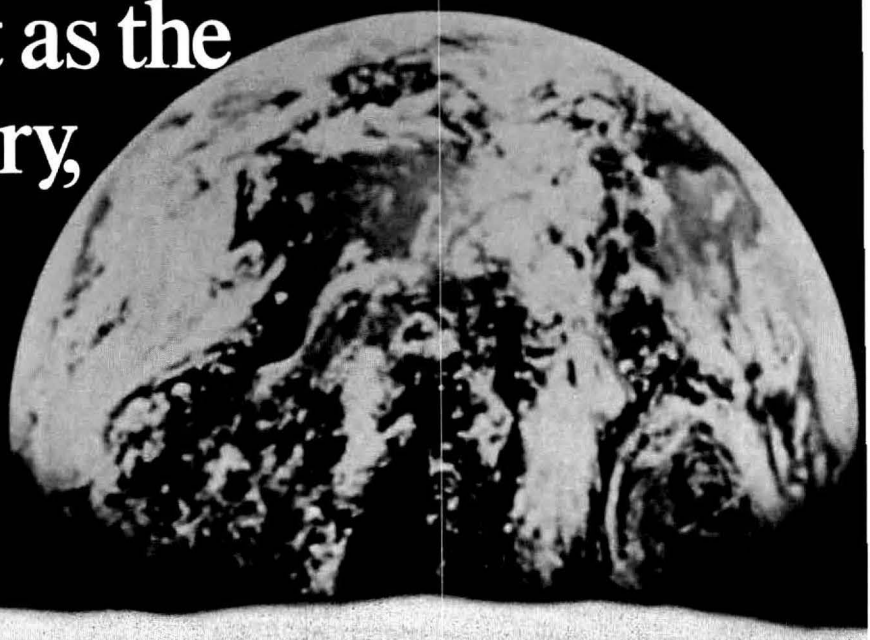
If the space program had advanced as fast as the computer industry, this might be the view from your office.



And space stations, Martian colonies, and interstellar probes might already be commonplace. Does that sound outlandish? Then bear these facts in mind:

In 1946 ENIAC was the scientific marvel of the day. This computer weighed 30 tons, stood two stories high, covered 15,000 square feet, and cost $486,840.22 in 1946 dollars. Today a $2,000 kneetop portable can add and subtract more than 20 times faster. And, by 1990, the average digital watch will have as much computing power as ENIAC.

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The other six are monthly magazines that concen trate on specific microcomputer systems. PC World the comprehensive guide to IBM personal computer and compatibles. inCider, the Apple II journal. Macworld, the Macintosh magazine. 80 Micro, the magazine for TRS-80 users. HOT CoCo, the magazine for TRS-80 Color Computer and MC-10 users. And RUN, the Commodore 64 & VIC-20 magazine

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Circle 112 on reader service card

Flash Flash Flash

TOP NAMES LOW PRICES LIGHTNING SERVICE

hardware

	Retail Price	Micro Flash
COMMUNICATIONS & EMULATION BOARDS		
CXI #3270 Coaxial	1595	1130
IRMA		CALL
Techland #3276 w/o Keyboard	795	640
EXPANSION CHIPS		
64K RAM		25
256K RAM Set of 9		119
GRAPHICS CARDS		
AST RESEARCH		
Monograph Plus	595	399
Hercules		
Graphics	499	319
Color	245	169
Paradise Systems		
Multiple Display Card	459	300
MASS STORAGE SYSTEMS		
Alloy		
Stor6300 for AT&T	4295	3261
Iomega		
Bernoulli 10/10 20MB	3695	2695
I-Square		CALL
Maynard		CALL
Media Tech		CALL
Micro Systems International		
MT25, 25MB	1050	890
Sysgen		
Sysgen II G-20	3995	2949
Quick File 20MB	1495	1199
MODEMS		
Anchor		
Mark XII	399	249
Hayes		
Smartmodem 1200	699	449
Smartmodem 1200B w/Smartcom II	599	395
2400 External IBM	899	699
Prentice		
Popcom X 100 External	475	380
Popcom C 100 Internal	444	355
U.S. Robotics		
2400	895	495
MONITORS		
AMDEK		
Color 500 RGB	525	345
Color 600 RGB	599	430
Color 710 RGB	799	575
PGS		
Max 12 Amber	249	179
HX 12	695	466
MULTIFUNCTION CARDS		
AST RESEARCH		
Six Pak Plus 64K w/Sidekick	395	262
MegaPlus II 64K	395	265
Emulex/Persyst		
Time Spectrum "0"K	295	221
Orchid Technology		
Blossom w/64K	395	252
PC Turbo w/128K	895	615
Quadram		
Quadboard 64K	395	245
PLOTTERS		
Bausch & Lomb		
DMP 595	595	480
DMP 695	695	558
DT-11 Digitizer	765	678
DT-114 Digitizer	810	720
Enter Computing		
Sweet P 6 Pen	1097	966
Nicolet Zeta		
Zeta 8	5950	5295
Zeta 824	11900	10500

	Retail Price	Micro Flash
PRINTERS		
Citizen		
MSP 10 160CPS	449	329
MSP 15 160CPS	649	489
Diablo		
639 API	2340	1795
Epson		
FX-80	569	425
FX-100	849	589
LX-80	399	295
Okidata		
Microline 84P	899	730
Microline 92 IBM	499	408
Microline 93 IBM	799	659
NEC		
P212	875	550
P312	1200	760
3550	1895	1485
TERMINALS		
Kimtron		
KT-7PC 12 inch	895	769
KT-7ASCII 14 inch	645	554
Wyse		
50	695	504
85	799	679

software

	Retail Price	Micro Flash
ACCOUNTING		
BPI		
General Accounting	595	395
OptionWare		
Multipaks	399	258
Sorcim/IUS		
General Ledger	595	395
COMMUNICATIONS		
Hayes		
Smartcom II	149	93
Menlo Corporation		
Insearch	495	350
Microstuff		
Crosstalk	195	117
DATABASES & INTEGRATED		
Ashton Tate		
dBase III	695	385
Framework	695	385
Cosmos		
Revelation	950	720
Innovative Software		
Smartware System	995	495
Micro Data Base System		
Knowledgeman	500	345
GRAPHICS		
BPS		
Business Graphf	350	255
Graphic Communications		
Graphicwriter	395	279
Koala Technologies		
Executive Presentation Kit	300	240
Microsoft		
Chart	250	155

	Retail Price	Micro Flash
LANGUAGES		
Borland		
Turbo Pascal 3.0	70	49
Digital Research		
C Compiler 3.0	395	275
Microsoft		
FORTRAN Compiler	350	230
MISCELLANEOUS		
Living Videotext		
Think Tank	195	125
SCHEDULING		
Breakthrough Software		
Time Line	395	300
Harvard Software		
Total Project Manager	495	375
Microsoft		
Project	250	155
SPREADSHEETS		
Innovative Software		
Smart Spread Sheet	495	350
Microsoft		
Multiplan	195	125
Sorcim/IUS		
Supercalc 3	395	237
UTILITIES		
Borland		
Sidekick Protected	55	35
Sidekick Unprotected	85	55
SuperKey	70	45
Bourbaki		
"1 Dir"	95	60
Funk Software		
Sideways	60	45
WORDPROCESSING		
Innovative Software		
Word Processing	395	250
Life Tree		
Volkswriter Deluxe	295	177
Micropro		
Wordstar 2000	495	259
Microsoft		
Word with Spell	375	235
Multimate International		
Multimate	495	247
Samna		
Word III	550	376
SSI		
Wordperfect	495	250

CALL ABOUT FULL LINE OF MACINTOSH SOFTWARE

Micro Flash Terms: Purchase Orders accepted. $6.00 shipping charge for UPS surface. Printers, plotters and monitors higher. Add $3.00 for UPS 2nd day air. Call for information on CODs, US mail or foreign orders.

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Ask about our 365 DAY WARRANTY

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QIC-60 streaming tape backup is more than just fast and simple to operate. It's also the leader in powerful processing.

For example, our unique five-head tape deck offers immediate read-after-write verification. No rewinding necessary. And no re-recording of the entire backup after an error.

Another powerful advantage is automatic adjustment of the head mechanisms to seek the best track alignment every time a tape is inserted. Plus our exclusive power sensor is designed to alert and freeze the write head if PC power is reduced, which eliminates the chance of disk damage. We're so confident in the technical excellence of QIC-60 that we offer an aggressive one-year limited warranty on the entire line, compared to the 90-day warranty provided by other manufacturers.

Best of all are a pair of backup bonuses that turn QIC-60 into a sophisticated data management tool. When you select mirror-image restore, QIC-60 sees bad disk sectors and automatically reroutes data to safe locations for improved data reliability.

Tecmar offers AT owners a special enhancement with an internally-mounted QIC-60 tape drive that costs even less than external systems. And when you add our internal AT Hard Disk to the package, you have a fully upgraded system ready to use today.

Pure speed. Pure power. Pure innovation from Tecmar.

For a free demonstration of the new standard in tape backup, see your Tecmar dealer or call us at **216/349-1009** for the location of the dealer nearest you.

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THE POWER BEHIND THE PC

6225 Cochran Road Solon, Ohio 44139

Circle 190 on reader service card

Ven-Tel's Half Card™ modem is in all the best computers. Here's why...

Ven-Tel gives you lots of reasons to buy our Half Card™ modem for your IBM PC or compatible. The Half Card™ is a complete system that lets you communicate with other PCs, mainframes, and databases effortlessly. It includes Crosstalk-XVI® software. It's reliable. It's got all of the features you want. And it's a good value.

Do You Own One of These Computers?

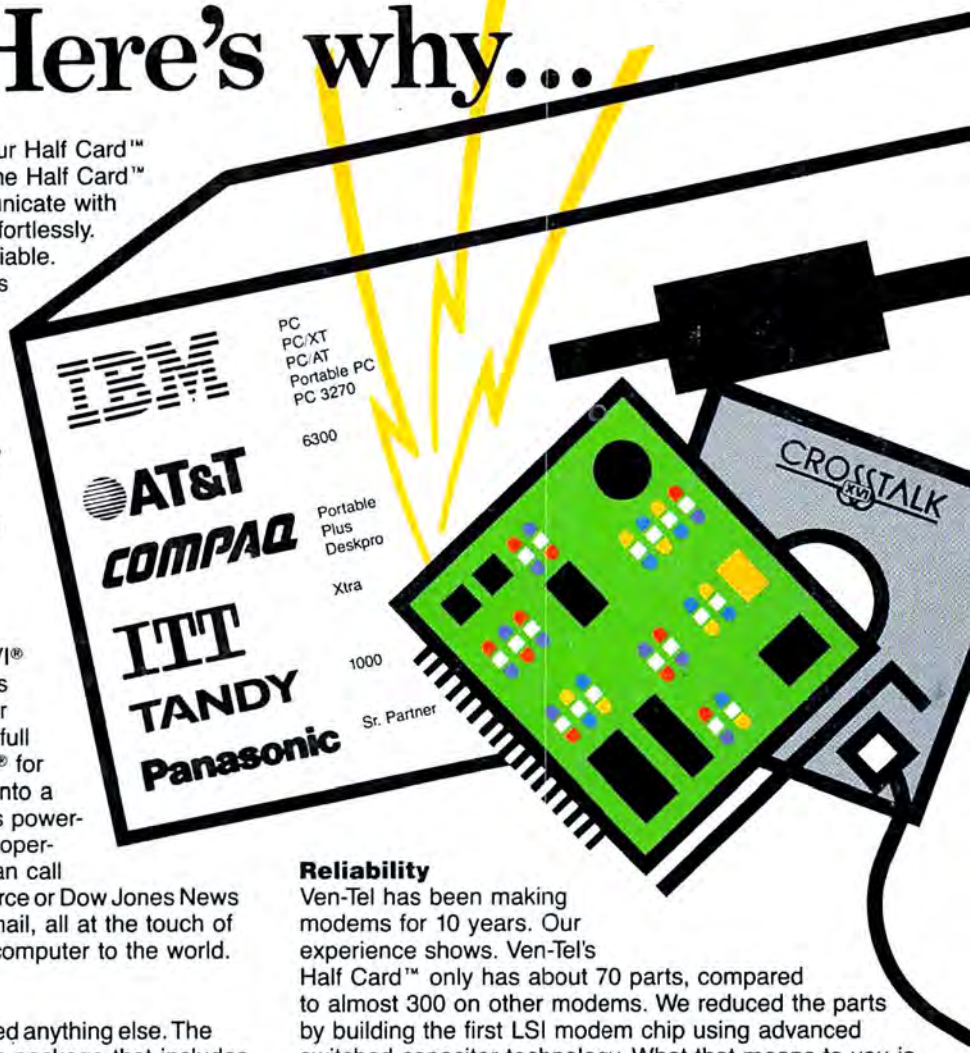
Chances are you do. And if you're thinking of buying a modem, consider the Half Card™. Because of its small size, the Half Card™ fits in more computers, including all of the models we've listed here. The Half Card™ is small, so it fits in short slots or long. That means you can save your long slots for other expansion uses.

Effortless Communication

Each Half Card™ comes with Crosstalk-XVI® communications software, by Microstuf. It's the easiest to use, whether you're a beginner or an old hand, and the most powerful. A full on-line help menu makes using Crosstalk® for the first time a snap. It can turn your PC into a terminal on a mainframe computer with its powerful terminal emulation feature. It will even operate your PC when you're not there. You can call into an information service such as The Source or Dow Jones News Retrieval, or transfer files and electronic mail, all at the touch of a button. The Half Card™ connects your computer to the world. Effortlessly.

More Modem for Your Money

When you buy the Half Card,™ you don't need anything else. The Half Card™ is a complete communications package that includes a full-featured modem and the best known software on the market. Complete easy-to-understand instructions with full technical support on installation and use. And a very competitive price. The Half Card,™ with Crosstalk-XVI® software, retails for only $549.



Reliability

Ven-Tel has been making modems for 10 years. Our experience shows. Ven-Tel's Half Card™ only has about 70 parts, compared to almost 300 on other modems. We reduced the parts by building the first LSI modem chip using advanced switched capacitor technology. What that means to you is greater reliability and lower power consumption, so you can load up your PC with expansion boards and not worry about heat or power problems. And we back the Half Card™ with a fu two-year warranty on parts and labor.

Features

- 1200/300 baud auto-dial, auto-answer.
- Uses the industry standard "AT" command set.
- Runs with virtually all communications software, including Smartcom II and PC Talk III and integrated packages such as Symphony and Framework.
- Includes Crosstalk-XVI® software.
- On-board speaker and extra phone jack for easy switching from voice to data mode.
- Selective tone or pulse dialing; full or half duplex.
- Automatic answer on any ring.
- True ring or busy signal detection.

You Can Buy the Half Card™ Anywhere

You can get the Half Card™ at Comput Land, Businessland, the Genra Group, Entré Computer Centers, Macy's Compu Stores and other fine dealers nationwi Also from Ven-Tel: the 1200 Plus,™ an external modem and the PC Modem 1200,™ an IBM internal with V.22 inter-national capability.

Effortless Communicatio

Ven-Tel Inc

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(408) 727-5721

Crosstalk is a registered trademark of Microstuf, Inc. Smartcom II is a trademark of Hayes Microcomputer Products. Symphony is a trademark of Lotus Development. Framework is a trademark of Ashton-Tat

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