

# PC WORLD

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*The Comprehensive Guide to  
IBM Personal Computers and Compatibles*

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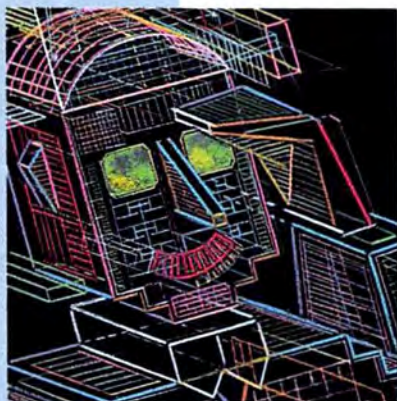
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# PC WORLD

*The Comprehensive Guide to IBM Personal Computers and Compatibles*  
January 1986



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# PC WORLD

January 1986  
Volume 4, Number 1

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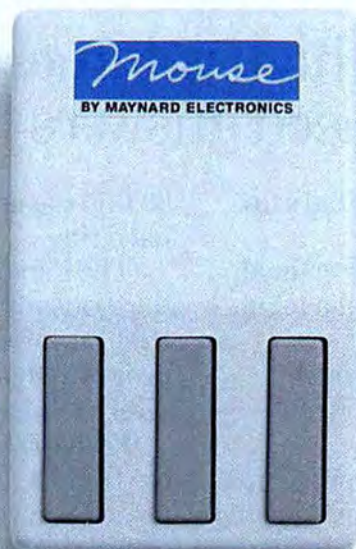
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# This Little Fella Means Business.

The Mouse by Maynard Electronics makes your favorite programs faster, easier, and smarter!



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At last, an "intelligent" mouse! Now you can add command power to your programs, when you want, the way you want — instantly! The Mouse by Maynard Electronics comes with our CustomKey™ software which lets you assign and reassign commands **while using your favorite programs — even those without mouse utilities.** Fly through programs like Symphony\*, Lotus 1-2-3\*, Framework\*, MultiMate\*, and others with undreamed of speed! And of course, it's fully compatible with all programs written for a mouse, too.

## A Tale Of Three Mice . . .

Compare our Mouse with the others running around and you'll see, there's no comparison! Here are just a few features across the board:

FEATURES	Maynard Mouse	Micro-soft	Mouse Systems
# of Button Combinations	7	3	5
Button Auto Repeat	Yes	No	No
Diagnostics	Yes	No	Yes
Dynamic Scaling	Yes	No	No
Cursor Overshoot Control	Yes	No	No
Adjustable Cursor Speed/Up, Dn (while running application)	Yes	No	No
Adjustable Cursor Speed/Rt, Lft (while running application)	Yes	No	No
Buttons-Definable (while running application)	Yes	No	No
Macros-Definable (while running application)	Yes	No	No
User-Definable Alternate Cursor Movement	Yes	No	No

## Free Drawing!

Purchase The Mouse now and receive the popular paint program Telepoint\* at no additional cost — a \$149 value!



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# The personal computer that raised high performance to new heights.

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You need a personal computer that's up to the task.

Which is why IBM created the Personal Computer AT® system. It's changed a lot of ideas about business computing.

The idea of "fast" has become much faster. The idea of "data capacity" has become far greater.

There are new definitions of "power" in a stand-alone PC. While phrases like "sharing files" and "multi-user systems" are being heard more often.

And surprisingly, words like "affordable" and "state-of-the-art" are being used *together*.

Clearly, the Personal Computer AT is different from anything that came before. And what sets it apart can be neatly summed up in two words.

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If you've ever used a personal computer before, you'll notice the advances right away.

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You can also use a Personal Computer AT as the centerpiece of a three-user system, with your existing IBM PCs as workstations.

Most important, only the Personal Computer AT offers these capabilities *and* IBM's commitment to quality, service and support. (A combination that can't be cloned.)

If you'd like to learn more about the IBM Personal Computer AT, see your Authorized IBM PC Dealer, IBM Product Center or IBM marketing representative. For a store near you, call 1-800-447-4700 (in Alaska, call 1-800-447-0890).

## The IBM Personal Computer AT, for Advanced Technology.

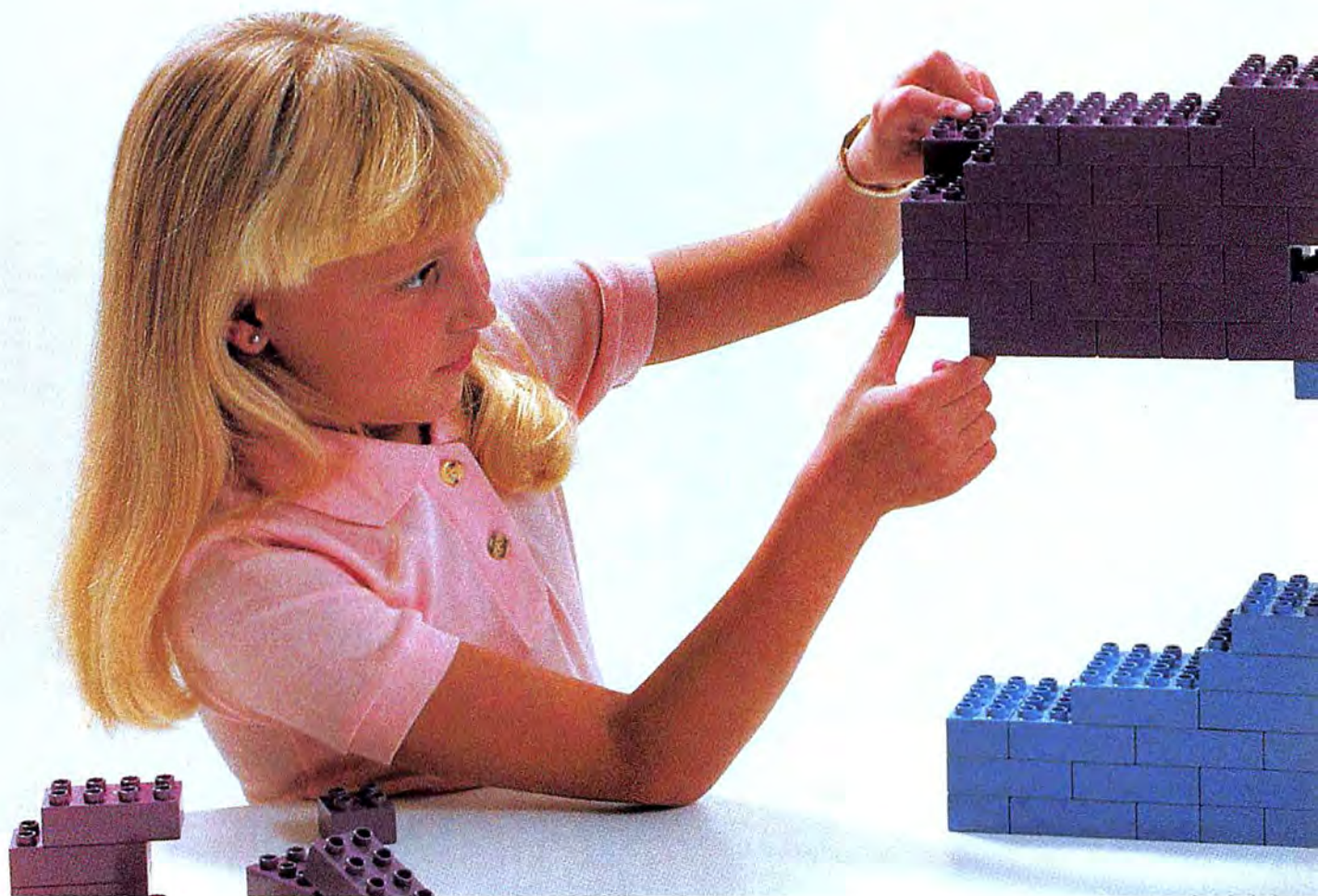




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# Sharing Resources Is Often The Sim



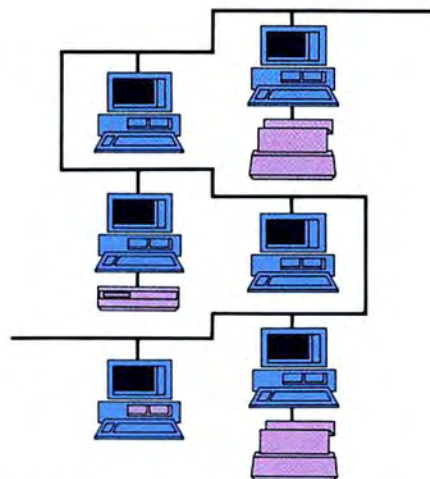
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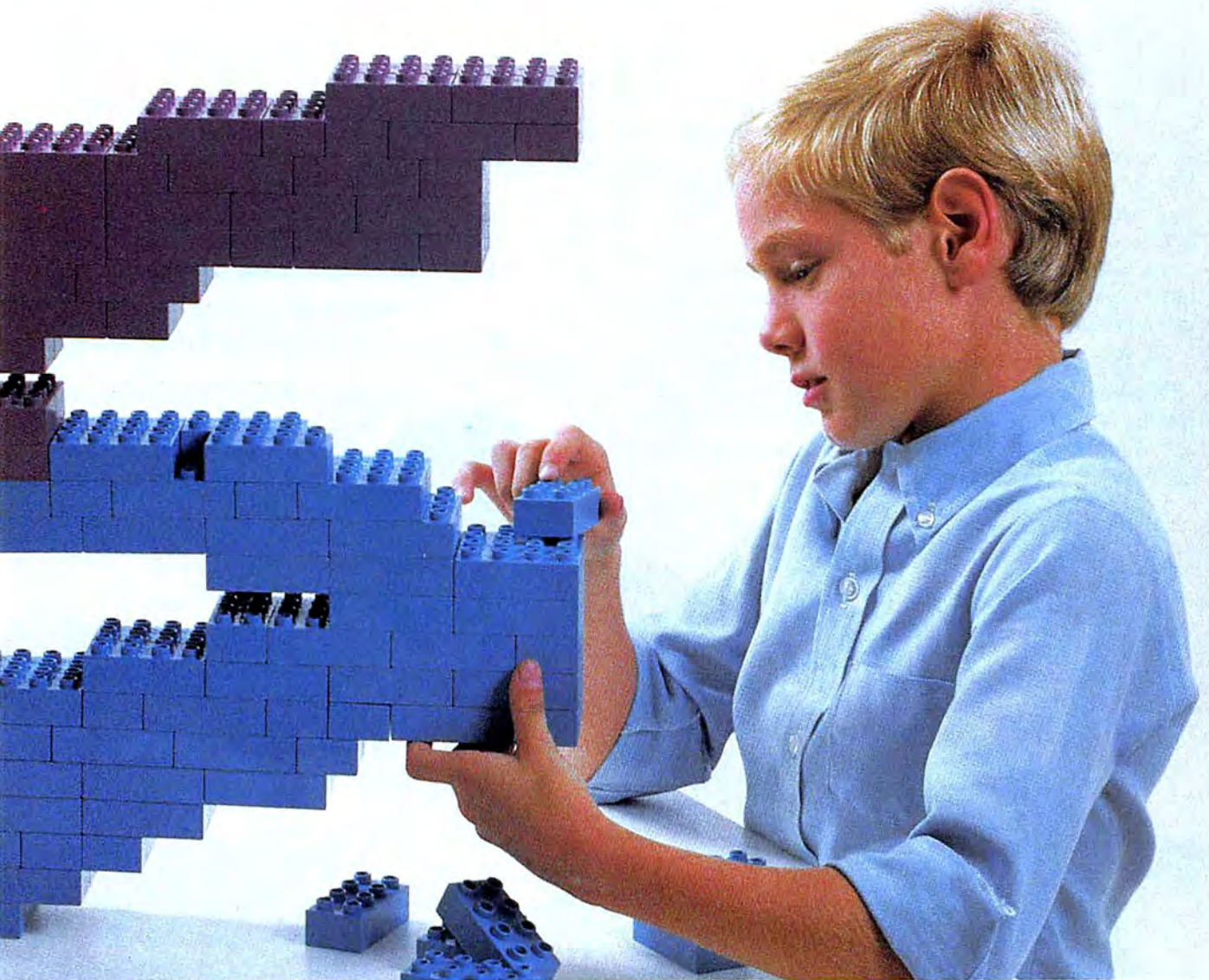
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*With the new AST-Resource Sharing Network, you can easily and efficiently share data files and expensive peripherals like high speed laser printers and hard disk subsystems.*



# Simple Solution To Complex Problems.



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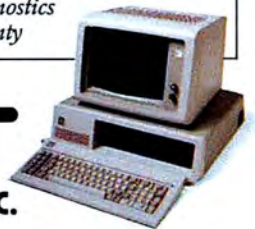
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# Why drive wh

This is an ad to introduce the latest in mouse technology from Microsoft.

A device in which you need have no interest.

Unless you use Lotus\* 1-2-3\*, WordStar\*, Multimate\*, DisplayWrite\*, VisiCalc\*, Microsoft\* Project, Word, Multiplan\*. Or any of scores of other programs which run faster and more efficiently with the benefit of the Microsoft Mouse.

The Mouse, with its whimsical name, is somewhat misunderstood. But for those who find its name frivolous, we can assure you, its function is extremely practical.

## When pointing is quicker than typing.

The Mouse is not intended to replace your keyboard. But the fact is, there are many times when it can transport you from Point A to Point B considerably faster and more naturally than your fingers on a cursor key.

The Mouse skips through paragraphs. Highlights sentences or entire passages.

Instead of sliding like a cursor—right, left, up, down—the Mouse flies directly over a screen-full of cells to a pinpoint landing at your destination.

And because the Mouse substitutes for cursor keys, you can leave the numerical keypad in NUMLOCK to save yourself a lot of inefficient switching. In short, our Mouse makes shorter work of daunting projects.

## What's on the menu.

With the Mouse, you can initiate commands with a mere point-click.

And much of what you are doing by hand today can be automated through our Mouse Menus. They let you translate multiple key commands and





# en you can fly?

mouse moves into a one mouse-click operation.

We supply a roster of pre-programmed menus for such programs as WordStar, 1-2-3, Multiplan and VisiCalc. And it's a simple matter to customize your own menus for other programs.

## Fine points of the Microsoft Mouse.

Having been left to our own devices for several years now, we have raised them to a high degree of perfection.

Some evidence of excellence: Our new Microsoft Mouse delivers twice the resolution of most other mice—200 points per inch. An aid to faster, smoother, more precise pointing. All of which can be accomplished with just the merest movement of your wrist. And on any reasonable desk surface.

We've also engineered a new body. With wrap-around command buttons designed to fit naturally in the palm of

any size hand. Details which may sound a bit droll. But the benefits are very practical.

## Take it for a test flight.

We're not suggesting you throw your keyboard overboard. But we are inviting you to try out our new Mouse at your Microsoft dealer. To see how effectively it can accelerate your personal computer operations.

From then on, you can wing it.

# Microsoft

The High Performance Software™

Microsoft Mouse also comes with  
Microsoft Notepad, PC Paintbrush,™ and Practice Programs.

For the name of your nearest Microsoft dealer, call (800) 426-9400. In Washington State and Alaska, (206) 828-8088. In Canada, call (416) 673-7638.



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- High Speed—up to 10MB in just 2 minutes
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- 20MB backup capacity
- Same price as 10MB floppy tape systems
- Internal and external models for the PC, XT and AT

	EVEREX EXCEL STREAM-20	Floppy Tape	Sysgen Image
Capacity	20MB	10MB	10MB
No extra slot needed	•	•	•
Backup time for 10MB	2min.	16min.	4min.
Automatic Verification	•	•	•
Automatic formatting	•	•	•
File-by-File Restore from Image Backup	•	•	•
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EXCEL STREAM-20 is a trademark of Everex Systems Inc.

Replace your floppy disk controller with Everex's combination cassette AND floppy disk controller—no extra cost, no extra slot needed. Data is *automatically* verified/corrected and the tape is pre-formatted during backup—saving you the 30 minutes you waste to format and verify with a floppy tape system. The STREAM-20 includes the most advanced backup/restore software. The choice is simple—the Everex EXCEL STREAM-20 Cassette backup system—High Performance backup at a floppy tape price. Visit your local Everex Dealer today and ask to see the STREAM-20 in action. For the name of your nearest Everex Dealer, please call 415-498-1111.

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David Bunnell

It's 1986 and everybody who's anybody makes far-reaching predictions about the future of personal computing. Is it fact or fiction? Art or science?

# The Art of Making PC Predictions

**A**t the recent *PC World* Forum dinner, Adam Osborne, president and CEO of Paperback Software, posed a tantalizing question to the dinner guests—distinguished pundits, moguls, and gurus of the personal computer industry.

"Are there people here who go by astrologers, soothsayers, divining chicken entrails, or whatever?" Osborne asked.

He was quite serious, although you could hear a little irony in his voice.

George Morrow, president and CEO of Morrow Designs, scratched his head. "Are there people like that?" And Brian Jeffery, a Silicon Valley-based PC analyst, said, "That's what market research is all about."

Osborne then made his point. "In this industry it seems like chance makes all the difference between tens of millions of dollars and zip. And after a while, you wonder, Why me? and you get superstitious!"

What Osborne says probably has some truth to it, but people might easily dismiss his notion that destiny in the PC world is just

dumb luck or the result of some evolutionary marketing theory.

However, I think Jeffery's idea that most market research is the equivalent of reading tea leaves or doing the tarot is really right on. All you have to do is look at the track record of major industry analysts who have been busy making predictions about trends and sales figures. They are constantly revising their estimates upward or downward.

That seems to be par for the course. You can't deny that making PC predictions is fun—although I firmly believe that there is definitely an art to making accurate predictions.

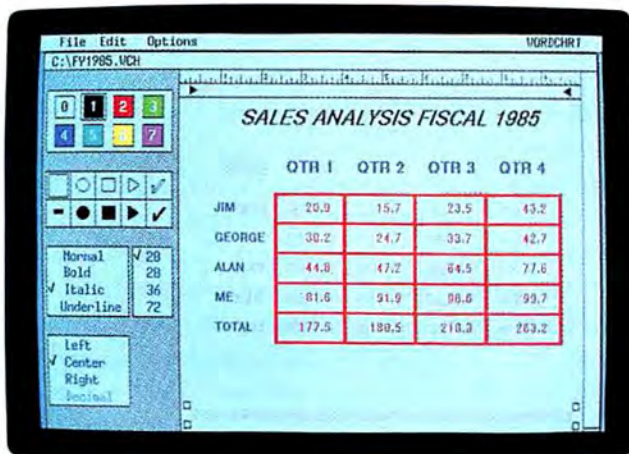
In this issue, Bill Gates, Dan Bricklin, and a number of other big shots make their predictions about personal computers in the next three years.

In reading their astral musings, I found that they made lots of interesting predictions but they weren't really very daring—they were actually kind of conservative.

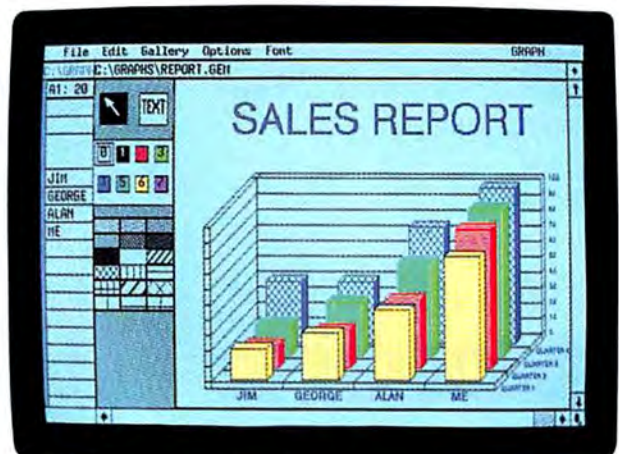
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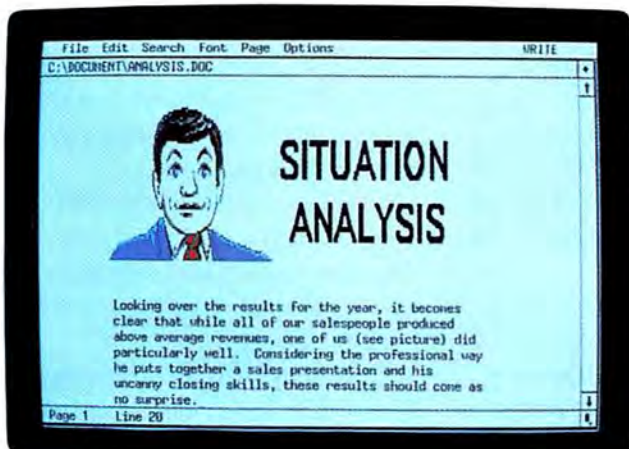
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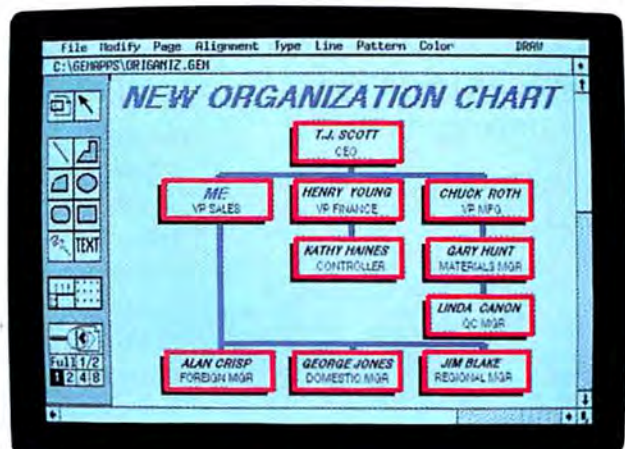
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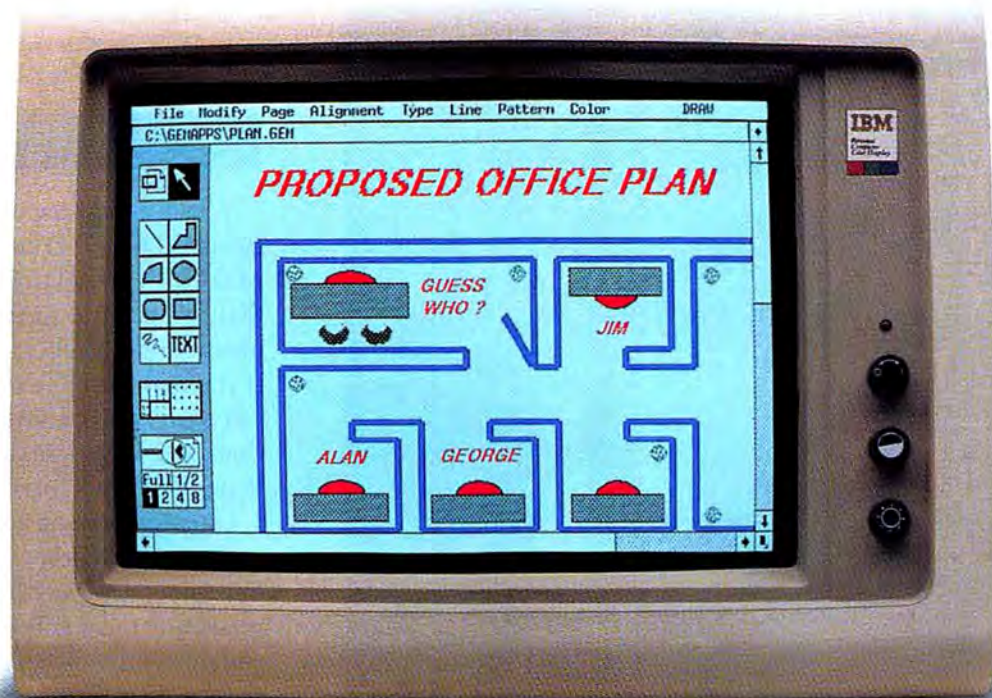


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David Bunnell

Which brings me to the "David Bunnell Theory on the Art of Making PC Predictions." I think that the secret to success is in the number of predictions you make. If you make enough of them, you can remind people of the predictions you were right about and hope that they'll forget the others.

Of course, we have to remember that market analysts got into hot water last year by overpredicting the number of personal computers that people were going to buy.

So I'm adding a rule to my theory: You should make lots of predictions, but you should never predict the exact number of machines that are going to be bought.

I've put all these principles to work in making my own predictions as sort of a psychic supplement to the prophecies of the industry moguls and visionaries in this issue:

- My first prediction is an easy one: In three years people will have lots more memory in their PCs.

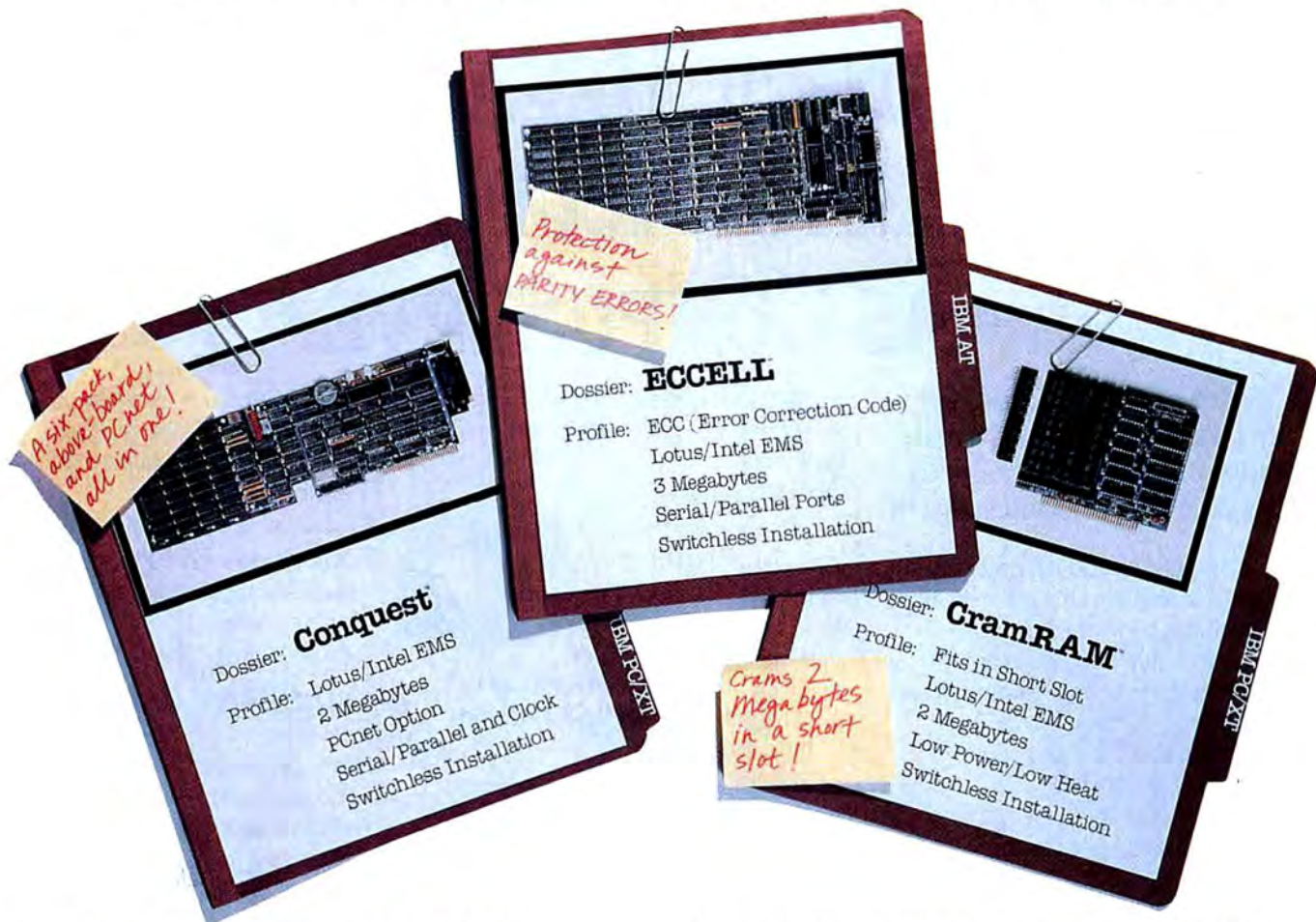
- Desktop publishing will emerge as a super-high growth area for PCs, perhaps equaling the growth of the financial planning field that was spurred on by spreadsheet software.

- The next *VisiCalc* will be written in the next three years, and it will probably be in the desktop publishing area. This software will radically change the nature of business documents, and the number of newsletters and reports will increase greatly. The change will principally affect advanced versions of the Macintosh

*(continues)*



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- IBM will endorse *Microsoft Windows* and drop *TopView*.

- AT&T will retaliate by licensing the Macintosh interface from Apple.

- The 386 chip won't become a big deal. Almost everyone predicts that it will, so they're probably going to be wrong. That's *my* prediction.

- UNIX will finally happen, but when it does it will be a shell that fits over MS-DOS. And it will probably be in the form of Xenix or something similar.

- Steve Jobs will introduce a super-high-end, low-cost machine that will ... who cares? It will be wonderful.

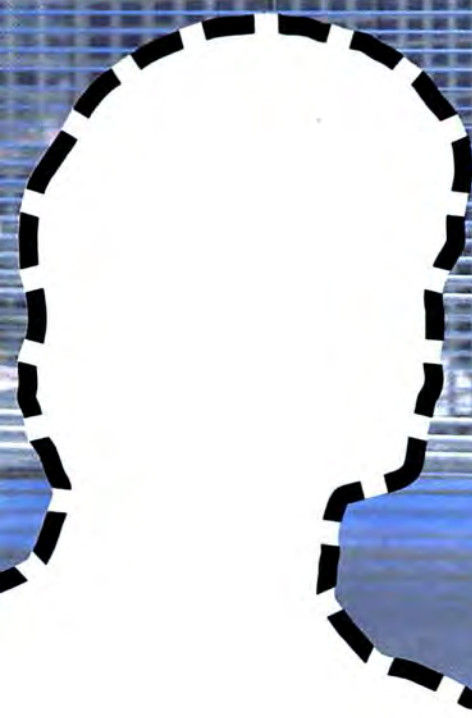
- Bill Gates will bring out a rock 'n' roll album. He will go into hibernation for a year to think about software and how to change the course of the personal computer. In the process, he will become fascinated with music synthesizers and music software.

He will end up composing an entire album using PCs, and it will be a big hit. He will go one step beyond Wozniak by sponsoring the first worldwide rock 'n' roll

(continues)



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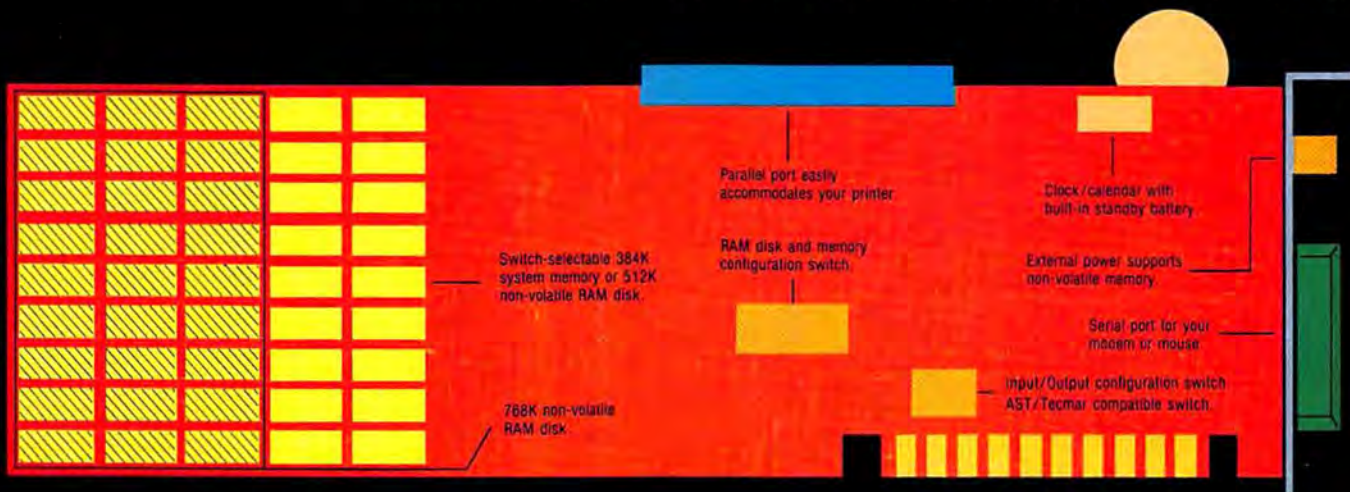


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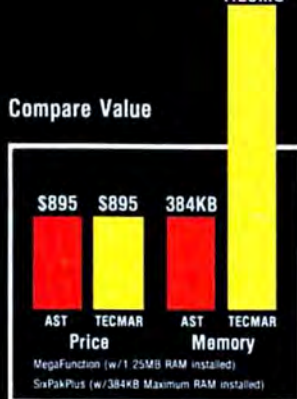


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- Mitch Kapor will get involved in Massachusetts politics, first as a supporter and behind-the-scenes campaigner for a major politician. He will then decide to enter the political arena himself, running for either governor or senator of Massachusetts.

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- Steve Wozniak will single-handedly stem the tide of the Japanese electronic invasion by creating a home computer interface for controlling home entertainment systems. Thanks to Woz, Japan's MSX will miss the boat. In fact, it will be torpedoed!

- My final prediction—in line with the strict rules for making successful predictions—concerns the number of personal computers that will be bought in the next three years. There will be a lot of machines bought. You have my word on that. ●



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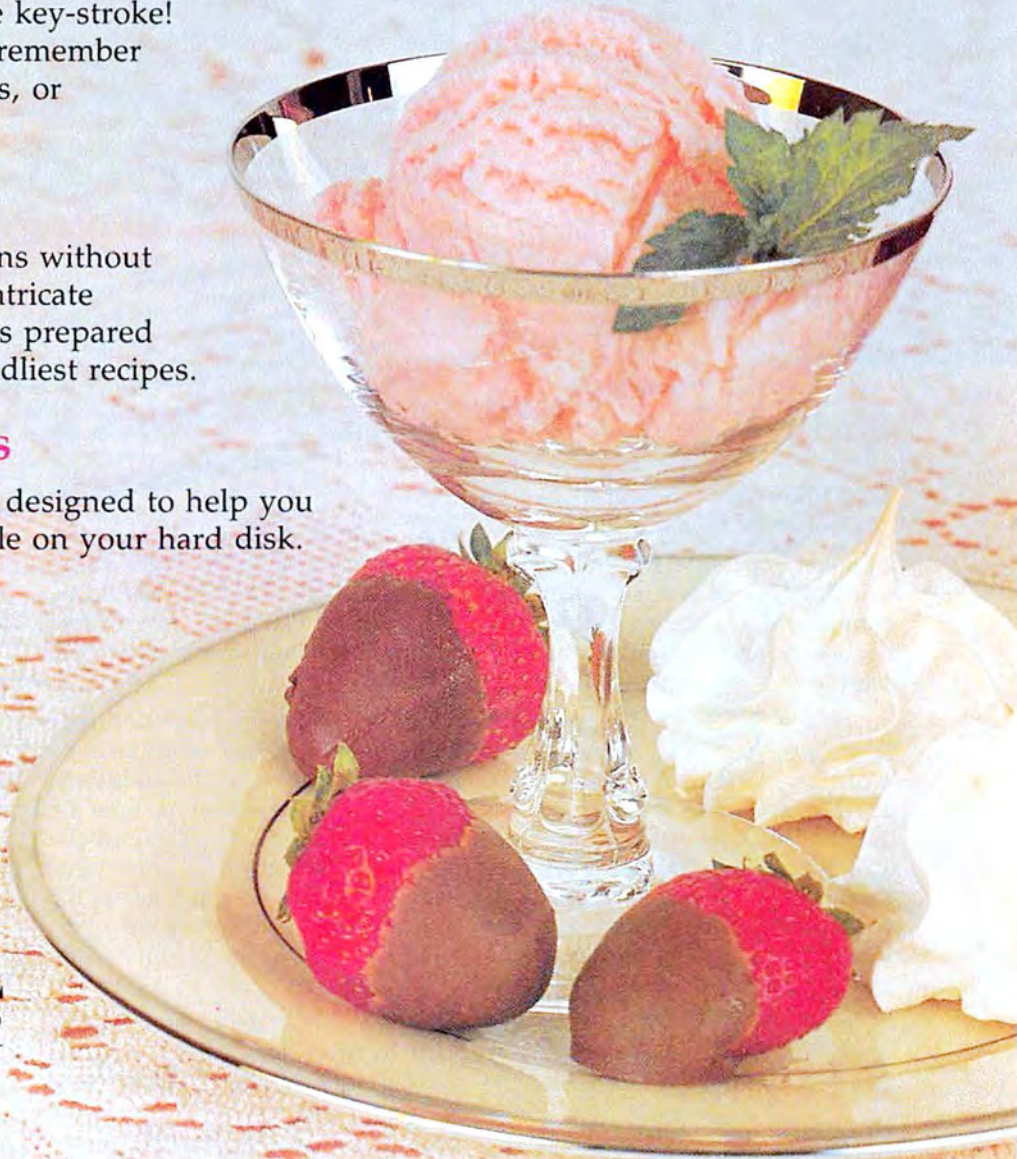
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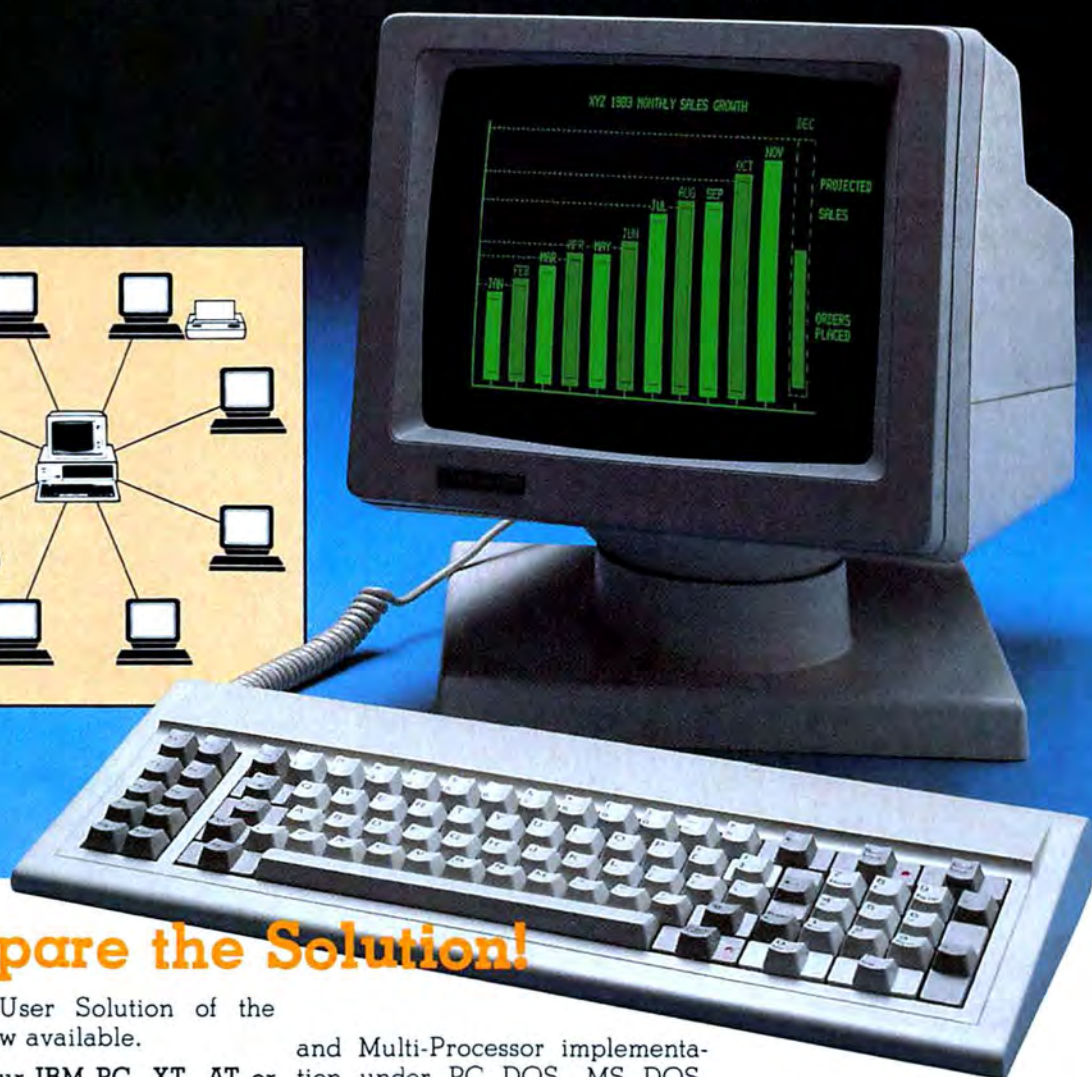
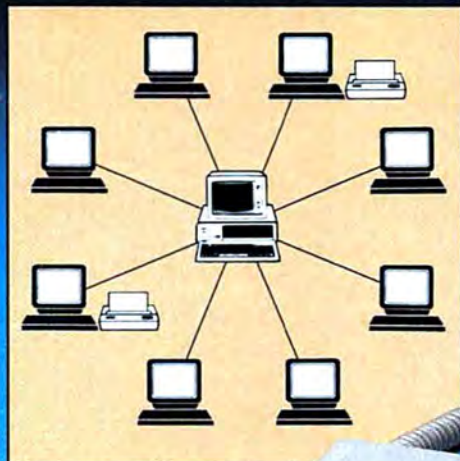
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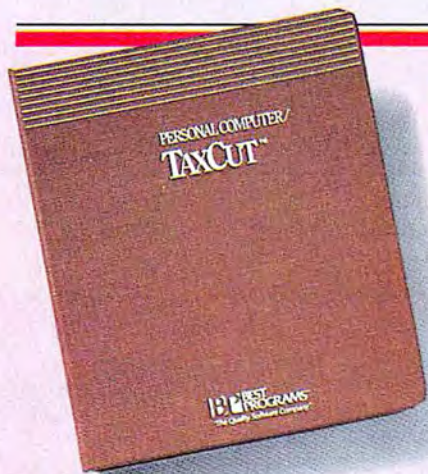
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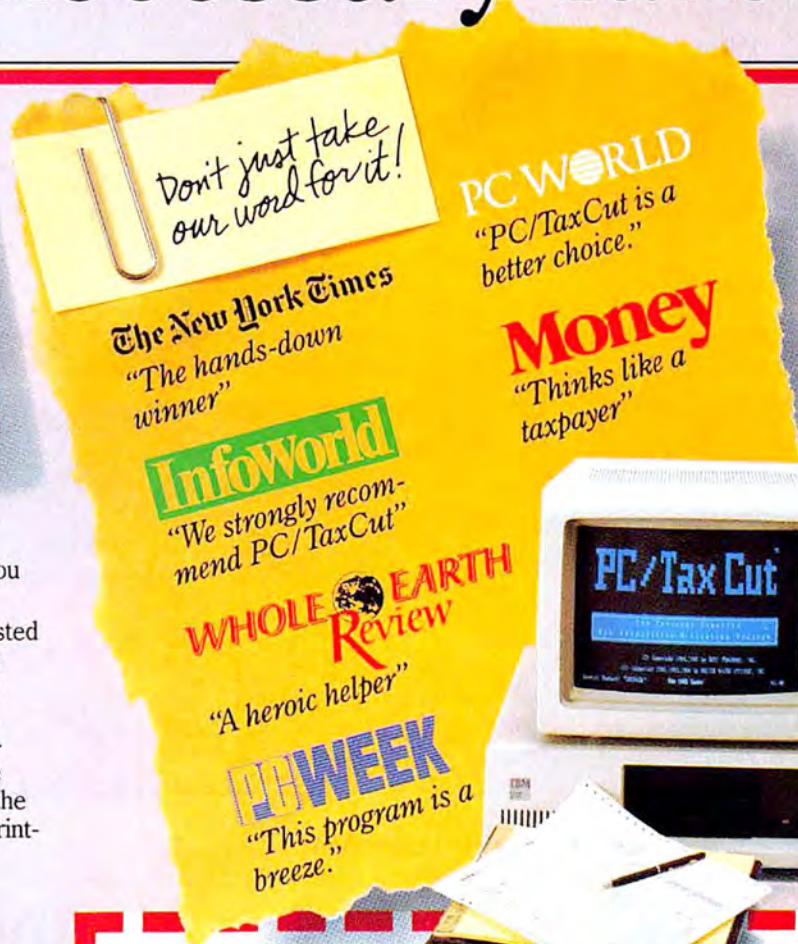
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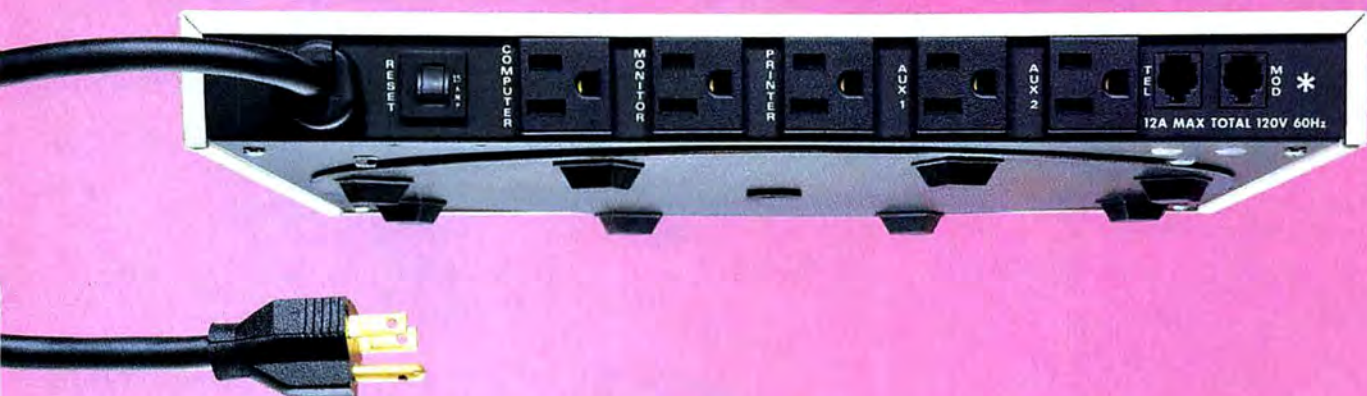
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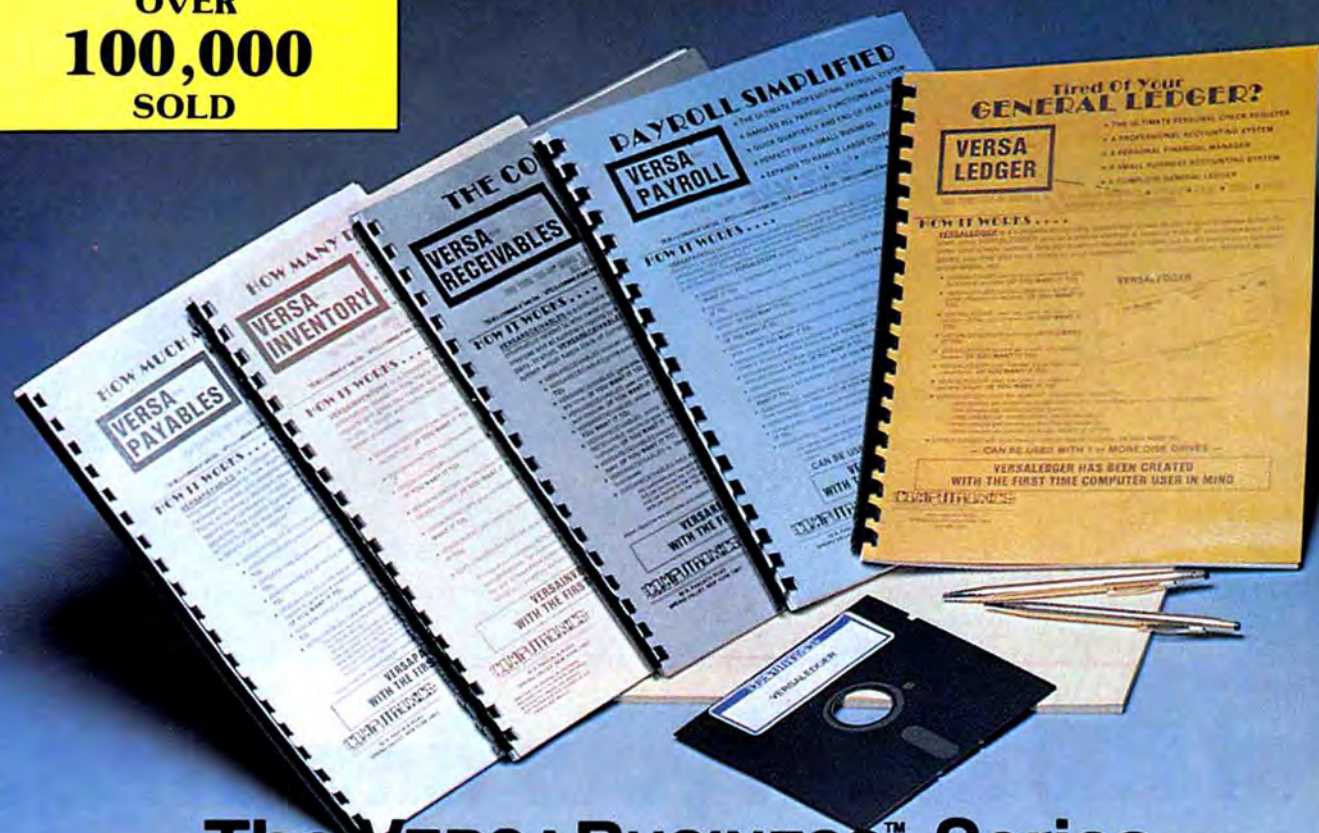
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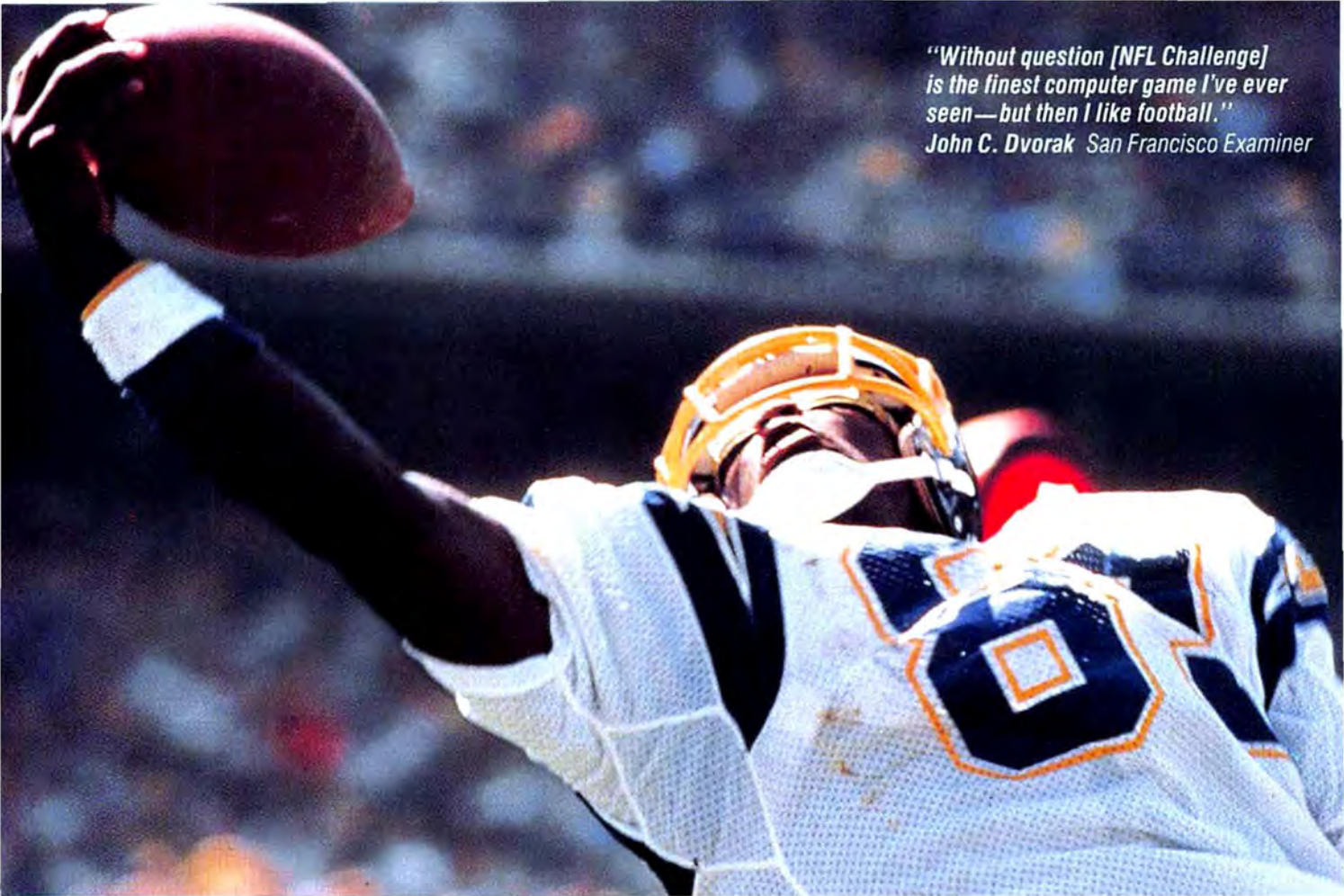
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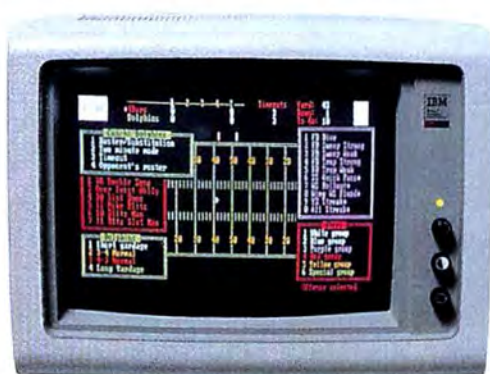
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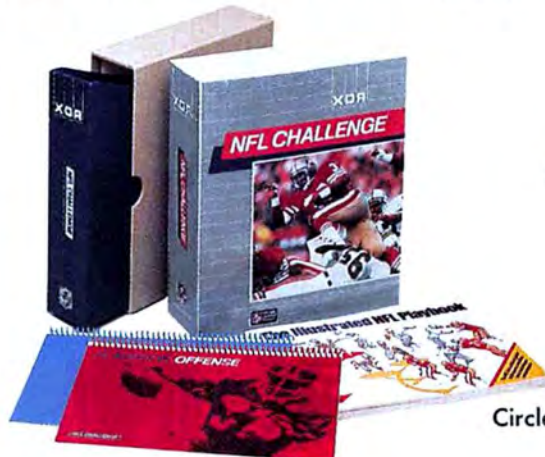
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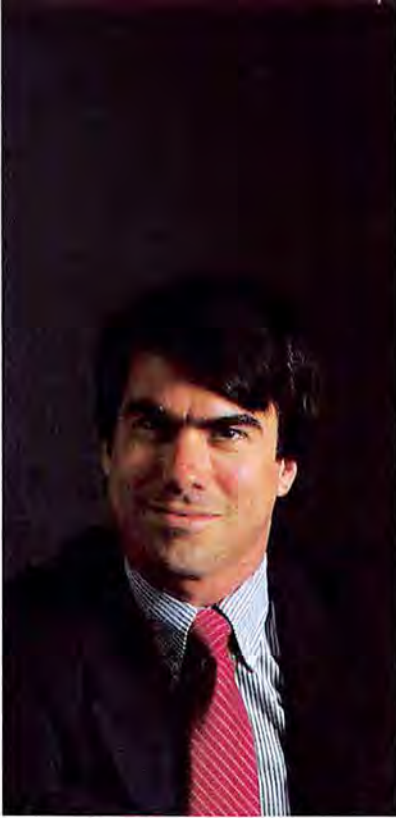
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Toth had escaped Hungary for the United States in 1969 and in short order began to emulate his hero, Thomas Edison. He graduated from Columbia and landed a job writing mainframe programs, but his real interest lay in his off-hour inventions. He came up with a better electric shaver and, for the man in a hurry, spring-soled shoes, but he couldn't get either to market.

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advisers looked at the 1-2-3 send-off and estimated it would cost another \$3 million to bring his idea to market in similar fashion. Thus began Toth's venture capital nightmare.

Armed with a demonstration program, his management team's résumés, and a business plan, Toth spent the next year and a half singing and dancing for big bucks. Things looked good when one of the original investors, Olivetti Corporation, agreed to put up half the needed funds if matching monies could be found, and a Citicorp vice president recommended the bank take the rest of the action. But the members of Citicorp's executive committee had read the headlines bemoaning big losses in the software business and decided a software company would be a bad risk.

The original investors pulled the plug, and all but Toth and one marketing type were back out on the street.

**W**hen Robert Shostak and Richard Schwartz got started, back before there was an IBM PC, venture capital was the furthest thing from their minds. Their problem was memory capacity.

During their days at the Stanford Research Institute (SRI), Shostak and Schwartz used AI to verify programs. AI techniques enabled a NASA engineer to be confident that the program he had written would guide a rocket into space instead of, say, into downtown Miami.

At night and on weekends, Shostak and Schwartz worked on

a means of allowing novice computer users to put data into a friendly program instead of into a place from which they might never get it back—like a *dBASE II* file.

They were inspired by the work of two other academicians, Dan Bricklin and Bob Frankston. The program that team had written, *VisiCalc*, was not necessarily more useful than other personal computer programs; what had made Bricklin, Frankston, and their publisher rich and famous was that *VisiCalc* was more playful.

Schwartz and Shostak thought they could make a powerful microcomputer-based data manager playful by creating a little AI genie that would take care of the complex syntax and logic of data bases. They would simply invert the AI techniques they used during the day, which deduced a program's action from its logic, and create a product that deduced the needed logic from a simple representation of the desired action.

AI had one nagging problem, however. The problem emerged with a vengeance following one of the many speeches Schwartz gave on his work at SRI. Someone asked how much it cost to verify a program.

"Well, it's hard to put an exact figure on it, but it's in the neighborhood of \$1000 per line of code verified," Schwartz said.

"Do you give quantity discounts?" a wiseacre asked, drawing a laugh.

"No," Schwartz shot back. "Our prices go up exponentially

(continues)



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*Marc Stern, InfoWorld*

"What you see, then, is an interesting hybrid of a database and a spreadsheet that is ideal for analyzing tabular data."

*Adam B. Green, InfoWorld*

"More flexible than spreadsheets, this easy-to-use database analysis package presents information with visual clarity...Reflex is for you. The flexibility of switching between different views of the data lets you see relationships you may have previously overlooked...Without 'what-if' analysis, key variables—such as cost of goods sold or travel expenses—may be out of hand but unnoticed. The type of analysis to uncover such a foible is awkward to do on a spreadsheet, yet, it may mean the difference between success and failure in a competitive situation."

*Ira H. Krakow, Business Computer Systems*

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You use Reflex's Form View to build your database; the List View lets you put data in tabular List form; the Graph View gives you instant interactive graphic representations; the CrossTab View gives you amazing "cross-referenced" pictures of the links and relationships hidden in your data. Report View allows you to import and export data to and from Reflex, 1-2-3, dBASE, PFS File and other applications and prints out information in the formats you want. In fact, Report View is probably the best 1-2-3 report generator you can buy today. It's also the cheapest—and you're getting all the other features free.

The commands for all five Views are consistent—so you're not stuck learning five different ways to get something done. And because Reflex uses advanced windowing techniques, you can see several views on the screen at the same time—without having to switch back and forth. You get the picture—and the pictures—all at once—if that's the way you want to look at things.

Modify a number and all your Views—List, Form and Graph—are immediately updated, on-screen. Changing a number changes the picture—which is mighty handy when you're analyzing (let's say) sales figures by salesperson; or you're in "What-If?" country asking yourself "What if we could add 2.5% in January sales?" "Show me."

"Give me the picture." "Show me what happens when we shift 11% of Nebraska's inventory to the new store in Hawaii."

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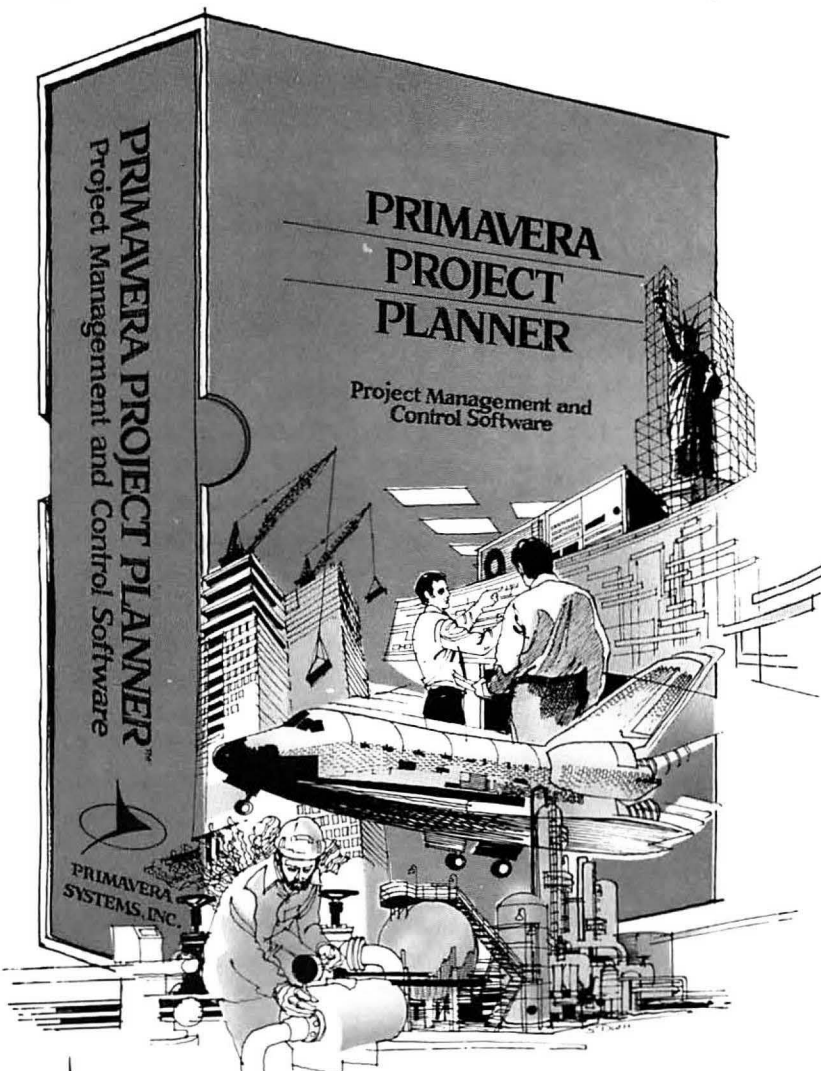
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with the length of the program verified."

It was funny because it captured the quintessential AI dilemma: The complexity of an AI-based solution grows faster than the complexity of the problem. Schwartz and Shostak's moonlighting would certainly produce a genie larger than the available magic micro-lamps. They could only hope the market would cross the 64K bridge before they reached it.

Their work teetered on the precipice well before the industry bridged the gap. Although the introduction of the PC increased available memory by a factor of ten, programming languages remained stuck at 64K. A year or so later Shostak and Schwartz became primary beta testers for the first version of Lattice C that could compile larger programs, but it was slow, shaky going. They were trying to fix bugs without knowing whether the problem resided in their code or in the compiler.

Finally, after the original flash of inspiration and years of perspiration, they had a program that worked. They then discovered that what they really needed was venture capital.

Meanwhile, Bricklin and Frankston's author/publisher relationship with *VisiCalc* that had initially worked so well had collapsed into legal rubble. It was clear that Shostak and Schwartz's new model should be Lotus. They

*(continues)*



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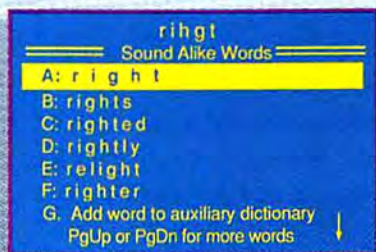
What we've done has been called "Artificial Intelligence," we simply call it "*Turbo Lightning*." This information revolution — driven by *Turbo Lightning* — means that the way you look things up is definitely looking up.

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So how does it work? Let's say the word you meant to type was "RIGHT," but you accidentally typed "RIHGT," which is wrong. What happens then?

You immediately hear a "beep," so you know there was a boo-boo. You instantly see a window, that doesn't list "RIHGT" but it does list "RIGHT" and its sound-alike words. So your screen looks like this:



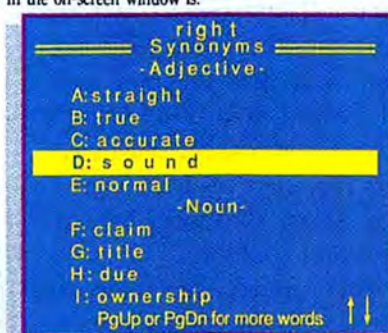
So you move your cursor to "A," which is the right "right," hit Return and the spelling mistake is instantly fixed. And the program you were working on has continued to run while you did a little spelling sidetrip with *Turbo Lightning*. (If you'd rather not remember your Spelling grades in school, the beep might make you *oos*, but you can choose the "whole page" option. Which means that when you finish writing the entire page, any spelling mistakes will be highlighted. You go in and straighten things out straight away.)

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"right" right, it also gives you instant synonyms. Because you also have *Turbo Lightning*'s Random House Thesaurus at your fingertips, you can really get to know your 'rights.' So back to the word "Right," but this time in the thesaurus. Type in "Right" and what you see in the on-screen window is:



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needed to become part of a marketing machine the way Mitch Kapor and Jonathan Sachs had. But the widely publicized demise of software firms like Ovation and, indeed, VisiCorp, signaled a general drying up of venture funding. Little time remained.

Shostak and Schwartz worked in earnest. They put a 1-2-3-like interface on their program, quit SRI, formed Ansa, and bought a high-volume espresso machine. Soon they were ready to invite Sevin Rosen, the money behind Lotus, in for a look.

"There are very few times when you see a product and know immediately you really have something," Ben Rosen says of that initial meeting. "I knew it with Bricklin and Frankston, and I knew it when Kapor and Sachs showed me *Trio*, which became 1-2-3. You get a feeling about their resident genius and the soundness of their underlying technology." He knew it with Shostak and Schwartz.

Rosen's eyes lit up when they demonstrated the product, dubbed *Paradox*, Shostak recalls, and their venture capital dream began. Sevin Rosen moved quickly. One of the firm's partners, Stephen Dow, became president and CEO of Ansa, and Ben Rosen devoted himself to the product, showing it clandestinely to influential people around the country. He even took control of the product launch, right down to ordering hyphens removed from press kits.

And yes—Sevin Rosen invested several million in venture capital.

Kalman Toth is troubled by the manner in which venture capital has funded software. As he sees it, instead of thinking in businesslike terms, backers have behaved more like Hollywood investors, pushing for a big production, a star-studded premiere, and a blockbuster hit.

But that thinking is changing. While glitzy unveilings are still staged in New York, and the press is still feted at the 21 Club (as they were by Lotus), low-key promotions threaten to spoil the party. The long-awaited launch of Symantec's *Q&A* was held in a Palo Alto theater known for showing art films. Symantec's president, Vern Raburn, isn't counting on *Q&A* to be a hit of 1-2-3 proportions. Raburn told a small crowd that Symantec's business plan was scaled so the company could survive on sales of 2000 copies a month.

Ansa's launch of *Paradox* was grander, but it appears to be the episode that closed an era. 1-2-3 was the first big software package, says Rosen, and Ansa's *Paradox* will probably be the last.

The venture capital nightmare is over. When the multimillion-dollar rug was pulled out from under Toth, he buckled down and finished *MindReader*. It's a fast, solid program with a great light bulb of a front end that opens word processing to the hunt-and-peck typist.

True, a lack of both funds and marketing savvy may be responsible for its off-the-mark positioning: The packaging and title suggest *MindReader* is a game. It's

(continues)



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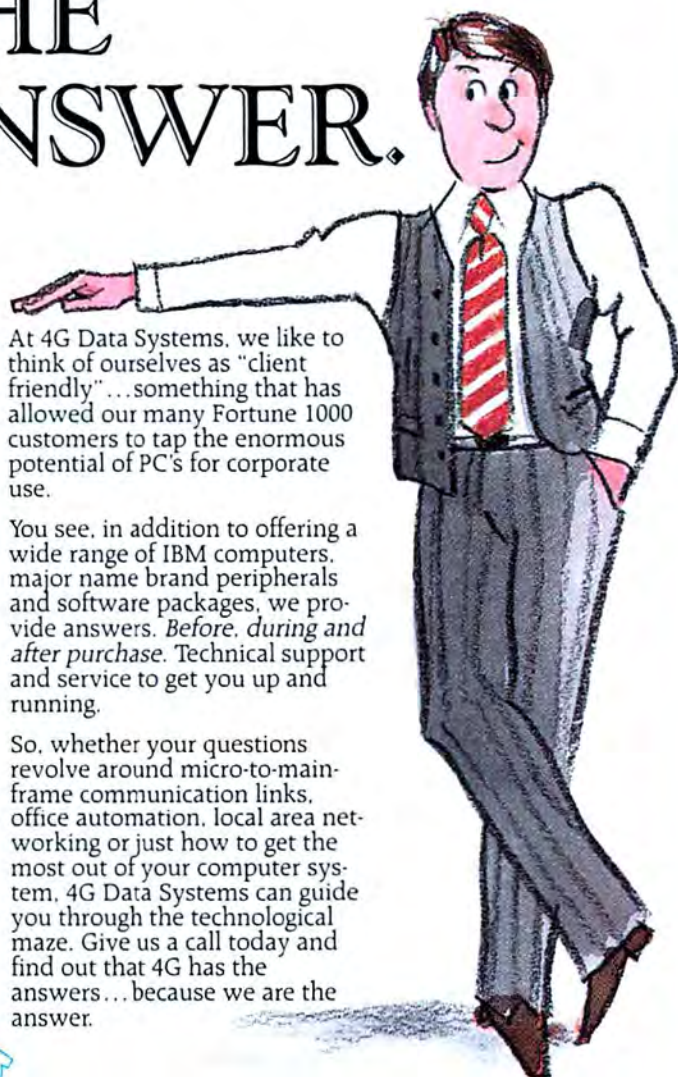
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Kevin Strehlo

also true that adequate cash flow would by now have enabled Toth to tap the other market for *MindReader*—fast typists who want to be faster. He knows veteran word processing users are unlikely to switch to *MindReader*, and they probably won't be interested in scanning the pop-up window for word codes, because more key-strokes are lost than gained in the second or two it takes to scan the box. But a fast typist who memorized the codes—"b1" for business, "un2" for United States, and so on—could move from 70 words per minute to more than 100, and Toth claims his program is far easier than learning Gregg's shorthand. Toth is talking with a company interested in placing his technology atop its word processor.

Finally models exist for making it without venture funding: Borland launching Turbo Pascal and *SideKick* for next to nothing, Living Videotext's *ThinkTank*, Forefront's deal to develop *Framework* for Ashton-Tate, and Jonathan Sachs' independent development for Lotus.

The software business may be returning to a pure version of the aphorism Toth likes to borrow from Edison: Genius is 10 percent inspiration and 90 percent perspiration. If that perspiration is no longer wasted sweating out venture capital deals, we should see more light bulbs illuminating personal computing's remaining dark corners. ●

*Kevin Strehlo hunts for PC tales from an office overlooking Silicon Valley.*



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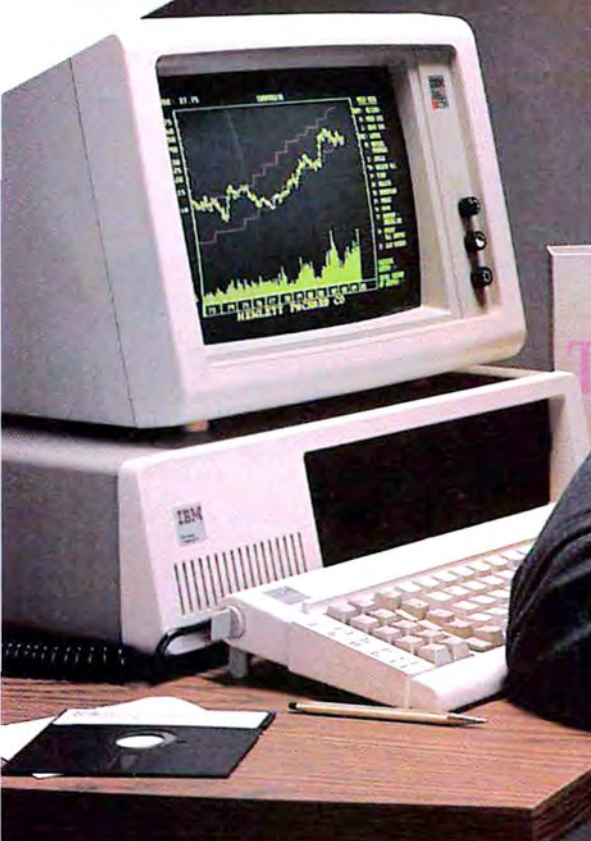
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#### DICTIONARY

**irrefragably**, *adv.*, Undeniably  
**rodomontade**, *n.*, Boasting, bragging  
**syntagma**, *n.*, Word or phrase forming a syntactic unit

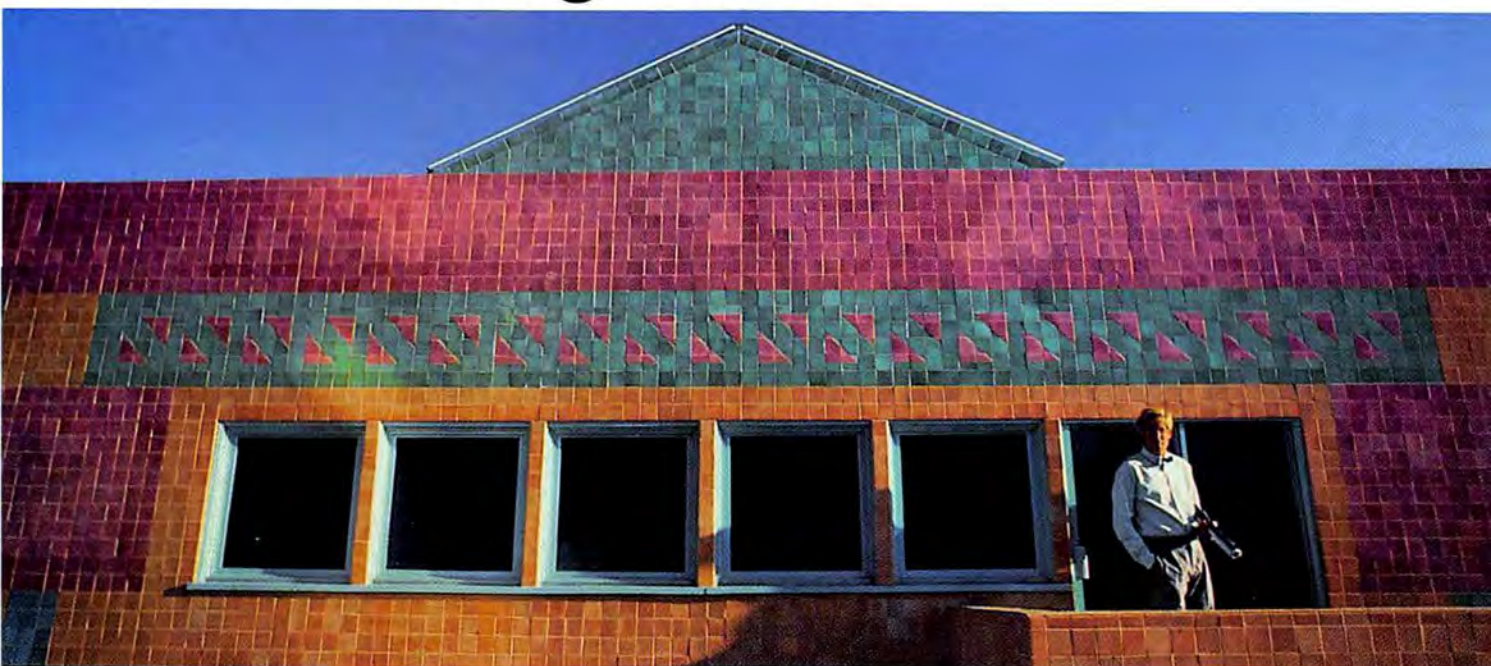
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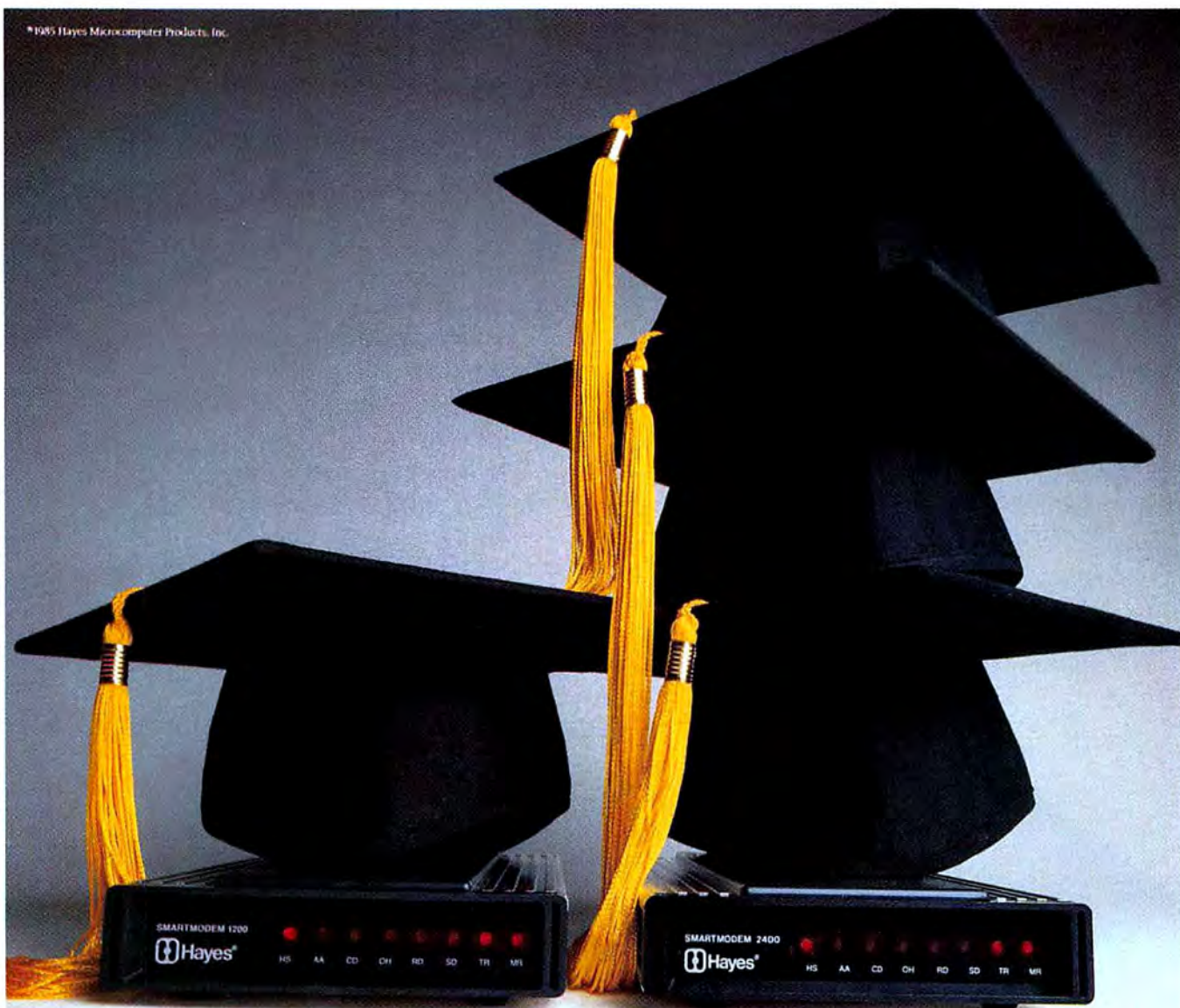
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Stephen A. Blumenthal

# REMark: A Little Knowledge

A healthy skepticism about software magic can go a long way. A keen observer of the computer marketplace takes an iconoclastic look at the industry, the hype, and how much computing power you really need.

In the movie *The Magnificent Seven*, the bad guy, Eli Wallach, offers to cut a deal with the good guy, Yul Brynner. Let's carve up the property of these peasants, he proposes. "If God did not want them sheared, he would not have made them sheep."

This quote came back to me with alarming frequency recently as I was evaluating a number of popular, consumer-oriented software packages. The sophistication of some programs you can procure for a few hundred bucks is a tribute to the creativity of software developers. However, that advertisements tout these programs by suggesting that without them you are at a serious, if not terminal, disadvantage in the business world is a sign that things have gone awry.

You may be shocked to learn that reports can be written without space-age graphics, that you can order stocks over the telephone without a PC-to-broker interface, that your spreadsheet need not extend to infinity, and that most people can live with data managers that lack programming languages. You'd be shocked, that

is, if you believed every word of ad copy describing the software industry's latest and greatest. The heretical truth (heresy to marketing types, anyway) is that just because a software capability exists, not everybody needs to own it. The message that responsible computer journalists and commentators ought to spread far and wide is that buyers should do their own cost/benefit analyses before plunking down *any* spare change.

My favorite example of death-threat marketing is the push to sell software that enables investors to do their own fundamental or technical analysis. Don't misunderstand me; I'm not out to pick on financial analysis software. Some of these programs are first-rate, and their marketing hype is no more offensive than that of other business programs. The few thousand people in this country who work for brokers, banks, and insurance companies, or who publish market newsletters, and need these products are a lucky bunch indeed. If such people were the

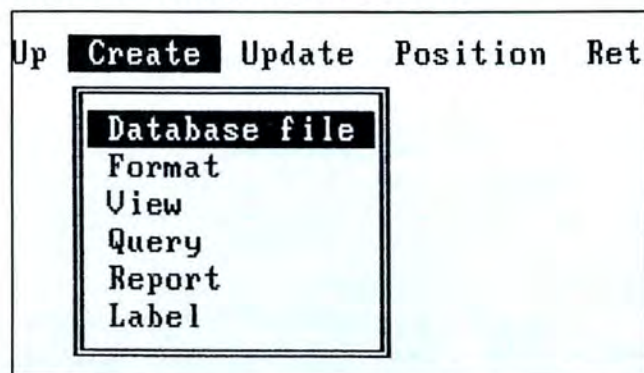
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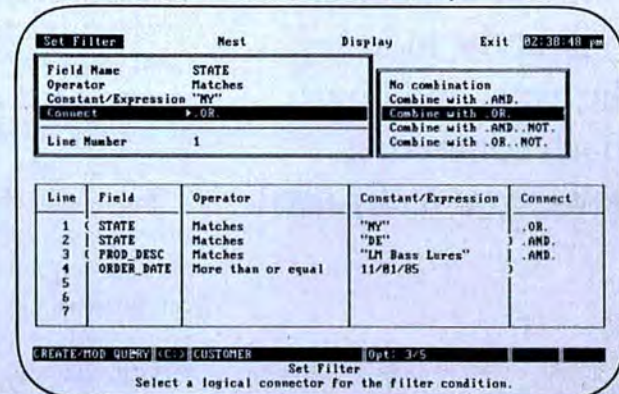
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These are only a few of the dBASE III PLUS features that can help new users quickly get up to speed. And experienced users quickly increase their speed. (Sorting, for example, is up to two times faster and indexing up to ten times faster than dBASE III.)



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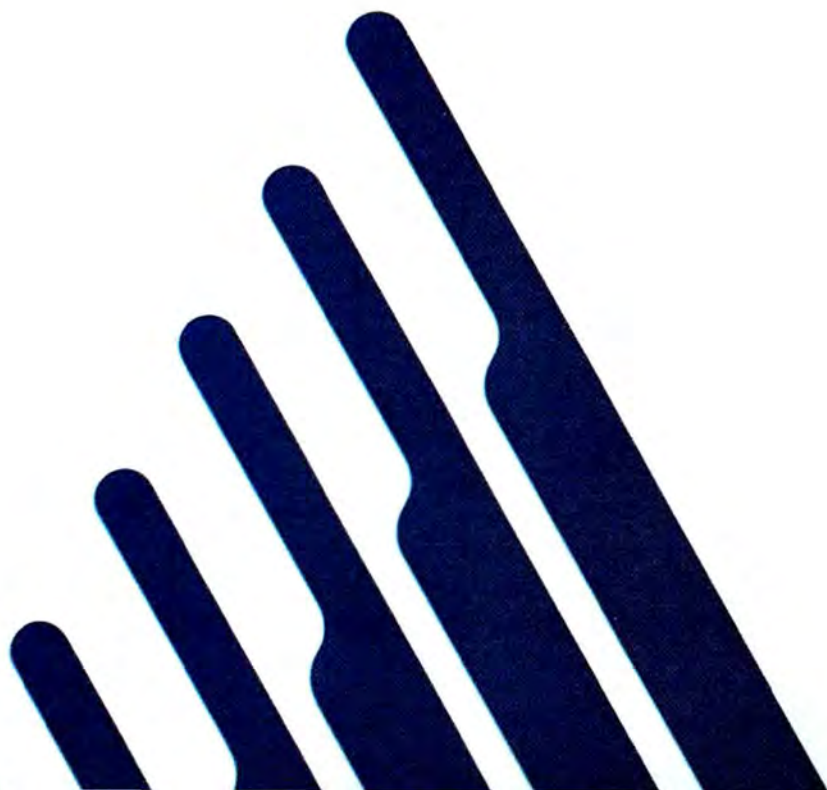
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only sector of the market being wooed, we wouldn't have a problem. But of course, they're hardly alone. Ads for securities analysis programs run in every computer magazine. Indeed, there are magazines devoted exclusively to financial software for Mr. or Ms. Average Investor.

So what's the big deal about making professional tools available to amateurs? It's a matter of responsibility. Selling sophisticated tools to people who cannot use them, or who will use them improperly, brings to my mind the old admonition about a little knowledge being a dangerous thing. An unskilled investor doing

this or her own securities analysis will succeed only by virtue of the "blind pig" principle of investment decision-making. As the old Wall Street adage says, "Even a blind pig finds an acorn sometime."

In addition, although most PC-equipped investors might admit to knowing better, many are frankly seduced by today's slick, smart investment software; there's an understandable desire to believe that expertise and experience can be stamped on a floppy disk. Moreover, do-it-yourself investment software bestows the power and the glory on the individual—where we'd like it to be—and not on some faceless Wall Street institution.

The worst fate that can befall amateurs with newly discovered

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from Plus

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the results of this research to investors is part of the stock-in-trade of the full-service firm. It is what such houses offer in lieu of the lower commissions of discount brokers.

Investors who lack academic training or market experience, not to mention access to the raw data and processing power available to professionals, are better off following their brokers' recommendations than entrusting their savings to the charts and histories of a canned stock analysis program. Perhaps, like cigarettes, financial analysis software should bear the legend: "Warning: In the wrong

hands this program could be hazardous to your financial health."

The shakeout in the computer industry has occurred in part because machines were built in quantities not justified by popular demand. This marketing problem was exacerbated by software that nontechnical types found too difficult to use. Now a problem of an opposite nature may be developing. I suspect that in the future we'll witness a significant dent in the software business because companies have developed programs that are so easy to use they enable you to do things you have no business doing without proper training.

In *The Magnificent Seven* the sheep end up shearing the wolves.

Computer users who are dissatisfied with a product because it promises heaven and delivers only blue sky won't forget that discrepancy the next time they spy ads for products from the same source. Until more responsibility (and slightly less ambition) becomes the rule in software marketing, consider the wise counsel of the ancient Roman marketplace: caveat emptor. ☉

*Stephen A. Blumenthal is a Washington, D.C., attorney and vice president of regulatory relations for the Securities Industry Association.*

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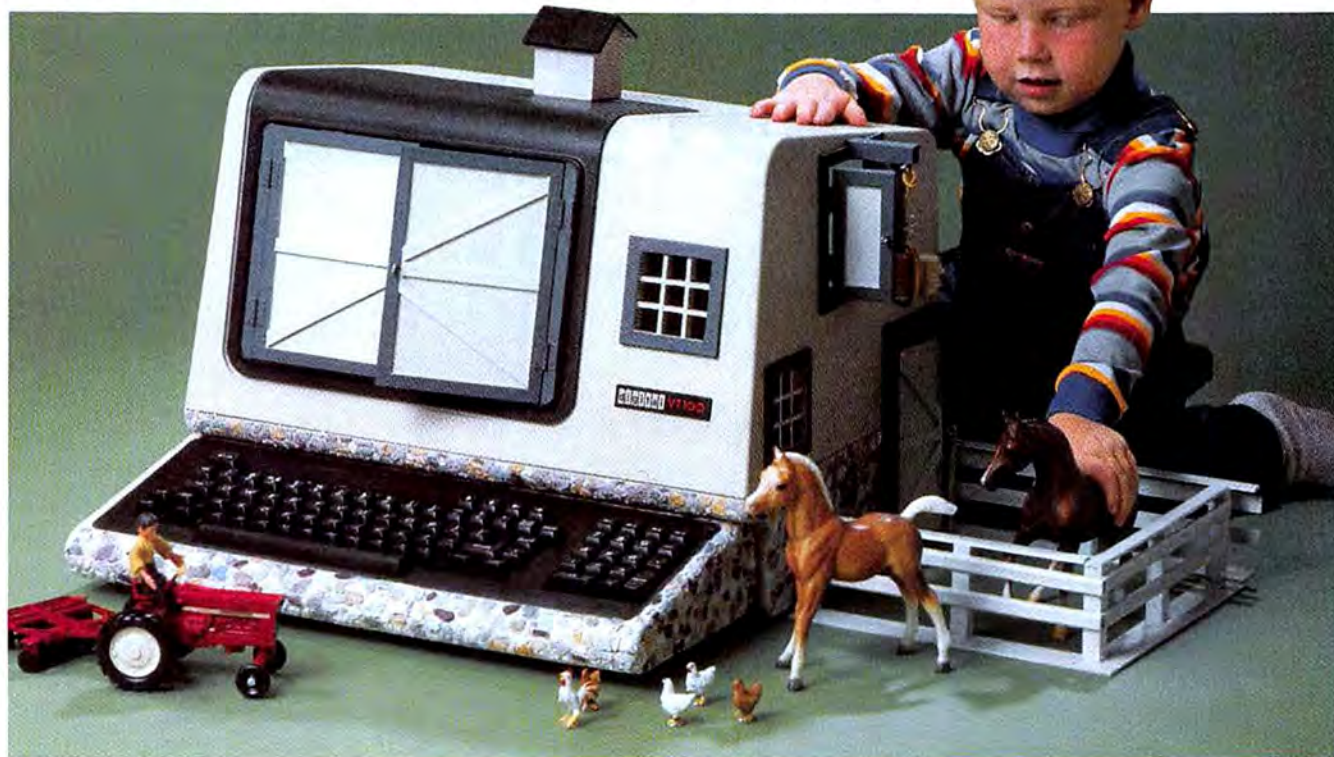
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**IDEA CREDIT: Ann Garner Riddle of Winston-Salem, N.C.**

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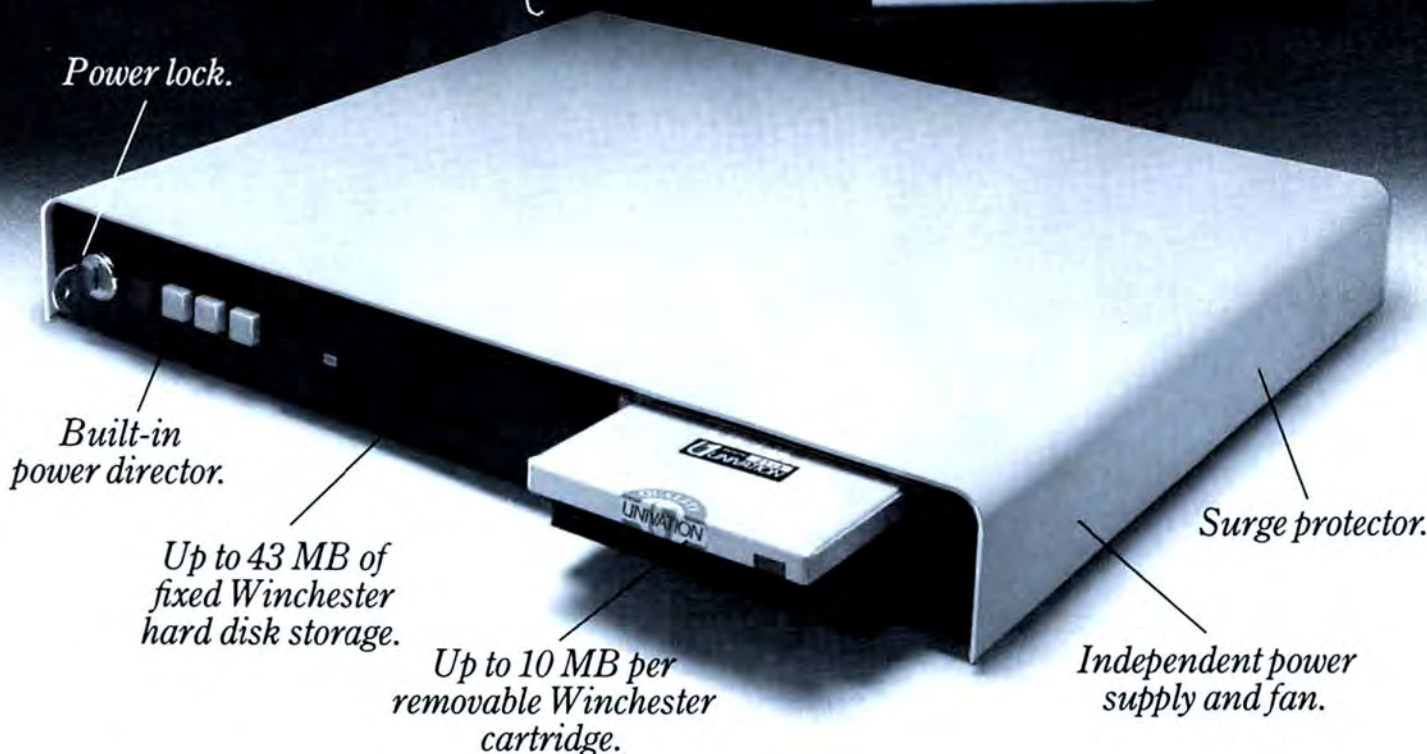
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## WINDOWING

It should be possible to have the outline and the main document at the same time on the screen. This would be a great feature for the user.



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# Letters

## *Reactions and responses from the PC World community*



### Preface to Prophecy

When reading Dr. Vannevar Bush's prognostications on the personal computer ["The PC's Mid-Life Crisis," *PC World View*, September 1985], it is advisable to remember that not all predictions by learned people are accurate, nor does expertise in one area necessarily (or even usually) carry over into others. Like the claims made by astrology columns in the popular press, successful predictions tend to be remembered, inaccurate ones forgotten.

In December of 1945, shortly after making his comments on personal computers, Dr. Bush pontificated to a U.S. Senate committee: "There has been a great deal said about a 3000 miles high-angle rocket ... shot from one continent to another, carrying an atomic bomb and so directed as to be a precise weapon which would land exactly on a certain target, such as a city. Technically, I don't think anyone in the world is capable of accomplishing this feat, and I feel confident that it will not be done for a very long period of time."

Such shortsighted prophecy led Arthur C. Clarke in *Profiles of the Future* [Harper & Row, New York, 1962] to surmise that when a scientist says something is possible, it usually is; but when a scientist says something is impossible, that isn't necessarily the case. I don't mean to denigrate Dr. Bush's expertise in his own field, but simply to urge cautious digestion of his pronouncements on "impossibilities."

Mark R. Chartrand  
Aurora, Colorado

### Bookmaker Bites Back

John C. Dvorak's "The Last Computer Book" [*PCW*, September 1985] betrays his pretense of knowledge about the book business in general and computer book publishing in particular. "So what happened to the good old computer book?" he asks. The answer is, it's back in the hands of the experts where it belongs.

The titles mentioned in Dvorak's column point out the dilletantism with which traditional publishers approached the blossoming computer book market. Both the *Whole Earth Software Catalog* and *Digital Deli* were "cut and paste" books with brand-name authors attached for a semblance of credibility. And the notion that *Deli* publisher Peter Workman represents the best efforts of traditional publishing is both facetious and cynical. Although Mr. Workman does what he does extremely well, much of what he publishes is "nonbooks" or "trinkets" (which I suspect Mr. Dvorak's *Expert Series* to be), masquerading as books.

In his cynicism, Dvorak unwittingly makes a social comment about the publishing industry: It is not a get-rich-quick business by any means, and the bandwagon riders usually get burned and jump off. Responsible publishing is dedicated to bringing useful and meaningful information (as well as leisure and art) to as many people as possible. In a capitalist democracy, this effort translates to commercial enterprises, some more successful and conscientious than others. It is to these hands that the computer book business has finally returned, healthier than ever.

(continues)



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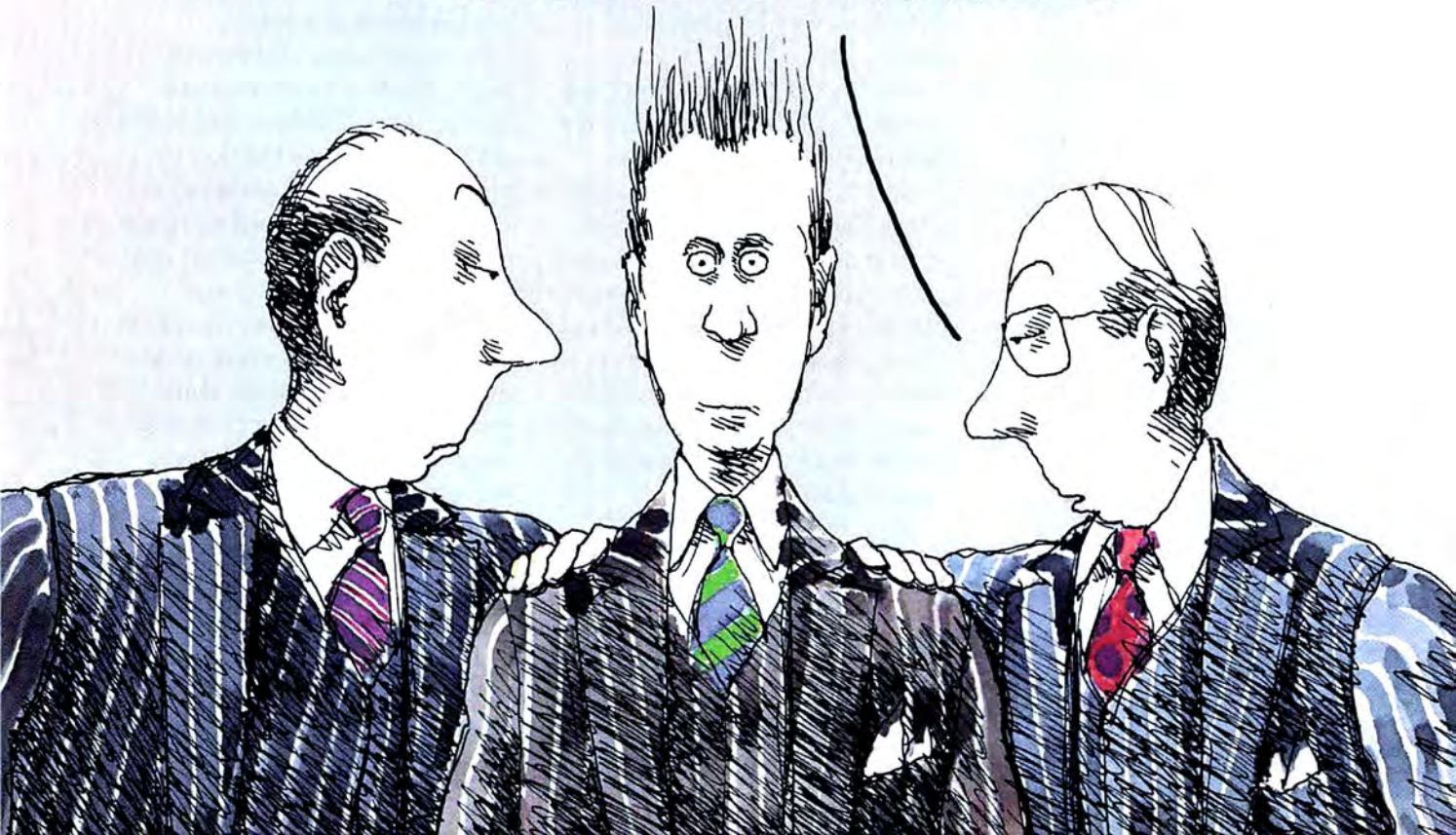
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Maximum Characters/Record	65000	1530	4000
Maximum Fields/Record	65000	400	128
Relational Operators	9	6	6
Data Dictionary	Yes	Yes	No
Procedural Language	Yes	Yes	Yes
Variable-Length Fields	Yes	No	No
Report Writing Features:			
A) Access to Date/Time	Yes	Yes	No
B) Row or Column Formats	Yes	Yes	No
C) Accessible Tables	6000	40	10
Password Security	Yes	Yes	No
Definable Data Entry Rules	Yes	Yes	No
Pre-Defined Macros	Yes	Yes	Yes
Application Generator	Yes	Yes	No
Application Compiler <sup>(1)</sup>	Yes	Yes	No
Run-Time Module	Yes	Yes <sup>(2)</sup>	Yes <sup>(2)</sup>
Natural Language	Yes	Yes <sup>(3)</sup>	No
Network Version	Yes	No <sup>(4)</sup>	No

1) From original manufacturer; 2) Available soon; 3) Extra cost option; 4) Announced for late 1985. dBASE III is a trademark of Ashton-Tate. R:Base 5000 is a trademark of MicroRIM, Inc. MS is a trademark of Microsoft. IBM is a registered trademark of International Business Machines Corporation. NetWare is a trademark of Novell, Inc.

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With LETTRIX™ your IBM ProPrinter, Epson, Okidata, IBM Graphics, Star Gemini, or Panasonic printer can print proportionally-spaced and microjustified **letter-quality text directly from all software**. This entire advertisement is an **actual-size** photograph of text printed from a word-processing program on a \$300 Epson printer controlled by LETTRIX.

Before: ABCDEFGHIJKLMNOPQRSTUVWXYZabcdef  
After: ABCDEFGHIJKLMNOPQRSTUVWXYZabcdef

LETTRIX resides in memory between your software and printer, responding automatically to justification, spacing, paging, margins, **boldfacing**, **underlining**, *italics*, **subscripts** and **superscripts**. You just print as you would normally from within your word-processor.

*"A fun program that is easy to use."* -- PC WEEK  
*"The sharpness and clarity nearly equals that of an expensive daisy wheel printer."* -- THE NEW YORK TIMES  
*"Surprisingly low price."* -- BOARDROOM REPORTS

**"LETTRIX is the top of its class."**

-- Ronni and Harry Geist, PC PRODUCTS, August 1985

Design your own typefaces, or use the 20 included: **Broadway**, **Courier**, **Old English**, **Art Deco**, **OUTLINE**, **ABCDEFGHIJKL**, **Engraved**, *Park Avenue*, **WESTERN**, **SHADOW**, **Roman**, **BANKER**, **Gothic**, **Prestige**, **Folio**, **ORATOR**, **OCR-A**, the entire IBM mathematical/line-drawing character set, as well as **Français**, **Español**, **Русский** and **Ελληνικός**.

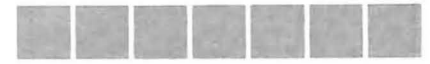
*You can control LETTRIX features either by accessing a menu that pops-up over your current software, or by placing simple single-character commands in your text.*

For fastest delivery, charge LETTRIX to your VISA or MasterCard by dialing (800) 351-4500. LETTRIX™ costs just **\$98.50**. We pay all shipping.

**SIXTY-DAY MONEY-BACK GUARANTEE. NOT COPY-PROTECTED.** Call and mention this magazine for a free print sample. LETTRIX requires an IBM PC, XT, AT, or compatible with 50kb of free memory, and DOS version 2.0 or greater.

HAMMERLAB CORPORATION 5700 ARLINGTON AVENUE  
(203) 776-5699 RIVERDALE, NEW YORK 10471

Circle 495 on reader service card



Computer book publishers are celebrating the death of the "trinket" computer book, as are booksellers nationwide.

*James F. Brown*  
*National Sales Manager,*  
*Microsoft Press*  
*Bellevue, Washington*

### CompuServe Critique

John Dvorak's comments in "Entertainment and Time—The Razor Blades of the 1980s" [PCW, August 1985] are right on the money. Since signing up with CompuServe in 1980, I've seen a lot of changes in the system, most of which have not been for the better.

Letters of complaint to CompuServe management, whether via their "feedback" option or the U.S. Postal Service, come to naught. I'm convinced that some upstart programmer has developed a program to scan complaint letters and automatically answer them with an electronic form letter.

One of my pet peeves is on-line advertising. In pre-PC days, advertisers paid to get their messages across. Now I pay CompuServe to read advertisements, whether I want to or not.

Hats off to MCI Mail and other no-nonsense services. They at least stop counting their money long enough to read their in-box.

*Michael Schwartz*  
*Paris, France*

(continues)



# *Start faster so you can finish sooner.*



In your race to the head of the pack, a fast start can make all the difference.

Which is why you shouldn't be without PFS®:WRITE.

It's the word processing program that lets you get more done in less time. Because you can get started a lot faster.

Unlike other software, WRITE's screen resembles a standard sheet of paper. Which means if you're familiar with a typewriter, you practically already know how to use WRITE. With WRITE, you can get it right the first time.

From brief memos to long documents, WRITE speeds up the whole process of word processing. Because WRITE has the power to get the job done quickly. With just a few keystrokes, you can make insertions and deletions, create

boldface type and move whole blocks of text.

WRITE even has a spelling checker\* so you can polish your words without spending valuable time looking them up.

And if you ever need it, help is just a keystroke away.

Since WRITE is fully integrated with the PFS Family of Software, you can quickly and easily use information from other PFS programs. For example, you can produce personalized

form letters complete with addressed envelopes from PFS:FILE data.

So hurry and get PFS:WRITE. Because when you can start faster, you can often write off your competition.

See your computer dealer today for a demonstration.



## **PFS:WRITE**

*Software that puts you ahead.*

©Software Publishing Corporation \*Available on selected MS-DOS computers version only.



# THE FASTEST LINK

FROM MICRO

TO MAINFRAME



## BARR/HASP: POWERFUL, VERSATILE, EASY TO USE for the IBM PC, XT, AT and compatibles includes software, synchronous adapter board and manual

The BARR/HASP Intelligent Communications package provides more than just a connection—it's powerful enough to drive multiple high-speed printers for volume printing, yet versatile enough to print checks and invoices on any size printer. With the menu-driven software, you can perform all program functions accurately, easily, and without lengthy training.

BARR/HASP emulates a full function IBM 3777-2 and HASP on the 360/20. Print speeds on single and multiple printers range from 30 cps to beyond 2,400 lpm (7,000 lpm on the PCAT). Line speeds range from 1,200 to 9,600 Baud on dial-up and to 19,200 Baud on a dedicated line. With the PCAT, you can achieve a new speed record for a micro-computer—56,000 Baud—and drive even the fastest laser printers at maximum efficiency.

All tasks—printing, plotting, sending jobs, and using the console—operate simultaneously from a single PC. Such high performance translates into instant savings. BARR/HASP now replaces expensive, cumbersome Remote Job Entry workstations—and does it for a fraction of the cost.

You'll find the BARR/HASP manual complete and refreshingly intelligible. But should you have a question, BARR's technical experts are just a toll-free phone call away.

### FREE 30-DAY TRIAL

See for yourself how the BARR/HASP Link can work for you. For a free 30-day trial, call

**800-BARR-SYS**  
(800-227-7797)

in FL, call 904-371-3050



**\$890**

Host Systems:	MVS/JES2 MVS/JES3	VM/RSCS VS1/RES	NOS/RBF MVT/HASP
Requires:	128K synchronous modem		

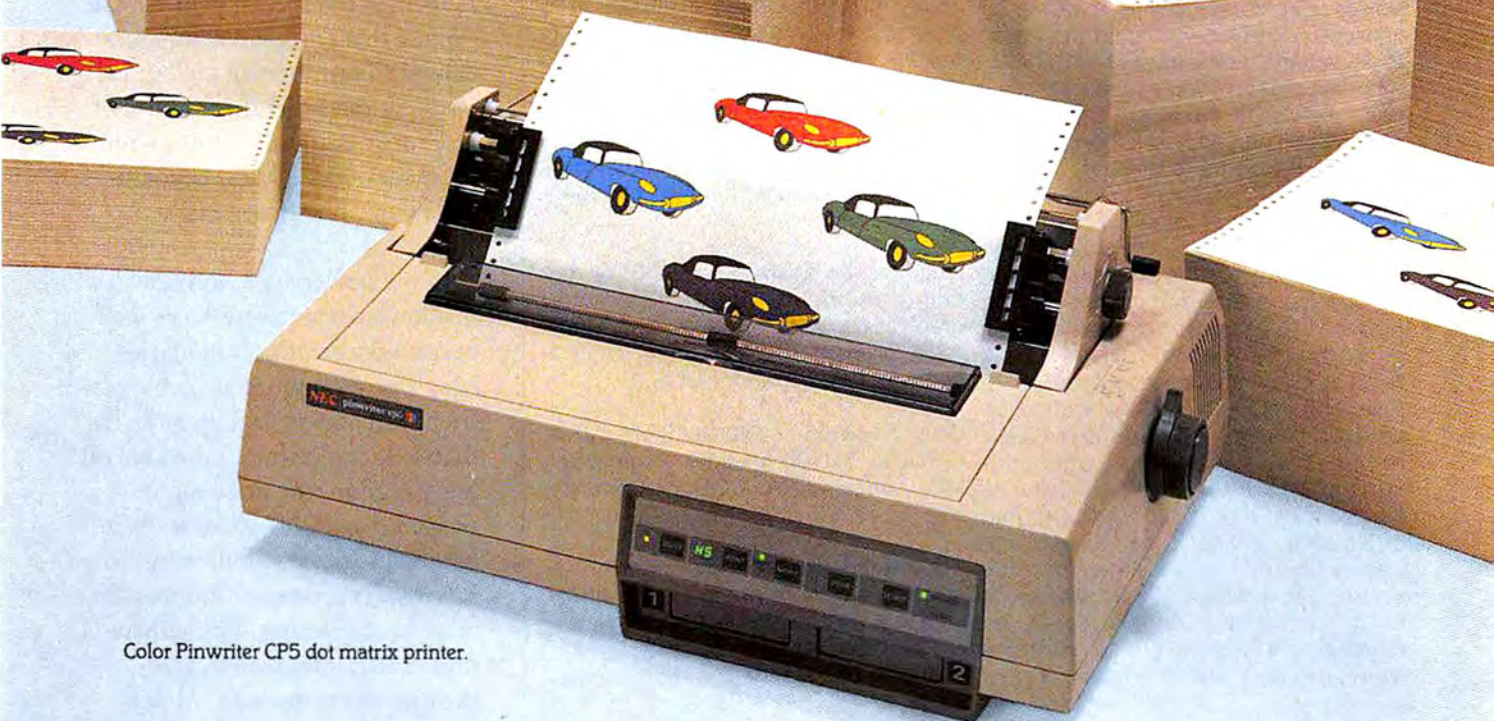


**BARR SYSTEMS, INC.**

Suite M, 2830 NW 41st Street  
Gainesville, FL 32606



# THIS NEC PRINTER CAN MANUFACTURE 2 MILLION CARS WITHOUT A REPAIR.



Color Pinwriter CP5 dot matrix printer.

To build 2 million of these cars requires printing more than 25 billion dots. And that's how many our new Pinwriter™ P5 printer can print before you have to think about a repair.

This NEC printer is not an exception. In fact, any NEC printer can run an average of 5 years in normal use before it needs a repair.

Such reliability doesn't come easy. Every NEC printer is built on a highly automated assembly line. From the most advanced components in the industry. Then it's subjected to some of the most demanding tests ever devised for printers.

Reliability is not the only thing this NEC printer has going. It's also the quietest dot matrix printer in its class. And it has the finest graphics resolution, plus more built-in true fonts. And it's the fastest multi-speed 24-pin dot matrix printer available.

Now don't you wish NEC also made cars?

Check out a new Pinwriter P5 at your nearest NEC dealer. Or for more information, call 1-800-343-4418 (in MA 617-264-8635). Or write: NEC Information Systems, Dept. 1610, 1414 Massachusetts Ave., Boxborough, MA 01719.

**NEC PRINTERS. THEY ONLY STOP WHEN YOU WANT THEM TO.**

**NEC**  
NEC Information Systems, Inc.

**C&C** Computers and Communications

Pinwriter is a trademark of NEC Corporation.



At last! - Fast, On-screen

# FLOWCHARTS

## And Organization Charts

Finally! An on-screen flowchart processor that knows about flowcharts and organization charts - not just another "screen draw" program that makes you do most of the work.

**Interactive EasyFlow** is a powerful full-screen graphics program dedicated to flowcharts and organization charts. With this program you can quickly compose charts on the screen. More important, you can easily modify charts so they are always up to date.

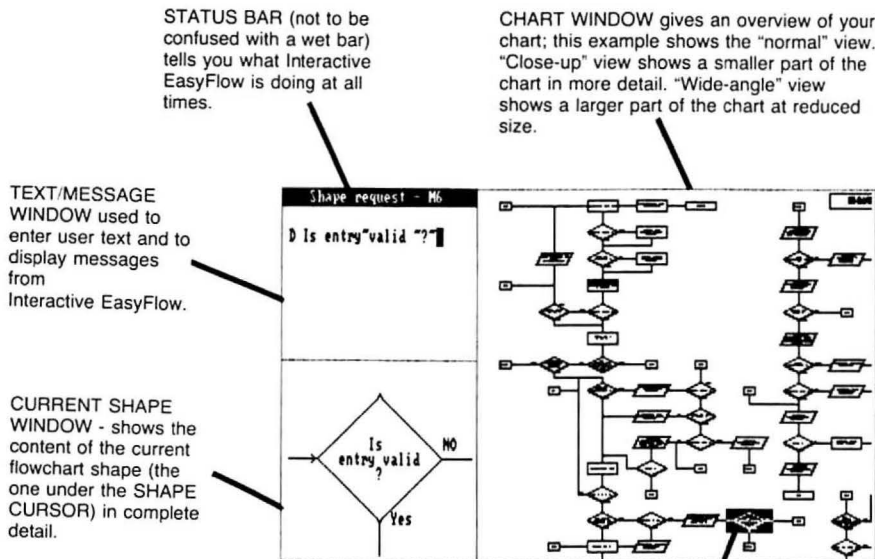
**Features:** • Text is automatically centered, character by character, within shapes as you type it. • Lines are created by specifying the starting and ending points - the program automatically generates the route. • Powerful editing facilities allow shapes and even entire rows and columns of shapes to be inserted or deleted; lines are automatically re-routed as necessary. • Large chart size (up to 16 shapes wide by 16 shapes high) allows very large flowcharts and organization charts to be handled with ease. • Charts can be larger than the screen - the window into the chart scrolls both horizontally and vertically as necessary. • Flexible printer interface allows it to work with all printers, not just

dot matrix printers. Wide charts can be printed in strips. Also works with Hewlett-Packard (and compatible) plotters. • Eighteen standard flowcharting shapes included. • User defined shapes can be added to the shape library. • The manual is extensive (125 pages) and includes many examples. • On-line "help" facility provides immediate assistance at any time. • Any number of titles can be placed on a chart. • Commentary text blocks can be placed anywhere in the chart. • Plus many more features than we can mention here.

Requires an MSDOS or PCDOS machine equipped with an IBM color/graphics compatible adapter and at least 256K of memory. Runs under DOS 1; contains full support for DOS 2.

Only **\$149.95** + \$2.00 S&H (USA/Canada), \$10.00 (foreign). Payment by MO, check, VISA, COD or Company PO.

The sample screen display shown below is typical of what you see while editing a chart. Other screen displays are provided for entering titles, changing options, getting "help" and so on.



**HavenTree Software Limited**  
P.O. Box 1093-M  
Thousand Island Park, NY 13692  
(613) 542-7270 ext 47

Circle 348 on reader service card

### Brains Drain Software

Darcy DiNucci's article "Copying Software: Who's Right?" [PCW, September 1985] was most intriguing. However, an overlooked element is the special below-retail pricing that software companies extend to members of college faculties, in the belief that the use of a product in the classroom will augment outside sales. Unfortunately, this practice is easily corrupted.

In my university community, this low-cost software seeps well beyond the campus boundaries. Major programs are available to friends of college faculty at prices that kill retail sales. In the case of one program, the price tag was slashed from \$795 to \$60! On a national scale, the dollars lost to software companies (and retailers) must be staggering. While these same companies blame piracy, their products are sold for piddling amounts on campuses all over the country. The millions lost by legitimate outlets boggles the mind.

*An anonymous retailer  
(name withheld at reader's request)  
Los Osos, California*

### One of Our Chips Is Missing

The answer to question 3 of "The PC World Advanced Users Quiz" [PCW, July 1985] denies the existence of the 8086-2 chip. Maybe "8086-2" isn't an official Intel chip designation, but a number of Japanese manufacturers advertise the 8086-2 as the resident processor

(continues)



# How to get mainframe color graphics on your PC.

## PCOX/GRAPHICS, how else?

It's really quite easy.

Just slip our PCOX/GRAPHICS™ board into a single slot of your IBM® PC, XT, AT or compatible. And you can run mainframe graphics software like SAS-Graph™, GDDM™, DISSPLA™ and others.

PCOX/GRAPHICS offers you true S3G terminal emulation. All in full color.

And it works with either a high-resolution IBM Enhanced Color Display or a standard PC Color Monitor.

But that's only half the story.

With PCOX/GRAPHICS, you can access

mainframe files, too. Upload and download data. And it's 100 percent hardware-compatible with IRMA™. Which means if your software works with IRMA, it will work with PCOX.

We could go on, and we will. In our brochure.

For your copy and the name of your nearest CXI distributor, call **(800) 225-PCOX**. In California, call (415) 424-0700.

Or write CXI, Inc., 3606 West Bayshore Road, Palo Alto, CA 94303, Telex 821945.

**More  
micro-to-mainframe  
answers.**

**CXI**

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# ALICE

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Pascal**

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SOFTWARE  
**CHANNELS**  
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See this ad for details

Now, everyone can program their computer. Because now, there's *ALICE* to show you the way.

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All the information you'll ever need from *ALICE*. A tutorial, features of Pascal, and the meaning of error messages is now at hand ... in over 500 screens of on-line HELP.

*ALICE* is currently being used in hundreds of schools to teach Pascal programming. Why Pascal? Because it has emerged as the language of choice of colleges and universities and is now the language of choice of the SAT examinations.

- windows, menus, and function keys ... easy.
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- screen control, color highlighting, and macros ... powerful.

To order by credit card, call 1-800-448-3400 ext. ALICE (in Canada 1-800-387-9018). Specify software or demonstration diskette. Or, fill in the order form and send to:

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4 Kingwood Place, Kingwood,  
Texas 77339 (713) 359-1024

# ALICE

The Personal Pascal

**ALICE:** The Personal Pascal software prices include shipping and handling to the US and Canada. COD's will not be accepted. Texas residents add 4½% sales tax. Ontario residents add 7% sales tax. For IBM PC, XT, AT and compatibles. Dealer and distributor inquiries welcome. Site licences available.

Circle 168 on reader service card



## 200,000 PC-FILE III USERS ARE ABOUT TO EXPERIENCE MORE POWER AND SPEED THAN THEY EVER THOUGHT POSSIBLE . . .

Now, with the **legendary PC-FILE**, Jim Button has included integrated word processing (with mail merge), relational retrieve capabilities, and "pop up" help screens - all in one package called PC-File/R.

### YOU'LL LOVE THE POWER

Work with several databases at once. Search multiple fields. Take advantage of expanded reporting formats and improved flexibility. Set up impressive keyboard macros. Speed up data entry. Learn from the examples and figures in the expanded and enhanced manual.

### THE NEW STANDARD

Combine all of that power with calculated fields, lightning fast binary searching, DOS subdirectory support, and the ability to exchange data with other programs (1-2-3, WORD, Wordstar, dBASE, PeachText and Word Perfect) and you have the new standard in multi-faceted database programs.

### THE RIGHT PRICE

The best part of all about PC-File/R is that you'll learn how to use it fast. And, it's very easy to use, too . . . just like PC-File III. ButtonWare's commitment to affordable software prices continues on with PC-File/R. Registered users can upgrade for \$99.00. New customers can buy it for \$149.00. Ask your dealer for it or order it from us.

*If your local computer store doesn't have PC-File/R, ask them to order it. **OR** Call 1-800-JBUTTON to place your order. Mail orders will be processed within two to three weeks and will also include a \$5.00 shipping and handling charge.*

**JIM BUTTON  
MEANS BUSINESS**

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## Your PC Market-Maximizer Account

The *PC World* Directory is a highly cost-effective way to enter the profitable IBM PC market—available in three- and six-month contracts. This comprehensive listing is your best bet for high returns with a minimal advertising investment. See this month's Directory for details.



in their personal computers. The NEC 9800 series (APC III in the U.S.) is one example.

*Robert Kawaratani  
Tokyo, Japan*

*Thanks for the correction. The 8086-2 is indeed alive, well, and an official member of Intel's iAPX 86 family. It's an 8MHz version of the 8086 and is nestled comfortably in a number of PC compatibles including AT&T's PC 6300, the Compaq Deskpro, and Eagle's Turbo Series. NEC, by the way, says it is under license by Intel to produce the 8086 and refers to the APC III processor as the "NEC 8086-2." —Ed.*

### Buttressing the DataTower

"Ambitious Archiving" by Reed McManus [PCW, August 1985] was excellent and informative. I'd like to offer one correction and a few updates on the Priam DataTower.

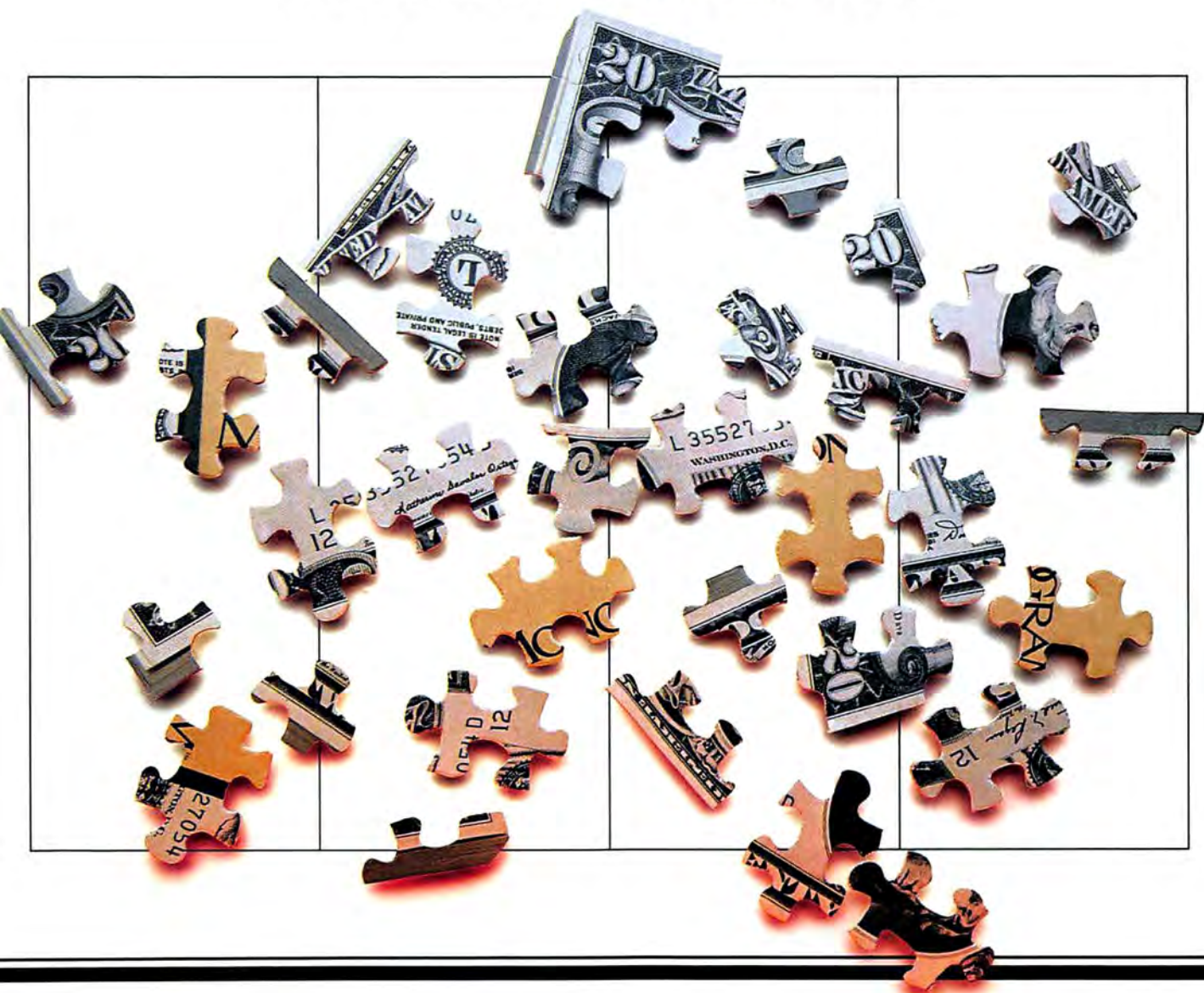
While it is generally true that "image backups" can be successfully restored only to the disk from which they were taken, DataTower image backup tapes can be restored to any DataTower disk. Priam's controllers automatically bypass bad sectors on a disk during all read, write, backup, and restore operations and correct all detectable disk errors without intervention by the host PC.

Our backup and restore utilities, TBACK and TREST, now have the capability to store several backup sessions on the same tape. Finally, the storage capacities of

*(continues)*



IF YOU WANT TO  
SORT OUT YOUR  
FINANCIAL PICTURE,  
YOU'D BETTER  
START USING SOME  
COMMON SENSE.





# COMMON SENSE.

## DOLLARS AND SENSE™

MONOGRAM

If you're puzzled about your financial situation, you probably should be.

But if you're puzzled about financial management software, you really shouldn't be.

Because Monogram™ has just the pieces you're looking for.

### The pursuit of the almighty Dollar.

For more than two years now—or ever since it was introduced—Monogram's Dollars and Sense® has been the best-selling program of its kind.

Because all kinds of people have been buying it. For all kinds of uses.

At home. At the office. Or both.

And so should you.

**Most likely to succeed.**

Dollars and Sense is a powerful double-entry accounting package that you don't have to be an accountant

## FORECAST™

MONOGRAM

## MONEYLINK

MONOGRAM

DATE	DESCRIPTION	AMOUNT	BALANCE
6/23/79	March Carol	175.00	175.00
6/24/79	Wash by Che	50.00	125.00
6/25/79	Repair	275.25	125.00
6/26/79	Pacific Books	123.00	125.00
6/27/79	Municipal Club	125.00	125.00
6/28/79	Smith Auto Body	125.00	125.00
6/29/79	American Express	175.00	125.00
6/30/79	Deposit	155.54	125.00
6/31/79	20th Century	252.87	125.00
6/32/79	Belmont	252.87	125.00
6/33/79			125.00





(or a computant for that matter) to use right away.

Even if your idea of double-entry accounting is a firm with two front doors, you'll still come out ahead.

Armed with our literate manual, friendly tutorial and two sets of pre-defined starting accounts (one for personal and another for business), you'll be sorting out your financial picture in a flash.

And that's just for starters.

Because we designed Dollars and Sense to be user-friendly for *everyone* who uses it.

(After all, power users need love, too.)

You can enter and edit large amounts of information right on the screen. Write checks. Make automatic transactions. And jump from one function, transaction or account to another without hunting around, waiting around or hitting a lot of keys.

In other words, it's as fast as you are.

### Getting the big picture.

You can establish budgets along any lines



you like: Monthly or annually. Fixed or variable.

And you can change them whenever you see fit.

As your picture develops, Dollars and Sense tells you exactly how it's going. With monthly and yearly comparisons of where you wanted to be vs. where you are.

At a keystroke, you can generate income statements, balance sheets, year-to-date summaries, cash flow analyses and more.

Not to mention everything you need to settle up with the IRS.

You can ask searching questions by date, type, amount, check number, tax status or any sort of sort you can think of.

You can graph your business growth. Chart the cost of seeing your shrink. And dream up "What if?" scenarios involving BMWs, pork bellies and bungalows in Boca Raton without losing your balance.

### Is Uncle Sam about to rain on your parade?

This is the ultimate in "What if?" questions.

And FORECAST<sup>™</sup>, Monogram's tax estimating and modeling program, is the quickest and easiest way to get a straight answer.

Unless, of course, you'd prefer to part with the price of the program for a visit with your accountant.

With FORECAST you can estimate your taxes—and plan your strategies—for up to five years in the future. Or look at this year's liability and compare up to five "What ifs?" at a time.

Side-by-side, right on the screen.

You can use FORECAST alone, or together with Dollars and Sense.

But be sure to use it soon.

While there's still time to seek shelter.

### Now you can bank on it.

If Monogram seems like a forward-looking software publisher, keep watching.

For Moneylink<sup>™</sup>.

This revolutionary new program links personal computer banking services to your Dollars and Sense database. Automatically.

One keystroke up-loads all your bills, loan

payments, transfers and other transactions. Another one downloads all your account activity, including current balances. And a third reconciles the whole thing instantly and automatically.

When you're finished you can check out the tax implications with FORECAST.

That is, if you have a moment or two to spare.

Moneylink is already up and running and available at Citibank and Bank of America. With many more banks on the way.

To see if yours is one of them, give them—or us—a call.

### Que tips.

To see if you're getting the most out of Dollars and Sense, get the latest book from Que Corporation.

*Using Dollars and Sense* is available at your local retailer or from Monogram. And it's filled with useful applications from the simple to the complex.

To help you sharpen your senses.





# HOW SENSIBLE CAN YOU GET?

One of the best things about Monogram software is that it's constantly getting better.

Because we're constantly adding features, eliminating limitations and generally giving our software as much sense appeal as possible.

## Take 2.0

For example, if your PC is an IBM® or 100% compatible, you can take advantage of our most powerful product yet.

Dollars and Sense 2.0 includes both FORECAST and a brand-new portfolio manager that tracks stocks and bonds, calls and puts, currencies, commodities and any kind of capital gain (or loss) you want to own up to.

Account capability—with consolidation—is unlimited, reports can be customized any way you like them, and on-line HELP is in detail as well as in context.

Version 2.0 not only runs under the PC DOS environment, but it lets you export files to your favorite ASCII spreadsheet.

And, of course, it's ready for Moneylink.

Our latest versions for the Apple® II family support Apple's new 3½" UniDisk, for up to 800k of storage. And you can export your files to AppleWorks.

As a Monogram customer, you'll find our upgrades inexpensive, our newsletter informative and our customer support invaluable.

Whenever you can't make sense of something.



## Software for the most popular hardware.

Dollars and Sense is available for the IBM PC, PC/XT, PCjr, PC AT and 100% compatibles, the Apple II family, Macintosh and the TI Professional.

FORECAST is included with all IBM versions

of Dollars and Sense, with a separate program available for the Apple II family and Macintosh.™

Availability and specific functions of Moneylink will be determined on a bank-by-bank basis.



8295 South La Cienega Blvd.  
Inglewood, CA 90301 (213) 215-0529



the DataTower line have been upgraded to 75MB, 160MB, and 292MB.

Bill North  
Priam Systems  
San Jose, California

### Vapor Trails

I must complain about the ad for subLOGIC's *Jet* in *PC World* [September 1985]. When I called to order the optional scenery disks described in the advertisement, I was told they weren't actually available. The subLOGIC staffer added that it is common practice to advertise software before it's ready for market. If not illegal, it is at the very least unfair to dupe consumers into calling to purchase a nonexistent product.

Tom Olson  
Chicago, Illinois

We do not subscribe to the practice of advertising software that is not available. Occasionally subLOGIC makes late releases in order to perfect programming. In the case of the scenery disks [for *Jet* and Microsoft's *Flight Simulator*], our engineering department was slowed by the quest for compatibility with the many versions of *Flight Simulator*. The scenery disks should be available by November 1985. —Stu Moment, Chairman, subLOGIC Corporation

### Corrections

Two digits of the *Fido* bulletin board phone number were transposed in "Fido: A SYSOP's Best Friend?" (*Password: Communicate*, PCW, October 1985). The correct phone number is 513/579-2587.

"Ready-to-Run Accounting" (PCW, September 1985) also may have prompted readers to dial for directory assistance. The correct phone number for Alfred Publishing is 818/995-8811. We apologize for any inconvenience these errors may have caused.

Letters should be mailed to Letters, *PC World*, 555 De Haro St., San Francisco, CA 94107, or sent electronically to MCI Mail PCWORLD, CompuServe 74055,412, The Source STE908, or Direct-Net 500. We reserve the right to edit letters. All letters must include the writer's name, city, and state before being considered for publication and should not exceed 300 words. ●

# FORMS

# CHARTS

# and MORE

## EVEN WITHOUT A GRAPHICS BOARD!

With MonoGrafx, you can create just the form or chart you need using 3 font sizes, 6 different kinds of boxes, 4 kinds of lines, arrow heads and nearly 100 graphics characters.

"When good form matters . . . [MonoGrafx] just might hit the spot for your business presentation."

—PC Magazine

Editing is easy. Moving, copying, erasing, etc. are child's play. You can even undo your last command. Or undo the undo.

"Incredibly easy!"—Computer Buyer's Guide and Handbook

MonoGrafx is flexible and versatile. For example, you can hide comments or instructions and print 2 different versions of the same page. Pages can be as large as 11" x 14", and you can print up to 66 pages with a single command. The list of features goes on and on.

"You have to see it to believe all it can do."—Bay Area PC Newsletter

The program is 100% quality. From the lightning speed of operation to the well-organized manual.

"An excellent new program."

—Computer Graphics Today

### TRY IT RISK-FREE!

Our guarantee is pure and simple. Try MonoGrafx for 15 days. Money back if not satisfied.

Credit card and PO orders, call **1-800-992-0085** or 617-641-0400. If ordering by mail, send \$69.95 (\$99.95 non-protected) plus \$3 shipping (\$10 outside U.S. and Canada). In Mass., add 5% tax.

If you're interested, but just not sure, send \$5 for an evaluation kit that includes a demo disk and print samples.

Analytics International, Inc.  
1365 Massachusetts Ave.  
Arlington, MA 02174

Circle 192 on reader service card



# 250,000 customers made us do it. The WYSEpc.

We established a precedent on better than 250,000 desktops with our terminals. So when our customers got ready to include PCs in their plans, they didn't think they should have to settle for less than Wyse style, performance and economy.

We agree. And now you can get the WYSEpc with IBM compatibility in hardware, software and expandability. We've thoroughly tested more than 350 software packages and accessories. It runs even the acid tests — Lotus 1-2-3 and Flight Simulator — in beautiful Wyse style.

Our price *includes* dual floppy drives, monochrome 14" tilt/swivel monitor, height-adjustable keyboard, 256K RAM, two serial ports, one parallel port, MS-DOS with GW-BASIC — and more.

There's also an IBM PC/XT compatible model with a 10-Megabyte Winchester disk. A color graphics option is available on either model.

For more information about how much less all this costs from Wyse, call toll-free, today.

## WYSE

Call 800-GET-WYSE



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The "V" shaped design is a trademark of Wyse Technology. IBM and IBM PC/XT are trademarks of International Business Machines Corporation. Lotus 1-2-3 is a trademark of Lotus Development Corporation.  
MS-DOS and GW-BASIC are trademarks of Microsoft Corporation.

Circle 438 on reader service card





## Introducing the TI 880 AT Printer. Because you need a multi-user printer that works overtime.

The last thing you need is the wrong printer. A printer that quits when your work is nonstop. Or one that burns out from overwork.

Let's say you have a typical multi-user environment or a local area network. It includes IBM Personal Computer ATs, PC/XTs or compatibles. What you need now is a printer that can handle your system's entire workload. A printer you can trust your business to.

You need a high-speed printer

that's software compatible with PC industry standards and capable of sustaining 300cps. It should have straight paper paths to eliminate jams, changeable fonts and enhanced print modes to take care of draft, correspondence and graphics. Its design should be rugged, durable and as reliable as you've come to expect from TI printers.

The OMNI 800™ Model 880 AT Printer from TI fits this description.

The printer that works overtime.

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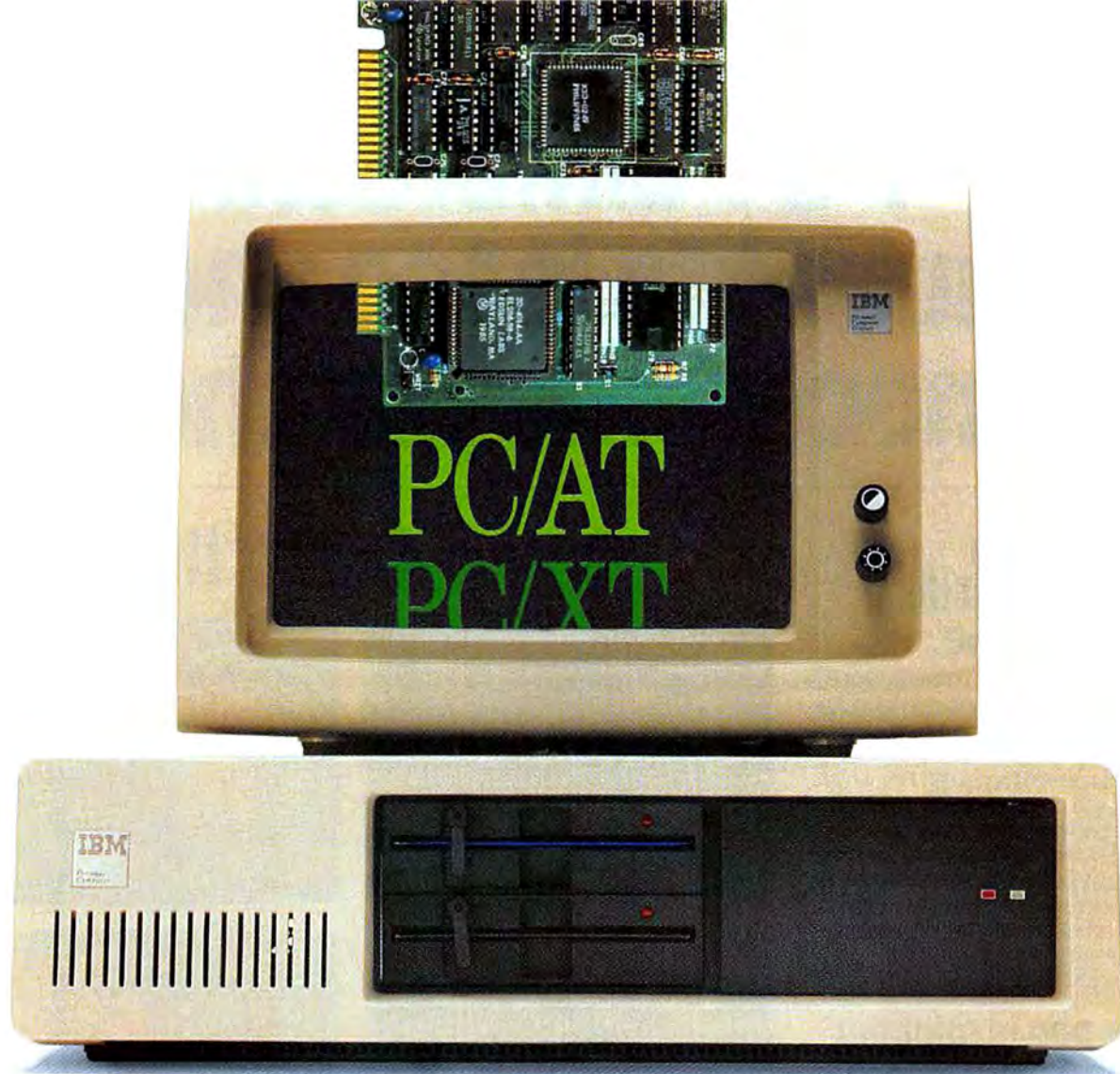
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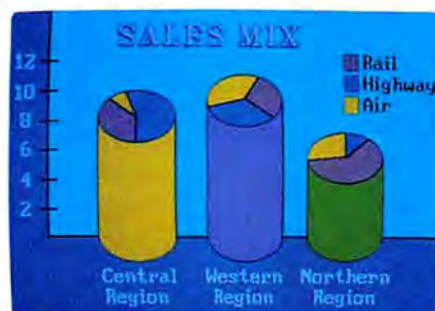
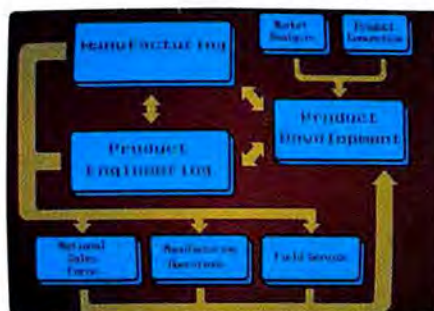
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Circle 182 on reader service card



# PELICAN: 2.8 Mbytes of removable high-speed storage

## Pelican packs more data onto a floppy than ever before

You've heard about the new Kodak high-density disk drives. And the new Kodak 3.3 Mbyte diskettes that can hold eight times the data of one ordinary floppy. Now the Pelican 3.3 from Pacific Micro Systems packages those exciting new components in a handsome and compact unit (along with internal half-slot controller card and high-speed cache software) that brings new levels of performance and convenience to users of IBM PCs and compatibles.

## Pelican offers unequalled capacity and speed

- Just one Kodak high density 5.25 inch diskette stores 2.78 Mbytes of formatted data! So, for example, you could put all your spreadsheet data or word processing files on one HD floppy. Just four diskettes deliver more formatted storage than a hard disk: 11.14 Mbytes to be exact. And you can keep expanding in 2.78 Mbyte multiples, diskette by diskette. So Pelicans deliver storage capacity by the beakful—on a birdseed budget.
- Access your data at least twice as fast. The Pelican system accesses stored data at 500,000 bits/second—twice as fast as regular floppy disks. And Pelican software automatically creates cache buffers in the PC memory that mirror data on disk. So it is often presented ten times faster than data coming from disk.



## Advantages of removable, expandable storage

- Makes hard disk back-up easy. And inexpensive. Since your Pelican is always on line, it is now fast and convenient to back up files frequently while they're being worked on. Or, at the end of the day, you can use a backup program to copy only modified files to a high-density diskette. It's fast. To copy a full 10 Mbyte disk takes less than 14 minutes.
- Provides data security a fixed disk can't. The removable high capacity floppies can be locked up when not in use. Individuals can be given diskettes holding only the data they require. So confidentiality is preserved and the possibility of erasure by others is eliminated.

## We start with Kodak reliability, then add a limited one-year warranty

The Kodak logo on the drive tells you about the quality inside. Should your unit ever need service, we do the work in our own plant. Support hotline? You bet—10 hours a day. Pacific Micro Systems, incidentally, has been supplying high-quality peripherals since 1981.

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At \$795, the Pelican makes a lot of sense. And no other form of removable mass storage even comes close to that price. But at \$795, there's no room for the markups that would be added on if you bought your Pelican in a store. So you have to go to the place where Pelicans are hatched.

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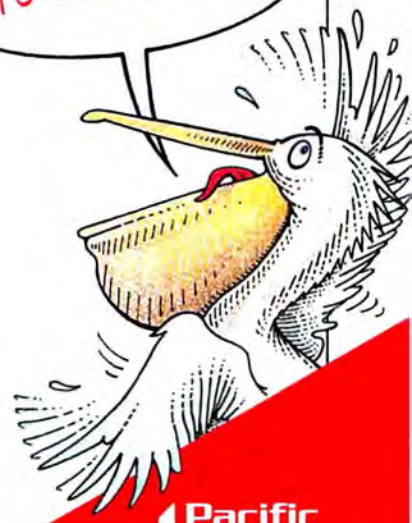
The Pelican takes off with all programs that run under DOS 2.0 or higher. Soaring with a pelican presents no risks at all. Try it for 15 days. You can return it, then, if it's not for you, for a full refund.

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# PC WORLD

## The Great Disappearing Data Department Store

*Computer showcases may be an idea whose time has gone... even before it came.*

A few years ago, before most of the bubbles that were going to burst did so, a handful of entrepreneurs arrived at the same conclusion on roughly the same day: What the computer industry needed was a perpetual, decentralized, unfrenetic COMDEX.

It seemed like a capital idea at the time. But the concept of an ongoing computer trade show—peppered with seminars, meaningful hands-on experiences, and

the luxury of browsing—has definitely lost something in the execution.

Just two weeks after a gala send-off complete with champagne and balloons, California DataMart—only the second computer trade mart in the nation—was abruptly forced to change its name and identity. The reason for the turnabout: The facility's owners couldn't round up enough business to make the venture profitable.

The \$22 million, 175,000-square-foot San Francisco edifice has been renamed Showplace Business Mart. Instead of "a one-stop show" for computer addicts, as San Francisco mayor Dianne Feinstein described it, the mart will become a showroom for office-related products ranging from postage meters to local area networks.

"What we've done, obviously, is to change our emphasis," says co-owner Bill Poland. With just 20 percent of the nearly 50 showrooms leased on opening day, and with such big-league players as IBM, Hewlett-Packard, and Apple Computer conspicuously absent, Poland and his associates said they had to change their game plan—fast.

By offering a wider range of office products and by forswearing computer trade shows (such gatherings would have been "totally out of sync with the size of our building," says Poland), the former DataMart's principals hope they can keep the glass-encrusted art deco building from becoming a white elephant. They also hope that all nine tenants, including Epson America, will stay on.

Although taken aback at the abruptness of the announcement, most observers said they weren't surprised at the computer mart's switch. The mart opened as the sluggish summer of 1985 was drawing to a close—a season that saw companies throughout the industry slashing their budgets to stay afloat. It wasn't a particularly opportune time to experiment with untested marketing ideas.

Even Trammel Crow's palatial \$100 million Dallas Infomart, the nation's first computer mart and hailed as a success by many, is just 45 percent leased—and that means some 750,000 vacant square feet. Analysts are beginning to wonder aloud if the computer trade mart idea has merit at all.

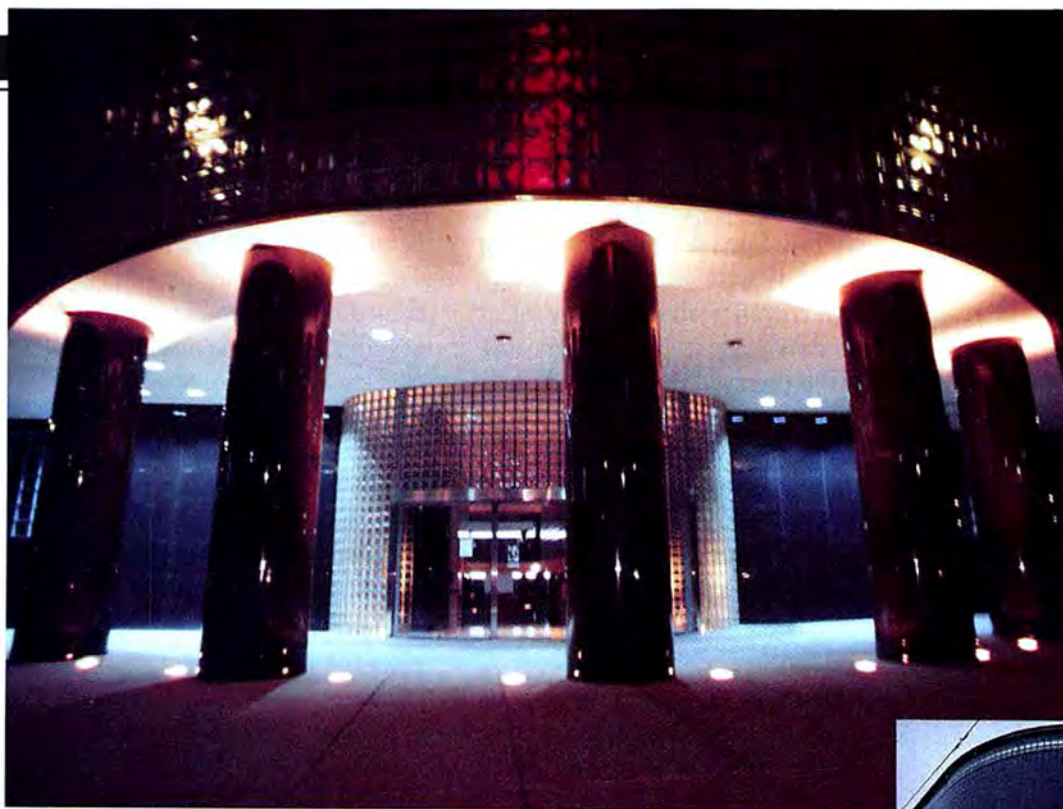
*PC World View reports new developments in computer technology, items of interest to computer enthusiasts, and the most significant and enticing insights about industry trends and personalities. We've reserved the "Grapevine" section of this column for industry reports that are still at the speculative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

—Ken Greenberg



# View

News and notes for the computing community



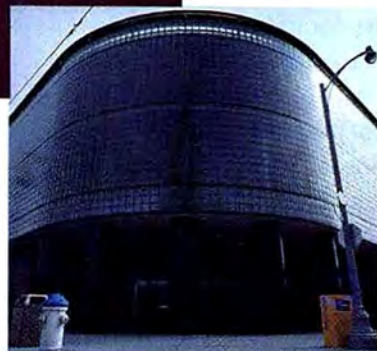
The Showplace Business Mart's attractive high-tech look was apparently not enticing enough for computer industry vendors.

Yet despite DataMart's woes, architect John Portman is pressing on with Inforum in Atlanta, and plans for other computer trade marts continue apace—albeit with a value-added twist. In nearby Santa Clara, Techmart is set to open next September. Although its owners haven't yet persuaded any companies to sign leases, the \$45 million, 318,000-square-foot structure is half-completed.

If Techmart doesn't follow in DataMart's path, it will be because of its Silicon Valley locale and because of its inclusion in a

complex that also offers a convention center, a hotel, and a golf course.

That plan is being duplicated elsewhere. Boscom, a computer trade mart in Boston, was once doomed for lack of tenants. But a new development team added adjoining convention facilities to lure businesses of all types—and renamed the facility the World Trade Market Center. The 200,000-square-foot showroom was slated to open January 1; half of this space has been spoken for since last August. It just goes to show you that there's more than one way to snare a tenant. —Jeff Peline





# Big Pitch for Big Business

*When the Fortune 500 talks, Ashton-Tate listens.*

Ashton-Tate is gambling. The company that publishes *dBASE III* and *Framework II* is betting that its 14-member Corporate Advisory Board—stocked with representatives of as many top U.S. firms—will provide its products with a better business focus and eventually yield even better sales. It's a simple wager, but one that guides a corporate outreach effort unusual for a software firm.

The risk is giving potential customers a peek behind the curtain; the reward includes high visibility (for Ashton-Tate) and the opportunity for a dozen-plus corporations to play a prominent role in software development. Assuming compliance with strict non-disclosure rules, board members have a crack at Ashton-Tate products as much as 18 months prior to release.

The advisory board's roster reads like a star-studded corporate directorate, replete with representatives of AT&T, Chase Manhattan, DuPont, Grumman Aerospace, Westinghouse, Bechtel, and Electronic Data Systems. Ashton-Tate's plan is a spin-off of its Corporate Emphasis Support Program, launched last April to provide direct assistance to microcomputer managers.

Karen Orton, the driving force behind the support program, also champions the Corporate Advisory Board. She characterizes board members as a power-user elite capable of providing feedback based on intensive experience. Ashton-Tate isn't shy about being out early with an idea destined to gain currency among software vendors. "Most PC suppliers still haven't figured out that large corporations are unique and have particular needs," she says. "I'm amazed that some of our competitors have yet to institute real support programs to serve their corporate accounts."

Andrew Sujata manages data systems in Bechtel's advanced technology division. "We're at the forefront of Ashton-Tate's coming product line," says Sujata. "We

can anticipate what Ashton-Tate will market so we can possibly incorporate new products in any planning we might do."

Ashton-Tate is both listening and responding. At its first meeting last July, the board attended a demonstration of *Framework II*. The product's final version reflected board members' suggestions to include a spelling checker with a global search and replace function and to offer import/export with 1-2-3.

The board is now contributing to Ashton-Tate's formulation of a corporate purchasing policy. And this is just the tip of the iceberg. Says Orton, "Next year, we'll be after the Fortune 1500." —Wes Nihei



Ashton-Tate's Karen Orton: cultivating the corporate user



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## Grapevine

The computer business is no longer overrun with marketing wizards, but Max Toy is the genuine article. Toy spent the past few years as vice president of sales at Compaq, where he perfected the art of stroking dealers and getting products into the right channels. Now Toy, who's also an alum of IBM's Entry Systems Division, has become senior vice president of marketing at ITT Information Systems, maker of the Xtra XP. ITT: big company, solid machines, but meager success to date. Here's a defection to watch.

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## Big Blue's News

IBM selling *other companies'* products? That notion has a snowball's chance, you say?

Well, forget the mop; things are changing. In the William Lowe era Entry Systems Division is emerging as the consummate team player: first by signing a long-term pact on systems software with Microsoft, and now by embracing two dozen third-party products—some in blatant competition with Big Blue's own hardware.

The list includes such winners as AST's SixPakPlus, Tecmar's Maestro, Mouse Systems' Mouse, Emulex communications boards, Amdek monochrome monitors, and Tecmar's Q60AT, a 60MB internal streaming tape drive for the AT. IBM's direct sales force will be pitching the products for high-volume accounts.



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## Follow That Story!

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## As the Pivot Turns

*First in a series of occasional PC World View follow-ups to previously published PCW features.*

Building a great computer is a great way to go bankrupt. It nearly happened to California's Morrow Designs when the company unveiled its upgraded but pricey DOS-based portable just as the market hiccuped. Desperate negotiations with Morrow's bank and with a major vendor staved off what looked like the inevitable, but the dust hasn't settled yet. Morrow recently slashed its dealer network and abandoned its commitment to CP/M in favor of seeing its DOS portable through rocky times.

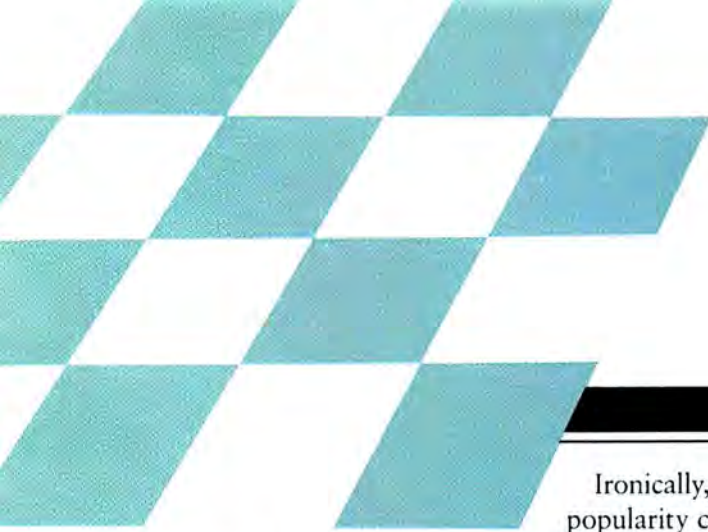
The San Leandro company was founded by George Morrow, a mercurial independent with a weakness for Sartre and sneakers (see "Talk of the Times," PCW, December 1985). Though perennially short of capital, Morrow Designs prospered with a line of

affordable CP/M machines, until it became clear that supporting CP/M had little in common with long-term prosperity.

Enter the Pivot, a lunchbox-shaped portable with a flip-down keyboard and two  $\frac{1}{3}$ -height  $5\frac{1}{4}$ -inch floppy disk drives. In a departure from George Morrow's independent personal style, then-president Bob Dillworth negotiated a mutual licensing agreement whereby Morrow would produce the Pivot itself and Zenith Data Systems would help with financing and supply systems software, including the ROM BIOS. A revamped version, dubbed the Pivot II, hit the market in mid-1985, enticing users with a backlit liquid crystal display that provides high contrast and negligible glare.

Response to the Pivot has been enthusiastic. It remains the only portable on General Electric's approved list; it is under evaluation by EDS, General Motors' computer unit; Sperry put its own label on the Pivot in a bid for a





## ***Follow That Story!*** (continued)

15,000-unit IRS contract; Osborne released a version for sale in Europe; and Morrow recently got a \$300,000 order from the General Accounting Office. The company has a backlog of orders in excess of \$2.5 million, and a hungry market. "Every delivered machine produces orders for at least three more," says Mr. Morrow.

So why did he nearly go bust?

The basic problem was getting the new machine out the door. Morrow's strategy was to sell its CP/M machines to pay for the Pivot's development. In good times, with plenty of capital, the scheme would have worked. In these less-than-robust times it almost led to disaster.

The company ran into technical problems producing the improved Pivot II. "Zenith furnished us with a ROM BIOS that was full of bugs," says Mr. Morrow. "It was far from finished." California's Union Bank started to worry about the size of Morrow's debt, which at one point reached \$7.2 million. Despite significant progress payments from Zenith, the company was in trouble.

Ironically, the new machine's popularity compounded the problem. Dealers would order 50 Pivot IIs and get 5; companies eager to evaluate the machine grew restive. In San Leandro, talk of Chapter 11 was the company's September song. Morrow's payroll, once 160 strong, was temporarily pared to 25. Zenith got so nervous it even moved its stock into a separate warehouse, out of the reach of creditors.

About that time, Union Bank began intimating that the company's debt was out of control. Going almost cold turkey, George Morrow cut his company's line of credit to \$2.8 million. Intense contract negotiations produced a shaky peace with Zenith. Morrow rehired most of its furloughed workers, and production on the Pivot resumed. The company is currently turning out 1000 machines a month and could produce 3000 with proper financing.

Obtaining that financing may still be problematic. In dropping CP/M machines, Morrow pruned its roughly 500 U.S. dealers to 100 but is placing the accent on high-volume corporate sales. Now dealers, not CP/M machines, are expected to cough up the cash (a reported \$3 million) to finance the Pivot.

The relationship with Zenith has survived, but only just. Dillworth left the Morrow presidency

to join Zenith, which is now manufacturing its own version of the Pivot, the Z-171. And the usually brash Mr. Morrow is sounding distinctly subdued. "We have a temporary patch-up," he says. "Zenith's interest in us is only short-term, and I haven't detected any Good Samaritans back there."  
—William Rodarmor

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## **When In Doubt, Type It Out**

Thanks to *Broadcasting* magazine for reminding us of the sanctity—and the vulnerability—of the floppy disk. Seems that the Federal Communications Commission was recently ready to go to press with a notice soliciting comment on how it should handle hostile takeovers and proxy fights in the electronic media. As luck would have it, the commission misplaced the disk containing the document, which was, of course, brimming with the intricate legalese dear to federal agencies. Some poor soul was assigned the task of rekeying in the notice from start to ignominious finish.



## Seeing the Forest for the HPs

Like mushrooms sprouting in a forest after a rain, a multitude of new products, inspired by the first affordable laser printer, has suddenly sprung up. These accoutrements are all aimed at making life easier for owners of the Hewlett-Packard LaserJet.

Why the flurry of activity? "My experience is that a lot of people out there are pretty frustrated," says Jack Leach, creator of the *Polaris PrintMerge* utility. That frustration is not, of course, with HP's near typeset quality printer, but with the dearth of software drivers and with shortcomings of programs, particularly *WordStar*, that were designed P.L. (pre-laser).

With Leach's utility, *WordStar* users can add new commands to their files to switch among various LaserJet fonts or to print simple graphics. Other software utilities supply similar agility to users of 1-2-3, *MultiMate*, and *DisplayWrite*, as well as interfaces for non-DOS machines including the Macintosh, DEC's DECmate II and III, and Wang PCs and word processors.

The LaserJet galaxy extends beyond software to hardware add-ons, including interfaces to the 3270 PC and to 3Com local area networks; automatic sheet and envelope feeders; and emulation boards for IBM 3278/3262/5210, Diablo 630, NEC, and Qume Sprint protocols. One product, the *Interlynx/3287*, lets the LaserJet emulate a coaxial-connected printer, enabling IBM mainframes to print without alteration to host software.

In addition to products that fill the gap between the LaserJet and existing hardware and software, other new applications operate in stand-alone fashion to support the advanced features of the original LaserJet and the new LaserJet Plus. For example, *LaserType* from Softlab of St. George, Utah, simplifies the downloading of fonts from floppy disks to the LaserJet

Plus. *Inset* from APG Software in Danbury, Connecticut, enables you to capture screen images and later incorporate them into printed documents. And *Lasersoft* from Business Systems International in Canoga Park, California, lets you create and store forms in the printer.

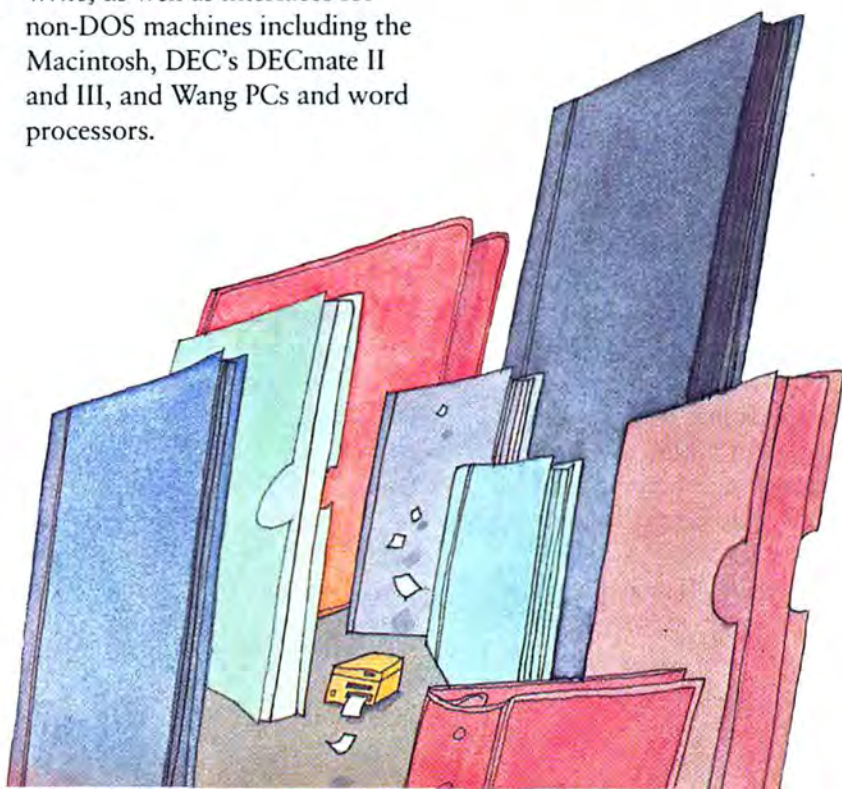
Many users and dealers have yet to catch the new wave of LaserJet products. According to Steve Blaha, who created the *Laser Print* utility, most users don't seem to realize that they bought something more than a faster, quieter near typeset quality printer. "The real issue is not software or hardware," he notes, "but education—acquainting users with the power that's already there." —*Ted Nace*

## Out of the Graphics Thicket?

Every area of computer applications has at least one Golden Fleece. In the graphics arena, one of the most elusive objectives has been an efficient universal interface between application software and hardware. Late last year Graphics Software Systems (GSS) took its second big step toward device independence by releasing the *GSS Computer Graphics Interface (CGI)*.

The idea behind the GSS CGI is similar to that of *GSS-Drivers*, an

(continues)





### Out of the Graphics Thicket? (continued)

earlier software product endorsed by IBM and incorporated into the Enhanced Graphics Adapter (EGA). GSS writes the device drivers for a full array of graphics hardware products and bundles them with the company's interface software, enabling software developers to write applications for a single "virtual" device. When new devices or hardware upgrades emerge, GSS simply adds new drivers to the GSS CGI, leaving the relationship between the interface and a graphics application unchanged. And that means virtually no muss, no fuss when using a new piece of hardware with software written for a virtual device.

Unlike *GSS-Drivers*, *GSS CGI* is raster-based (that is, bit-mapped) rather than vector-based. This distinction has some far-reaching implications. While vector graphics has a number of advantages over bit-mapped graphics, the processing power required to crunch vector algorithms greatly increases the cost of graphics hardware. The industry's swing toward bit-mapped graphics means GSS is banking on a continuing boom in raster-based devices such as CRTs and laser printers.

By the fourth quarter of this year, GSS hopes that chip makers will begin incorporating *GSS CGI* into firmware. Whether or not this occurs depends on industry response, especially IBM's. Other

graphics interfaces—notably the one resident in *Microsoft Windows*—provide tough competition for the GSS line (although GSS could toss Microsoft a curve or two before the final inning is played).

GSS CGI's superior support of bit-mapped graphics, plus its new options for adding fonts and custom user interfaces, may make it attractive to an industry hungry for standardization. —Eric Knorr

## O Christmas PC

What? No AT or Deskpro under your Christmas tree? Be of good cheer: There's a better than even chance a PC helped get that tree to market.

It initially seems an odd alliance—one of the slowest growing crops paired with a speedy management tool. This season, ATs, XTs, and look-alikes found a profitable place in the offices of Christmas tree farms nationwide.

Jane Sivincki, director of the American Christmas Tree Association in Milwaukee, sees irony but no mystery in growers' increasing interest in automation. Sivincki reports that although a majority of the nation's 12,000 tree farms are small operations that regard PCs as useful but not yet essential, the more than 100 corporate Christmas tree farms view the machines as almost mandatory. Each of these farms moves 25,000 evergreens annually and leaves several times that many in the ground.

For Christmas tree growers, PCs are most productive during the harvest and shipping seasons. During the 20 hectic days of the harvest, ten years of growth abruptly ends. "The industry's

short harvest and shipping times create a critical need for up-to-date, detailed inventory and customer records and a lightning-fast harvest payroll," says Debbie Simmons, who handles the books for Stone Bros. Christmas Tree Farms of Salem, Oregon.

The industry has also embraced PCs for budgeting and planning. The larger growers use 1-2-3 or *Symphony* for recording production and analyzing accounting data. For the folks who cultivate the fir trees and the pines, PCs have helped deliver a Christmas decked with long green—and devoid of red ink. —Dick Landis

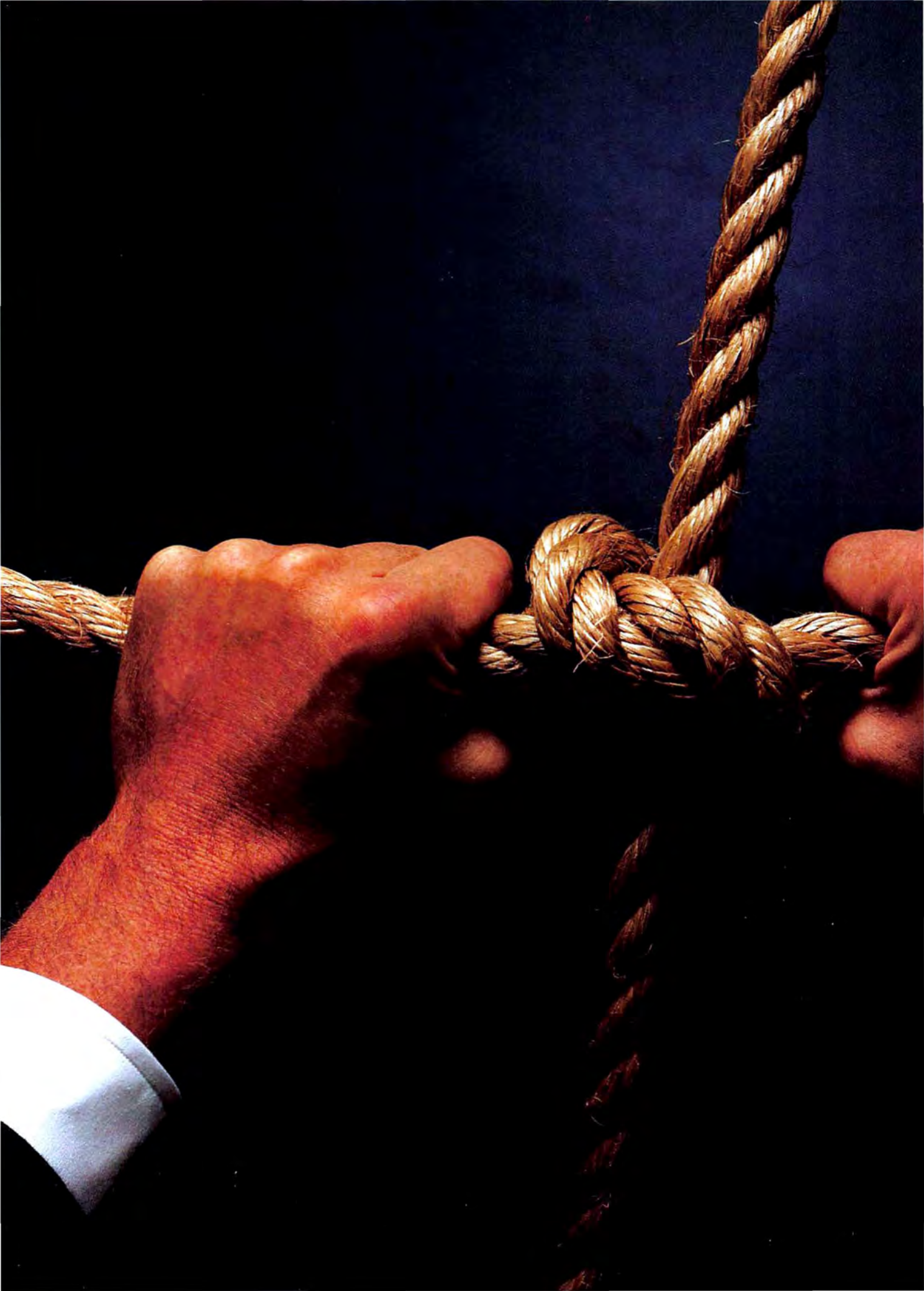
*Jeff Peline is a business writer for the San Francisco Chronicle; Dick Landis writes on PCs and agriculture. William Rodarmor is a freelance writer. Ted Nace is a Contributing Editor, Eric Knorr is an Assistant Editor, and Wes Nihei is the Editorial Assistant of PC World. ●*





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**Circle 212 on reader service card**



# The Help Screen

*PC World offers answers and advice at every level*

This month: Tips on sharing your phone with a modem, connecting a modem to a PBX line, and shielding modems from lightning; protecting inactive screens from phosphor damage; and an improvement to batching backwards

*Karl Koessel*

## *Voice to Modem and Back—In One Call*

*Q. I have a single phone line, which my voice shares with my Hayes-compatible modem. When I want to telecommunicate with someone who has the same setup, I'm forced to begin by calling and vocally telling the other party that I'm ready. After our telecommunications programs have been loaded and our modems turned on, one of us calls the other again. I've heard that it's possible to make one phone call, turn on the PCs and modems, and make a connection without having to hang up and redial. However, my modem's manual doesn't explain how to do this. Any advice?*

*Cynthia Aulait  
Tacoma, Washington*

A. The procedure is simple. Initially call the other party, and stay on the phone. When both of you have your modems on and your telecommunications programs running, one should type **ATD <Enter>** (which means "attention, dial"), and the other should respond with **ATA <Enter>** (which means "attention, answer"). After a connection has been made, you can both hang up the handsets and proceed with your telecommunications session.

You can also switch from modem to voice without hanging up and redialing. From within your telecommunications program, type a message to your friend indicating that you want to talk. Both of you should then lift your handsets and type **+++ <Enter> ATH <Enter>** (which means "switch from on-line to command mode, attention, hang up"). The modems will "hang up" (acting like extension phones), and you can begin conversing. These codes will work

with a Hayes-compatible modem such as yours; other modems have similar commands listed in their manuals.

## *The PBX Connection*

*Q. I have a Hayes Smartmodem 1200B internal modem board in my Compaq Portable and use PC-Talk III. At home I have no problems telecommunicating, but as a traveler I occasionally encounter trouble when I connect the modem to a phone on a PBX system. I know I must have the telecommunications program dial 9 to get an outside line before dialing a phone number—that isn't the problem. Can you tell me what is?*

*Diane Goldman  
Washington, D.C.*

A. Whoever installed your internal modem should have warned you that a switch on the modem board should be toggled before you connect to a multiline or PBX phone. Failure to do so can result in damage to the Smartmodem. There are three tiny switches in a small box at the top of the board, above the connection to the phone line. The switches can be changed without taking the modem out of the computer, but be sure the computer is off. The middle switch, switch 2, should be off, or open (pointing toward the board's mounting bracket), for a single line connection and on, or closed, for a multiline connection.

This caveat also applies to external Hayes modems. On external modems, however, look for switch 7 (located inside the modem); set it off for a single-line connection and on for a multiline connection.

*(continues)*



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## The Help Screen

### Phone Line Lightning Arrestors

*Q. I live in an area frequently plagued by electrical storms. Last month lightning entering through the phone lines knocked out two of my company's internal modems. Surge protectors on the AC lines shielded the PCs, but the phone lines were left unguarded. Is there some type of voltage suppressor for phone lines? My local computer dealer is unaware of such a device—surely it exists.*

*Roger C. Garber  
Mount Joy, Pennsylvania*

**A.** Most PC users don't have to worry about lightning, but as you well know, modems with unprotected phone lines are at risk in areas where electrical storms are frequent. Telephone lightning arrestors that can withstand up to 3000 VAC can be purchased from MCM Electronics, an electronics parts distributor. To order an arrestor (or an MCM Electronics catalog), call 800/543-4330 (in Ohio, 800/762-4315) or write the company at 858 E. Congress Park Dr., Centerville, OH 45459-4072.

### Protecting Screens From Phosphor Burn

*Q. The sample AUTOEXEC.BAT file included in the article "Directory Assistance" [PCW, August 1985] included the command SCRNL, which automatically blanks the PC screen after 10 minutes of inactivity to prevent "burning" the screen's phosphors. This seemed like such a useful utility that I added the command to*

*(continues)*



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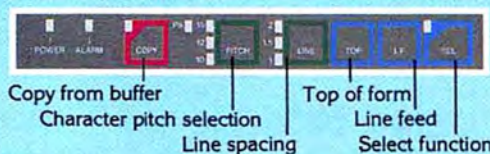
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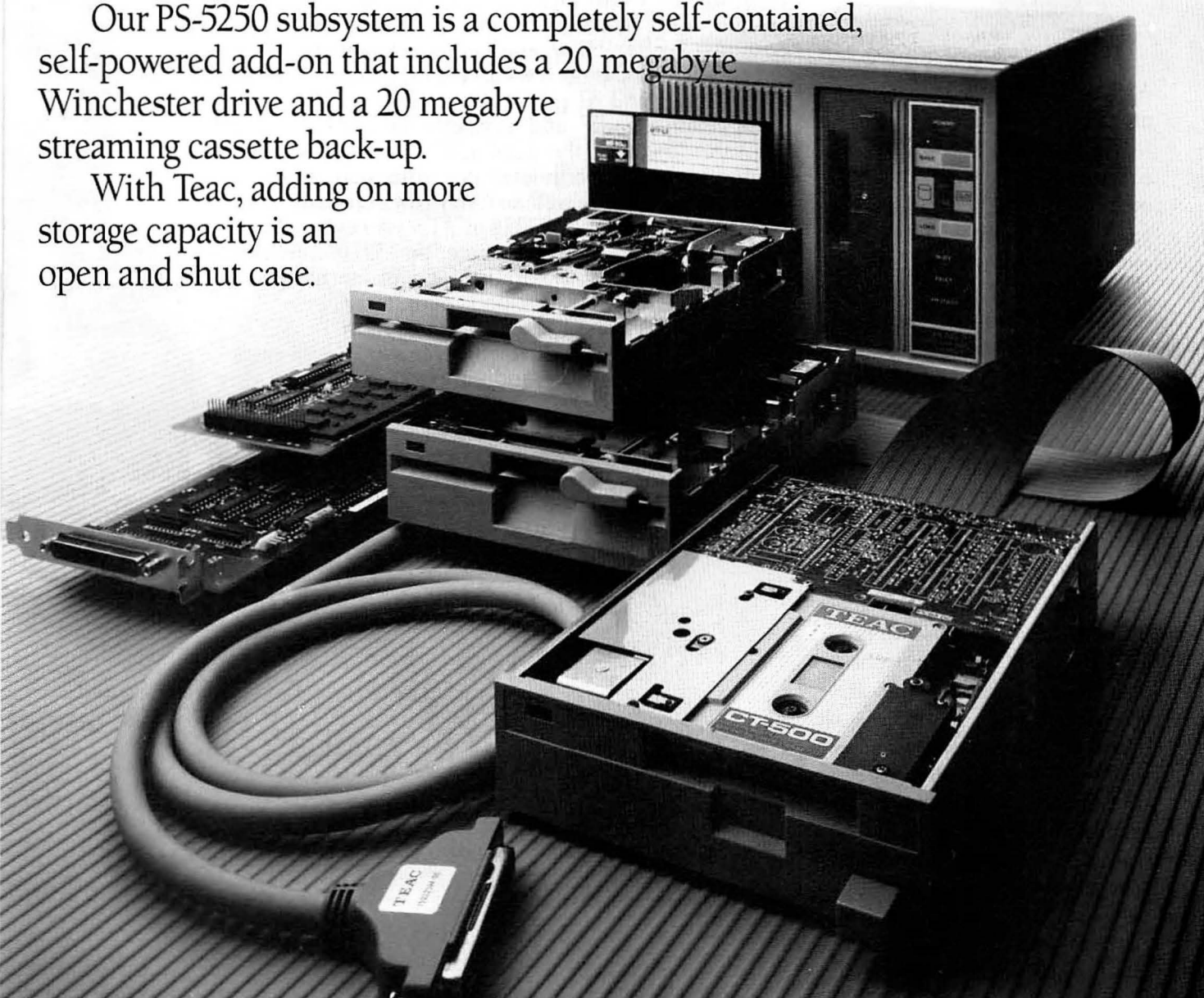
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my AUTOEXEC.BAT file. Attempts to use the command, however, have elicited the error message 'Bad command or filename'.

I use DOS 2.10, and I wonder if SCR.N is a utility packaged with DOS 3.00 or 3.10. Or does that command refer to a program you have written? If so, how can I obtain a copy?

J. F. Kenny

Rotterdam, Holland

A. SCR.N.COM, the screen-saver program I use, was written by J. T. Thannum. Thannum has copyrighted the program but permits copies to be made for personal, noncommercial use only. I obtained my copy from the PC World Utilities Disk included with the book *The Fully Powered PC*, by Burton Alpers, Andrew Fluegelman, and Lawrence Magid, which is published by Simon & Schuster.

Many other programs that prevent burning of the screen exist, including one that appeared in "Build a Better Blanker" (\*), PCW, Vol. 2, No. 11). Most public electronic bulletin board systems (BBSs) have at least one such program for the PC and compatibles. Some have so many that they are all "packed" into a single "library" file, which is given a name such as BURNOUT.LBR. Packing uses an algorithm to compress a program file, reducing the file's size and thus the amount of transmission time. A library file must be "unpacked" before the files it contains can be run. Most BBSs also provide a library utility that

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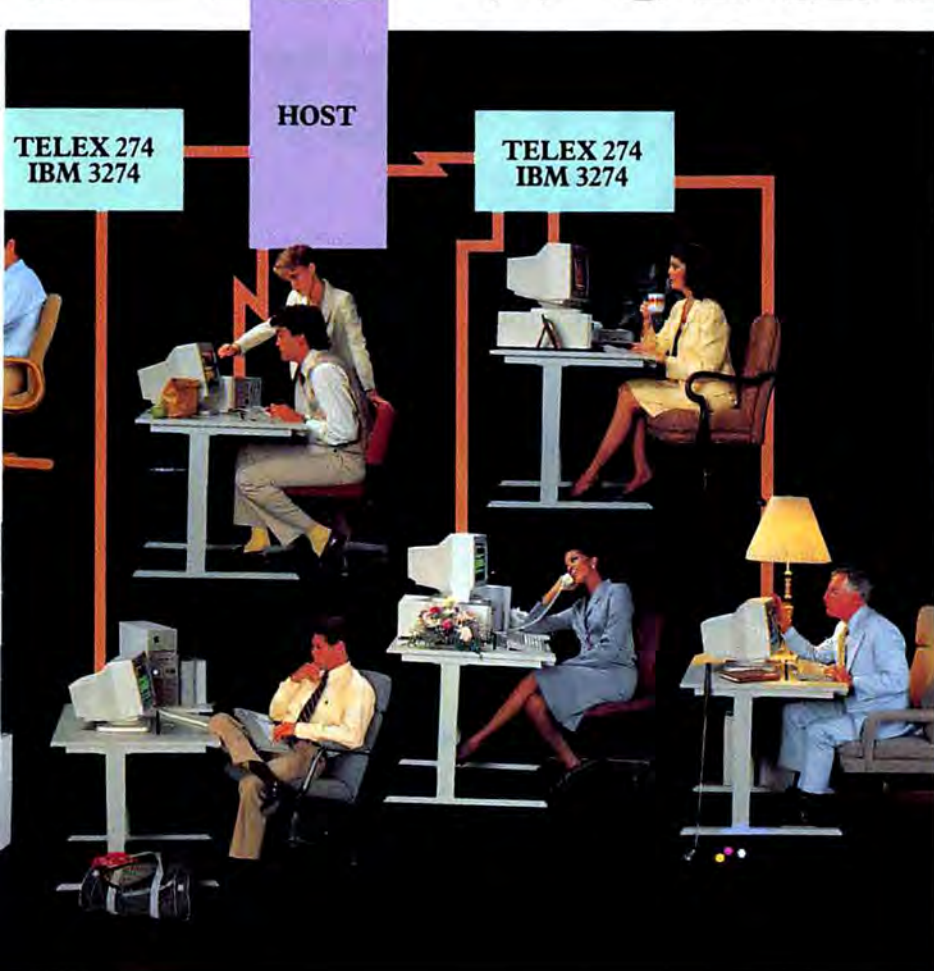


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performs packing and unpacking. The PC World Utilities Disk also contains a library utility written by T. Jennings, called LU.EXE.

*Upgrading the Compaq Portable Q. I bought a Compaq Portable in April 1984 with the standard 256K and two floppy disk drives. Since then I have been entertaining the possibility of upgrading my unit by replacing one of the floppy disk drives with a 20MB half-height hard disk and replacing the other full-height floppy drive with two half-height drives. This configuration would leave room for an internal half-height tape backup device, if I have enough money left.*

*I have called people in my area to inquire about this "dream machine," and everyone I talked to cautioned me that my power supply is probably not large enough to handle such a load. However, no one knows for certain.*

*Do you know the size of the Compaq Portable's power supply? Can I replace it with the 200-watt power supply used in the Compaq Portable 286? If this cannot be done I suppose I may have to buy the Compaq Deskpro Model 4.*

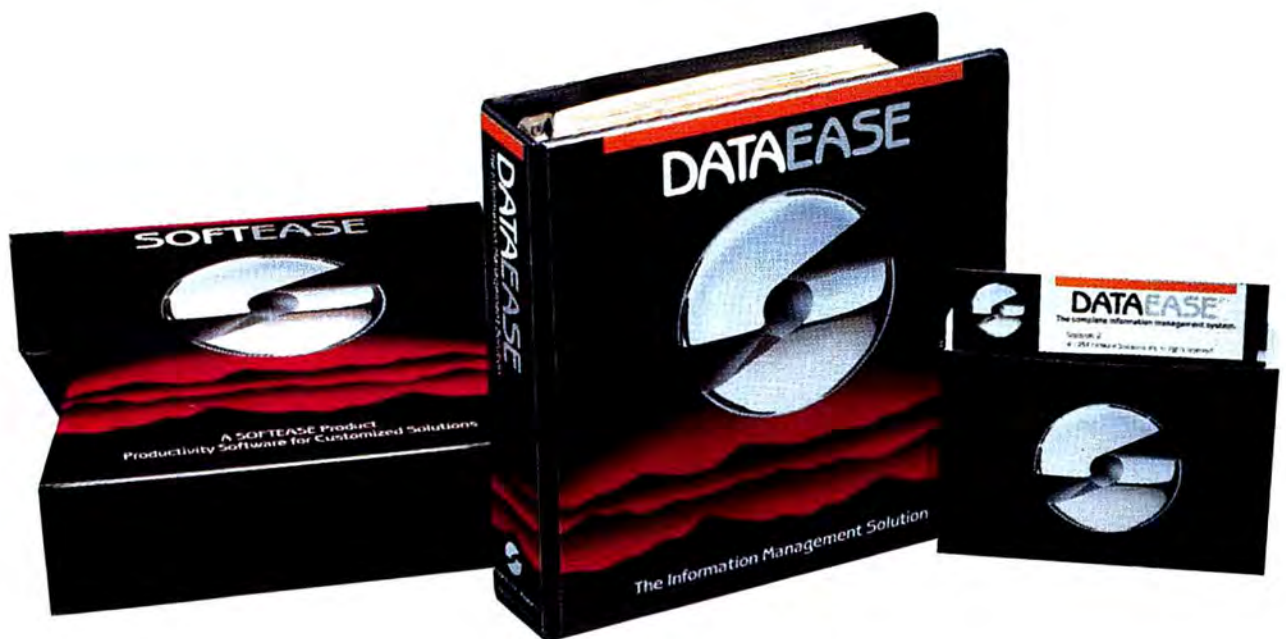
*Richard S. Delong  
San Francisco, California*

**A.** First, the Compaq Portable's power supply is rated at 130 watts, and second, the 200-watt power supply used in the Compaq Portable 286 will not fit in your Compaq Portable. The Compaq Portable lacks the controller to operate

(continues)



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—David Obregón, *PC Magazine*

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the tape backup device used in the other Compaq computers. Besides, the power supply is not large enough to handle a power-hungry tape backup unit along with a hard disk and two floppy drives. There are external tape backup devices you can use that supply their own power, but you will need a free expansion slot to install the tape controller board.

You do have other options, though. One of the floppy drives could be replaced with a third-party internal hard disk (see "Sensible Storage," *PCW*, August 1985). When installing hard disks, Compaq Computer Corporation shock mounts them, a practice you should follow. (A hard disk's controller board would also take up an expansion slot.)

Alternatively, you could install one of the newest innovations in hard disk storage: a hard disk and its controller all on one standard-size expansion board. Hard disk boards, such as Plus Development Corporation's Hardcard, draw less power than conventional internal hard disks, and you would still have two floppy drives. However, hard disk boards cannot be shock mounted and are not recommended for computers that do a lot of traveling.

In either case, your Portable, like other PCs of comparable age, will need a new ROM chip before it will recognize the hard disk. You need ROM revision C or a later version, which your dealer can provide inexpensively. (See the editor's note to "Really Affordable Memory" in this issue's \*.\*.)

(continues)

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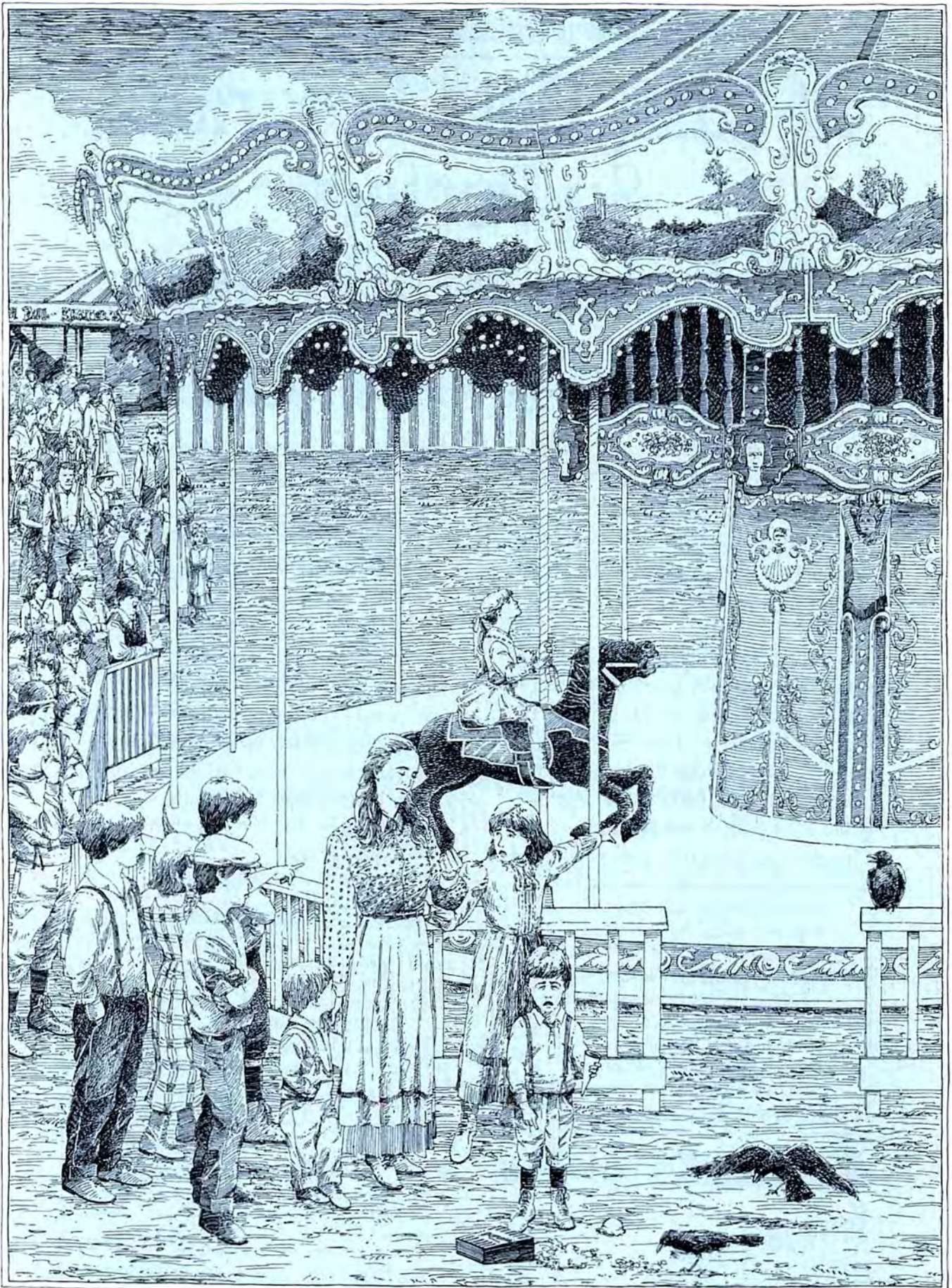
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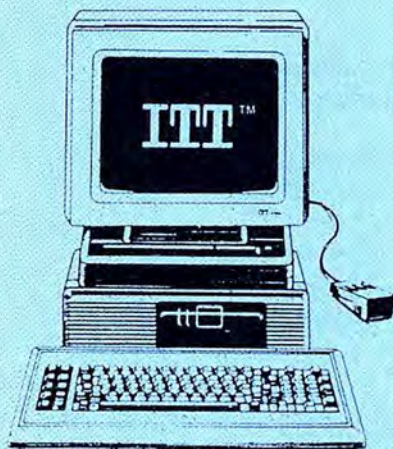
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## The Help Screen

```
COPY C:\BATCH\CDSPACE.TXT C:\BATCH\RESET_CD.BAT >NUL
CD >>C:\BATCH\RESET_CD.BAT
REM The shaded lines that begin and end this sample
REM batch file can be added to any batch file that
REM changes directories so that the batch file can
REM change back to the directory from which it was
REM invoked.
CD
CD \BATCH
CD
RESET_CD
```

Listing 1: SAMPLE.BAT illustrates the three DOS commands that, along with CDSPACE.TXT, enable a batch file to return to the directory from which it was called.

### Improved Return to a Previous Directory

"Batching Back to a Previous Directory," (*The Help Screen*, PCW, October 1985) presented a method to make a batch file that changes directories switch back to the directory from which the batch file was invoked. A couple of readers (special thanks to Danny Moran of Phoenix, Arizona) have suggested a more elegant solution—one that doesn't require BASIC. Like October's method, this technique assumes that batch files are kept in a directory called BATCH and that a PATH command that includes the BATCH directory is executed by the hard disk's AUTOEXEC.BAT file (see "Directory Assistance," PCW, August 1985).

This routine relies on a 3-character ASCII file called CDSPACE.TXT and three DOS

commands (shown shaded in Listing 1) that you can add to any batch file that changes directories. First create CDSPACE.TXT and store it in the hard disk's BATCH directory with the following procedure. From DOS, type **COPY CON C:\BATCH\CDSPACE.TXT** and press **<Enter>**. Then type **CD** and press the **<Space>** bar. To write the file to disk, press function key **<F6>** and then **<Enter>**.

Now, to create a sample batch file, begin by typing **COPY CON C:\BATCH\SAMPLE.BAT**, press **<Enter>**, and enter the lines shown in Listing 1, pressing **<Enter>** at the end of each line. Then press function key **<F6>** and **<Enter>** to save the file. Type **PATH <Enter>** to verify that C:\BATCH is included in the list of directories that are to be searched for the commands or batch files not in the current directory. (If it is not included, type **PATH C:\BATCH <Enter>**.) Make the root directory current by typing **CD \ <Enter>**, and run the example batch file by typing **SAMPLE <Enter>**.

(continues)



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The first line of SAMPLE.BAT copies the 3-character ASCII file CDSPACE.TXT into a file called RESET\_CD.BAT in the BATCH directory of drive C:. The '>NUL' at the end of this line redirects the screen output of the copy command, '1 file(s) copied', to the NUL device (the equivalent of "nothing") so that the copy message is not displayed on the screen. The double greater-than symbols in the second line cause the CD (current directory) command's output (in this case, C:\), which is normally displayed on screen, to be appended to the 3 characters of

RESET\_CD.BAT. RESET\_CD-.BAT now consists of the command CD followed by the name of the directory from which SAMPLE.BAT was invoked. These two lines, of course, must be executed before the batch file changes directories. SAMPLE.BAT then displays the current directory (the directory from which it was invoked), changes directories, and displays the name of the new current directory. The last line of SAM-

PLE.BAT calls RESET\_CD.BAT, the file that was created by SAMPLE.BAT's first two lines. RESET\_CD-.BAT makes the directory from which SAMPLE.BAT was called the current directory.

*Do you have any questions concerning the IBM PC or compatibles? Send them to The Help Screen, PC World, 555 De Haro St., San Francisco, CA 94107, or electronically to CompuServe 74055,412 or The Source STE908. ●*

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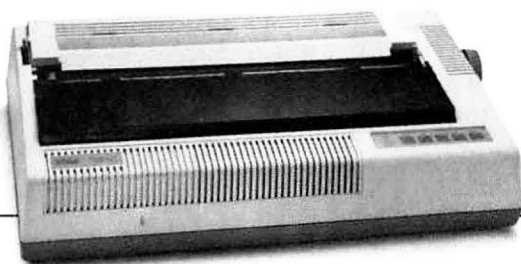
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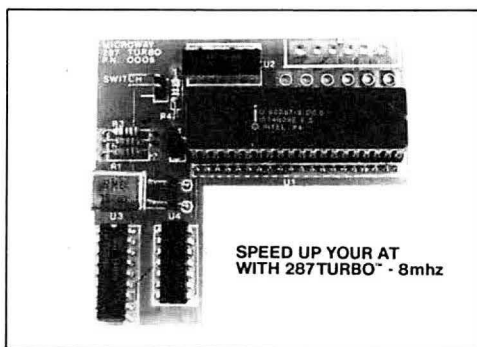
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# First Time On Line

When possibilities abound, why let your PC stand alone? If you understand the fundamentals, communications can build a bridge between you and a multitude of powerful new capabilities.

*Danny Goodman*

Communications offers so many opportunities, it's tough to know where to begin. You can turn your PC into a terminal and take advantage of massive mainframe processing power. If you're feeling sociable, you can send an electronic letter to a friend, or even meet new people through an on-line service. Best of all, you can access huge reserves of information on virtually any subject. Once you're on line, you may find linking up with the outside world a fascinating addiction.

Along with these attractions, mysteries abound. In fact, communications is one of the most difficult computer applications to comprehend. In the self-contained quarters of word processing, spreadsheet calculation, and data base management, all you need worry about is your PC and its software. As Figure 1 illustrates, linking up with the outside world adds a whole new set of considerations. Your system, a modem, a communications network, and the remote computer's hardware and software must work in tandem for a successful exchange of data to take place.





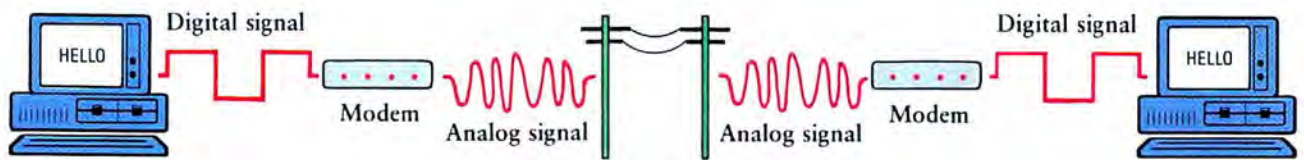


Figure 1: The basic elements that make up a telephone network communications link between two computer systems

### Common Ground: The ASCII Standard

The first step toward understanding communications is to look at computer data at its most basic level. Computers manage, store, and exchange data using electronic pulses that come in only two varieties: high and low. Numerically, these two types of pulses are represented in *binary* form as either a 1 or a 0. Each 1 or 0 is known as a *binary digit*, or *bit* for short.

Every character (letter, numeral, symbol, or punctuation mark) is composed of a group of eight bits called a *byte*. The way the bits are arranged within each byte—that is, the order in which the 1s and 0s appear—determines which character a byte represents. To avoid enormous incompatibility between systems, the computer industry has created a number of standards that establish hard-and-fast relationships between bit combinations and their corresponding characters.

By far the most common standard is ASCII, an acronym for American Standard Code for Information Interchange. This code assigns a different number to each letter of the alphabet (with separate numbers for uppercase and lowercase), as well as to each digit, each common punctuation mark, and several special symbols. Table 1 shows some examples of keyboard characters and their ASCII code values in both decimal and binary form. The letter A, for example, corresponds to the decimal number 65, which is equivalent to the binary number 0100 0001.

During a communications session, a computer transmits a byte representing the letter A starting with the rightmost bit: first a 1, then five 0s, a 1, and a final 0. At the receiving end, that series of bits is compared with a built-in electronic ASCII table, which translates 0100 0001 into the letter A.

Obviously, a misplaced 1 or 0 in a stream of bits means the receiving computer will come up with the wrong ASCII character. The slightest crackle on the telephone lines can cause this kind of error. Fortunately, most communications programs use bits added to each character to detect and correct mistransmission.

The standard ASCII table contains characters numbered from 0 through 127. The PC and many other computers assign ASCII values to an additional set of 128 characters, up to number 255. Characters in this second group are called *high-bit* characters, because the eighth bit of each byte is always a 1, or *high*.

Unfortunately, no universal standard exists for high-bit ASCII characters. On the PC and compatibles, this character set consists of foreign language symbols and graphics characters. But on other computers, high-bit characters are entirely different or even nonexistent. Therefore, to send or receive ASCII high-bit graphics and foreign language characters, you need a PC or a compatible on both ends of a communications link.

### The Serial Connection

Bits flow between computers in one of two ways. The most common method sends bits in a continuous stream, like a string of boxcars riding a railroad track. This type of data transmission is termed *serial* because bits flow in a series. The other prevalent variety of data transmission is referred to as *parallel*. In this method, each of the eight bits that make up a character travels a separate wire simultaneously. While parallel data flow is impractical for communications over telephone lines, it's the predominant way computers are linked to printers.

To communicate with the outside world, your PC must have an external serial connector, usually located on the end of a plug-in board. The three most common names for this connector are *serial port*, *RS-232C connector*, and *asynchronous communications port*.



These terms are less slippery than they first appear. *Port*, for example, merely refers to any connector on your computer that acts as a point of data entry or departure. *RS-232C* is the label assigned to a technical standard that specifies how each pin of a serial connector is wired and which pin fulfills what function. The term *asynchronous* means, in its broadest sense, that data is transferred in byte-size pieces, rather than in a continuous, synchronized stream of bits. *Synchronous* communications is common in the mainframe world, but most PC-to-PC communications falls into the asynchronous category.

If you use a special cable to connect one computer directly to another via their serial ports, the signals going through the cable are the same digital pulses that flow within the computers themselves. This “null modem connection” is the purest possible method of communicating data from one computer to another. There’s little chance of error creeping in, provided the cable is not too long.

### Modem Conversion

Communicating with a computer over the telephone lines is a different story than establishing a simple cable connection. Because telephone lines handle only audible signals, you can’t transmit digital pulses.

To send data you must *modulate* these pulses, or convert them into sounds that represent high and low bits. At the receiving end, the audible signals need to be *demodulated* back into digital pulse form. This MODulation and DEModulation is performed by the aptly named *modem*. Currently, you have a choice of three modem types. One is *acoustic*, while the other two are *direct-connect* modems.

Acoustic modems are easily recognized by their rubber cups, which hold a telephone handset. This kind of modem is rare these days, principally because it is relatively slow at transmitting and receiving data and because it lacks a number of automatic features that are now commonplace.

More than likely, you’ll be using a direct-connect modem—one that connects directly to a telephone line. Direct-connect modems for the PC come

**Table 1: Keyboard characters and their decimal and binary equivalents**

Character	ASCII code	
	Decimal	Binary
A	65	0100 0001
a	97	0110 0001
3	51	0011 0011
!	33	0010 0001
<Ctrl>-C	3	0000 0011

in two styles. One is a *stand-alone* modem, so called because it sits apart from the PC, connected by cable to the PC’s serial port. The other type, referred to as an *internal modem*, is usually a plug-in expansion board but may be built in at the factory, a common practice with laptop computers.

Both stand-alone and internal modems usually have two modular telephone jacks on their rear panels. One connects the modem to the telephone wall jack. You can plug your telephone in to the other and perform both voice and data communications over the same line.

### Communications Software

The communications program you choose plays a key role in data exchange between computers. If you’re on the receiving end, communications software lets you decide whether you want to save data to disk, send it to a printer, or simply let it scroll off the screen. When you transmit data, most programs let you choose between sending it from a disk file or typing it directly from the keyboard.

Software for communications also stores telephone numbers, modem commands, and other critical settings. Usually, these parameters reside in a dialing directory, so you don’t have to reenter them each time you want to hook up with a remote system. A well-designed communications program makes it easy to select a remote system from the directory and begin connection procedures.



## Choosing Parameters

Before logging on, you must make sure that you and the remote system are using the same communications parameters—the various settings that regulate the means of communications.

The following is a description of the most basic parameters: *baud rate*, *parity*, *stop bits*, and *echo*.

*Baud rate* refers to the rate or “speed” of data transfer. In common parlance, this means the number of *bits per second (bps)* sent or received. Technically, baud rate refers to the rate of the phase-shifting method a modem uses to transmit information—which is not necessarily the same as the bps rate. However, most modem manufacturers use *baud rate* to describe bps, and this corruption of the technical term is now commonplace. Since transmitting one character usually takes 10 bits, dividing the baud rate by 10 will give you a rough approximation of how many characters per second are being transferred.

Which baud rate you use depends on the capabilities of your modem, as well as the equipment used by the remote system. Most modems for personal computers transfer data at 300 or 1200 baud. Newer modems, which can communicate at 2400

baud, are now widely available and increasing in popularity. Whatever baud rate your modem supports, remember that the rate for your modem and the remote system must be identical.

Sometimes a remote system will have different phone access numbers for different baud rates. In general, you should communicate at the highest baud rate possible, since this reduces the amount of connect time you’re charged for. Be aware, however, that some commercial information systems charge premium rates for communications at higher baud rates. Even so, the time saved makes using higher baud rates more economical when transferring large files.

*Parity* refers to a scheme using a single bit along with each character to test for accurate data transfer. The most popular configuration for PC communications uses seven bits for data and the eighth bit for *even parity*. Using even parity during data transfer means that the eighth bit always makes the 1 and 0 bits within a character add up to an even number. If the receiving computer detects an odd number, it either requests retransmission or ignores the character completely. Sometimes, however, eight bits are used for data and an additional bit is used for parity, resulting in another common setting: eight bits and no parity. Other parity schemes, such as *odd*, *space*, and



*mark* are also used, but they're fairly uncommon in PC communications.

*Stop bits* refers to the variable number of bits used to mark the end of each character transferred. Often, you may see parity, the number of data bits, and the number of stop bits in one reference. "E-7-1," for example, means even parity, seven data bits, and one stop bit. One stop bit is used almost universally in personal computer communications, and many communications programs automatically use this setting unless you specify otherwise.

*Echo* refers to a remote system's practice of sending back the characters you transmit, giving you on-screen verification that the characters have been received. Mainframe computers and commercial information services often use this procedure, while most PC link-ups omit echo.

When you're on line, it's easy to determine whether to turn the echo function on or off. If you see no characters on the screen as you type, turn echo on; if the characters you type appear in duplicate, turn echo off. Most communications programs let you adjust the echo setting while you're engaged in a communications session.

Many communications programs direct modems to dial, hang up, and answer incoming calls automatically. While it's the modem that actually performs these tasks, the software provides the appropriate instructions. For example, when the program sends the modem a dial command and a phone number, the modem automatically goes *off-hook* (the same as lifting a telephone handset), waits for a dial tone, and proceeds to generate *click* pulses, or tones that dial the number.

Most modems provide an audible indication that dialing is in progress, followed by a signal that a connection has been made. You'll hear the modem beeping out tones like fast fingers on a touch-tone phone. Then, if all goes well, you should hear the remote system's line ring and the remote modem "pick up" the call. The remote modem then generates a high-pitched answer tone, to which your modem responds with a burst of tones of its own. This opening interchange is called *handshaking*. Once two modems are locked on to each other, most communications programs display a 'Connect' message on screen.

## ■ Going On Line

Before you establish a communications link, you must adjust various settings to match those of the computer you want to connect with. Called *communications parameters*, these settings vary with different types of computers and programs (see the sidebar "Choosing Parameters"). Fortunately, most communications programs let you store and retrieve the parameters that apply to various remote systems.

When you connect to a remote system such as an on-line information service, you'll probably be asked to reply to one or more on-screen questions. Generally, you'll need to provide some kind of identification, such as your name, an account number, and a password. This brief dialog between you and the remote system is often called a *logon* procedure.

Some remote systems compare your identification with a list of paid subscribers. Obviously, if you're not on the list, you won't be able to access the service. Other systems use the logon procedure as a security measure, protecting valuable records from tampering. In either case, the remote system maintains a record, or log, of every caller.

Many communications programs support automated logon procedures. When you log on for the first time, the program "records" your entries for



later use. Subsequently, when you access the remote system, these entries are automatically supplied in response to prompts from the remote system. Many

*Some programs now include more advanced session level protocols that check for errors throughout an entire communications session.*

communications software packages let you dial, connect, and log on to a remote system at the touch of a single function key.

Once you've gone through the formalities, the remote system usually welcomes you with a greeting and waits for your next command. At this point, your communications software has turned your computer into a simple video terminal, allowing you to use the remote system's software as if you were connected directly to the system.

### File Transfer

Transferring files to and from your disk drive is one of the most common communications applications. These files may be bulletins, electronic mail messages, airline information, or even computer programs.

In addition to matching communications parameters, file transfer requires that both systems in a communications link agree on a common *protocol*. A protocol consists of the technical details that regulate data transmission between computers. Fortunately, you need only a rough idea of how a protocol works in order to use one.

The simplest to understand is the text, or ASCII, protocol. This method sends a file as one uninterrupted stream of ASCII characters. While this protocol offers transmission of the most characters in the shortest possible time, it is also the one most likely to produce errors, especially over noisy telephone lines.

To combat flaws in file transfer, most protocols now offer *error correction*. Specific methods vary

from protocol to protocol, but the basic error correction scheme is the same: breaking up a file into small *blocks* and then comparing the received blocks to those that were sent to make sure they're identical. Each block includes an extra character mathematically derived from the ASCII values of the characters it contains. If the receiving computer comes up with a different value for that character after it receives a block, it assumes an error has occurred and requests that block again. While this procedure reduces throughput, error checking and correction virtually assure error-free file transfer.

Common error-correction protocols include XMODEM, Kermit, and Polite. Some programs now include more advanced *session level* protocols that check for errors throughout an entire communications session, not just during file transfer. Tymnet's X.PC and Microcom's MNP fall into this latter category. (See this issue's *Password: Communicate* for more information on the X.PC protocol.)

### Logging Off

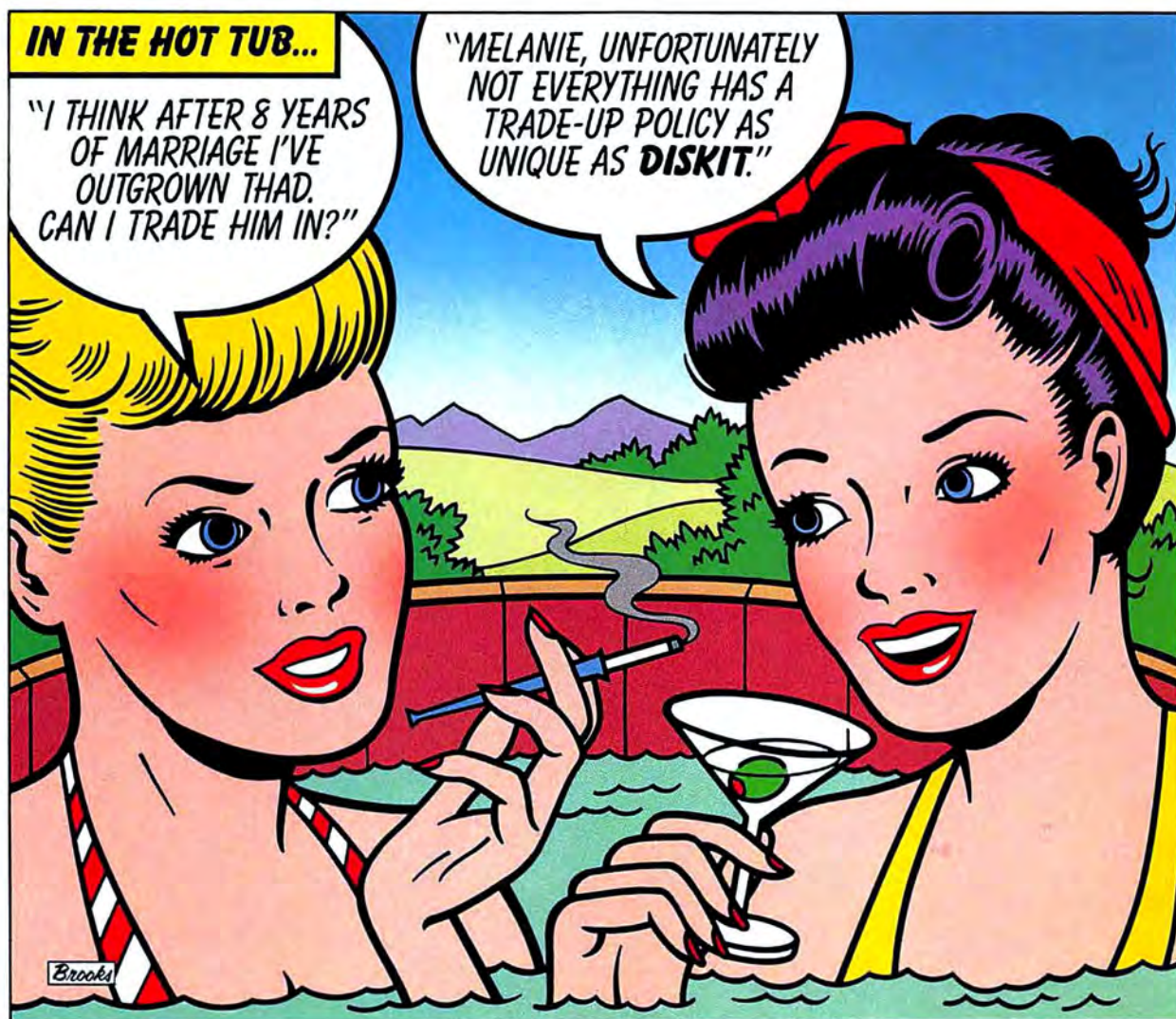
When you've finished a session with a remote system, you need to formally *log off*. Usually, the system displays a message on screen confirming that log off procedures have been properly completed. Standard log off commands include Bye, Quit, Off, and Exit.

If you disconnect without formally logging off the system, the remote system may be fooled into believing you're still connected. When you're using a commercial service that charges by the minute for *connect time*, this can be quite an expensive mistake. Therefore, it's a good idea to watch for the remote system's log off confirmation on screen.

You should now be ready to tackle computer communications. Have patience—if you take advantage of your system's communications capabilities often, going on line will soon seem as natural as talking on the telephone. ●

*Danny Goodman is a Contributing Editor of PC World.*





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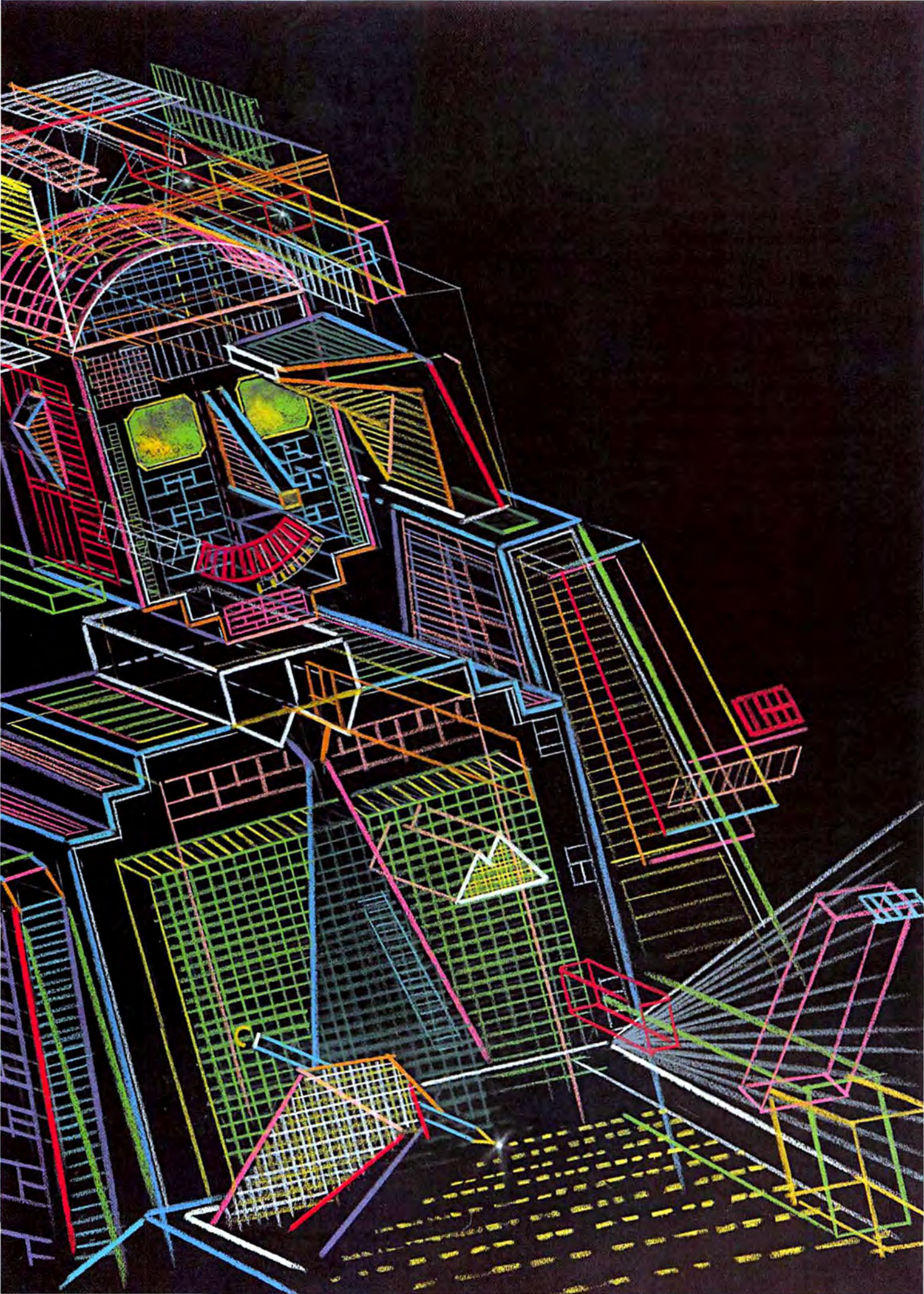
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# The Shape of Things to Come

*Edited by Ken Greenberg*



oday's sedans came off Detroit's drawing boards more than five years ago. In its brief life, the personal computer industry hasn't yet known the luxury of that kind of advanced planning. The business has principally been hand-to-mouth (or, more precisely, lab-to-production-line).

The future of personal computing may hinge on the industry's capacity to sustain its technological energy at a time when marketing rules the roost. Still, these are good times for users; what the industry's key participants are thinking largely reflects the user community's ability to formulate the right questions.



*PC World* recently prevailed upon roughly two dozen leading lights—in hardware, software, distribution, and industry analysis—to share their hopes and expectations for personal computing's immediate future. We asked each to assess where personal computing is headed during the coming three years (on the assumption that three years does a PC "generation" make), and how it will get there. We prodded our respondents on the "hows"—how the market can be expanded, how users can obtain superlative problem-solving tools, how tomorrow's advances will enable users to do their jobs better or more quickly—how, in other words, the PC can fulfill its great promise. We also probed to see where breakthroughs might surface: in graphics, artificial intelligence, user interfaces, communications—and areas yet to coin their own buzzwords.

Our sample is unified by optimism but split on the means of sustaining it. Participants articulate practical rather than quixotic prognostications, shaped by today's pitfalls and paradigms. We began last month's *PC World* Forum with speculation on what it will take to create the next *VisiCalc*. We begin now with the man who helped develop that signal success.

**■ Dan Bricklin, Coauthor of VisiCalc**

New personal computers, including the AT, are becoming faster and cheaper—but users aren't necessarily rushing to buy them. There are millions of PCs out there, and people are exploiting the older hardware to its fullest, figuring out what else they can do besides word processing or using a spreadsheet; but getting to that second application usually requires several years.

We're headed for the age of the peripheral. The average PC today is much different than it was in 1981. Machines with 512K and a hard disk are commonplace. Laser printers, local area networks, and

high-resolution graphics monitors are additional indications of how people are going to squeeze the most out of the existing technology.

**■ Kevin Jenkins, President,  
Hercules Computer Technology**

Thank goodness Steve Jobs has been put out to pasture, along with his new wave computer philosophy. You know—how the PC expands personal freedom, opens up new areas of human potential—all that nonsense. In three years, I expect to look back on the hoopla that Apple used to promote "the next wave," and see IBM [still] laughing all the way to market supremacy because it understands one principle very well: A computer is a tool to solve a business problem.

We're off-base if we think that soon the PC won't need to be controlled but instead will anticipate what we want to do. We should be striving for easier control and easier programming, in manageable steps, not for a breakthrough in user interfaces.

Progress in hardware development will continue to far outstrip progress in software. At any rate, discussing directions for new products is somewhat moot, because the present distribution system for hardware and software will not allow new products to break in. Instead, you'll have to do what Borland did: sell by mail.

**■ David Wagman, Cochairman of Softsel**

Two parallel trends are hiking the demand for PCs: The PC is more user-friendly, and users are increasingly PC-friendly. We in the software industry now have a better understanding of how people want to interact with PCs. We're exploring new types of user interfaces and ways to help people maintain the discipline required to use a PC. At the same time, people are becoming more familiar with PCs and how they work. A corollary issue is ease of learning versus long-term ease of use; a program that provides the former doesn't always guarantee the latter. Friendly menus and prompts may prove a hindrance once a user is proficient.



■ **Stanley Kugell, President, Javelin Software**

In the years immediately ahead, we'll see a more realistic view of personal computers as vital tools for office work. The false promises of artificially intelligent oracles-on-a-floppy-disk will fade. Stoves aren't chefs even though they cook, and computers and software aren't intelligent even though they "think."

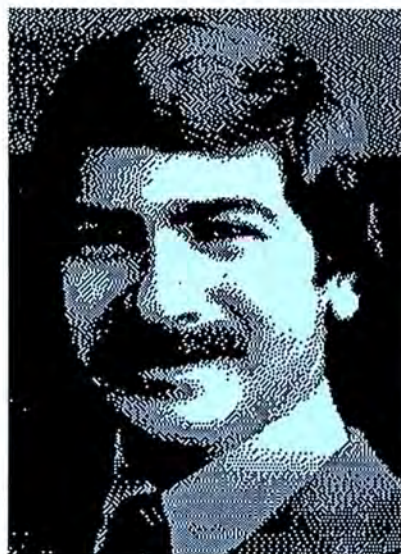
Consequently, the PC will rise in importance. As an effective tool for an increasing number of office functions, it will be used for a larger proportion of the workday by an increasing segment of office workers.

Advances are needed, therefore, primarily in the way we design software. The successful companies will be those that understand what non-technical people do during their workdays. These companies will have the vision to adapt and improve on the tools people actually use.

■ **Ben Rosen, Partner, Sevin Rosen Management**

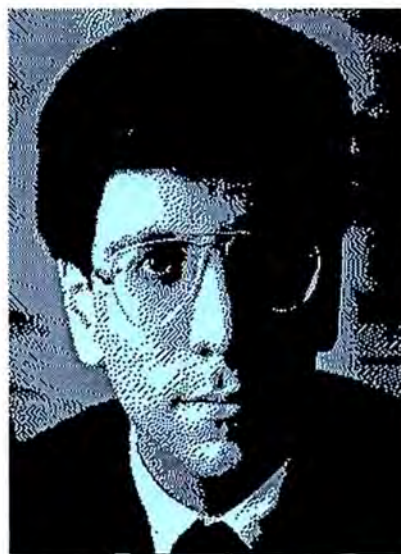
I see the business marketplace growing at an annual rate of 20 to 25 percent during the next three years, largely due to a newfound stability in the industry. For the last few years there's been tremendous instability from the PC user's point of view: several operating systems, a multitude of networks, many new products, and frequent price changes.

The stabilizing factors include a standard architecture, which accounts for 90 percent of the marketplace. The significance of the evolution from the 8088/8086 to the 80286 and now the 80386 is that users know their investment in hardware and software is protected—and that they can upgrade with impunity. In addition, the battle for shelf space is over; the top dealers won't be displacing IBM, Apple, and Compaq with many new labels. Another force for stability, when it appears, will be software that takes full advantage of the 80286's memory, storage, and multiuser capabilities. Such software will send PC sales skyrocketing; the effect will resemble the impact of *VisiCalc* on Apple II sales.



*'Two parallel trends are hiking the demand for PCs: The PC is more user-friendly, and users are increasingly PC-friendly.'*

*—David Wagman*



*'The false promises of artificially intelligent oracles-on-a-floppy-disk will fade. Computers and software aren't intelligent even though they "think."' —Stanley Kugell*





*'Software that takes full advantage of the 80286's memory, storage, and multiuser capabilities will send PC sales skyrocketing.'*  
—Ben Rosen



*'The influential innovations in the coming three years will concern high-resolution graphics and optical disk technology.'*  
—Gary Kildall

PC graphics and communications products improve month by month. IBM's Token-Ring network and Compaq's Telecompaq will spur an entirely new class of products, making PC telecommunications a huge growth area.

**Finis Conner, Cofounder of Seagate Technology**

Three years? Three years is the average life for most companies in this business! Computer products seem to follow a five-year cycle: A new technology results in an important product, demand rises, peaks, and then a slump sets in as the market is satiated—like now.

The 80386 will probably be the catalyst for new software and hardware development. If nothing else, it's going to motivate companies to come up with faster disk drives and other peripherals. It will be the spur.

**Gary Kildall, Chairman, Digital Research**

The PC's great promise is in making information readily available to people so they can search for, retrieve, and display data in ways that are both timely and fun. The influential innovations in the coming three years will concern high-resolution graphics and optical disk technology. The advantages these innovations offer—animation, easy access to large amounts of information, affordable prices—will outweigh the convenience of the printed page and provide excellent teaching and data management tools.

Expert systems are more likely to gain widespread acceptance in two or three years. One foreseeable application will involve tying an expert system into a large data base for easier search and retrieval. Also coming is the evolution from "flat," one-dimensional data base structures—essentially encyclopedias in electronic form—to multidimensional, layered data base structures. You'll be able to pursue an individual interest within a much larger data base. Multitasking and local area networks will become more widespread, but they won't basically change the way in which we compute.



**Bill Gates, Chairman, Microsoft Corporation**

We believe there'll soon be a time when many organizations will have a PC on every desk. We need two key ingredients before that can happen—a graphical user interface, in part to take advantage of advances like larger screens, new chips, and laser printers; and networking. People will start to see the benefit of applications that run in a distributed way.

A year from now all PCs sold will be 286-based. Within three years we'll see them become 386-based. Today, we really don't trust the machine in terms of its storage capacity (or the ease of getting at programs) to the extent that we keep data on it long-term. The PC is not yet part of the backbone of the office. Eventually, companies will hand out programs tailored for the work they do. Standard applications and hardware will improve dramatically to a point where they'll help promote PC use. People will feel that if they don't have a PC, they can't be as productive.

Reduced prices in the chip industry, along with manufacturers' ability to design new chips quickly, haven't made an impact on the machine yet. We haven't seen a super-small machine with only ten nonmemory chips, a cheap display with 1000- by 1000-pixel resolution, or a variable-frequency monitor. But we'll get there in the next three years. People in word processing will look at the 640 by 200 we have today and wonder what we were doing—it's like a hammer and chisel.

**William F. Zachmann, Vice President of Research, International Data Corporation**

The keys to the next stage of personal computing include a new generation of microprocessors; much more capable visual interfaces, including optical disk-based images; PC networking based upon industry standards; and software that can make use of all this hardware.

Over the next few years, microprocessor-based systems will have a devastating effect on the information systems industry. The issue is not one of incorporating PCs into the mainframe environment; instead, the problem will be how minis, superminis, and mainframes must adapt and change in order to survive in the PC environment. Traditional larger systems are roughly in the position of the dinosaurs after a large meteorite hit the earth some 60 million years ago. PCs are the protomammals of the future.



*'Standard applications and hardware will improve dramatically. People will feel that if they don't have a PC, they can't be as productive.'* —Bill Gates



*'Communications will control computing. The pipeline to and between computers will be more important than the box on the desk.'* —Martin Alpert



**Fred Gibbons, President, Software Publishing**

I would like—and I expect—three things to happen. The first is that PCs will remember their roots and become more personal. Cost reductions on compatibles—bringing machines below \$1000—will make personal computers more cost-justifiable to more people. We'll see PCs being used for more applications, including home applications.

The second concerns high-powered machines like the AT. That horsepower, combined with local area networks, will draw the PC into what is now the mini and mainframe segment. Applications like CAD/CAM and desktop publishing will be brought fully to the PC.

Third, we will continue to see experiments with natural language and bit-mapped graphics approaches. Three years from now, most applications will be bit-mapped; we'll pull away from character-based applications almost entirely in favor of more understandable picture-based programs. This will take three years because that kind of software needs multimegabyte storage, 286 processing, and a megabyte of RAM. Software companies can't grow complacent—we have to stay on top of the situation with software to take advantage of this hardware.

**Martin Alpert, President, Tecmar**

Communications will control computing. The pipeline to and between computers will be more important than the box on the desk. Communications will substitute for transportation; electronic mail in place of letters is one example. Portable computers will proliferate and merge with portable and cellular phones. Increasingly, transaction processing such as banking and purchasing will be performed remotely. These kinds of developments will be spurred by a desire to save money rather than simply by convenience.

**Mitch Kapor, Chairman,  
Lotus Development Corporation**

As a result of the tremendous progress in personal productivity tools, whole new groups of users are emerging—people with no previous computer experience, or with very specific vertical application needs, who have significant demands that will shape future software development.

For the most part there will be evolution, not revolution, within existing classes of products like spreadsheets and word processors. Rather than differences in functions, we will see an increase in the accessibility of functions.

Substantially new applications will appear in response to currently unfilled needs. Technology will be available in the near future for several exciting new classes of applications: group productivity through networks, intelligent assistance in daily management routines, effective and convenient PC-based electronic messaging and information systems, and idea processors.

Artificial intelligence tools and techniques will be broadly applied as internal components of application programs. The effect will be smarter, more flexible, more adaptable products. Machines will think more like users rather than the reverse, which tendency prevails today. Retailers will continue to play a role, but vendors will increase their direct involvement with Fortune 2000 companies. As long as technology and product development are driven by the real needs of users, the industry as a whole will have a healthy future.

**Stewart Alsop, Publisher of PC Letter**

People often say that to bring new users to computers you have to continue to introduce new ingredients. I think we've got to make applications that already exist work better and better.

That will be accomplished by a combination of factors, but much has to do with applying to the DOS world what people have learned from the Macintosh. IBM will adopt a graphical interface, which I think will be *Microsoft Windows*. It won't turn the PC into a graphics machine, but it will supply an easy-to-use interface.

The real promise of personal computers lies in their ability to do more than one task and in their ability to communicate. In communications, too, the ease-of-use problem remains unsolved. General Electric's *Dealertalk* and Cullinet's *Information Data Base* also show how micro-to-mainframe communications can be achieved by any user—if the interface is good.



**Tom Yuen, Cofounder, AST Research**

We're on the brink of a revolution in the industry that will make the computer as acceptable as the telephone. For this to happen, we need a breakthrough in user interface technology, probably relating to voice recognition and synthesis. Just as important, there must be a huge effort to educate the masses and make computers less intimidating. This task can only be accomplished by companies like AT&T and IBM, which have the resources needed to accomplish the task.

**Wayne Erickson, Chairman, Microrim**

Increasingly, computers will be on networks. We've been hearing that for two or three years, but now the operating system includes network support. Software—especially data managers—will need multi-user capabilities. And because of advances in personal computer hardware, applications will continue to move down from minis and mainframes.

We'll also see more expert system software and greater use of natural language front ends, both of which are memory- and disk-intensive. Rather than using one kind of interface, however, products will have interfaces appropriate to different tasks and different users. Natural language, pull-down menus, and icons will all have their places. Flexibility is the key, enabling users to choose the interface that's right for them. Will one interface knock everybody's socks off? I don't think so. Rather, there will be improvements to what we have now.

The important thing is to pay attention to what users want—to listen to their wish lists. Don't believe your own baloney. Our job is not to come up with neat technology and then sell it to users, but to see what people need and then to drag the technology to them.

**Ira L. Weise, CEO, 800-Software**

In the short term, personal computer sales will decrease. Most individuals and corporations that readily saw a need for a personal computer already own one. For sales to increase, many nontechnical people—those who presently don't own or use a computer—must recognize the PC's value. We need new



*'There will be evolution within existing classes of products. We will see an increase in the accessibility of functions.'*  
—Mitch Kapor



*'Long-term, personal computer sales and usage will increase dramatically, fueled by software relying on simple user interfaces.'*  
—Ira L. Weise





*'The PC market will have to shift from a focus on individual buyers to an emphasis on the corporate world.'*  
—H. Glenn Haney



*'The most important means of opening new horizons is larger data storage. Most people have enough computing power.'*  
—Philippe Kahn

software that will cause these fence sitters to buy personal computers, software like Ansa's *Paradox* and Symantec's *Q&A*.

The most important advance in software will deal with user interfaces. Long-term, personal computer sales and usage will increase dramatically. This increase will be fueled by software relying on simple user interfaces, which will be implemented atop artificial intelligence techniques.

■ H. Glenn Haney, President and CEO,  
MicroPro International

In order to grow, the PC market will have to shift from a focus on individual buyers to an emphasis on the corporate world. Corporations haven't been served very well because current products are not connected. MIS people rightly have the idea that PCs must connect, sharing data bases and linking departments. IBM's token ring protocol will push the industry forward. It will give software vendors a path to follow.

The other way to speed growth is by developing simpler products. Most of today's software was built for sophisticated users. Most people not only don't know computers but are afraid of them. That segment will sooner or later constitute the major share of the market.

■ Richard Rabins, President, Alpha Software

There's no question that PCs are having a profound influence on the shape of American society. The challenge in the business market is to increase PC use within companies. Business applications will move more and more into the area of decision support, rather than remaining in the information processing domain where they are today. By broadening the PC's role to include decision support, computers will become more attractive tools to senior management.

Consistent with this, I expect distinct improvements in the way in which people get information into the computer and information, plus knowledge, out. Under this umbrella I see a greater use of graphics, on-line data bases, and communications software that ties PCs to other computers.



■ **Regis McKenna, Founder of Regis McKenna, Incorporated**

The general purpose personal computer will have a very difficult time surviving in its present form. Consumers buy things for specific purposes, and it's tough for the average person to adapt the technology for specific uses.

The most successful computers are those that integrate a variety of technologies—and do so to the extent that the supplier, not the consumer, is doing the integrating. If PCs are going to survive, they'll have to incorporate those technologies that move business into more dedicated products.

You can't have a revolutionary technology without a revolution in marketing. I'd like to see a marketing revolution in the way we approach small and medium-size businesses. In order for small businesses to compete today, they need access to new technology. We've got to bring educational and training support services to those small businesses.

■ **Philippe Kahn, President, Borland International**

The most important means of opening new horizons is larger data storage. Most people have enough computing power, and with IBM's Enhanced Graphics Adapter, graphics are adequate. All that's lacking is storage.

With CD ROMs and the like, you'll be able to access giant data bases. On-line information is key; it will change how people use their PCs. Up to now, computers have been used as number crunchers, but they will finally become real *computers*.

We'll also see the introduction of more intelligent software. Software will give users better views of data and do a better job of managing the desk top. The machine will adapt to the user rather than making the user adapt to it.

■ **Sam Tramiel, President, Atari**

We feel that the market will continue to settle down and that people will be less confused about what to buy. They'll be buying more because computers will have incorporated more advancements, be easier to use, and be much less expensive. But we'd really rather not make predictions or give out information to our competitors.

■ **James Porter, President, Disk/Trend**

Despite the puffery about new storage devices for the PC—optical, bubble, and the rest—the next three years are going to consist of more of the same. We'll see smaller, faster, cheaper personal computers and hard disks.

By 1988, fully 60 percent of office PCs will have hard disks. Another trend is also evident: IBM will continue to call the shots in the industry. There's no question, for example, that the AT's 1.2MB drive will dominate in the office. From other vendors, it's likely that the AT class of machine will get very fast 300MB hard disks.

■ **Jonathan Rotenberg, President, Boston Computer Society**

Novelty and media hyperbole no longer drive the industry. New products can succeed only if they offer true benefit and cost savings to users. In the next three years, the market's going to be fueled by software and technology that is carefully tailored to specific user needs. There's a tremendous potential for powerful, easy-to-use systems that automate small business operations.

Communications has enormous potential, but there are major obstacles: lack of coherent standards, lack of easy integration, and too little benefit for the price. I see other niches expanding; rapid advances in software and printing should catalyze some exciting developments in low-cost computer-aided publishing. Research in display technology and low-power integrated circuits should finally lead to portable computers that match desktop computers function for function. Of course, there'll be new uses for personal computers that haven't yet been conceived. Those will probably have the greatest impact. ●


|| *Ken Greenberg is the Senior Editor of PC World.*



# The Paperless Chase

When Harvard insists that the managers of the 1990s cut their teeth on PCs, you know personal computing has arrived. One MBA candidate chronicles an on-going revolution in Cambridge.

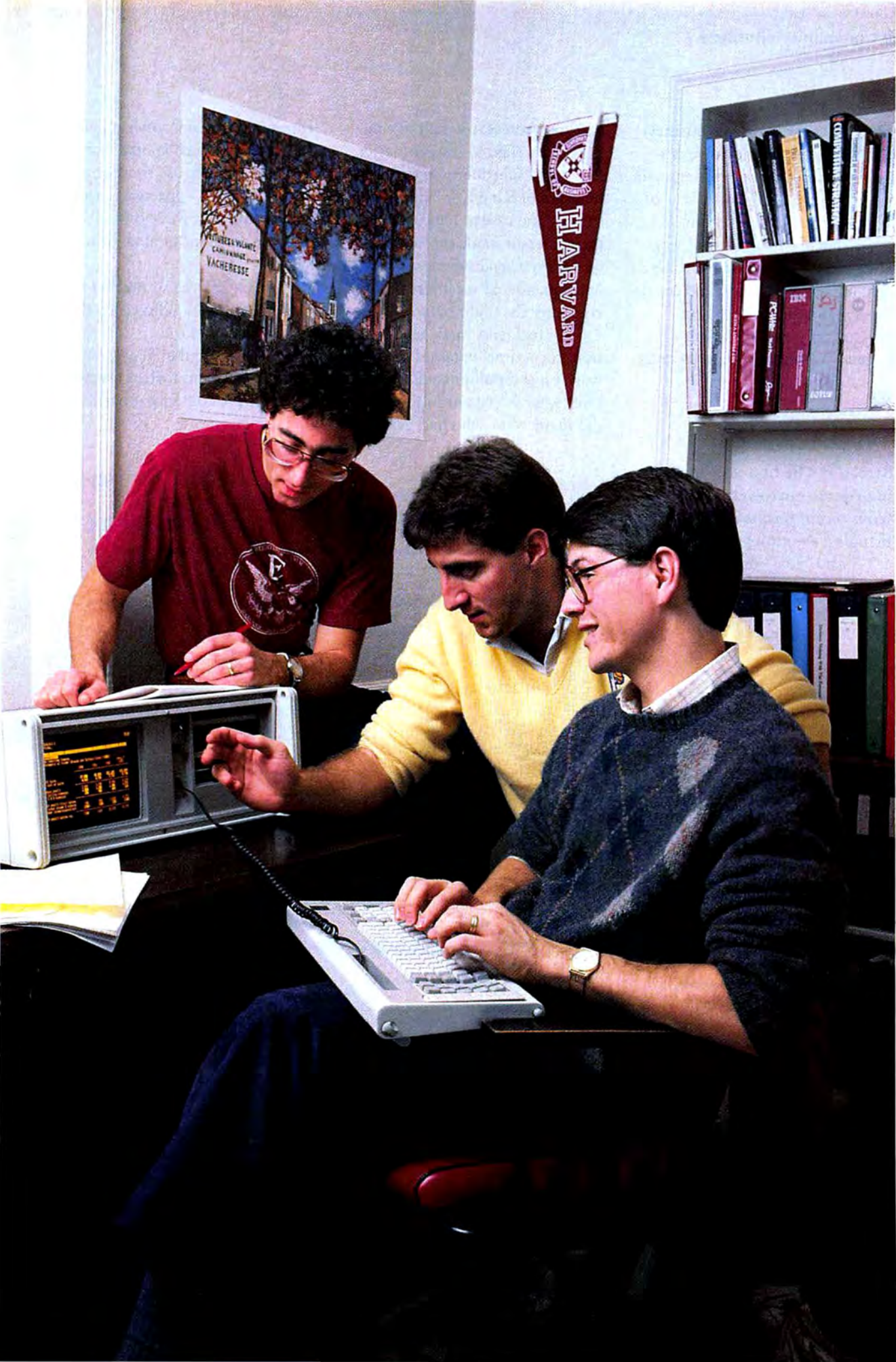
Gordon Slack

 Congratulations on your acceptance to the Harvard Business School. We look forward to welcoming you to the MBA program this fall. As part of the first-year curriculum, students will use personal computers. To help you make the PC part of regular assignments, we will provide one to you, at an attractive price, on Registration Day.

The letter was at once cause for elation and a touch ominous. The promise wasn't only that I would graduate with a Harvard MBA, but that I'd acquire state-of-the-art computer skills en route, thus becoming eminently employable. On the other hand, I had to graduate first, and the PC loomed as just another obstacle course to run at the West Point of capitalism.

Looking back on my initial year as a good soldier in Harvard's unprecedented venture to leverage the PC in its MBA program, both the elation and the apprehension were a bit out of proportion. Harvard's program, developed after a two-year joint research project with IBM, was a vast improvement over typical MBA regimens with their one-credit adjunct courses in business computing. However, the PC-related activities initially seemed to be embellishments rather than integral parts of the curriculum. Nonetheless, the experiment paid handsome dividends, in part because it confirmed, as few developments could, the PC's move from the periphery of business to center stage.







# Getting Down to Business

Harvard's innovative embrace of personal computing made for a year of glory—and a year of stories, many with a high-tech twist. There was the friend who fiddled until 3 a.m. with a simulation for his production and operations management class. He pressed on well after losing cogency (around 1:30), reasoning

that the professor would ask the next day's class to dissect master and detail scheduling in the manufacture of King Kool air conditioners, the case at hand. When the professor made no such request, my friend wondered why he had squandered six hours on the computer the night before.

Such incidents made us all question, for a time, whether the PC wasn't just a pointless distraction. Only after we began summer jobs did many of us who had expressed

reservations, even cynicism, about the PC experience realize that businesses really use those machines, that PC expertise is appreciated, and that we had received a genuine, even invaluable, head start.

Actually, by the second semester most students had discerned the method in Harvard's madness. Knowing when the PC was an appropriate tool and when it wasn't was half the computing battle, just

**Screen 1: The first-year marketing course borrowed a few cases from recent business history, bringing examples to life via 1-2-3 and "live" data.**

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H1: Menu Choice(type zero to enter 1-2-3):

A	B	C	D	E	F	G	H
<b>Harvard Business School</b>							
<b>Diskette (#2) Directory: First Year Marketing</b>							
Each menu choice listed below corresponds to a 1-2-3 worksheet file on this diskette (the filename is listed in [J]). Type the desired number to load the associated worksheet. (This worksheet is named AUT0123.)							
<b>Menu Choices:</b>							
1. Titanium Fabrication Division (A) [TIFABA]							
2. Vicks Health Care Division: Project Scorpio (C) [VICKSC]							
3. Deere & Company: Industrial Equipment Operations [DEERE]							
4. Sealed Air Corporation [SEALAIR]							
5. U.S. Retail Coffee Market (A) [COFFEEA]							
6. U.S. Retail Coffee Market (B) [COFFEEB]							
7. Brim (A) [BRIMA]							
Copyright (c) 1984 by the President and Fellows of Harvard College							

**Screen 2: A sample worksheet from the marketing cases library captures financial data on a Deere & Co. line of tractors.**

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A61: 'Exhibit 4  
Find a particular exhibit

A	B	C	D	E	F	G	H
<b>Exhibit 4</b>							
<b>The Deere Crawler Tractor Line</b>							
	(a)	(b)	(c)				
	List	Net	Cost	Cost/	Net	Weight	
	Price	Price		Price	Horseyow.	(in lbs)	
				Ratio			
JD350-C Bulldozer	\$20,923	\$15,169	\$11,377	75%	42	10,600	
JD350-C Loader (d)					42	12,400	
JD450-C Bulldozer	29,854	21,644	14,068	65%	65	14,250	
JD450-C Loader					65	16,700	
JD550 Bulldozer	33,336	24,169	16,919	70%	72	15,510	
JD555 Loader					72	18,255	
JD750 Bulldozer	59,785	45,137	36,110	80%	110	28,985	
JD755 Loader					110	32,000	
JD850 Bulldozer (e)			40,717		140	36,140	
JD855 Loader					190	46,060	
Note: All confidential company data have been disguised. Price, cost and weight are for the representative configuration, the standard							



as it is in the “real world.” It is no exaggeration to say that by placing their hands on PCs today, tomorrow’s crop of managers not only avoid estrangement from technology but are apt to use computers in creative and productive new ways.

### Just in Case

To appreciate Harvard’s use of PCs, it is important first to understand the school’s approach to teaching business. The credo is summed up in two words: *case method*. Scrutinizing cases is the pedagogy for every course at the Harvard Business School. Students analyze actual business situations and formulate recommendations. Once these prescriptions are completed (that is, once assessments have been codified during nightly labors that often entail reading and note-taking on two or three 10- to 25-page case studies), students meet in a classroom with 90 cohorts to discuss each other’s recommendations. This discussion is abetted by a professor, who chooses a victim to open the class by explaining the gist of the case and offering his or her analysis. The professor fosters dialogue by questioning students and encouraging debate among them, and assigns up to 50 percent of each student’s course grade based on how well that student expressed himself or herself.

The PC quickly became our vehicle for case method analysis. Commencing with the 1984-85 school year, many of the textbook

cases were augmented with floppy disks (see Screen 1). While disks usually contained 1-2-3 templates or entire programs, some disks offered nothing more than exhibit data in 1-2-3 format. Yet even data disks gave students the opportunity to juggle numbers within an exhibit, or to combine numbers from several exhibits, and thus support arguments for or against a particular decision—nicely mirroring the way computers are in fact used in business (see Screen 2).

Professor F. Warren McFarlan, head of the Required Courses Committee and a driving force

### Crystallizing Costs

Consider Professor Robin Cooper’s Myer-Taps study, which uses a 1-2-3 template to teach cost accounting—a straightforward enough concept in itself. A business allocates costs to a particular plant or part of a plant; cost analysis can break down the costs of operating a particular lathe on the factory floor. The more cost centers, the greater the control, but also the greater the overhead. Making this idea concrete and usable—the real purpose of the case method approach—is not so simple.

*Cost accounting was demystified, and students quickly grasped the notion that only so many cost centers can be added before returns diminish or even disappear.*

behind the automation of business school curricula, suggests that using PCs in the MBA program is as significant in supporting the teaching process as in providing computer experience. McFarlan, a seasoned lecturer on information technology, says the PC helps pack more into the two-year MBA program than was previously possible by enhancing case studies with simulations and methods of handling more complex materials (see the sidebar “Spit-and-Polish Computing”).

“Before we had PCs, teaching cost accounting was difficult,” says McFarlan. “We had to use cases involving small companies with a few very simple products and a very limited number of cost centers. Otherwise, data analysis would prove overwhelming.” In the era of pencils and ledger pads, the academic approach to cost accounting was vastly different from its practice in the field at, say, Chrysler or Lockheed. The 1-2-3 template that accompanied the Myer-Taps case materials enabled students to handle the complexity of a multiproduct company, breaking expenses down into 15 cost





## Spit-and-Polish Computing

The letter that introduced the Harvard Business School class of 1986 to personal computing, Harvard-style, said purchase of the machine was optional: computers would be available for general use.

But one need not read between any lines to catch the drift of the following admission: "It is anticipated that using these few machines will create considerable inconvenience." In view of the horror stories I'd heard about Harvard as the boot camp of capitalism, accepting an additional "inconvenience" was inconceivable.

Boot camp, indeed. All 800 members of the class took the same courses and marched around in "platoons" of 90 with professors as sergeants. Not that shaved heads and push-ups were part of the package; instead, you were just generally run ragged. Like sergeants, professors had a certain influence over your destiny—they could make you "hit the screen" (one low grade too many and you were sent packing). And just as it wouldn't do to disagree

with the supply sergeant upon arrival in boot camp, it didn't seem wise to argue about how Harvard wanted to outfit you. If they said "buy this computer" (the somewhat obscure IBM Portable PC), you didn't ask questions.

As it turned out, only 51 of Harvard's hand-picked recruits didn't fork over the extra money (238 already owned PCs or compatibles). Although that left only 13 PC-less students competing for the 20 machines Harvard provided its 800 first-year enrollees, buying my own turned out to be a good move. True, IBM dropped prices about 25 percent shortly after it signed the deal with Harvard, but the service was excellent. The school even supplied a luggage carrier to help each student cart the new "Portable" PC up to his or her room.

By my rough calculations, our class accounts for about 2 percent of the total installed base of the sluggishly selling Portable PC. Some students had been tempted to buy a



Compaq portable instead—the marketplace, after all, had overwhelmingly identified it as the better machine, and we were at Harvard to become attuned to the market—but not many bought Compaqs. The package we received included software written expressly for the MBA program, software we were advised might not run on the otherwise perfectly compatible Compaq. Of particular concern in that regard was the *PC Telecom* program used to log on to the electronic mail system set up for us on the campus mainframes. (Not that many bothered with *PC Telecom*; why send E-mail to people you see in class all day every day? As it happens, last summer, when it would have been nice to keep in touch, the school shut the system down.)

The Portable PC came with 256K of RAM, two half-height 5¼-inch disk drives, and an IBM

Graphics Printer. In addition, 1200-bps modems were provided on a temporary basis to off-campus students (because dormitory rooms are hard-wired to the mainframes, modems weren't necessary for those living on campus).

Professor McFarlan, a prime mover behind Harvard's endorsement of personal computing, says the specific hardware was determined by the substantial investment in software that the school and its students would surely incur. Harvard was intent on not being saddled with a short-lived machine (even though the Portable PC may no longer be among the living, its software base is as solid as the PC's). Fortunately, the PCjr was eliminated as a possible contender fairly early on because of what was then its notoriously poor keyboard.

In the end, choice of the Portable PC over the PC was based more on the Portable's smaller footprint than on its portability (don't forget the luggage cart). And the few square inches gained

were important; Harvard dormitory rooms *are* that small.

Selecting software was simpler. Spreadsheet analysis constituted the backbone of an MBA student's computer usage, and 1-2-3, clearly the dominant product in the field, was the only real choice. That decided, the MBA program's break-neck pace necessitated bringing students up to speed in 1-2-3 as quickly as possible.

Harvard hired Micro-Mentors of Cambridge to run a one-day 1-2-3 training session that, true to Harvard's commitment to the case method, was integrated into a three-part marketing case. The training itself received mixed reviews. The consultants descended on classes with walkie-talkies and did a credible job of covering the basics of spreadsheet use, but all were not equally well versed in 1-2-3. In some sections, students with previous 1-2-3 experience

*(continues)*



found themselves answering questions before the Micro-Mentor consultants could track down a knowledgeable source via two-way radio.

The surprise smash among the applications was word processing, but here the drawbacks of a bundled package were evident. Most students applauded IBM's *Writing Assistant*, the word processor provided, as easy to learn and use, but its limitations frustrated others. Those restrictions were especially acute for the 90 students asked to prepare papers using a rigid scheme of variable-length headers and footers—requirements beyond *Writing Assistant's* capabilities.

The draft-quality IBM Graphics Printer also drew jeers when it came time to produce résumés and cover letters in the second semester scramble to secure a summer job. As we queued up in the computing commons to use one of the 20 PCs with letter quality printers, we groaned

about why Harvard hadn't selected a printer with at least a near letter quality mode.

Our lamentations have not gone unanswered. This year's crop of incoming MBA students has seen several changes. While Harvard made available the same basic package as last year (save for offering the dual-mode IBM Proprinter in response to requests for letter quality output), students will be free to omit certain elements in favor of components purchased on the open market. The school has drafted a list of recommended word processing packages, freeing students to choose the program that best meets their needs. And a comprehensive statistical program will replace the unpalatable limited-regression analysis package that Harvard had reclaimed from its VAX.

But the program's most ambivalent trait persists: With 50 percent of a student's grade dependent on tests, and with computers banned from testing rooms, the incentive for computer usage is somewhat diminished.

Learning how to solve problems by hand—as you have to when it counts—often seemed the more logical way to go. That's why Professor McFarlan is banking on bringing in a truly portable machine. "What we need is a 6½-pound computer with 256 to 512K and a high-quality screen—not a liquid crystal display. The machine would be battery powered and could run for up to 4 hours," he says. "We can get bits and pieces of that now, but not the comprehensive unit."

Given the luck of the class of 1986, such a machine will be announced next month. We, however, will still have to make do with the Portable PC, a luggage cart and, on exam days, a *paper* spreadsheet and a pencil.



centers. Moreover, 1-2-3's malleability let students witness the effect of reorganizing the company into anywhere from 1 to 31 cost centers.

Cost accounting was thus demystified, and students quickly grasped the notion that only so many cost centers can be added before returns diminish or even disappear. McFarlan notes with satisfaction that nothing in the literature drives those points home so clearly. "The PC enabled us to put across a whole new series of cost accounting concepts," he says.

#### Education Imitates Life

Quantitative and useful though the accounting courses were, students uniformly agreed that finance cases showed the PC to best effect. The attraction of finance was simply its likeness to workaday reality. Ours was the first Harvard class to do spreadsheets as financial managers do them, with 1-2-3. Many among us grew to wonder how our predecessors survived finance without a PC to help them build *pro forma* financial statements and "what-if" their way into the future. This liberation from canned simulations packed undeniable appeal.

While a single *pro forma* set can be created relatively easily with pencil and paper, changing any one of the assumptions requires a reiteration of the entire process. For MBA students with a limited number of hours in which to prepare the next day's cases, the time required for additional iterations is prohibitive.

By using an electronic spreadsheet, students were able to float

from worst-case to best-case scenarios in just minutes. Those scenarios were built using unformatted numerical data distributed on disk; we were expected to make sense of the figures by constructing our own models to analyze, for instance, the cash-flow implications of a leveraged buyout.

That was the good news. The bad news was the tendency to become too dependent on 1-2-3 for building models and performing sensitivity analyses—a pitfall that entailed more than a fear of overemphasizing the numbers. It was true that some students became immersed in the intricacies of getting a *pro forma* working properly and had precious little time left to think about the issues; class discussion, after all, made up 50 percent of our bottom line. The real problem, however, was that for the

not relying excessively on the computer, and some of the prescient students exhibited just such foresight.

#### Power Users on the Rise

A handful of first-year students were so enamored with building 1-2-3 models that they bucked the drawbacks. Take Greg Brinks, a budding MBA who reported actually *enjoying* the managerial economics cases that packed little punch for most. Brinks poured a great deal of extracurricular energy into automating the Abbey Freeman case.

That case required that the managers of the Abbey Freeman winery decide when to harvest their grapes. Picking immediately would yield a steady, predictable wine, privately labeled, at a guaranteed profit. Picking later meant

*The testing facility was decidedly off-limits to our Portable PCs, in part because the room lacked the space and power requirements.*

other 50 percent of our grade—derived from performance on exam days—we had to revert to low-tech tools like paper worksheets, calculators, and pencils. The testing facility was decidedly off-limits to our Portable PCs, in part because the room lacked the space and power requirements for 90 machines. Indeed, that restriction suggested the wisdom of

betting that weather conditions would create a useful mold on the grapes, thereby enabling the winery to produce a rare wine for eventual sale under its own label at a greater profit. Delaying the harvest also risked the failure of the mold to grow—leaving the winery with grapes past their peak, the chance of bottling vinegar, and the likelihood of a loss. Although the case study focused on making a decision tree without



the PC, Brinks built a 1-2-3 decision tree model that he could fine-tune according to weather forecasts pegged to growth of the lucrative mold.

For every spreadsheet jockey, however, a dozen students viewed the PC as little more than an elaborate calculator. Few felt compelled to probe for assumptions behind the curtain of a functioning model, preferring instead to treat a template simply as a useful time-saving device. The template included with the Titanium Fabrication case, for example, was to me nothing but a useful black box that somehow removed the pain from learning how action plans affected scheduling.

This taste of computing was both sweet and sour. Given our schedules, it was fortunate to have a model do much of the work. But ignorance about how to build such spreadsheets and about their underlying assumptions troubled the computationally astute faction among us. Like Greg Brinks, some devoted time—a precious commodity to Harvard MBA students—to poking around the model to see what they could see.

One case in managerial economics, for example, involved facilities management and the issue of whether a particular shipping firm should add a third dock, given that traffic was expected to top 2500 ships annually and that time spent waiting for a free berth cost the firm money. Harvard had prepared a model that simulated the random arrival and length of stay of 100 ships. That meant running the appropriate macro 25

times, however, and nascent power users like student Mitch Goldstein were encouraged to tweak the macro so it would run all 2500 ships nonstop.

“I’d say 80 percent of the class never looked at any of the macros, but I found them compelling,” says Goldstein. He’s convinced that examining the logic behind

through the school’s mainframe computers but now available to students in their rooms, via either a dorm’s hard-wire link or the PC and the MBA program’s communications package.

Greg Brinks, for one, spent a great deal of time on a case involving the Corvette stores, engrossed in the PC’s ability to let him relate

*It was fortunate to have a model do much of the work. But ignorance about how to build spreadsheets troubled the computationally astute faction among us.*

such models and macros will enable him to write similar simulations once he’s working behind a mahogany desk; at the very least, he’ll know when a simulation is appropriate. “In a managerial post, I’ll also know what questions to ask about the assumptions behind a simulation,” Goldstein says.

#### **Beyond Spreadsheets**

Harvard’s power user coterie was fascinated by the PC’s potential—good news to McFarlan, who had talked enthusiastically of “providing the opportunity to bring certain analytical tools directly onto the desks of students.” Those tools include linear programming and regression packages, formerly supplied only

the sales volumes of particular stores to demographic breakdowns of their area by income, age, and sex; the amount of floor space; and whether the store was located in a mall.

There was a downside, however. In this case the program had literally been moved down from a DEC minicomputer, and most students found it distinctly unfriendly. It also demanded data in a nonstandard, undocumented format. Even a sophisticated user like Brinks gave up after a few attempts to apply the package to other tasks.

Although the PC shouldered the burden of much MBA class work previously consigned to Harvard’s larger computers, students still had a crack at the mainframes. A PROFS system that offered access to bulletin boards and electronic mail didn’t experience much traffic



after the first few weeks of school, but the big computers came into their own during the traditional first-year "Business Game."

The Business Game is a week-long management simulation during which groups of 15 students form businesses, then compete against each other for a supposed 11-month period. Students manage their companies by making monthly marketing, production, distribution, and financial decisions.

The game provides a forum for computing at many levels. Team members in charge of purchasing, for example, used a 1-2-3 template for rough assessments of what products to produce in which factories during what times in order to meet the needs of the other team members. If the preliminary analysis warranted building or acquiring additional production capability, members could log on to a DEC mini and enter minute details into a complex model, also factoring in such considerations as learning curves. Group decisions, in turn, were entered into a main-frame simulation program to generate an 11-month bottom line.

Although the Business Game was ungraded, and thus voluntary, more than 90 percent of the class participated, and at least one group used the PC's telecommunications capabilities during the game. That contingent ran their venture via remote control from a Cape Cod hideaway.

### Flying High

Professor McFarlan is the first to acknowledge that the PC's value to the Harvard MBA program transcends its ability to enhance the case method of teaching. In a sense, the PC program is the MBA's vocational training.

"We expect that the overwhelming majority of students will find this kind of technology on their desks when they get out; if not immediately, at least within a few years," says McFarlan. "In a real sense, the personal computer has become as much a part of the MBA's analytical tool kit as the slide rule was when I graduated in 1961 or the pocket calculator was in 1975." Familiarity with the PC will breed confidence, he suggests, and place students on the cutting edge when it comes time to enter the corporate mainstream. "PC expertise will allow students to organize more data in order to make those tough kinds of decisions and analyses that we try to simulate in our case studies," he says.

Not every student totally agrees. One claims that "the greatest thing" he learned at Harvard was "how to land a plane in all kinds of weather at airports all over America." While the *Flight Simulator* analogy may not precisely match the Harvard MBA experience, it's not entirely tongue-in-cheek either.

It's true that you might not feel safe entrusting your life to a pilot who had "flown" a PC but never a plane. On the other hand, someone trained with *Flight Simulator* would probably be more skilled than a pilot steeped in the theory of aerodynamics who had logged no time at the stick, even on a simulator.

To complete the analogy and to end with one last good news/bad news observation: The good news—I've already dealt successfully with some of the toughest problems a manager could ever face. The bad news—they were all Harvard case study simulations on a Portable PC. Worse still, I've got nearly another year of them to go.

Still, I suspect the job market will tell me that's better than never having faced such situations at all. ●

*Gordon Slack is enjoying his second year at the Harvard Business School.*

### Portable PC

IBM

Systems Products Division

P.O. Box 1328

Boca Raton, FL 33432

800/447-4700

List price: with 256K, one disk drive \$1950

### 1-2-3

Lotus Development

161 First St.

Cambridge, MA 02142

617/494-1270

List price: \$495

Requirements: 192K, two disk drives

### IBM Writing Assistant

IBM

P.O. Box 1328

Boca Raton, FL 33432

800/426-2486

List price: \$149

Requirements: 128K, one disk drive



# 'Twas days before Christmas,

and all through the offices, many creatures  
were stirring, even the bosses. Year-end figures were  
wrung by the accountants with care. In the hopes  
that black ink would somehow appear there.

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# When inside my brain,

there arose such a clatter,

I looked up from my keyboard to see what  
was the matter. Away to my notepad I flew like a flash,  
to see what I'd done in Christmases past.

The following Microsoft mice now  
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Alphabet Zoo (ages 3 to 8) ..... 20.

Kidwriter (ages 6 to 10) ..... 20.

Trains (ages 3 to 8) ..... 20.

Snooper Troops I (ages 10 to adult) ..... 23.

Snooper Troops II (ages 10 to adult) ..... 23.

In Search of the Most Amazing Thing

(ages 10 to adult) ..... 23.

Delta Drawing (ages 4 to adult) ..... 27.

President's Choice (ages 4 to adult) ..... 27.

### Springboard

Fraction Factory (ages 8 to 14) ..... 19.

Make A Match Math (ages 2 1/2 to 6) ..... 19.

Piece of Cake Math (ages 7 to 13) ..... 22.

Early Games for Young Children

(ages 2 1/2 to 6) ..... 22.

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## PC Connection

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603/446-3383

190W

For the IBM-PC Exclusively.

Circle 136 on reader service card

# PC CONNECTION®



# The glow on the screen,

told a tale sad but true. I'd forgotten  
to get presents for people I knew! A modem for mother,  
Zork for the kids. Tycoon for the chief,  
and a hard drive for Sid.

## Springboard (continued)

- ✓Music Maestro (ages 4 to 10).....\$22.
- ✓Easy As ABC (ages 3 to 6).....24.
- Stone** (requires graphics board)
- ✓Across the U.S.A. (ages 5 and up).....22.
- ✓My Letters, Numbers, Words (ages 1 to 5).....29.
- ✓Kids Stuff (ages 3 to 8).....29.
- ✓Memory Master (ages 3 to 8).....29.
- The Learning Company**
- ✓Addition Magician (ages 6 to 10).....23.
- ✓Magic Spells (ages 6 to 10).....23.
- ✓Word Spinner (ages 6 to 10).....23.
- ✓Reader Rabbit (ages 5 to 7).....26.
- ✓Moptown Hotel (ages 8 to 13).....26.
- ✓Number Stumper (ages 6 to 10).....26.
- ✓Moptown Parade (ages 8 to 12).....26.
- ✓Rocky's Boots (ages 9 and up).....32.

## RECREATIONAL

### Blue Chip

High finance simulations.

- ✓Baron.....32.
- ✓Millionaire.....32.
- ✓Squire.....32.
- ✓Tycoon.....32.

### Broderbund

- ✓Championship Lode Runner.....23.
- ✓Ancient Art of War.....27.

### CBS

- ✓Murder By The Dozen (your turn, Sherlock).....21.

### Electronic Arts

- ✓Pinball Construction Set.....25.
- ✓Dr. J/Larry Bird One-on-One.....28.
- ✓Music Construction Set.....28.

### Friendlysoft

- ✓PC Arcade.....35.

### Funtastic

Among the finest arcade style games available.

- ✓Cosmic Crusader.....27.
- ✓Snack Attack II.....27.
- ✓Big Top.....29.
- ✓Master Miner.....29.

### Hayden Software

- ✓Sargon III (highest rated Chess program).....35.

### Infocom Difficulty levels shown in italics

#### JUNIOR

- ✓Seastalker.....25.

#### STANDARD

- ✓Enchanter.....the Witness.....Planetfall
- ✓Cutthroat.....Wishbringer.....Zork I
- ✓Hitchhiker's Guide.....each 25.

## ADVANCED

- ✓Zork II.....✓Zork III.....✓Infidel
- ✓Sorcerer.....✓Suspect
- ✓A Mind Forever Voyaging.....each \$29.

## EXPERT

- ✓Deadline.....✓Starcross.....✓Suspended
- ✓Spellbreaker.....each 31.

Invisicubes (hint booklets) are available

for most Infocom games. Specify game... 6.

## Microleague Sports

- ✓Microleague Baseball (you are the manager).....25.

## Microprose

- ✓F-15 Strike Eagle.....22.

## Microsoft

- ✓Flight Simulator 2.12 (now works with Hercules Mono Card).....32.

## 1Step Software

- ✓Golf's Best (break 70 at Pinehurst No. 2).....32.

## Origin Systems

- ✓Ultima III.....39.

## Parlor Software

- ✓Bridge Parlor (the best Bridge simulation).....49.

## PCSoftware

- ✓Championship Blackjack.....23.
- ✓Chess 2001.....27.
- ✓Armchair Quarterback.....27.

## Professional Software

- ✓Trivia Fever.....22.
- ✓Trivia Fever II.....15.
- ✓Super Sports Trivia.....18.

## SEGA

- ✓Spy Hunter.....29.

## Sierra On-Line

- ✓Championship Boxing.....24.
- ✓Frogger.....24.
- ✓Ulysses.....24.
- ✓King's Quest.....33.
- ✓King's Quest II.....33.

## Sir-Tech

- ✓Wizardry.....42.

## Spectrum Holobyte

- ✓GATO.....27.

## Sublogic

- ✓Night Mission Pinball.....29.

## Jet

- ✓Scenery (airport) disks are available for Jet—100 airports.....each 15.

## Telarium

- ✓Rendezvous with Rama.....27.
- ✓Amazon.....27.
- ✓Fahrenheit 451.....27.

## XOR

- ✓NFL Challenge (be the coach).....\$79.

## HARDWARE

### AST Research

All AST Boards come with a full one year warranty.

SixPakPlus 64k upgradeable to 384k, with clock calendar, serial & parallel ports & now includes Sidekick version 1.5 non-copy protected (game port optional).....225.

384k (fully populated).....239.

MegaPlus II 64k upgradeable to 256k (or more with MegaPak) with clock calendar and serial port (parallel, game, or second serial port optional).....249.

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.

✓AST-5251-11.....579.

✓AST-3780.....579.

✓Reach Modem half card 300/1200 baud internal modem includes Crosstalk XVI

Advantage 128k upgradeable to 1.5 Meg (or more with Piggyback Card), with serial, parallel ports, now includes Sidekick version 1.5 non-copy protected (game port and second serial port optional).....399.

✓RAMpage! upgradeable to 2Mb, fully supports LOTUS/INTEL expanded memory specification (EMS).....call

### Amdek

✓Video 300G composite monitor (green).....129.

✓Video 300A composite monitor (amber).....139.

✓Video 310A mono monitor (amber).....169.

✓Color 600 - RGB monitor.....399.

✓Color 700 - RGB monitor.....439.

### Compucable

Plastic Keyboard & Drive Cover Set.....17.

✓IBM Mono Screen Enhancement.....17.

### Cuesta

Uninterruptable power backup units

Datasaver 240 WATT.....call

Datasaver 400 WATT.....call

### Curtis

#### ACCESSORIES

✓PC Pedestal (for IBM Mono or Color).....37.

✓Portable Pedestal.....47.

✓System Stand.....19.

✓System Stand for IBM-AT.....37.

✓Low Profile Tilt and Swivel Pedestal.....37.

✓Crystal 300-watt (line conditioner).....159.





# PC Persistence.

## Or, Paradise Revisited.

Remember this picture? We used it in our very first raccoon ad about two years ago. Back then we wrote your orders out by hand, and filed them on top of the fireplace mantle. 256K was a lot of memory. And, according to our calculations, only about 10% of the people now reading this ad even owned a PC.

But persistence has paid off. We've grown and thrived throughout all the trials and tribulations of the PC marketplace. Why we don't even have to sell moonshine anymore to make ends meet.

### Traditional values.

Shortly after our world famous micro mascot first plowed his way through your typical Marlow snowdrift, we cleared off the mantle and loaded everything into an IBM System 38. This mighty mainframe gives our sales consultants instant access to a multitude of mesmerizing minutiae. Like product availability, the status of your order, how much memory a program requires, what printers it supports, and whether a new version is expected soon.

With an ever-increasing array of electronic wizardry at their fingertips, our persistently pleasant phone people

can help you take your PC to new pinnacles of performance. You see, we still go to mind-boggling lengths to answer your *toll-free* technical questions—before or after the sale. We still guarantee every product we sell for a full 120 days, and many for longer than that. Our prices are still consistently among the lowest around. And, if a price ever goes down before we ship, you will automatically get the new low price.

### Only a 4.3 light year drive from Alpha Centuri.

Alas, Marlow, NH remains a bit off the beaten track for even the most adventuresome of our customers. But you still have a standing invitation to visit us the next time your business takes you to Boston, or pleasure takes you to the ski areas of Vermont and New Hampshire. This spring we'll be opening our completely renovated store and training center in the old Christmas Trees Inn (partially pictured above) across the river from our headquarters.

Just call 1-800/243-8088 or 1-603/446-3383, M-F 9:00 to 9:00; Saturday to 5:30. If you're planning to visit, call ahead to make sure what you want is in stock. The showroom closes at 8:00 M-F and at 5:00 on Saturday.

For the IBM-PC (XT & AT) exclusively.

# PC CONNECTION®



# Call 800/243-8088.

I dialed that number. They got it all straight.  
And I heard them exclaim as they resolved my poor plight,  
"Happy Holidays to all, and to all  
a good night."

## Quadram

Expanded Quadboard with clock calendar, parallel, serial & game port, I/O bracket, and Quadmaster software.  
384k (fully populated) ..... \$219.  
Øk (upgradeable to 384k) ..... 189.  
Gold Quadboard Øk upgradeable to 640k, includes Quadmaster III software, clock calendar, serial port, parallel port, and IBM compatible color graphics (second serial or parallel port optional)..... special  
Silver Quadboard Øk upgradeable to 640k, includes Quadmaster III software, clock calendar, two serial ports, and game port..... 215.  
Liberty Board 64k upgradeable to 2Mb, fully supports LOTUS/INTEL expanded memory specification (EMS)..... 287.  
Quad Sprint w/8086 processor, increases the speed of your PC..... 479.  
Short Ram Card 64k..... 169.  
✓Microfazer Printer Buffer (parallel) w/copy MP 64 (64k) upgradeable to 512k..... 159.  
✓Quadcolor 1..... 197.  
✓Quadchrome Monitor..... 469.

## SMA

PC-Document Keyboard Templates available for:  
DOS/Basic 1.1 ..... Supercalc 3  
DOS/Basic 2.0-2.1 ..... Wordstar  
✓DOS/Basic 3.0-3.1 ..... ✓Wordstar 2000  
✓Lotus 1-2-3 ..... Turbo Pascal  
✓Symphony ..... ✓WordPerfect  
Multiplan (IBM) ..... dBase II  
Multiplan (Microsoft) ..... ✓dBase III  
Framework ..... ✓Multimate  
Volkswriter Deluxe ..... each 12.

## Toshiba

All Toshiba printers listed are 24 pin dot matrix.  
✓P1340 printer (80 column) ..... 469.  
✓P341 printer (136 column) ..... 899.  
✓P351 printer (136 column) w/serial and parallel interfaces ..... 1129.  
**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) ..... \$75.  
**IOMEGA**  
✓Bernoulli Box 20 Meg ..... 2349.  
✓10 Meg cartridge ..... 48.  
✓Head Cleaning Kit ..... 69.  
✓Standard Interface (PCØ) Card ..... 129.  
We are an authorized IOMEGA service center.

## OUR POLICY

- We accept VISA and MASTERCARD.
- No surcharge added for charge cards.
- Your card is not charged until we ship.
- If we must ship a partial order, we never charge freight on the shipment(s) that complete the order.
- No sales tax.
- All shipments insured; no additional charge.
- Allow 1 week for personal and company checks to clear.
- UPS Next-Day-Air available.
- COD max. \$1000. Cash or certified check.
- 120 day guarantee on all products.\*
- To order, call us anytime Monday thru Friday 9:00 to 9:00, or Saturday 9:00 to 5:30. You can call our business offices at 603/446-3383 Monday thru Friday 9:00 to 5:30.

## SHIPPING

**Continental US:** For monitors, printers, and drives, add 2% for UPS ground shipping. Call for UPS Blue or UPS Next-Day-Air. For all other items, add \$2 per order to cover UPS shipping. We will automatically use UPS 2nd-Day-Air at no extra charge if you are more than 2 days from us by UPS ground.  
**Hawaii:** For monitors, printers, and drives, actual UPS Blue charge will be added. For all other items, add \$2 per order. **Alaska and Outside Continental US:** Call 603/446-3383 for information.

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## Seagate

20 Meg Internal Hard Drive (w/controller, cables, and manual) ..... \$479.

## Shugart

10 Meg Internal Hard Drive (w/controller, cables, and manual) ..... 379.

## Tallgrass Technology

TG 5025-25 Meg Hard Drive (w/controller and 60 Meg Backup Unit) ..... call

## Tandon

TM 100-2 (5¼") full-height drive (DS,DD) 95.

## TEAC

FD-55B (5¼") half-height drive (DS,DD) 85.

## Toshiba

✓AT 360k Drive (5¼") half-height drive... 99.

## MEMORY

64k Memory Upgrade Set for IBM-PC or XT system board or any memory board  
150 nanosecond (set of 9) ..... 8.  
200 nanosecond (set of 9) ..... 7.  
Install memory upgrades & run diagnostics at time of board purchase only ..... 10.  
✓128k Memory Upgrade Set for IBM-AT System Board (9 chips piggybacked) .. 29.  
✓256k Memory Upgrade Set for any IBM-AT memory board (9 chips) ..... 29.

## DISKS

**DS/DD Disks** for the PC & XT (40 TPI).  
10 disks per box.  
Maxell MD-2 ..... 19.  
Verbatim Datalife (w/free calculator—for a limited time only) ..... 19.  
**DS/High Density Disks** for the AT (96 TPI).  
10 disks per box.  
Fuji ..... 39.  
Maxell ..... 39.  
Verbatim ..... 45.  
✓Flip Sort (holds 75 disks) ..... 15.

## INFORMATION SERVICES

### Compuserve

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

### Dow Jones

✓Membership Kit ..... 19.

### Source Telecomputing

✓The Source (subscription and manual) .. 39.

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# PC CONNECTION®



# It gave me great pain.

There was so much to do!

How could I possibly see this list through?

When what to my wondering eyes should appear, but  
PC Connection's number big, bold, and clear.

## CABLES

AC Plug Adapter (any monitor to your PC)	8.
Smartmodem to IBM Cable	\$17.
Keyboard Extension Cable (3 to 9 feet)	27.
Extension Cables for IBM Mono Display	33.
Color and Monochrome Extension cables	39.
Printer-to-IBM cable	17.

## SURGE SUPPRESSORS

All surge suppressors have an on/off switch.	
Safestrip	21.
Diamond (6 outlets)	28.
Emerald (6 outlets; 6 ft cord)	34.
Sapphire (3 outlets; EMI/RFI filtered)	44.
Ruby (6 outlets; EMI/RFI filtered; 6 ft cord)	50.
Command Center (5 outlets; EMI/RFI filtered; digital clock; master key switch; circuit breaker)	123.

## DataProducts

8050 color printer	call
8070 color printer	call

## Epson

All Epson dot matrix printers have built in graphics capability. In addition, the LX-80, FX-85, FX-185 and LX-90 can all print in near letter quality (NLQ).

DX-10 (letter quality)	call
DX-20 (letter quality)	call
FX-85 (replaces FX-80+)	call
FX-185 (replaces FX-100+)	call
JX-80	call
LX-80	call
LX-90	call
LQ-1500 (letter quality dot matrix)	call
SQ-2000 Ink Jet	call
Epson Books	call
Printer-to-IBM cable	15.
We are an authorized Epson service center. Ask about the extended service plan.	

## FTG

Light Pen	195.
Demo Disk for Light Pen	39.

## Hayes

Smartmodem 300	149.
Smartmodem 1200	389.
Smartmodem 1200B (w/Smartcom II)	349.
Smartmodem 1200B (no software)	289.
Smartmodem 2400	579.
Smartcom II 2.1 (software)	89.
Transet 1000	289.
Accessory Kit for Transet 1000 (cable and software)	29.

## PC Connection Hardware Special

through January 31, 1986

### QUADRAM

#### The Gold Quadboard 0k

Quadram introduces a new standard in PC enhancements.

Includes:

- Memory expansion to 640k using 64k or 256k chips
- RGB and Composite Video Output
- Parallel and serial port (2nd parallel or serial port optional)
- I/O bracket, clock/calendar
- Keysaver, QuadMaster III Software, PolyWindows DeskPlus™, QuadPaint
- 100% IBM-PC compatibility... \$369.

### Hercules

Hercules Color Card (parallel port)	169.
Hercules Graphics Card (parallel port)	289.
Hercules Graph-X Software 2.0	42.

### Innovative Concepts

Flip n' File 50	12.
Flip n' File 50 w/lock	18.
Library Case (holds 10 disks)	4.

### Kensington Microware

Masterpiece	94.
Masterpiece Plus	129.
Printer/portable computer stand	17.

### key tronic

5150 keyboard	139.
5151 keyboard (deluxe)	169.
5153 keyboard (with touch pad)	289.
AT Converter (allows Key tronic 5151 keyboard to work with the AT)	12.

### Kraft

Joystick	29.
Executive Cursor Control (w/Joystick)	47.
Executive Cursor Control (software only)	27.

## 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.
Pinwriter P5 (IBM, 132 column)	899.
Spinwriter 2050 (letter quality 17 cps)	679.
Spinwriter 3550 (letter quality 32 cps)	1099.
Spinwriter 8850 (letter quality 50 cps)	1489.

## Orchid Technologies

All Orchid Boards come with PCnet Drive (Ram disk), PCnet spool (print spooling), disk caching & partitioning. Conquest Multifunction Board 0k upgradeable to 2Mb, fully supports LOTUS/INTEL expanded memory specification (EMS), includes clock/calendar, serial port, and parallel port. A PCnet Daughter Board can be added 289. PCnet Daughter Board piggybacks to Conquest with networking software call PC Net (stand alone card) call PC Turbo 186 w/256k and Turbo Daughter Board expandable to 640k, increase the speed of your PC call Eccell Multifunction Card for the AT 0k upgradeable to 1 Meg, fully supports LOTUS/INTEL expanded memory specification (EMS) and Error Correction Code (ECC), (serial and parallel ports optional) call

## Paradise Systems

Modular Graphics Card	275.
Backpack for Modular Graphics Card (0k upgradeable to 384k)	225.
Multidisplay Card	195.
Five Pack w/384k	149.

## PC Designs

FD 1000 Computer	789.
PC Magazine called it "a top performance bargain" (Oct. 15) PC Week called it "a terrific machine at a terrific price" (May 10). Please call for more information about this computer.	

## Princeton Graphics

HX-12 RGB monitor (690 x 240)	449.
HX-12E RGB monitor (EGA compatible)	589.
MAX-12E Amber monochrome monitor	179.
SR-12 RGB monitor (690 x 480)	597.
ISM Scan II Board for SR-12	149.

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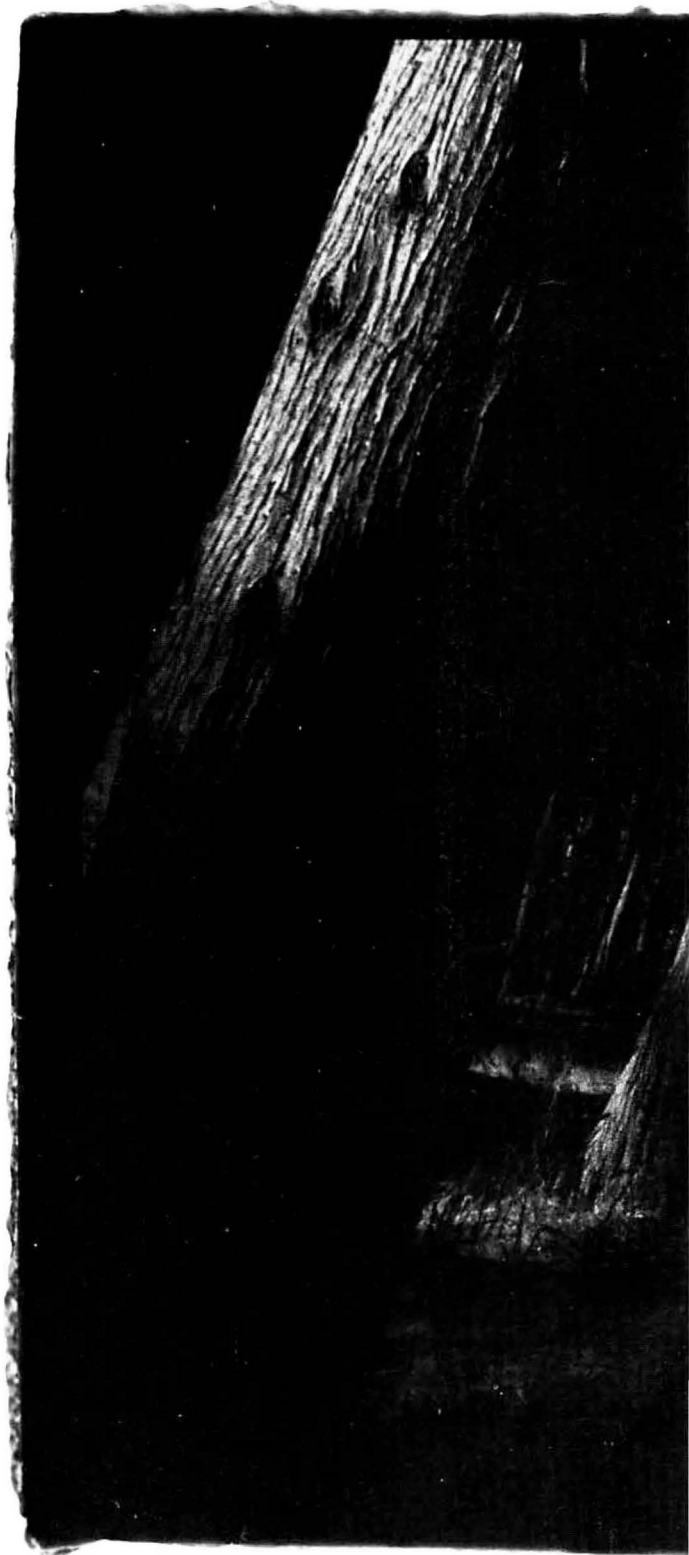
# Equal Access

Microsoft Access simplifies communications by furnishing custom menus for some of the major information services. Throw in a programming language and concurrent communications, and you have a package few communicators will outgrow.

*Jim Heid*

■■■■ Learning to conquer communications technicalities and navigate complex information services is enough to redefine anyone's idea of frustration. While some users complete the course and go on to benefit from everything a modem can bring, others abandon their attempts and gain a new appreciation for the accessibility of express couriers and the *Wall Street Journal*.

For years communications software developers have tried to provide programs that insulate users from the cruel and cryptic world of on-line protocols and commands. Most programs attempt this insulation by means of keyboard macros, which let you record phrases and commands on a single keystroke, and script files, which automate communications sessions by sending logon commands without your intervention. Microsoft's ambitious new communications program, *Microsoft Access*, gives you these features









and more; it's the first general-purpose communications program that escorts you beyond logon into the data bases themselves. *Access* accomplishes this by providing menus that act as intermediaries between you and the most popular information services.

Although *Access* holds the beginner's hand, it also supplies more than enough power to please demanding communicators. Besides furnishing keyboard macros and VT 100 and VT 52 terminal emulation, *Access* boasts a BASIC-like programming language that you can use to write complex script files. *Access* is also the first program that supports the X.PC communications protocol, letting you communicate with up to eight computers simultaneously. And for dessert, *Access* dishes up remote control, data encryption, and file conversion.

### Once Is Not Enough

The sheer bulk of *Access*'s 400-page manual may intimidate new users, but reading only a few chapters enables you to go on line for the first time. As you require more information, the manual serves as a thorough, although not especially friendly, reference.

The copy-protected *Access* program disk comes with a backup and two disks containing electronic

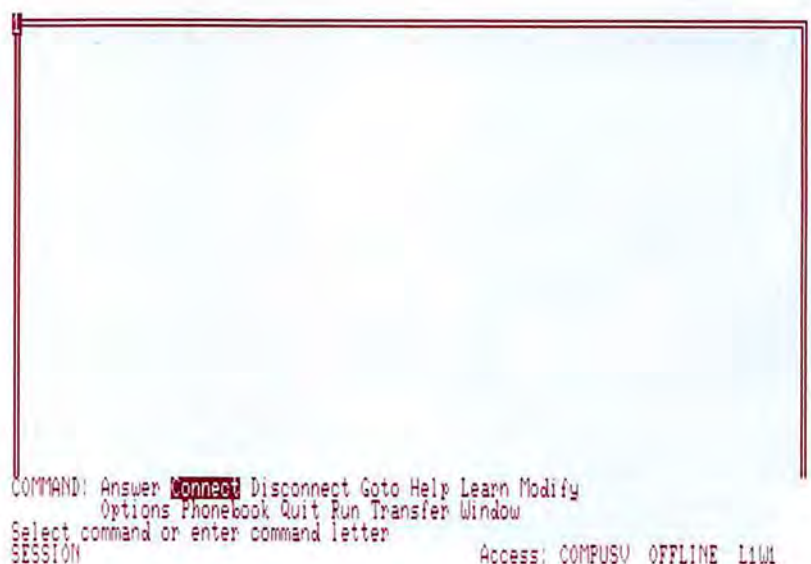
mail, on-line help, and custom menu files. A utility is included for copying *Access* to a hard disk—but only once. Microsoft apparently believes that you'll use the same hard disk forever—the utility cannot “uninstall” *Access* for copying to a different hard disk. This throw-away-the-key protection scheme is especially frustrating because *Access* works best on hard disk PCs—the program and the script files that compose its custom menus take up almost a megabyte of code.

*Access*'s installation procedure first determines how many serial ports the computer has and, if it finds two, makes sure that you've arranged the serial boards' jumpers so that one board is COM1 and the other COM2. No other communications program I know of performs this simple yet vital test during installation.

Next, *Access* presents a menu that lets you specify 1 of 24 auto-dial modems or a direct connection or manual-dial modem. If your auto-dial modem isn't on *Access*'s menu, you can teach *Access* how to control the modem by entering the modem's setup and dial commands. After you specify the modem type, *Access* performs some other helpful services: It tests the modem to verify that it responds to dialing and hang-up commands and asks whether your phone line supports tone dialing and whether a prefix number is required.

*Access*'s installation procedure can create automatic sign-on files and provides custom menus for Dow Jones/News Retrieval service, CompuServe's

Screen 1: The Session menu is the gateway to *Access*'s other menus. When you're on line, the Session menu disappears to provide a larger display area.





Executive Information Service, NewsNet, the Official Airline Guide, MCI Mail, and Western Union's Easy-Link. Before creating the file, *Access* asks for the service's telephone number and your identification number and password. Unlike Hayes Microcomputer's *Smartcom II*, *Access* doesn't offer a "protect" option for hiding stored passwords from roving eyes.

### Menus and Tab Tapping

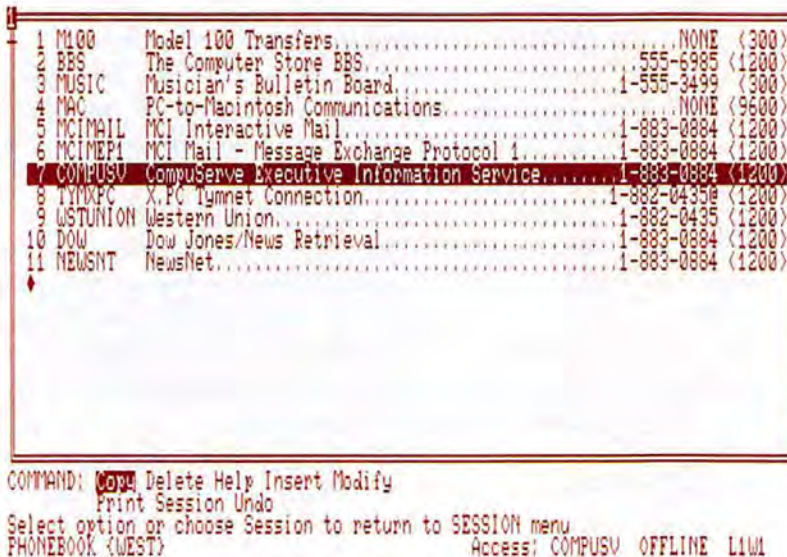
Once you've installed *Access*, you can go on line by choosing the Connect command from *Access*'s main menu, the Session menu (see Screen 1). As with other Microsoft programs, you choose a command by typing its first letter or by using the <Space> bar to highlight the command and then pressing <Enter>. When you choose a command, "command fields" appear into which you type information. Pressing <Alt>-<H> displays help for the particular command you're using. When you're on line, the Session menu surrenders its place on the screen, leaving only a status line and a bordered window that displays 22 lines of text (23 with the border turned off). Pressing <F10> displays the Session menu again.

Overall, *Access*'s menus do a good job of organizing the program's myriad commands into logical groups. Unlike most Microsoft programs that have similar menus, however, *Access* doesn't support a mouse. Instead, you must move from one command field to another by pressing <Tab>—as many as ten times to access some command fields. How you respond to Microsoft's menu structure will probably determine whether you choose this program. Some people find the Microsoft standard cumbersome; others, like myself, feel right at home.

### Macros, Protocols, and Ciphers

When you select Connect you are asked to choose from a list of phone numbers in *Access*'s directory, called the Phonebook. The Phonebook stores the communications settings, phone numbers, and macro key assignments of remote computers (see Screen 2). You can print reports that show the settings and key assignments for each Phonebook entry—a practical feature for documenting how you use each service.

Screen 2: *Access*'s little black book, the Phonebook, stores communications settings, phone numbers, and macro key assignments.





Once you're on line, you can take advantage of *Access*'s thorough complement of nuts-and-bolts features. You can, for example, print incoming text by pressing <F3>, or you can capture incoming data in

*Access is the first program that supports the X.PC communications protocol, letting you communicate with up to eight computers simultaneously.*

a disk file called "temp" by pressing <F4>. Being able to name the captured file later makes a lot of sense; some programs force you to name the file first, but there's no reason to pay on-line fees while you think of an appropriate file name.

*Access* keeps you informed with a status display that appears at the bottom of the screen. An elapsed-time display acts like a taxi meter, clicking off the time you've been connected. When you press <F5>, another status display appears that shows if a script file is executing, or whether you're capturing to disk or printing. The display also indicates how much memory remains in *Access*'s text-review buffer—a holding area that allows you to reexamine text that has scrolled off the top of the screen.

*Access*'s keyboard macros, called Quickeys, let you assign up to 255 characters to each letter key. You create and edit Quickeys from *Access*'s Phonebook and activate them by pressing <Alt> along with the desired key. Conveniently, you can also define Quickeys while on line; pressing <F7> records your keystrokes in a macro until you press <F7> again.

*Access* can send and receive text files without error-checking, or it can send text or binary files under the XMODEM error-checking protocol. You can

also use the session-level X.PC protocol with other PCs and services that support it (see "X.PC—The Multisession Protocol" in this issue's *Password: Communicate*). Unlike its major competitor in concurrent communications, Microstuf's *Crosstalk Mark 4*, *Access* doesn't support the Kermit file-transfer protocol.

When you send files without a protocol, you can specify that *Access* turn tab codes into spaces, that it pad blank lines with a space for transmission to computers that interpret a blank line to mean the end of transmission, and that it remove linefeed codes from outgoing files.

*Access* comes with Cipher, a separate encryption program that scrambles sensitive files before sending them—provided the recipient also has a copy of Cipher. Cipher encrypts files by shifting the bits that make up each character according to a password you supply. Cipher doesn't conform to virtually unbreakable, government-sanctioned encryption schemes like DES, but most users should find it adequate for their data security needs.

## File Conversion and Remote Control

File conversion is another extra that *Access* provides. A utility called Export converts columnar ASCII files into formats readable by *Multiplan*, 1-2-3, and any program that can read DIF files. Export lets you specify the column widths of the file you're creating and is smart enough to translate fractions into the correct decimal values.

If you have an auto-answer modem, you can operate *Access* from any remote computer equipped with a modem. Simply choose the Answer command before you leave the PC, and you can call in to transfer, delete, and print files. You can even specify that *Access* request a password from callers immediately upon establishing a connection.

When *Access* answers, instead of presenting a menu, it greets you with the prompt 'Command:'. You can issue any command as if you were sitting in front of your PC—simply by typing its first letter. The remote caller can type a question mark to receive a list of available commands. You can also turn control of *Access* over to a remote caller during a communications session.



## Tailor-Made Menus

Anyone who has explored information services has probably gotten lost in a maze of awkward, hard-to-remember commands. *Access*'s unique custom menus are intended to keep you from worrying about whether *Q*, for example, means *quit* or summons a stock *quote*. You can choose commands from menus on the bottom of the screen, and *Access* translates your choices into the codes expected by the information service. In essence, the custom menus make portions of the major services "look" as if they were part of *Access*. If you prefer the direct approach, you can always bypass the custom menus and use the service's native commands.

*Access* doesn't provide custom menus for every area of a service, but it does offer a mix of menus intended to appeal to *Access*'s target audience of business computer users—people who want stock quotes, airline and travel data, news, electronic mail, and sports information. You'll find no menus for services such as on-line shopping or for searching the Utilities data library of CompuServe's IBM PC user group. However, if your on-line tasks match those of *Access*'s target customers, you're in luck. The custom menus work, and they're easier to use than native commands.

Searching a half dozen CompuServe data bases for information on a company is a matter of filling in the command fields shown in Screen 3. To obtain historical stock information from the Dow Jones/News

Retrieval service you would simply type the company's symbol and the beginning and ending dates. Checking flight listings on the Official Airline Guide is equally easy. You select the departure and arrival cities from an on-screen list and indicate your departure date and time, and *Access* displays the list of flights. If you want more details on a given flight, *Access* displays the details to the right of the flight list (see Screen 4), eliminating the time-consuming task of asking for a new flight list when the old list scrolls off the screen.

Unless you've memorized every command needed to navigate a service or written a script file to do the job for you, you won't be able to issue commands as quickly as *Access* can. Since custom menus free you from having to remember and type commands, chances are you'll be able to sign on, get what you want, and sign off more quickly.

Because information services occasionally add new features or change their commands, the script file controlling a custom menu might become outdated. Microsoft provides updates to custom menu files through its CompuServe special interest group. If there's a weak link in the custom menu chain, it's here. Updating a custom menu involves disabling the CompuServe custom menus, finding your way into

Screen 3: Custom menus in action. This CompuServe custom menu searches several data bases for information on a given company. After you specify the data bases that you want to search, *Access* sends CompuServe the appropriate commands.

```
CompuServe          TOP
1 Instructions/User Information
2 Find a Topic
3 Communications/Bulletin Bds.
4 News/Weather/Sports
5 Travel
6 The Electronic MALL/Shopping
7 Money Matters/Markets
8 Entertainment/Games
9 Home/Health/Family
10 Reference/Education
11 Computers/Technology
12 Business/Other Interests
SEARCH COMPANY company symbol: ibm
                current quote:(Yes)No   issue description:(Yes)No
                price history:(Day)Week Month No   dividends:(Yes)No
                start date: 9/27/85   end date: 9/27/85
                S&P Green Sheets:(Yes)No
                Value Line annual:(Yes)No   Value Line quarterly:(Yes)No
                Value Line projections:(Yes)No   IBES Forecast: Yes NO
                list bonds:(Yes)No           list options:(Yes)No
Select option or type command letter
COMPUSV          Scr          Access: COMPUSV 00:05:13 L1W1
```



the Microsoft interest group, and downloading the new menu files using the XMODEM protocol—an easy chore for a communications veteran but a potential trauma for a novice. And if you don't subscribe to CompuServe, you must wait for a future release of *Access* to update the menu files.

## The Mail Room

An even more ambitious attempt at simplifying communications is *Access*'s electronic mail system, Mail, which lets you create, edit, and file electronic correspondence while off line. Mail is probably more than the casual correspondent needs, but it could be a godsend to someone who corresponds with, say, several field representatives and branch offices, or to a secretary in charge of an entire office's electronic mail system.

Mail creates a metaphorical desk: An in-box stores mail you haven't read, an out-box holds outgoing mail, and a folder holds mail to be saved (see Screen 5). Custom menus eliminate the need to interact with MCI Mail or EasyLink, the two mail services that *Access* supports. Mail signs on to a mail

service only when you actually send or receive a letter. This elaborate metaphor makes using electronic mail more like using the regular mail. Just as you don't have to go to the post office to write or read a letter, you don't have to sign on to an electronic mail service to write or read electronic mail.

In a typical Mail session you would write a letter with the Compose command. *Access* comes with a full-screen text editor called Notepad that is a subset of *Microsoft Word* and also makes a great substitute for EDLIN. If you prefer a different editor, you can install it using Mail's Modify Settings command. Next, you address the letter. What's next? You guessed it—add a stamp. Stamping a letter stores it in your out-box, allowing you to post it with the Send command.

Mail's ease carries a performance penalty: Its underlying complexity makes it deathly slow on floppy disk PCs. Cobwebs will form between you and your computer while *Access* grinds through Mail's many script files. You can store the Mail script files on a RAM disk and improve performance dramatically, but you'll lose memory that would otherwise be set aside for *Access*'s text-review buffer. A hard disk helps, but even then Mail's performance is only acceptable.

Screen 4: Custom menus also streamline the Official Airline Guide service. You type the arrival and departure information, and *Access* sends the ciphers that OAG expects.

```

$          DIRECT FLIGHTS      TUE-14 JAN      X5
FROM-BOSTON,MA,USA          EXPANDED DIRECT FLIGHT DISPLAY
# TO-PITTSBURGH,PA,USA/GREATER PITTS      LEAVE- 12:25P  ON-14 JAN
NO EARLIER DIRECT FLIGHT SERVICE      FROM-BOSTON,MA,USA
1 715A BOS 850A PIT AL 11 73S B 0      USAIR/ALLEGHENY COMMUTER FLIGHT 89
2 740A BOS 1050A PIT PE 315 72S F 1      AIRCRAFT-MCDONNELL DOUG. DC9 30-80 SE
3 830A BOS 1005A PIT AL 369 B11 B 0      CLASS-COACH/ECONOMY
4 1155A BOS 127P PIT AL 45 72S S 0      MEAL-SNACK
5 1225P BOS 158P PIT AL 89 D9S S 0      ARRIVE- 1:58P  ON-14 JAN
6 225P BOS 400P PIT AL 236 73S 0      AT-PITTSBURGH,PA,USA/GREATER PITTS
ENTER                                ELAPSED TRAVEL TIME 1H 33M
                                ENTER
FARES depart city: BOS          arrive city: pit
      depart date: 1/14/86      return date:
      depart time: 7A
      class:(Coach)First Both Excursion All
Enter information or press direction key for list
OAG                               Scr                               Access: COMPUSV 00:09:50 L1W1

```



## Simultaneous Connections

You may not be able to do eight things at once, but *Access* can. *Access* lets you open up to eight windows and assign each to a communications session. Through its use of multiple windows and its support of the X.PC protocol, *Access* can communicate with up to eight computers at once, provided that each is accessible through the same network phone number. When you use X.PC for multiple sessions, 1 serial port is split into 15 channels; COM1, for example, becomes COM1.1 through COM1.15. You'll never use all 15 channels at once, however, because the program is limited to displaying only eight open windows. On PCs with 2 serial ports, *Access* can conduct two communications sessions simultaneously without requiring the use of the X.PC protocol.

To test *Access*'s electronic juggling ability, I used Tymnet to sign on to CompuServe, MCI Mail, and EasyLink at 1200 bps using a Hayes Smartmodem under the X.PC protocol and then established a direct connection with an Apple Macintosh on COM2. As I transferred files between the PC and the Mac in one window while switching between information services in three others, my screen cluttered and my mind boggled, but *Access* never skipped a beat.

Watching half a dozen windows scroll wildly is interesting, but the question is, Who needs it? While the casual stock-quote seeker or electronic mailer is unlikely to require multiple communications sessions, practical applications do exist for frequent communicators. A stockbroker could use X.PC to sign on to Dow Jones and MCI Mail simultaneously, then read

and route noteworthy news to clients through MCI Mail. In an office with electronic mail, you could sign on to NewsNet and Dow Jones using a modem attached to COM1 and link into the office mail system through COM2. If an interesting story caught your eye, you could capture it and then switch to the electronic mail window, sending copies of the story to co-workers. While practical applications for multiple sessions aren't plentiful now, more will undoubtedly surface as more programs and communications vendors support X.PC.

## Thank You MASC Man

To borrow from a mail-order TV commercial, "But wait! There's more!" With *Access* you also get a full programming language that lets you write script files for automating communications. An *Access* script file can be as simple as a one-line program that transmits a command, or as complex as a computer shopping program that waits until 11 p.m. for phone rates to drop, then dials an information service, logs on, searches for the items you want, determines if their prices are within your range, and then places the order and signs off.

If you know Microsoft BASIC, you know the Microsoft Access Script Command (MASC) language. MASC offers many of BASIC's control and branching structures, including FOR...NEXT and

Screen 5: *Access*'s electronic mail system, Mail, uses a metaphorical desk with an in-box and an out-box for holding incoming or outgoing mail. Mail greatly simplifies electronic mail but is too slow to be useful for occasional correspondents.





WHILE ... WEND loops and IF ... THEN ... ELSE tests. The language also offers named integer and floating-point variables and arrays, and a full set of arithmetic and logical operators. Error-trapping statements are also provided, as are statements for controlling every aspect of *Access*'s operation. And while MASC maintains BASIC's simplicity, it abandons its biggest shortcoming, line numbers. In MASC, you give blocks of code labels like SIGN.ON:, and then refer to them by name.

An easier way to create script files is to record an on-line session with the Learn command. Listing 1 shows a MASC program that *Access* wrote based on one of my CompuServe sessions. The program dials and signs on to CompuServe, enters the IBM PC special interest group, and asks for and prints a brief description of all utilities added within the last two weeks. The Learn function doesn't miss a trick: If you make a typing error and then backspace a few times, *Access* will repeat your mistakes and your corrections when it runs the script. For this reason, you may want to edit scripts using Notepad.

Microsoft offers a developer's kit that includes instructions for creating custom menus and a compiler for integrating them into script files. The possibilities for specialized applications could include a program that monitors the performance of field sales personnel using electronic mail, a package containing

custom menus for simplifying access to mammoth data bases, and an integrated software package that uses X.PC and custom menus to provide simultaneous access to and a consistent user interface for several information services.

### Should You Access?

*Microsoft Access* is possibly the most feature-laden, ambitious communications package running on a microcomputer. Its custom menus tame information services, its multiple-session capabilities let you squeeze more out of your modem, and its MASC language makes it a promising development tool for vertical applications. Experienced telecommunicators will have to go far to find a program with more brute communicating power.

However, *Access* didn't make it to market without its share of flaws. Users who aren't familiar with Microsoft's trademark menu structure may find the endless menus and tabbing cumbersome. *Access*'s slow performance in executing complex script files, especially those of the Mail facility, virtually demands a hard disk, yet *Access*'s inflexible copy protection prohibits you from copying the program to a hard disk more than once. Worse, once you install *Access*, it's stuck. You can't uninstall it.

Despite these flaws, *Access* succeeds in making communications accessible to people who think a prompt character is an eccentric who arrives on time. *Access* can't clear all the fog that shrouds communications, but it does part the clouds and shed some light on the subject. ●

*Jim Heid is a freelance writer and the coauthor of The Complete Guide to the Tandy 1000 (Ashton-Tate Publishing, Culver City, California, 1985).*

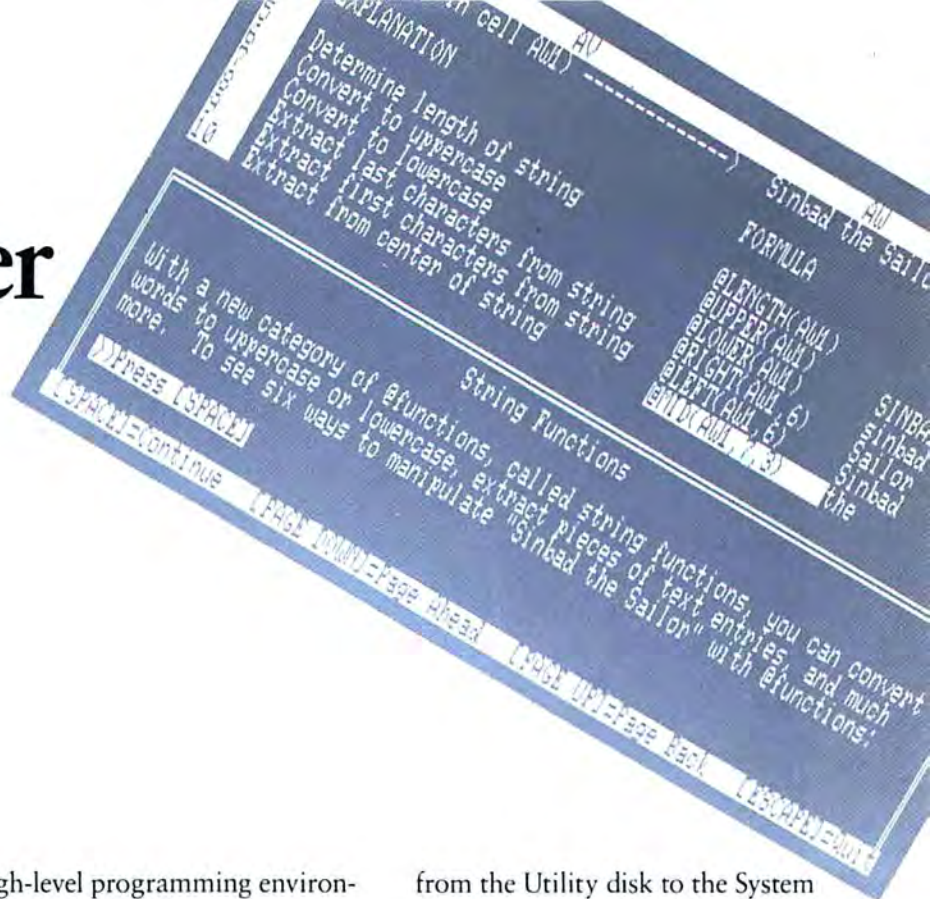
*Microsoft Access*  
Microsoft Corp.  
10700 Northup Way  
Box 97200  
Bellevue, WA 98009  
206/828-8080  
List price: \$250  
Requirements: 256K, DOS 2.00  
or later version

```
Wait 2
Send "^C";
Match "^JUser ID: ",10
Send "76174,556"
Match "^JPassword: ",10
Send "pass?word"
Match "^JEnter choice number !",12
Send "go ibmsig"
Match "^JPress <CR> : ",14
Send ""
Match "^JEnter choice or H for help : ",10
Send "dl1"
Match "^JPress <CR> to continue: ",10
Send ""
Match "^JEnter choice or H for help: ",12
Printer = ON
Send "cat/des/age:14"
Match "^JPress <CR> to continue: ",90
Printer = OFF
Send ""
Match "^JEnter choice or H for help: ",10
Send "off"
Disconnect
```

Listing 1: IBM PC SIG routine



# More Power to You



"If it's not broken, don't fix it," goes the adage. The developers at Lotus obviously agree. 1-2-3 release 2 brings more power to power users and provides some welcome refinements without sacrificing the familiar functions and features.

Harry Miller

1-2-3 release 2 blends added power and finesse, but it doesn't do much to make spreadsheets easier to understand or use. A good portion of the product's enhancements are aimed at the sophisticated and experienced 1-2-3 user; many of the new features and functions extend its usefulness as an application development tool. 1-2-3 has always been part application program and part

high-level programming environment. With support for more memory, string manipulation functions, and macro commands that control program flow, the new 1-2-3 highlights the programming potential of Lotus's mainstay.

Only a little of this added power will be new to *Symphony* users. Most of the release 2 enhancements simply transplant and tailor *Symphony*'s spreadsheet functions to 1-2-3's command structure. Because *Symphony* encompasses word processing and communications applications, its menu structure is much more complex than 1-2-3's. Release 2 does a very smooth job of grafting the power of *Symphony* onto 1-2-3's simpler edifice.

## Effortless Installation

An installation procedure easier and slicker than release 1A's greets you the first time you use release 2. Instead of a batch file that copies and renames the appropriate set of driver (.DRV) files

from the Utility disk to the System disk, the new release uses a dedicated program to create a single configuration (.SET) file that contains all the necessary device drivers. *Symphony* users will find this scheme familiar.

The installation program is almost sinfully easy to use: You answer questions like, 'Can your computer display graphs?' and 'How many monitors do you have?' by moving a cursor over a list of possible answers. (Yes, even to the extent of 'One Monitor ... Two Monitors!') At each turn, the highlighted choice is explained in a context-sensitive description box.

Gone, however, are the on-line tutorial and the nifty part of the Lotus Access System that enabled you to sort a disk directory or copy a group of files by marking them when they were highlighted. The new Access System simply invokes 1-2-3, PrintGraph, Translate,



## First Annual Report

Lotus's first add-on product for 1-2-3 is a fast and flexible report generator that reads and processes files from 1-2-3 release 1A or 2. It makes short work of creating mailing labels or filling out forms using data stored in a worksheet file.

The product was originally designed and produced by Concentric Information Processing. Just before CIP brought the product to market, Lotus licensed it and adapted it to more closely follow 1-2-3 conventions and to work with the new file formats for 1-2-3 release 2 and *Symphony 1.1*. (Because release 2 and *Symphony 1.1* files are interchangeable, 1-2-3 *Report Writer* can also read *Symphony* files.)

Lotus also added device drivers and the installation procedure that

is now common across its product line. 1-2-3 *Report Writer* is a separate program, but it uses a 1-2-3-style menu and help screens, so if you know how to use 1-2-3, you'll pick up *Report Writer* in no time. One small stylistic difference is that 1-2-3 *Report Writer* uses pull-down menus for some secondary menu choices.

You create a report by selecting a worksheet file and moving fields (field names and representations of the data) around on a free-form screen. You can easily delete some fields and display others with or without their field names. Any field can be moved to any position, and you can insert control breaks and headers and footers, calculate totals, and change the format of any field.

A built-in but flexible mailing label report enables you to precisely specify the layout of each label and of all the labels on a page. As with other report forms, a "test pattern" feature saves paper and time by printing (or displaying) a mock-up of

a report. In this way, you can be sure the labels or forms are lined up properly.

1-2-3 *Report Writer* can also be used as a query system for 1-2-3 files. The /Query command builds complex query statements from a series of pop-up moving-bar menus. You can even query using undisplayed fields—that is, calculated fields not used in the printed report. In addition, *Report Writer* enables you to sort on up to four key fields, two more than you can use in 1-2-3.

You can't create or alter 1-2-3 files with 1-2-3 *Report Writer*, but you can save report specifications, so running a report more than once is easy. The product's focus is creating output in exactly the form you want. 1-2-3 *Report Writer* adds the missing link to using 1-2-3 for data management tasks: free-form report generation.



or Install or returns to the operating system. In lieu of the on-line tutorial, the Access System offers something called a "View" of 1-2-3—a macro-driven demo that illustrates the basics, works through an example, or displays some unique release 2 features. The tutorial is now in book form and introduces all important aspects of the program, including macros. It does, however, stop short of data tables and multiple regression.

### ... And Throw Away the Key

With release 2 of 1-2-3 (as well as 1-2-3 *Report Writer*), Lotus has finally acknowledged the convenience of a hard disk. The copy protection on these new versions enables you to install the program entirely on a hard disk and start it without having a "key disk" in drive A:. Any of the three programs can be uninstalled from the hard disk, allowing installation on another hard disk.

Another nice touch at start-up: The meaningless 'Press any key to continue' message is gone; typing 123 from the DOS command line displays a logo while the program is loading and automatically brings up the spreadsheet grid.

### Four Corners of the Spreadsheet

One obvious change to 1-2-3 is the fourfold increase in worksheet size; a worksheet is still limited to 256 columns, but the maximum number of rows has jumped from 2048 to 8192. In addition, columns can now be 240 characters

wide instead of 72, although viewing columns wider than 72 characters can be awkward even for those with 132-column video display boards.

More important, release 2 includes two major enhancements governing how worksheets are stored and the type of memory in which they're stored. Worksheets are held in *sparse matrix* format, which doesn't waste memory on blank cells. In addition, 1-2-3 worksheets can now use up to 4MB of RAM via the Lotus/Intel/Microsoft Expanded Memory Specification (EMS). Both capabilities enable you to build and use massive spreadsheets.

With this added size, improving the design of spreadsheet models should be much easier. Because

would result in the dreaded 'Memory Full' message. Three factors combine to make release 2 a practical alternative for data management: the availability of the add-on 1-2-3 *Report Writer* (see the sidebar "First Annual Report") that makes sophisticated reports possible; the much improved string functions that let you use words in formulas; and the conquest of the 640K memory barrier, enabling 1-2-3 to store and manipulate a meaningful number of records in a data base.

Be forewarned, however, that code for the new version consumes an extra 80K (1A takes up about 93K, and release 2 uses approximately 172K). Thus, the net gain in the size of the work area may not be as great as it first appears.

*In addition to encouraging better organization, the increased size makes 1-2-3 release 2 much more useful for some data management tasks.*

the sparse matrix technique doesn't penalize the use of remote areas of the worksheet, it becomes practical to maintain separate and safe areas for assumptions, macros, lookup tables, and even notes or documentation for your models.

In addition to encouraging better organization, the increased work area size makes 1-2-3 release 2 much more useful for some data management tasks. Release 1A's data management facility was hampered by its RAM limitations; anything more than a few hundred records of even a simple data base

If your machine has only 256K of RAM, and a worksheet you created with release 1A is large and tightly constructed, you may not be able to use the model with release 2. Fortunately, most models are not designed with memory conservation in mind, so the vast majority will fit comfortably in the new version; how much extra working space you'll gain depends primarily on the shape and contents of the model.

*(continues on page 182)*



## Macro Magic

Release 2 adds 40 new macro command words to 1-2-3's vocabulary. Some of them duplicate release 1A's /X macros—all of which are still available, so your old macros will continue to work.

### Respond Promptly

Several of the new macro commands are interactive, creating prompts and storing the response in a given location in a specified form. For example, {GETLABEL "Enter your name: ",name}{calc} displays 'Enter your name:' on the command line as a prompt and copies the answer as a label into the cell called "name." As you might expect, {GETNUMBER} stores the response as a value in the specified location. {GET location} won't create a prompt on the command line, but it will store a single keystroke (a normal typewriter character or a special 1-2-3 key) in the specified cell location. Each of these convenient statements accomplishes what it would take release 1A two or three statements to do.

The {LOOK} statement in a macro determines whether a character has

been typed since the macro began and, if one has, stores it in a given location.

You can delay execution of a macro by using the {WAIT} statement and specifying an amount of time. You'll probably use the @TIME function or the @NOW + @TIME combination as an argument to the {WAIT} command. {MENUBRANCH} stops macro execution temporarily while you select a menu item stored in a particular cell; macro execution then continues at the cell just under the selected menu item. {MENUCALL} acts in a similar fashion but branches to a subroutine of the macro as a result of the menu selection.

### Keeping Data Under Control

In case you've gotten lost in the mechanics of creating elegant macros, several new macro commands let you actually manipulate data and control the contents of worksheet cells. {BLANK} acts like /Range Erase and is

slightly more convenient to use in a long macro. {LET} stores a number or a string (you can specify which) in a given cell, and {PUT} works like {LET} except that it stores the entry in a cell at a given position in a range. That is, you describe the target cell address by specifying a range name, then the column and row numbers as offsets from the upper left cell of the range.

{RECALC} recalculates a specified area of the worksheet row by row a given number of times or until a specified condition is met. {RECALCCOL} works in the same way except that it recalculates one column at a time. Both of these commands are especially convenient shortcuts when recalculating a small area of a large worksheet.

### File Finesse

As if to confirm that release 2 is a serious application development environment, nine new commands enable you to manipulate ASCII files from macros.

The {OPEN} statement opens a specified ASCII file so that data may be



read from it, written to it (if it's a new file) or modified (if it's an existing file). The {CLOSE} command closes the file used by the {OPEN} command. {FILESIZE} stores the size (in bytes) of the currently open file in a given cell. {GETPOS} records the current position of the file pointer for an open file into a given cell, and {SETPOS} can specify a new position for that file pointer.

{READ} reads a specified number of characters from an open file and stores them in a given cell. {READLN} performs the same task, but one line at a time. Conversely, {WRITE} copies specified characters into an open file, and {WRITELN} adds carriage-return and line-feed codes to a given string before copying them to the file.

### Resource Allocation

Eight new macro statements provide a new level of control over the computer's resources. The {BEEP} statement sounds any one of 1-2-3's four tones that you choose. {INDICATE} enables you to display a message up to five characters long in

the indicator box at the upper right of the screen. {PANELOFF} and {PANELON} freeze or restore the control panel during macro execution; {WINDOWSOFF} and {WINDOWSON} perform the same function for the rest of the screen. Macros run more quickly if 1-2-3 doesn't continuously rewrite the screen, and they are much less distracting for users of turnkey systems.

{BREAKOFF} and {BREAKON} disable and reenable the <Break> key during macro execution. While creating an invincible macro may sound attractive, it's rarely done.

### Flowing Freely

Ten of the new statements control macro program flow. {IF} executes the command that follows it if a specified condition is met; it works in a macro much like the @IF function works in normal spreadsheet operation. {BRANCH} simply continues macro operation at a specified cell; {DISPATCH} does the same thing except that

the specified cell can contain the address of yet another cell where the macro is to continue execution. {FOR} provides a FOR loop capability similar to that of BASIC or other high level languages; {FORBREAK} cancels the execution of a {FOR} loop.

{ONERROR} works like an {IF} statement with the condition specified as a 1-2-3 error. The most common use for {ONERROR} will surely be to display a user-defined error message. {DEFINE} is the mechanism by which variables and their types are declared in macros. The {DEFINE} statement specifies the cell address of a variable for a macro or macro subroutine as well as whether the variable will be a string or a value.

{QUIT} signals the end of a macro and returns control to the keyboard. {RESTART} cancels the execution of a subroutine and clears the subroutine stack (that is, ignores any other subroutines waiting in line to be executed). {RETURN} returns control from a subroutine to the main macro.



## Fill'er Up

To get some idea of the usefulness of the larger worksheet size, I loaded into release 2 a simple budget worksheet created with release 1A. The budget file eats up about 38K of RAM in release 1A and covers approximately 2200 cells. Loaded into release 2, the model takes up 37K (7K of conventional and 30K of expanded memory). In either version, recalculating the worksheet takes about 7½ seconds. Release 2 automatically uses an 8087 or 80287 math coprocessor if one is installed. My PC is so equipped, but with a file of this size and given its simple calculations, no great speed advantage was apparent. Those users with larger or more sophisticated calculations may discern a more decisive improvement.

The time it took to copy the budget model down to row 2600 made me hope it's never necessary

build a worksheet in excess of 100,000 cells (whatever your hardware configuration).

I then tried the same model copy trick with release 1A. The 'Memory Full' message stopped me at about 25,000 cells, which took about half as long to recalculate as the 57,000 cells in release 2. As a result of these quick and very dirty tests, I surmised that Lotus has indeed given us enough cells to get into some serious mischief.

## End of the .WKS

Lotus has made the upgrade to release 2 as smooth as possible. You won't have to relearn commands or change many habits. For the most part, the new menu selections are simply appended to the right end of the menu line.

Release 2 files use a new format and are identified by the extension .WK1. Release 1A .WKS files (and

You can use the Translate facility to convert a release 2 (.WK1) file to a release 1A (.WKS) file, but there are some important caveats. Because release 2 uses sparse matrix and expanded memory, the release 2 file may be too large for release 1A. Release 2 can create password-protected files that cannot be used in release 1A. Files using time-of-day or any of the other new macro or @function commands will not work accurately in 1A; some @functions will be converted to labels. International graphics characters will be converted to some reasonable alphanumeric equivalent (see the discussion under "Last LICS"). Macros that use cursor movements to control slash commands may not work with the new version. When you convert a release 2 file to a release 1A file, the Translate facility provides several screens of advice, including a list of @functions that will be converted to labels and a conversion table for international characters.

To prevent inconsistencies within files, the program handles some of the conversions automatically. For example, formulas that use @TODAY no longer work. Release 2's equivalent is the @NOW function that includes access to the time of day. However, if you retrieve a release 1A file that uses @TODAY formulas, 1-2-3 release 2 will automatically replace the @TODAY in those formulas with @NOW and retain the date format from the .WKS file. If you use the Translate utility to change the file back to a release 1A file, the @NOW formulas will be converted back to @TODAY.

## One potential compatibility problem with templates designed for release 1A is the way release 2 handles international and graphics characters.

to build a real model that expansive. The dummy model's 57,000 cells filled about half of my PC's 2MB of RAM and took a little more than 2 minutes to recalculate. Even with the worksheet expanded to about 100,000 cells, the model still would have operated properly. What's more, with another 2MB of RAM, I could theoretically have filled about 200,000 cells. Speed is relative, but have plenty of patience if you

*Symphony 1.1* files with an extension of .WR1) can be retrieved and read in directly. A Translate utility program is included to convert .WK1 files to and from a variety of file formats including *dBASE II*, *dBASE III*, *Symphony 1.0* or *1.1*, *DIF*, and *Jazz*. *VisiCalc* files can be converted to .WK1, but not vice versa.



### ■ Last LICS

One potential compatibility problem with templates designed for release 1A is the way release 2 handles international and graphics characters. Using the Lotus International Character Set (LICS), 1-2-3 release 2 offers access to letters with umlauts, tildes, and circumflexes, as well as grave and acute accents. Lotus describes LICS as an extension of the ASCII character set. That sounds fine, but it differs from the PC's character set (which is also an extension of the ASCII set). The problem is that many commercial 1-2-3 template publishers have been clever enough to display the PC's graphics characters on 1-2-3 worksheets. Further, some utility programs have given users the ability to use those graphics characters in their templates as well. Loading one such template in release 2 will fill your screen with umlauts and tildes—not, I can assure you, terribly pleasing to the eye.

### ■ A New Slash on Life

Release 2 introduces a few new commands, but equally important are its refinements to existing commands. The discussion of these additions and enhancements follows the sequence of the menus (see also the sidebars "Macro Magic" and "Fully Functional").

*/Worksheet Column Hide.* Making a point or analyzing results is often easier when the columns showing intermediate calculations are hidden. The */Worksheet Titles* or */Worksheet Windows* commands have provided only partial solutions. The */Worksheet Column Hide* command enables you to temporarily hide a column or range of columns and display or print only the relevant ones.

*/Worksheet Column Display* brings the hidden columns back into view.

In addition, the control panel at the top of the screen now displays the column width if it has been changed from the default or the width set globally and indicates the protection status of the current cell.

*/Worksheet Global Default Printer Interface.* In keeping with Lotus's modest support for local

International punctuation choices also provide options for currency, date, and time formats. Overseas business contacts will have an easier time understanding your numbers if you use a simple macro (*/WGDOIPBQQ*) to replace periods with commas before printing a worksheet; for domestic use, a similar macro (*/WGDOIPAQQ*) will switch the punctuation back. The Clock choices govern the format of the date and time display in

■ *Release 2 introduces a few new commands, but equally important are its refinements to existing commands.*

area networks, release 2 adds four new network printer interface choices to release 1A's four local printer interface options.

*/Worksheet Global Default Printer Name.* The installation program allows multiple printer drivers to be included in a single .SET configuration file. The new Name option lets you select which installed printer driver to use for subsequent printing.

*/Worksheet Global Default Other.* This new command lets you specify international punctuation and clock display formats, as well as whether the 123.HLP file will be available. When storage is at a premium, as it is in floppy-disk-based systems, keeping the 114K help file handy is sometimes inconvenient. The */Worksheet Global Default Other Help Removable* command elicits a 1-2-3 prompt to insert the required disk if the program doesn't find the 123.HLP file.

the lower left corner of the screen. One of the Clock choices turns off the clock display.

*/Worksheet Global Zero.* The Copy command is a great time-saver in any spreadsheet. Instead of repeatedly (and painstakingly) entering the same formula into a range of cells, you simply copy it. Unfortunately, the range very often includes some cells that won't logically be needed or that will have a useless value of 0. The */Worksheet Global Zero Yes* command suppresses the display of unwanted zeros; selecting */Worksheet Global Zero No* displays zeros again. The manual recommends using cell protection on ranges having suppressed zeros to avoid inadvertently writing over the formulas in those cells.

*/Worksheet Status.* When using release 2, you may want to be apprised of several conditions. The */Worksheet Status* command now

*(continues on page 186)*



## Fully @Functional

Lotus has built up the built-in functions that are the backbone of all calculations. Release 2 adds 39 new @functions, most of which are also included in *Symphony*.

The new version provides access to time arithmetic and functions as well as to existing date functions. @TIME(hr,min,sec) returns the serial number of the specified time—that is, the decimal fraction of a day since midnight; @NOW returns the serial number for the current date and time—the number of days since midnight, January 1, 1900; @HOUR (time number) extracts the hour number from the time serial number; and @MINUTE (time number) and @SECOND (time number) perform the same tasks for minute and second numbers. All the time functions can be formatted to use standard (12-hour) or international (24-hour) notation, with or without displaying seconds. Unfortunately, still

missing is access to day-of-the-week functions, which are useful for project management or monitoring tasks.

### Interesting Financial Functions

The @CTERM function can determine the number of compounding periods required for a present value to increase to a future value earning a fixed periodic interest rate. @TERM returns the number of payment periods required for an investment, given the payment amount, periodic interest rate, and the investment's future value. @RATE uses the present value, the future value, and the number of compounding periods to calculate the periodic interest rate required for the present value to grow to the future value.

@DDB calculates the double-declining balance depreciation allowance for an asset of specified cost, salvage value, useful life, and period. @SYD uses the same parameters to determine the sum-of-the-years'-digits depreciation allowance. @SLN

calculates the straight-line depreciation for one period, given the values of the other parameters.

### Stringing Along

Certainly among the most universally useful additions are release 2's string manipulation functions. Handling of text strings has always been one of 1-2-3's weaknesses and a great attraction of *Symphony*'s spreadsheet module. You can now specify the string to be acted upon by typing out the text or, more likely, by referring to a cell or range that contains the string.

@ISNUMBER and @ISSTRING return a value of 1 if the condition is true (that is, if the cell specified as an argument contains a number or a string); if false, a 0 is returned. The @EXACT(string1,string2) function will likewise return a 1 or a 0 depending on whether the given strings match precisely, including case.

@CHAR(x) returns the character that corresponds to the ASCII/LICS code x. Similarly, the value of @CODE(string) is the ASCII/LICS code



for the first character in the specified text string.

**@FIND** determines the position of the first character of a given search string within a specified string. In other words, the value of **@FIND**("this", "Use this word in another string function", 0) would be 4. The formula translates to "find the position of the search string within the specified target string starting at the character number 0 [the first character]." The **@FIND** function is case sensitive and works with several other **@**functions.

**@LEFT** extracts characters from the beginning of a specified string, **@RIGHT** extracts them from the end of the string, and **@MID** returns characters from the middle when you specify where in the string to start extracting and how long the extracted string should be. **@LENGTH** counts the characters in a given string and returns the result. **@LOWER**, **@UPPER**, and **@PROPER** change the case of the specified

string; **@PROPER** indicates a word with the first letter capitalized.

The **@FIND** function will normally be used to support other string functions, finding the beginning of a word to be extracted from a long string (with **@MID**) or to be capitalized (with **@UPPER**). The way this simple example is stated, you could count the position faster manually than you could write the formula, but the benefit of this function is enhanced when you use a range name to specify the target string.

**@N** returns the numeric value of the upper left cell of a specified range; **@S** similarly returns a string. **@STRING** converts a specified numeric value to a string, while **@VALUE** does the reverse, turning a string into a numeric value. **@REPEAT** duplicates a given string any number of times, regardless of column width. (Its function is similar to that of a repeating label—one that starts with a backslash—but repeating labels are limited by the column width.) **@TRIM**

removes excess space characters (those preceding and following the nonspace characters) from a specified string; it also converts multiple space characters within a string to a single space.

String handling is not limited to the **@STRING** functions. On the contrary, one of the handiest new features is the ability to use strings in a lookup table or an **@IF** formula. For example, in release 2, a workaholic might write a formula like: **@IF(@NOW <= @TIME(18,0,0), "STOP WORKING NOW!! GO HOME!! RELAX A LITTLE!!")** which will display a message at 6:00 p.m. to remind him or her that there is a reality out there beyond cell IV8192. You could, of course, use any relationship as the test and have the formula display a different message if the condition is not met.



displays a full screen of data about available conventional or expanded memory, existence of a math coprocessor, recalculation method and order, addresses of any circular references, cell format, label prefix, cell protection, and current global column width. The command also lets you know whether the zero suppression feature is active.

Trying to find the source of that unsettling CIRC indicator in a large and complex model can be like searching for the proverbial needle in the haystack. The /Worksheet Status command offers some relief by listing the last cell you created that contains a circular reference—a formula that refers to the cell itself, a sort of mathematical Mobius strip. If that cell is the end of a complex chain of circular references, 1-2-3 displays the next problem cell address as you clear up the last, but only one cell address at a time.

**/Worksheet Page.** Release 2 can control page breaks. Fitting a lengthy spreadsheet model on 8½-by 11-inch pages can be an exer-

cise in frustration. The usual procedure for getting page breaks right is trial and error—tearing up lots of paper and tearing out at least a little hair. Invoking the /Worksheet Page command inserts a new page-break indicator (:) in column A of the current row and moves the rest of the worksheet down one row. When the work-

**/Range Format Hidden.** While the /Worksheet Column Hide command makes a column disappear, the /Range Format Hidden command blanks the display of a cell or range. When you pass the cursor over cells hidden by this Range command, the contents of each cell are displayed in the control panel at the top of the screen.

*You can embed printer control codes, such as those that invoke condensed or enlarged print on a dot matrix printer, in spreadsheet cells.*

sheet is printed, the page break forces the printer to move to the next page. Alternatively, you can type :: directly into a column A cell. You can also embed printer control codes, such as those that invoke condensed or enlarged print on a dot matrix printer, in spreadsheet cells. Thus, you can designate special printing effects for specific sections of the worksheet.

Hiding cell contents might be especially useful for intermediate calculations (which may be distracting) or for sensitive assumption data.

**/Range Value.** More like an adaptation of the Copy command, /Range Value enables you to copy a source range containing formulas to a destination range that will contain only the current values of the formulas. If you used the Copy command, the new range would contain formulas adjusted for its new relative position.

**Screen 1: The /Range Name Table command conveniently displays an alphabetized list of range names with addresses directly on the worksheet.**

Ranges	Addresses
CRITERIA	A16..018
INPUT	A20..N50
MACROS	A0002
OUTPUT1	A61..N91
RANGETABLE	I03..I052



That is, if the formula in cell A3 that referred to A1 were copied to cell C3, the formula would be adjusted to refer to C1. Moreover, with the /Range Value command, the destination range remains unaffected by changes in the values of source range cells. The /Range Value command might be useful if you wanted to save the results of several iterations of a model. You could copy each version of the data range to a different area of the worksheet, where the versions could later be compared.

**/Range Transpose.** Somewhat less useful than /Range Value, the /Range Transpose command also copies a range of cells. This command's trick is to rearrange columns in the source range to be rows in the destination range. In other words, in column A of the source range, A2 would become B1 in the destination, A3 would become C1, and so on. Because this is a copy operation, the source range remains intact.

The manual warns that formulas using relative cell addresses

won't be adjusted properly, however, and I can confirm the veracity of the warning; the result of such efforts will be gibberish in the destination range. The value of transposing ranges would thus seem limited to situations requiring a different orientation of previously entered raw data or of values (created by the new /Range Value command) for a report.

**/Range Name Table.** To get a list of range names in release 1A, you'd have to use the /Range Name Create command and cycle the pointer through the horizontal alphabetical list that appears in the control panel. With the /Range Name Table command, release 2 offers a better way: You can use that command to create an alphabetized list of range names in one column with addresses of the upper left and lower right cells of the range displayed in an adjacent column (see Screen 1). I suspect it will become commonplace to set

aside an area of the worksheet for the range name table and write a simple macro to move the cursor to the first cell of the table area, thus providing a handy guide to the previously defined ranges.

**/File Save.** You can assign a password to protect a worksheet as you are saving it. After specifying the file name, you simply leave a space and press P; 1-2-3 then prompts you for a password. Password protection occurs at the file level only. You cannot protect a record or a range with a password.

**Moe, Larry, Curly, and Business Graphics.** Like *Symphony*, release 2 offers exploded pie charts. Pie charts usually have only one data range, called A. You create a B range to contain your choices for the shading pattern or color (a number from 1 to 7) and add 100 to the shading factor that corresponds to the wedge you want exploded (see Screen 2). A more elegant method would be to specify the shading and explosion choices

X Range Labels	A Range Values	B Range Shading
Status	35	1
Power	15	100
Size	26	2

22-Oct-85 05:30 PM

Screen 2: To specify the exploded wedge of a pie chart, you add 100 to its shading factor (usually 1 to 7).



from the graph menu or graph options submenu, but the new graph type adds flexibility nonetheless (see Screen 3).

*/Data Query Find.* In an improvement on the release 1A command, */Data Query Find* now enables you to edit any field in a record as it's found. Simply press the left or right cursor control keys to point to the appropriate field and then press <F2> (the Edit key) to edit the field. You'll now be able to update all records that meet a specified criteria.

*/Data Parse.* When you import an ASCII file into a 1-2-3 spreadsheet, the data can be treated either as numbers, in which case any text will be converted to zeros, or as text, whereby each line of the file becomes a label. The */Data Parse* command converts an imported column of labels into several columns of labels or numbers.

You can specify in a format line just how each of the columns should look and whether the data in them should be labels, values, dates, time, or ignored.

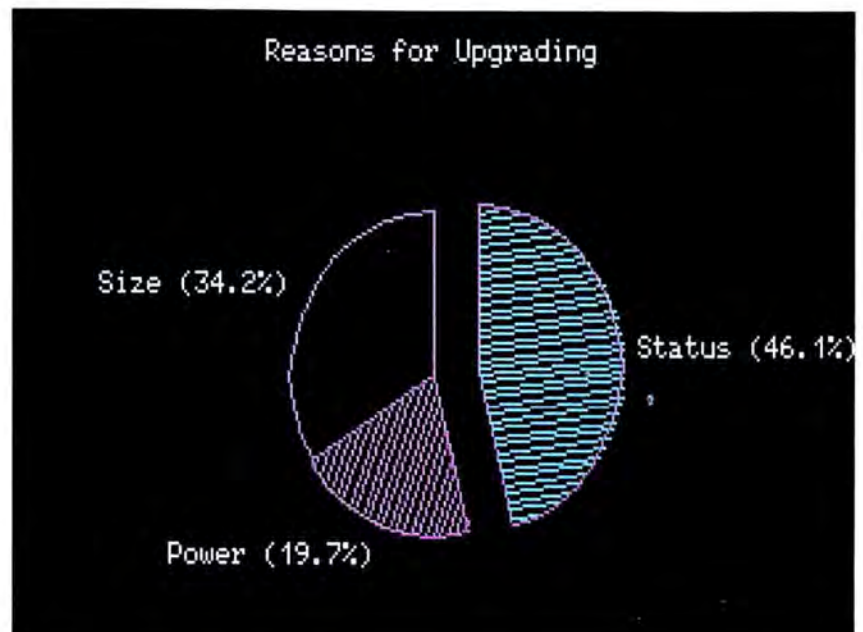
Release 2 also provides the capability to perform multiple regression analysis and to solve simultaneous equations. And it makes matrix mathematics available (inversion and multiplication) to effect the regression analysis.

*/System.* From the main menu, the System command provides access to DOS without leaving 1-2-3. The command */S* interrupts 1-2-3 and causes it to load a secondary command processor (another copy of COMMAND.COM). From the system prompt, you can perform any DOS function, including running another program. 1-2-3 remains resident, and the secondary

command processor also takes up some room, so you'll have about 175K less RAM to work with. Attempting to load a RAM-resident utility from the secondary command processor can yield unpredictable results, but that is a function of either the utility or DOS, not 1-2-3. When you're ready to go back to 1-2-3, typing **EXIT** will display the 1-2-3 worksheet just as you left it. Incidentally, file specifications can now include full path names. Release 1A required a two step process: You had to change the file directory before you could specify a file in a remote directory.

Don't be tempted to include the */System* command in a macro, however. Once the command processor is loaded, 1-2-3 macros are out of their league—the contents of the typeahead buffer are erased. Repeating the */System* command returns you to the disk and directory last used by the secondary command processor.

Screen 3: The exploded pie chart adds an extra dimension to 1-2-3 graphics but does nothing to improve display quality.





Release 2 is clearly an upgrade that serves 1-2-3's installed user base well. It would seem unfair to

## ■ To Upgrade or Not to Upgrade

For my part, I've long been awaiting string functions in 1-2-3 and the capability of the /Range Value command. I won't be going back. ☹

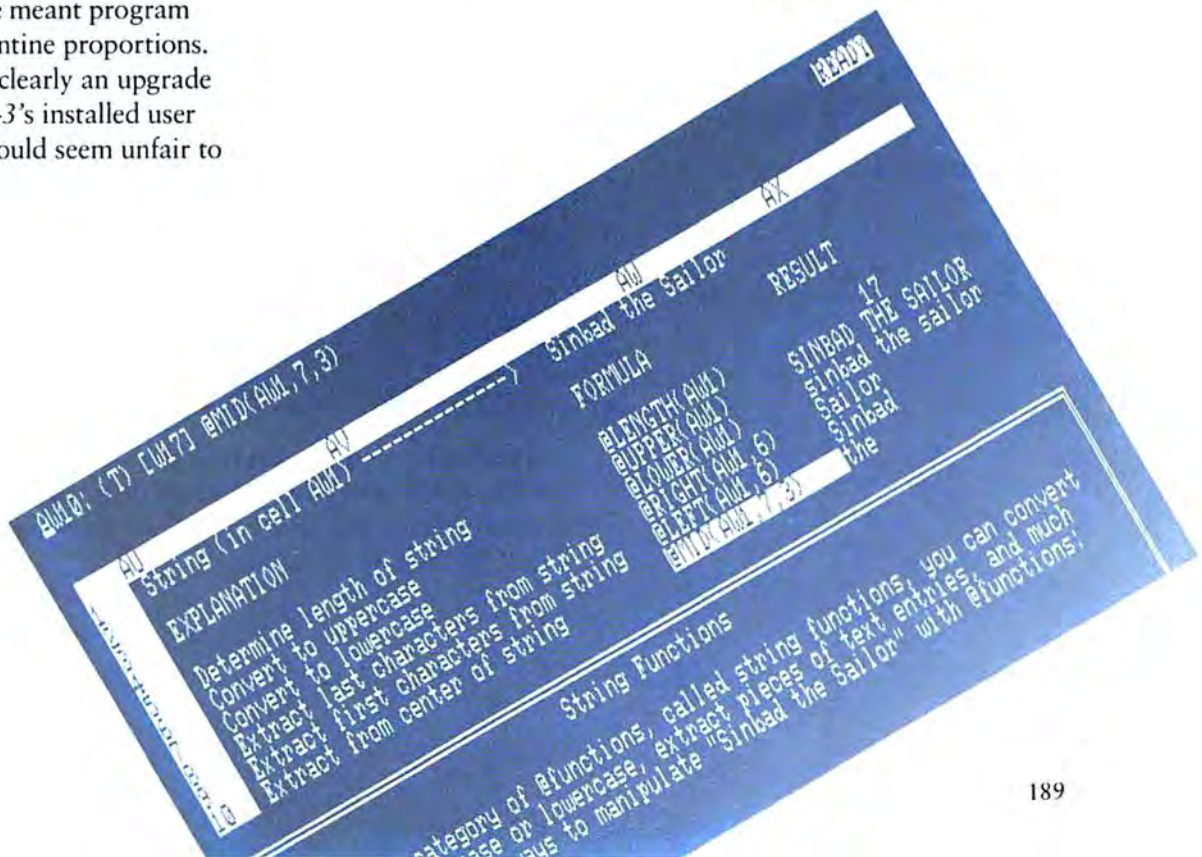
*Harry Miller is the Editor of PC World.*

Lotus Development Corp.  
55 Cambridge Pkwy.  
Cambridge, MA 02142  
800/343-5414, 617/253-9150  
Massachusetts  
List price: \$495, upgrade kit  
from release 1A \$150  
Requirements: 256K, one disk  
drive

*Lotus Development Corp.*  
List price: \$150

*Requirements: 256K, two disk drives, DOS 2.00 or later version*

Copy protected

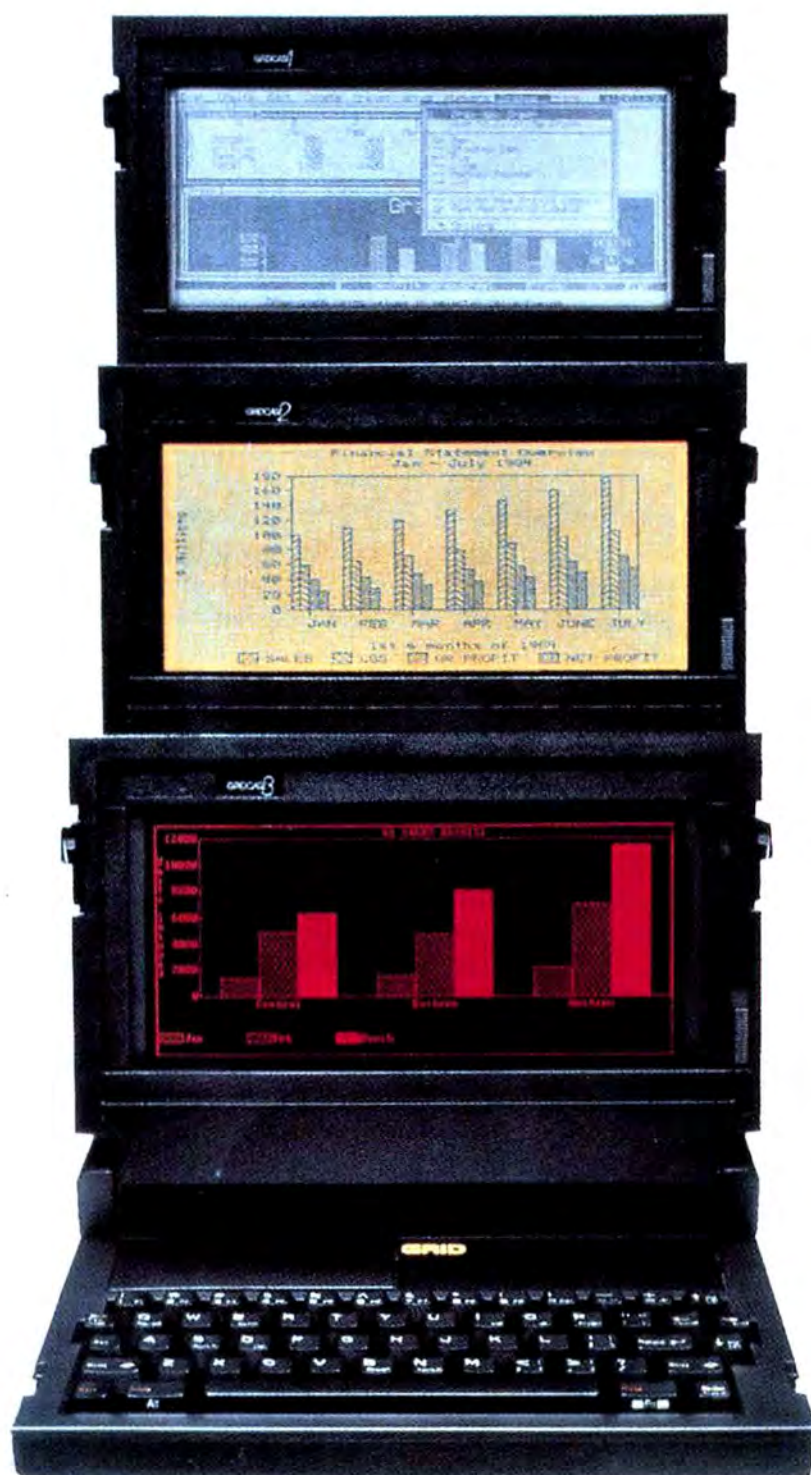




# Business-Class Traveler


The new GridCase portable computer combines ample RAM and ROM, a readable screen, and a built-in disk drive in a handsome package. Though pricey, this PC compatible could be ideal for anyone who spends more time on the road than at a desk.

*Danny Goodman*



The GridCase spectrum runs from plasma red to LCD yellow and gray. Whatever their color and technological origin, all GridCase displays are a full 25 lines by 80 columns.



 When its display panel is closed, the machine has the sleek, black, executive look of a Cadillac stretch limousine. When you open the panel and insert a 3½-inch disk, the feel and sound are solid, like a Mercedes-Benz. Its interior, as customizable as a Toyota van, can be equipped as sparsely or as lavishly as your budget allows. Yet when you use familiar software, the machine becomes a reliable workhorse, like a Ford Country Squire station wagon. It is equally practical for office and portable use, just as a Volvo is for taking the kids to school or arriving for a night at the opera. Of course, when you add up the costs of all those vehicles, you may be able to buy a Rolls Royce—or, on a comparable scale, a GridCase portable computer.

### Compass Directions

Grid Systems is perhaps best known for its state-of-the-art portable computer, the Compass, which was introduced in 1982. With its electroluminescent flat panel display and bubble memory, the Compass was an elegant attempt to create a feature-laden small computer. But that system relied heavily on communications through departmental file servers and on Grid's house mini, an IBM Series/1 called Grid Central, for its software. The idea was that if you were on the road and needed a particular Grid program, you could call Grid Central and download the software into your Compass computer's nonvolatile memory. You could also use Grid

Central to file away documents in a password-protected section of its mass storage. When you needed the files, you would simply connect with Grid Central and retrieve them.

That dreamlike scenario has been realized, and Compass computers continue to appeal to segments of business and the military that need ruggedness, nonvolatility, and portability. I've even seen news clips of a Grid Compass floating around the cabin of the space shuttle.

More recently, Grid has added PC compatibility to its laptop workstations. The company has developed a new line of PC-compatible computers, the GridCases, that are powered by internal battery packs, have workable solutions to the shortcomings of flat panel display, and can be configured to play a credible dual role: portable and full-fledged desktop PC.

### Bare-Bones Grid

Because Grid has no retail dealers (sales are handled directly by the company and a limited number of vertical market dealers), the factory configures your machine for you when you purchase one. Options can be added later only by Grid, so you're probably better off buying a machine decked out with all the goodies. In fact, all GridCases are assembled and tested in the full configuration; options you don't want are removed prior to shipping.

The standard model, GridCase 1, has an 80C86 microprocessor (a low-power CMOS version of the Intel 8086), 128K of CMOS RAM (expandable to 512K), and one built-in 720K double-sided 3½-inch microfloppy disk drive, plus

one RS-232C port and one parallel printer port. You also get the AC power transformer; the rechargeable battery pack is a \$60 option. The motherboard has a socket for an 8087 coprocessor, and the computer contains four ROM sockets that hold up to 512K of software.

Even though the Grid strikes a very low profile, the designers have put as many connectors on the rear panel as you'll find on some well-equipped desktop PCs. In addition to the serial and parallel ports, the unit includes connectors for AC power, a PC-compatible keyboard or numeric keypad, an RGB color monitor (the connector and associated circuitry are a \$350 option), a telephone line for the optional internal 300/1200-bps modem, and external Grid disk drives. These include a 5¼-inch floppy disk drive, 3½-inch microfloppy disk drive, and a 10MB hard disk. (Figure 1 shows the computer's rear panel connectors.)

Grid's peripherals feature a unique modular design. While some computers' daisy-chained peripherals (Hewlett-Packard's, for example) cable to one another like boxcars, Grid created a clever swivel connector for the top and bottom of each peripheral's box so you can stack the devices and connect them directly. You use a cable only to attach the first peripheral to the computer (see Figure 2). If you want to run two or more peripherals, you also need a box called a base station, which supplies power for the extra components and has a 4-hour fast charger slot for GridCase battery packs.



## Screens: No Good, Much Better, Best

There's little question that the primary shortcoming of laptop portable computers has been the eye-straining liquid crystal display (LCD) used in place of a video monitor. Trying to read dark gray characters on a light gray background just doesn't make for a pleasant computing experience, despite the Grid screens' 640-by-200 resolution and full 25 lines

Unlike the two LCDs, which reflect surrounding light, the plasma display emits light, so you can see it even in a completely dark room. (Conversely, in direct sunlight the display can wash out, just like a video monitor; LCDs fare reasonably well in such conditions.) In return for added readability, however, you pay a price in battery life and dollars. Battery life drops to about one hour per charge, because plasma display technology in

GridCase's are handy sealed packs that fit through an opening on the rear panel. If one battery pack dries up, you can easily remove it and slide in a fresh one. (Backpackers take note: Each battery pack weighs about 20 ounces.)

The two optional carrying cases (\$120 and \$150) have room for an extra pack or two, and the AC power pack can also be toted along. Battery packs charge whenever the unit is connected to an AC power outlet, whether the machine is on or off; recharging takes 12 hours. An optional self-contained battery charger is also available.

*There's little question that the primary shortcoming of laptop portable computers has been the eye-straining liquid crystal display used in place of a video monitor.*

of 80-column text. The GridCase 1 has the traditional hard-to-read LCD, but the company offers two other models with more desirable displays.

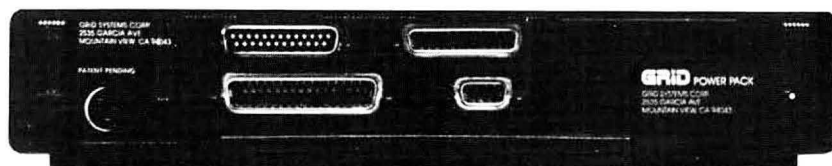
The GridCase 2 sports a yellow LCD that produces a much higher contrast between the characters and background than the gray LCD. A wider viewing angle enables several people to view the screen at once, finally giving a laptop machine legitimacy as a presentation tool. This display consumes as little power as its gray counterpart, allowing three to four hours of use on a single charge. The yellow LCD will set you back an extra \$175.

But the hands-down winner in readability is the red-on-black plasma display of the GridCase 3.

general is power hungry—although to my knowledge, this is the first time this kind of display has been used successfully in a commercial, battery-operated product. Also, you must pay an extra \$1300 for the privilege of being able to read the display.

## PC Compatibility

Many computer manufacturers are achieving true PC compatibility by licensing their ROM BIOS from Phoenix Software Associates. Grid has joined Kaypro, Tandy, Xerox, and others in this approach, creating a GridCase that is about as operationally faithful to the PC as you can get. As expected, the machine passes the requisite compatibility tests



## The Juice

Although battery life is relatively short with the plasma screen—one hour may suffice for a presentation to a client but not for a transcontinental flight—the battery situation is admirably managed. Unlike the rechargeable batteries on some portables, the

and also runs the new versions of *Symphony* and *Framework*. Displays of graphics are somewhat distorted, however, because the GridCase's width-to-height ratio exceeds that of a video monitor.



The GridCase's 3½-inch disk drive might pose some media incompatibility problems, but system options provide ready solutions. The most obvious is to add Grid's external 5¼-inch floppy disk drive, which connects to the GridCase's rear panel via cable. You can load DOS and any compatible program directly from the external drive.

### ■ The PC-to-Grid Connection

When you buy DOS for the GridCase (\$150 on a 3½-inch floppy disk, \$300 for a ROM version), you also get a 5¼-inch disk containing device driver software that turns a PC or compatible into a slave machine for the GridCase. By using a serial cable to connect the two computers, you can rely on standard DOS commands, executed from the portable, to access any of the desktop machine's disk drives. Thus, copying document files from a 5¼-inch disk on a PC is as simple as performing a DOS COPY command between drives. Data transfers aren't as

rapid as with a built-in disk drive, but speed is certainly adequate. Non-copy-protected software can be converted to 3½-inch disks to run on your GridCase (although it's always prudent to check software licensing agreements about the legalities involved). You won't, however, be able to adapt copy-protected software to the 3½-inch disks.

Grid offers an assortment of popular programs on 3½-inch disks, and even some as plug-in ROM cartridges. The disk software includes *1-2-3*, *Symphony*, *Framework*, *SuperCalc* (versions 1, 2, and 3), *Multiplan*, *TK!Solver*, *MultiMate*, *WordStar Professional* and *WordStar 2000*, *WordPerfect*, *Microsoft Word*, *Volkswriter Deluxe*, *dBASE II*, *dBASE III*, *Condor*, *Crosstalk*, *SideKick*, *ProKey*, *DR Draw*, *DR Graph*, most *pfs:* titles, *MBA*, accounting software from Peachtree and Chang Labs, and Microsoft's *Flight Simulator*. ROM software is limited but includes *DOS*, *dBASE II*, *Multiplan*,

and *Crosstalk*; Grid will also install and test ROM software for you.

Although the GridCase portable will use DOS software primarily, Grid's proprietary operating system, Grid-OS, and application programs are worth investigating if you're not tied to DOS compatibility. By and large, the applications aren't for "power users" and run rather slowly, but they prove to be capable tools integrated into a simple and logical environment.

At the heart of Grid-OS is a screen called a File Form. With its help, you open applications and documents merely by moving an on-screen pointer with the cursor keys and pressing <Return> or <Code>-<Return>. The <Code> key plays a prominent role in Grid-OS (much like the <Ctrl> key in DOS); two are provided, one on each side of the <Space> bar. Commands within all applications are largely identical, which makes learning additional programs relatively easy.

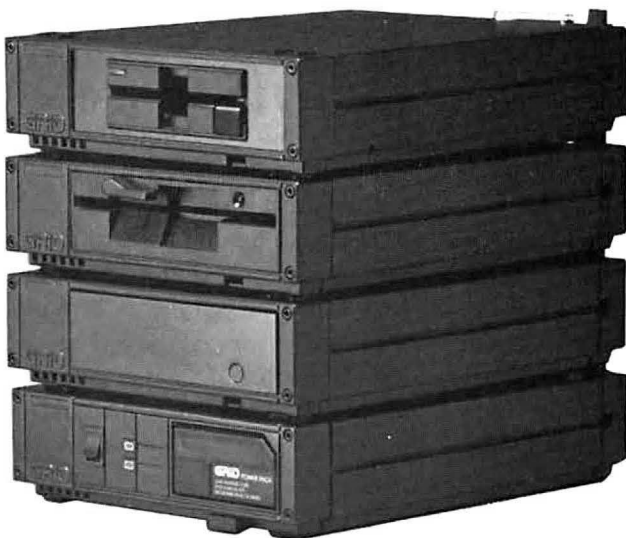


Figure 1 (far left): The rear panel of the GridCase portable, showing the variety of connectors provided with the machine. Figure 2 (immediate left): GridCase peripherals stacked together, using swivel connectors provided on the top and bottom of each.



## On the Road With GridCase

In road-testing all three models over the course of several weeks, I found the 12-pound machine to be almost everything I could want in a portable. For indoor use, the plasma screen was first-rate, while the yellow LCD would be my choice if most of my field computing were done literally in the field or in bright natural light. Several practical considerations are worth noting.

the <Alt> key instead of the <Ctrl> key. To compound the confusion, the <Esc> key is located where the <Ctrl> key sits on the PC keyboard. For a machine designated as PC compatible, the keyboard is, in short, a mess.

The GridCase keyboard has only 57 keys—clearly not enough. Operations for which the PC has dedicated keys, such as the 10 function keys, <Ins>, <Del>, and <PgDn>, are all two-key se-

to 20 percent. Even at this relatively heavy rate of disk use, the machine churned on for 3¼ hours before flagging. That kind of life span is acceptable, given today's battery technology.

To help conserve battery power, the GridCase serial port and modem are usually turned off. In early designs, Grid reportedly tried a CMOS serial chip, but found it incompatible with the IBM Asynchronous Adapter, so the company went the conventional high power NMOS route. The serial port and modem can be turned on by a DOS MODE command.

*As any traveling portable computer owner will tell you, most hotel phones are 'hard wired' to the wall, and there are no modular phone jacks to connect a modem.*

First and foremost is the built-in keyboard. The keyboard feel is wonderful, with superb tactile feedback, and it is exceptionally quiet. But the key layout leaves much to be desired. In a nod to economy, Grid simply pressed the Compass keyboard into service on its new machines. Two unfortunate misplacements are the apostrophe/quotation key and the <Ctrl> key. The former is inexplicably placed next to the letter P rather than beside the semicolon/colon key. The <Return> key is located where I expected to find the apostrophe, which proved disconcerting at times. The <Ctrl> key is positioned where the <Alt> key is on the PC keyboard. To visualize how awkward this is, imagine using *WordStar* on a PC with

quences. Other manufacturers, including Kaypro, have managed to cram additional keys on their laptops, so it can be done.

You can plug in a PC-compatible keyboard to compensate for these deficiencies, but that solution works only while you're at the office—unless you choose to travel with a Key Tronic keyboard as well. Otherwise, touch typists will have problems on the road.

For the LCDs, battery life is admirable, considering that the packs have to power up to 512K of CMOS RAM. On those units, the red low-power indicator came on after only about an hour's use—far sooner than I expected. I later learned that these two units' indicators had been set unusually high at the factory, making them overly sensitive. Using one of those same units, I ran Grid's battery test program and set the disk access factor

## Modem Trouble

The GridCase modem operates at the currently essential 1200 bps and is Hayes compatible, but I initially encountered one deviation. The modem's default setting returns result codes in their short format, meaning that the modem sends 1-digit values back to the communications software to indicate a connection, no carrier, or other conditions. The communications software I was using, however, expected long result codes—full words, such as CONNECT—which are the defaults on Hayes modems. A quick trip to the manual—and helpful experience with such matters—indicated that I had to change the result code format with the DOS MODE command each time I turned the modem on. (I eventually placed these commands in a batch file that automatically set the modem before starting the communications software.)



This is the sort of problem that a communications novice would have trouble solving without help.

The built-in direct-connect modem proved unusable when I was staying in a hotel. As any roving owner of a portable computer will tell you, most hotel phones are "hard wired" to the wall, and there are no modular phone jacks to connect a modem.

### Small Nuisances

While the keyboard and remarkably quiet built-in disk drive might not disturb your neighbors as you take notes in an auditorium, your legs will soon complain for lack of blood if you perch the computer on your lap. The machine weighs one-third as much as a Compaq Portable, but a 12-pound load gets mighty heavy after a time.

The GridCase's documentation is a real puzzle. Here you have a computer that costs anywhere from \$3000 to \$8000, yet the

One last nuisance is that all those connectors on the back of the GridCase can become a nightmare should you want to run out the door with the computer under your arm. You'll have as many as seven cables to disconnect and reconnect. If you do things the right way—screwing down the wide, D-shape connectors—it's a major project. A desktop docking module of some kind would be a welcome addition to Grid's accessories.

### Sticker Shock

All along, I've alluded to the GridCase's high price tag. Here's how some configurations check in at the cash register: A yellow LCD screen GridCase 2 with 256K of RAM, internal disk drive, modem, and battery pack costs \$4605, plus the cost of the operating system and application software. A plasma display GridCase 3 with 512K, internal disk drive, modem, 8087 coprocessor, battery pack,

According to Grid, GridCases have been acquired in quantity by several Fortune 500 companies for their field staffs. Primary applications concern sales and marketing in the insurance, petroleum, automotive, and pharmaceuticals industries. The list of installations also includes some companies whose top executives use GridCase machines. Who knows? Perhaps one day soon the GridCase will replace the company-owned BMW as an executive status symbol—even if it's priced like a Toyota Tercel. ●

*Danny Goodman is a Contributing Editor for PC World and the author of How To Buy an IBM PC or Compatible Computer (PC World Books/Simon & Schuster, New York, 1984).*

*The keyboard's feel is wonderful, with superb tactile feedback, and it is admirably quiet. But the key layout leaves much to be desired.*

owner's manual is reproduced from typewritten masters, like a public domain software product. The DOS manual, although in a stunning binder, is likewise typewritten. Only the Grid-OS manual is typeset and printed in two colors. The owner's manual is adequate for computer neophytes (except for the modem section, as noted) but lacks technical details that more experienced computer users might appreciate.

RGB monitor port, and external 5¼-inch disk drive comes to \$7925.

Obviously the GridCase is not a mass-market item. In fact, most of Grid's customers are businesses that buy dozens of GridCases at a shot. For those kinds of orders, quantity discounts of up to 15 percent are available.

GridCase  
Grid Systems Corp.  
2535 Garcia Ave.  
Mountain View, CA 94043  
800/222-4743


List price: GridCase 1 (gray LCD) \$2975, GridCase 2 (yellow LCD) \$3150, GridCase 3 (plasma) \$4350, 128K add-on RAM \$600, 384K add-on RAM \$1200, rechargeable battery pack \$60, internal 300/1200-bps modem \$795, internal RGB color video port \$350, 8087 math coprocessor \$195, base station \$450



# Watson, It's Elementary

For those who need more than just an answering machine, Watson builds a modem, voice mail, and on-line scheduling into one plug-in board.

*Sanjiva Nath*

 I'm not the kind of guy who normally likes answering machines, but my itinerant lifestyle forced me into getting one. I soon discovered, however, that I wasn't the only one with reservations about talking to a machine. My most frequent message was a click and a dial tone.

To start some real communication going—which is the whole idea, after all—I began making recordings for specific people, like, “If this is Joanie, I’ll be home by 7. If you can’t make it, say so after the beep.” That worked okay,

until I got an ominous message from Marlene: “So who’s Joanie, jerk?”

Obviously, there had to be a better way. Ever on the cutting edge, I decided to try voice mail. A voice mail message is a canned audio telegram that travels the telephone lines. If this sounds like the old familiar answering machine, you’re not far off, except for one crucial difference: A voice mail system connected to a computer lets you send and receive *personalized* messages. In other words, the messages you record reach only the individuals you want them to reach.

Watson from Natural Micro-Systems is, among other things, the premier voice mail station. A 300/1200-bps Cermetek internal modem board that fits into your PC, Watson, with its attendant software, releases audio messages to callers with the appropriate access codes and organizes incoming voice mail according to time, date, and caller’s identity. You can even retrieve messages recorded by specific callers from a remote location.

Watson’s domain extends beyond the telephone to other areas of your desk top, notably the Rolodex and the desk calendar. An electronic card file stores up to 500 entries, and the on-line appointment scheduler includes an alarm system to remind you of special engagements. Watson also doubles as a dictaphone, letting you call in memos, letters, or inspirations for future transcription. Finally, Watson includes a copy of *PC-Talk III*, a popular telecommunications program.

Watson’s many features can help consultants, salespeople, investors, or virtually anyone with a telephone-intensive job manage communications more effectively. The board’s facility for remote access makes it especially useful for people who travel. Because messages consume a large amount of disk space, however, you’ll find a hard disk an indispensable prerequisite for Watson.

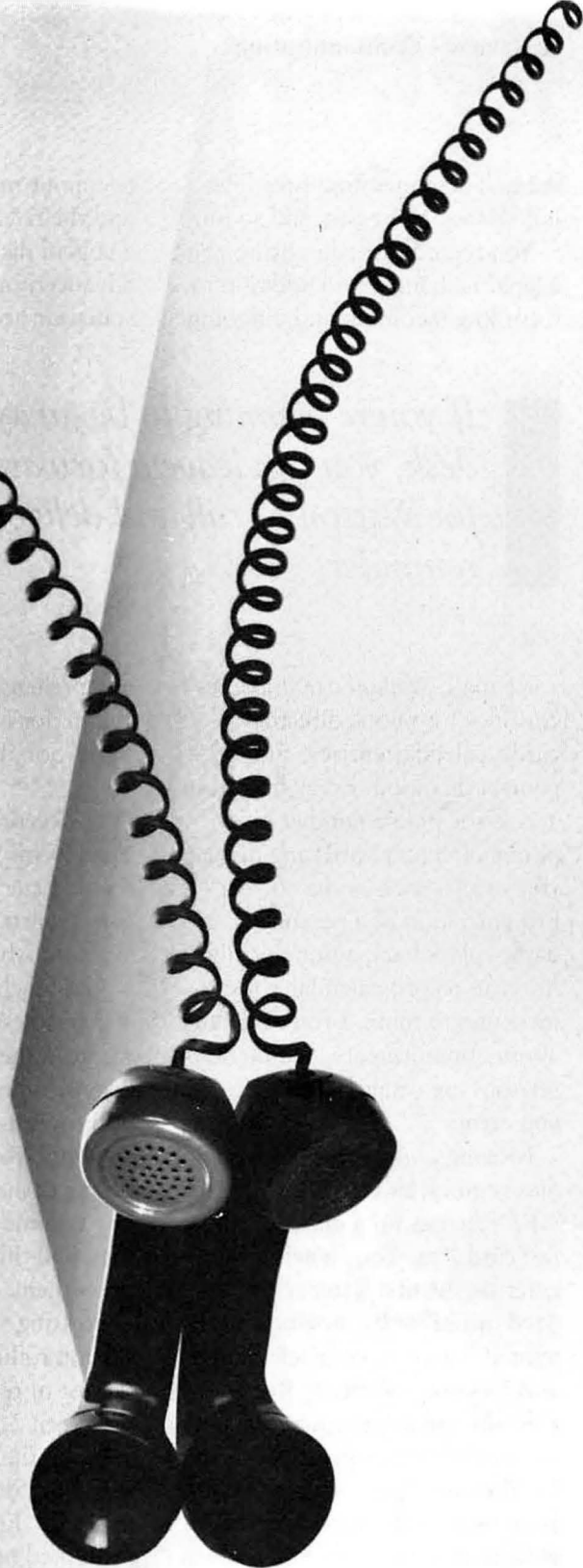


### ■ Flip 'n File

Watson's basic operational metaphor is a Rolodex. Reference data appears on screen in a graphic representation of an index card, and up to five overlapping cards may appear at one time. To bring the card you want to the top of the stack, you either flip through the whole file with the <PgUp> and <PgDn> keys or enter the name of a card and have Watson bring it up for you.

Watson maintains five separate card files: a phone book, outgoing messages, incoming messages, calendar entries, and dictation. Only one card file appears on screen at a time, but virtually all program commands work in any of them, and the cards have the same appearance from file to file.

As Screen 1 illustrates, each card holds four lines of text. The top line contains the most essential information—name, phone number, and assigned access code. Callers dial in their access codes with a touch-tone telephone to retrieve the voice mail you've left for





them. The remaining three lines hold notes, addresses, and so on.

You record messages using your telephone handset. In addition to recording incoming and outgoing

telephone management features, and the reference manual includes a cogent discussion of Watson's advanced capabilities. The installation section is particularly

the standard message, I pressed <F9> to play it back.

Any hope of a technetronic monotone evaporated immediately. Crystal clear and unmistakable, the voice on the receiver was mine.

Watson digitizes all voice messages and then records directly on disk, just like a tape recorder. You can select high-density mode, which saves disk space, or low-density mode, which improves audio quality. In low-density mode it was tough to differentiate my real voice from the recording.

As small consolation for my lost fantasy, I discovered that the program's supplemental disk includes a stock outgoing message in an impersonal male voice. This same narrator also supplies periodic vocal prompts and even on-line help if you request it. Rather than sounding high-tech, however, he just sounds bored.

### ■ Dialing In, Dialing Out

As soon as you load Watson's software and hook up your phone, the system is ready to receive calls. When a call comes in, Watson plays your generic message. If you've provided the caller with a special access code, he or she can interrupt this message by pressing the telephone's asterisk key. The caller may then punch in the 1- to 3-digit access code followed by the number symbol key (#) to hear any messages left expressly for him or her. If identified callers leave voice mail, Watson displays the person's name and the time and date of the call on the appropriate index card in the incoming messages file.

*If you're planning to be away from your desk, you can leave a forwarding number for Watson to call and deliver a recorded reminder.*

voice mail, Watson can make recordings for phone directory cards, calendar entries, and, of course, dictation. Every time you access the phone number on a phone directory card, any message you've left—such as the correct pronunciation of a person's name—plays back automatically. You can record calendar voice messages to remind you of details about appointments, and dictation sessions are cataloged by titles that you create.

Moving among the various card files is quick and easy. Pressing <F2> brings up a menu of the five card files: You switch files by entering the first letter of the desired option or by moving a highlighted cursor to your selection and pressing <Enter>. Because you add and delete cards and perform other basic operations with the function keys, Natural Micro-Systems provides a keyboard template to help you remember which key does what.

Watson's documentation is generally clear, although the manual's telecommunications section is a bit sketchy. A quick-start guide introduces you to the system's basic

comprehensive, making the procedure for installing Watson a foolproof affair.

### ■ Recording Speech With Watson

I felt a little stage fright when I began my first recording session with Watson. After all, those messages would reach my friends, clients, and business associates, not to mention the TV pollsters who rely heavily on my opinions of late night reruns. Romantic notions of a robotic voice answering the phone flashed in my mind. "This guy is some high-tech yuppie," they will think. That should impress them.

Pressing <Ctrl>-<F1> got my session rolling, supplying me with the list of recording options shown in Screen 2.

Using the cursor keys, I selected the 'New.Std.Out.Msg' option and pressed <Enter>. Watson then prompted me to pick up the phone. When I finished recording



When you press <F5> Watson automatically dials the number listed on the top card in your phone book. It calls until a connection is made, at which point you're prompted to pick up the phone. Outgoing calls are timed for your reference.

Watson also offers a time billing function that lawyers, consultants, and other professionals can use to log their time spent on billable calls. The billing feature provides fields for a user-defined account number and an assigned dollar value for outgoing calls. Time billing records are stored in Data Interchange Format (DIF) files for easy transfer to a spreadsheet.

### Scheduling On Line

Watson's personal calendar card file lets you track appointments by day and by hour. As shown in Screen 3, each appointment is logged on a separate card. Monthly and daily calendar page displays give you a visual reference for engagements. When you create an appointment card, a corresponding symbol appears on both calendar displays.

You can enter appointment times to the nearest ten minutes and set up recurring engagements on a daily, weekly, or monthly basis. If you wish, Watson can sound an audio alarm to remind you of special appointments. If you're planning to be away from your desk, you can leave a forwarding number for Watson to call and deliver a recorded reminder. Of course, it's also possible to use this feature to send

Taborchek, Bill	618-1456	Daily 8:30pm	10
Taborchek, Bill	997-0302	Daily 6:00pm	10
Salinger, Joan	778-3216		13
Rincon Systems	239-6187		201
Prescott Corp. 3500 Hwy. 17 Albuquerque, NM 870184	(989) 415-1650		163
Ed Meyer x319			
Fri 1-03-86 2:31pm Phone Book No spoken message for this card.			
Card file: Phonebook			

Screen 1: A typical card file display from Watson's phone book

No Outgoing Messages (use F7 to insert cards)			
Fri 1-03-86 2:32pm Out Messages			
Do?	New.Std.Out.Msg	Personal.Out.Msg	Listen.In.Msgs Add.to.Phone.Book Exit

Screen 2: Watson displays a menu of options for recording outgoing messages.

Wed 1-08-86 10:00am	M Meet with Rory Schafer
Tue 1-07-86 2:30pm	C Call Jane DuPont
Mon 1-06-86 4:30pm	R Submit new projections
Weekly Mon 9:15am	S Staff Meeting
Fri 1-03-86 3:00pm	A Meet with consultant at SC&B
bring Brougham printout	

Fri 1-03-86 2:53pm		Calendar	No spoken message for this card.	
--------------------	--	----------	----------------------------------	--

Fri 1-03-86		January 1986						
AM	1	Sun	Mon	Tue	Wed	Thu	Fri	Sat
7	2				01	02	03A	04
8	3 A	05	06sr	07c	08m	09	10	11
9	4	12	13s	14	15	16	17	18
10	5	19	20s	21	22	23	24	25
11	6	26	27s	28	29	30	31	
12	Ev							

Screen 3: Watson's appointment calendar uses the card system plus a calendar display.



voice mail automatically to other parties, but you'd better be sure who's going to get the call.

### Remote Control

Similar to a sophisticated telephone answering machine, Watson can be controlled via a remote touch-tone phone. Accessing remote functions requires that you enter your owner's ID code, which you establish during the installation procedure.

The documentation includes a pocket-size reference card that lists Watson's commands in their touch-tone incarnation. If you've forgotten your card, you can even access on-line help in verbal form (supplied by Watson's friendly homunculus narrator). Using the proffered commands, you can listen to your phone messages, record new outgoing messages, dictate a memo, check your phone directory for specific numbers, and add or access calendar dates and times. Watson will read the numbers or appointment times to you along with any recorded messages.

Watson's usefulness as a dictation machine is greatly enhanced by its remote capabilities. Via touch-tone phone you can fast forward, rewind, and cut and paste speech until you're satisfied with the result. But watch out for the amount of disk space you use: A single 4½-minute recording, for instance, takes up an entire megabyte.

### Watson in the Background

Watson is designed to run 24 hours a day. When you're on the road this presents no problem (as long as you turn your monitor

other than a slight decrease in program speed.

I also tested Watson under the *Desqview* multitasking system to see if I could run several applica-

*To justify Watson's price tag, you should have the kind of occupation—or social life—that warrants a telephone management system.*

off). But when you're hashing out the monthly budget you may sense a conflict developing: Who gets the computer—you or Watson?

This problem is resolved relatively effortlessly, without the burden of concurrent (or multitasking) operating environments like *Microsoft Windows* or *TopView*. By pressing <F4> you can suspend Watson to perform a DOS function or run other programs. Although inactive, Watson stays resident in RAM and automatically returns when you're through with other tasks.

To have Watson take calls while you're running another program, you must exit to DOS and type *Share progname* at the DOS prompt. Watson will remain active in the background. By pressing <Ctrl>-<RightShift>-<Enter>, you can switch back and forth between Watson and another application. Natural MicroSystems has tested Watson successfully with *WordStar*, *1-2-3*, *Office-Writer*, *Personal Editor*, *PC-Write*, and *CIP*, and claims it should work with many other programs as well. I tested it with *WordPerfect* and experienced no problems

tions concurrently. The experiment failed miserably, probably because Watson writes directly to the screen memory to display its fancy logos and card file images. Watson is designed to be *TopView* compatible, but on most PCs, take away 256K for *TopView*, 192K for Watson, and you're left with *maybe* enough memory for one more application.

### Watson as a Modem

For many power users, Watson's data communications abilities may be sufficient justification for the board's taking up an expansion slot. The modem is Hayes compatible and offers both 300- and 1200-bps modes. Although you can use the modem with any Hayes-compatible communications software, Natural MicroSystems has bundled and adapted *PC-Talk III* specifically for Watson.

A Headlands Press Freeware offering, *PC-Talk III* can handle



both PC-to-PC communications and data retrieval from on-line services. It supports a number of advanced features found in expensive commercial packages, including remote access, macro programming, auto-dialing, XMODEM error-checking, and access to DOS commands.

Pressing <Alt>-<F4> invokes the telecommunications portion of Watson and disables all telephone management functions. Essentially, these keystrokes put you in a different program, with a completely different set of keyboard commands. Most of *PC-Talk III*'s commands are easy to remember, however, and the program offers adequate on-line help.

Some users may be annoyed by Watson's lack of a speaker; when

and the company subsequently explained that several hundred boards had bad crystals. You may want to test the modem at 1200 bps before buying.

### ■ Just an Expensive Answering Machine?

Whether you find Watson a frivolity or a necessity depends, obviously, on your applications. To justify Watson's \$698 price tag, you should have the kind of occupation—or social life—that warrants a telephone management system. If your needs include a modem as well as an automated receptionist, you may find Watson a worthwhile investment.

One obvious use for Watson is telemarketing. In fact, Natural MicroSystems offers an add-on

But I let things go too far. As I lay in the sun one bright Sunday morning, I heard the phone ring indoors. I figured Watson could answer it, until I remembered the argument I'd had with Joanie, and the nasty message I'd left for her. "Watson! I'll get the phone!" I yelled as I ran inside.

I heard a click telling me Watson had finished delivering the old message. "No! No, Watson, please," I cried, grabbing the handset. I was too late. There was nothing but a dial tone.

I stood motionless, staring at the screen. 'In Messages—Press Play (F9) to hear message', it read. Obliging, I pressed the function key, and heard a familiar voice say, "Marlene was right, you really are a jerk."

Feeling helpless and dejected, I slumped against my PC. Watson, how could you do this to me? ●

*For many power users, Watson's data communications abilities may be sufficient justification for the board's taking up an expansion slot.*

*A coauthor of several books on microcomputer applications, Sanjiva Nath is a programmer analyst specializing in data communications.*

you're waiting for a connect message, there's no way to tell whether the auto-dial is functioning properly. Also, although I successfully hooked up with MCI Mail and The Source, I had no luck at all logging onto CompuServe at 1200 bps. Natural MicroSystems told me they'd had some trouble with the 1200-bps mode and sent me the latest upgrade of Watson's software, assuring me that this would alleviate the problem. In fact, the trouble persisted,

software package called *Watson VIS* (voice information system) that turns your system into an automated pollster. While running *VIS*, Watson can call a whole list of numbers, ask multiple choice questions, and gather touch-tone responses.

Personally, I found Watson a vast improvement over my clunky old answering machine. As time passed, I preferred to let Watson answer phone calls, schedule appointments, and even deliver personal messages rather than do these tasks myself.

*Watson*  
Natural MicroSystems Corp.  
6 Mercer Rd.  
Natick, MA 01760  
617/655-0700  
List price: \$498, *VIS* \$298  
Requirements: 192K, additional 64K for *VIS*; hard disk; DOS 2.00 or later version



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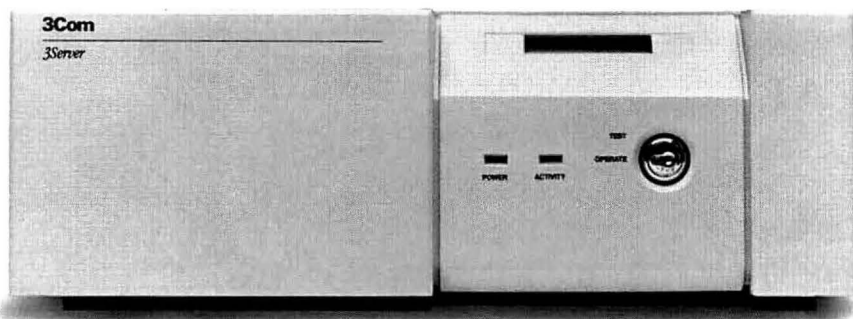
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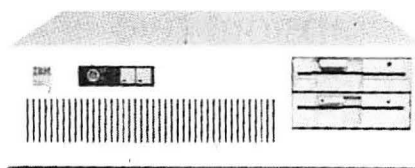
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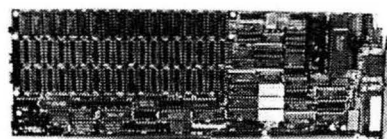
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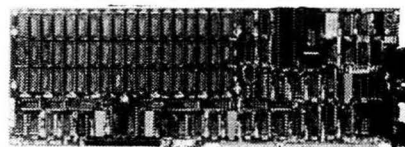
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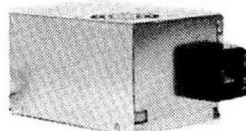
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# The RAM Revolution

Memory expansion boards have been on the market since the advent of the PC, but new developments are raising RAM stakes to unprecedented heights. Two multimegabyte designs are now competing for popular support, and each has friends in high places.

*Bruce Owen*

Memory is the key to a computer's power and speed. The more memory, the faster, the more versatile, and the more efficient your computer can be. And today's software, from spreadsheets and windows to pop-ups, RAM disks, and print spoolers, is pushing the 640K limit, especially if you want two or more programs to coexist in your system.

The PC AT was supposed to be the answer to the modern memory blues, with 16MB of directly addressable RAM. But unless you're prepared to switch to the complicated, minicomputer-style Xenix operating system and restrict yourself to the limited number of programs available to run under it, you'll find all that extra memory accessible only as a RAM disk. DOS simply does not support use of this "extended memory," and few programmers are willing to write software for an environment that lacks all the operating system services routinely available to programs in

the lower 640K. Practically speaking, an AT is as limited to 640K of program memory as a PC or an XT is.

However, a technique exists that can expand the available memory in a PC, an XT, an AT, or a compatible beyond 640K. Actually, there are two slightly different ways to expand a computer's memory, each endorsed by several major hardware and software companies. The first to be announced was the Expanded Memory Specification (EMS), backed by Lotus Development, Intel, and (after a brief delay) Microsoft. The second, called the Enhanced Expanded Memory Specification (EEMS), is supported by AST, Quadram, Ashton-Tate, Quarterdeck, Borland, and Digital Research. EEMS is a superset of EMS. That is, any software written for an EMS board will run equally well on the EEMS boards made by AST and Quadram. Both approaches have been dubbed "life-cycle extenders" for the aging PC line (see "Committed to Memory," *PCW*, December 1985).

Neither of these "teams" claims to be competing for dominance in the expanded memory marketplace. Both contend that they are merely trying to establish a standard for the general good of the industry. But the software clout of Lotus Development is supporting Intel's AboveBoards and the numerous EMS boards from other manufacturers, while AST's advertising budget and hardware distribution channels will be pushing its EEMS RAMpage! board into the machines of users everywhere.



Consumers will ultimately line up behind one standard or the other as they buy boards to run the emerging breed of expanded memory software. Whether by design or default, in the next few months these two camps, stocked with some of the biggest names in the PC industry, will be maneuvering for the advantage in the RAM revolution.

### ■ Seeking a Standard

Both EMS and EEMS are a combination of hardware and software standards. Strictly speaking, EMS and EEMS are documents distributed to hardware and software firms by the companies in the two expanded memory camps. These documents specify what an expanded memory board must do to work with expanded memory software and how software has to be written or modified to take advantage of the hardware.

To use expanded memory, you need both a special memory board and specially designed software. Programs not specifically written or adapted to use expanded memory will still be limited to 640K (unless you have an "expanded memory" multitasking shell—more on that later). Microsoft has promised that a future release of DOS will make it easier for programs to use EMS RAM, but existing programs will still have to be modified to use EMS expanded memory.

EEMS boards have a more flexible design that allows programs written specifically for them to do things not possible with EMS boards. However, any program written to take advantage of the additional powers of EEMS boards will not run on EMS boards unless the software also has a reduced-capability EMS mode.

Users are tempted to buy the typically more expensive EEMS boards because both types of software will run on them. Yet software developers may go in precisely the opposite direction. Unless developers feel that the additional capability of the EEMS is essential to an application, they are inclined to write programs for the simpler EMS standard rather than support two different standards.

EMS and EEMS are only standards. No one is required to follow them, not even the companies that wrote the specifications. For example, the Lotus/Intel/

Microsoft EMS standard calls for both hardware and software to support a total of 8MB of RAM. Intel's AboveBoard PC and Lotus's *Symphony 1.1*, however, allow a maximum of only 4MB. Realistically, 4MB should be more than enough for any application, but that is not the standard. Tall Tree Systems' JRAM-3 EMS board contains more logic than the specification requires, allowing it to be controlled with fewer commands than other EMS boards, and runs slightly faster. Other boards have their own minor variations, but none diverges significantly from the EMS or EEMS standards.

### ■ What Will Expanded Memory Do for You?

Expanded memory means potentially expanded productivity in ways both obvious and subtle. Expanded memory is a boon to disk caching, RAM-resident packages, print spoolers, and graphics-intensive applications, as well as to spreadsheets and RAM disks. It may also provide a back door to multitasking.

Because they support expanded memory, *Symphony 1.1*, 1-2-3 release 2.0, *SuperCalc 3*, and other spreadsheets and integrated software packages enable you to build spreadsheets several times larger than you can without expanded memory. No special procedures are required; you simply have more space within which to work. Recalculation speed, not memory, is now the limiting factor in spreadsheet size. The major spreadsheet developers have addressed this problem by adding support for Intel's 8087 and 80287 math coprocessors, along with more efficient algorithms for solving simultaneous equations (or circular references, in spreadsheet parlance). Coprocessor support is essential in light of the 2 to 3 percent speed penalty that bank switching à la EMS (or EEMS) imposes when recalculating spreadsheet data stored in expanded memory.

Spreadsheets are not alone in feeling the memory pinch. A tightly integrated package such as *Enable* or *Framework* allows its different parts to exchange data easily, so that, for example, a change in a worksheet automatically adjusts the values cited in a document. As long as such a program is forced by a shortage of RAM to keep some of its data on disk, changing windows or adjusting related references can become irritatingly slow. Expanded memory lets integrated software store more of its data in RAM so the



integrated package can operate at full electronic speed.

Even though expanded memory cannot add extra capacity to most existing software, you can speed up any disk-based program such as a word processor or data manager by running it from an expanded memory RAM disk. RAM disks function very much like ordinary disk drives but many times faster.

Expanded memory lets you create RAM disks up to 8MB in size, hefty enough to hold the largest programs and data files, without reducing the amount of memory in which programs can be run. A *dBASE III* operation (such as indexing a large data base) that takes half an hour on a hard disk takes 10 minutes or less with a large RAM disk. If you use a so-called environment manager such as *Desqview* or *Microsoft*

**T***There are two slightly different ways to expand a computer's memory, each endorsed by several major hardware and software companies.*

*Windows*, you'll be delighted at how much faster you can switch between windows when your programs and data reside in a big RAM disk rather than on a hard or floppy disk.

Similarly, you can speed up any disk-based program by creating a large disk-caching buffer in expanded memory. A disk-caching system takes all data read from a hard disk or a floppy and stores it in memory, including data not yet actually requested by the program but located near the requested data on the disk. If a program needs to reread any of that data, it obtains the data directly from memory rather than from the comparatively slow hard or floppy disk.

Owners of PCs and XT's may well find that a large RAM disk or disk-caching buffer is the single most important advantage that expanded memory boards offer. AT owners, of course, have at their disposal one or more extremely fast hard disks plus the capability of creating RAM disks of up to 2.5MB in size using the AT's extended memory and DOS 3.00's VDISK program. Because AT users are already apt to possess the speed offered by EMS boards, they may be more impressed by some of expanded memory's other ramifications.

Sophisticated, instant-access pop-up programs, from calculators and calendars to data managers and text editors, tap one of those impressive capabilities. To be instantly accessible from within other programs, pop-ups are *RAM resident*. That is, they remain in memory as long as the PC is on, taking up space that would otherwise be available for other programs. Borland's *SideKick*, for example, occupies almost 60K. The elaborate new *Homebase* package from Amber Systems, with a pop-up data manager and background telecommunications features, consumes more than 170K. And most pop-up products offer only simplified versions of the functions you really want.

Expanded memory changes all that: The bulk of a pop-up program can reside in expanded memory, leaving just a tiny kernel resident in ordinary memory to "listen" for the keystrokes that signal the program. Pop-ups can now be as large and well endowed as ordinary programs—without filching memory from other applications.

If you must print long documents, large spreadsheets, or graphics, you may already use a print spooler, which enables you to print text and graphics while freeing your PC for other tasks. With expanded memory and appropriate print-spooling software, for example, you could print thousands of labels or hundreds of pages while simultaneously preparing next year's budget with a spreadsheet program.

Finally, expanded memory may in the not-too-distant future directly improve the image quality of graphics, both on screen and in hard copy. Several full-featured graphics programs are already using earlier incarnations of megamemory boards to store high-resolution color images; West End Film's *Artwork* package is one. As expanded memory becomes increasingly pervasive, more and more of these elaborate graphics programs can be expected to make use of it.

Similarly, as graphics printers achieve higher resolution, additional memory is needed to hold a full-page image. Laser printers like the HP LaserJet create images at 300 dots per inch, forming letters of near typeset quality and graphics good enough to publish. A single page of graphics at that resolution occupies almost 1MB of memory.



Expanded memory makes short work of creating graphics and custom font programs for laser printers, both by storing the graphics building blocks and the fonts in RAM for fast access when constructing the page image, and by holding the finished page image for display, editing, and transmission to the printer. Several leading companies, including Soft-Craft, LeBaugh Software, and Forefront (creator of *Framework*), plan to support laser printers in full-page, high-resolution graphics mode using expanded memory.

### ■ Inside Expanded Memory

How is it possible to stuff megabytes of memory into the same PCs that just a few months ago were supposedly mired at 640K? The trick is called bank switching.

The PC, the XT, and compatibles allow for roughly 1 million addresses, each of which corresponds to a “box” where one byte of data may be stored. These boxes make up an *address space* that starts at address 0 and runs through address 1,048,575. (Just as 1K equals 1024, 1MB equals 1024 times 1024.) Any given address can contain RAM, ROM, or no memory at all. Each byte of memory requires a unique address for the PC to read and write to it.

When the PC was designed, certain areas of the 1MB address space were reserved for specific functions. Parts of the area between 704K and 768K, for example, are reserved for the RAM that stores the image on the computer’s screen. The area from 800K to 816K is reserved for ROM containing code to control a hard disk. All the addresses above 640K are reserved for such specialized uses, although many of these addresses still have no officially sanctioned purpose. All the addresses from 0 to 640K are available for user RAM. Figure 1 illustrates the address space in PCs, XTs, and ATs.

Ordinary RAM and ROM are assigned to particular addresses. When you install most memory boards, you set switches that indicate the address of the first byte of RAM on the board; the successive bytes of RAM occupy the succeeding addresses. Once you have installed RAM in all the addresses from 0 to 640K, you’ve filled up the addresses that are not reserved. There is no place left to go; you have reached the infamous 640K limit.

The memory on expanded memory boards is different. The RAM on these boards is not permanently tied to a particular set of addresses. Instead, any 16K bank of memory (called a *logical page*) can be temporarily assigned to a specified 16K portion of the PC’s address space (called an *address window*) by a software command. Another command can assign a different logical page to the same address window, bumping the previous page out of the window altogether. By using bank switching, an expanded memory board can provide a large number of logical pages of memory, even though the PC’s address space has room for a only few pages at a time.

Once a logical page of memory has been assigned to a certain address window by the appropriate software command, a program can read from it and write to it exactly like ordinary memory. When the program is finished with that logical page, it issues the command to assign a different page to that same window. Later, when the program needs the information it stored in the first page, it assigns that page to the address window once again. Figure 2 illustrates one of the many logical pages of memory on an expanded memory board appearing in an address window, while the other pages wait in no-address limbo.

Any program using this switchable memory must keep track of what it stored in each of the logical pages of memory, and it has to know how to make the desired logical pages appear in the appropriate window. This is why, absent an “expanded memory” multitasking shell, software must be specifically written or modified to take advantage of expanded memory (for details about how software uses expanded memory, see the sidebar “The Expanded Memory Manager”).

### ■ A Tale of Two Specifications

The Lotus/Intel/Microsoft EMS calls for four 16K windows in the address space. These windows must be contiguous, so they form a single 64K *frame*. The 64K address frame must start at an address that is a multiple of 64K, such as 640K or 832K. The four windows within the frame are numbered 0 through 3, regardless of where the frame is located in the address space. Any logical page of memory on the expanded memory board may appear in any of the four windows in the address frame. Figure 3 illustrates a typical 64K address frame with four logical pages appearing in it.



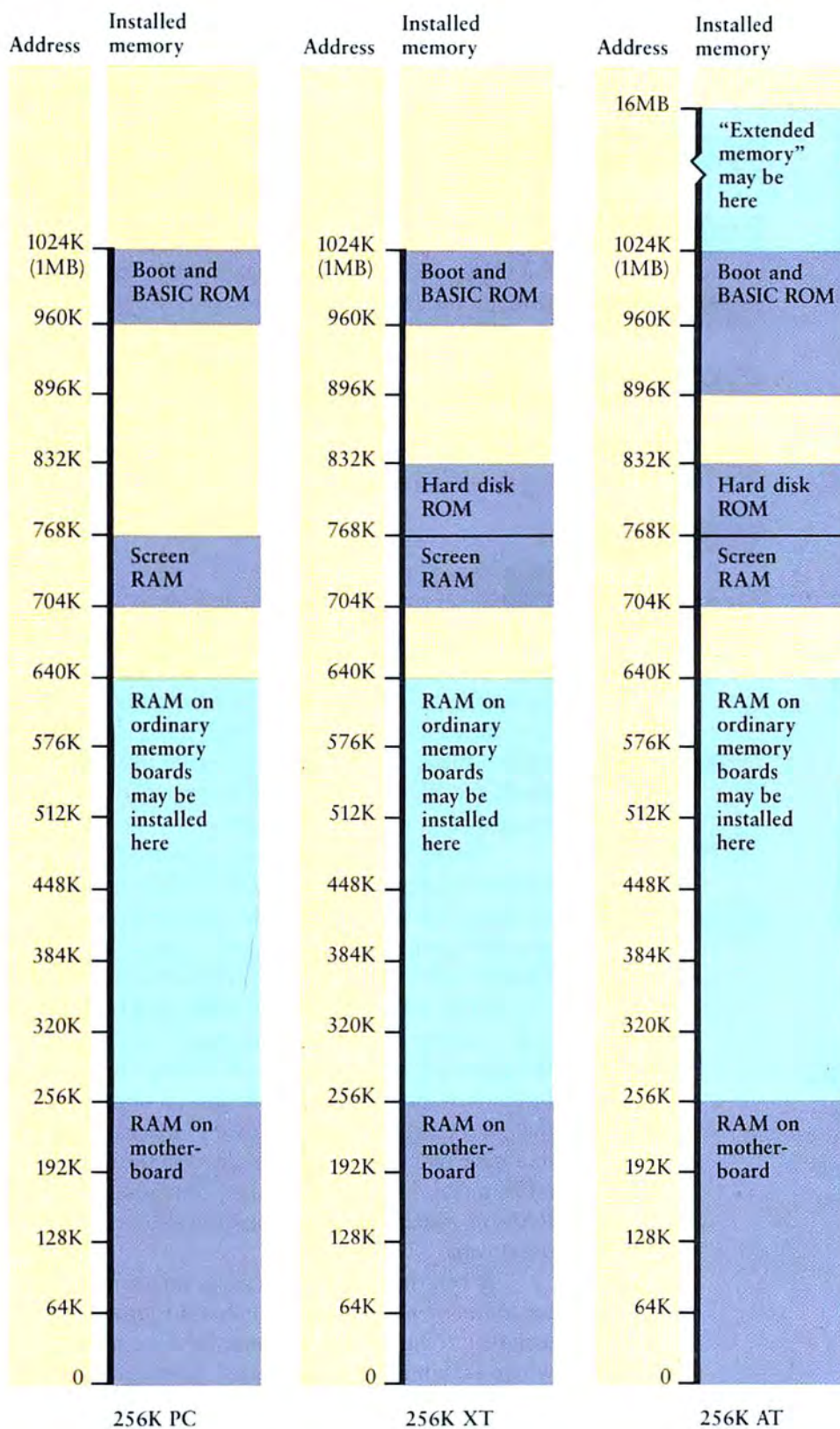


Figure 1: The address spaces in a PC, an XT, and an AT



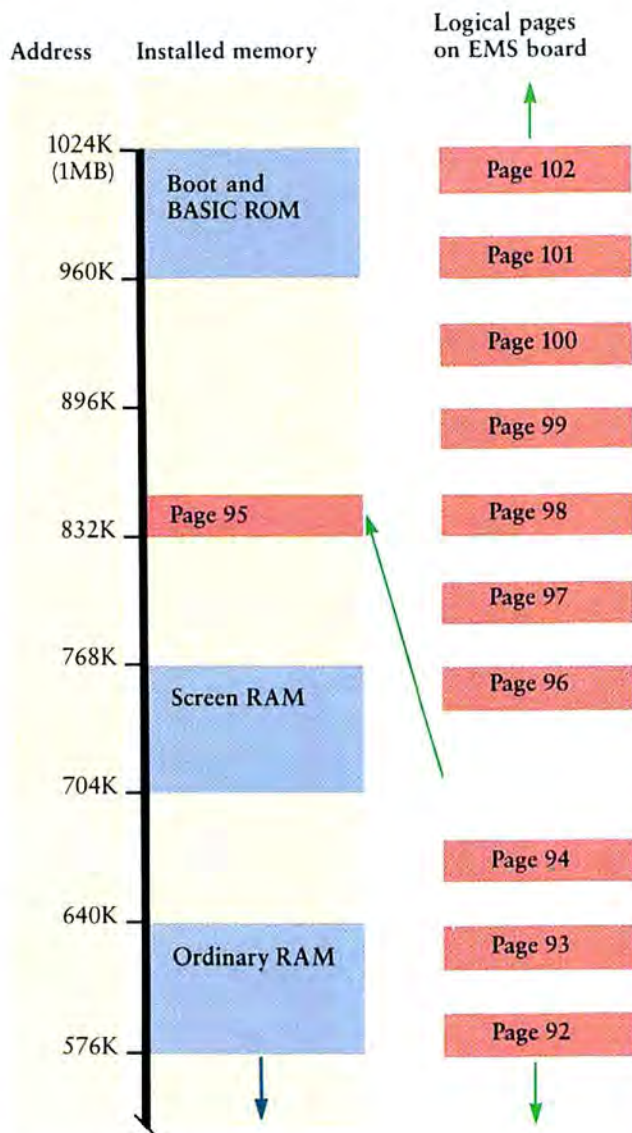


Figure 2: A logical page of expanded memory installed in the address space of a PC. All the other pages are in no-address limbo and cannot be read from or written to by the computer.

The AST/Quadram/Ashton-Tate EEMS allows not just 4, but 64 16K windows. In other words, the EEMS expands the 64K frame of EMS to cover the entire 1MB address space. The 16K address windows are numbered 0 through 63, with window 0 beginning at an address that is an even multiple of 64K. Subsequent windows are assigned successively through the 1MB address space and “wrap around,” so that window 63 is just below window 0. The first four windows of the EEMS standard are exactly the same as the four windows described in the EMS. Figure 4 illustrates the 64 address windows of the EEMS, with a few logical pages of memory appearing in various windows.

### Vive la Différence?

The EEMS has two principal advantages over the EMS. The first is that more than four logical pages (64K total) of expanded memory can appear in an address space at one time. For most applications, the four windows of the EMS 64K address frame are quite sufficient. Yet some applications, like *Frame-work*, run slightly faster if they can use blocks of expanded memory larger than 64K.

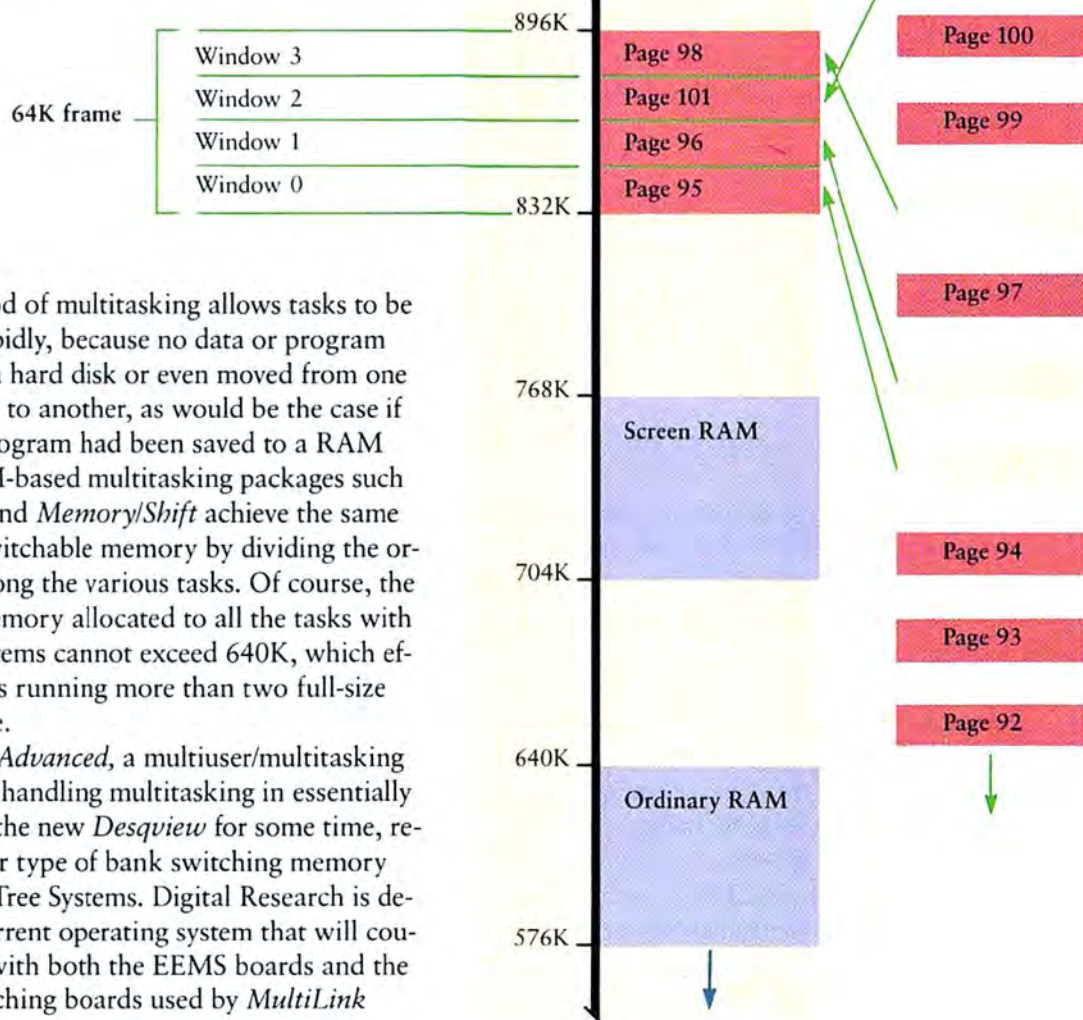
The EEMS's second advantage is that it allows pages of expanded memory to be assigned to addresses in the lower 640K, where programs run. A specific type of multitasking application—such as Quarterdeck's *Desqview*—can take particular advantage of this ability. In such a system, each terminal or task is assigned a set of logical pages of memory on the expanded memory board. When the multitasking program wants to work on one task, it designates that all the logical pages assigned to that task appear in a large block of address windows in the lower 640K range. This creates a large, contiguous area of RAM in which unmodified programs can run in the usual way.

When the multitasking program wants to work on another task, it simply switches the logical pages assigned to the second task into the same address windows, bumping the first task's pages out. Later, when the program brings the first set of logical pages back into the address space, the first task can pick up where it left off. Other sets of logical pages, of course, may be assigned to additional tasks.

This fall, AST began bundling the *Desqview* environment manager with RAMpage! boards. The



coupling isn't so much a clever marketing ploy as a means of implementing AST's design philosophy for the EEMS. The company's approach involves viewing bank switching from an operating system—that is, task—perspective rather than from what AST suggests is Intel's application—or data—orientation. In other words, AST envisions the EEMS as a means of making room for multiple programs, not merely enormous spreadsheets. As an environment manager *Desqview* makes program juggling feasible—and, significantly, does not require program modification.



This method of multitasking allows tasks to be switched very rapidly, because no data or program code is saved to a hard disk or even moved from one location in RAM to another, as would be the case if the suspended program had been saved to a RAM disk. Other RAM-based multitasking packages such as *DoubleDOS* and *Memory/Shift* achieve the same speed without switchable memory by dividing the ordinary 640K among the various tasks. Of course, the sum of all the memory allocated to all the tasks with these simpler systems cannot exceed 640K, which effectively prohibits running more than two full-size programs at once.

*MultiLink Advanced*, a multiuser/multitasking system, has been handling multitasking in essentially the same way as the new *Desqview* for some time, relying on an earlier type of bank switching memory board from Tall Tree Systems. Digital Research is developing a concurrent operating system that will couple this method with both the EEMS boards and the earlier bank-switching boards used by *MultiLink Advanced*.

Whether EEMS's additional flexibility proves important and receives support from the market at large remains to be seen. There's a clear need for

Figure 3: Four logical pages of expanded memory installed in the four address windows allowed by the EMS. The four windows make up a single 64K frame, starting at an address that is a multiple of 64K. Any logical page can be assigned to any of the four address windows.



some sort of expanded memory for all types of PC applications, and software developers are sure to support at least the EMS.

### How Programs Use Expanded Memory

Spreadsheets take two fundamentally different approaches to using expanded memory, one typified by *Symphony 1.1*, the other by *Framework*.

*Symphony* stores integer values of 4 digits or less in 4 bytes of ordinary memory, and all other types of cell contents—formulas, longer integers, floating-point numbers, or labels—in expanded memory. For each cell whose contents are stored in expanded memory, *Symphony* keeps a 4-byte value in ordinary

*Whether EEMS's additional flexibility proves important and receives support from the market at large remains to be seen.*

memory that indicates which bytes in which logical page of expanded memory hold the contents of that cell. Because each cell requires 4 bytes of ordinary memory, the amount of that memory available in the computer limits the number of cells a *Symphony* spreadsheet can have.

*Framework* takes a different approach. This program treats all data as *objects*; each chapter of a document, for instance, might be a separate object, as might each cell in a spreadsheet. *Framework* can store objects anywhere: in ordinary memory; on a hard disk, floppy disk, or RAM disk; in the extended memory of an AT; or in expanded memory. The part of the program that tracks where each object is stored is entirely separate from that part using the objects. Data storage space in *Framework* is not limited by the amount of ordinary RAM in the computer. This additional complexity, however, threatens to slow such processes as spreadsheet recalculation.

*Framework* is one application in which the EEMS has a slight edge over the EMS. If an object stored in expanded memory fits into an address frame, *Framework* will manipulate the object within the address frame itself. If not, *Framework* must copy a chunk at a time from expanded memory into ordinary memory before it can work on the object. Because the EEMS permits an address frame of more than four 16K windows, a *Framework* object that won't fit in a 64K EMS address frame can fit in a larger EEMS address frame.

Living Videotext's *Ready!*, an innovative pop-up outline processor, takes a different approach to using expanded memory. When the tiny kernel of *Ready!* that remains resident in ordinary memory detects the keystrokes that invoke the outline processor, it takes control of the computer and suspends the current program. The kernel then copies a 128K chunk from the middle of the suspended program into eight unused pages of expanded memory. Next, it copies the rest of *Ready!* from expanded memory into ordinary memory, writing over the portion of the suspended program that it has just copied to expanded memory. All of *Ready!* is then in ordinary memory, ready to run. To return to the suspended program, the kernel reads the saved portion of the program back from expanded memory into ordinary memory; that is, it overwrites the 128K of *Ready!*, restoring the suspended program so it can pick up where it left off.

### The Bottom Line

Expanded memory is a practical way to increase the memory available to an ordinary PC, XT, or compatible, and even to expand the useful memory of an AT or compatible. Expanded memory lets you build bigger spreadsheets, run your existing software several times faster with a RAM disk or disk-caching system, and use a new generation of increasingly capable pop-up utilities.

Expanded memory isn't even particularly expensive. Indeed, its cost is comparable to that of adding ordinary memory, if such were possible beyond 640K.

After you've used a multimegabyte PC for a while, you'll probably wonder how you ever tolerated the sluggishness and space limitations of an ordinary



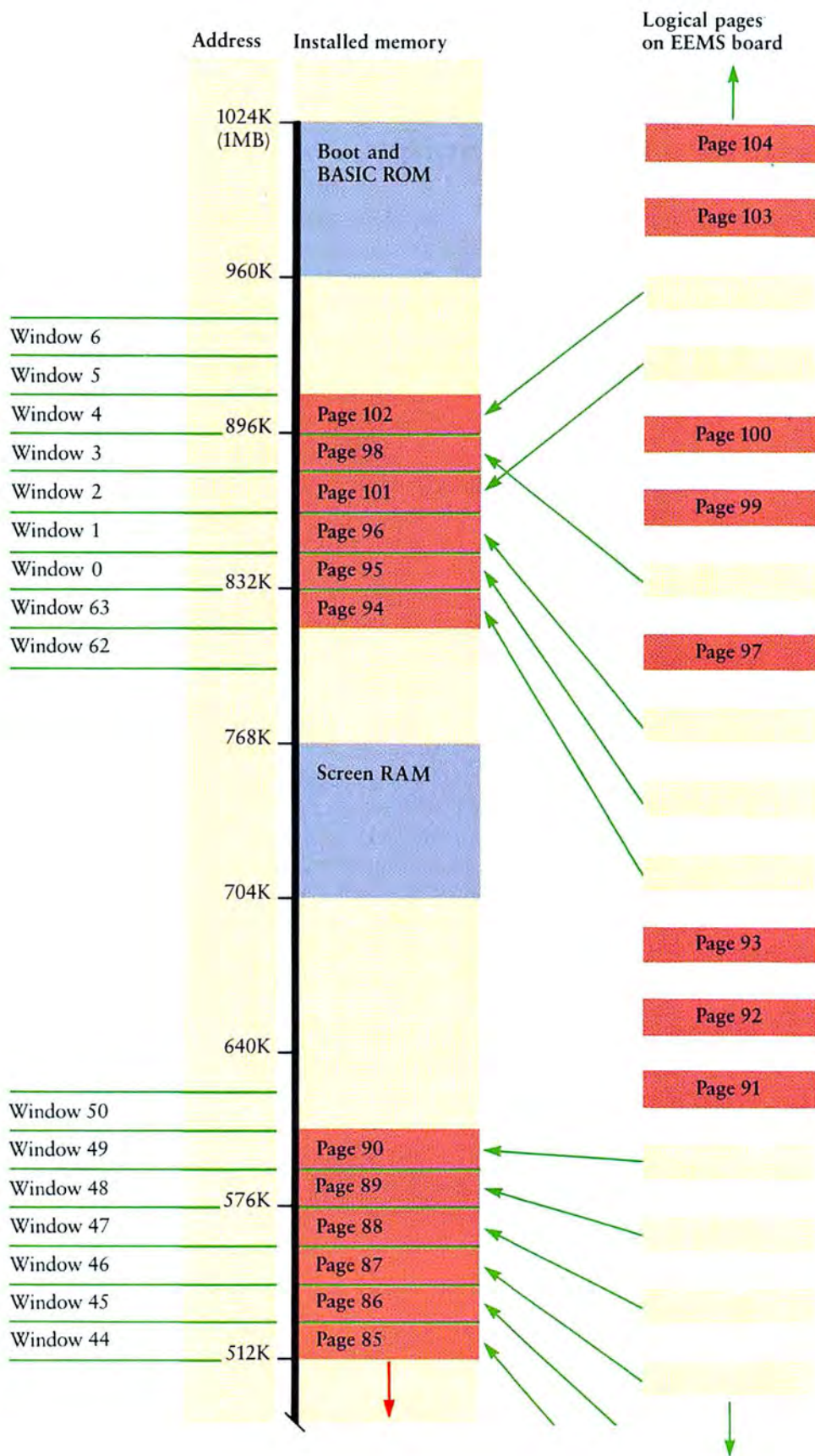


Figure 4: Numerous logical pages of expanded memory installed in some of the 64 16K address windows allowed by the EEMS. The EEMS allows more than 4 windows in the address space, and it allows windows in the lower 640K range of addresses. Windows 0 through 3 are exactly the same as in the 64K address frame of the EMS.



## Managing Expanded Memory

As long as only one program switches logical pages of memory in and out of the PC's address space, there's nothing to worry about. But in the real world of pop-up utilities, background tasks, suspended tasks in windows, and true concurrent processing, a host of programs in a single PC may seek to control expanded memory.

If every program simply issued commands to switch logical pages in and out of the address space with no knowledge of what the other programs were doing, chaos would ensue. Different programs would claim the same logical pages of memory and corrupt each other's data.

The solution to this potential mess is the Expanded Memory Manager (EMM), the software driver that comes with every expanded memory board. Although each hardware company must write its own version of the EMM, the functions of this driver are specified by the EMS and the EEMS, as are the functions of the expanded memory boards themselves. The EMM's file name is listed in the CONFIG.SYS file, which DOS 2.00 and later versions read when you start the PC. DOS actually incorporates the EMM into itself, availing all active programs of the EMM's features.

The EMM serves as a traffic cop. When a program wants to use expanded memory, it calls the EMM and requests a specified number of logical pages. The EMM verifies that this number of logical pages is available and then allocates them to the requesting program. When another program calls the EMM, the EMM knows that some logical pages have already been allocated and that only the remaining pages are available for the new application. When a program ends, it notifies the EMM, and the logical pages that were allocated to that program are freed for another program to use.

Programs call the EMM to make the desired logical page of memory appear in a specified address window; the EMM in turn issues the appropriate commands to control the expanded memory board. The EMM ensures that each program controls only the logical pages allocated to it, thereby preventing programs from disturbing one another's data.



PC. Speed and memory are addictive. Given the elaborate, memory-hungry software that is becoming the norm and the trend toward packing more and more programs together into a PC, expanded memory should catch on in a big way.

The old standby 640K PC suddenly seems undernourished. The RAM revolution is on. ●

*Bruce Owen, an archaeology student at UCLA, has written documentation for Tall Tree Systems and DataVision.*

#### *AboveBoard*

*Intel PCEO*

*5200 N.E. Elam Young Pkwy.*

*Hillsboro, OR 97123*

*503/629-7377*

*List price: for PC \$395, for AT \$595*

#### *Desquiew*

*Quarterdeck Office Systems*

*1918 Main St.*

*Santa Monica, CA 90405*

*213/392-9851*

*List price: \$99.95*

*Requirements: 512K (640K recommended), one disk drive, DOS 2.00 or later version*

*Not copy protected*

#### *Enable 1.1*

*The Software Group*

*Northway 10 Executive Park*

*Ballston Lake, NY 12019*

*800/932-0233, 800/338-4646*

*New York*

*List price: \$695*

*Requirements: 256K, two disk drives, DOS 2.00 or later version*

*Not copy protected*

#### *Framework II*

*Ashton-Tate*

*10150 W. Jefferson Blvd.*

*Culver City, CA 90230*

*213/204-5570*

*List price: \$695*

*Requirements: 384K, two disk drives, DOS 2.00 or later version*

*Copy protected*

#### *JRAM-3*

*Tall Tree Systems*

*1120 San Antonio Rd.*

*Palo Alto, CA 94303*

*415/964-1980*

*List price: \$699*

#### *MultiLink Advanced*

*The Software Link*

*8601 Dunwoody Pl. #632*

*Atlanta, GA 30338*

*404/998-0700*

*List price: \$495*

*Requirements: 17K plus 9K per workstation, two disk drives, DOS 2.00 or later version*

#### *RAMpage!*

*AST Research*

*2121 Alton Ave.*

*Irvine, CA 92714*

*714/863-1333*

*List price: \$495*

#### *Ready!*

*Living Videotext*

*2432 Charleston Rd.*

*Mountain View, CA 94043*

*415/964-6300*

*List price: \$99.95*

*Requirements: 112K, one disk drive, DOS 2.00 or later version*

*Not copy protected*

#### *Symphony*

*Lotus Development Corp.*

*55 Cambridge Pkwy.*

*Cambridge, MA 02142*

*617/253-9150*

*List price: \$695*

*Requirements: 284K, two disk drives, DOS 2.00 or later version*


*Copy protected*



# ISDN: Network of the Future?

If the breakup of Ma Bell left you feeling disoriented, hold on to your hat. Your local analog phone system may soon turn into an integrated services digital network that can simultaneously carry voice and data at supersonic speeds.

*Judy Getts*

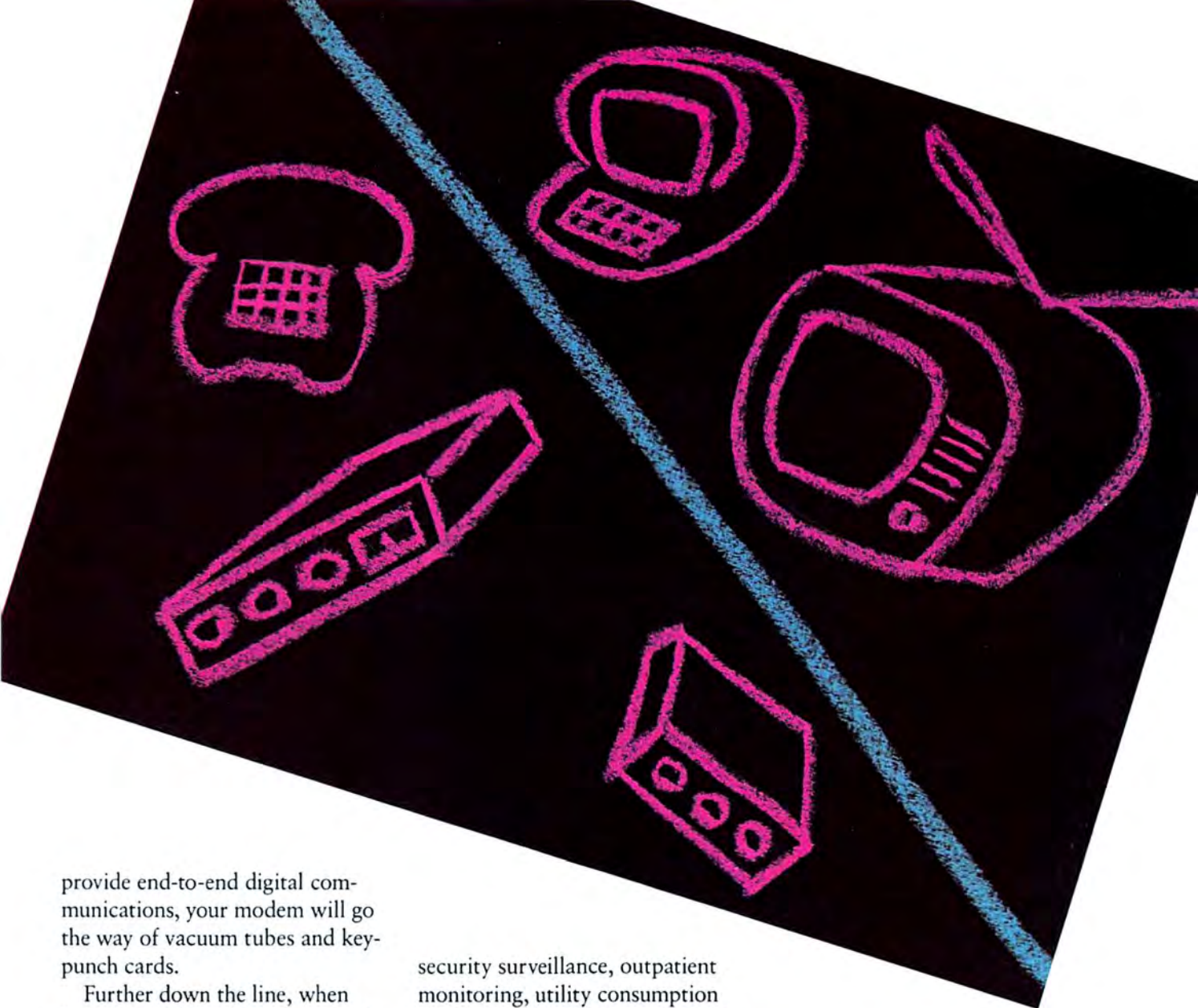
 Imagine a one-lane highway, the kind you find connecting little towns with names like Piney Flats and Moose Jaw, a narrow strip carved into the terrain before cars could go fast and time was of the essence. Compare that to the multilane arterials of southern California, and you have a pretty accurate idea of the capabilities your telephone line may hold in the near future contrasted with those available now. At the heart of this upcoming wizardry is the integrated services digital network, or ISDN—an evolving international standard for a worldwide digital network that can carry both sound and data with equal ease.

The implementation of ISDN will probably occur incrementally, surmounting formidable obstacles at each step. The first step, already in progress, involves converting current analog phone switching stations to digital. Next, hardware and software will be added to the stations to provide *narrowband*

ISDN, the splitting of each existing phone line into three high-speed digital channels for simultaneous voice and data transmissions. The final step will upgrade switching stations to a *broadband* capability that will divide each phone line into 24 superfast channels and will probably require the replacement of existing phone lines with fiber-optic lines.

Some analysts call ISDN the public phone network of the future. Others call it a half-baked public relations gimmick by AT&T to sell equipment. According to the publicists' scenario, once ISDN is in place in your local phone company, for the price of a little extra phone cord and a "modest" monthly fee, you'll be able to turn your single-lane, analog phone line into a digital expressway. You'll be able to simultaneously talk and swap data on the same line, and since ISDN will





provide end-to-end digital communications, your modem will go the way of vacuum tubes and key-punch cards.

Further down the line, when broadband ISDN is implemented, fiber-optic connections will super-sonically dispatch your data faster than Chuck Yeager pushed the envelope at dawn. ISDN's wide transmission bandwidth, together with its ability to split one phone line into dozens of lines, will open the way to a Disneyland of wonders flowing in through your phone jack. Cable TV, teleconferencing, graphics and still video transmissions, and interactive video will be available from a single phone line, not to mention telemetry applications such as home

security surveillance, outpatient monitoring, utility consumption tracking, and, to quote one ISDN booster, "a whole host of applications we haven't even thought of yet."

Until recently, talk of ISDN was limited to those cautiously speculative chapters at the end of telecommunications texts, typically titled "What the Future Holds." But over the past couple of years, the discussion has moved less cautiously into the present tense. In fact, early 1987 is the date European telecommunications giant Siemens AG predicts that narrow-band ISDN services should be available in major U.S. cities.

#### **Daring to Go Digital**

Rather than representing a specific technology, ISDN is a set of evolving standards whose formulation was begun in the late 1970s by the telecommunications industry's international standard-setting body, the Comité Consultatif International Téléphonique et Télégraphique (CCITT). For political reasons, the standards are not expected to be completed until at least 1988.



The purpose of the standards is to provide a framework for the acquisition of new technology by the world's public phone networks. Leading to the formulization of ISDN was an industrywide realization that demands on phone networks were going to increase exponentially between now and

For transmission of voices as well as data, analog is grossly inferior to digital. The speed is slow, signals weaken over long distances and need to be periodically re-amplified in transit, and noise interference often crops up and becomes amplified along the way. Additionally, analog is as antitheti-

destination, if you're calling somebody just down the street, or on up through a hierarchy of numerous other switches.

The United States has approximately 12,000 local central office switches. The switches in operation today range from the primitive step-by-step, a hard-wired board that routes a call from one switching center to the next; to the somewhat crude crossbar, which is similarly electromechanical but has much more sophisticated call routing and processing capabilities; to the dominant switching technology—high-speed electronic analog, controlled by software and built of integrated circuits and semiconductors. But the first step in ISDN relies on the installation of a new generation of switches now making their appearance—state-of-the-art digital switches such as Northern Telecom's DMS, AT&T's 5ESS, and Siemens' EWSD.

The current crop of digital switches vary greatly in design, but all include a central communications processor that handles serializing, error management, synchronization, and code conversion. The processors' memory banks contain such data as the numbers dialed by particular callers and the services subscribed to by each customer. The communications processor is hooked up to a variety of peripheral units that may include processors for message prioritization, secondary routing, internal failure detection, diagnostic routines, and multiplexing functions. The switching system may have a capacity of 100,000 or more trunks that connect to other switching centers,

*If something wasn't done soon, the globe's phone systems were in danger of becoming an obsolete hodgepodge of incompatibility.*

the next century, telephone companies were going to make grand-scale investments in new technology to keep up with the growing demands of digitized data, and if something wasn't done soon, the globe's phone systems were in danger of becoming an obsolete hodgepodge of incompatibility.

Currently, ISDN standards span many layers in the technical tangle of phone transmission, from the type of switches used by telephone exchanges to protocols for addressing and routing messages within the network. ISDN can be characterized as digital-plus technology. That is, it assumes the adoption of a foundation of digital technology. Currently, almost all public switching systems are analog, transmitting voices as well as data in waves of continuous electrical impulses of varying voltage. In the digital systems that are beginning to appear, voices and data are transmitted in electrical pulses, or in optical pulses if the lines are made of fiber.

cal to the binary persona of the computer as yin is to yang; hence the necessity of a modem to arbitrate (translate: slow things down) between your PC and the phone system. The trend is clear. With transmission of computer data expected to mushroom within the next 15 years to 15 percent of all telephone network traffic, the need for digital transmission has arrived.

#### Switching the BOC Switch

The first step on the path to ISDN is to replace all the central office analog switches in the network with digital switches. Since delivering ISDN services to the telephone user requires only this lowest level of switches, not the upper ones that constitute the long-distance switching bureaucracy, providing ISDN is the job of the Bell Operating Companies (BOCs), those regional castaways from the breakup of AT&T.

Every time you dial a number, your call is routed via a phone line known as the local subscriber loop to a local central office switch. The switch acts as an envoy, routing your call either straight to its



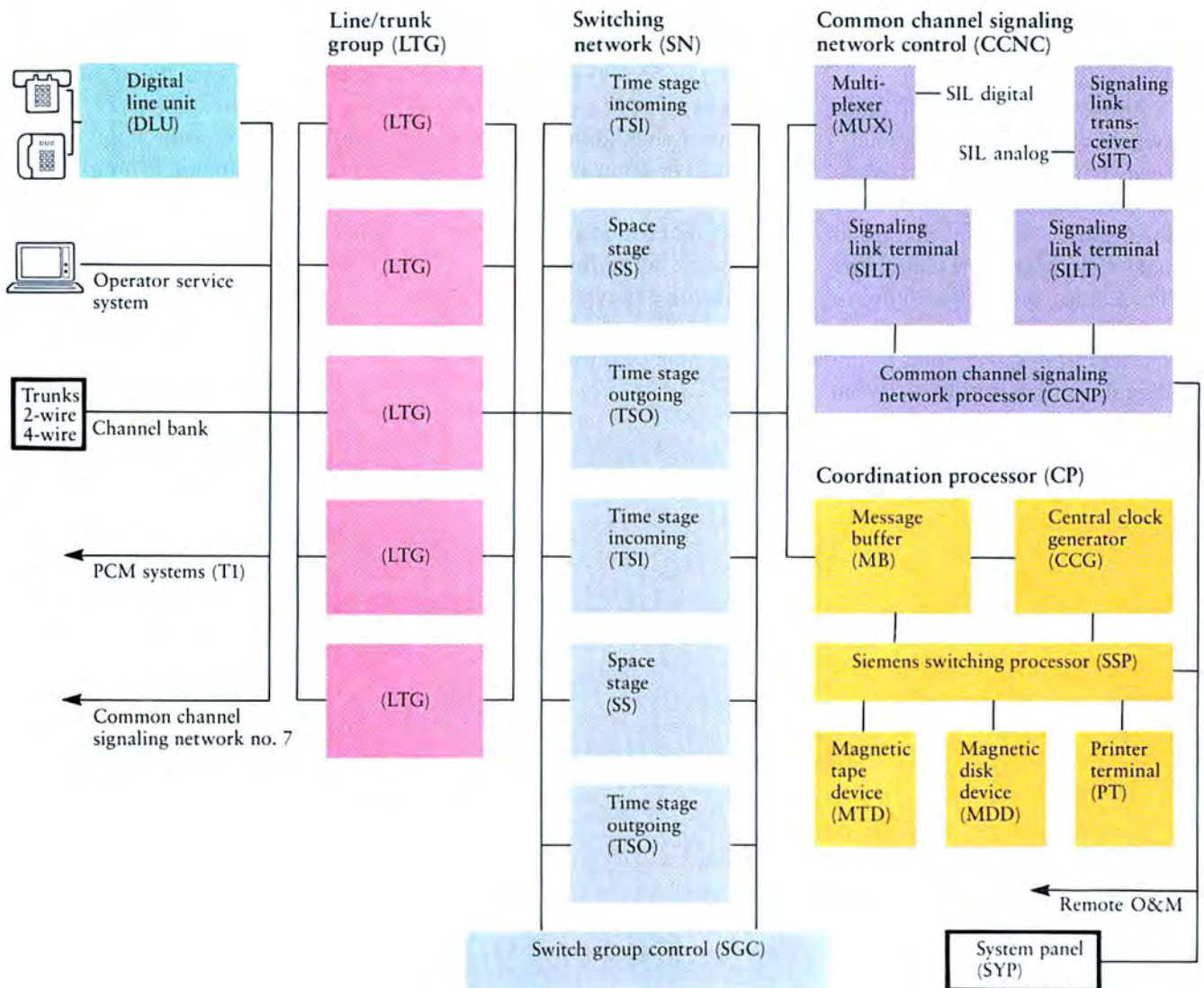


Figure 1: Schematic for the EWSD digital switch from Siemens. The computerized system is divided into five function blocks: the digital line unit, the line trunk group, the digital switching network, the common channel signaling network control, and the coordination processor. The digital line unit and the line trunk group connect the network with the outside world. Signaling, code receiving, and tone generation occur here, along with analog-to-digital conversion for processing non-digital calls. The line trunk groups contain a microprocessor

for every eight subscriber lines. The switching network does the actual switching of calls, transmitting data at an internal rate of 8 megabits per second. The channel controller contains the system multiplexer and links the peripheral group processors with the coordination processor. The coordination processor coordinates all operations and contains the system's permanent memory storage.

Source: Siemens AG



and be able to switch over half a million calls per hour (see Figure 1).

About one quarter of all phone switches in the United States already have some digital capabilities, with about 10 percent of the local subscriber loops that originate with them being digital lines. These lines, mostly leased by corporations, offer a wide range of services from direct point-to-point digital communications between computers to private digital switches leased by large companies. While a corporation today

may rent digital lines for high-speed communications—such as the T-1 or 56,000-bps lines—those services come at a premium that is prohibitively high for the small business or home user. One purpose of ISDN is to provide end-to-end digital connectivity at low cost to all subscribers.

The price of replacing an analog central office switch varies with the number of subscriber lines the

switch supports. According to Bill Harshbarger, a project manager at Pacific Bell, a switch may support anywhere from 2500 to 50,000 customer lines, with digital upgrade costs ranging from \$1500 to \$2000 per line. “You’re talking about \$6 million a switch,” says Harshbarger, a cost that’s frightful

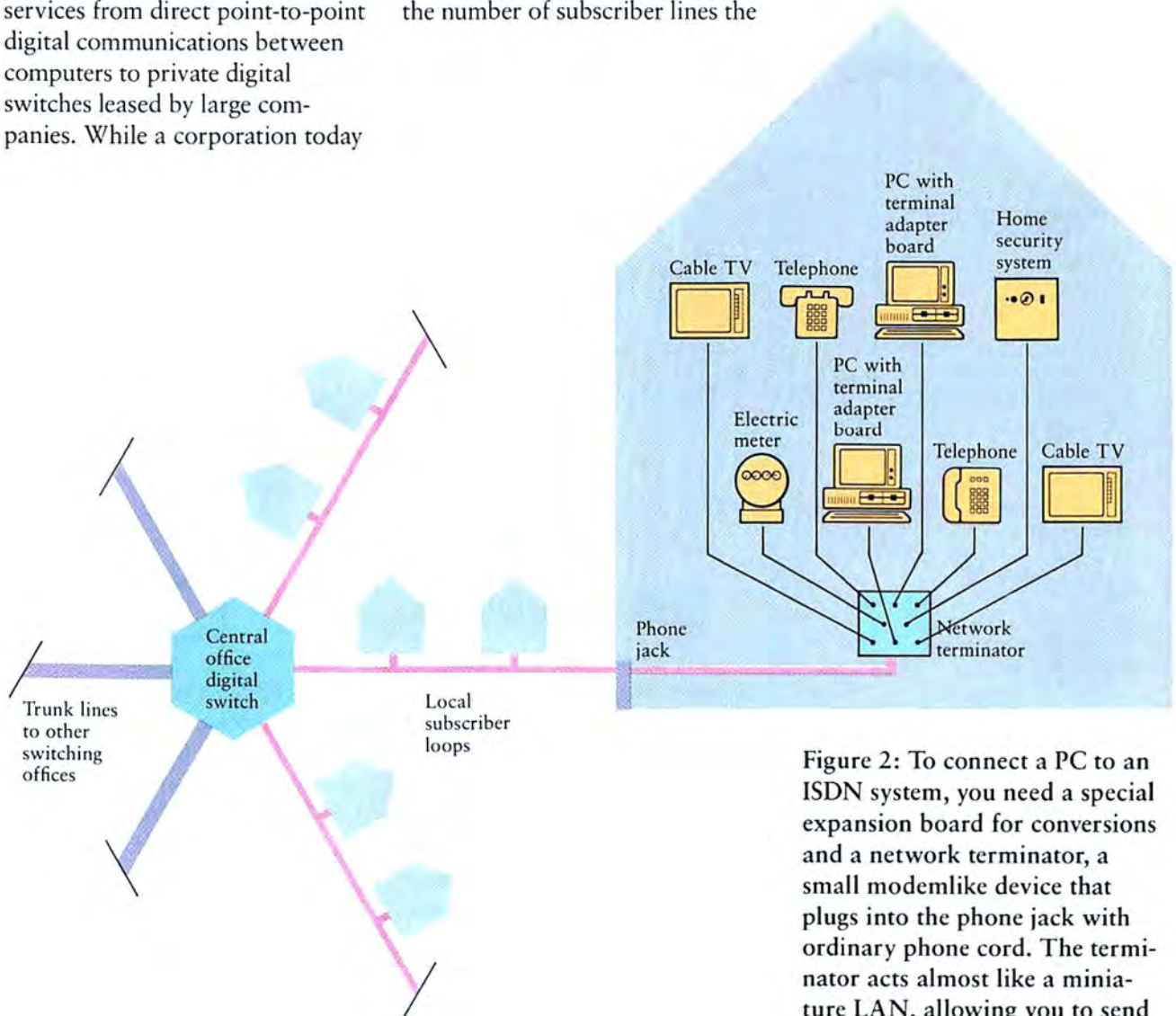


Figure 2: To connect a PC to an ISDN system, you need a special expansion board for conversions and a network terminator, a small modemlike device that plugs into the phone jack with ordinary phone cord. The terminator acts almost like a miniature LAN, allowing you to send voice and data back and forth between various computers, phones, and other appliances, as well as controlling the flow of voice and data to and from the outside world.



as far as the BOCs are concerned. Nevertheless, Pacific Bell intends to become fully digital within the next ten years and plans on eventually migrating into ISDN.

As to whether other BOCs will follow suit, taking the plunge into digital and then ISDN, Sue Burrows, media relations manager for Illinois Bell, says she'd be "very surprised" if a BOC exists that's not negotiating for the purchase of a digital switch equipped with ISDN. "There's a major drive for it right now," says Burrows.

Barry Eckhart, director of technical marketing for Northern Telecom, advises caution, however, explaining that phone companies are often slow in updating their technology. "It was only two years ago," he says, "that the last manual switch in the United States was replaced."


#### Narrowband ISDN

Once a digital central office switch is in place in your regional BOC, what next? To get from there to narrowband ISDN, the system is upgraded through software and sometimes hardware add-ons. AT&T's 5ESS switch and Siemens' EWSD are upgraded solely through software enhancements, while Northern Telecom's DMS requires both software and hardware to become ISDN compatible. In a typical upgrade, the software handles messaging protocol conversion, encodes the data—packetizing and depacketizing it—and converts it into a format accepted by the central switch's interface.

Exactly what will constitute narrowband ISDN and how it will be engineered depends a great deal on who you talk to. Since the standards for so many aspects of ISDN are still unhatched, such as the interface between an ISDN-

greater accuracy than in the traditional analog scheme.

ISDN's ability to turn existing single phone lines connected to conventional wall jacks into triple-lane thoroughfares comes from its wide transmission bandwidth as

 *'In the past few years there's been more of a shift in the LAN market toward wide area networking. ISDN may hurt some of the smaller LAN vendors, but the big companies will profit.'*

equipped local subscriber loop and an in-house PBX system, many quip that ISDN stands for "I still don't know."

It is known, though, what the telephone user will get: high-speed, integrated voice and data digital communications over an ordinary phone line broken into three distinct channels—a service known as basic access. The ISDN standards define it as two 64K-bps digital circuit-switched bearer channels carrying voice and data, and one 16K-bps channel primarily devoted to carrier signaling but also capable of transmitting voice and packet-switched data.

The 64K-bps channels carry data more than twice as fast as data can theoretically travel over analog channels of ordinary twisted-pair copper cable, and almost seven times as fast as 9600-bps asynchronous modem communications. The digital signaling also enables voices to be transmitted more clearly, and data can reach its destination with far

well as its tripartite channeling arrangement. The wide bandwidth ensures that voices and data do not cross paths and pick up from a neighboring channel that signal pollution known as cross talk.

For business users, the real appeal of ISDN will be the ability to use existing phone lines for all services, both voice and circuit or packet-switched computer communications. Says Ronald L. Weindruch, vice president of sales for Siemens Communication Systems' Public Switching Division, "If a university wants to make its mainframe available to all the students in a dorm, it won't have to rewire the whole building but can simply subscribe to ISDN and make use of the phone lines already in place." Businesses will no longer have to invest in special digital leased lines and expensive front-end PBX equipment.



### ■ A LAN in Miniature

To take advantage of ISDN, PC users will need a terminal adapter (a plug-in board for the PC to handle conversion to ISDN protocols) and a network terminator. Similar to a modem but not much bigger than a pack of European cigarettes, the network terminator is equipped with modulation and multiplexing functions, provides for fault partitioning, and handles other network maintenance jobs. The network terminator is plugged into a standard modular wall jack and contains eight plugs, which can accommodate PCs, phones, and other equipment (see Figure 2).

Since data can be exchanged between various devices attached to the terminator as well as with the outside world, the terminator can almost be considered a local area network (LAN) in miniature. Even better than a LAN, the terminator requires no rewiring of the premises for installation, and terminals and equipment can be moved at whim without contacting the vendor or phone company.

As to whether the terminator will ever challenge the popularity of its distant cousins, the LAN and the PBX, there are still too many unknowns to predict. But most telecommunications analysts think not. Martin Pyykkonen, a senior consultant with Arthur D. Little in Cambridge, Massachusetts, says that ISDN and its miracle terminator will actually help LAN vendors in some ways. "In the past few years, there's been more of a shift in the LAN market toward wide area networking,

ISDN may hurt some of the smaller LAN vendors, but the big companies will profit." As for the PBX market, John McCann, a consultant with IGI Consulting of Boston, says it will adapt. "ISDN isn't going to hurt the PBX market. It's going to allow the PBX to interface more services. They may have more to offer."

Existing communications software will function normally on an ISDN line, but the programs will need modification to capitalize on ISDN's special multitasking potentials. ISDN equipment vendors such as Northern Telecom admit they rely on entrepreneurial ingenuity to make the ISDN standard a reality. Communications software, network terminators, terminal adapters, and dedicated ISDN terminals that combine computing with sophisticated voice and video

ing systems. "It creates a liability," he says of the loose ends in the standards. "You might design yourself into a box. Your system could turn out to be wholly incompatible with what ISDN turns out to be. Then what do you do?" The answer that AT&T, Northern Telecom, and Siemens have latched onto is to create digital switches with open architectures that can be easily modified to conform to future ISDN standards.

### ■ Trial by Test Site

Last fall a digital switch equipped with narrowband ISDN was demonstrated by Siemens Communication Systems at various locations in Wisconsin. The switch, housed in a flatbed trailer and proclaimed by Siemens to be the first fully operating ISDN switch in the United States, was

*'Pacific Bell is trying to make use of the equipment that's already in place. We want to provide ISDN services without the ISDN bill.'*

telephony features for the most part do not yet exist outside of research labs.

The entrepreneurs, however, can't really get started until ISDN is defined more clearly. For instance, the two-wire interface on the network terminator hasn't been standardized. And that's just the beginning. How do you go about designing for standards that haven't taken shape? Very cautiously, says Jerry Johnson, AT&T network systems manager for product planning of digital switch-

hooked up through traditional copper phone cable to a series of office mock-ups. Through a digital phone connected to an IBM PC via plain vanilla phone cord and a special network terminator, observers could call other similarly equipped office mock-ups and, while speaking, swap data and send telexes simultaneously over the same line, sans modem.

Currently, two field trials of narrowband ISDN services are



planned by Northern Telecom for late 1986. One, scheduled for Portland, Oregon, will be carried out with Pacific Northwest Bell, and a second, slated for Phoenix, Arizona, with Mountain Bell. Both tests, which will give some 200 telephone customers the opportunity to test-drive integrated voice and data, will run approximately six months.

Meanwhile, in California, Pacific Bell is pursuing a highly original course in testing ISDN-like services. Pacific Bell's system, dubbed Project Victoria, which should be available to telephone users by early 1987, breaks a traditional phone line into two voice and five 9600-bps data channels. Similar to ISDN, its transmission on the local subscriber loop is digital, and it uses a seven-port "residential unit" that Pacific Bell declines to describe further, but which sounds suspiciously like the network terminator of ISDN.

However, Pacific Bell insists on avoiding the ISDN label. "We've taken the position that Victoria is Victoria," says Thomas Edrington, executive director of technology assessment and planning at Pacific Bell. "It doesn't make any technical sense to say you have ISDN when we don't even know what ISDN is."

As Bill Harshbarger explains, "What Pacific Bell is trying to do is make use of the equipment that's already in place. We want to provide ISDN services without the ISDN bill."

## ■ Broadband ISDN

If questions remain about narrowband, broadband is a virtual sea of uncertainty. The standards define the primary access on trunk lines between switching offices, plus the access available over the local subscriber loop, as consisting of 23 64K-bps circuit-switched bearer channels for voice and data together with one 64K-bps channel for network signaling and packet-switched data.

Those 24 channels on a single phone line can be used individually in various combinations, or all together for one super channel capable of transmitting data at a breathtaking 1.544 megabits per second. ISDN standards further separate the channels into subdivisions designated for specific applications, such as transmission of video. Broadband's high speed, multiple channeling, and wide bandwidth can open up an ordinary copper phone line to cable TV, interactive video, and teleconferencing, in addition to all the applications possible with narrowband.

Exactly how a digital switch will be upgraded from narrowband to broadband ISDN—and how much it will cost—are just some of the many questions swirling around broadband. "I've heard the figure bandied about of \$20 million to upgrade a central office," says IGI's McCann. "But there are still too many unknowns, too many variables for anyone to come up with a realistic cost."

Some of the cost questions concerning broadband may be cleared up this year. Starting this September, AT&T will hold a field trial of broadband ISDN services

at McDonald's world headquarters, accounting offices, and Hamburger University in Oakbrook, Illinois.

## ■ The Fiber-Optics Issue

One broadband issue that already has the BOCs running scared is whether they will have to replace their underground copper local-subscriber loops with fiber optics. Fiber-optic lines aren't required by the standards, but copper is hardly the best transmission medium for digital information running at megabit-plus speeds. To sustain 1.544-megabit transmission, copper must be "souped up" with amplifiers or repeaters about every two miles. Unfortunately, every time you tap into the line this way, you add distortion to the signals.

Fiber not only requires fewer repeaters, it more easily sustains wide bandwidths and hence high data rates, and because it transmits signals via light beams instead of electrons, it's almost immune to electromagnetic noise interference. Analysts say it's only a matter of time before BOCs pull up all their old copper subscriber loops and replace them with fiber.

## ■ Microcircuitry and Chimera

Analysts see broadband ISDN as a service geared primarily for corporations with a high volume of data transport. Narrowband, they say, will be sold more to home PC users. Weindruch of Siemens says that the most down-to-earth benefits of ISDN "will be seen by the



household that has a kid who loves to play with the computer and tie up the phone line for hours. Subscribing to ISDN services will cost less than half of the \$15 it does now to run a separate phone line into the house."

Most telecommunications analysts say not to expect narrow-band until at least 1990 or broadband until 1995. "The real questions today are not technological," says McCann of IGI Consulting, explaining that the necessary technology is already on the shelf. "But it's questions of cost, questions of service, not to mention all the regulatory issues, that will determine when we get ISDN, and these questions are not going to be effectively answered in the next few years."

"The whole notion of ISDN has made a lot of people starry-eyed. An ISDN network will come about only in very small pieces, not in the sense of a worldwide network. Each country is going to have its own version of what ISDN will be."

Currently, field trials of narrow-band ISDN are scheduled for Canada, Japan, and almost every country in Western Europe. At present, Europe leads the United States in implementation of ISDN standards, largely because the public phone networks are government owned and therefore driven by a unified vision. According to Pyykkonen, the divestiture of AT&T has hurt the United States' chance of acquiring an ISDN network that's wholly compatible,

of the century. The technology could radically change the nature of our home life. For example, picture phone transmission, a technology that has been promised for decades but has never quite gotten off the ground, is expected to finally succeed with the advent of broadband ISDN.

The telemetric possibilities of broadband may also open up a whole new genre of market research. For instance, the folks at Nielsen may no longer have to let their fingers do the walking, but will merely secure viewer permission to tap into phone lines to determine what's coming in over cable TV. Utility companies would similarly have the opportunity to research customer consumption and even offer discounts in exchange for the right to switch off certain appliances during peak times. Similarly, hospitals could follow outpatient progress through electronic monitoring devices such as EKGs, transmitting sine waves over the phone lines. Although the interactive capabilities of ISDN could provide great benefits to home consumers, bureaucratic intrusions could also pose threats to privacy and personal freedom. It is hoped a discussion of these issues may play a part in the continuing definition and development of ISDN. ●

**I**SDN is a concept becoming reality, as ridiculed with doubt and misconception as a moon shot would have been in 1955.

One part drawing board specifications, one part microcircuitry, three parts chimera, ISDN is a concept becoming reality, as ridiculed with doubt and misconception as a moon shot would have been in 1955. As to whether it will indeed become the universal phone network it was intended to be, Pyykkonen of Arthur D. Little says, "Just the thought of that is ridiculous." He adds that no, you will not be able to get rid of your modem, and no, there will be no end-to-end digital communications across the face of the globe.

not just internally, but with the emerging networks of Europe.

Tim Sammons, chairman and director of Sammons & Associates, agrees. "That everyone in the world will be able to communicate using the same protocol is an erroneous assumption. It's not going to happen that way." Sammons says that as ISDN switches emerge in the U.S. market, they will all be slightly different and are likely to end up totally incompatible.

Whether or not a universal ISDN comes into being, it seems probable that most of us will be able to enjoy the wonders of broadband ISDN before the turn

*Judy Getts is a freelance writer and editor in Wauwatosa, Wisconsin.*



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# Express Yourself







You? Set up a menu-driven data base application? With R:base 5000's Application Express, even a novice can create an effective custom system.

*Nicholas M. Baran*

■■■■ On mainframe computers the data base is the core of all applications, and programmers labor tirelessly over labyrinthine routines to coax information from a shapeless mass of data. *dBASE II* and its programming language brought the full power of data management to the PC but not to most PC users; building the custom applications that make data meaningful was still the province of the experts.

*R:base 5000* includes a module called the Application Express, which finally brings full data management power to the nonprogrammer (see "The R:base Express," *PCW*, November 1985). You tell the Express what you want, and it does the programming for you.

The Express is an *application generator*, a program that writes other programs based on your input. Creating a simple application will show you how to put the Express to work. You can take advantage of the Express even if you've never worked with a data management system before.



## Custom Applications

A menu-driven application makes your data easily accessible and thus usable. Instead of querying the data base with carefully woven lines of code, you need only choose items from menus. You can create a system to automate tasks ranging from simple mailing lists to complete inventory systems and generate reports at the touch of a key. By devising a customized “front end” for your data, you can provide a turnkey system for others to use or menus to simplify your own work.

The application described in this example tracks the status of proposals for a consulting firm. Its menus include options for the four main functions of a data management application: entering, editing, and displaying data and printing reports.

## Separate Tables

The first step in creating an application is setting up the data base itself, and the first step in setting up the data base is determining the information it should contain. Data bases can be visualized as tables of rows and columns, with each row containing all the data about the item you’re tracking—in this case, a proposal—and each column containing a single kind of data about that item, for example, the proposal number. Write down the kinds of information you’ll want about each item. Each statistic will call for a column in the data base.

The proposal data base system should quickly summarize the status of the consulting firm’s outstanding proposals, offering a snapshot of the business’s financial health. For each proposal, you’ll want to know the dollar value, the probability of success, and the client for whom it was prepared. You’ll also want the mailing address and phone number of each client. To differentiate clients with the same last name, give each client a unique client number; to differentiate proposals with the same description, assign proposal numbers. These elements result in the column names shown in Figure 1. (*R:base* imposes an 8-character limit on column and table names and a 7-character limit on data base names.)

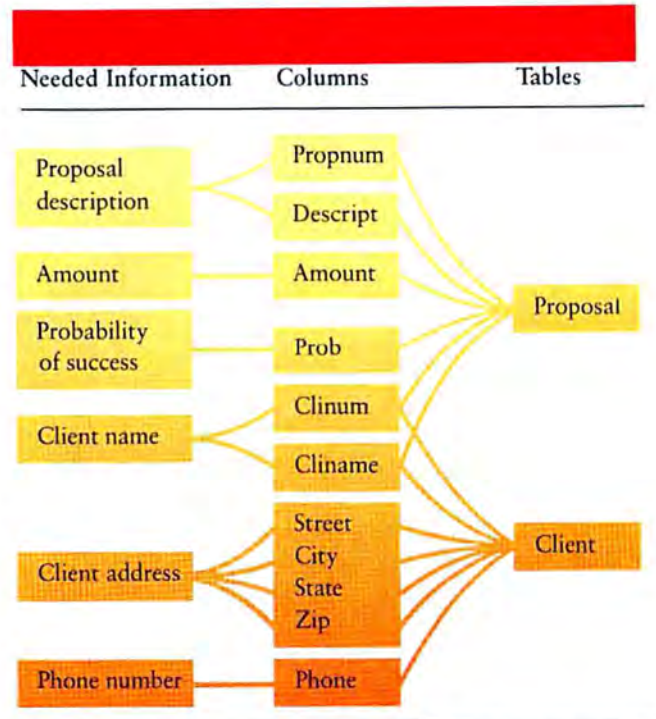


Figure 1: To determine what your data base should hold, list the information you want to get out of it. Turn each of those items into column names, then split them into logical tables.

An *R:base 5000* data base can contain up to 40 tables. How many tables should this data base use? Assume for a moment that the data base consists of only one table. Say that a proposal falls through and you want to delete it from the data base. If you delete the row in the table that contains that information, however, you will delete the information on the client at the same time—data that might be useful for future business. You could keep outdated proposal information in the data base in order to preserve client data, but that would waste disk space.

As a rule, data that you expect to refer to repeatedly (such as a client’s address) should be kept



separate from data that will constantly be changing (specific proposals, for example). Keep logically related data in a single table. (For more information on setting up tables, see "Blueprint Your Data Base," PCW, Vol. 2, No. 7.)

Because it's a relational data management program, *R:base 5000* enables you to combine tables to answer a query. When you create applications completely within the Application Express, however, you cannot take advantage of this feature; to do that you must use the *R:base* programming or command language or create your reports in *R:base*'s separate Reports module. If you create your system's reports within the Application Express, you must group all the data for one report in a single table.

Based on these design considerations, the sample data base here will consist of two tables, one containing client information, the other holding information on the firm's outstanding proposals. You will create two reports to print the information from each table.

## According to Form

Now you're ready to use the Application Express. Type **EXPRESS** at the DOS prompt or select Express from the *R:base* main menu to enter the program, and select the Define a New Database option from the Express's main menu. Enter **PROPOSAL** as the name of the data base (in keeping with the 7-character limit). The data base definition screen that appears makes it easy to create the tables.

The Express will prompt you for the name of the first table to be designed. Type **PROPOSAL** (to fit the 8-character limit). As you type each entry, the cursor moves to the next column. Type the name and data type for each column as shown in Screen 1.

## Data Types

After you type each column name, *R:base* asks you to specify a data type for that column so the program can treat the data appropriately. Real and Integer data types represent numerical values. Use Integer for columns that will contain only whole numbers (like Clinum) and Real for columns that will contain numbers with decimal points (like Prob). Specifying these data types enables you to perform numerical calculations on the data in those columns.

Text is used for columns that contain text or noncalculable numbers. For each text column, you must specify a maximum length that will accommodate the column's longest possible entry. (The default is 8 characters.) In adhering to the maximum field length, you avoid wasting memory by allocating space you don't need.

Because no computation is associated with the client number, you could also use the Text data type for that column. Notice that in Screen 2, Zip is represented by a Text data type, though zip codes are numbers. With a Text field, you can supply a simple data entry error check by specifying a length of 5

Screen 1: The Proposal table. To set up a table, simply type a name and select a data type for each column.

Enter or change the column names - [ESC] when done

PROPOSAL						
PROPNUM	DESCRIPT	AMOUNT	PROB	CLINUM		
INTEGER	TEXT 25	DOLLAR	REAL	INTEGER		

[F1] Insert [F2] Delete [F3] Review [F5] Reset value [F10] Help  
Database PROPOSAL — Defining table PROPOSAL — Column 6



characters, and because you won't want to calculate sums or averages of zip codes, you lose nothing. Specifying Date, Dollar, and Time data types allows you to access special calculation functions for those types of figures.

Once the columns are defined, press <Esc> to end the session. You are prompted to define another table or to return to the main menu. Define the Client table as shown in Screen 2.

### Menu Mapping

Once the data base is created, you can design the system to maintain and access it. You develop the system by building menus, then hooking the appropriate function to each menu choice using the Express. The Express lets you carry out from a menu the basic *R:base* query functions and—if you can program in *R:base*—any action available in the *R:base* programming language.

It is helpful to sketch out your menu tree with pencil and paper before you start. You could put all

possible choices in one huge menu, but a more structured approach is advisable. Cluster the primary actions in the main menu, relegating subsidiary activities to submenus. In the Proposal system, the main menu will include selections for the four main functions of the system (see Figure 2). Option 3 will require a submenu, while the others perform the operation directly. You can create up to three levels of menus.

To begin, select the Define a New Application option from the Express main menu. You'll then be asked to select the data base with which the application will work (PROPOSAL) and to type a name (using up to 8 characters) for the application you are creating. Call the application **PROPOSAL**.

The Application Express requires you to take a top-down approach when defining menus, starting with the main menu and working through each level methodically. Accordingly, when you are prompted for the name of the first menu, the default is Main.

Once you supply a name, the Express asks you to select either a vertical or horizontal menu format. Horizontal menus follow 1-2-3's layout, in which you choose an option by typing its first letter or by highlighting it with the cursor keys. Vertical menus,

Screen 2: The Client table. The Clinum column links this table with Proposal.

Enter or change the column names - [ESC] when done

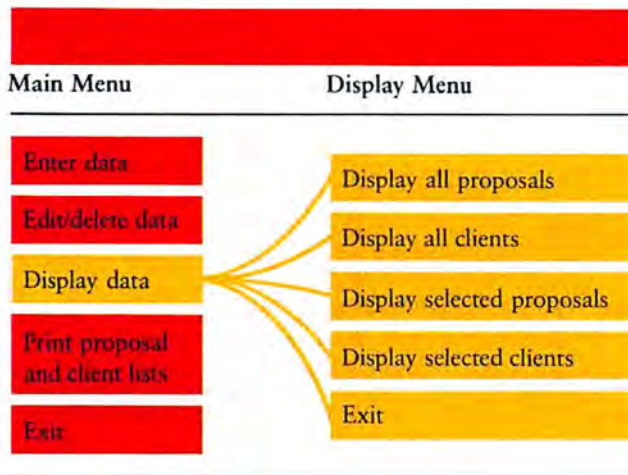
CLINUM	CLINAME	STREET	CITY	STATE	ZIP	PHONE
INTEGER	TEXT 25	TEXT 25	TEXT 20	TEXT 2	TEXT 5	TEXT 12

[F1] Insert [F2] Delete [F3] Review [F5] Reset value [F10] Help  
Database PROPOSAL --- Defining table CLIENT --- Column 1

Screen 3: The main menu lists the main function of the application.

MAIN MENU FOR CLIENT/PROPOSAL DATABASE	
(+)	ENTER PROPOSAL OR CLIENT INFORMATION
(2)	EDIT OR DELETE PROPOSAL/CLIENT INFORMATION
(3)	DISPLAY PROPOSAL/CLIENT INFORMATION
(4)	PRINT PROPOSAL/CLIENT REPORTS
(5)	EXIT





**Figure 2:** The Proposal system's menu tree. It's a good idea to design the menu tree on paper before defining your menus with the Express.

which list items along with numbers you type to select a choice, are generally easier to read and allow more descriptive text. Accordingly, you'll want to use vertical menus.

Enter the text for the main menu heading and then text for each menu selection, as shown in Screen 3, and press <Esc>. As you leave the menu definition screen, the Express will ask whether <Esc> should be used to exit the menu. If you select No, you must provide a menu selection for exiting the menu—a good practice anyway. Select Yes to provide a simple, standard exit method.

Next the Express inquires whether you want to include help text. If you choose Yes, the Express will display a blank screen onto which you can type information to explain the menu. The system operator could access the help screen by pressing <F10>. For this menu, choose No.

Once the menu is typed, you give it life by selecting an action for each menu option from the box at the bottom of the screen. The Load action is used for data entry. Edit and Delete enable you to change values in tables. Browse and Select display rows of data; Browse allows you to edit the data you are perusing. Print sends your previously defined reports to a printer or the screen (see the discussion under "Ace

Reporting"). The Custom and Macro actions allow you to execute procedures of your own devising, written in the *R:base* programming language. Use Menu if the option should proceed to a submenu.

### It's a Setup

The first option of the main menu is Enter Proposal or Client Information. The Express loads information into only one table at a time. Assuming that the operator will need to enter information into both tables, design the option to access the tables sequentially.

Select Load. The Express responds by asking which table it should load data into. Select Proposal, and the Express asks for a data entry form name. Press <Enter> to accept the default name (the name of the table), Proposal. The Express then lists the names of the columns in the chosen table, from which you select the items that should appear on the entry form. Since the operator needs to supply information for every column, press <Enter> at each column name. Select All, and press <Esc>.

The new form will appear on the screen. Enter a heading and replace the column names with English-like prompts. When the form looks like the one shown in Screen 4, press <Esc>.

The Express now asks if you want to specify another action for option 1. Respond with Yes, and choose Load as the action and Client as the table. Create an entry form for the Client table as you did for Proposal. When an operator chooses option 1, the two data entry forms will be displayed sequentially.

### Editing of Sorts

The second option on the main menu is Edit or Delete Data. For this option, choose Edit, which also allows you to delete data from a table. When asked to specify data entry forms, use the Proposal and Client forms you designed for loading data.

For editing, reporting, and displaying data, you can specify a sorting order of up to three columns. When asked to select a sorting column, choose Propnum. The proposals will be displayed for editing in numerical order.

For the editing, displaying, and printing options you can use the Express's qualifying feature to tell *R:base* to present only records that fit certain criteria. To create a menu option to edit or delete only those



proposals related to Building Analysis, you would choose the Descript column as the qualifying column and specify = **BUILDING ANALYSIS** as the condition. To be able to edit all records, press <Esc> when asked for a qualifying column.

Define two actions for the editing option (as for loading), one for each table.

### ■ Ace Reporting

To give the operator of the system maximum control over what records to view, you'll want to use a submenu for the third selection, Display Data. Select Menu as the action. Again, choose a vertical menu, and accept <Esc> as an option for exiting. Give the submenu the name **DISPLAY** and follow the prompts to create the menu shown in Screen 5.

From here, the Express will take you to option 4 of the main menu; you'll define the second-level menu later. For option 4, Print Proposal and Client Lists, the obvious action choice is Print. The procedure for designing reports is virtually identical to that for designing data entry forms.

First, select the table to print, and name the first report **PROPOSAL**. Choose a columnar format for

the report, which tells *R:base* to print the data in columns, as it is organized in the table. A row format prints each data item on a separate line. Select All for the columns to print. Then edit the report as you did the data entry forms, giving each column an English-like name—within the strict character limits imposed by the Express, of course.

Select Propnum as the sorting column, and press <Esc> when prompted for a qualifying column. Repeat the process to create a Client report. Now, when an operator chooses option 4, *R:base* will send both reports to either the printer or the screen, depending upon the operator's choice.

For option 5, simply select the Exit action. With all the options for the main menu defined, the Express will move to the next level of menus, which consists of the submenu of option 3, Display Data. (If you ever lose track of your position in the menu tree, you can press <F3> to display the tree with the current menu highlighted.)

Use the Browse action for the first two options, Display Proposals and Display Clients. Choose All for the columns to display, and select Propnum and Clinum, respectively, as sorting columns for the tables.

Use Select as the action for options 3 and 4 of the submenu. In both cases, display all columns.

### Screen 4: The Proposal form.

The forms you create are used to enter data with the Load action and to display data for the Edit action.

Press [ESC] when done with this data

#### PROPOSAL DATA ENTRY FORM

Proposal Number:   
Description:   
Amount:   
Probability:   
Client Number:

### Screen 5: The Display submenu.

Using submenus gives the application operator one-keystroke access to complicated functions.

#### DISPLAY MENU FOR CLIENT/PROPOSAL DATABASE

- (1) DISPLAY PROPOSALS
- (2) DISPLAY CLIENTS
- (3) DISPLAY SELECTED PROPOSALS
- (4) DISPLAY SELECTED CLIENTS
- (5) EXIT

The actions for menu selection 1 will be defined

Select action for this menu selection

Edit Delete Browse Select Print Custom Macro Menu Exit

[F3] Review [F5] Reset value [F10] Help

Database PROPSL - Defining Application PROPOSAL - Menu MAIN



Choose Propnum and Clinum respectively as sort columns. Because these options call for the display of only a selected client or proposal number, choose Propnum and Clinum as qualifying columns. When asked for the qualifying condition, select Eq (equals). When asked for a message to display, enter **PLEASE ENTER PROPOSAL NUMBER** for option 3 and **PLEASE ENTER CLIENT NUMBER** for option 4. When an operator executes these options, he or she will be prompted for the proposal number or client number to display. Select Exit as the action for selection 5 of the submenu.

### Ready to Run

With all the menus defined, your system is complete. You'll see code scroll by on the screen as the Express compiles the command file that will execute your design.

When the program is written, you'll be asked if you want to create an RBASE.DAT file for the application. An RBASE.DAT file automatically runs the application whenever *R:base* is loaded, like an AUTOEXEC.BAT file in DOS. This is handy when setting up a turnkey system for novice users or users who run only one application. If those using your system don't fit these characteristics, select No for this option.

To run the application, exit the Express and load *R:base*. If you did not compile an RBASE.DAT file, type **RUN PROPOSAL IN PROPOSAL.APX <Enter>** at the R> prompt. This tells *R:base* to run the application Proposal, which *R:base* has compiled in PROPOSAL.APX. The main menu of the proposal application will appear. The proposal data base is now easily accessible; through menus and entry forms, you can enter data, edit and delete information, view the data base in a number of ways using the display submenu, and print relevant data in a previously formatted report.

### Freedom of Expression

The Express does not incorporate all the power of the *R:base* programming language; instead it offers a system that almost anyone can use to quickly create a menu-driven entry and display system. Because applications generated by the Express are written in

*R:base's* programming language, however, you can easily implant sections of your own code. By choosing Macro as the action for any menu item, you can hook custom-made procedures into Express-generated systems. The Custom action enables you to write an *R:base* program while in the Application Express—a procedure recommended for only the most nimble programmers, because you cannot debug and test the code from within the Express. To test it, you must exit the Express and run it from inside *R:base*.

Those familiar with *R:base* can use its Reports and Forms modules to create custom reports and data entry forms that include error checking and data entry validation and that can cull data from several tables. Custom-designed data entry forms and reports are displayed by the Express as options for the Load, Edit, or Print actions.

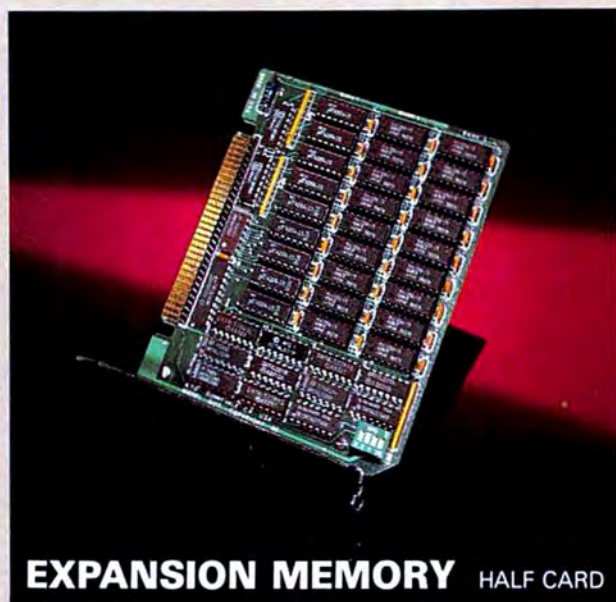
You should now be able to design simple applications with the Express. In less than an hour you can create a basic application with menu options for data entry, editing, displaying, and printing. You can start with a straightforward application and add more sophisticated features later. Extra columns to add to filed information, extra submenus to hone choices, and elaborate reports are logical additions to the proposal application and are easy to add from within the Express. And with the Express, modifications can be implemented almost instantaneously—you're the programmer. ●

*Nicholas M. Baran, a San Francisco-based technical writer and consultant specializing in data management and communications, is the coauthor of Using R:base 5000 (Osborne/McGraw Hill, Berkeley, California, 1985).*

*R:base 5000*  
Microrim, Inc.  
3380 146th Pl. SE  
Bellevue, WA 98007  
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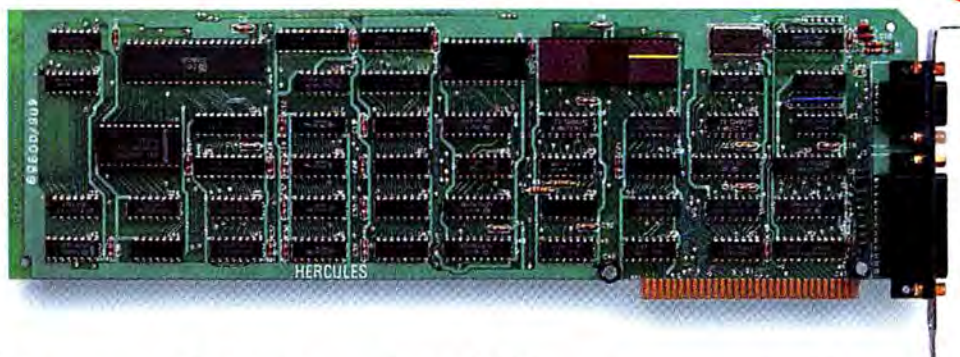
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# From the Software Shelf

*PC World offers first impressions of recent software releases*

This month's software grapples with James Joyce, the joys of capitalism, better book-keeping, and the windmills of your mind.

Edited by Robert Luhn

## Notebook II and Bibliography

"Thesis: Tree of Knowledge, etc."

"...yapyazzard abast the bloody creeks."

"'Au! Au! Aue! Ha! Heish! A lala!' Significance: Joyce's extensive reading about Egyptian primeval mud hills and burial vaults."

No, this isn't a script from a "Monty Python" show or a conversation posted on some teenage-hacker bulletin board. This was my graduate thesis on James Joyce, and at that particular moment in my checkered past, it was strewn all over my apartment floor on several thousand 3-by-5 notecards, each card an inscrutable island unto itself. I fumbled through the piles, broke rubber bands, struggled with grasping paper clips, and generally cursed the Muses.

Faced with the same task today, I would chuck the cards and sidle up to a PC with a copy of Pro/Tem's

*Notebook II*. While the program won't make Joyce user-friendly, it will keep your floor uncluttered and your mind fully hinged. Envision a well-organized, thoroughly indexed binder full of neatly typed notes, and you have a good idea of what *Notebook II* can do. Those who take extensive notes but find themselves at a loss when it comes time to organize them will appreciate *Notebook II*'s bibliographic and cross-referencing talents.

At heart a straightforward database, *Notebook II* allows you to create, edit, copy, sort, print, select, merge, and search (by key or character string) through records with a minimum of keystrokes. Records can run up to 28,000 characters in length; the number and size of data bases is limited only by disk space. You can assign records as many as 50 different headings of unlimited length and change, delete, or reorganize headings at any time.

(continues)





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*price, excellent documentation, drive replacement policy, and changeable interleave, may be the best deal going."* PC WORLD 8/85

*"Rugged construction, and DOS simplifying software (1 dir) make the Qubie' hard disk add-in a standout."* PC PRODUCTS 12/84.

*"Installation is easy. The documentation walks you through the entire process... We found the Qubie' consistently performed faster than the Microscience drive, shaving as much as one-third off the times in a series of access time tests... Considering the performance and money back guarantee, we have to rate the Qubie' PC20 a special value because of its relatively low price."* INFOWORLD 9/16/85.

Full reprints of these reviews available upon request.

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BT6Plus with 384K memory, serial, parallel, clock, BTDRIVE and BTSPool software. 1 year warranty.

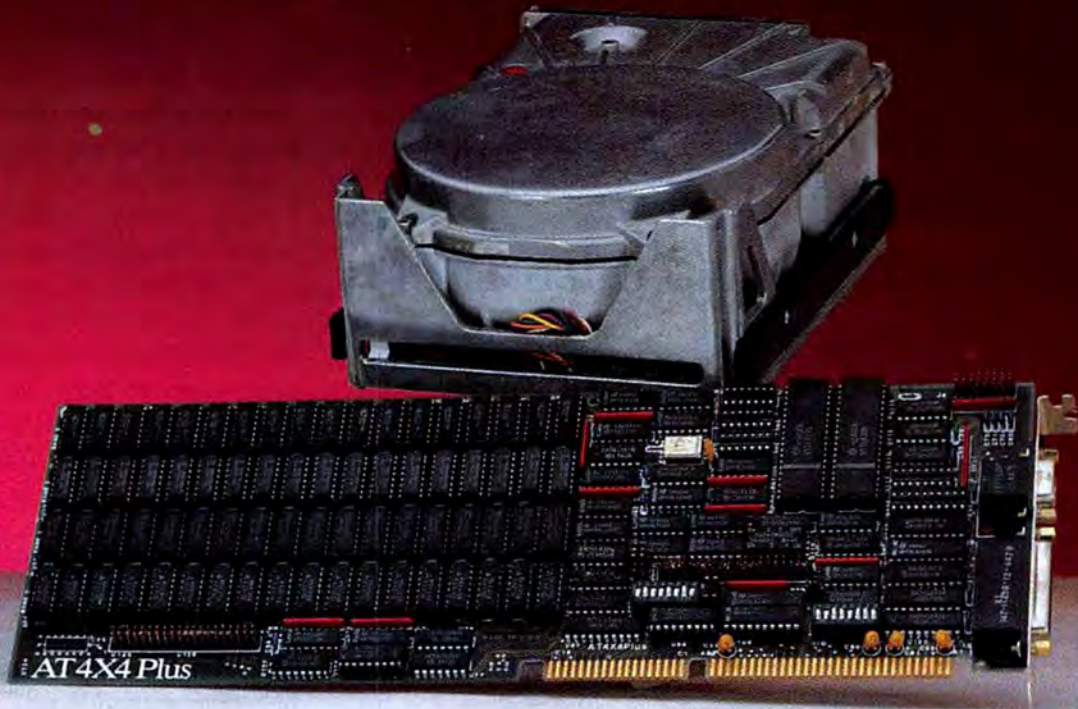
Qubie' PC 20 includes: 20 Megabyte hard disk, 5.25" controller, cables, Installation and User's Guide, **1 dir** and **zyINDEX** software. 1 year warranty.

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*Notebook II* is a handy tool; when combined with the separately sold *Bibliography*, it's an organizational powerhouse. *Bibliography* searches through a text file for citations, compares them with entries stored by *Notebook II*, and quickly constructs a complete bibliography in the format you specify. *Bibliography* can even replace citations in a text file with those from a *Notebook II* data base. However, *Microsoft Word* users take special note: *Bibliography* will accept only unformatted *Word* documents.

As you may have surmised, such textual acrobatics come at a price. You must wade through a taxing number of prompts and master a considerable collection of arcane commands. Delineating citations in a document is somewhat laborious as well, since you must bracket each reference with percent signs. *Bibliography* will strip out these markers once you've finished a compilation.

This duo's interface is also a bit imposing for the uninitiated. Certainly any program that includes a help file on the subject of moving the cursor should be approached with care. Both programs come with a precisely written user manual that bends over backward to be clear. Nonetheless, expect to set aside several afternoons to get acquainted with the programs.

If you're a full-time researcher, a recreational bibliophagist, or just

(continues)



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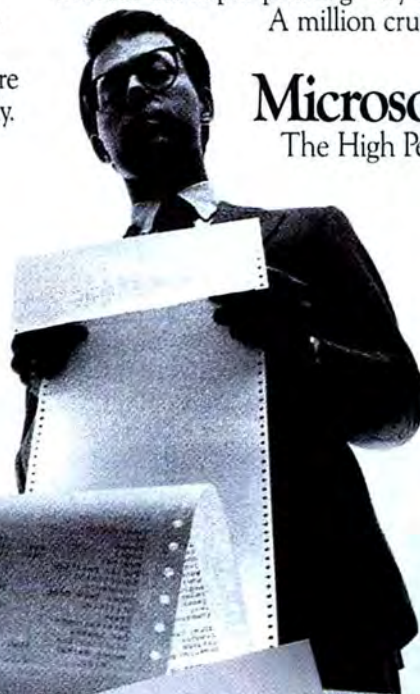
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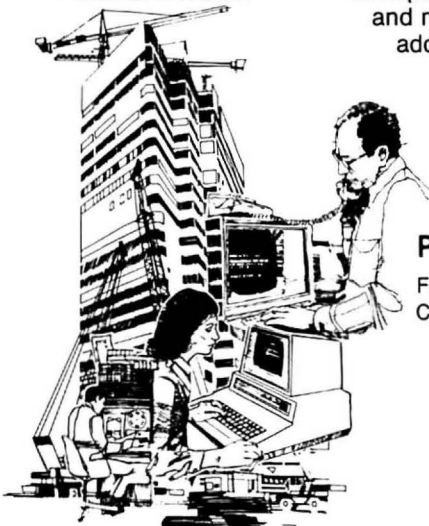
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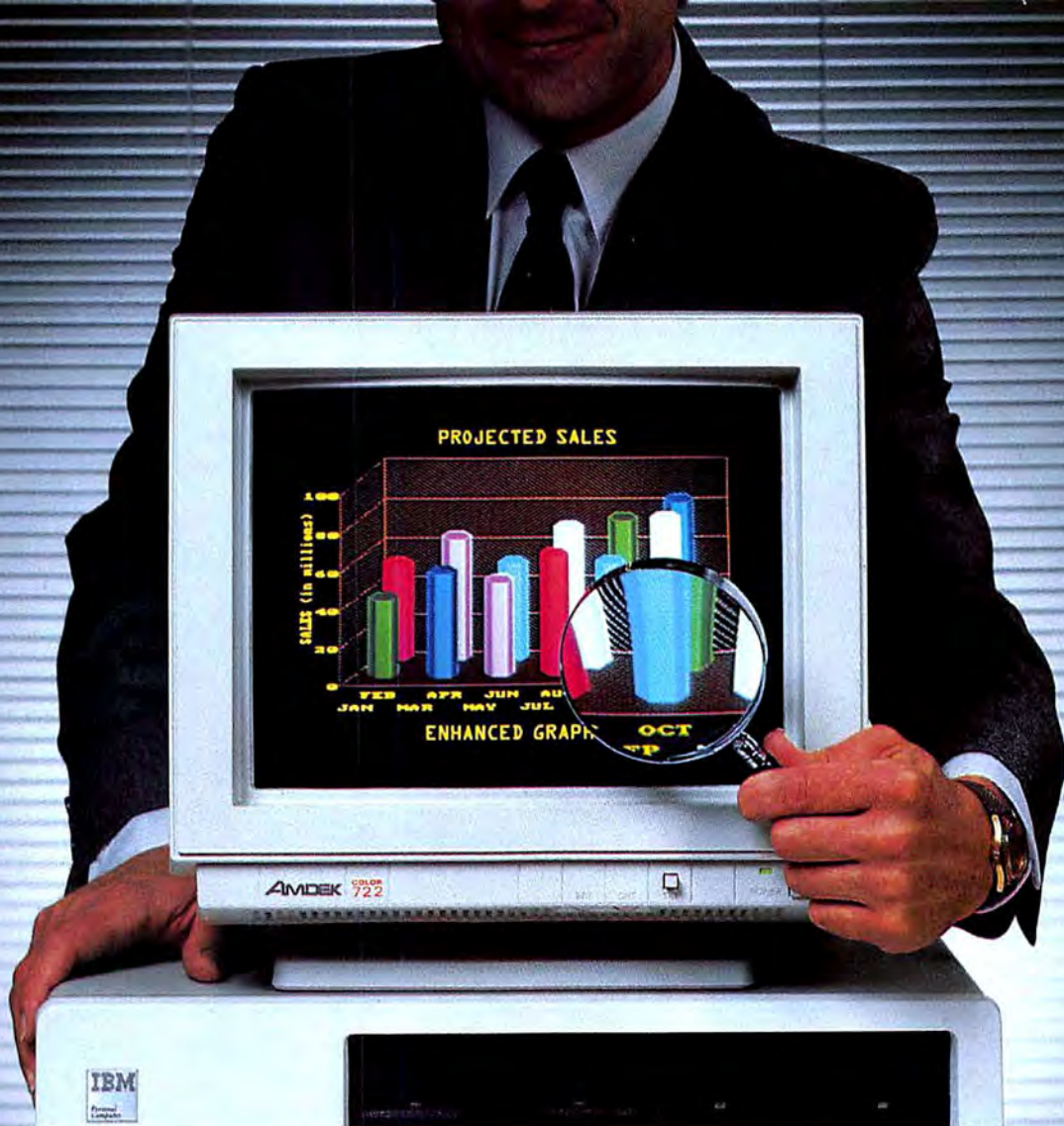
Unlike the stock market, futures trading is a zero-sum game. In order for you to make a dollar, somebody else has to lose one. A waggish Securities and Exchange Commission staffer once suggested that amateur investors provide the capital that makes the commodities markets profitable for professional traders. A commodities regulator pooh-poohed this notion, holding that the only difference between professionals and amateurs is the speed at which they lose money.

*Speculator* recreates this madcap world in stunning detail. The game begins with the clock set at 7:24 a.m. Chicago time. (Everything in commodities revolves around Chicago, just as the stock market centers on New York.) Up to six players enter orders, the program calculates margin requirements, and after some silly stick figures parade across the program's exchange floor, trades are executed. Players then check their long and short positions and discover how much money they've made or lost. As your trading skills sharpen, you can jump from novice (with a grubstake of \$10,000) to speculator (\$20,000), and finally to floor trader (\$40,000).

Though sold as a game, *Speculator* is a first-rate simulation. Futures contracts open on rotation, and you can enter sophisticated orders that open spread positions, such as long December Treasury bonds, short June Treasury bonds. The program verifies unfilled orders, monitors continuous price

(continues)





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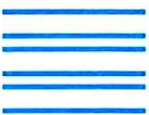
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*Speculator* also reinforces another basic investment concept: Cut your losses quickly and let your profits run. A trend, in short, is your friend—but never fall in love with one. Acquiring the necessary discipline takes some practice, something *Speculator* can provide without obliging you to mortgage your house.

In the commodities market, of course, disaster is the stuff of which fortunes are made, and *Speculator* regularly flashes tantalizing headlines of possibly profitable catastrophes. War breaks out and gold goes through the roof; a freak snowstorm wipes out Florida farmers, hiking orange juice prices. The savvy player gauges these acts of the Ultimate Kibitzer and places his bets accordingly. Remember: A robust swine flu epidemic could be worth millions in pork belly profits. Ah, the joys of capitalism!

Though *Speculator* doesn't encompass all the complexities of the commodities market, it's a useful whetstone for those familiar with the subject—and it's bully good fun.

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## One-Write Plus

Writing a book is one thing; keeping books is quite another. When faced with maintaining a set for my own retail business, I bought a ledger, sharpened a dozen pencils, and dedicated my evenings to the

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Your business scenario need not follow this sorry course. With *One-Write Plus* from Evergreen Software you can reduce book-keeping headaches and your CPA's tab at the same time. Anyone familiar with the manual One-Write system can be up and running with *One-Write Plus* in short order. The thoughtful documentation painlessly introduces you to the wonders of keeping your money straight; the program's self-explanatory menu system gives you easy access to program functions, the general ledger, and the cash disbursements and cash receipts journals.

As with a One-Write or Safe-guard checkbook/ledger system, fill-

(continues)



# How does WordPerfect top 4.0? Extra credit.

## WordPerfect 4.1 Performance Report

*A  
+5 extra  
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A lot of people have been saying a lot of good things about WordPerfect, lately. In fact, our 4.0 version has been called the industry standard for word processing.

Of course, our first reaction was smiles all around (and a celebration or two). Our second reaction? Back to work on WordPerfect. Not because it isn't already a great program. But because the one thing that has made WordPerfect a success is our commitment to constant improvement. Reaching for perfection.

The latest result of that commitment is WordPerfect 4.1. And with several new features, it scores more than a few extra points.

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With a built-in thesaurus, WordPerfect 4.1 lets you choose synonyms for any words in your document.

### *2. Split Screen*

By splitting the screen

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## A few other things \$495 won't buy.

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ing in an on-screen check (see Screen 1) simultaneously enters the date, payee, check number, and amount in a cash disbursements journal that lies "underneath" the check. *One-Write Plus* not only displays the checkbook balance (and flags overdrafts) but ensures that numbers are entered correctly and in the right slots. Once a check is "written," press <CursorRight> until the appropriate account column appears, press <Enter>, and the amount is posted. If you must distribute an amount to as many as six accounts—for example, if a loan payment includes principal, tax, fees, and so on—the program automatically calculates the value of the final entry and ensures that everything balances.

Monies received are posted to a cash receipts journal in similar fashion. Both cash receipts and cash disbursements journals offer 25 user-definable account categories plus a number of miscellaneous accounts for unusual entries. *One-Write Plus* also automatically posts recurring fixed income and expenses to their appropriate journals at the beginning of every month. Like any good accounting package, *One-Write Plus* can juggle several checking and savings accounts and issue checks on printed forms.

Though *One-Write Plus* can't close the books at the end of the month, it will automatically post all transactions to a double-entry general ledger. Manual entries, such as bank charges and automatic loan payments, can be posted to this ledger as well. After a month is "closed," entries cannot be changed.

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Though my CPA was skeptical about general ledger programs (and computers), *One-Write Plus* has turned him into a PC evangelist. "*One-Write Plus* is an all-inclusive financial system for small businesses," he says; forthcoming Accounts Receivable, Accounts Payable, and Payroll modules should buttress that opinion.

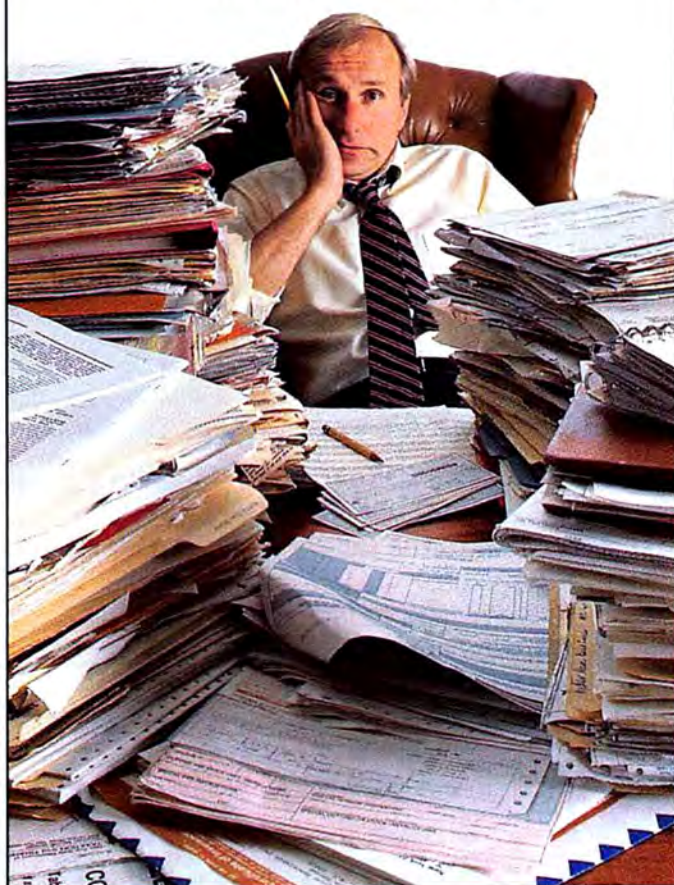
*One-Write Plus* isn't the alpha and omega of accounting programs, but it does give the small business owner just the right measure of scope and depth. *One-Write Plus* will not only keep your records straight and pare your bookkeeping bills, it will provide timely and accurate information for making business decisions. How can you lose? —Linda Gail Christie

*One-Write Plus, version 1.0*  
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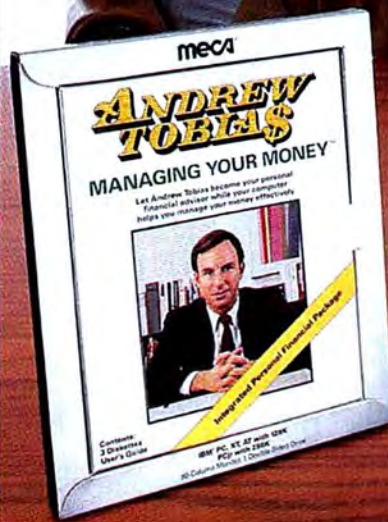
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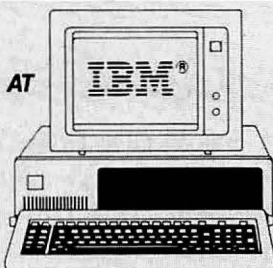
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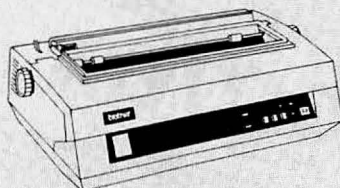
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cursoff  
curson  
delete  
drand  
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exit  
exitmsg  
exp  
fabs  
fclose  
fdopen

feof  
ferror  
flush  
fgetc  
fopen  
fread  
free  
freopen  
fscanf  
fseek  
fgetc  
fgetch  
fgetchar

## Functions

getcseg  
getdseg  
getd  
putd  
getdate  
gettime  
geti  
puti  
getkey  
getmode  
setmode  
gets  
getw  
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*Life/Time Manager* is no expert system, but it quickly forces you to sift important and realistic goals from the dreamy chaff. Unfortunately, I'm the sort who wants to do everything in the shortest time possible, and this tends to complicate the process. I did discover that

(continues)



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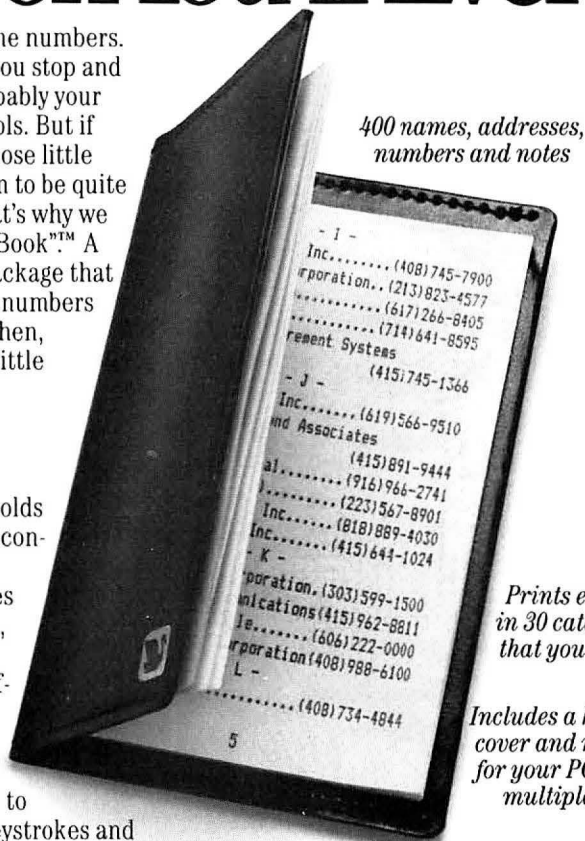
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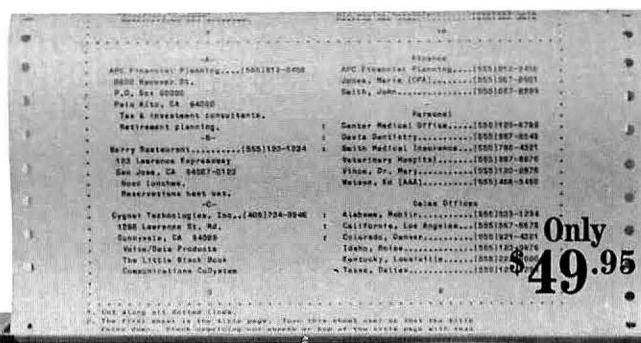


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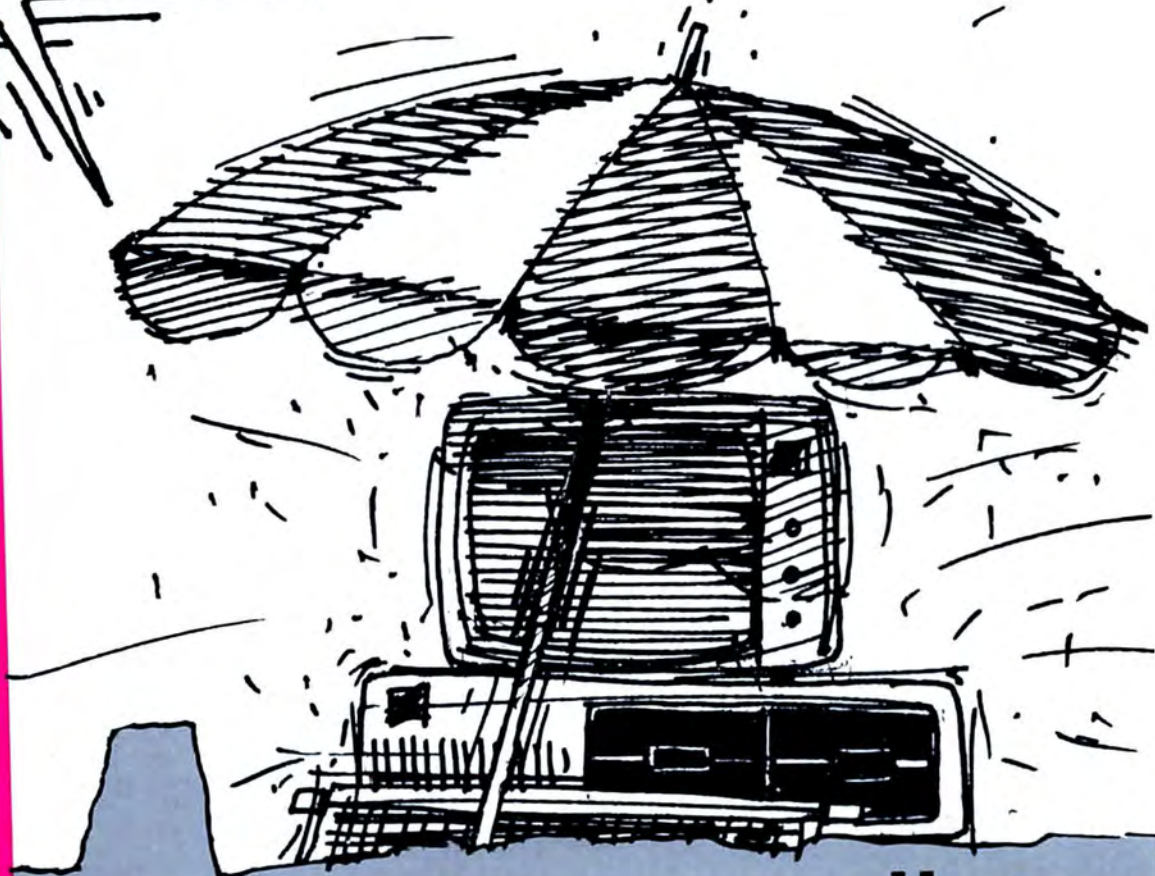
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some of my lifetime goals (such as living on another planet) were decidedly vaporous and thus hard to plan for. Conversely, I found that others (buying a car, visiting the Ozarks) were reachable within six months.

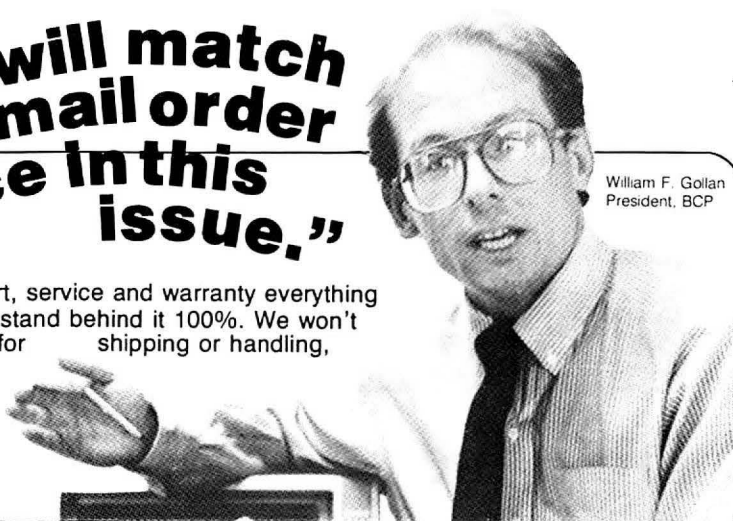
Of course, *Life/Time Manager* can't make decisions for you. Is getting tickets for The Boss "extremely important" or merely "very important"? Such issues are beyond any program, but *Life/Time Manager* can help you beat a quicker path to those personal and professional doors you want to open. — May Sui

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Judy Getts is a freelance science writer in Wauwatosa, Wisconsin. Stephen A. Blumenthal is a Washington, D.C., attorney and vice president and director of regulatory relations for the Securities Industry Association. Linda Gail Christie is a columnist for Pico and the author of *Simon & Schuster's Guide to Microcomputer Peripherals*. May Sui is editorial secretary for PC World. ☐

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# From the Hardware Shelf

*PC World offers first impressions of recent hardware releases*

Compatibles lining this month's shelf: Panasonic's Executive Partner, Tandy's penny-pinching 1000, and HP's new and improved Portable Plus. For graphics fans, a look at the Modular Graphics Card.

*Edited by Robert Luhn*

## Executive Partner

Panasonic strikes again. The Japanese consumer electronics giant has eclipsed its two-year-old success story, the Sr. Partner, with the Executive Partner, a sleek new transportable dressed for corporate success. Key differences are a high-resolution plasma display, faster processing (courtesy of an 8086-2), and graphics and correspondence quality printing on a built-in thermal printer, all for what the Sr. Partner cost last year—\$2595. (For information about the Sr. Partner, see *From the Hardware Shelf*, PCW, August 1985.)

Not surprisingly, the Executive Partner has inherited the traits that guaranteed the Sr. Partner's popularity: PC compatibility, value, and a heavy dose of innovation. On the first point, Panasonic claims that over 400 PC programs run on the Executive Partner. In my own informal tests, *1-2-3*, *dBASE III*, *WordStar*, and Microsoft's *Flight Simulator* ran without complaint.

Unlike other transportables, the Executive Partner's memory can be expanded from the standard 256K to 640K just by adding RAM chips to the motherboard. The dual-drive system also includes a built-in clock/calendar, an 8087 socket, serial and parallel ports, MS-DOS 2.11 and GW BASIC, and a 120/220 voltage selector for travel abroad. Like its less svelte sibling, the Executive Partner has only one short expansion slot. If you have bigger plans for your unit, Panasonic sells an expansion box with three full-sized slots and a 35-watt power supply.

Don't be fooled by Panasonic's cleverly photographed ads: This is no laptop computer, but rather a

The Executive Partner ready to go



29-pound machine that's best left on your desk. In fact, it takes up slightly more desk space than the Sr. Partner, though it is 3 inches thinner and thus a little easier to transport.

Whether on your desk or on the road, the Executive Partner's main attraction is its stunning 9½-inch plasma display. Text and graphics are sharp, and though the burnt-orange display takes some getting used to, it is noticeably more soothing to the eye than green. Unlike other displays, plasma is flicker-free, and it has an estimated life span ten times that of standard CRTs and four times that of liquid crystal displays. The system's built-in display adapter emulates the IBM Color/Graphics Adapter, so PC color graphics programs run in monochrome with nary a hitch.

Graphics from such programs are easily trotted out on the Executive Partner's built-in thermal printer. In thermal mode, the printer produces drafts at 60 characters per second (cps); it is restricted to using thermal paper



available only from Panasonic dealers. (The \$4.95 perforated rolls are roughly equivalent to 70 8½- by 11-inch pages.) For correspondence quality output, insert a thermal transfer ribbon cartridge and you can print on all manner of single-sheet paper, though the smoother the stock, the better the results. At 30 cps, the printer won't set any speed records, but at least you can avoid chemically coated paper and the miseries of installing paper rolls.

In terms of ergonomics, the Executive Partner scores high on this reviewer's Clap-O-Meter. The plasma display can be adjusted to any viewing angle. Both computer and printer are mercifully quiet. The keyboard is responsive, more or less matches the PC's layout, and features larger keys for easier touch-typing. Unfortunately, the keyboard cannot be detached from the system unit, so adjusting one moves the other.

Having had the dubious pleasure of mastering the idiosyncracies of many PC compatibles, I would rate the Executive Partner among the best. If I were handing out awards, this computer would receive "Most Portable Transportable" and "Best Quality Graphics and Text Display," with honorable mentions for compatibility, innovation, and durability. The Executive Partner is one traveling companion you'll be proud to share your office with.  
—Christine Whyte

*Executive Partner*  
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It's not a laptop, but  
the Executive Partner  
is tops in compatibility  
and screen display.

## HP Portable Plus

When I reviewed the Hewlett-Packard HP 110 Portable ("HP's Desktop in a Briefcase," *PCW*, Vol. 2, No. 13), I praised the machine for several notable features. Having I-2-3 wired into the machine made for quick loading and nearly instantaneous response. The battery-backed RAM disk let me save files without bothering about disk drives—even with the power turned off. And HP's battery management system was simply the best I'd seen in any portable computer. The screen displayed the percentage of power left; when the internal batteries ran low on power, the unit automatically shut down, thus preserving files until AC power was available for recharging. For the business user rightly impatient with DOS minutiae, HP wrapped a permanent software "shell" around DOS called the Personal Applications Manager, or PAM, that made managing files and DOS subdirectories a cinch.

On the negative side, the HP 110's 16-line liquid crystal display (LCD) was tough to read even in favorable lighting. And while the 110's memory contingent was large enough for a few built-in programs, such as I-2-3, it left precious little room for anything else. The lack of PC software for the system also gave me pause.

(continues)



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Hewlett-Packard apparently listened to both its customers and, in all modesty, the press. The HP 110 Portable Plus keeps its predecessor's good features while addressing some nagging problems. First off, the Plus features a 25-line LCD screen. Both memory and the selection of programs have been expanded, thanks to two special form-fit "drawers" that accommodate RAM and software stored in ROM. Plus owners can also opt for a 300/1200-bps modem.

Except for the system's standard 128K of low-power CMOS RAM and a CMOS 8086 microprocessor, virtually everything for the Plus comes à la carte. The unit accepts up to two 128K CMOS RAM drawers (at a whopping \$595 apiece); if you're hungry for more, you can add two additional 128K

RAM boards (\$495 each) to each drawer, bringing system memory to a respectable 896K. Memory can be partitioned easily between main memory (where programs "live" while running) and a RAM disk, where files are stored.

Since RAM and ROM drawers use the same slots, it's wise to devote one slot to RAM (for a maximum of 512K) and the other to HP's 12-socket ROM drawer. Of the ROM software tested, *Microsoft Word* is the greediest, demanding 140K of main memory. But on a 384K system, that still leaves 244K for documents.

Because the Portable Plus accepts software in ROM, HP has unwired 1-2-3 and several other programs

(continues)



Out of sight, not out of reach: the Portable Plus with removable drawer and ROM software

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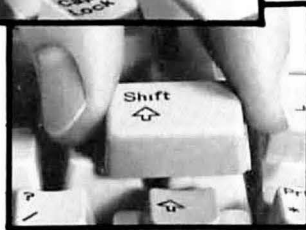


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from the unit. Although DOS, PAM, and Terminal are still built into the system, you must now pony up the cash for *1-2-3* and *Memomaker*. HP is not thoroughly heartless about the matter: The basic Plus is a full \$700 cheaper than the HP 110 Portable.

*Memomaker* is also paired in a ROM chip with a handy new utility called *Time Manager*, a desktop manager that features an alarm clock, a calendar, a phone directory/dialer, and an appointment book. *Time Manager* even rings an alarm when the Plus is turned off and closed up. When you hear the trill, open up the computer, and the message you originally typed in when you set the alarm is displayed. Another extra to consider: Portable Desktop Link, a PC expansion board and software combination that, once installed on an IBM PC or HP Touchscreen computer, makes data transfers to and from the Plus a breeze.

The real bonus, however, is the growing, albeit severely limited, selection of powerful ROM-based software. Currently available programs include *1-2-3*, *Microsoft Word*, *PC-2622* (a terminal emulation program), and *Microsoft BASIC*. *Multimate*, *Symphony*, and *Executive Card Manager* should be in the chips soon. *1-2-3-on-a-ROM* is functionally identical to the *1-2-3* version 1A wired into the original Portable. The ROM variant of *Microsoft Word* is version 1.10, not the 2.00 disk version currently on the market. Still, it is a powerful word processor that runs quickly and

(continues)





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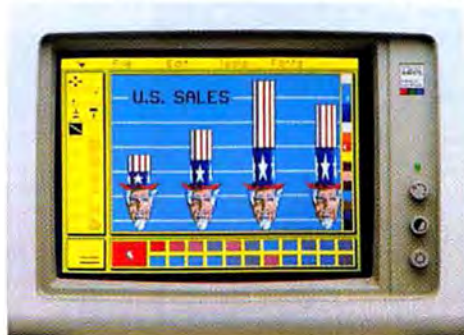
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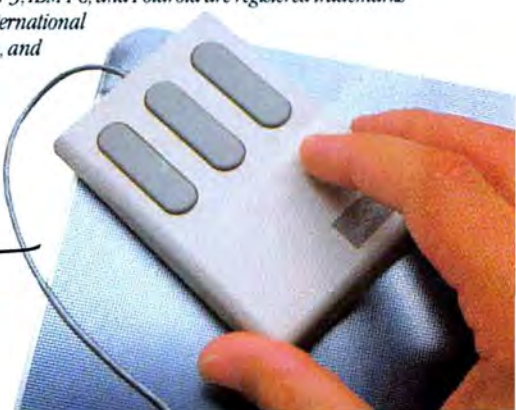
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with its character formatting capabilities intact. Even on the LCD, you can view boldfaced, underlined, and super- or subscripted characters. On-line help is built into ROM, as are drivers for over 20 printers. An accompanying utility disk includes a program that converts WordStar files to Word format.

Hewlett-Packard is the first to admit that briefcase computers can't take the place of desktop machines. Prime hindrances are the poor LCD screens and, in the case of the Plus, a dearth of powerful application software. Consider sticker shock too: A 512K Plus with all the trimmings can easily top \$4000. Add pricey ROM software (which is not that easy to find), and you have a machine costing as much as a Compaq DeskPro. Nevertheless, if portability is a primary requirement—and you use the same software on your desk-bound machine—you won't regret laying down the money for a Plus.

—Danny Goodman

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## Modular Graphics Card

The only sure bets in the computer industry are taxes and product revisions. Unlike detergents, where only the packaging changes, software and hardware sometimes undergo massive revisions within the first six months of release. In the rush to stay a step ahead of competitors, many companies close their eyes, release a product, and hope they'll get a chance to "upgrade" it the second or third time around. Knowledgeable PC users have learned to wait until the upgrade frenzy subsides before buying a product.

In the case of the Modular Graphics Card from Paradise Systems, it's not a matter of shaking out bugs but merely refining an already solid piece of engineering. On the market since August 1984, the board is aimed at business users wanting sharp IBM monochrome text, plus the ability to display monochrome graphics produced by 1-2-3 and color graphics generated by other programs. The board drives any RGB or composite monitor that is compatible with the IBM Color/Graphics Adapter, as well as any IBM-compatible monochrome monitor. Paradise affirms that the Modular Graphics Card works with compatibles from Leading Edge, Sperry, Columbia, ITT, and Zenith, plus the Tandy 1200 and

*(continues)*



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the NCR PC4. Corona and Eagle owners can use the board only if color monitors are attached.

Unlike its competition—notably monochrome and color boards from Hercules—the Modular Graphics Card runs any PC-compatible graphics program, from *Symphony* to *Flight Simulator*, without modification. You need not load a software driver before running a program—the Modular Graphics Card has this necessary software magic stored on a ROM chip.

The Modular Graphics Card duplicates the text and 16-color graphics output of the IBM Color/Graphics Adapter, replacing each color with a shade of gray when attached to a monochrome monitor. Unlike the IBM Color/Graphics Adapter and the Hercules Graphics Card, the Modular Graphics Card is flicker-free. It does not currently support 640-by-350 graphics resolution such as that produced by the IBM Enhanced Graphics Adapter.

Paradise has made life easier for customers by also storing the necessary hardware drivers in ROM. Installing a monitor for earlier versions of the Modular Graphics Card involved setting board switches to signify type and brand of monitor and then loading the appropriate driver. With version 4.0, you merely move a jumper on the board to specify whether a composite or RGB monitor is being used. You need only set switches when using a monochrome monitor. For monitors not listed in the user manual, a utility

(continues)



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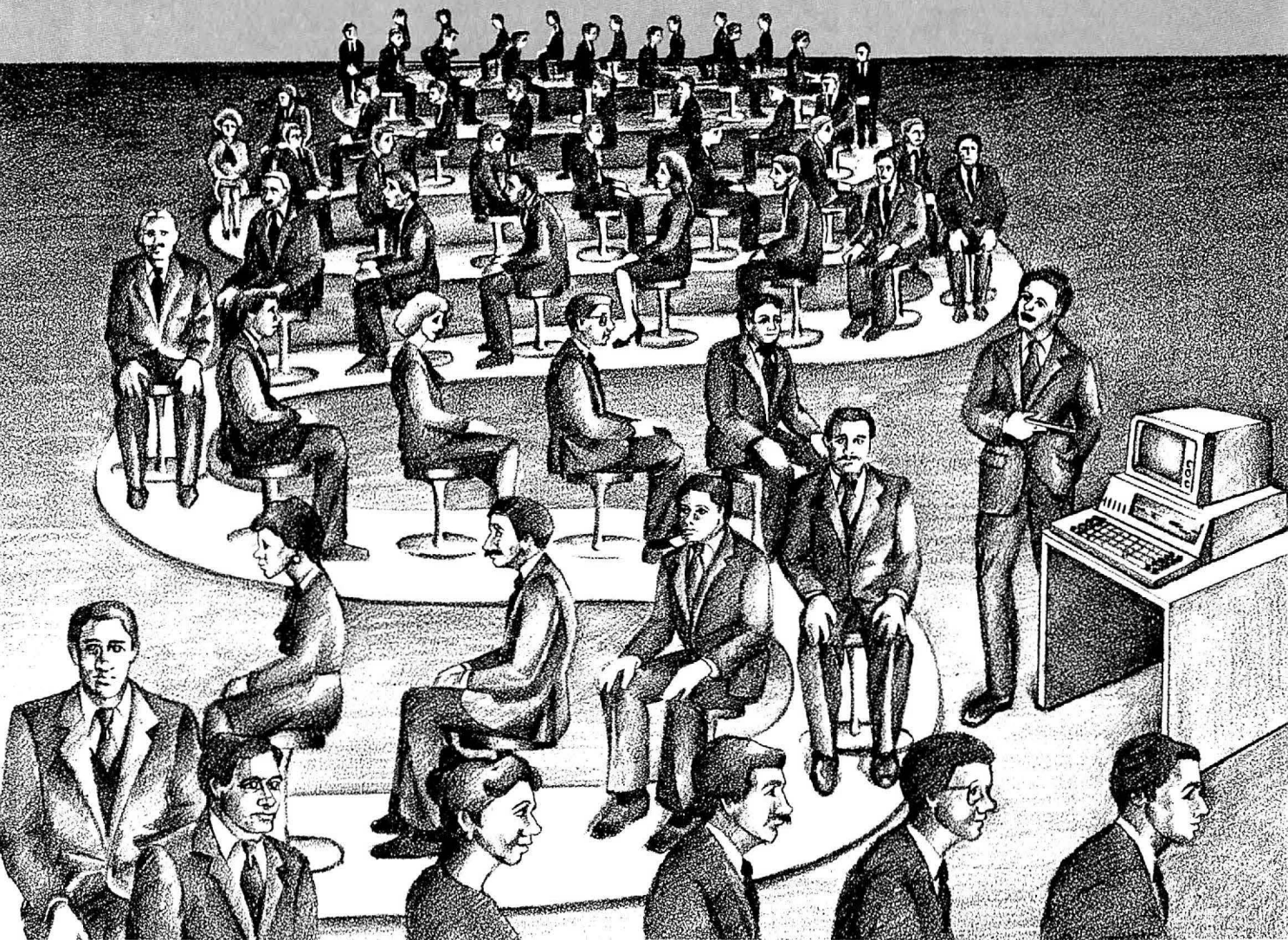
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## The Class Alternative

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program included with the board provides instructions for altering software or setting the correct switches.

At worst, installation might take 5 minutes. If you have only this board and you frequently switch between monochrome and color monitors on your PC, your patience may wear thin as you repeatedly open up the system unit to set switches.


Like most PC hardware in these competitive times, the Modular Graphics Card comes in varied styles. You can add a serial or parallel port (Module A); 64K, a clock/calendar, and sockets for 256K of memory (Module B); or all of the above plus sockets for an additional 128K of memory (Back-Pack Module). RAM disk and print spooling programs come gratis with the board.

The price is right, and the Modular Graphics Card offers enough facets to satisfy the graphics user eager to travel the monochrome-to-color upgrade path. The Modular Graphics Card makes the climb easier and less expensive.

—Christine Whyte

*Modular Graphics Card*  
Paradise Systems, Inc.  
217 E. Grand Ave.  
South San Francisco, CA 94080  
800/527-7977, 800/822-2020  
California, 415/588-6000  
List price: \$395, Module A \$95,  
Module B \$195, BackPack  
Module \$299

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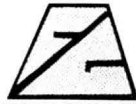
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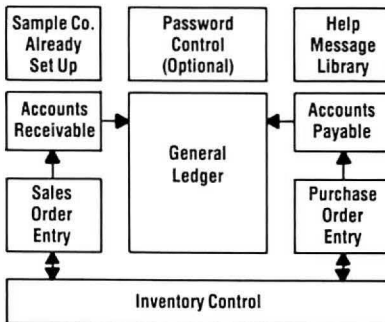
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Howard Millman Manager, Software City Centerville, Ohio



### PERFORMANCE CHART

	DAC	Starbridge Accountant	Open Systems
Integrated Modules	Y	Y	Y
On-Screen Editing	N	Y	Y
Flip Chart Manual	N	Y	N
Password Control	N	Y	Y
Multi-Company Option	N	Y (9)	Y
Price	\$69.95	\$99.95	\$595.00 /Module

### FEATURES

- Manual features a Business Selection Chart to choose the modules you need for your type of business. Modules can be run separately.
- Full system installs in less than 30 minutes.
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## Tandy 1000

The Tandy 1000 is what the PCjr should have been: a compatible, economical PC alternative that offers built-in video and printer interfaces, near-PC performance, and a humane keyboard. The 1000 doesn't represent a microcomputing milestone; it's simply a solid performer at a rock-bottom price.

The 1000 is an inexpensive ticket to the MS-DOS world. A 128K, single-drive unit sells for \$999 (\$775 from some mail-order houses). An easily installed second floppy drive costs \$199. Adding a board with 256K of RAM and direct-memory access (DMA) circuitry that speeds up operations costs \$239. (Tandy omitted DMA from the basic 1000 to cut costs, maintaining that most programs that run on a 128K PC don't require it.) For another \$250, you can complete the system with a serial port and a monochrome graphics monitor. In short, about \$1500 buys all the computer many people need. And for those wanting more storage, the 1000HD, which lists for \$1999, offers a 10MB internal hard disk.

A petite PC, the 1000 weighs only 17 pounds and measures 6 by 17 by 13¾ inches. Under the hood an 8088 governs up to 640K of RAM, video circuitry compatible with both the PCjr and IBM's Color/Graphics Adapter, a parallel printer port, and three-voice sound circuitry. The 1000 can drive RGB

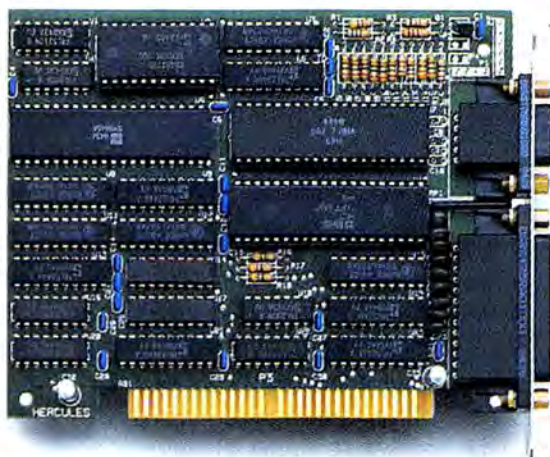
or composite video monitors and is more colorful than the PC, offering 4 hues in high resolution and 16 in medium resolution. Although the printer interface is PC compatible, don't expect to use your PC's cable with it. A 34-pin connector rather than IBM's 25-pin connector is required; Radio Shack naturally stocks this cable. Expectant number crunchers should be aware that only recently manufactured 1000s (marked on the back panel as 1000As) contain a socket for the 8087 coprocessor.

The 1000's small size works against it in one big way: The computer's three expansion slots can't house boards longer than 10 inches. This means doing without a Hayes Smartmodem 1200B or Intel's megamemory AboveBoard. Luckily, Tandy has introduced its own internal 1200-bps Hayes-compatible modem for a paltry \$299. The 1000's memory barrier may soon be broken by two veteran TRS-80 peripheral companies—Hard Drive Specialists of Houston and Matthew Electronics of Ojai, California—that are developing products that cram 512K, a clock/calendar, and a serial port onto a smaller board for the 1000.

On the software side, the 1000 comes with MS-DOS 2.11 and GW BASIC (manuals are optional) and *DeskMate*, a Tandy-created program combining word processing, filing, spreadsheet, communications, and scheduling functions.

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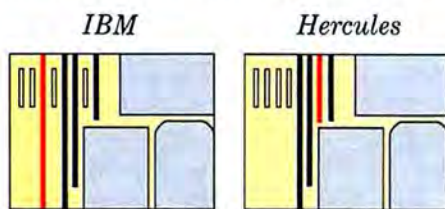
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Did you know that there's a color graphics card specially designed for the XT™? It's called the Hercules™ Color Card. We think that it's better for your XT than the IBM® Color Graphics Adapter. Here's why.

The XT comes with an empty short slot. IBM's card is too long to fit in it, so you're forced to sacrifice a valuable long slot, while your XT's short slot goes unused.

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And we'll do just about anything to make our products the most reliable you can buy.



Of course, you *will* have to give up something when you buy a Hercules Color Card. You'll have to give up software incompatibility. With Hercules, there is none. Every program that runs on the IBM color card will run on the Hercules Color Card.

You'll have to give up IBM's ninety day warranty. Ours is two years.

Compare warranties	
IBM	3 months
Hercules	2 years

And you'll have to give up a dollar. The Hercules Color Card is \$245—IBM's is \$244.

Look into the Hercules Color Card for the XT, PC or AT™. Find out why the readers of *PC World* voted the Hercules Color Card 1985's best color graphics card—ahead of IBM's. Call 1 800 532-0600 Ext. 421 for the name of the dealer nearest you and we'll rush you our free info kit.

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## From the Hardware Shelf

Tandy bills *DeskMate* as a "first step in software" for new 1000 owners. That's accurate billing—*DeskMate* is no *Framework*, but it's an ideal beginner's package, and the price is right. Commands are consistent across all applications, and *DeskMate* provides integration through its Merge command, which inserts an ASCII file created by one application into another.

But PC compatibility is what often makes or breaks an MS-DOS machine. PC-DOS 2.00 and 3.00, 1-2-3, *Flight Simulator*, Microsoft Word, and *ProKey* all ran faithfully on the 1000. But Tandy's engineers, anxious to provide added value, failed to reckon with the problems a nonstandard IBM keyboard creates. The 1000 keyboard features two extra function keys and a <Hold> key (which acts like a <Ctrl>-S/<Ctrl>-Q toggle), yet lacks the <ScrollLock> key that is so vital for using *Framework* and *Flight Simulator*. You can produce the same effect in *Framework* by pressing <Ctrl>-<Hold> <Hold>—not a particularly elegant solution. Programs that use the PC's <GrayPlus> and <GrayMinus> keys, such as *ThinkTank*, also experience difficulties because Tandy curiously combines these keys with the <Ins> and <Del> keys, respectively. But the company applies balm by including a keyboard device driver, which you can install in the system's CONFIG.SYS file.

Despite some minor flaws—shorter slots and a keyboard that strays from the IBM trail—the Tandy 1000 is a worthy contender in the crowded clone arena. With over 9000 stores and annual sales in the \$3 billion ballpark, Tandy is here to stay. In an era when compatibles makers rise and fall like the tides, that's a factor no one should overlook. —Jim Heid

### Tandy 1000

Tandy Corp./Radio Shack  
400 Atrium

One Tandy Center  
Fort Worth, TX 76102  
817/390-3011

List price: 1000 \$999, 1000HD  
\$1999 ●

Christine Whyte is PC World's Product Review Editor. Danny Goodman is a Contributing Editor for PC World and Macworld and the author of *How to Buy an IBM PC or Compatible* (PC World Books/Simon & Schuster, New York, 1984). Jim Heid is a freelance writer and the coauthor of *The Complete Guide to the Tandy 1000* (Ashton-Tate Publishing, Culver City, 1985).



**On March 30, 1985, the freighter MERCEDES was deliberately dynamited and sunk, becoming an artificial reef and diving wreck.**

*Boca Raton, home of the IBM PC  
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The ATplus40™ drive has double the capacity of the standard IBM 20MB drive, runs 30% faster, and has reliability second to none.

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How about the random failures, the thousands of users that are progressively losing data — part of a file here, two files there.

### THE CRASH OF '86.

InfoWorld, a highly respected computer weekly, conducted an intensive evaluation of IBM's hard disk and CORE's ATplus™ 20MB drive. They went beyond routine speed and technical comparisons, evaluating resistance to head crashes with destructive testing.

Like bumping, dropping and slamming the drives while the computer was in use.

"...It [the IBM drive] was the only unit that failed every bump test, destroying data and developing bad bytes with even the gentlest of the tests. Because the jostling of test 1 is fairly common in offices, the chances of your losing data with the [IBM] drive are good with only normal, regular use, precisely the problem reported by many AT users. During the [more severe] test 2, the [IBM] disk came close to self-destruction... We do not recommend its use."

In summary, they said, "...the hard disk drives supplied as standard in the [IBM] AT are unreliable, destroying data and requiring many trips to service centers for reformatting and exchanges."

### AN EDITOR'S ODYSSEY.

"The bottom line is that IBM is not maintaining the reputation for quality products that has made it so successful in the business world," says John Dickinson, a contributing editor to PC Magazine, a leading periodical for IBM personal computer users.

Consider his AT hard disk ordeal: His original AT Enhanced model's hard-disk began failing after six-months of light use.

Two replacements from IBM also failed to perform.

The third IBM drive failed to write most of a word-processing file.

While he goes into much detail in

the story, Mr. Dickinson concludes that, "There have been plenty of 'authoritarian' reasons given in the press about the cause of the AT's disk problems— none of course, come from IBM. Wherever they come from, my experiences support all the popular theories..."

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InfoWorld's testing the ATplus™ in comparison with the IBM drive actually confirms exactly what we have been saying all along: "Now you can build the IBM PC-AT that IBM didn't."

CORE's ATplus™ passed all of their tests. InfoWorld went on to say, "[CORE's] hard disk drive is built like a Sherman tank, offering exceptional per-

formance and reliability. Even novices should be able to install the kit, and technical support is good."

PC Magazine, in another in-depth article says, "CORE International's big, fast, tough add-in mass storage systems for the IBM PC-AT use proven technology to gain speed, [increase] capacity, and avoid the problems said to plague the AT's factory issue hard disk."

### PEACE OF MIND.

We're the world's largest supplier of high-performance PC-AT compatible hard disk drives.

And respected magazines such as PC Week, InfoWorld and PC Magazine have told you how we got there.

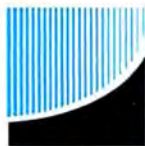
ATplus drives are available from or are in use by Computerland, General Micro, MicroAge, Inacom, Businessland, Entre, NASA, GE, EXXON, the Department of Defense, the White House, Rockwell International, AT&T, major universities such as UCLA, USC, LSU, and get this — even IBM.

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## Versatility

Workstations can be configured for specific academic requirements. Diskettes are optional, and memory, printers, graphics, or special hardware can be added as needed. Waterloo JANET networks are connected using IBM PC Cluster Adapters, IBM PC\* Network Adapters, or Tecmar PC-MATE IEEE-488\* Interface Boards.

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Waterloo JANET provides a secure environment. Students have private access to their data. Instructors can provide course materials and software in read-only libraries. Access to this software can be controlled on a class or course basis.

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us to produce and support software which meets specific academic requirements. WATCOM is a corporate partner of Waterloo's Institute for Computer Research and of EDUCOM. Partnerships such as these keep WATCOM on the leading edge of software developments and academic requirements.

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# Password: Communicate

*Insights and information on the PC communications marketplace*

This month: IBM announces its token ring network for the PC, X.PC takes charge in the protocol wars, and BRS/Brkthru offers on-line research for everyone

*Edited by Eric Brown*

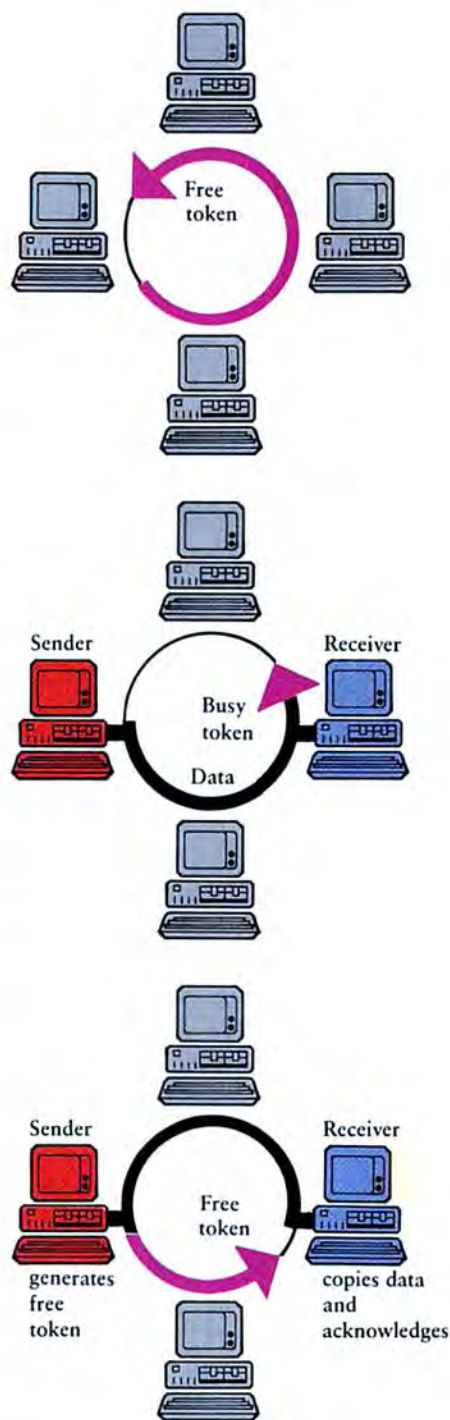
## Networks

### Tokenism

Just when you thought it was safe to buy a PC Network, IBM made waves again with the first installment of its token ring LAN. Three years in the making, the token ring product has been touted as IBM's definitive local area network, potentially linking every major component of IBM's computer line from the PC to the Sierra. However, the "big picture" everyone has been waiting for is still somewhat fuzzy. The Token-Ring network will be released one piece at a time, commencing this quarter. IBM opened the bidding with the PC component, leaving direct mini and mainframe connections (including a reported 16 megabit-per-second "backbone" ring) on hold. Gateways have been announced for SNA, the PC Network, and Rolm CBXs.

The Token-Ring is designed for peer-to-peer communications, that is, a networked environment in which any machine can talk to any other machine as an equal. At the heart of the Token-Ring is a three-chip set developed and manufactured by IBM. The hardware standardizes the means of linking computers, terminals, telecommunications hardware, and other devices and supports a data transfer rate of 4 megabits per second. Unlike the PC Network, which is dependent on coaxial cable, the Token-Ring network can use shielded twisted pair, coaxial, or fiber optic cable as well as telephone wire.

*(continues)*



**Token passing on a ring:** On IBM's new token ring network, the sender waits for a free token to pass by on the ring, then changes the token to "busy" and adds data. The receiver copies the data and sends the token back to the sender. The sender sets the token free, and the token is available to carry another message.





# Two Powerful Networks...

LAN or Multi-User System? Until now, you've been forced to choose between these two, normally incompatible, types of networks for your company. And that's too bad, because multi-user systems are usually less costly to install since they use inexpensive terminals, instead of PCs, as workstations. For a wide variety of applications, a multi-user system makes more sense than a LAN.

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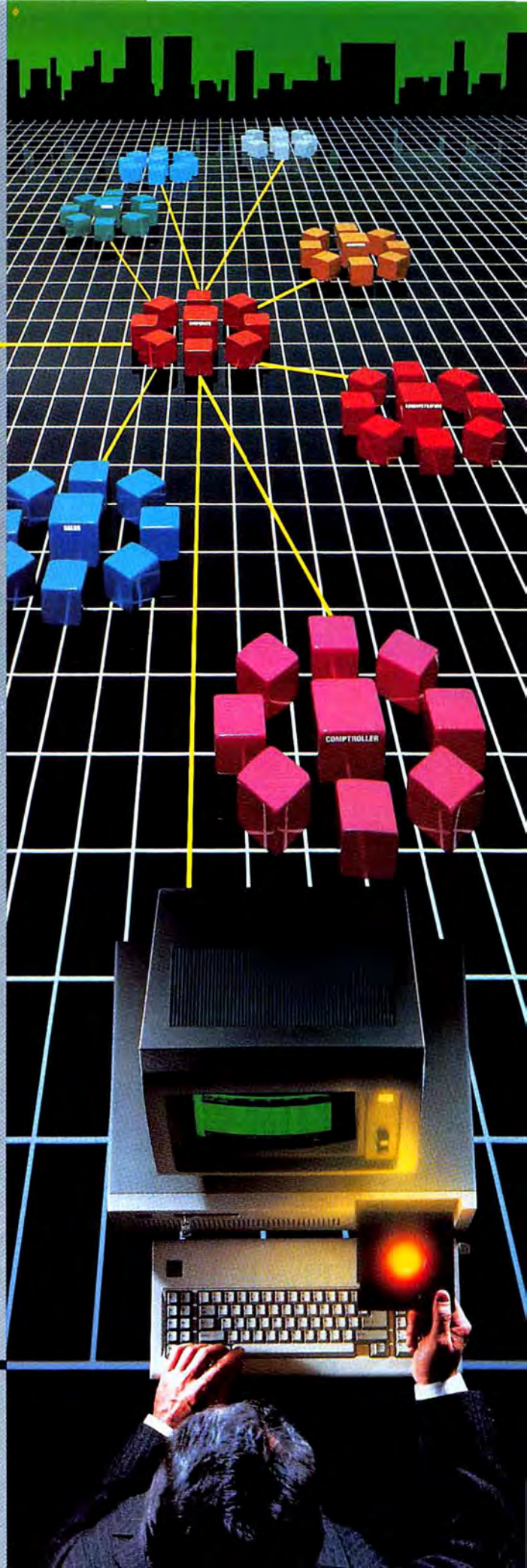
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IBM teamed up with Texas Instruments (TI) on the Token-Ring project in 1982 and since then has periodically released network protocol and cabling specifications. At the same time IBM announced the Token-Ring, TI released its own five-chip set, intended to spur third-party support. Thanks to this open architecture, the first phase of the Token-Ring had an immediate and galvanizing effect on Big Blue's competitors, many of whom saw in IBM's announcement legitimacy for their own efforts. Most of the major LAN vendors—3Com; Proteon; Ungermann-Bass; Bridge; Torus; Nestar;

and Sytek, maker of the PC Network board—announced Token-Ring-compatible products within hours of IBM's move. TI anticipates more than 100 Token-Ring products from two dozen companies by midyear.

Network executives lavished praise on the IBM announcement. 3Com's Bill Krause dubbed the Token-Ring "a watershed event," on a par with the debut of the PC itself, and promised collaboration between 3Com's Ethernet-based products and the Token-Ring. Nestar chief Charles Hart, whose company makes its own token ring network, noted that IBM had "blessed a new standard and clearly established a decisive direction for the LAN industry."

Although the Token-Ring seems to offer the coherent standard that the network marketplace has craved, this latest IBM network gives LAN buyers yet another option. By endorsing both baseband and broadband networks, IBM has at once clarified and clouded the market. While IBM is promising full compatibility with DOS 3.10 and NETBIOS—versions of which sit on both the Token-Ring and the PC Network Adapters—the Token-Ring LAN immediately became potential competition for, rather than a complement to, the slow-selling, comparably priced PC Network, which was introduced in mid-1984 and delivered

*(continues)*

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in early 1985. (See "Net Results," PCW, December 1985, for an explanation of NETBIOS.)

The PC Network is a broadband LAN; that is, it connects PCs via coaxial wire just like that found in cable TV systems. IBM selected broadband for several reasons, among them its capacity to move data on a frequency that uses only a small section of total cable bandwidth—thereby leaving room for voice, video, and additional data channels.

By contrast, the baseband system used by the Token-Ring can transmit data over twisted pair cable (such as a telephone line), and baseband signals use AM and are

thus more vulnerable to noise than FM broadband networks. While the Token-Ring network can be implemented on coaxial or fiber optic cable, its single-channel scheme is particularly well suited to twisted pair wire.

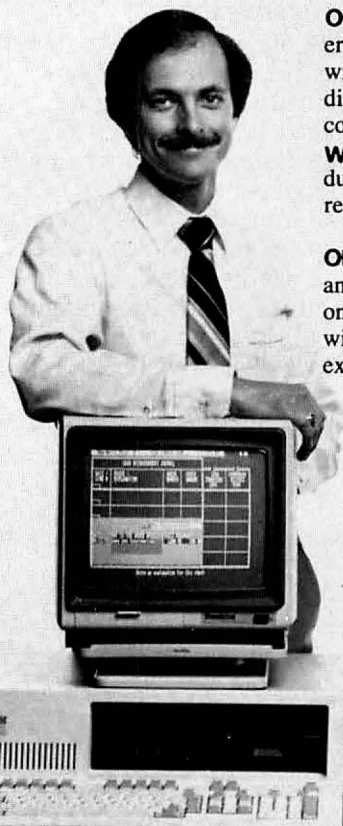
The components of a broadband network, however, are more complex and costly to manufacture than baseband systems. On paper, the PC Network is a product with a robust future. Thus far, however, neither IBM nor third parties have moved to exploit its potential for additional channels. Accordingly, some have viewed the PC Network as hardware overkill within a small work-group setting. In a sense, the Token-Ring, which is already in the process of

becoming a new networking standard, is a step backward to a simpler, less ambitious scheme.

A token-passing network derives its name from the single token that passes from station to station and grants the right to transmit. Think of the token-passing scheme as a variant of the postal system; in this case, however, letters can be mailed only by handing them to the letter carrier (the token). The station attaches its message, complete with the recipient's address, to the token. The token and its messages then pass to the next station, which may also toss a message into the token's electronic mail bag. When

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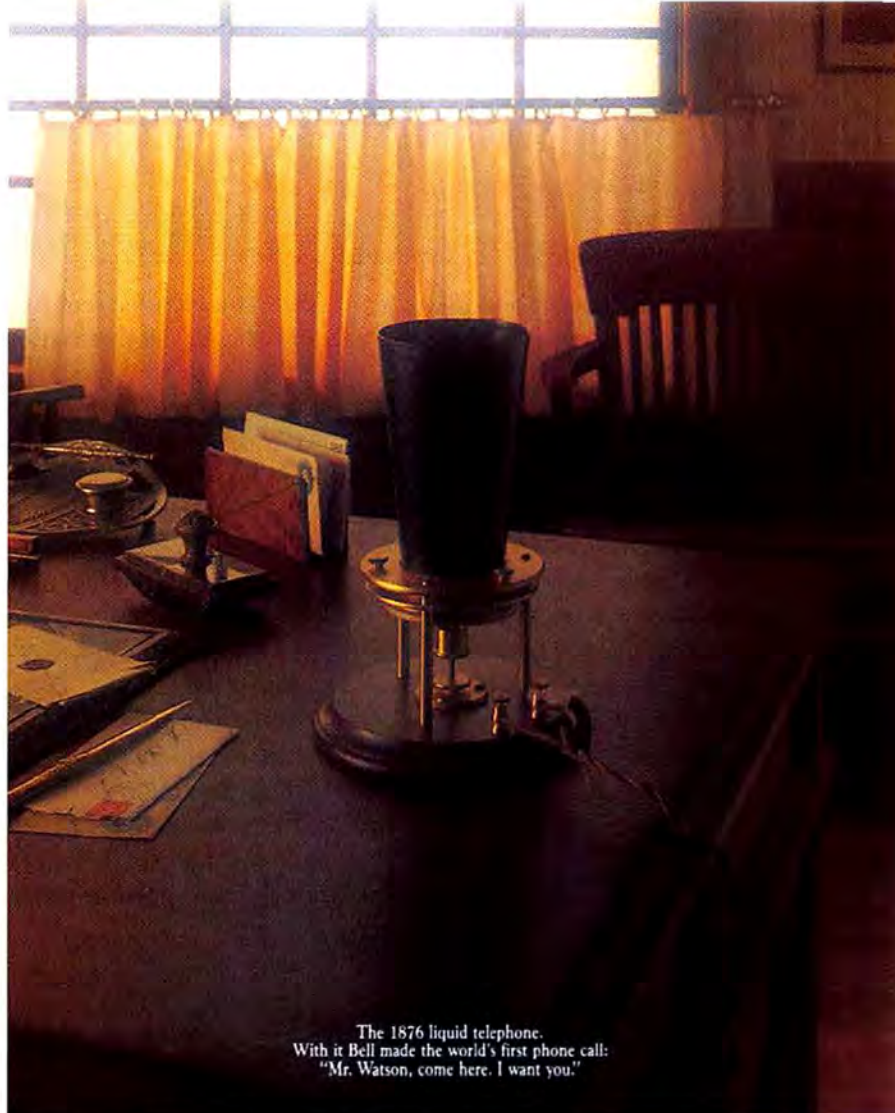
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the token reaches the addressee, it delivers the message but preserves a copy, which it carries with it around the ring as it makes its appointed rounds. When the token finally comes full circle, the PC that originated the message reads the copy to determine whether the original arrived intact. If the copy matches the original, the copy is erased, and the token continues on its eternal beat around the ring.

By contrast, the PC Network relies on the CSMA/CD scheme (carrier sense multiple access with collision detection); in CSMA/CD, a station "listens" to the line for activity. If the coast is clear, the station sends its message and monitors the line to check

whether a message sent simultaneously by another station has garbled both messages. If a collision is detected, both stations halt transmission and alert all network stations to the collision. Uninvolved stations remain on the sidelines until the two originating stations resolve the contention. Both stations wait a random amount of time before retransmitting.

Under the CSMA/CD technique, performance degrades with increasing traffic. With enough traffic, contention can reach 100 percent, bringing the network to its knees. Despite their greater speed, token-passing networks are

similarly subject to diminished performance in response to heavy traffic, but the token continues to be passed—however slowly.

Although the Token-Ring may well replace the PC Network one day, the two IBM LANs are certain to coexist for the time being. IBM is positioning the PC Network as the LAN of choice within departments and small work groups; it's pitching the Token-Ring as a way to connect department networks and to access remote hosts, relying on the Token-Ring's greater speed.

With its multiple channels, a broadband network offers more capabilities than a baseband LAN,

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a definite plus for large organizations looking to the future. Yet baseband networks such as the Token-Ring, which use cheap telephone wire, promise obvious cost benefits, and they're less likely to be logistical nightmares.

David Ferris, networking consultant and chairman of the Ferrin Corporation, suggests that the two networks offer a distinction without a difference. "The Token-Ring offers users no additional functionality," Ferrin says. "The differences [with the PC Network] will be trivial to users. IBM has removed one uncertainty, which will release some purchasing dollars, but the Token-Ring really brings nothing new to the marketplace."

The nexus between the two LANs is IBM's continuing commitment to provide direct Token-Ring connections to minicomputers and mainframes. Until those interfaces arrive, users will have to be satisfied with IBM's oft-expressed intention to connect all of its networks—an intention thus far stronger in word than in deed. —Ken Greenberg and Karl Koessel

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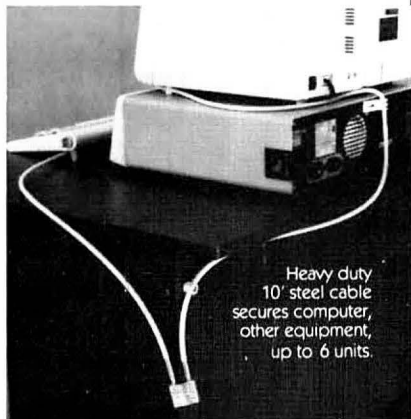
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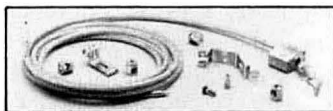
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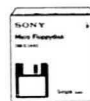
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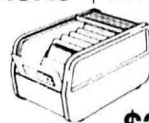
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agent their current type of coverage, when it expires, and a few details such as their address, type of home or car, and whether it is equipped with a burglar alarm. Bancsure's AT then searches its data base for the best rate. Rice claims that 80 percent of the time his company comes up with a better rate than the consumer is currently paying.

No charge or obligation is attached to the information, and clients are free to contact the insurance companies directly. However, most customers allow Bancsure to act as their agent, and the company makes its profit from commissions on policy sales.

At present Bancsure has five offices, three of which have LANs. The work at the home office in Santa Monica revolves around an AT with 120MB of data storage connected to 20 workstations, which include IBM PCs, XTs, and Compaq Deskpros. Satellite offices in Burbank and Bakersfield each have an AT connected to three PCs, while two smaller offices each have an AT that transmits information to the AT in Santa Monica.

For network software, Bancsure relies on Novell's Netware. The company purchased its application software from Compare Data, a local consulting and systems house. Compare Data customized its insurance rating software for Bancsure's operation and also provided customized word processing, data management, reporting, telemarketing, communications, and mass mailing programs.

Dave Proffer, a Compare Data systems analyst assigned to

Bancsure, says the 120MB file server has ample room to hold information on Bancsure's 5000 customers plus the 200 different insurance policies offered by the 104 companies it deals with.

When insurance companies revise their premiums, they forward the information to Bancsure either on a floppy disk or via modem. The central AT coordinates this information and then transmits it to the other ATs each night via modem.

Proffer is confident his data base can keep pace with customer inquiries, though he says he is counting on the next generation of LAN software to enable him to expand the size of the data base. He will probably need the fix quickly, as Bancsure president Rice is already talking about expanding into Florida, New York, and Illinois. —John Eckhouse

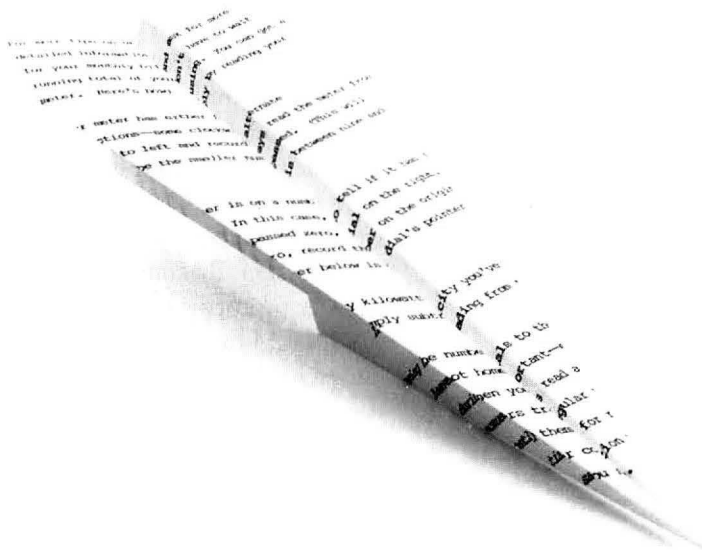
## Trends

### X.PC—The Multisession Protocol

No, X.PC is not the name of some new designer drug. It's the moniker of an increasingly popular communications protocol that could change the way you telecommunicate. X.PC was developed over the past two years by Tymnet, a telecommunications firm known for its packet-switching networks. Like GTE's Telenet

(continues)





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and other data communications networks, Tymnet acts as a relay station between you and distant information services, allowing you to access them through a local phone number.

By definition, X.PC is a session-level error-checking protocol that works throughout a communications session. By contrast, file-transfer protocols like Kermit and XMODEM operate only during file exchanges and perform no error checking during the rest of the session. Session-level protocols like X.PC and the Microcom Networking Protocol (MNP) perform their error-checking functions from sign-on to sign-off, which makes them valuable for accessing electronic banking services, stock market services, and any communications application for which accuracy is vital. Session-level protocols become increasingly important at high communications speeds like 2400 bps because line-noise errors crop up more frequently (see "The Microcom Agreement," PCW, Vol. 2, No. 5).

During the last year, the two major session-level protocols battled it out as the developers pressed computer vendors to install their protocols in software and hardware. Although Microcom's MNP took an early lead, boosted by an endorsement from IBM, X.PC soon caught up by garnering seals of approval from such influential communications purveyors as Microsoft, Hayes, and MCI Mail. The two biggest communications software newcomers of 1985, *Microsoft Access* and *Crosstalk Mark 4*, both included the X.PC protocol to the

exclusion of MNP. (See "Equal Access" in this issue for a review of *Microsoft Access*.)

The main reason for X.PC's increasing edge in the protocol wars is simple—X.PC is in the public domain and is therefore free for the taking. Microcom, on the other hand, has insisted on licensing its protocol to computer companies for a significant fee.

Although MNP sports a number of features not found in X.PC, such as the ability to change from asynchronous to synchronous communications while on line and a "virtual file system" that aids in the translation of files into compatible formats, X.PC is the only asynchronous protocol to offer concurrent telecommunications over a single phone line. Products that support X.PC, such as *Microsoft Access*, allow you to log on to several on-line services at once and cut and paste data between windows. One final edge for X.PC is its compatibility with the universally accepted X.25 protocol used in synchronous, packet-switching communications between mainframes.

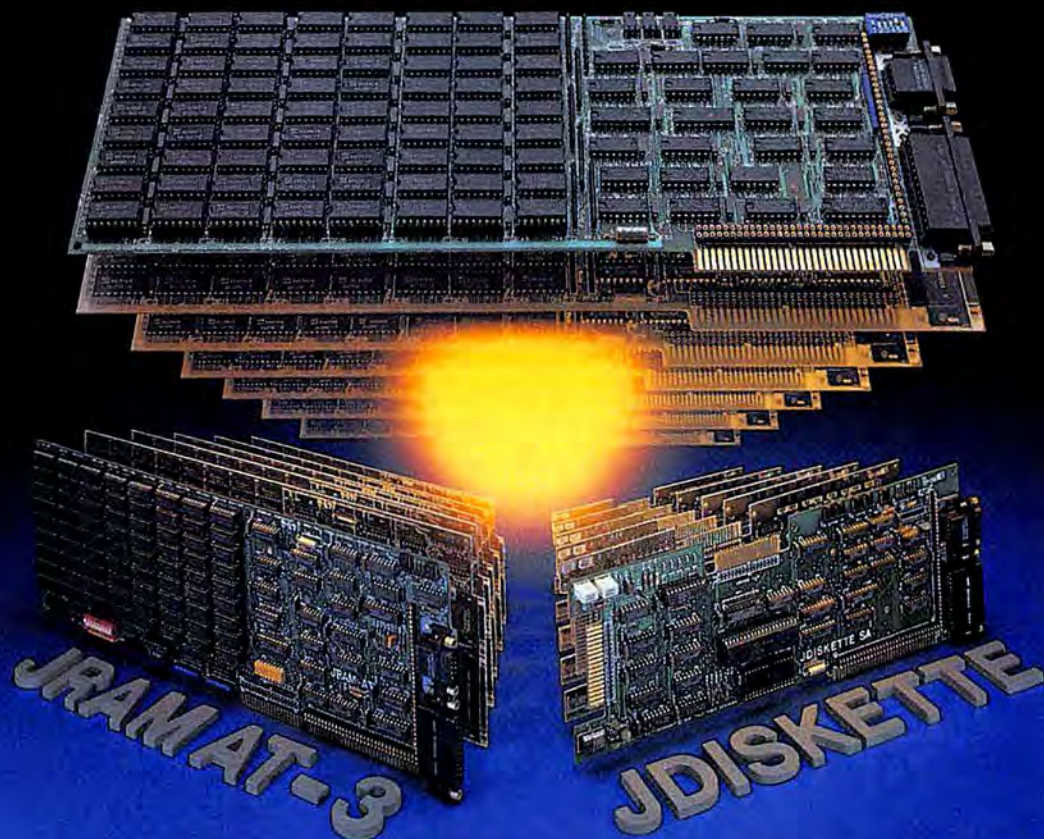
X.PC performs its error-checking magic by grouping the bits of outgoing data into "packets," then performing a statistical analysis of each packet and sending the results of the analysis along with the packet. On the receiving end, the X.PC software performs the same analysis on incoming packets and checks its results against those received from the sending computer. Matching results indicate a correct

(continues)



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## JRAM-3



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Tall Tree Systems presents JRAM-3, the newest member of the JRAM family. JRAM-3 is a fourth generation multifunction memory board and the successor of the highly praised JRAM-2. Designed to meet the latest expanded memory specification standard being implemented by the major spreadsheet vendors, JRAM-3 can access up to eight megabytes of memory for larger, more efficient spreadsheets. JRAM-3 can also be used for DOS memory, electronic disk, print spooler, and program swapping applications!

Determined to maintain our reputation as the price leader in memory expansion, Tall Tree Systems offers JRAM-3 fully populated with two megabytes for an amazing \$699. A JETDRIVE/JSPOOL combo disk is included free of charge. This is the same highly acclaimed JRAM software that has helped make Tall Tree Systems the pioneer in the industry

for bank switched memory and RAM disk technology. The new combo disk features JPAGER which allows any expanded memory application program to utilize multi-megabyte memory.

The family tree wouldn't be complete without an AT version. Look to us in September for the new JRAM AT-3, our third generation 16 bit board providing support for expanded spreadsheets. JRAM AT-3 will be available with two megabytes at \$799.

Don't forget the rest of the JRAM family either. We'll continue producing our popular JRAM-2 and our present JRAM AT board, along with our full range of "slim daughter board" modules. The JRAM-2 and JRAM-3 can co-exist in the same computer, but only the JRAM-3 can be used for expanded memory applications. Use JRAM-2 for DOS, multi-tasking, print spooling, and electronic disk.

To complete the family line-up we feature JDISKETTE. This controller card lets you put 1.2 megabyte diskette drive(s) in your PC or XT. You can read, write, and format the AT high density diskettes and communicate easily between a PC or XT and an AT. You won't lose a single slot, since JDISKETTE replaces your old controller and handles up to four internal floppy drives. Free of charge with JDISKETTE, you will receive the popular JFORMAT software, a DOS compatible device driver that gives your computer the ability to handle expanded disk formats.

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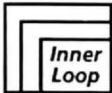
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transmission; mismatched results suggest that an error occurred during transmission of a given packet and cause the receiving computer to instruct the sending computer to retransmit that packet.

In multisession situations, X.PC encodes each packet with an address specifying the packet's destination. The X.PC software at the receiving end reads these addresses and routes each packet accordingly. Similarly, the packets your computer is receiving are coded with addresses specifying the host from which each packet was sent. Your communications program sorts the packets and displays their contents in the appropriate windows.

Where can you use X.PC? Tymnet supports the protocol, of course, so you can use it when accessing Dow Jones/News Retrieval service, EasyLink, CompuServe, MCI Mail, and any other information service that's accessible through Tymnet. MCI Mail is in the process of adding X.PC support to its direct phone lines as well. (Telenet does not support X.PC and has instead thrown its hat into the MNP ring.) X.PC also works in PC-to-PC links, provided that each machine's communications program supports the protocol.

Soon we can expect to see X.PC support built into modems. Concord Data Systems is already manufacturing 2400-bps modems with integral X.PC support; other manufacturers, including Hayes, are expected to follow suit with

their 2400-bps modems. X.PC-equipped modems would let you use X.PC's error-checking talents with any communications software. To conduct simultaneous sessions, however, you'll still need a communications program that supports X.PC's multichannel capabilities. If the good news continues for X.PC, such a program won't be too hard to find. —*Jim Heid*



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(continues)



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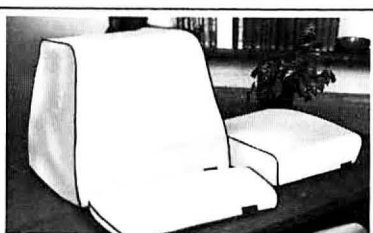


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## On-Line

### *Brkthru: Research With Ease*

As a writer and electronics consultant, I regularly need research materials on a wide variety of subjects. Having bought a PC and a modem, I delved bravely into on-line research, but I often found that my hefty investment in training time and subscription costs to access a number of confounding on-line services wasn't paying off. Sometimes it was easier to drive down to the local library.

Just as I was about to abandon my quest for an easy-to-use service that would satisfy most of my research needs, Bibliographic Retrieval Service came out with BRS/Brkthru. Brkthru offers many conveniences not found with other on-line data base services: a menu-driven, prompting interface; English-like search commands; and a rapid command-driven interface for experienced users.

Most services require you to struggle through on-line demos to learn the needed search commands; some even demand extensive classroom training. But with Brkthru's straightforward search techniques, I was able to search for and download research data without even cracking the manual. Whenever I do have a question I can turn to the responsive people on Brkthru's toll-free customer service line.

However, ease of use isn't the whole picture. Brkthru provides access to 65 data bases that offer a broad range of information on business, finance, science, medicine, education, social sciences, and general reference. Brkthru offers over two-thirds of the data bases provided on the comprehensive BRS/Search Service—20 more than are offered on BRS's nighttime consumer service, BRS/After Dark.

Using Brkthru to research a recent book on infertility, I searched successfully for such obscure subjects as *in vitro* fertilization, clomiphene citrate (a medication), and miscarriage. I found further information in scientific, psychological, and sociological data bases. For my consulting work I found nearly 1000 pages of patent information, marketing reports, financial data, and research papers on the subjects of electronics and telecommunications. Each data base I searched had recently been updated.

In designing a search, you can use Boolean operators (AND, OR, NOT), truncation (substituting a \$ for different word endings), and proximity logic (WITH, SAME, YEAR) to focus a search on the exact information you need. For example, I asked for INFERTIL\$ AND IN VITRO AND 1984.YR. to find all 1984 documents referenced under various forms of the word *infertility* that also mention *in vitro*.

Brkthru provides great flexibility in displaying records. You can

(continues)



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With VTERM, there's nothing to get in your way or slow you down. It's easy to use, yet packed with time-saving features. Like backscrolling, which redisplay up to 80 scrolled-off screens. And horizontal scrolling, which emulates 132-column display. (Of course, VTERM provides true 132-column display with an optional video board.)

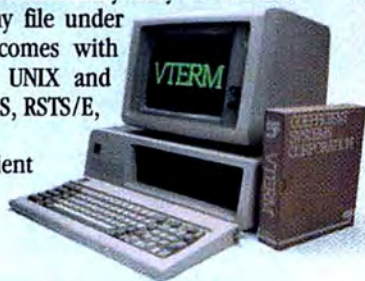
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Circle 166 on reader service card



## A defense against cancer can be cooked up in your kitchen.

There is evidence that diet and cancer are related. Some foods may promote cancer, while others may protect you from it.

Foods related to lowering the risk of cancer of the larynx and esophagus all have high amounts of carotene, a form of Vitamin A which is in cantaloupes, peaches, broccoli, spinach, all dark green leafy vegetables, sweet potatoes, carrots, pumpkin, winter squash, and tomatoes, citrus fruits and brussels sprouts.

Foods that may help reduce the risk of gastrointestinal and respiratory tract cancer are cabbage, broccoli, brussels sprouts, kohlrabi, cauliflower.

Fruits, vegetables and whole-grain cereals such as oatmeal, bran and wheat may help lower the risk of colorectal cancer.

Foods high in fats, salt- or nitrite-cured foods such as ham, and fish and types of sausages smoked by traditional methods should be eaten in moderation.

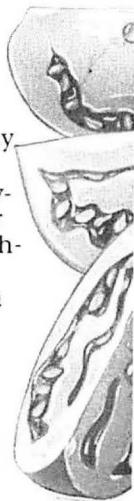
Be moderate in consumption of alcohol also.

A good rule of thumb is cut down on fat and don't be fat. Weight reduction may lower cancer risk. Our 12-year study of nearly a million Americans uncovered high cancer risks particularly among people 40% or more overweight.

Now, more than ever, we know you can cook up your own defense against cancer. So eat healthy and be healthy.

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choose to view them in short, medium, or long format and can request specific document numbers or all documents on a subject.

My main objection to the BRS service is that most of its data bases consist only of bibliographical data and/or abstracts; fewer than ten full-text data bases are available. However, abstracts often provide enough information to do the job without your having to order the full text through the mail. The only real gap in Brkthru information is up-to-the-minute news stories and stock market reports.

Ease of use doesn't come cheap. Although BRS/After Dark does not have Brkthru's friendly interface, the evening rates are substantially lower than Brkthru's. For example, the ABI/Inform data bases cost \$70 per hour during the day and \$26.50 per hour after hours on Brkthru, while After Dark charges only \$15 per hour. Brkthru's daytime rates are almost identical to BRS/Search rates, except Brkthru doesn't add \$9 per hour for long distance charges. However, unlike BRS/Search, Brkthru offers no frequent-user discount.

The typical BRS/Brkthru customer will probably be a businessperson or professional who periodically needs to search a large variety of data bases for information on medicine, science, business, social sciences, or education. Brkthru customers probably won't want to waste time learning command-driven search sequences. However, if you learn to

use Brkthru and find you're spending a lot of time on line, you may wish to investigate the less user-friendly BRS/After Dark for substantial savings. —Linda Gail Christie

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minimum monthly fee, variable  
data base access charges*

*Ken Greenberg is the Senior Editor of PC World, and Karl Koessel, the Technical Editor. John Eckhouse is a business correspondent for the San Francisco Chronicle. Jim Heid is a freelance writer and the coauthor of The Complete Guide to the Tandy 1000 (Ashton-Tate Publishing, Culver City, 1985). Linda Gail Christie is a freelance writer in Tulsa and the author of Managing Today and Tomorrow with On-Line Information (Dow Jones-Irwin, New York, 1986).*

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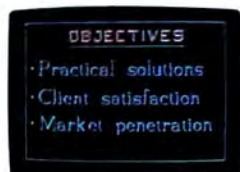
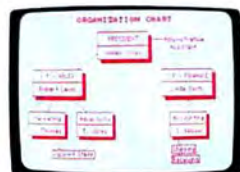
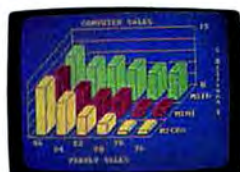
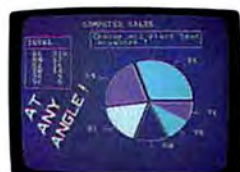
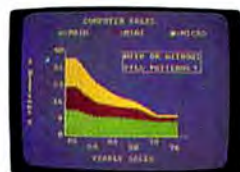
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## SYSTEM REQUIREMENTS

- IBM PC (or equivalent), XT, AT & compatibles
- Two double-sided disk drives (hard disk recommended for presentations)
- 192K RAM (256K for compatibles)

- Color Graphics adapter
- BASICA or equivalent
- DOS 2.0 or higher
- Mouse not required

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## Star-Dot-Star

*A global exchange of  
personal computer  
discoveries*

This month: an improved version of the DOS program MORE.COM that is ideal for WordStar users, a tip on inexpensive memory upgrades, a note for Turbo Pascal programmers, and one of the most useful utility programs ever to grace a floppy disk

*Edited by Steven Cook*

### Interactive Batch Files

DOS batch file commands don't support one very useful feature—user interaction. I have filled this gap with the program QUERY.COM, which, when executed, displays a message and waits for a single-keystroke reply. A batch file can then test ERRORLEVEL to determine the user's selection.

To use the program, type **QUERY** followed by the text you want displayed as a prompt, then an "at" sign (@) followed by the valid response characters. QUERY will set the ERRORLEVEL value to correspond to the sequence of the characters listed.

For example, when the lines shown in USERTEST.BAT execute, the PC will display the message 'Do you want to see a list of files?' and wait for you to press Y or N (upper- or lowercase); all other keystrokes are ignored. If you press Y, ERRORLEVEL will be set to 1. If your response is N, ERRORLEVEL will be set to 2. Note that because DOS performs an "equal to or greater than" test for ERRORLEVEL, you must test the highest values first.

If no @ character is found, QUERY will simply display the message. If a question mark is included at the end of the response list, QUERY will match any character. Don't put a space at the end of the list unless you want the <Space> bar to be considered a valid response.

*Richard Peterson  
Davenport, Iowa*

*Editor's note: To create QUERY.COM, load BASIC, then type in the lines shown in X-MAKER.BAS, followed by the lines in QUERY.DAT. Check your work carefully, then type **RUN** and press <Enter>.*

### More and Better

If you have ever used the TYPE command to examine the contents of a file, you know that it is difficult to prevent the text from scrolling off the screen before you have had a chance to read it. You have probably also made the mistake of trying to TYPE a file created with WordStar, only to find it displayed as gibberish.

The solution to the first problem is the program MORE.COM, included in DOS 2.00 and later versions. The program displays text 24 lines at a time, pausing between screenfuls until you press a key. Instead of using the TYPE command, you just type **MORE** <filename>. Unfortunately, MORE.COM displays everything exactly as stored in the file, so you still have to hack your way through the gibberish produced by word processing codes.

The lines shown in MORE.DAT can be used with the program shown in X-MAKER.BAS to create a better version of MORE.COM. It is almost the same as the one provided with DOS, but it displays legible WordStar files. You can use this new MORE.COM exactly the same way you used the standard version.

*Clifford Vander Yacht  
Jackson, Michigan*



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Ask about ZeroDisk to run copy-protected software from a hard disk without floppies.



```
ECHO OFF
CLS
QUERY Do you want see a list of files? @yn
IF ERRORLEVEL 2 GOTO NO
IF ERRORLEVEL 1 GOTO YES
:NO          don't show list of files
GOTO END
:YES          do show list of files
DIR
GOTO END
:END
```

USERTEST.BAT: Run this batch  
file to test and demonstrate  
QUERY.COM.

```
10 DEFINT A-Z:CLS:KEY OFF:DEF FNHEX(X$)=VAL("&h"+X$)
20 LOCATE 5,1:PRINT "X-Maker":READ F$
30 LOCATE 5,1:PRINT "Now testing for data errors...please wait";
40 SUM=0:READ LN:IF LN<0 THEN 80
50 READ H$:IF VAL(H$)<0 THEN 70
60 SUM=(SUM+FNHEX(H$))*2:SUM=(SUM\256)+(SUM MOD 256):GOTO 50
70 READ CKSUM$:IF SUM=FNHEX(CKSUM$) THEN 40 ELSE GOTO 170
80 RESTORE:CLS:LOCATE 3,1:PRINT "X-Maker":READ F$
90 LOCATE 5,1:PRINT "Press any key except ESC to create ";F$;": ";
100 AS=INPUT$(1):PRINT:IF AS=CHR$(27) THEN END
110 LOCATE 6,1:PRINT "Working...";
120 OPEN F$ AS #1 LEN=1 : FIELD #1,1 AS BX$
130 READ LN:IF LN<0 THEN 160
140 READ H$:IF VAL(H$)<0 THEN READ CKSUM$:GOTO 130
150 LSET BX$=CHR$(FNHEX(H$)):PUT #1:GOTO 140
160 CLOSE:PRINT:PRINT F$;" has now been created.":END
170 PRINT:PRINT "Error in DATA Line";STR$(LN);": ";
180 PRINT "Check your work.":BEEP:END
```

X-MAKER.BAS: Star-Dot-Star's  
program-creating program

```
1000 DATA "A:QUERY.COM"
1010 DATA 1,B3,00,BE,81,00,80,3C,0D,74,47,B2,0D,B4,02,CD,21,-1,BA
1020 DATA 2,B2,0A,B4,02,CD,21,46,8A,14,80,FA,0D,74,33,80,FA,-1,31
1030 DATA 3,40,75,EF,B2,07,B4,02,CD,21,BB,00,00,B4,08,CD,21,-1,4B
1040 DATA 4,3C,61,72,06,3C,7A,77,02,24,5F,43,8A,20,80,FC,0D,-1,EB
1050 DATA 5,74,E7,80,FC,3F,74,0A,3A,E0,75,EF,8A,00,B4,02,CD,-1,85
1060 DATA 6,21,B2,0D,B4,02,CD,21,B2,0A,B4,02,CD,21,8A,C3,B4,-1,53
1070 DATA 7,4C,CD,21,-1,E2,-1
```

QUERY.DAT: Add these lines to  
X-MAKER.BAS to make  
QUERY.COM.

(continues)



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1000 DATA "A:MORE.COM"

```

1010 DATA 1,B4,0F,CD,10,88,26,CD,01,BA,DC,01,B4,09,CD,21,33,-1,8E
1020 DATA 2,DB,B4,45,CD,21,8B,E8,B4,3E,CD,21,BB,02,00,B4,45,-1,1F
1030 DATA 3,CD,21,FC,BA,E0,01,B9,00,10,8B,DB,B4,3F,CD,21,0B,-1,D2
1040 DATA 4,CD,75,02,CD,20,8B,C8,8B,F2,AC,3C,1A,74,F5,24,7F,-1,70
1050 DATA 5,3C,0D,75,07,C6,06,CF,01,01,EB,4C,3C,0A,75,06,FE,-1,D2
1060 DATA 6,06,CE,01,EB,42,3C,08,75,0D,80,3E,CF,01,01,74,37,-1,6B
1070 DATA 7,FE,0E,CF,01,EB,31,3C,09,75,12,8A,26,CF,01,80,C4,-1,DB
1080 DATA 8,07,80,E4,F8,FE,C4,88,26,CF,01,EB,1B,3C,20,72,1D,-1,9B
1090 DATA 9,FE,06,CF,01,8A,26,CF,01,3A,26,CD,01,76,09,FE,06,-1,C9
1100 DATA 10,CE,01,C6,06,CF,01,01,8A,0D,B4,02,CD,21,8A,26,CE,-1,E1
1110 DATA 11,01,3A,26,CC,01,72,1C,BA,0D,01,B4,09,CD,21,B4,01,-1,25
1120 DATA 12,CD,21,BA,DC,01,B4,09,CD,21,C6,06,CF,01,01,C6,06,-1,5D
1130 DATA 13,CE,01,01,49,74,03,E9,70,FF,E9,56,FF,18,50,01,01,-1,35
1140 DATA 14,0D,2D,2D,2D,4D,6F,72,65,2D,2D,2D,24,0A,0D,0A,24,-1,D7
1150 DATA -1
    
```

MORE.DAT: Use these lines  
with X-MAKER.BAS to create a  
new version of MORE.COM.

### Talking to Turbo

I recently wrote a program in Turbo Pascal and wanted to pass parameters to the program via the command line. Mindful that DOS saves command line parameters at an absolute location in memory, I rummaged through the Turbo Pascal manual for information about memory arrays and absolute variables. All you have to do is add the declaration

```

var cmd_line: string[128] absolute
cseg:$0080;
    
```

to your program; you can then read the command line parameters as the string variable cmd\_line.

Stephen Zebrowski  
Ansonia, Connecticut

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(continues)



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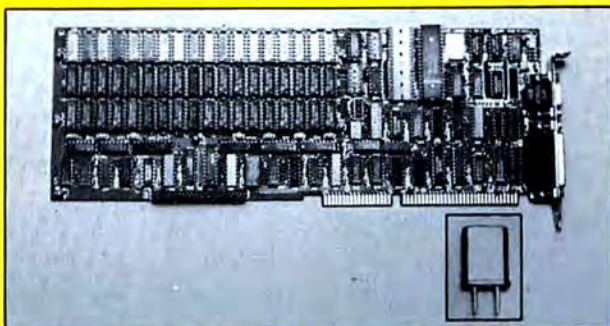


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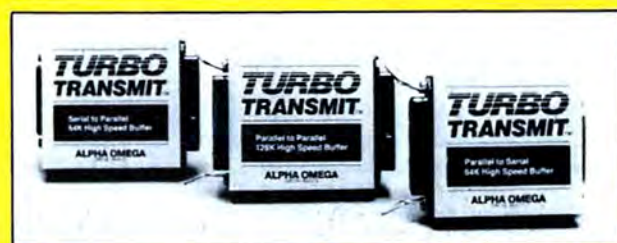
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```

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1010 CLS
1020 INPUT "How many";K
1030 DIM A$(5000)
1040 FOR I = 1 TO K
1050 A$(I) = CHR$(65+INT(RND * 26))
1060 A$(I) = A$(I) + CHR$(65+INT(RND * 26))
1070 A$(I) = A$(I) + CHR$(65+INT(RND * 26))
1080 NEXT I
1090 PRINT TIME$
1100 QN = K : GOSUB 20100
1110 PRINT TIME$
1120 INPUT "Press ENTER to see the sorted items: ";Z$
1130 PRINT : PRINT : FOR I = 1 TO K : PRINT A$(I);"; " : NEXT I : PRINT
1140 PRINT "Done."
9999 END

20000 REM SORT ROUTINE BEGINS HERE
20100 QL = 1 : QR = QN : QFLAG = 0
20200 IF QR > QL THEN QI = QL : QJ = QR + 1 : QV$ = A$(QL) : GOTO 20400
20300 IF QFLAG = 0 THEN 20900 ELSE IF QFLAG = 1 THEN 20800 ELSE IF QFLAG = 2
      THEN QFLAG = 0 : GOTO 20200
20400 QI = QI + 1 : IF QI <= QN AND A$(QI) < QV$ THEN 20400
20500 QJ = QJ - 1 : IF A$(QJ) > QV$ THEN 20500
20600 IF QJ < QI THEN SWAP A$(QL),A$(QJ) ELSE SWAP A$(QJ),A$(QI) : GOTO 20400
20700 QL = QL : QR = QJ - 1 : QFLAG = 1 : GOTO 20200
20800 QL = QI : QR = QN : QFLAG = 2 : GOTO 20200
20900 RETURN
  
```

**JSORT21.BAS: Quick-sort implementation for up to 500 items**

later) ROM available from Compaq dealers.

Dave Ornee

Willowbrook, Illinois

*Editor's note: To determine the BIOS ROM installed in your Compaq, load BASIC, type*

**DEF SEG = &HFE00:FOR I=0 TO**

**72:PRINT CHR\$(PEEK(I));:NEXT**

*and press <Enter>. If the displayed copyright date is 1982, you have the Revision B ROM. You can also install 256K-bit chips in a variety of PC compatibles. Contact Microprocessors Unlimited for details. Another company, CMS of Santa Ana, California, makes a similar kit for the XT or Portable PC that does not require soldering. You can call CMS at 714/549-9111 to locate your nearest dealer.*

*Prices may vary from dealer to dealer.*

## Useful Sorts

I recently wrote a BASIC program that required an efficient sort routine. I found two sorts that met my performance criteria (sorting several hundred strings in 5 to 10 seconds using compiled BASIC).

JSORT21.BAS is an implementation of the first sort algorithm presented by Robert Sedgewick in his paper "Implementing Quick-sort Programs" (*Communications of the ACM*, October 1978, Volume 21, Number 10). Although the algorithm is recursive, I have implemented it in BASIC using GOTO statements and flags. It is not a particularly efficient routine, but it is short and performs acceptably when sorting fewer than 500 items.

JSORT31.BAS is an implementation of the second sort Sedgewick presented in his paper. The

(continues)







Table 1: A comparison of two sorting algorithms\*

Number of Items	JSORT21		JSORT31	
	Interpreted	Compiled	Interpreted	Compiled
50	11	2	9	1
100	38	4	18	2
250	186	26	47	6
500	—	95	99	13
1000	—	—	—	29
2500	—	—	—	81
5000	—	—	—	206

\*Times in seconds

routine is somewhat larger than JSORT21.BAS but is more efficient and is adequate for sorting up to 5000 items.

Table 1 summarizes the time required by these algorithms to sort random three-character strings. As the table shows, JSORT31 produces exceptional results in both interpreted and compiled BASIC. JSORT21 drops out of the competition for sorting more than 250 items, but when compiled, JSORT31 remains appropriate for up to 1000 items. Despite its complexity, JSORT31 is probably the best algorithm for most purposes.

James Howell  
Cambridge, Massachusetts

(continues)

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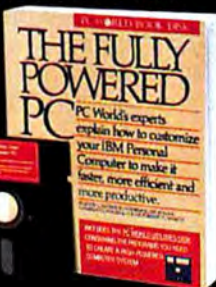
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```

1000 REM JSORT31.BAS
1010 CLS
1020 INPUT "How many";K
1030 N = K
1040 DIM A$(5000)
1050 FOR I = 1 TO K
1060 A$(I) = CHR$(65+INT(RND * 26))
1070 A$(I) = A$(I) + CHR$(65+INT(RND * 26))
1080 A$(I) = A$(I) + CHR$(65+INT(RND * 26))
1090 NEXT I
1100 PRINT TIMES
1110 QII = 1 : QJJ = N : GOSUB 12000
1120 PRINT TIMES
1130 INPUT "Press ENTER to see the sorted items: ",Z$
1140 PRINT : PRINT : FOR K = 1 TO N : PRINT A$(K);" "; : NEXT K : PRINT
1150 PRINT "Done."
9999 END
11999 REM SORT ROUTINE BEGINS HERE
12000 DIM QIU(16),QIL(16)
12100 QM = 1 : QI = QII : QJ = QJJ
12200 IF QI => QJ THEN 14100
12300 QK = QI : QIJ = (QJ+QI)/2 : QT$ = A$(QIJ)
12400 IF A$(QI) <= QT$ THEN 12600
12500 A$(QIJ) = A$(QI) : A$(QI) = QT$ : QT$ = A$(QIJ)
12600 QL = QJ
12700 IF A$(QJ) => QT$ THEN 13200
12800 A$(QIJ) = A$(QJ) : A$(QJ) = QT$ : QT$ = A$(QIJ)
12900 IF A$(QI) <= QT$ THEN 13200
13000 A$(QIJ) = A$(QI) : A$(QI) = QT$ : QT$ = A$(QIJ) : GOTO 13200
13100 A$(QL) = A$(QK) : A$(QK) = QT$ : QT$ = A$(QL)
13200 QL = QL - 1
13300 IF A$(QL) > QT$ THEN 13200
13400 QT$ = A$(QL)
13500 QK = QK + 1
13600 IF A$(QK) < QT$ THEN 13500
13700 IF QK < QL GOTO 13100
13800 IF QL-QI <= QJ-QK THEN 14000
13900 QIL(QM) = QI : QIU(QM) = QL : QI = QK : QM = QM + 1 : GOTO 14400
14000 QIL(QM) = QK : QIU(QM) = QJ : QJ = QL : QM = QM + 1 : GOTO 14400
14100 QM = QM - 1
14200 IF QM = 0 THEN RETURN
14300 QI = QIL(QM) : QJ = QIU(QM)
14400 IF QJ-QI => QII THEN 12300
14500 IF QI = QII THEN 12200
14600 QI = QI - 1
14700 QI = QI + 1
14800 IF QI = QJ THEN 14100
14900 QT$ = A$(QI+1)
15000 IF A$(QI) <= QT$ THEN 14700
15100 QK = QI
15200 A$(QK+1) = A$(QK)
15300 QK = QK - 1
15400 IF QT$ < A$(QK) THEN 15200
15500 A$(QK+1) = QT$
15600 GOTO 14700

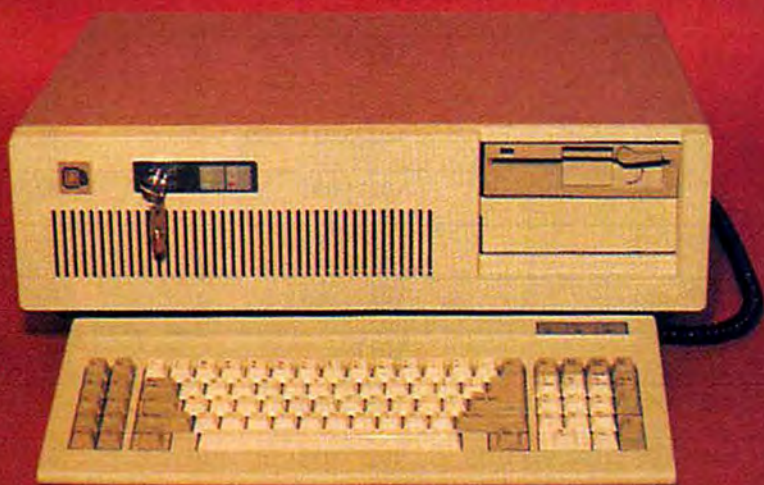
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JSORT31.BAS: Quick-sort algorithm for up to 5000 items

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C. Itoh 8510	\027\081	\027\069	\027\066
IDS Prism	\029	\031	\027\066\044\054\044\036
TI 855, 865	\027\081	\027\080	\027\048
HP ThinkJet, LaserJet	\027\038\107\048\053	\027\038\107\050\053	\027\038\049\056\068

<sup>1</sup> 10 pitch

<sup>2</sup> 15 pitch

(continues)

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### 1-2-3 Printer Setups

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It shows the printer setup strings that 1-2-3 needs to invoke normal mode or condensed type and to print 8 lines per inch with most popular printers. We find that the combination of condensed type and 8 lines per inch works well, but remember that if you select 8 lines per inch, you have to change the page length to 88 lines.

(If you select condensed print, you must also change the right margin.)

To enter a printer setup string in 1-2-3, type /**PPOS** from READY mode, then type in the string as shown in the table and press <Enter>. You can type more than one string before pressing <Enter> to select, for example, condensed type and 8 lines per inch simultaneously.

Dennis Landrum  
Bryan, Texas

*Editor's note: Even if you have only one printer, it's handy to make such a table listing the printer features you use most*

*often. Put the table where you will be able to spot it easily—for example, taped to the printer or the PC.*

### MIN and MAX Revisions

In "New BASIC Functions" (\*.\* , PCW, October 1985), Greg Perry offered functions for finding the lesser and the greater of two numbers. Both functions, however, return 0 if the inputs are equal. Here are corrected versions:

```
10 DEF FNMIN(A,B)=A+(A-B)*(A<B)
```

```
20 DEF FNMAX(A,B)=A+(A-B)*(A>B)
```

As Mr. Perry explained, FNMIN(A,B) returns the smaller value of A and B, and FNMAX(A,B) returns the larger value.

Daniel Bernstein  
Bellport, New York

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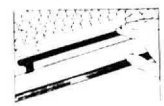
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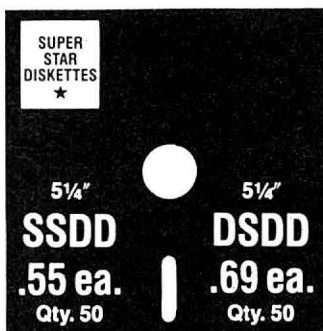
Rather they are fabricators or marketers, taking other company's components, possibly doing one or more steps of the processing themselves and pasting their labels on the finished product.

The new Eastman Kodak diskettes, for example, are one of these. So are IBM 5 1/4" diskettes. Same for DYSAN, Polaroid and many, many other familiar diskette brand names. Each of these diskettes is manufactured in whole or in part by another company!

So, we decided to act just like the big guys. That's how we would cut diskette prices...without lowering the quality.

We would go out and find smaller companies to manufacture a diskette to our specifications...specifications which are higher than most...and simply create our own "name brand" diskette.

Name brand diskettes that offered high quality at low prices.



Super Star diskettes are sold in multiples of 50 only. Diskettes are shipped with white Tyvec sleeves, reinforced hubs, user ID labels and write-protect tabs.

#### Boy, did we get lucky. Our Super Star Diskettes are the same ones you've been using for years...without knowing it.

In our search for the low priced, high quality diskette of our dreams, we found something even more interesting.

We found that there are several manufacturers who don't give a hoot about the consumer market for their diskettes. They don't spend millions of dollars in advertising trying to get you, the computer user, to use their diskettes.

Instead, they concentrate their efforts on turning out the highest quality diskettes they can...because they sell them to the software publishers, computer manufacturers and other folks who (in turn) put their name on them...and sell them for much higher prices to you!

After all, when a software publisher or computer manufacturer or diskette marketer puts their name on a diskette, they want it to work time after time, everytime. (Especially software publishers who have the nasty habit of copy-protecting their originals!)

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Well, that's the story.

Super Star diskettes don't roll off the boat from Pago-Pago or emerge from a basement plant just east of Nowhere.

Super Star diskettes have been around for years...and you've used them for years as copy-protected software originals, unprotected originals. Sometimes, depending on which computer you own, the system master may have been on a Super Star diskette. And maybe more than once, you've bought a box or two or more of Super Star diskettes without knowing it. They just had some "big" company's name on them.

Super Star Diskettes are good. So good that a lot of major software publishers, computer manufacturers and other diskette marketers buy them in the tens or hundreds of thousands.

We buy them in the millions.

And then we sell them to you.  
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#### When every little bit counts, it's Super Star Diskettes.

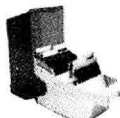
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  - ADDRESS—Maintain names & addresses. Search/Print on name, street, city, state, zip, comment
  - LBL—Select font & print Labels
  - PRNT—Set printer fonts (also use as typewriter) *Lesko Software Development, P.O. Box 15562, Colorado Springs, CO 80935, 303/472-0265*

#### Documentation Generator

The PC-DOS tree-structured file system follows the directory structure used in the real world. This is the design guideline that Customizing Documentation Generator (CDG) follows. Use your imagination to create files or directories, then ask CDG to generate documentation for you. \$39. *U-Need & See Computer Systems, P.O. Box 7363, Thousand Oaks, CA 91359, 805/495-8441, 818/889-3324*



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	Miller, Harry	Dec.	216	A	<b>Ledger Domain</b> The changing functionality of spreadsheets
	Urschel, William	Oct.	178	R	<b>A 1-2-3 Foursome</b> Reviews of <i>Bottomline V</i> , <i>CPA +</i> , <i>Key II</i> , and <i>Stock Record/Query/Portfolio Manager</i>
	Williams, Andrew T.	June	310	H	<b>The Lotus Link</b> Managing data with 1-2-3's File Combine command



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	McManus, Reed	Aug.	210	R	<b>Sensible Storage</b> Review of internal hard disk drives from Alpha Omega, Creative Edge, Kamerman Labs, Maynard, and Qubié
		Aug.	224	R	<b>Ambitious Archiving</b> Sysgen, DataTower, and IDEAdisk external hard disks compared
Systems	Brown, Eric	Oct.	186	R	<b>On the Trail of the Datavue 25</b> Quadram's 14-pound portable survives the jungles of South America
	Delehanty, Hugh	July	184	P	<b>The PCjr Survival Kit</b> Helpful advice for finding software, peripherals, service, and support
	Fischer, Edward	April	226	H	<b>The Practical Portable</b> Everything you always wanted to know about traveling with a portable
	Greenberg, Ken	Dec.	232	A	<b>Committed to Memory</b> Shattering the 640K barrier dominated the year in systems
	Guttman, Michael K.	Feb.	136	R	<b>The Multiuser Dimension</b> A review of North Star's Dimension, a PC-compatible multiuser computer
	Hewes, Jeremy Joan	Oct.	224	H	<b>Retrofit Your PC</b> Transform your PC into an XT or an AT with hand-picked hardware
	Novogrodsky, Seth	Feb.	198	P	<b>A Drive to Succeed</b> Extra power for the PCjr with Rapport Corporation's Drive Two Enhancement Package
	Shinyeda, Merrily	May	158	R	<b>DG/One for the Road</b> Data General's PC compatible is sleek, portable, and powerful
Utilities	Altman, Rick	Nov.	202	R	<b>Elegant Enhancers</b> A new wave of keyboard macro programs that save time, work, and keystrokes
	Goodman, Danny	Aug.	236	R	<b>Clutterbusters</b> Desktop managers <i>SideKick</i> , <i>Spotlight</i> , <i>PolyWindows</i> , and <i>Pop-Up DeskSet Plus</i> compared
	Hoening, Alan	Aug.	231	R	<b>Pathfinders</b> A comparison of DOS shell programs <i>Direc-Tree</i> and <i>PC-Menu</i>
	Miller, Harry	July	214	H	<b>Transfer of Power</b> Programming batch files and macros with Alpha Software's <i>Keyworks</i>
	Urschel, William	Dec.	326	A	<b>Filling In the Gaps</b> Utilities are no longer just for hackers
Word Processing	Alperson, Burton L.	Sept.	179	R	<b>And the Word Is Good</b> Update on the improved version 2.0 of <i>Microsoft Word</i>
	Altman, Rick	April	168	P	<b>WordStar for Jr</b> MicroPro adds a little flash to its PCjr version of <i>WordStar</i>
	Beckman, David B.	Jan.	138	R	<b>DisplayWrite 2: In the Corporate Mold</b> IBM's <i>DisplayWrite 2</i> closely imitates Big Blue's dedicated word processor
	Bridges, Rebecca	May	174	R	<b>OfficeWriter: Simply Dedicated</b> <i>OfficeWriter</i> raises the ante in the word processing wars
	Brown, Eric	Jan.	100	R	<b>Word Processing '85</b> An essay on word processing trends for 1985
		Dec.	192	A	<b>Word Processing and the Three Bears</b> Three-tiered product lines dominated word processing in 1985
	Crider, Bill	June	288	S	<b>Personal Publishing</b> Typeset-quality pages with a PC, a laser printer, and a variety of software
		Oct.	192	R	<b>Every Word a Key</b> <i>ZyINDEX</i> and <i>4-1-1</i> , two file-indexing programs compared
	Datz, Terry	April	116	R	<b>A Brighter Star?</b> <i>WordStar 2000</i> : Is it too much, too late?
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Subject	Author	Issue	Page	Section	Title and Description
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	Nace, Ted	Sept.	206	H	<b>Dress Up Your Documents</b> Creating documents with HP's LaserJet printer, <i>WordStar</i> , and <i>Microsoft Word</i>
	Shinyeda, Merrily	Jan.	126	R	<b>WordMARC: An Office Powerhouse</b> WordMARC provides complete business word processing descended from mainframes
		Mar.	52	G	<b>Word Processing: The Deciding Factors</b> Guidelines to help you choose the right word processing package
	Wallace, Elizabeth	Jan.	108	R	<b>THOR: New Thunder</b> THOR's text data management system signals new directions for word processing

# Columns

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Bunnell, David	Jan.	11	<b>Surveying the PC Marketplace</b> A <i>PC World</i> subscriber survey reveals who our readers are
	Feb.	11	<b>A Case of Government Interference?</b> A fight against federal agencies interfering with bulletin board systems
	March	11	<b>Special Treats for Our Readers</b> Introducing <i>PC World's</i> four special issues for 1985
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	May	11	<b>Software Piracy—One More Time</b> A balance between user convenience and software publishers' livelihoods
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	Dec.	13	<b>Don't Wear a Suit—Telecommute</b> Over 5 million people now telecommunicate to work
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Miller, Harry	March	19	<b>The Matrix Menace</b>	Simple spreadsheet errors can lead you down the road to ruin
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Rodarmor, William	Oct.	29	<b>REMark: Sermons and Soda-Water</b>	The computer industry as a major source of pollutants and toxic waste

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	Macrophobia	June	100	More macros: macro libraries and toggling macros explained
Addendum	Swapping Serial Port Addresses	Feb.	65	Addendum to "Swapping Ports with Assembly Language" (Vol. 2, No. 1)
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Apple	Picking Text Files From an Apple	Sept.	87	Two methods to transfer data from the Apple IIe to the IBM PC



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Subject	Title	Issue	Page	Description
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Subject	Title	Issue	Page	Description
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Integrated Applications	May	105	Offix	Word processing and data management for small businesses
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	May	94	Mentor Preview Series	Disk magazine packed with free software demos
Spreadsheets	May	95	The Spreadsheet Auditor	Error checking for 1-2-3, <i>SuperCalc</i> , and <i>VisiCalc</i>
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	April	154	Samna Word II, III, version 2.0	Update on Samna's word processing program
	July	106	Starplus	<i>WordStar</i> utility to redefine the function keys
	Sept.	230	Executive Writer/Filer	The old <i>Idea Processor</i> repackaged for less
	Nov.	258	Polaris PrintMerge	Utility brings <i>WordStar</i> to the HP LaserJet

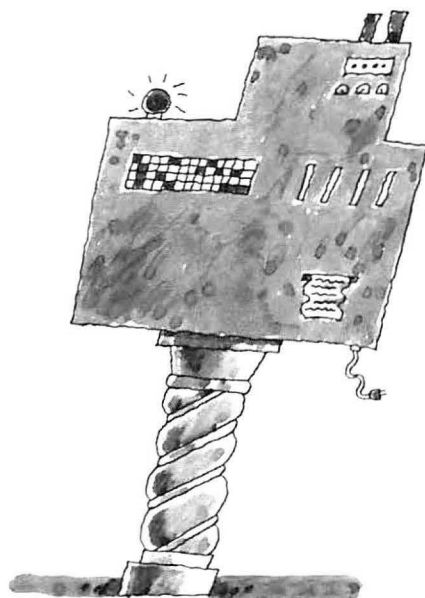
## From the Hardware Shelf

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	Oct.	263	Kaypro 16	Portable, compatible, and affordable hard disk computer
	Oct.	268	PCturbo-186	Accelerator board using 80186 microprocessor



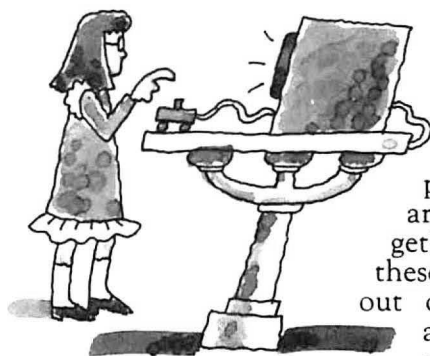
# WANTED: OLD THINKER TOYS.

CW Communications, ComputerLand and The Computer Museum invite you to send in your early personal computers, software, and memorabilia — you could win a free trip to The Computer Museum in Boston



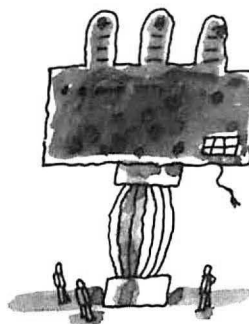
Your old, dusty "thinker toy" may now be ready to become a treasured museum piece. The Computer Museum in downtown Boston — an international museum dedicated entirely to computing — is searching for the very best and most unique relics of the personal computer revolution.

evolution of personal computers and a catalog highlighting the Museum's collections. If your submission is accepted for addition to the Museum collection, you will be invited to the grand opening of the exhibit and will receive a bound edition of the catalog. If your item is selected as one of the five best "finds", you will also receive an all-expense-paid trip to Boston for the grand opening party.



ComputerLand, CW Communications, and The Computer Museum are working together to bring these early relics out of your attic and into the collection of

The Computer Museum. The museum is especially looking for kit machines, prototypes, programs, output, newsletters and memorabilia of early computing from around the world. A selection of the finest items will be used to create an exhibit on the

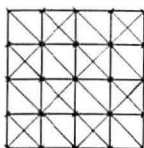


So, get up to the attic, down to the cellar and into your closets, and tell us what you find! Call or write the Museum for an official entry form, or send a photo and description of your items by March 1, 1986

to: The Computer Museum, Personal Computer Competition, 300 Congress St., Museum Wharf, Boston, Massachusetts USA 02110, (617) 426-2800, Telex: 62792318.

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Entries will be judged on significance, rarity, date, completeness and condition. Items particularly sought include pre-1980 machines, early serial numbers (get those number 1's out), machines made for purchase outside of North America (even modern machines are sought in this category); first releases of software such as first releases of operating systems, languages and mass-marketed and original applications; and pre-1980 photographs, newsletters, manuals and other records. The Computer Museum is a private non-profit educational institution. All donations are tax-deductible according to the provisions of the Internal Revenue Service. Thinker Toys is a registered trademark of George Murrow & Murrow Designs, Inc.



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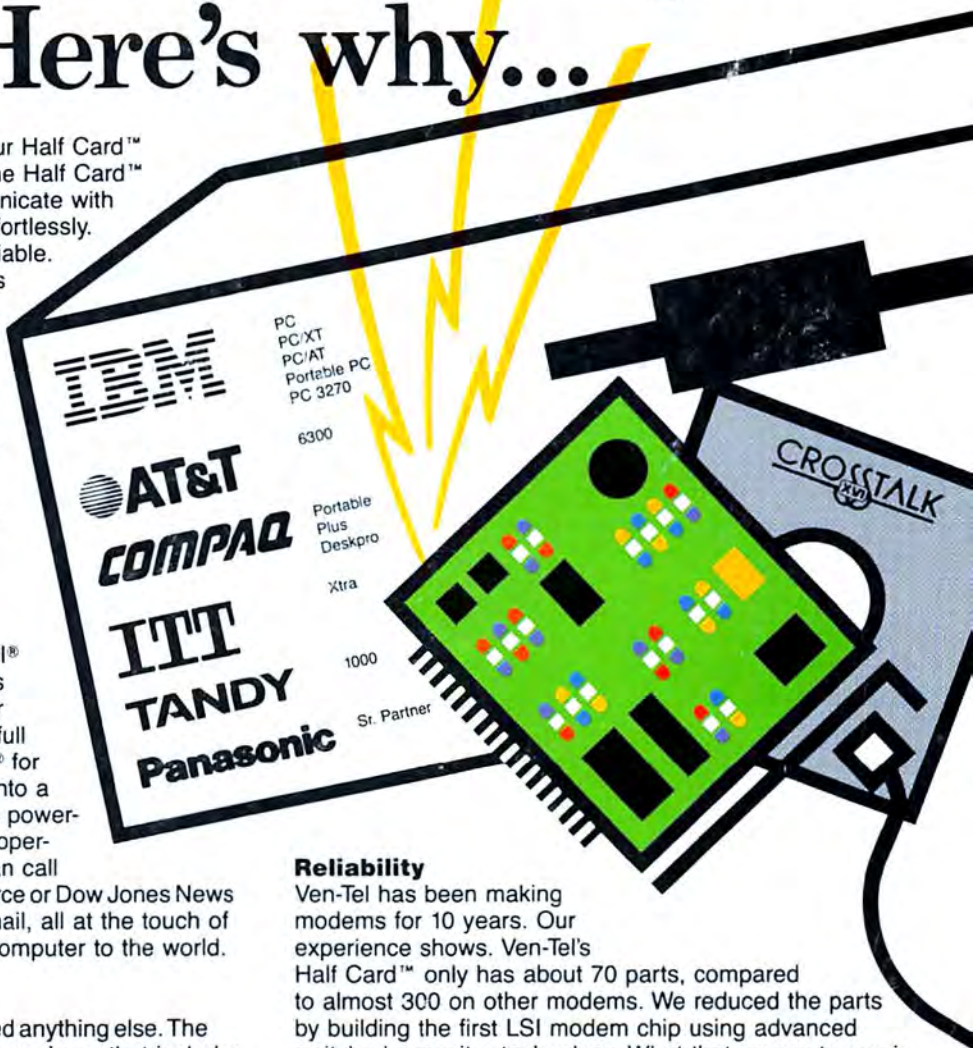
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