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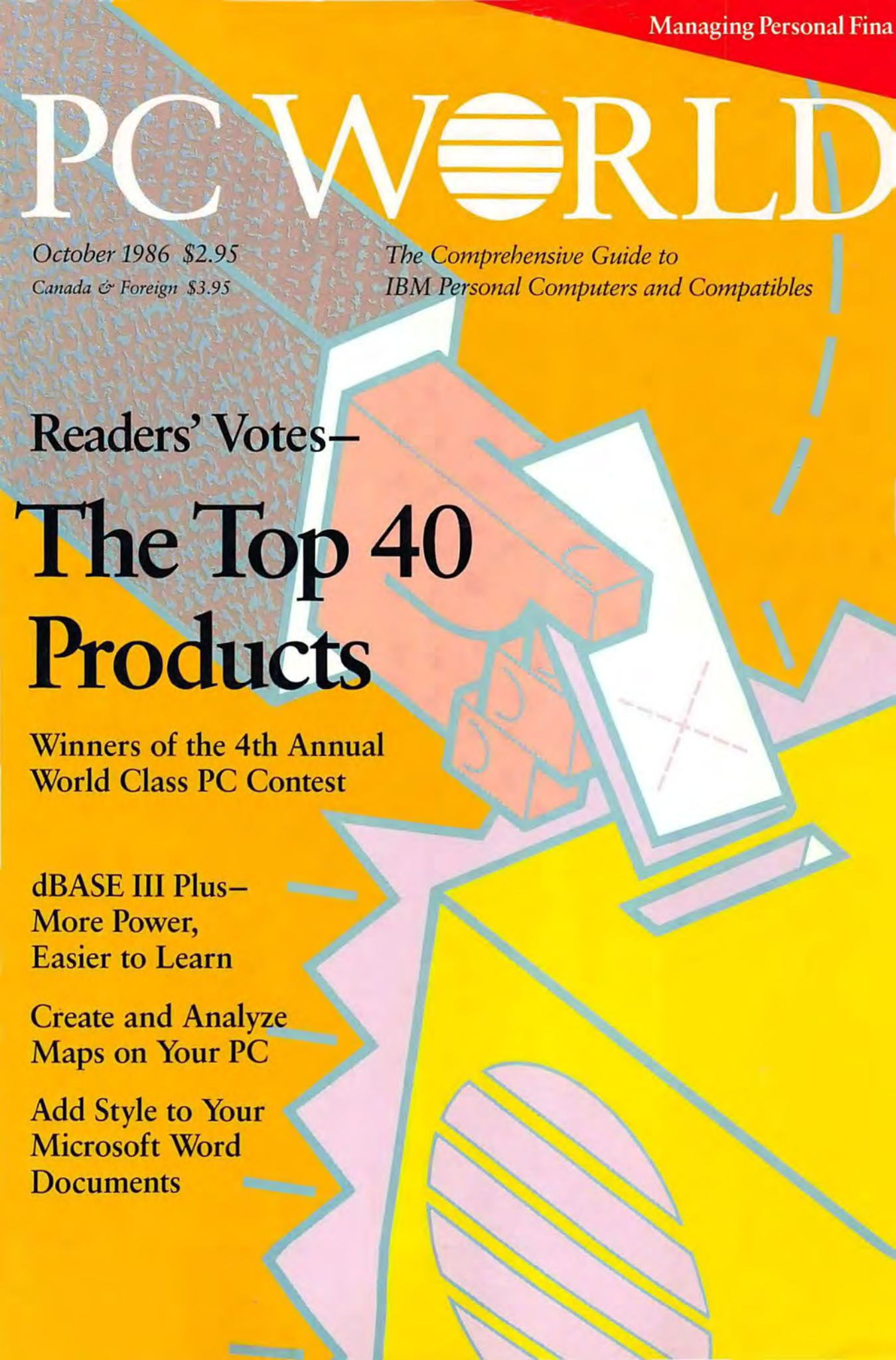

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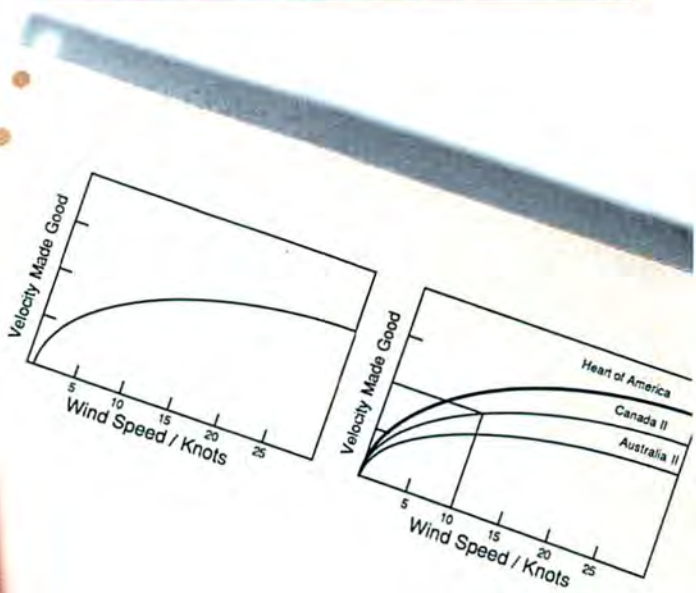
Recognition for Borland International has come from business, trade, and media, and includes both product awards and awards for technical excellence and marketing.

America's Cup. Coming Soon!

Send a buck to the boat!

If you'd like to help America's effort to recapture the America's Cup from Australia, you can make a tax-deductible donation to "Heart of America" Challenge, 11 South LaSalle St., Suite 1670, Chicago, Illinois 60603



How Borland is helping bring the America's Cup back to America!

"In the America's Cup, they don't give Gold Medals for second place"

Buddy Melges, skipper, "Heart of America," and one of the best helmsmen in the world.

Heart of America's skipper Buddy Melges with Borland International's skipper Philippe Kahn on a testing, training and analytical run, Santa Cruz, California.

Buddy Melges knows about medals. He's won both Olympic Bronze and Gold (Soloing Class, '72) and he knows there is no medal for coming in second in the America's Cup race.

"In the race, there are two *reaching* legs where anyone who doesn't fall overboard looks good, but the real duel is in the four *upwind* legs and two *downwind* legs. That's where you have to disadvantage your opponent, outsmart them, outguess them, and outsail them, and I think the kind of analysis Reflex provides is giving us a racing edge," says Melges.

"Borland's support has been both welcome and generous, and their interest in us is a lot more than the fact that we use Reflex® (and SideKick® and Turbo Pascal®). In fact, they didn't know we were using so many Borland products until we made a Tech Support call. They were more than helpful. Then one thing led to another, and now Borland is one of our sponsors. We're flying a Borland spinnaker, and they've even given us the full-time help of one of their top technical guys who's going down to Australia with us at Borland's expense. Philippe's an avid sailor and is so competitive that he keeps challenging us to race him in his boat here in Santa Cruz for the *Borland Cup.*"

"Heart of America" surfing downwind, Santa Cruz, California.

"So if trim tab angle is 4 degrees, windspeed's 21 knots and heel angle is 27 degrees, what's our best possible boat speed?"

Alex Brincko, "Heart of America," 12-meter racing yacht

Instant answer needed—because this is no academic question, *this is a race!* The America's Cup race, and the stakes are high. So Reflex: The Analyst® answers that question and the next question and a thousand other questions that stream at 4800 baud from *Heart of America*, one of the American contenders in the 1987 America's Cup races in Australia.

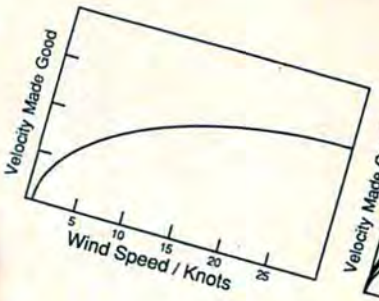
Reflex: The Analyst has to measure, calculate, connect, interconnect and interpret at least 20 different sets of criteria instantly. Data like *trim tab angle, wind speed, heel angle, heading, load on head stay, load on standing rigging, load on back stays, rudder angle,* give me lift vs drag, where's our best pointing angle?, what's our boat speed?, tell me and tell me *now!*

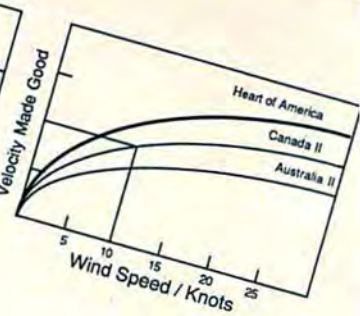
And in pure Reflex action, the graphs come up and the right answers race in. Wrong answer and you lose. Wrong move and you're history—because a wrong tack will cost you that *critical 30 seconds* that it takes a 12-meter yacht to get back up to speed.

America's Cup races are tactical, chess-game kind of races where the boats are usually equally fast, but the race pattern is *speed, speed, slowdown, speed, speed, slowdown*—and the *slowdowns* are tacks, sail changes, wrong guesses on the wind, and dumb moves on the high seas.

The *Heart of America* crew knows all that and more, and they're using Borland's Reflex: The Analyst to "Bring The Cup Up!" So here's to them all—and *Don't Leave Perth Without It!*

"There is no second prize" Omar Bradley





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October 1986

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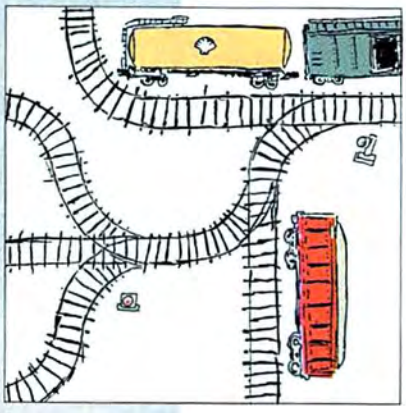

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Cover: Illustration by John Hersey

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PC World™ (ISSN 0737-8939) is published monthly at $29.90 for one year (12 issues), $53.90 for two years (24 issues), $74.90 for three years (36 issues) by PCW Communications, Inc., 501 Second St., San Francisco, CA 94107. Foreign orders must be prepaid in U.S. funds with additional postage. Add $12 per year for Canada and Mexico; add $25 per year for surface mail or $110 per year for airmail for all other countries. For subscriber service questions call toll-free 800/525-0643 (in Colorado 303/447-9330) or write: Subscriber Services, P.O. Box 55029, Boulder, CO 80322-5029. To place new orders call 800/642-9606. Second-class postage paid at San Francisco. POSTMASTER: Send address changes to PC World, Subscription Dept., P.O. Box 55029, Boulder, CO 80323-5029. Editorial and business offices: 501 Second St., San Francisco, CA 94107, 415/546-7722; CompuServe 74055,412; The Source STE908; MCI Mail PCWORLD.

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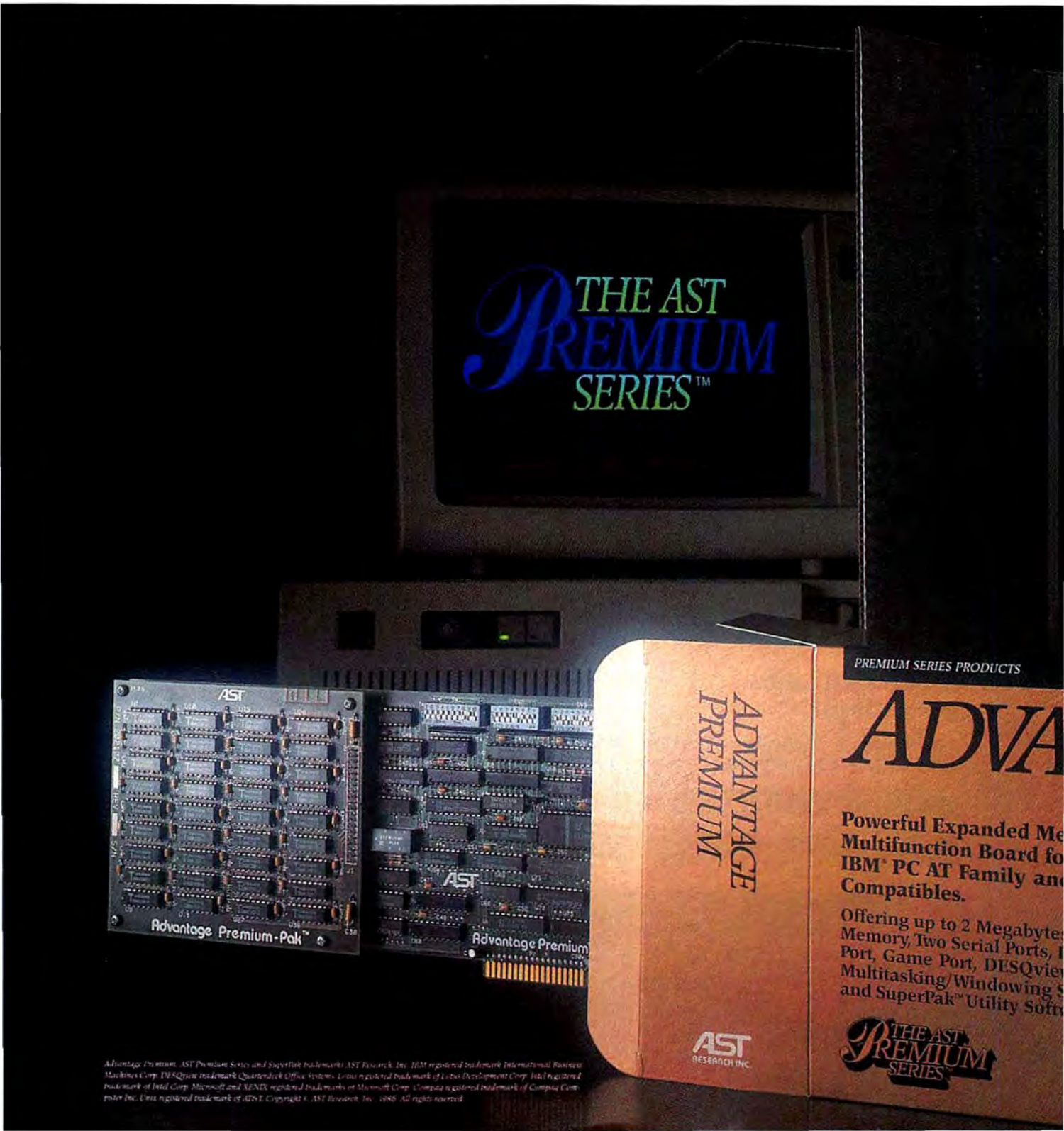

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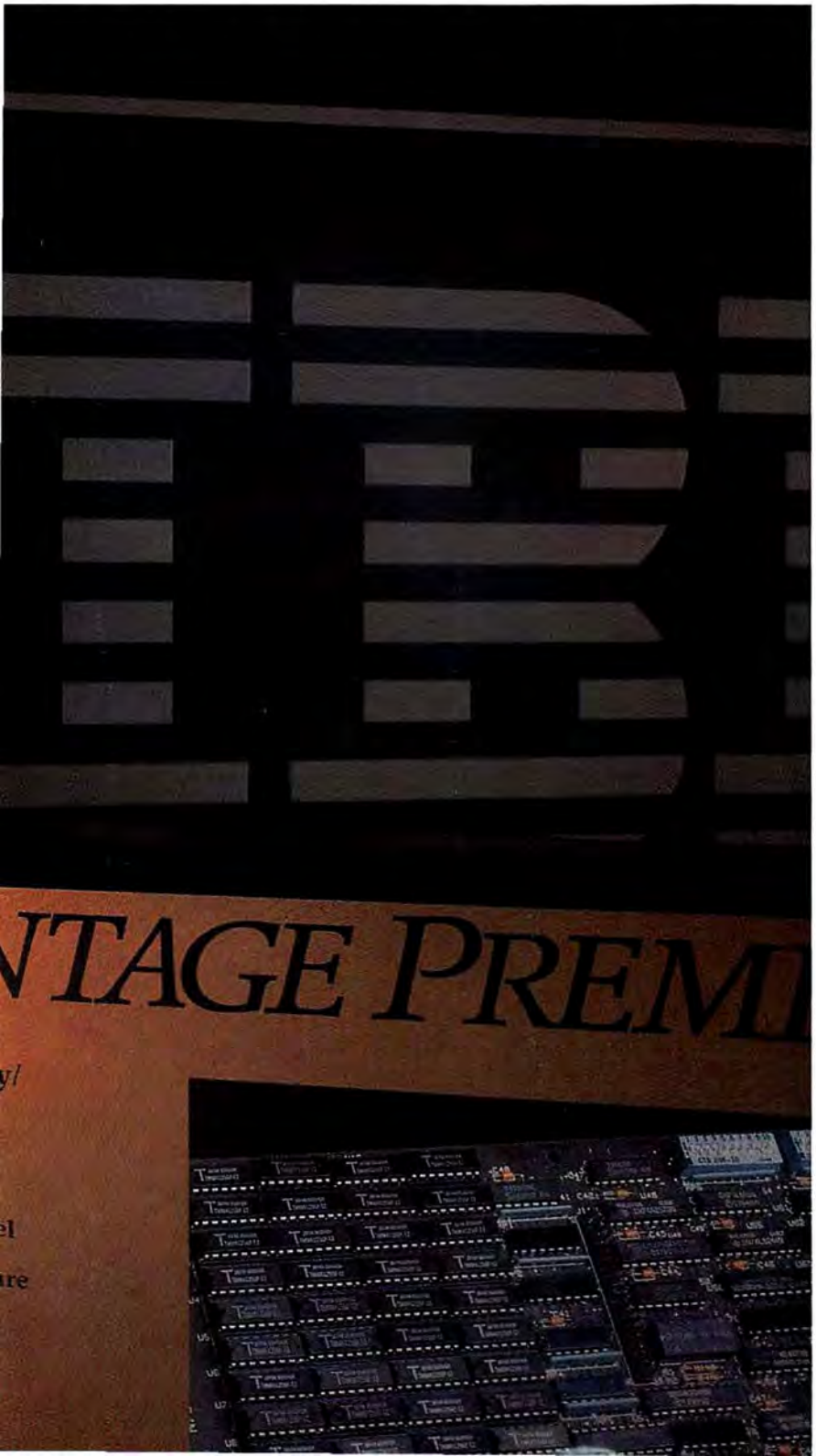

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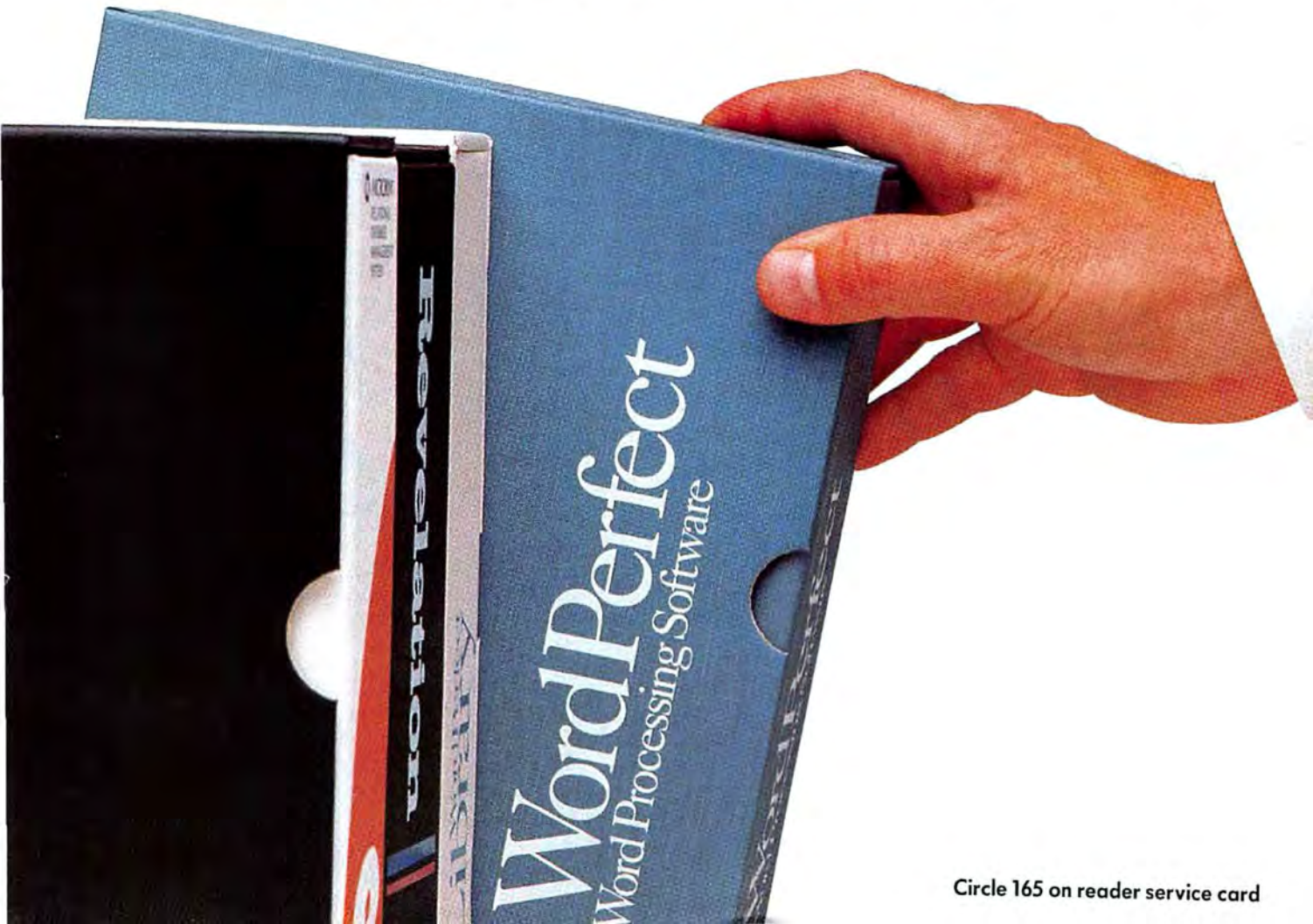

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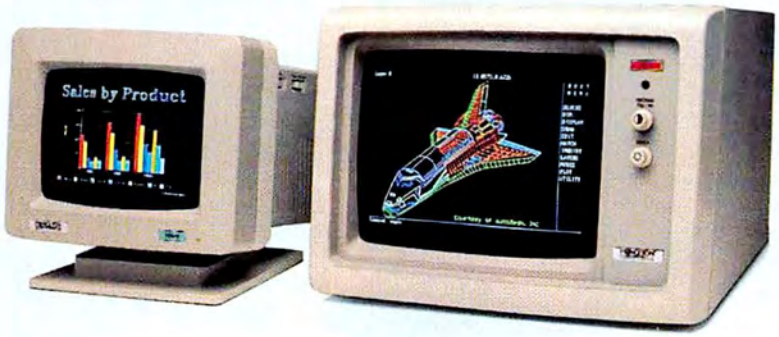

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David Bunnell

A Tale of Two Systems

In the cosmic scheme of personal computing, today's giant nebula may turn out to be tomorrow's dwarf star.

Somewhere in a distant personal computer galaxy, a new star is being born. In the meantime, back here on earth, we're being pelted by meteorites the size of IBM PC clones.

It's been almost a year since Apple president and CEO John Sculley issued his prophetic warning to the gurus and moguls of personal computing gathered at Esther Dyson's annual forum in Phoenix to discuss the shape of the PC universe.

One of the most serious consequences of sweeping MS-DOS standardization, Sculley cautioned, was that South Korea, Taiwan, and Japan would flood the United States with low-cost, high-quality personal computers and dominate the PC-compatibles marketplace.

No one at the conference took him very seriously. The personal computer industry leaders agreed that only one standard existed—namely, MS-DOS—and that anyone who wanted to be a force in the industry would have to conform to that standard.

This prompted another warning from Sculley. "Industry standards that don't allow for future innovation will end up stifling the industry's growth instead of regulating it," he reminded them.

But Compaq Computer president Rod Canion and others argued that the MS-DOS standard actually promoted rather than inhibited creativity. They maintained that staying within the standard would free you to do anything you wanted, while ensuring your software's compatibility with whatever machines were dominating the PC world.

The consensus was that Apple had positioned the Macintosh to be a factor in the corporate world—like the IBM PC—and that the attempt had failed miserably. I remember a moment during the conference when someone actually remarked, "Apple is dead but doesn't know it yet."

In session after session, speakers repeated the doomsday forecast for Apple Computer. They insisted that once the *Microsoft Windows* interface for the PC was released, the Macintosh—with its words-

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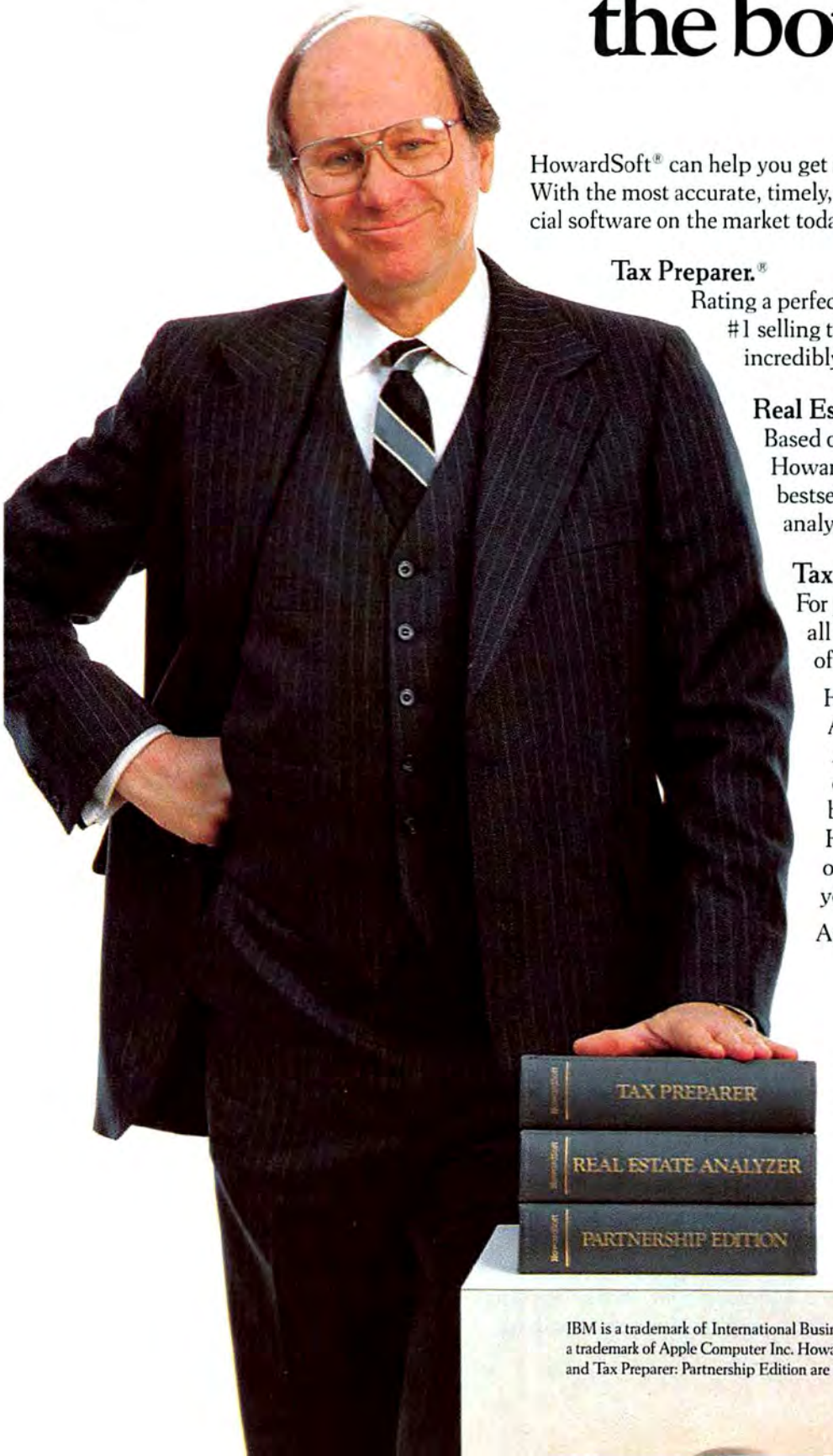

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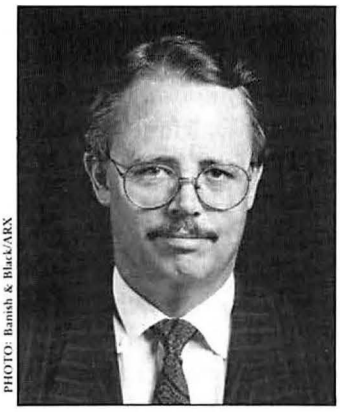

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DAVID BUNNELL
Chairman and Editor-in-Chief
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As a successful computer entrepreneur, Bunnell is at the center of the computer industry information flow. After working on the world's first microcomputer (the MITS Altair), Bunnell founded five successful computer publications. A keen observer of personal computer trends in many countries, Bunnell regularly hosts summit meetings for the captains of the industry. Last year he reported on events in Beijing, Paris, London, Sydney, and Tokyo, in addition to complete U.S. coverage.

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David Bunnell

and-graphics sophistication—would lose its temporary advantage over the PC.

Once *Windows* was available, they claimed, there would simply be no reason to own a Macintosh.

Well, *Windows* has been released, and the Mac is doing better than ever. It's now clear that if *Windows* does make an impact, it will largely be on the faster 286- and 386-based PCs: *Windows* requires more speed and more memory than the standard PC provides. Even with an accelerator board, *Windows* seems very slow.

It's also apparent that *Windows* on a PC doesn't yet compete all that well with a Macintosh, because the Mac's screen resolution is far superior to that of the IBM PC.

Eventually, *Windows*-based machines will indeed rival the Macintosh. But because *Windows* demands faster processing and more memory, there won't be enough *Windows*-based machines to constitute a real threat to the Mac for at least another year. And when this point is reached, the machines will probably be much more expensive than the Mac-based systems.

Microsoft chairman Bill Gates recently told me that "the Macintosh will be the low-cost alternative for graphics-based personal computers."

Meanwhile, the Macintosh has shown tremendous improvements in speed, performance, and software. And since it's based on a proprietary system that has yet to be successfully cloned, Apple can command healthy profit margins. In fact, Apple owns the whole Mac market, while IBM has only 40 percent of the PC market. And Apple has more than $600 million in the bank.

IBM, on the other hand, has witnessed a dramatic change in its fortunes. Because of competition from the clones, IBM has lost its hold on the MS-DOS world. Once reigning supreme, lately IBM has seen its power eroded not only by low-cost imports from Asia but by homegrown clones right here in the United States.

At the Phoenix conference IBM may have been touted as invincible, but here we are, less than a year later, asking the question, Will Big Blue ever regain the position it once held in personal computing?

The prospects are bleak indeed. Ironically, IBM is about to embark on a strategy of making its future computers less clonable and more proprietary—probably with methods similar to those Apple used with the Macintosh, such as placing routines that draw text fonts and display graphics in a proprietary ROM.

While IBM moves toward a closed system, Apple plans to open up the Macintosh.

At this point, Apple has the advantage because it stands to benefit from the lesson of IBM's trials in the world of compatibility. Thus Apple can incorporate all the benefits of open architecture while avoiding the pitfalls that have befallen Big Blue.

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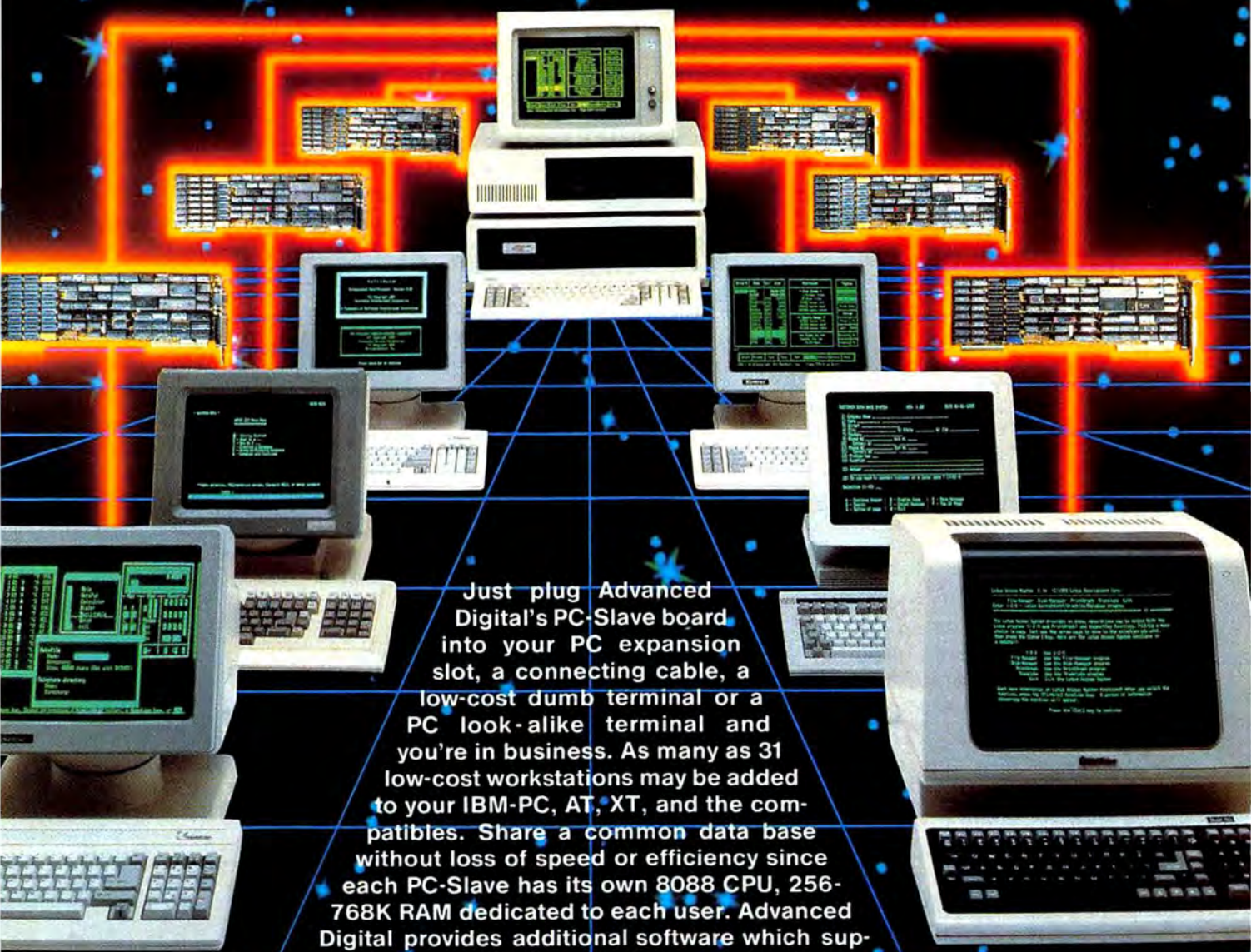

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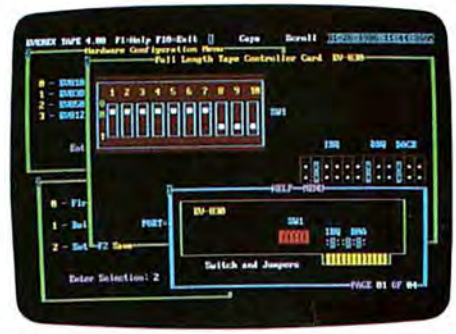

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boards, memory boards, and interface boards, Apple is encouraging the creation of different Macintosh configurations that otherwise might not have come about.

I predict that in the not-too-distant future we will see an explosion of diversely configured Macintoshes on the market. These machines will be loaded with different kinds of internal boards and configured to a wide variety of input and output devices.

However, despite the open Mac, Apple is unlikely to simplify the Macintosh's ROM enough to make it copyable. Apple is certainly not going to make it easy for competitors to churn out Mac clones.

That's another valuable lesson Apple has learned from IBM's experience, as well as its own Apple II saga.

Should Apple ever decide that having Mac clones could be an advantage, it can simply license the Macintosh ROM to a manufacturer and collect royalties on the clones that its licensee produces.

Vern Rayburn, president of Symantec—the company that makes the *Q&A* program for MS-DOS machines—recently observed that most of the exciting software development today is taking place in the world of the Macintosh, not in the PC world.

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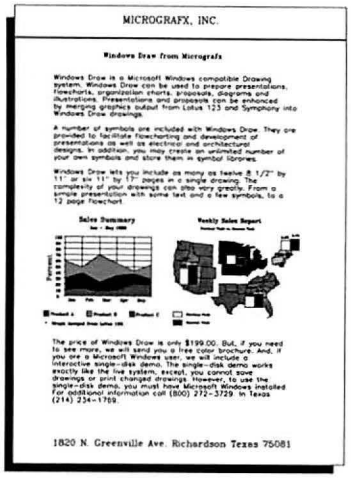

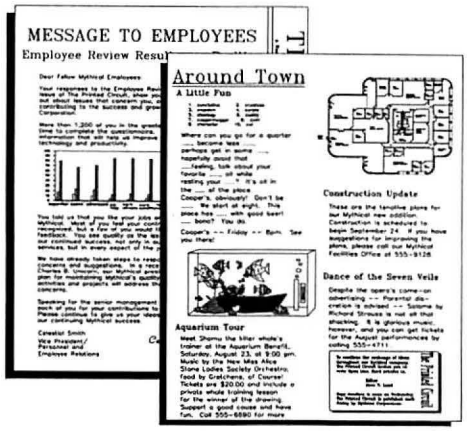

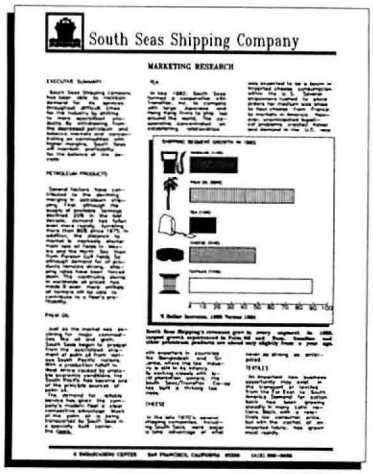

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For such applications, the Macintosh clearly has the edge over the PC. By the time the 386-based machines come along to steal the show, Apple will have built enough bridges to MS-DOS to include MS-DOS emulation on the Mac itself.

In this way, corporations can easily integrate the Macintosh system into a PC environment and exchange data and files, and even programs, through networks.

So Apple has the chance to make the Macintosh a winner in large corporations after all.

Several lessons can be learned from this tale of two systems. One is that you can't always rely on the conventional wisdom of industry gurus for answers to complex questions. They're frequently wrong. Another is that things aren't always what they appear to be.

A year ago, it appeared that the whole personal computer industry had gone into orbit around IBM and would never escape. Now it's not clear who's orbiting whom.

In fact, there may be more than one PC solar system out there. Just watch out for the black holes. And always remember, today's giant nebula may turn out to be tomorrow's dwarf star. ●

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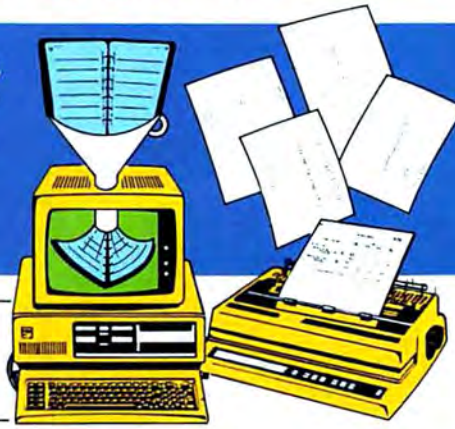

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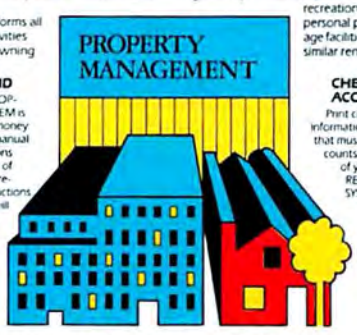

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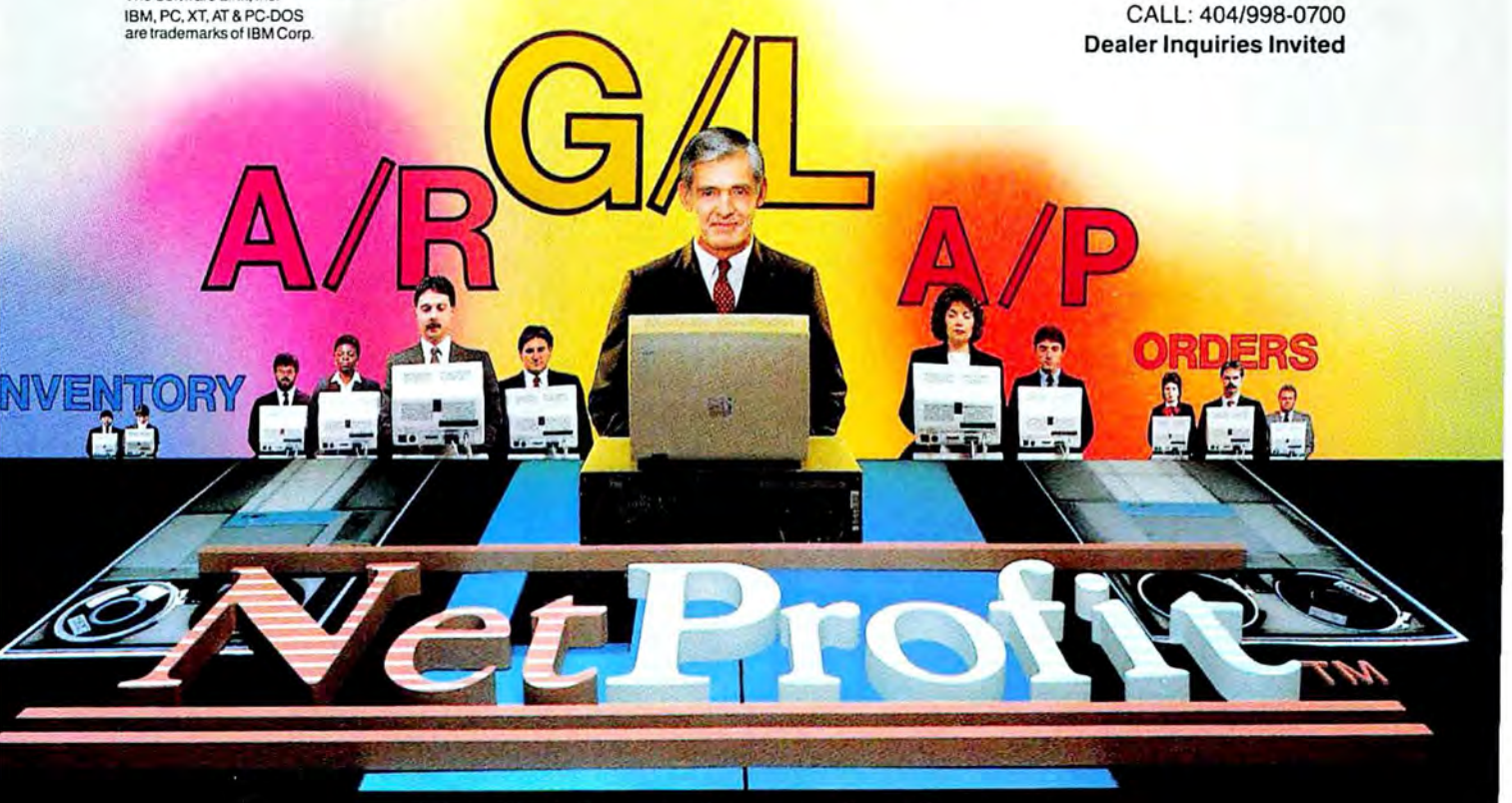

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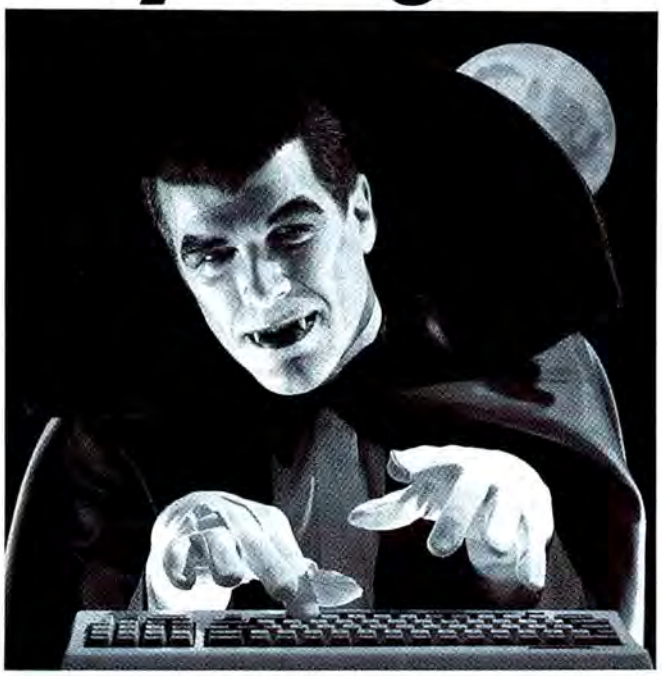

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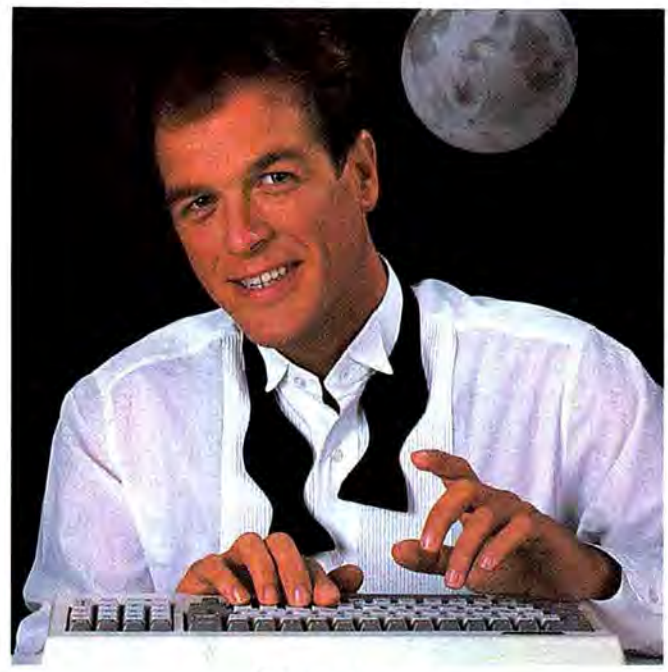

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Build an index on 2000 names	**1:43**	8:40	6:13	1:01	3:08
List company names and phone	**1:56**	3:12	2:25	2:17	0:32
Sort on indexed field	**4:42**	>60:00*	13:08	10:19	7:52
Count to 5000	**4:10**	9:04	9:43	11:35	18:51

(all times in minutes:seconds) *test terminated after one hour

And, because development speed is as important as processing speed, *VP-Info's* one-step compiler doesn't get in your way. A single command compiles any application. Programs can even be run without pre-compiling for speedier debugging.

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C&C Computers and Communications

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It gives you the best color resolution available at the price.

- Compatibility with the IBM Professional Graphics Adapter, the IBM Enhanced Graphics Adapter, and the IBM Color Graphics Adapter.

Compatibility with the IBM® Enhanced Graphics Adapter Board

- MultiSync, the NEC feature that automatically adjusts to color adapter board scanning frequencies from 15.75 KHz to 35 KHz—suggesting the possibility that the MultiSync monitor might be compatible with *all* color graphics boards that are fully compatible with the IBM PC, PC/XT, and PC/AT, now and in the future.
- Full implementation of high resolution graphics software for business and other applications, now and in the future.
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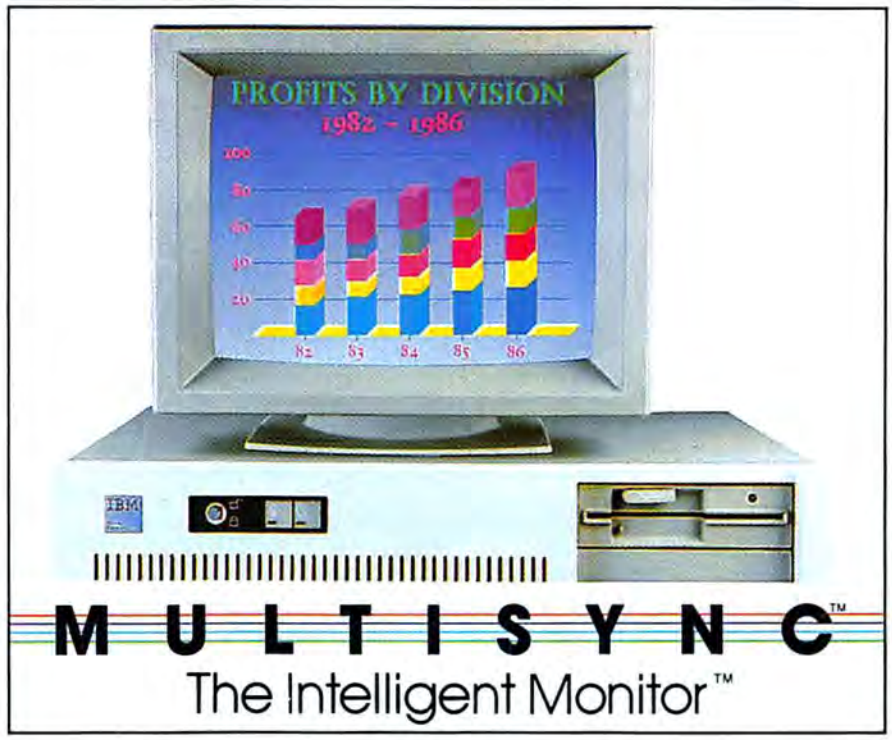
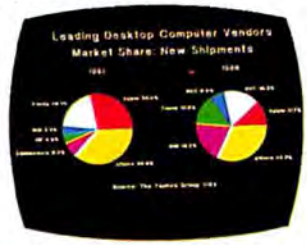
All from NEC, a name respected around the world for advanced, reliable products backed by nationwide service.

Compatibility with the IBM® Professional Graphics Adapter Board



It's the one color monitor that does everything your way.



Compatibility with the IBM® Color Graphics Adapter Board

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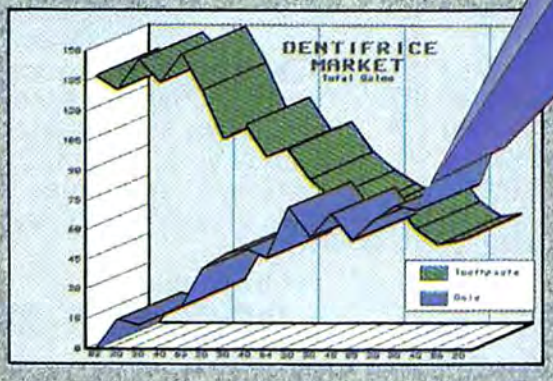
Graphs that make your numbers come alive.



MORE THAN 375 GRAPH POSSIBILITIES. AND FAST.

Decision Graphics gives you more versatility than any other package. You can choose a graph faster. Draw a graph faster. Even enter data faster. Compatible with Lotus 1-2-3, Samna+, dbase III, Symphony, Multiplan, Supercalc or Framework . . . using input formats ASCII, DIF, WKS, WK1, WRK, WR1, DBF or SYLK, you can make your hardware and your presentations work like never before.

You can add the power of 3-D. Vary your numbers with 11 totally different graph types. Use bars. Explode pies. Give lines and pyramids a whole new dimension. Special icons tailor your presentation. Or you can display points to make your point.

Decision Graphics offers more font options. More text enhancements. You can change every character size, color and position. Samna's package is so advanced, so professional, your inexpensive presentation looks like a million dollars. And so do you.

THE ONLY PACKAGE THAT'S A LOOKER AND A THINKER.

No other graphics software gives you over 30 built-in calculations, plus the power to add more of your own. Decision Graphics is ultra smart. Ultra simple. Ultra fast. A few easy keystrokes and suddenly boring numbers make beautiful sense. You get more out of your data. Your audience gets more out of your presentation.

And without leaving the program, you can project trends. Calculate averages. Compare growth rates. Right on the spot.

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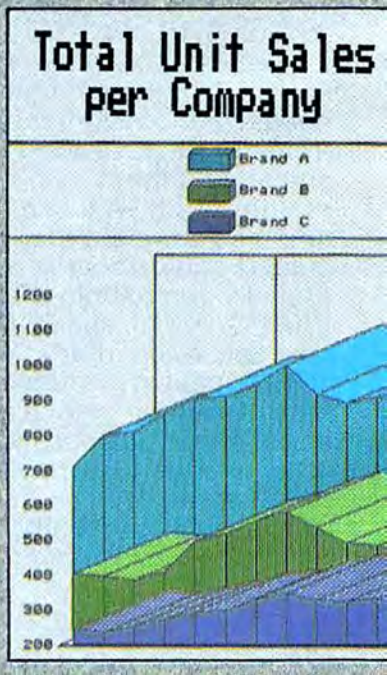

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By ADDE, Sarl.

NO OTHER PACKAGE GIVES YOU MACROS THAT ARE THIS EASY. THIS COMPLETE.

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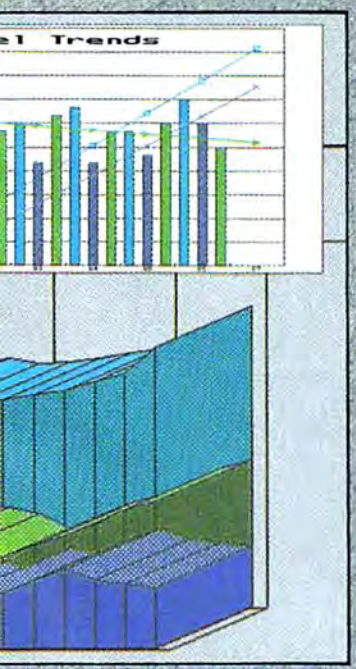
Decision Graphics' macros give you more options. In less time. All in one easy-to-use package. You can have your hardware working for you—even when you're not there working. And by chaining macros together, you can automate an entire presentation. The whole thing runs more smoothly. So do your nerves.

And while Decision Graphics' exclusive macros are fast and advanced, they're also outstandingly simple. You don't need a programmer's degree to make them or your presentation work . . . beautifully.

Five keystrokes.



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Samna's graphics speak more vividly. More powerfully. Taking full advantage of your high-resolution hardware. Graphs build quickly. Calculations perform in a flash.

You can display 30 quality graphs on one screen. Even more if you choose. And you can put them anywhere. In any size. Plus, you can add special interest with special effects such as "zooming." Presentations look high-quality. High-tech. Even if you're not a technician. And of course, smart Decision Graphics' visuals can go directly into overheads, slides and prints.

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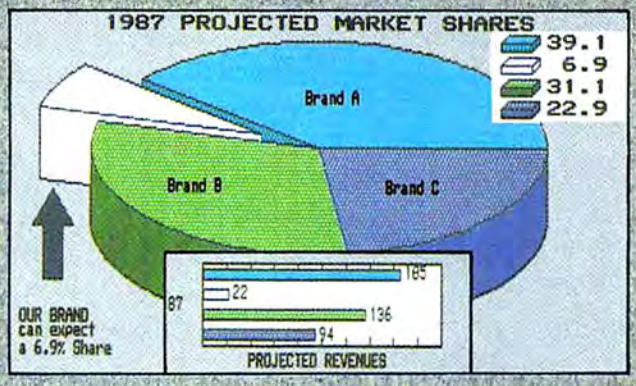

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Circle 281 on reader service card

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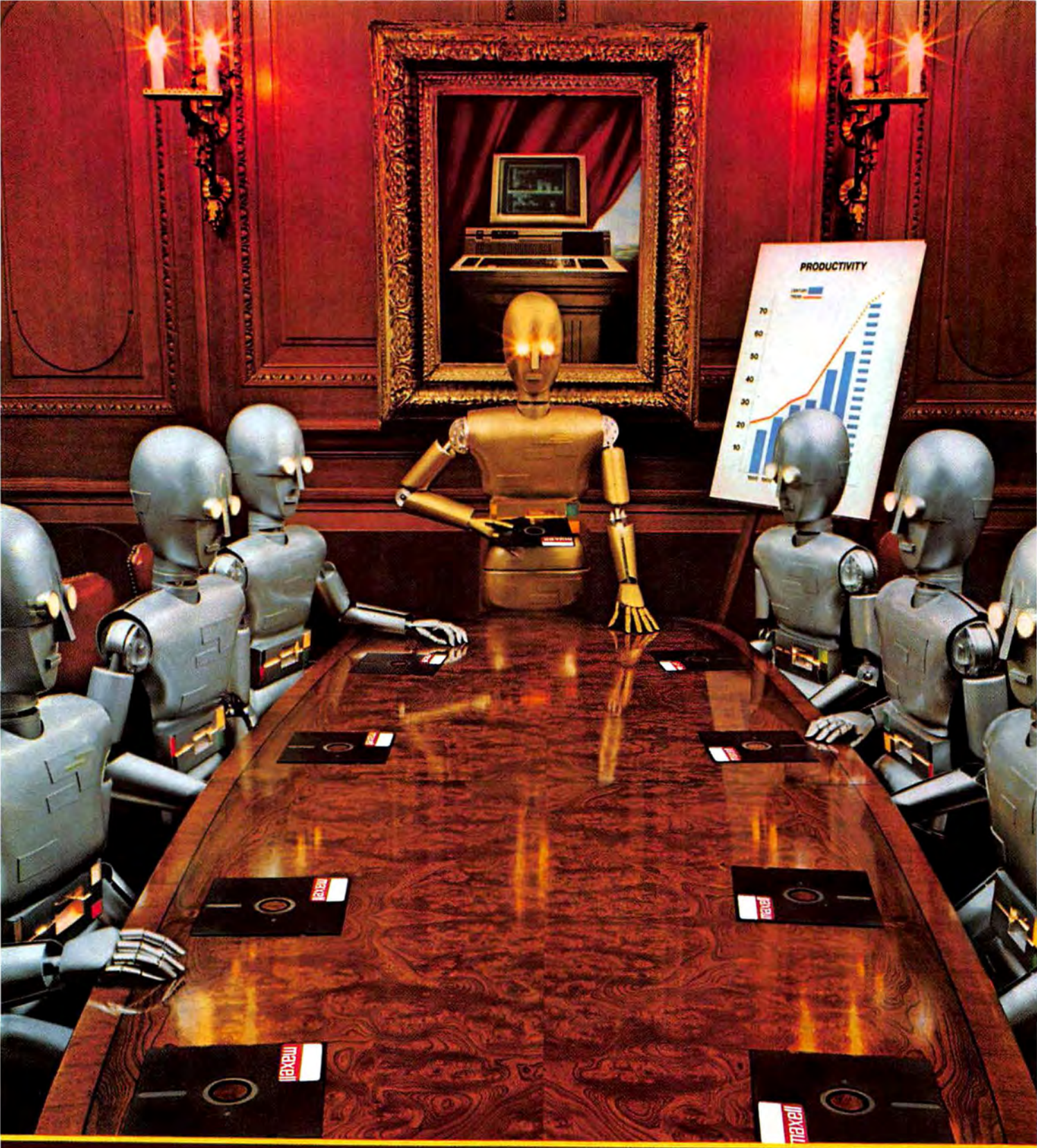

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Letters

Reactions and responses from the PC World community

No Substitute for Experience

Since I am a commercial printer and typesetter, the desktop publishing issue [*PCW*, July 1986] filled me with excitement, anticipation, and apprehension. Until now, I've just been hanging on to the coattails of the PC revolution, but like most people in my profession I find I must seriously devote a growing portion of my time to PCs and desktop publishing.

However, I think there is one point regarding typesetting and desktop publishing that has so far been totally ignored. Just as you'd go to a doctor for medical help, you should go to a typographer for typesetting advice. A novice using a desktop publishing system, like a beginner using a sophisticated typesetting device, can create an awful mess. There are multitudinous nuances that a professional typographer adds to a document simply based on experience and skill.

Typographers have experienced six technological "revolutions" in the past 30 years, progressing from handset type to digital photo systems. You can be sure they'll incorporate new PC and laser technology as it matures. Even with the arrival of desktop publishing systems, their expertise warrants consideration.

Richard Hopkins
President, Pioneer Press
Terra Alta, West Virginia

Our Program Right or Wrong

I enjoyed the point-counterpoint on *Volkswriter 3* in the July *Letters*. But as soon as I read Janet Crider's review ["The More Things Change . . . ," *PCW*, June 1986], I knew that your mailbox would overflow with mail from the outraged *Volkswriter 3* faithful.

Users are fiercely brand-loyal. This has nothing to do with a program's merits. Instead, it's directly related to the factors described by David Bunnell in "On the PC Fault Line" [*PCW*, July 1986]. Software is never as easy to use as publishers would like us to believe. Since it takes weeks to learn a full-featured program, users are rightfully proud of their accomplishment when they've learned one. Consequently, they're very reluctant to change programs or acknowledge better ones. To do so would be to admit that weeks of blood, sweat, and tears were in vain.

In this light I think it's fair to say that the *Volkswriter 3* loyalists acted predictably. Without impugning Ms. Crider's objectivity, had she learned *Volkswriter* as her first program, I doubt that the tenor of her criticism would have been so severe.

Monte Hall
Las Vegas, Nevada

The Dealer Dilemma

Computer dealers aren't entirely responsible for user woes. Dealers face a market with diminishing profit margins, hundreds of products from which to choose, and customers who expect to flip a switch and see all their business problems magically solved. PC hardware and software are complicated products requiring considerable effort and dealer support to become effective business tools. Despite all the media hype, "user-friendly" is a relative term.

(continues)

Microsoft Word 3. It outlines its own advantages.

The virtue of planning ahead is never more apparent than when you set out to make a point on paper. Which is precisely why we included a built-in outline program in Microsoft® Word Release 3.

Armed with the outliner, it's a simple matter to organize your thoughts before you write. Take a complex subject, break it down into a long roster of topics, subtopics, or arguments.

List all of these elements as headings. Then juggle their order and their level of priority. In Microsoft Word 3 the outline and the document it frames are linked. So you can jump back and forth between the outline and your work. Collapse long manuscripts down to manageable main elements. And restructure the entire piece by simply moving the headings.

Then watch your ideas fall into place.

Watch this live demonstration.

Any kind of writing can benefit from the gentle discipline imposed by the outliner. A good for instance is the ad you're reading right now. Say you had to write it. If Word were your writing instrument, you'd simply list its many attributes, stream-of-

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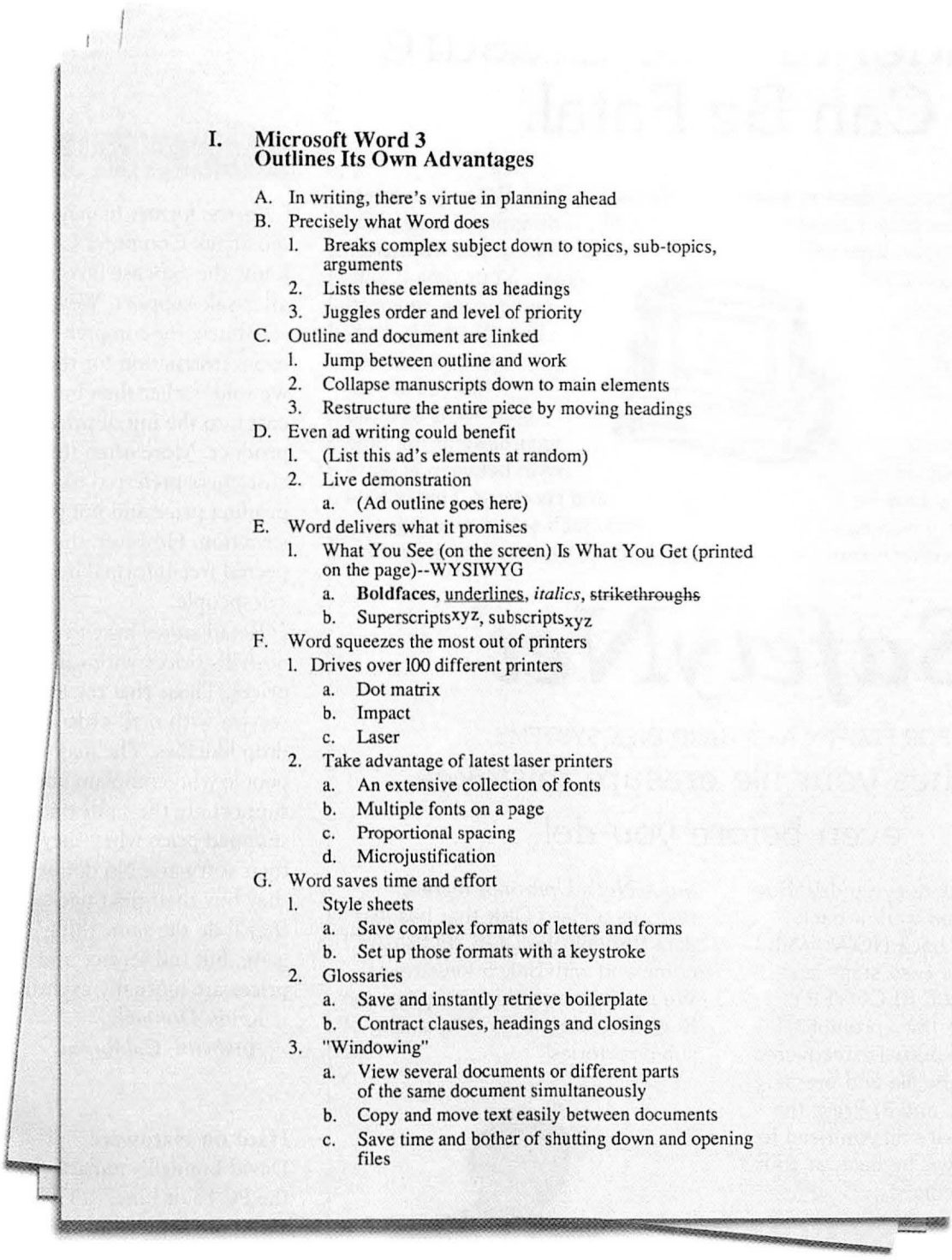

I. **Microsoft Word 3**
Outlines Its Own Advantages

A. In writing, there's virtue in planning ahead
B. Precisely what Word does
   1. Breaks complex subject down to topics, sub-topics, arguments
   2. Lists these elements as headings
   3. Juggles order and level of priority
C. Outline and document are linked
   1. Jump between outline and work
   2. Collapse manuscripts down to main elements
   3. Restructure the entire piece by moving headings
D. Even ad writing could benefit
   1. (List this ad's elements at random)
   2. Live demonstration
      a. (Ad outline goes here)
E. Word delivers what it promises
   1. What You See (on the screen) Is What You Get (printed on the page)--WYSIWYG
      a. **Boldfaces**, underlines, *italics*, ~~strikethroughs~~
      b. Superscripts^{xyz}, subscripts$_{xyz}$
F. Word squeezes the most out of printers
   1. Drives over 100 different printers
      a. Dot matrix
      b. Impact
      c. Laser
   2. Take advantage of latest laser printers
      a. An extensive collection of fonts
      b. Multiple fonts on a page
      c. Proportional spacing
      d. Microjustification
G. Word saves time and effort
   1. Style sheets
      a. Save complex formats of letters and forms
      b. Set up those formats with a keystroke
   2. Glossaries
      a. Save and instantly retrieve boilerplate
      b. Contract clauses, headings and closings
   3. "Windowing"
      a. View several documents or different parts of the same document simultaneously
      b. Copy and move text easily between documents
      c. Save time and bother of shutting down and opening files

consciousness style. The way it's displayed on the screen above.

Then, after designating each feature or thought as a heading, you electronically rearrange these random facts into something resembling real, organized writing. Like the very professional looking printout on the right side of the page.

We think you get the idea by now.

By now you not only understand pretty clearly how the outliner works, you've got a good overview of the new and amplified capabilities of Microsoft Word 3 for the IBM® PC and compatibles.

But you'll find it more satisfying if you get your hands on the program itself. Drop by a Microsoft dealer for a demonstration. And see how Word makes it easy to think before you write.

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SafetyNet™

FOR FLOPPY AND HARD DISK SYSTEMS

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Dealers circle 776 on reader service card

As the former manager of a Radio Shack Computer Center, I know the expense involved with after-sale support. We charged separately for comprehensive classroom instruction for the software we sold, rather than bundling that cost into the initial price of the product. More often than not, customers preferred to lowball the product price and not pay for instruction. However, they still expected free informal help from salespeople.

Retail stores have to balance no-frills prices with full-service prices. Those that try to offer full service with mail-order prices drop like flies. The majority of the people who complain about poor support are the same ones who shopped price when they bought their software. No doubt when they buy their next package, they'll do the same thing! Sorry gang, but full service and low prices are mutually exclusive.

Kevin Donnelly
Anaheim, California

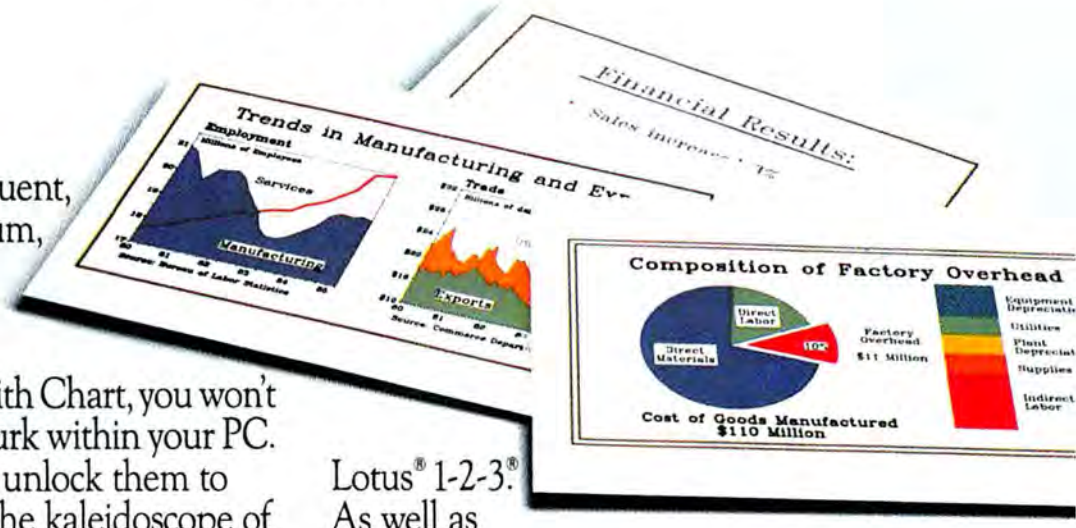
Hard on Hardware

David Bunnell's remarks in "On the PC Fault Line" [*PCW*, July 1986] are simplistic. Software and its documentation can always be improved, but laying the brunt of the blame for user hardships on software publishers is unfair.

As a consultant who has supported top-quality accounting systems, word processors, spreadsheets, and industry-specific programs, I'd say that most user frustration and dissatisfaction

(continues)

A thousand ways to draw applause.



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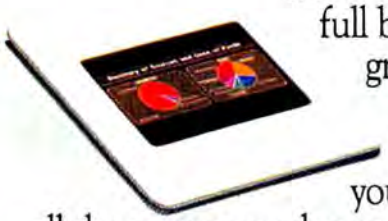

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Chart runs on IBM* PCs and compatibles. And supports IBM EGA and other graphic cards, as well as the latest output devices from Polaroid, Hewlett Packard, IBM and others.

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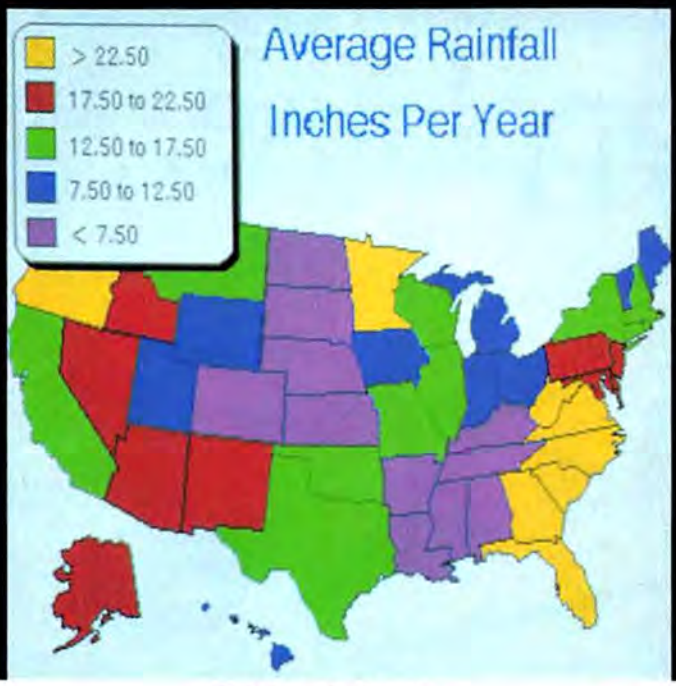
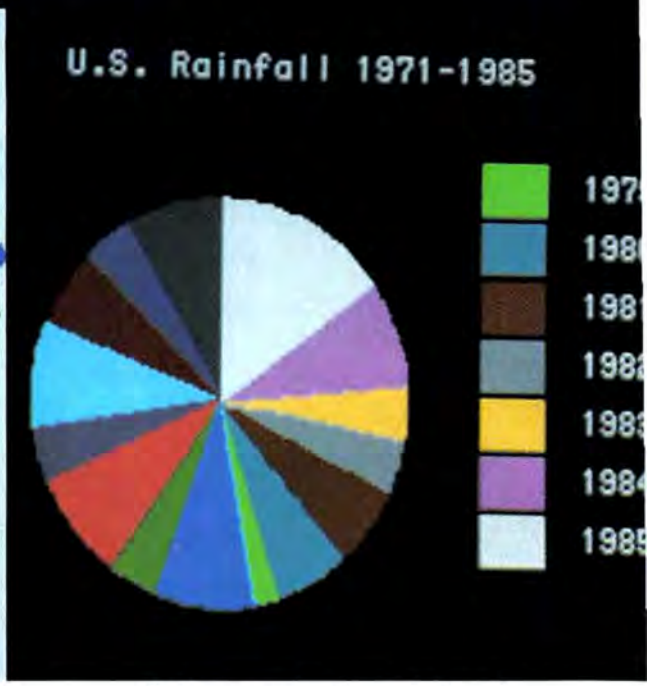


EGA Mode



Plantronics Mode

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You've decided you want an EGA Video Card because it offers the best quality text with high resolution color graphics. The problem is that older versions of popular software, like Lotus 1A, (and some current versions too) won't work with the EGA standard. That's a problem because in the course of your workday you'll need to use software written for different video modes.

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AutoSwitch. Only Paradise has it.

The Paradise AutoSwitch EGA changes video modes automatically to work with your software. No Mode commands. No special software to run. On RGB monitors it "autoswitches" between EGA, CGA (IBM Color Graphics) and Plantronics modes; on monochrome monitors between EGA, MDA (IBM Mono Text) and Hercules modes. The Paradise AutoSwitch EGA runs any PC software you want. Immediately. Automatically. That's something ordinary EGA Cards can't do.

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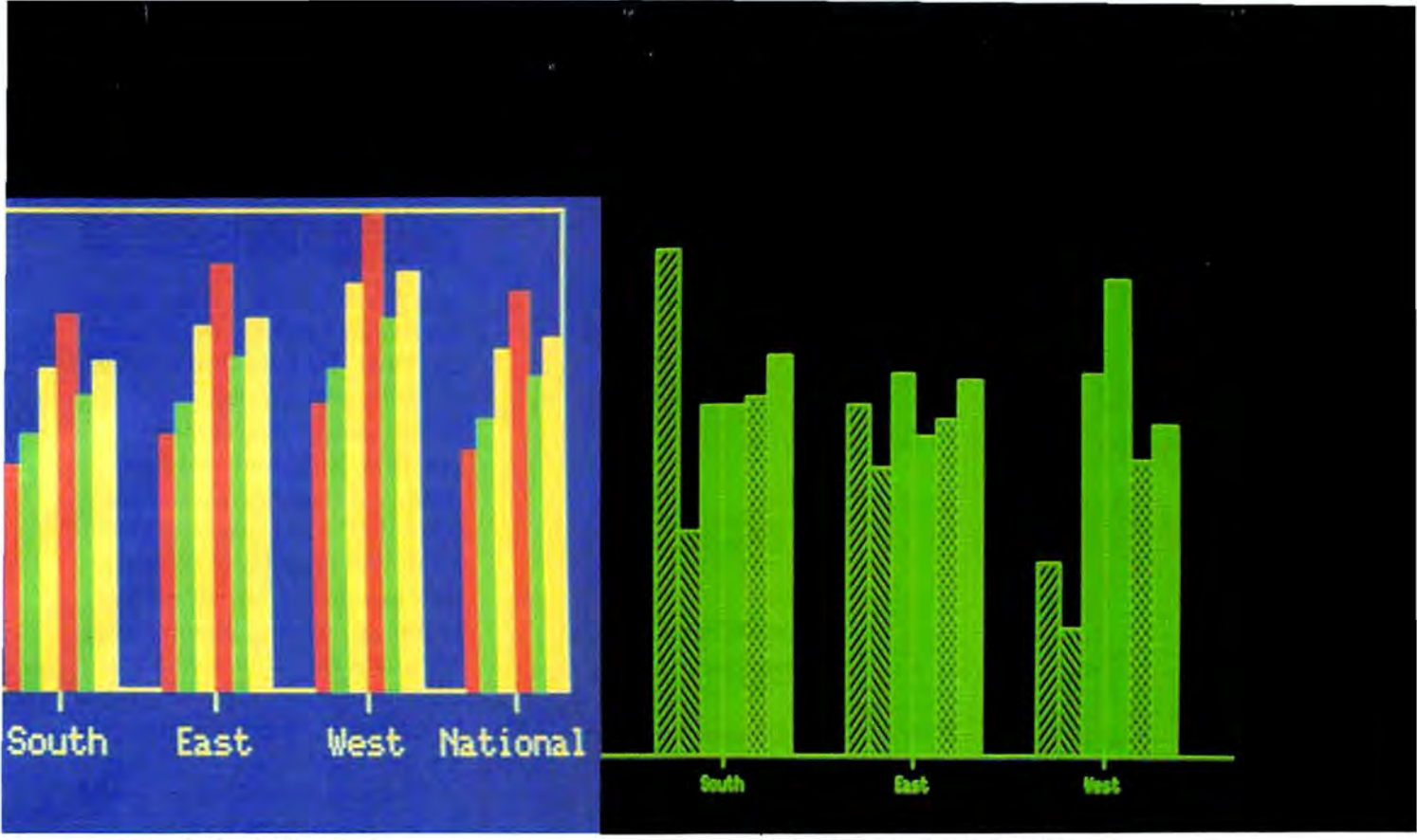

CGA Mode

Hercules Mode

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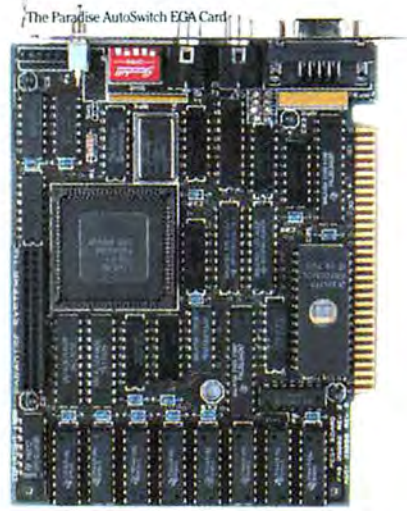
SYSTEMS, INC

The Paradise AutoSwitch EGA Card



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stem from unrealistic expectations fostered by hardware manufacturers. Promotions like IBM's "Charlie" ads promise instant push-button solutions to complex problems. Such overly optimistic assurances make users feel cheated when they realize that their $2000 investment probably won't replace their accountant, lawyer, stockbroker, or engineer. Business users are additionally frustrated when they discover that someone must be trained at company expense to use the system.

Hardware manufacturers should be held accountable for their advertising. Obviously, if "compatible" meant "100 percent compatible," if manuals contained all the necessary information, and if hardware were really "easy to use," there'd be no need for a consultant like me or for a publication like *PC World.*

Dave Robinson
Cypress, California

Stop the Presses

Your review of *The Newsroom* [*From the Software Shelf, PCW,* July 1986] makes me wonder if your business orientation is getting in the way of objective reporting. Although the program may not be the way to produce a corporation's annual report, my division of a Fortune 500 company uses *The Newsroom* for internal communications and announcements. You may feel that this program won't help score points with the boss, but the division president regards our employee-initiated

(continues)

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System Requirements: Worksheet files from 1-2-3 Rel. 1A, Rel. 2, or Rel. 2.01 or Symphony Rel. 1.0, Rel. 1.1, or Rel. 1.2; IBM® PC, XT™ AT® Portable, 3270 PC, COMPAQ® Computers, or AT&T® PC 6300; 256K RAM; DOS 2.0–3.1, inclusive.

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Newsroom newsletter as an important contribution to the overall sense of unity among a diverse staff working in different locations.

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Bernard Bushkin
Suffern, New York

Laser Burns

After reading "On-Line Vendors Eye CD ROM" [*Password: Communicate, PCW,* July 1986], I'd like to caution potential CD ROM users that new technology brings with it new problems. I've owned laser videodisk systems and compact disk (CD) players since their inception.

Laser disks can degenerate and produce snow in the video signal. That isn't a hardware failure in the disk player, but a "low-tech" failure of the clear plastic coating on the disks themselves. Wear and tear causes the plastic to separate from the aluminum-coated information surface, so that seeping air slowly tarnishes it. Rather than reflecting the laser beam, the tarnish absorbs it, causing signal loss. Both laser videodisks and CDs are touted as lasting 50 years, but I've had several laser disks and CDs go bad in this manner. With a CD ROM, this means the loss of data in a computer file. Considering the importance of records to business, think twice before trusting data to the CD medium.

Stan Burns
Glendale, California

(continues)

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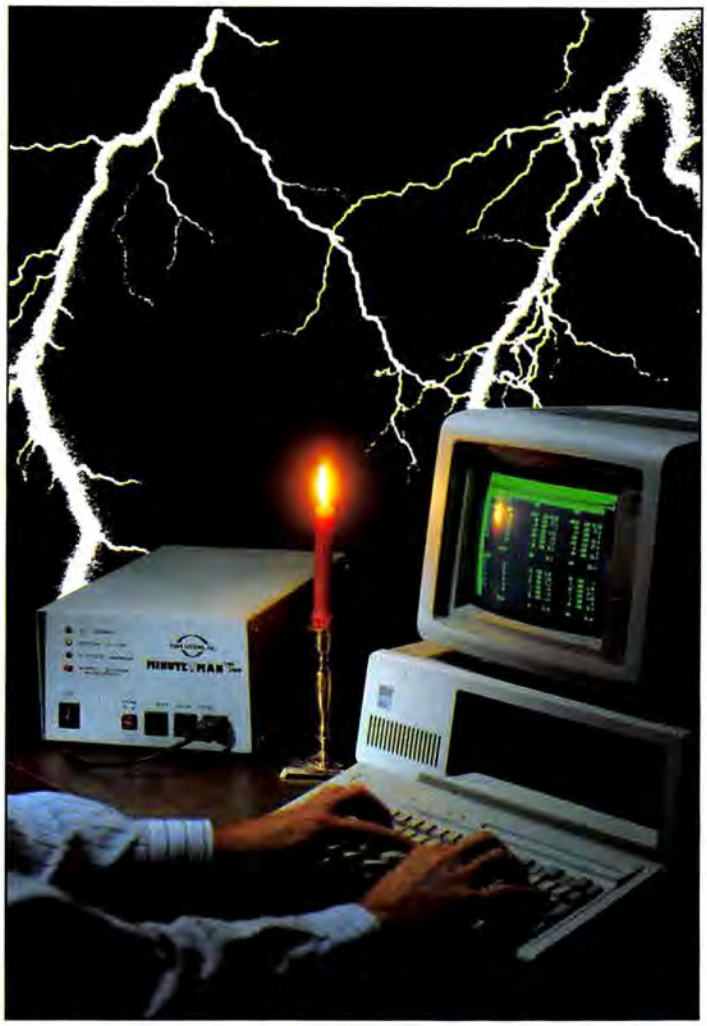

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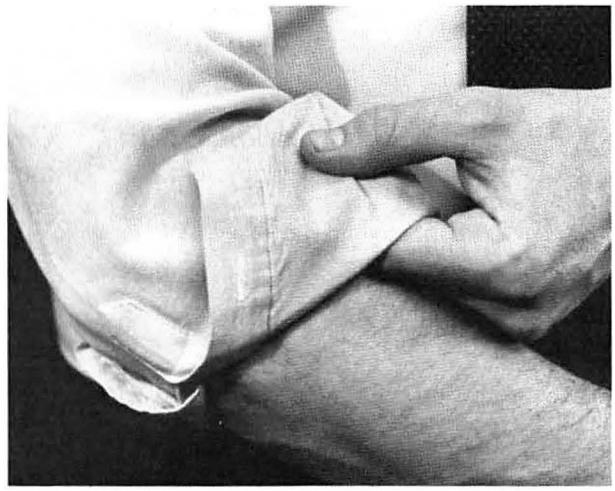

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Objection Sustained

"Holding Up a Mirror to Crosstalk" [*Password: Communicate, PCW,* June 1986] incorrectly states that "SoftKlone charged the U.S. Copyright Office with fraud for having granted Microstuf copyrights on the two disputed *Crosstalk* screens." The article should state that SoftKlone has alleged that Microstuf fraudulently induced the Copyright Office to accept applications for copyright registration with respect to several *Crosstalk* screen images. At this point in the litigation, SoftKlone has not alleged, and is not aware of any facts that would support an allegation of, fraudulent conduct on the part of the Copyright Office.

Frank G. Smith III
Law Offices of Alston & Bird
Atlanta, Georgia

Star-Dot-Starstrips

As a subscriber to *PC World* and an owner of a Cauzin Softstrip Reader, I think you should print the routines listed in *.* on Softstrip data strips. Cauzin's ads in *PC World* alerted me to the Softstrip Reader's capabilities, and I think this would be an excellent way to use the device.

Harold Eddens
St. Louis, Missouri

*Great timing! Starting with this issue *.* will print all of its programs on Softstrip data strips. –Ed.*

Letters should be mailed to Letters, PC World, *501 Second St. #600, San Francisco, CA 94107, or sent electronically to MCI Mail PCWORLD, CompuServe 74055,412, or The Source STE908. All letters must include the writer's name, city, and state and should not exceed 300 words. We reserve the right to edit letters.*

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Amdek's 1280 consists of a high-contrast, non-glare 15″ white phosphor monitor and a bit-mapped graphics board. The extra-large CRT can display up to 160 characters per line by 50 lines of text (vs. 80 x 25 for IBM).

Incredibly high resolution, 1280 (H) x 800 (V), plus the use of a 16 x 32 dot character (vs. 8 x 8 IBM standard), result in text and graphics that are remarkably sharp and easy to read. So, creating high quality flyers, reports, newsletters, bulletins or whatever else you want to "publish" at your desk is as simple as ABC.

The Amdek 1280 is also supported by one of the most popular IBM PC desktop publishing software packages, Clickart by T/Maker. Compatibility with AutoCAD and CADvance gives you full CAD potential. Convenience features include front-mounted operator controls for power, brightness and contrast; and a tilt-swivel base which allows you to select the most comfortable viewing angle.

So, stop the presses—Amdek has done it again! Because everything that's fit to print looks better on an Amdek 1280.

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TO: A.L. Walters
Director of MIS

FROM: George Schnyder
Sr. Systems Analyst

SUBJECT: Review and summary of tape back-up systems.

Attached is the report on tape back-ups that you requested. In summary, Peachtree Technology, Inc.'s Model T-33e is the tape back-up that I recomme.

Model T-33e Highlights:

- Can back-up 30 megabytes.
- Meets our quality standards.
- Provides best price performance, $795 suggested retail.
- Portable—runs off the floppy port, requires no installation.
- Has the software features of the more expensive competition (file by file or mirror image back-up).
- Compact, 3 1/2" width—No footprint.
- Self Diagnostics—Full LED instrumentation.
- Runs off our Novell network.

I would like to move ahead quickly and install the initial units by month's end.
Please advise!

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Referee's Sideline™ menu enables you to control RAM-resident programs from within an applications program!

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Referee puts an end to RAM-resident program conflicts. At $69.95, it solves a very big problem for a very small price.

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Robert Carr

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Everybody wants solutions; everybody's got tools. The wise user ought to know the difference.

Not long ago I found myself grappling with a small but irritating problem: overflowing closets. It wasn't that I had too much stuff jammed in a dark recess, only that the space was used inefficiently. One day, it became clear that I needed additional shelving and clothing rods.

In my quest for a solution I faced two options. Being a hobbyist woodworker, I considered designing a custom set of shelves, buying lumber, and using my complement of woodworking tools to fashion the storage system myself. After painting, I'd have an efficient and orderly cubicle—and one less problem to worry about.

As it turned out, I just didn't have the time for this hands-on, building-from-scratch approach, even though I would have enjoyed the chance to be a craftsman.

Instead, I found a relatively complete solution to my storage problem: I hired a firm that installs standardized, modular closet-shelving systems. I worked with a salesman to choose modules and sizes, and then sat back while a team installed the system. Up to that point, the major expenditure of energy on my part was writing a check.

This solution still required some action on my part, though: I had to remove all my possessions from the closet before the new apparatus could be put in place. I was also responsible for rearranging my goodies once the system was installed. This made sense—no one knows my things like I do. Nor can anyone else assume responsibility for the risk of wrinkling my Wranglers.

There's a moral here, and a useful analogy to the way users choose software. Each of us must make the same "tool versus solution" decisions that I made in trying to squeeze more space from my cluttered closet. In the expanding universe of software packages, each one a potential star, how can you determine which program will meet your needs?

To make some headway, it's helpful to classify a program according to whether it's a tool or a solution. Both categories promise

(continues)

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Drafix 1 features the best organized screen design ever devised. Very simply, it displays all the information you need, all of the time.

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And it's all controlled by a versatile three-button mouse, or digitizer, with on-screen prompts so each button function is clearly defined.

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Drafix 1 Features

Items
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- Arcs & circles
- Note text
- Polygons & ellipses
- Symbols/individual & nested

Item attributes
- 16 pen colors
- 255 Layers
- 8 Linetypes
- 12 Text fonts
- 32 Pt marker types

Screen Display
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- 8 Save Views
- Slide save/view
- Grids on/off

Metric & English Standards
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- Architectural (ft in)

Project drawing info.

Numeric input
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- Absolute, Relative, Polar

Snap Modes
- Gridpoint
- Endpoint
- Midpoint
- Intersect
- On item
- Quadrant
- Tangent
- Arc center

Transform/Copy
- Move
- Rotate
- Scale
- Mirror
- Align

Modify/Edit
- Attributes
- Break/Divide
- Fillet/chamfer
- Trim
- Stretch
- Erase
- Explode symbols & polygons
- Mask
- Replace
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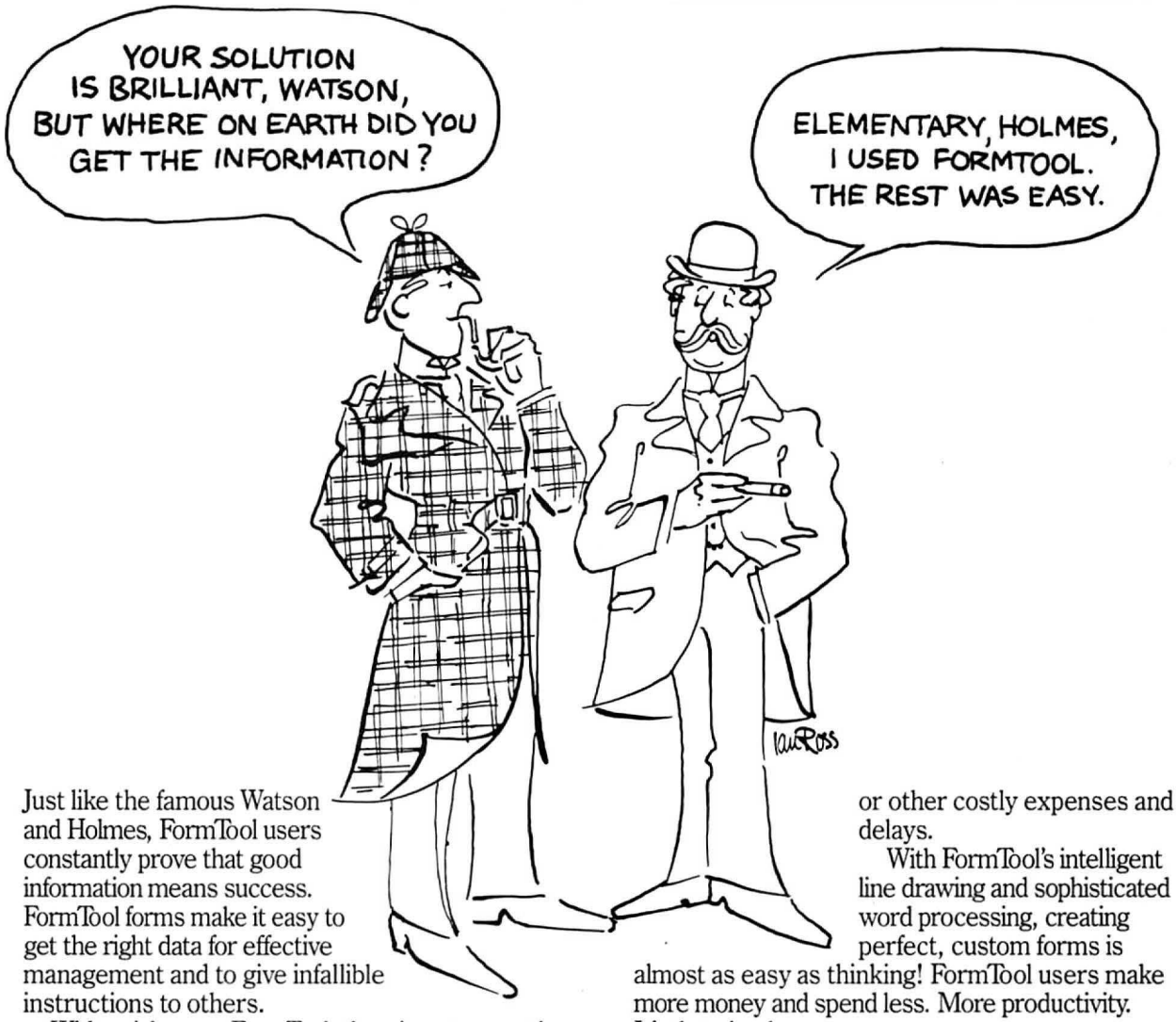

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special benefits for different needs. If you understand your requirements, and you understand whether a tool or a solution is more appropriate, the software universe will quickly start to exhibit a satisfying degree of order.

The distinction between tools and solutions isn't simply semantic; it's fundamental. It goes to the very heart of how people frame problems and how they go about fixing them. Software tools contrast clearly with software solutions: Tools are implements or interfaces with which you build solutions, rather than premixed applications that try to anticipate your needs.

The choice isn't made any easier by current fads. The buzzword of the hour is *solutions*. Conventional wisdom holds that people don't want technology, at least not for its own sake; they want ways of solving problems with minimum effort and maximum reliability.

But it's not necessarily true that the most successful software companies are those that deliver ready-made (ready-to-ware?) solutions. Recent history indicates that toolmakers—like Lotus Development and Ashton-Tate—have profited most in the PC business, although it's true that some tools, such as spreadsheets, have been sold as solutions.

Most people purchase an application program to accomplish a specific task or a group of related tasks. Software solutions demand relatively little of users—only data entry and the manipulation of a few commands. Solutions are working systems that get the job

(continues)

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Power. *Manages large data bases, up to 4 million bytes. Powerful searching including alphabetic, numeric, "and," "or," "not" and record browsing. Sorted retrieval. Global updating. Mailing labels, up to 64 across. Full reporting and crosstabs on 64 columns.*

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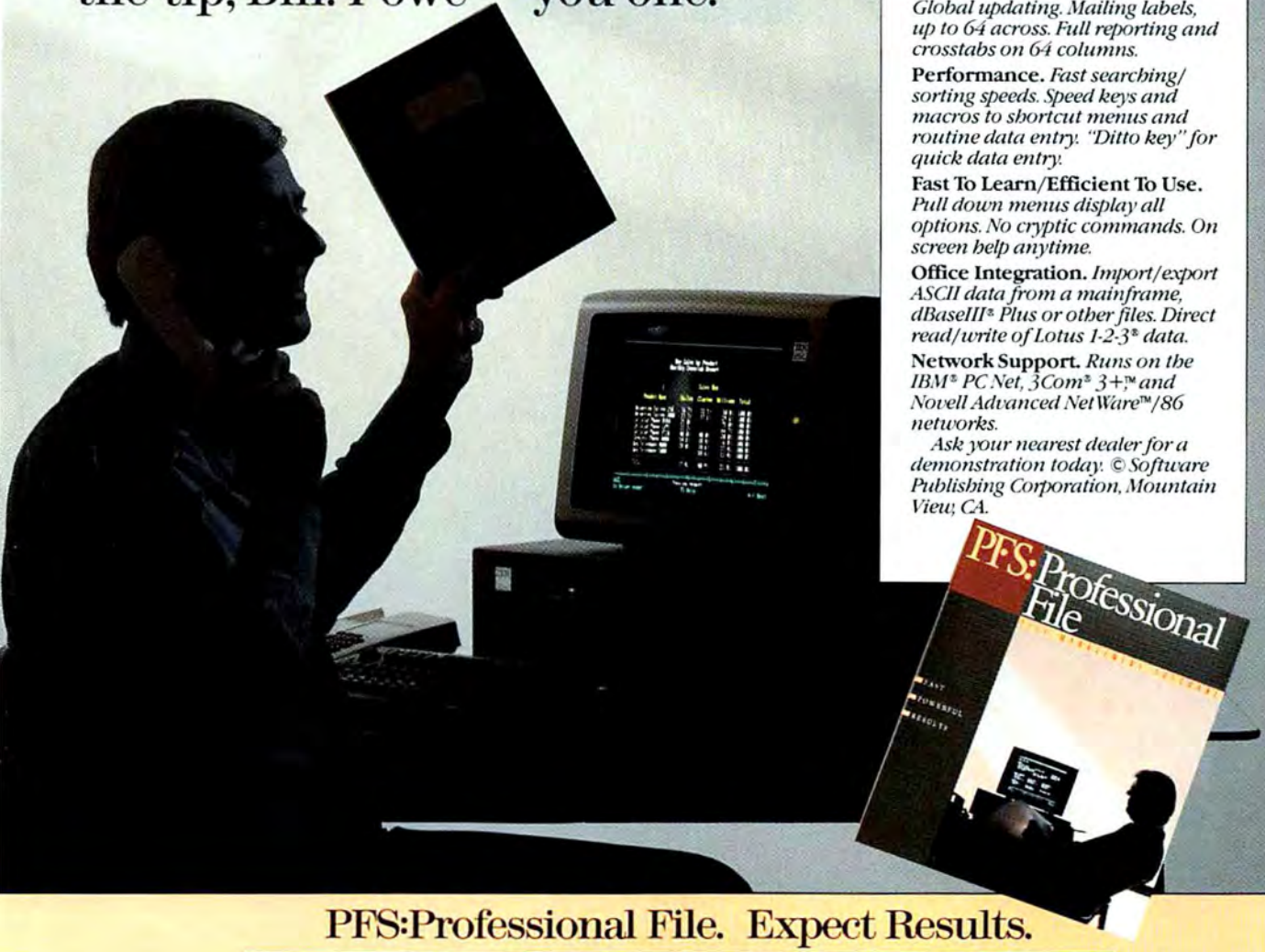

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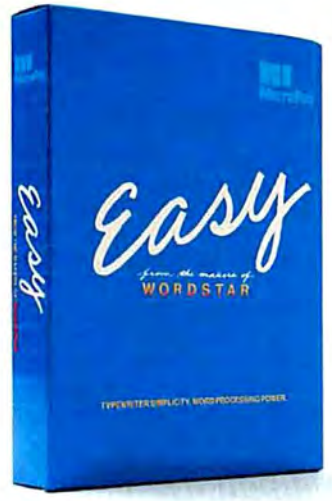

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The luxury sedan that gets five miles to the gallon.

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Every so often, though, there's an exception.

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Easy not only gives you several unique features. It gives them to you for about $50 less than its major competitors, PFS®: Write and IBM®'s Writing Assistant.

So you can have the best in price *and* performance.

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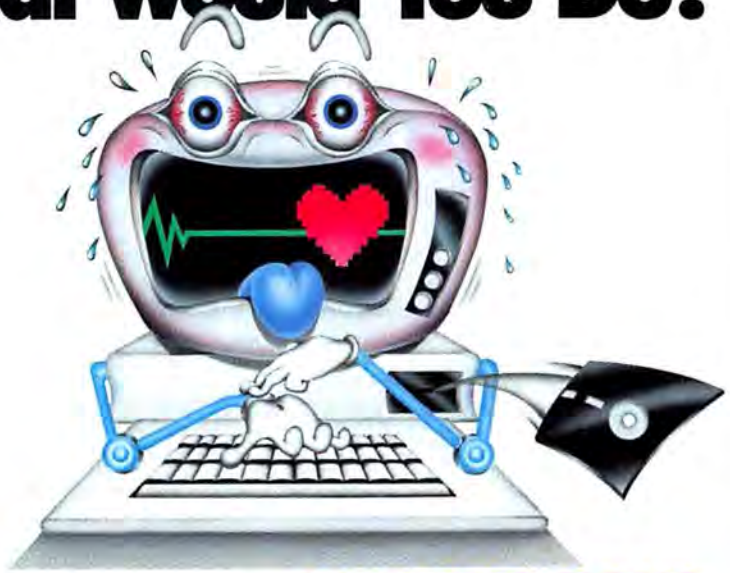
Easy 1.0 owners may update to Easy 1.5 or upgrade to Easy Extra by calling MicroPro Customer Update at (800) 227-5609. Easy 1.0 owners who have registered their software prior to September 30, 1986 may update to Easy 1.5 for FREE and upgrade to Easy Extra for $35. After September 30, update and upgrade prices will increase to $10 for Easy 1.5 and $79 for Easy Extra.

Circle 382 on reader service card

Sudden AT™ Death. What Would You Do?



You turn on your AT™ computer and suddenly it starts to happen. Your computer starts gasping for information because your AT battery is dying. The simplest data, like the time and date, becomes a struggle. All vital signs start fading from the screen. Without action, the victim will soon lapse into unconsciousness.

What would you do?

Until recently you would have been powerless to save your AT computer.
Replacement batteries were not readily available. All you could do was stand by helplessly as your computer's life source drained away.
But now, with the help of IBC, you can resurrect your AT, by using IBC's simple method of CPR– Computer Resuscitation. Just plug in one of IBC's new Tadiran high-energy lithium batteries, and your AT will have a new lease on life.

The Tadiran Replacement Battery from IBC saves you from an inevitable crisis. Every one of the million ATs, compatibles and clones in use today will face this emergency in the coming months. It could happen a few weeks from now, or maybe in a year. The lifespan of currently installed batteries varies from one month to 3 years.

Don't let time run out on your computer. Protect against down time!

Buy an IBC battery now, so you always have a back-up.

IBC Battery Features:
- Meets or exceeds all manufacturer's specifications
- Warranted for in-use life of 3 years
- 10-year shelf-life
- For IBM/AT, Compaq 286 series, and all other AT compatibles and clones
- Easy to install

If your computer should exhibit the following warning signs, you must take action immediately!

IBM/AT is a registered trademark of International Business Machines.
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WARNING SIGNS

- Clock calendar function fades and disappears
- Configuration files vanish

Steps to Take In Case of Sudden AT Death
- Do not panic
- Do not move injured computer
- No need to call repairman
- No need to call manufacturer

Just call IBC, and you will get immediate shipment of your new Tadiran AT replacement battery. The life you save will be your computer's.

Corporate quantity discount available.

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done and, at best, justify your decision to automate.

Out in the real world, how can you tell a solution from a tool? Software solutions range from a computer game, which entertains or helps you relax; to a legal time-and-billing package, which streamlines law office procedures with precise accounting of billable hours; to a spreadsheet template for IRS Form 1040, which enables you to avoid adding insult to financial injury. With solutions all you provide are the step-by-step responses to program prompts (fry that invader, post those accounts, print that tax form) and the necessary data.

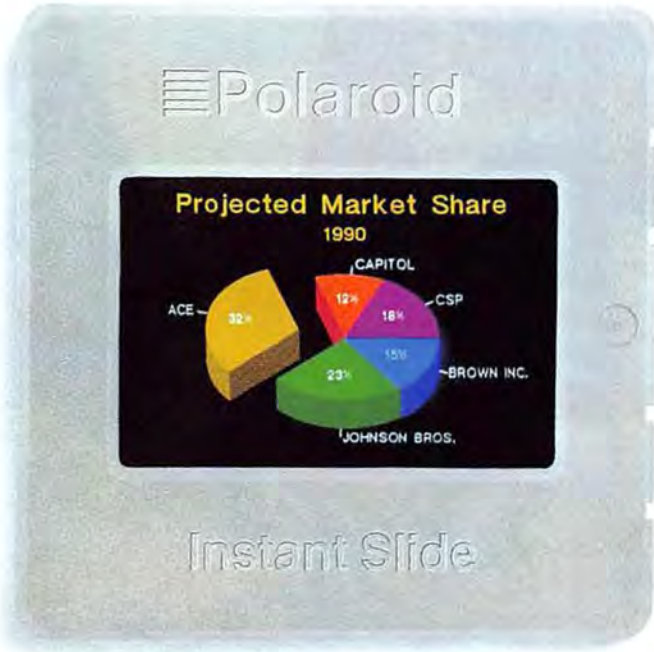
If solutions are the finish line, tools are the starting blocks. Tools generally require that you understand a problem well enough to design and implement the solution yourself.

Software tools include spreadsheets, programming languages, and operating systems. These programs do not offer self-contained solutions to day-to-day problems. Instead, with design and implementation work on your part, you can use spreadsheets to build recalculating models that are ready to run; you can use programming languages to tailor software applications of any kind; you can use operating systems to create directory systems and batch files that glue disparate software and data into a total environment.

Let's go back to the closet example for a moment. The tools approach–using a saw and a drill to build my own solution–would have resulted in a product tailored

(continues)

In house.



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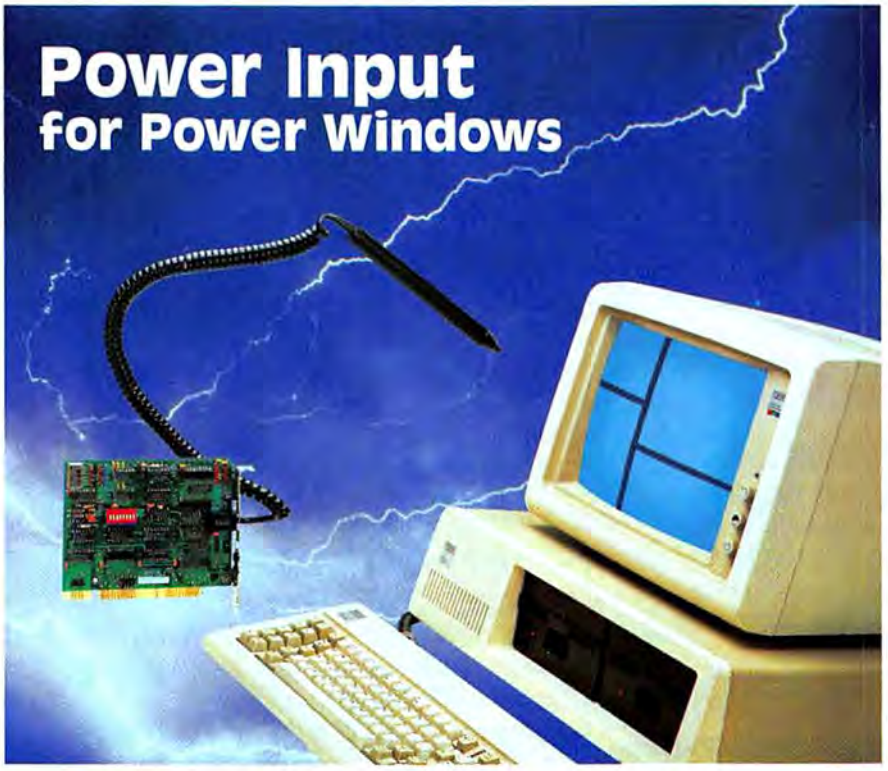

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to the limits of my skills and would have satisfied the artisan in me. If I've got enough time on my hands (and if my time isn't all that expensive), it would have saved money as well. But no doubt about it–the project would have consumed a great deal of time. The entire endeavor was based on my understanding the problem well enough to do a proficient job of building the system.

The solutions approach–buying modules off-the-shelf, so to speak–was ready to go rapidly, but proved to be costly. Also there was no guarantee at the outset that it would be ideal for my needs. And just as I had to restock the new shelves with clothes, so do virtually all software solutions require that you "stock" the program with data. Even the best ready-made solution, then, is incomplete without major intervention from the user.

The tools-versus-solutions option can be fairly described as a "make-versus-buy" decision. But before you embark on programming an accounting system yourself, understand the undertaking. You are a builder, and you must have a builder's skills.

The assumption that users have, or need, a builder's skills has receded somewhat as the personal computer industry has matured. But in general the industry's tendency has been to provide tools first and solutions much later. The challenge of the years ahead is to find ways of delivering more solutions that make computer users productive more quickly.

(continues)

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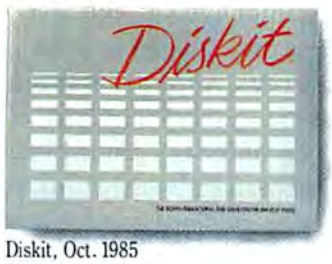

Diskit, Oct. 1985

IDEAshare, Nov. 1985

IDEAcomm 2400, Jan. 1986

IDEAcomm 5250/Remote, Feb. 1986

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IDEA Supermax/EMS, April 1986

All Aboard, June 1986

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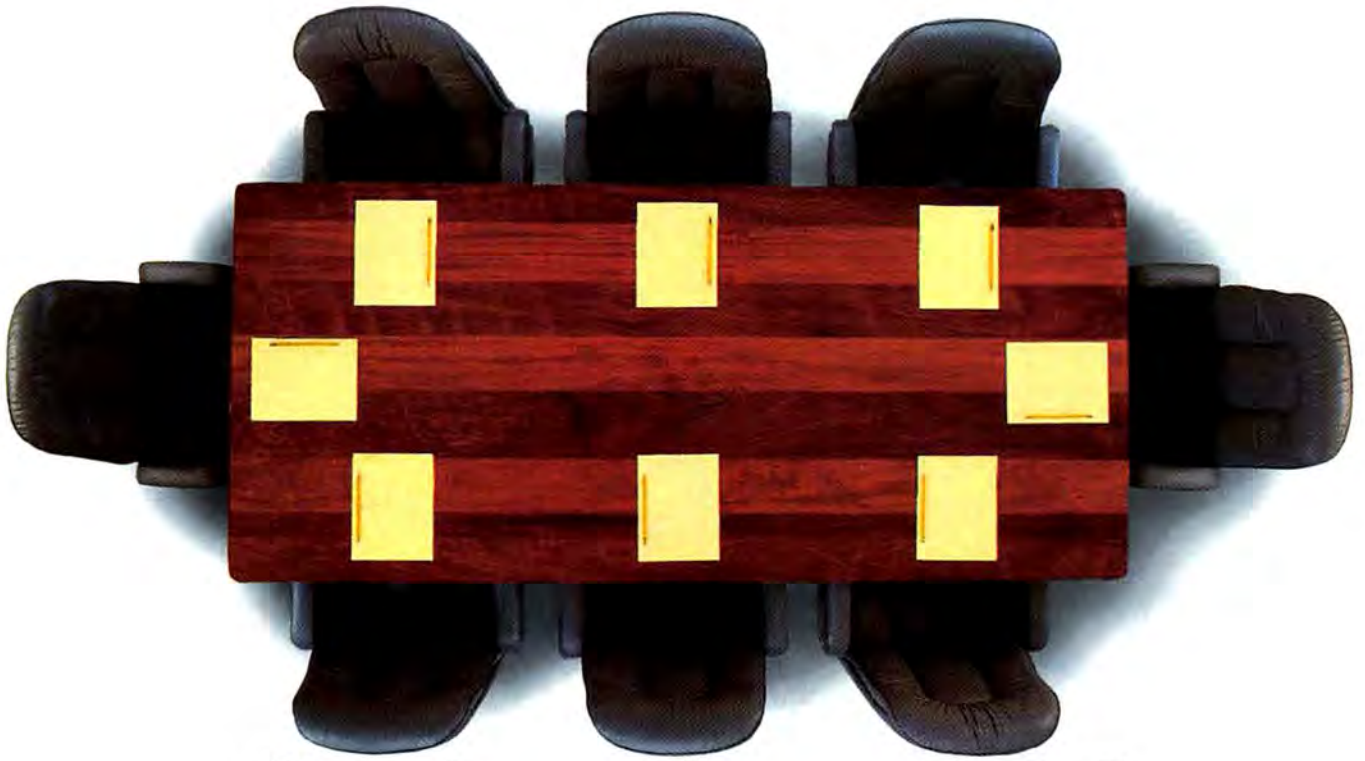
An even more formidable challenge is to increasingly give users flexible choices between tools and solutions—that is, to offer solutions that make users immediately productive, but that are sufficiently malleable so users can modify them and then use those solutions as building blocks. In that sense, today's solutions can become tomorrow's tools and push the industry (and the technology) toward even greater ends.

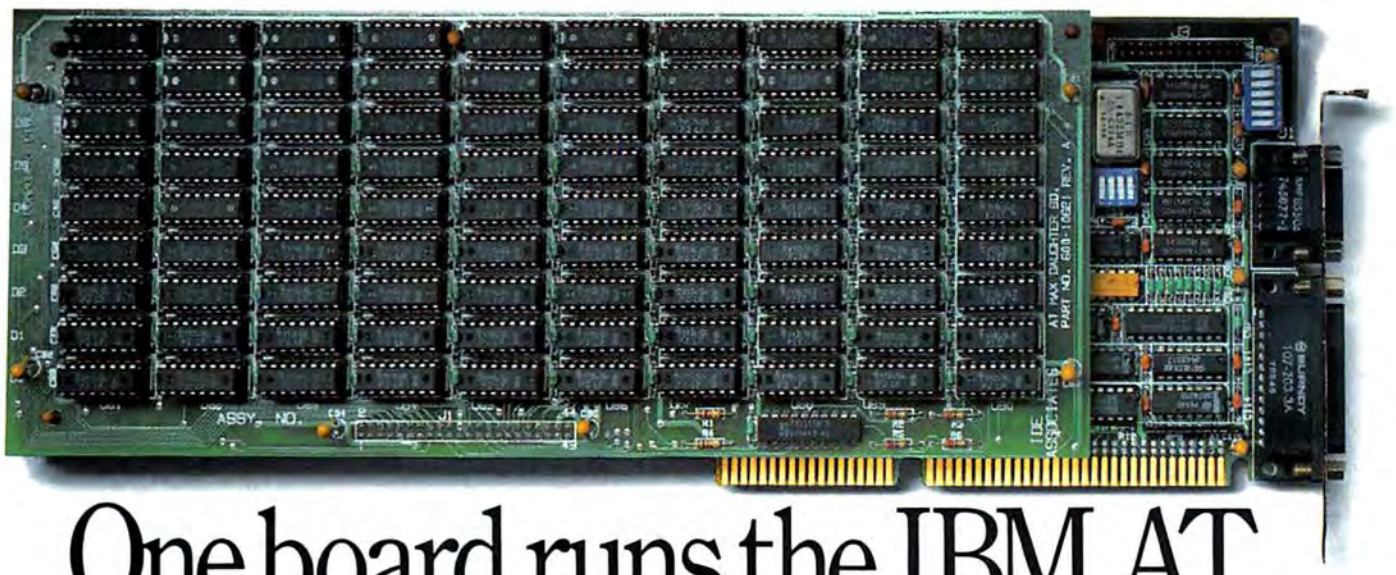
The programming languages embedded in some products—which are themselves tools-cum-solutions—represent a tentative move in this direction; still, the problems they attempt to solve are not easy ones. A tension between ease of use and flexibility persists. Too many of today's canned solutions are dead ends—they cannot grow or be modified according to users' wishes and needs. Ironically, the more flexible a software solution becomes (and the more like a tool it appears), the more difficult it is to use and the longer gratification—in the form of increased productivity—is delayed.

This is an irony and a dilemma that the industry—goaded by users—must overcome. ●

Robert Carr is the chief scientist at Ashton-Tate and the creator of Framework.



One board runs IBM.



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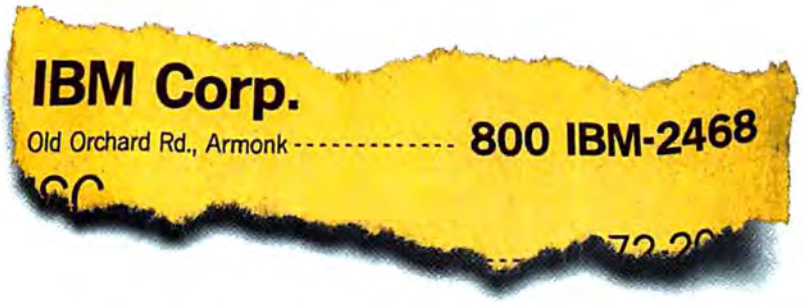

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Now call the people on the left, and you can emulate some terminals, a limited number of system printers, and not all of the 5250 display attributes. Of course you'll be able to work with IBM file transfers, but once the goods are delivered, can you work with virtually no support of PC based products?

So before you call the number on the left by force of habit, consider who's really giving you the best solutions in 3X communications. And ask yourself this.

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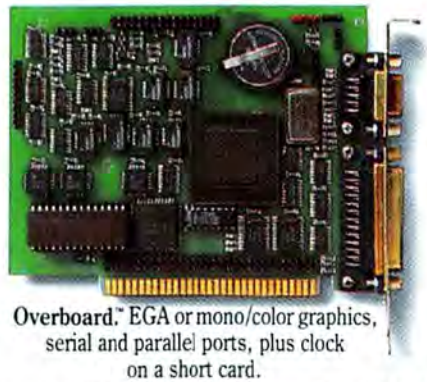

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PC WORLD

Leaving Lotus Land . . .

Mitch Kapor bows out at 35 from the most successful software firm in history.

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. –Eric Bender*

What do you do after working as a disc jockey, studying psychology at Yale, and creating the most successful software start-up in history?

Mitchell D. Kapor, founder of Lotus Development, wasn't quite sure. But he felt the time had come for "an intentionally unstructured period," and last summer he simply quit.

Jerry Sperandi

While his departure stunned Lotus and the industry, Kapor had in recent months dropped abundant hints that he was willing to relinquish his executive chores. Although a year ago he'd resumed day-to-day management of Lotus's mainstream applications division, which offers *1-2-3* and *Symphony*, he gave up that responsibility last winter. And in April he surrendered the title of chief executive officer to President Jim Manzi.

Kapor and others within Lotus scoff at any suggestion that his departure was a Manzi coup. A former newspaperman and management consultant, Manzi joined Lotus in 1983 as marketing director and rose to president the following year. The two executives found they had complementary working styles; Manzi once joked to a reporter that he and Kapor used to be "joined at the hip."

The 35-year-old Kapor remains a Lotus director. He will continue to work as a consultant on a software development project with Lotus principal technologist Jerrold Kaplan and other staff members.

"In some senses the move is more symbolic than actual," he remarks. "On a day-to-day basis, I'll

be doing what I have been doing for the past few months at Lotus."

Kapor plans to spend more time with his wife and 1-year-old son (who apparently shares his dad's fondness for Hawaiian shirts). Beyond that, Kapor says he intentionally has no firm plans, adding that he has "a fairly long list of things I can't do or won't do—for instance, anything directly competitive with Lotus—and an even longer list of things I might do."

High on the second list is learning more about artificial intelligence, cognitive science, and other technical esoterica. "I've never had an opportunity to look at nonsoftware areas of technology; I don't have any training as an engineer," he says. "I want to get educated—I love learning.

"I've done things in the past that have been radically different," he continues. "I'm not the kind of person who has trouble getting motivated. I have the opposite problem of going off and making a premature commitment just because it's twinkling and interesting."

When Kapor left, the high-flying software firm was in excellent financial health. Lotus posted $66.2 million in sales and $11.8 million in profits during the quarter that ended June 30—not bad for a company that has yet to celebrate its fifth birthday.

Kapor's own finances don't look too shabby either. By the time he resigned he had sold Lotus stock for more than $50 million but retained more than one-tenth of the company's shares, worth another $54 million.

Mitch Kapor garnered a roomful of verbal bouquets as he left Lotus—not only for his roles as software guru and hotshot entrepreneur, but for being a likable industry figure who retained his own, usually informal style despite the pressures of running the world's largest independent software supplier.

His tenure at the helm was so intense, it was "like being picked up by a tornado," says Kapor, reflecting on two personal high points.

The first was fall 1982 COMDEX, which came a month after the tiny start-up announced *1-2-3*. "We blew the doors off the barn," Kapor recalls. "We wrote $900,000 in orders on the floor in three days, which was astonishing given that the revenue forecast we had for the first year was $3 to $4 million. It turned out to be $53 million.... We were there at the right time, and things just went bonkers.

"Then in October 1983 we went public. We had only been shipping the product for nine months but were very profitable, and the future looked good.... Being a flash in the pan was a big issue at the time of the public offering—were we just one more sleazeball company capitalizing on this?" Lotus managed to climb through that brief window when fortune smiled on initial public offerings for software firms, and, says Kapor, "there was a lot of drama to that process."

Today, "It's fairly amazing to think there are 2 million real customers," he says. "They like the product, they use it, some people depend on it, some people wouldn't have a job without it! That's very gratifying. It's the equivalent of writing 'Johnny B. Goode'—it's going to be played forever. It's like being the Chuck Berry of software.

"When they make the movie, I think they should go for Dustin Hoffman," Kapor adds, grinning. Not Robert De Niro? "No, Robert De Niro should play Jim."

For more on Lotus Development, see the story "... And for Lotus, a New TAC" on page 89.

Brobdingnagian Buyer

Gulliver knew a giant when he saw one, and so do hardware vendors who compete for government PC contracts.

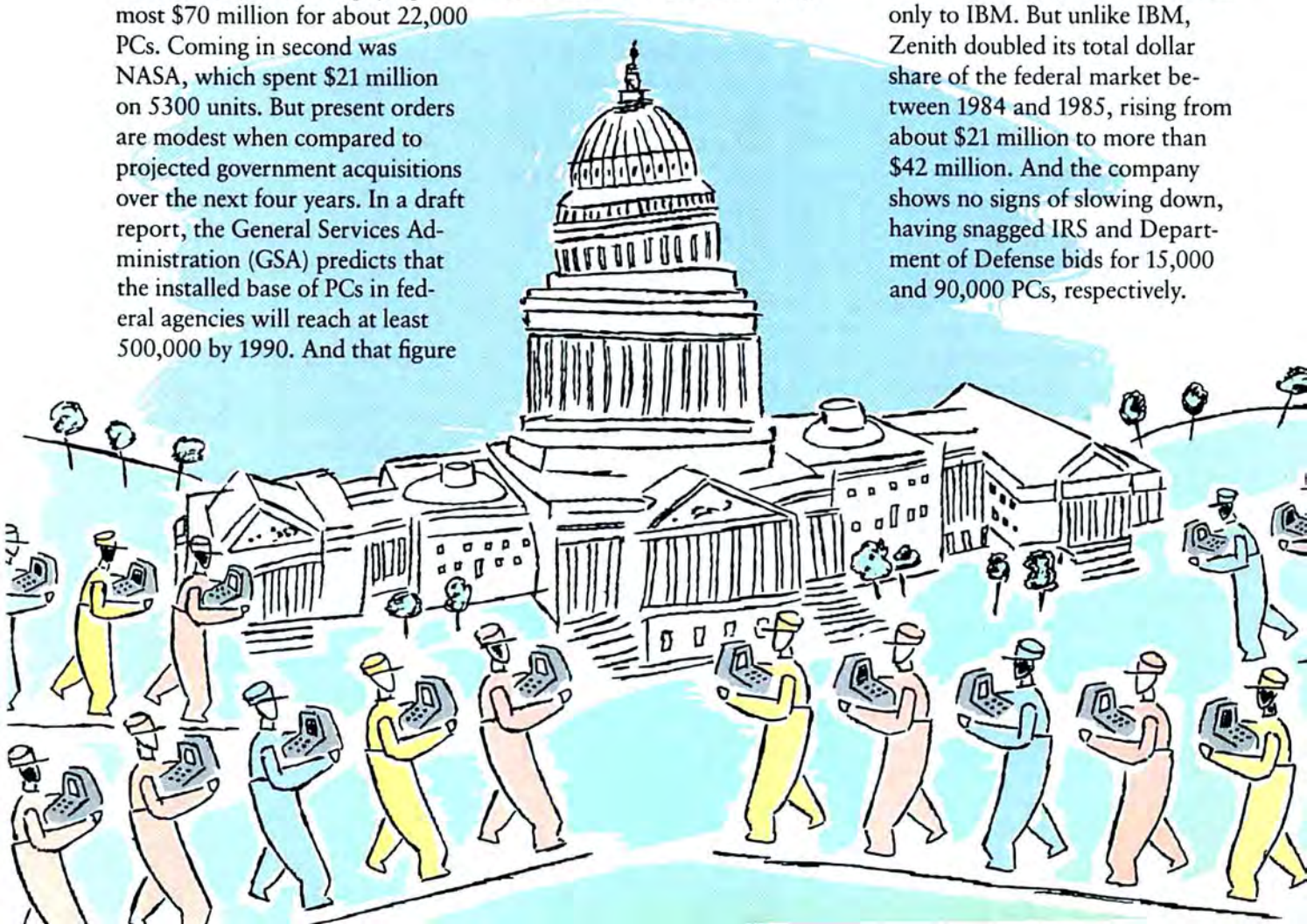
The United States government is perhaps the largest consumer of personal computers in the world. In fiscal year 1985, government agencies bought more than 67,500 PCs valued in excess of $216 million, according to the Federal Procurement Data Center in Washington. This megapurchasing trend is relatively recent—in fiscal year 1983, Uncle Sam bought only 8000 PCs.

Not surprisingly, the Department of Defense claimed the lion's share of the purchases, paying almost $70 million for about 22,000 PCs. Coming in second was NASA, which spent $21 million on 5300 units. But present orders are modest when compared to projected government acquisitions over the next four years. In a draft report, the General Services Administration (GSA) predicts that the installed base of PCs in federal agencies will reach at least 500,000 by 1990. And that figure doesn't include purchases made by quasi-governmental agencies such as the U.S. Postal Service.

With its colossal purchasing power, the government can influence computer industry trends—indeed, it can even create them. Lynn Bateman, president of Government Counselling Limited, a consulting firm in Springfield, Virginia, says voice recognition, optical character recognition, and security features such as Tempest shielding of electromagnetic emissions have become viable technologies thanks in part to continued government support.

But the federal government tends to be a conservative shopper, preferring tried-and-true products over the latest and the greatest. Under the 1965 Brooks Act, which governs the purchase of computer and communications equipment, government agencies are required to strive for cost-effectiveness, compatibility, and long-term value. As a result, PC compatibles and UNIX-based multiuser systems have emerged as de facto standards; outside of AT&T, the feds may be UNIX's strongest supporters.

Zenith Data Systems seems to have a knack for winning federal personal computer contracts. In fiscal year 1985, Zenith garnered 20 percent of that market, second only to IBM. But unlike IBM, Zenith doubled its total dollar share of the federal market between 1984 and 1985, rising from about $21 million to more than $42 million. And the company shows no signs of slowing down, having snagged IRS and Department of Defense bids for 15,000 and 90,000 PCs, respectively.



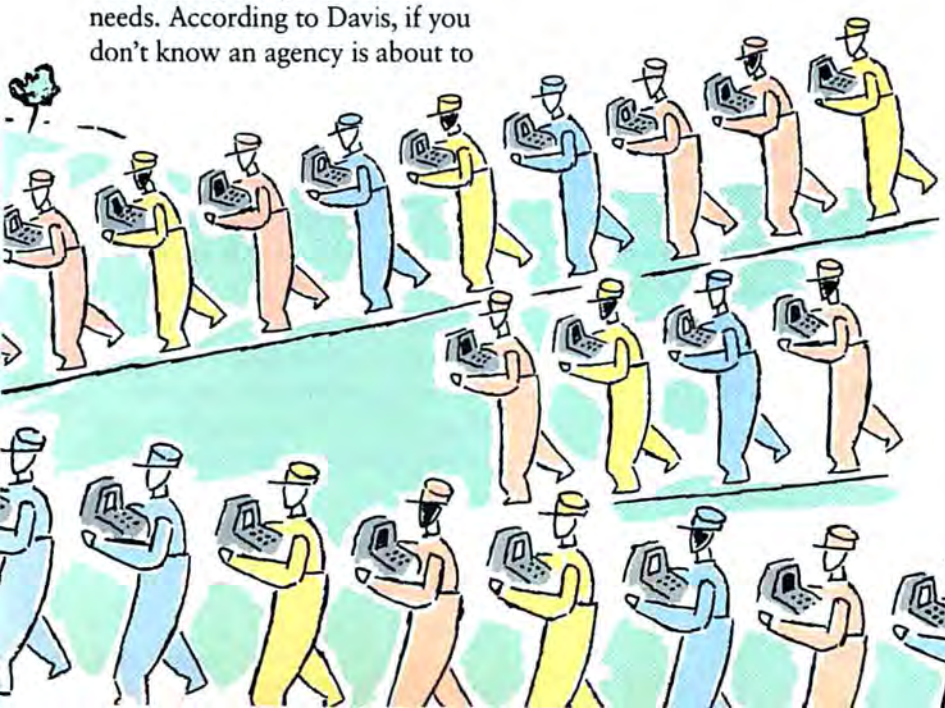
When government agencies need to purchase new systems, they publish an RFP—Request for Proposals—describing in minute detail the systems required. (The IRS RFP for laptops exceeded 200 pages.) For vendors, preparing a proposal in response to an RFP is a herculean, and costly, task.

Some industry players, notably David Kay of Kaypro, charge that winning a bid is largely a matter of having good connections. But Zenith marketing director Andy Czernek sees fairness written all over the procurement process. "We were nowhere in this business in 1983," he says. "We were told we would never succeed—that the contract was wired for another company—but we plowed ahead. We're proof of how open the process is."

Doug Davis, president of Areté Systems, a small firm in Silicon Valley, agrees that procurement procedures are open, but adds that winning a contract depends on anticipating the government's needs. According to Davis, if you don't know an agency is about to publish an RFP, you've already missed the boat.

But Davis doesn't believe that having friends in high places or greasing a few well-positioned palms is the key to success. "Once you've worked with an agency for a long time," he says, "you can take into account in your product planning what that customer may anticipate from you."

Selling PCs to the government requires savvy and a long-term strategic approach, and that gives many potential competitors pause. But the government isn't an ordinary customer. Contract options stipulating that an agency may buy more computers over a period of years are a powerful incentive for vendors to gamble on an RFP. Those who gamble and lose may complain, but the potential rewards ensure continued competition for a piece of the giant's business. *—Anita Amirrezvani*



Ward Schumaker

... And for Lotus, A New TAC

Mitch Kapor announced his departure from Lotus Development one day after the company introduced a product that suggests how far it has moved from its personal computer roots.

The Application Connector (TAC) is big-ticket software that links *1-2-3* and other PC packages with information-center-style data on IBM mainframes. But why another micro-to-mainframe offering, and why from Lotus?

"Roughly 95 percent of all data used in PCs and in Lotus spreadsheets is entered by hand," says Lotus president Jim Manzi. In corporations, Manzi adds, "80 percent of data is rekeyed from mainframe reports sitting next to the user."

Keying in data manually is a slow, clumsy, error-prone process, and as Lotus sees it, existing micro-to-mainframe software doesn't always brighten the picture. Traditional links tend to be awkward to use, or limited to specific PC and mainframe products, or both, claims Don McLagan, Lotus Information Systems Division vice president.

Those barriers create a huge gap between the 5000 mainframes that the Fortune 1000 has dedicated to information center tasks, and the end users who want data in *1-2-3* or another PC package. *TAC* is designed to bridge the gap, according to McLagan.

(continues)

Mark Farlan

Watch Z-Glove, Please

Ever wonder what happened to Michael Jackson's other glove? Have you run out of room on your desk for a mouse? And what do those questions have to do with each other, anyway?

For the answers, ask VPL Research of Palo Alto. The firm recently introduced a new input device called the Z-Glove—a snug-fitting glove with an attached cable and two small ultrasonic transmitters. If you're familiar with mechanical "Waldos" for hazardous or delicate material, you have the idea behind the Z-Glove.

The glove relies on small receivers that sit on the computer itself. The ultrasonic signals allow the computer to track the glove as it moves through three dimensions; the cable is hooked to sensors that can tell when each finger is clenched.

VPL packages the Z-Glove with a proprietary visual language called Grasp, which was featured in the September 1984 issue of *Scientific American*. With proper programming, the Z-Glove can differentiate among gestures and perform various tasks based on those gestures. Programming is done with the glove itself.

The Z-Glove may sound frivolous, but it isn't. The combination of tilt, grasp, and motion detection may make it faster and easier to use than a mouse, joystick, or trackball. (If nothing else, Z-Glove and Grasp-based music programs would let you conduct a symphony or play air guitar.)

VPL has shown only a Commodore 64/128 version of the Z-Glove, but company chairman Jason Lanier says a PC version is in the offing. The glove is available in three sizes, and yes—it's made for righties and southpaws alike.
—Daniel J. Rosenbaum

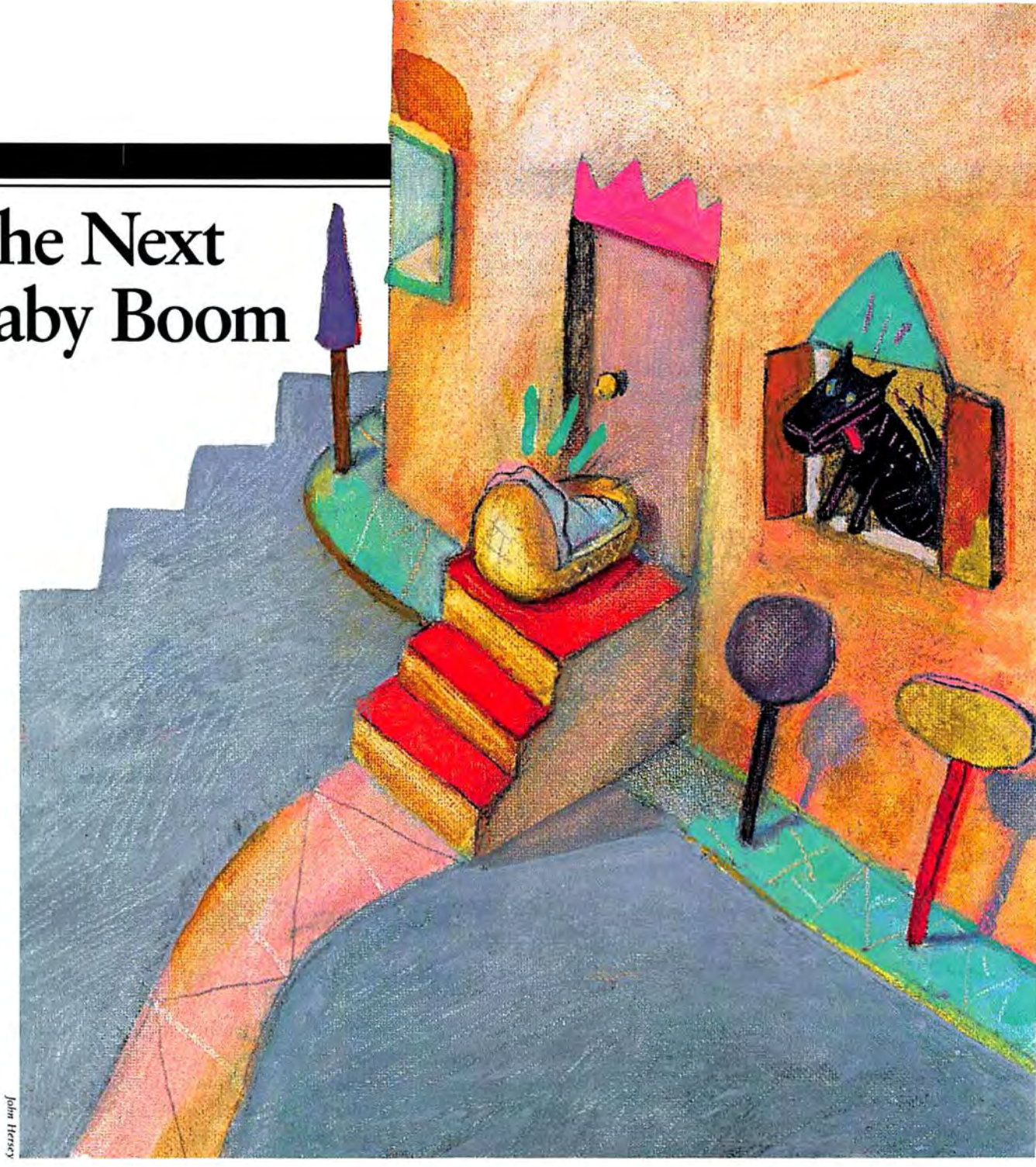
. . . And for Lotus, a New TAC
(continued)

TAC works on standard communications setups and joins hands with a number of fourth-generation language (4GL) packages popular in information centers, among them Information Builders' Focus and SAS Institute's SAS. Working with straightforward menus that span all the 4GLs, users can extract and download information into .WKS and other common formats. Data then can be manipulated and uploaded to the mainframe.

TAC includes three types of components: a standard module for mainframes running under MVS or VM, a module for each supported 4GL, and PC software. Lotus is also tailoring versions of the PC package specifically for *1-2-3*, *Symphony*, and Ashton-Tate's *dBASE* products.

A typical installation supporting two 4GLs costs slightly under $29,000 up front, plus a 15 percent annual rental fee after the first year. Lotus officials claim that one major automaker now running *TAC* for 75 users appears to be saving about $800,000 per year.

The Next Baby Boom



John Hersey

Who needs the 286 when a new generation has just been left on the doorstep?

With the first crop of personal computers built around Intel's 80386 microprocessor now arriving, sales of 80286-based systems—like the PC AT—are doomed. And in this fresh market, IBM will not be able to set the standard for compatibility.

So predicts Neil Colvin, chairman of Phoenix Technology, which has provided the IBM-compatible underpinnings for almost 1.5 million personal computers. Phoenix, whose clients include AT&T, Tandy, and other household names, is already shipping a 386 ROM BIOS to its customers.

As Intel cranks up production of its powerhouse 32-bit CPU, both software developers and the buying public will begin to ignore

(continues)

The Next Baby Boom
(continued)

286 systems, maintains Colvin, who doesn't shrink from bold forecasts. "When the 386 is available, there's just no reason for the 286. The 286 is a dead chip today."

According to Colvin, the new general-purpose chip is vastly more powerful, much easier to write software for, and adds only $200 to manufacturing costs. Says Colvin, "When Bill Gates says machines will be priced at $8000 to $10,000, that's totally ostrich-head-in-the-sand wishful thinking. We'll see $2500 386 machines in the first quarter of 1987."

Colvin predicts that most first entries will be "turbo ATs," which will incorporate the next-generation processor without major modifications to standard AT-compatible designs, achieving two to three times AT performance. High-end models with revamped memory architectures and new operating software that truly exploit the 386–giving three to six times the throughput of the AT–won't show up in force until the second or third quarter.

Colvin estimates that 250 firms are working on 386 systems: "PC manufacturers who never made an AT compatible will make 386 machines." He expects an IBM introduction "a year down the pike, in third- or fourth-quarter 1987," which makes the earlier systems "pre-clones."

Two obscure California firms appear to be the first to climb onto the 386 stage: American Computer and Peripheral with a plug-in board and Advanced Logic Research with a desktop system.

Phoenix has spearheaded a movement to define industry-standard bus architectures for the new machines. A 32-bit bus, however, is only one element of system compatibility, and the lack of an IBM standard may make hardware suppliers nervous–and leave would-be buyers on the fence.

Colvin insists that some basic architectural ground rules will make it difficult for IBM to give a 386 machine a sudden twist that would lock out other manufacturers. The 386 features built-in support for running multiple applications simultaneously under multiple operating systems, and in this kind of "virtual environment" software developers must play by the rules.

Such a design removes a major source of incompatibility that cropped up in PC software packages–the tendency to bypass DOS and write directly to the hardware. In any event, the absolute first requirement of the 386, everyone agrees, is to run the huge base of existing DOS software.

What about next-generation operating systems–either the fabled, not-quite-ready-for-prime-time DOS versions (see "Waiting for GoDOS," *PC World View, PCW,* September 1986) or perhaps some variety of UNIX?

Both DOS 5.00, which is expected to target the 286, and DOS 6.00, aimed at the 386, will be very large, very sophisticated

Automating the Micro Manager

These days everyone gets his or her own vertical-market software: doctors, lawyers, salespeople–and now even the embattled micro managers who struggle to keep corporate PC users happy.

Atrium Information Group describes its new *Micro Resource Manager* as the first package created specifically for PC support staff, helping them handle corporate user populations of up to 15,000 personal computers.

The package gives managers a tool to track and analyze PC purchasing, inventory, maintenance, training, and support. It's also designed to offer corporate executives some solid information on how PCs are being exploited within the organization.

Micro Resource Manager features more than 150 reports and on-line queries. Among the wealth of options is a complete report on warranties that are about to expire, explains Tim Fitz-Randolph, executive vice president at Atrium. "You also can print out an operation manual uniquely configured for individual users," he notes.

Folded into the program are studies of maintenance cost by

products that have very little to do with current DOS versions, Colvin predicts.

Because software developers don't want to start from scratch with another operating system, Colvin suggests, "A system combining UNIX and existing DOS software will be the environment of choice."

Regardless of how this tussle ends up, the 286 is history. "No software developers are writing to the 286—there are only two compilers written specifically for the 286; every other piece of software is generic. The 286 operating system will come out after the 386. If you're a developer and you've waited this long, you can wait a little longer and convert it to the 386."

vendor, analyses of how quickly PC support staff respond to problems, and a slew of other handy features.

Overall, *Micro Resource Manager* appears to answer most questions except, perhaps, how to judge the utility of new artificial-intelligence-based packages or when to badger Lotus about a new purchasing agreement. Micro managers can even modify the software for their particular corporate needs using Data Language Corporation's fourth-generation language, *Progress*.

Fred Simson

Hardware, Software, and ... Footwear?

Imagine footwear that comes with software—in this case a 44-page user manual, a list of error messages, and two floppy disks. Nothing pedestrian here; we're talking about Puma's new RS Computer running shoe.

The RS Computer shoe looks, feels, and wears like any high-quality running shoe but has one difference—it's electronic. A cab attached to the right heel holds two buttons and a device to record time and distance. The red button clears the shoe's memory, though Puma is mum on how much memory; the black button starts and stops the clock and foot-fall counter. In order to conserve energy, the battery-powered shoe "falls asleep" when not in use. Rapping it on the palm of the hand awakens it.

Somnolent habits aside, this is footwear for serious athletes. After completing a run, the diligent jogger removes the shoe and plugs it into his or her personal computer. (A cable connects a parallel printer port on one end and the shoe on the other. The trap door on top of the cab opens to reveal the Puma connector.)

A BASIC program—RUN "PUMA" (clever, eh?)—reads the time and foot-fall data from the heel. It then calculates speed, distance, and number of calories burned. This information is recorded in a diary file and may be displayed and graphed as a daily log of the runner's progress (or lack thereof).

These aren't dumb shoes—they can receive data as well as send it. Just enter how far you want to run and send the info to the shoe. When you've run that distance, the shoe beeps until reset. But if you actually walk more than you run, you'll have to wait for the next release; Puma's electronics are not yet sensitive enough to accurately measure a walk.

The RS Computer shoe is just $200 at better shoe stores everywhere—computer not included.
—Donald B. Trivette

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Anita Amirrezvani is the Assistant Editor for PC World; *Daniel J. Rosenbaum writes on communications from the marshes of northern New Jersey; and Donald B. Trivette collects software arcana in Wrightsville Beach, North Carolina.* ●

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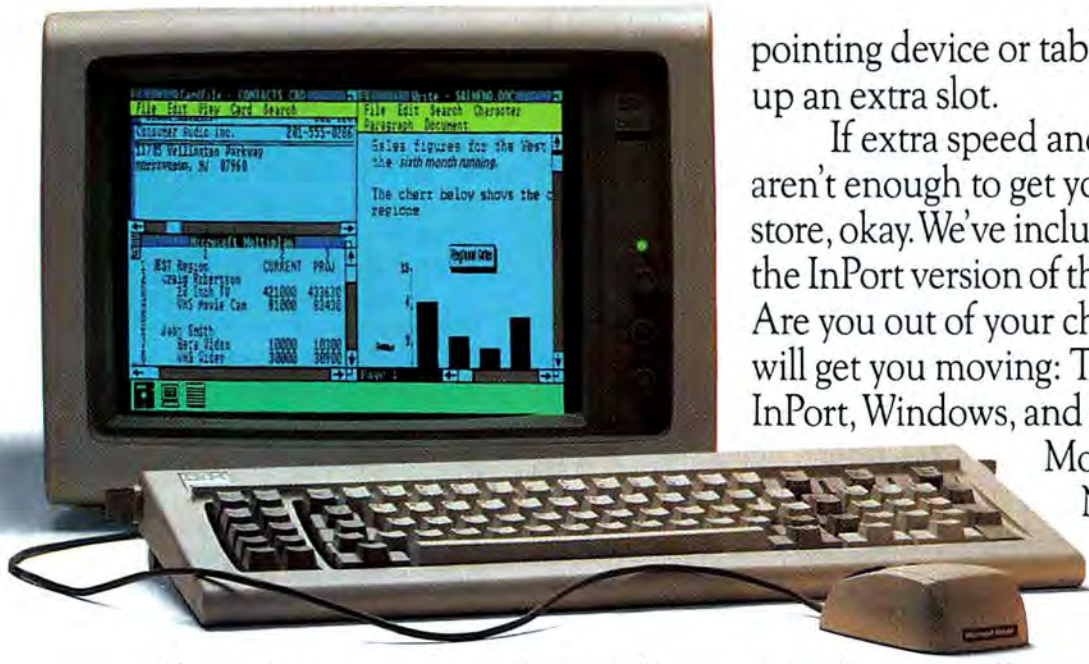

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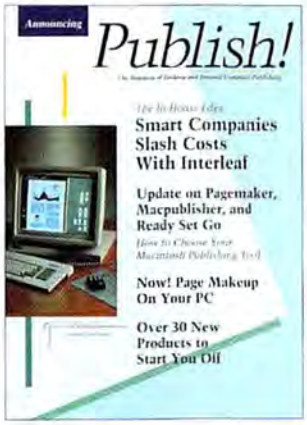

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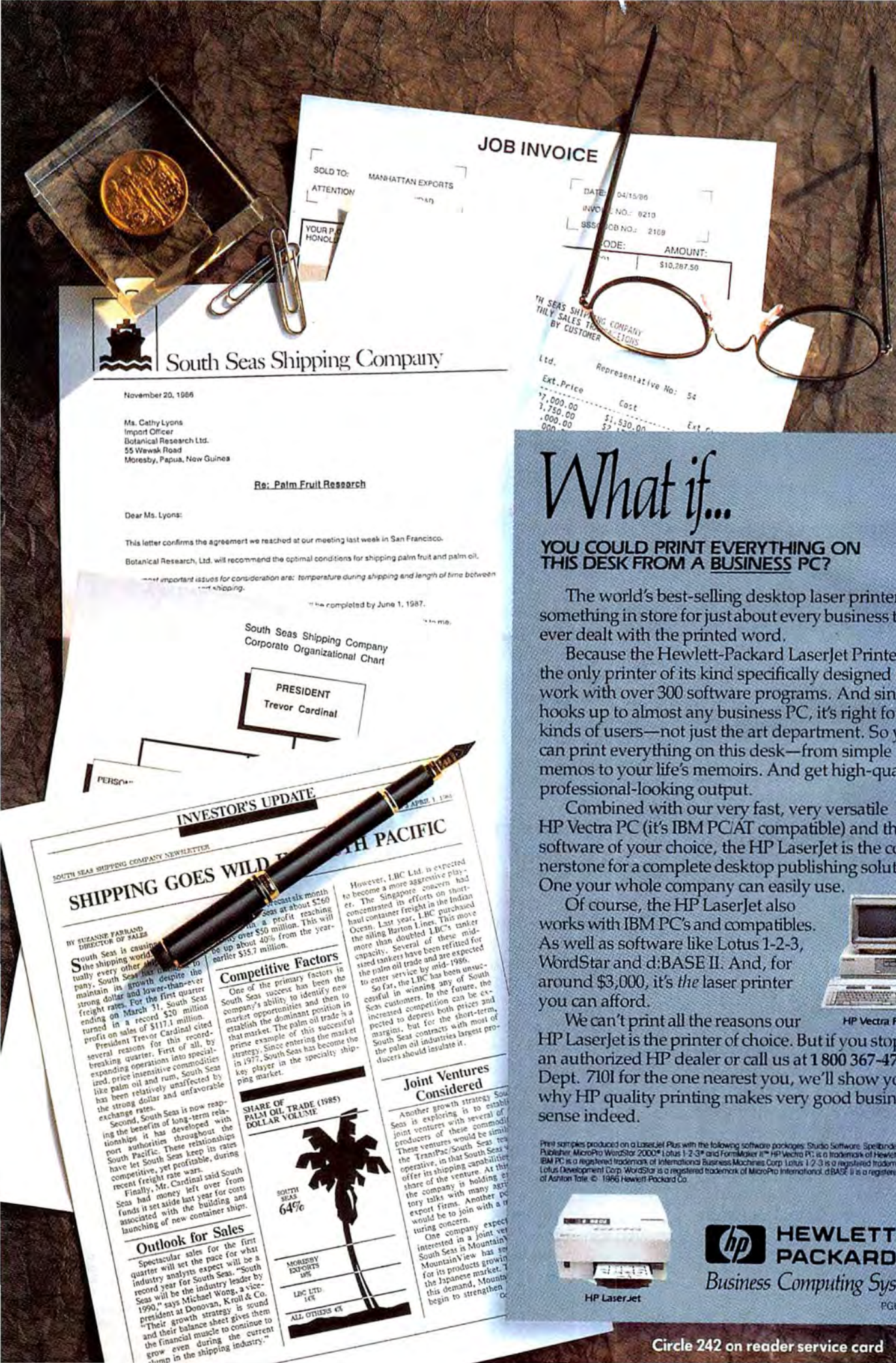

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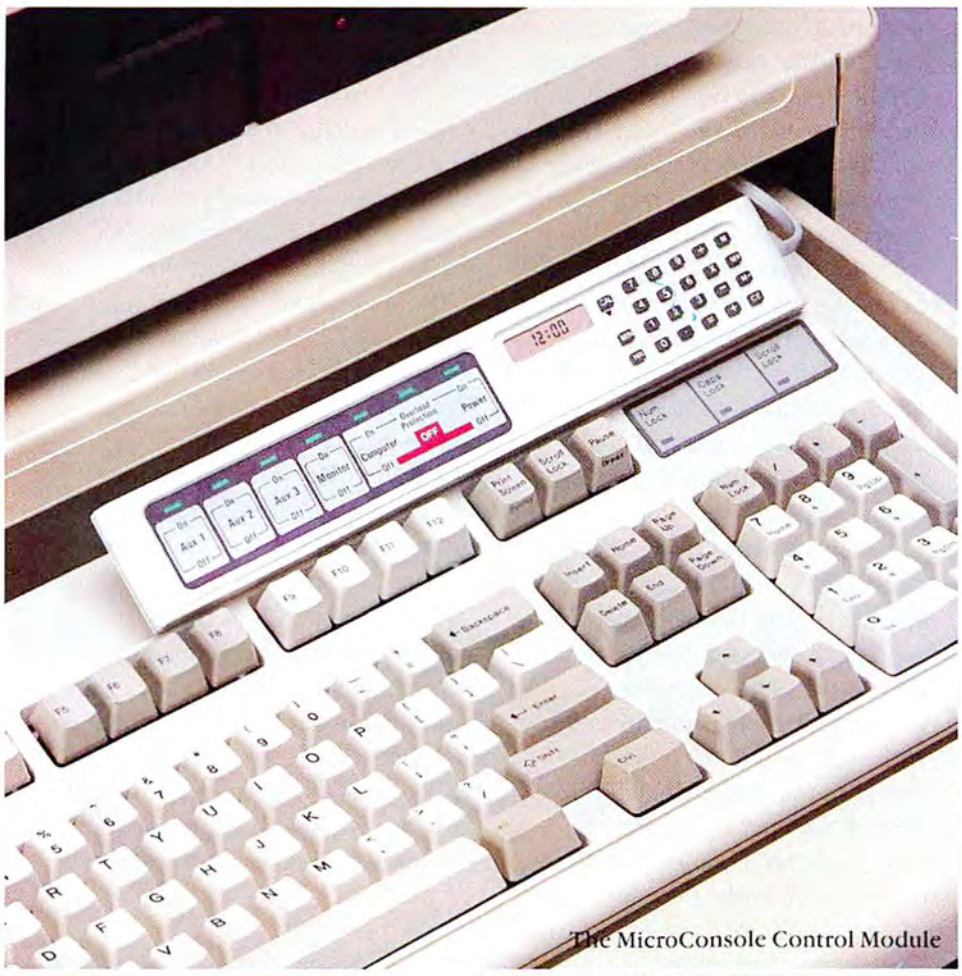

The MicroConsole Control Module

The Static Clear

The Surge Protector

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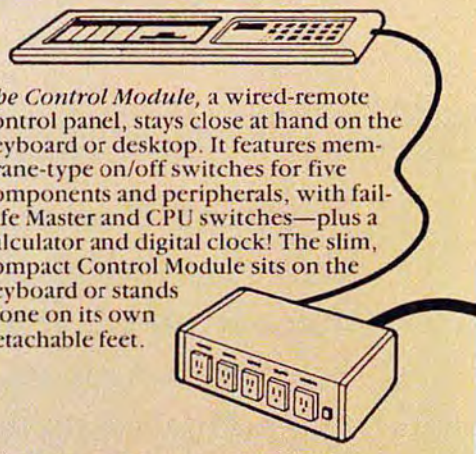

The Control Module, a wired-remote control panel, stays close at hand on the keyboard or desktop. It features membrane-type on/off switches for five components and peripherals, with fail-safe Master and CPU switches—plus a calculator and digital clock! The slim, compact Control Module sits on the keyboard or stands alone on its own detachable feet.

The Power Module stays on the floor and keeps messy cables out of the way. It provides outlets for five components and peripherals, with full three-path surge protection and telephone line conditioning for your modem.

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From the Hardware Shelf

PC World offers first impressions of recent hardware releases

As autumn breezes in, clones are cheaper than dumb terminals, the Softstrips are falling, and both mass storage and memory have shed their constraints.

Edited by Eric Knorr

THE PC+

Fade in. Close-up of the PC+ clone. Voice-over: "How much would you expect to pay for a PC with an AT-style keyboard and eight full-size slots? Before you answer, there's also 640K RAM on the motherboard and a keyboard-selectable, 8MHz "turbo" speed. How much would you pay? Don't answer yet! You also get a 135-watt power supply, one half-height disk drive, and IBM compatibility. Now how much would you pay? $2000? $1000? Would you believe $506.52? It's the most incredible deal in computer history, and it's yours through this special mail-order offer!"

In today's world of cost-cutting clones, the reason most people give for buying IBM is to get the dependability behind those three little letters. The computer reviewed here is also emblazoned with three letters—or at least it was until the nameplate fell off. THE is the operative acronym here, short for Thompson, Harriman & Edwards, the Chicago firm that assembles the PC+ from Taiwanese components.

If you suspect that buying an economy clone for the office will make you an object of ridicule—something like attending a Hell's Angels rally on a moped—fear not. The PC+ system unit is shrouded in a heavy-gauge-metal case, and the keyboard earns the same weak praise as that bestowed on most clone keyboards: a bit mushy, but usable. On the test track, this 8088-2-based machine's performance in 4.77MHz mode was virtually identical with the IBM PC's. The 8MHz turbo mode—executed by pressing <Ctrl>-<Alt>-<GreyMinus>—didn't force me into the back of my chair, but it did boost the PC+'s performance by 50 to 70 percent.

Actually, the PC+'s turbo mode might be better named the blackout mode. Just as a pilot risks loss of vision during a high-speed climb, the PC+ occasionally blacks out the video display during the switch to 8MHz operation. This sudden darkness can mean

About as expensive as a good color TV, the basic PC+ comes with a switchable clock and 640K RAM.

lost work unless you've memorized the keystrokes to save and quit.

Except for the occasional blank screen, the PC+ performed reliably during a six-week test period. THE expansion boards, however, were another story. The three boards that accompanied the review unit—an Enhanced Graphics Adapter (EGA) clone, the 20MB hard disk's controller board, and a combination monochrome and color graphics adapter with a parallel port—went belly-up within three weeks. Replacements for the hard disk controller and the combination board worked well, but a substitute EGA-compatible board was unavailable (THE maintains it's in the process of switching suppliers).

The PC+ fared well in the compatibility corner. *WordStar, 1-2-3* release 1A, *Framework II, SuperKey, ProKey, Flight Simulator,* and *Jet* all ran without incident. A selection of popular hardware was also fooled, including a Paradise display adapter, a Hayes Smartmodem 1200B, and IBM's Asynchronous Adapter.

The PC+'s 30-page manual admits to being a setup guide only. There's no tutorial, only instructions on setting DIP switches and adding a floppy or hard drive, video adapters, and other boards. The instructions are clear, however, and generously illustrated with close-up photos and diagrams.

THE's bottom line? The PC+ is a highly compatible clone worthy of consideration by bargain hunters willing to install their own boards and grapple with jumpers and DIP switches. Potential PC+ owners may want to look elsewhere for expansion boards, however, or at least verify that their dealer honors THE's one-year warranty; judging from my experience, the firm's return department is liable to be pretty busy. Yes, buying a computer through the mail can be like spinning a wheel of fortune. But if you're willing to forgo manufacturer support and the security of

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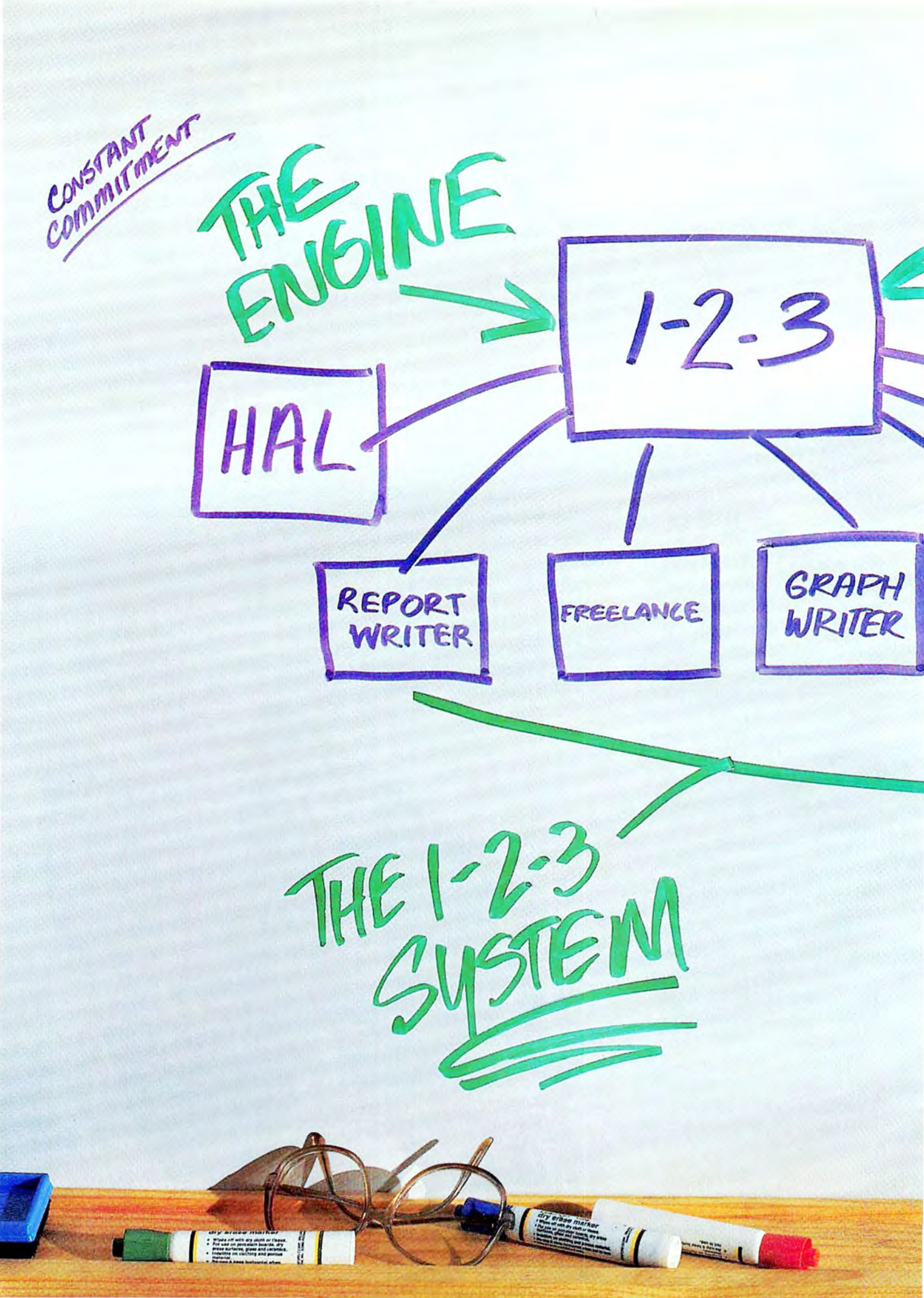
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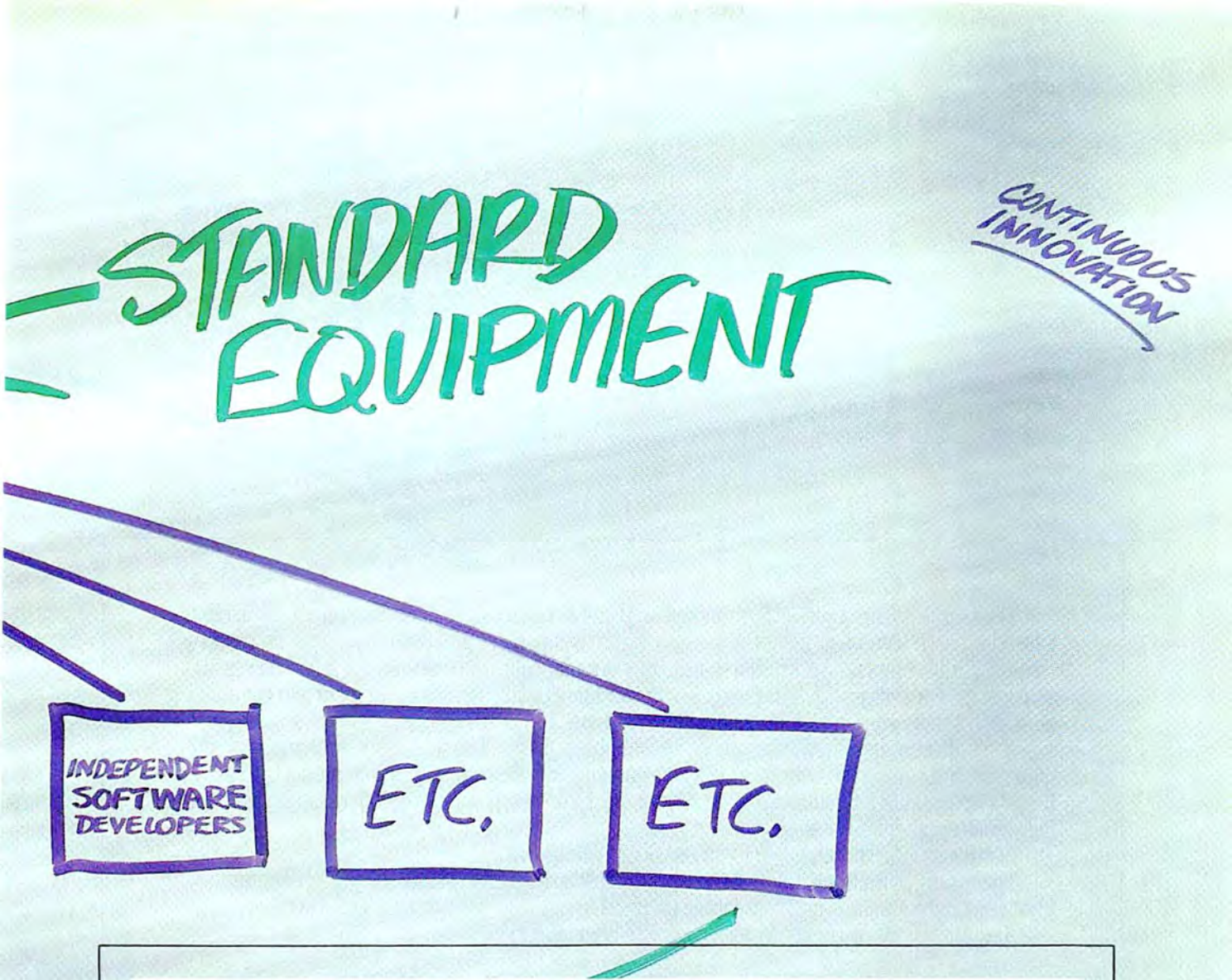

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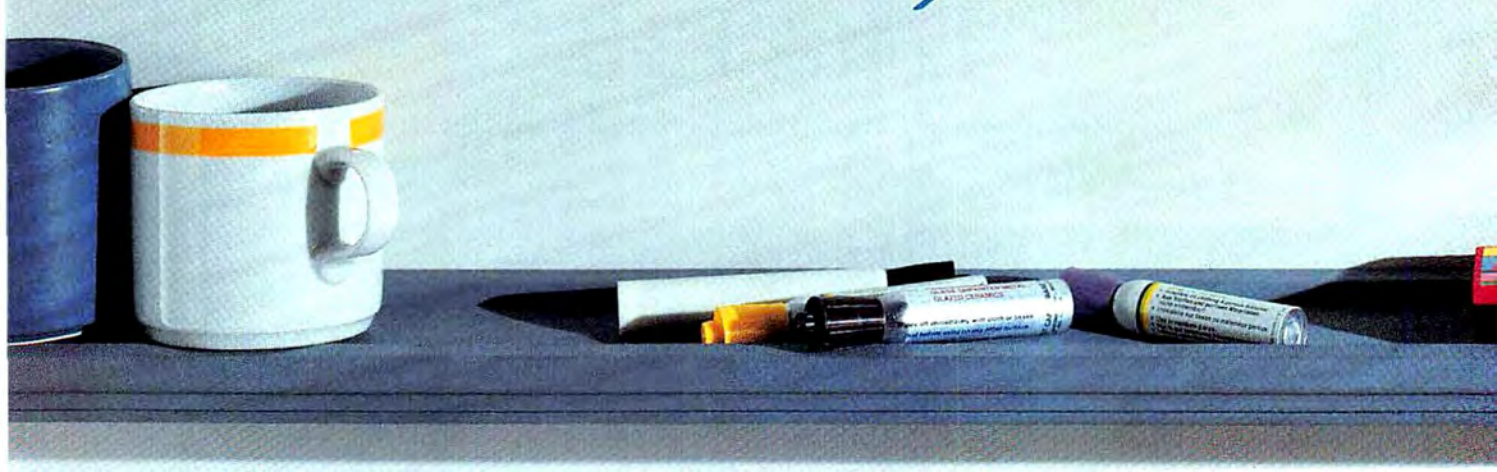

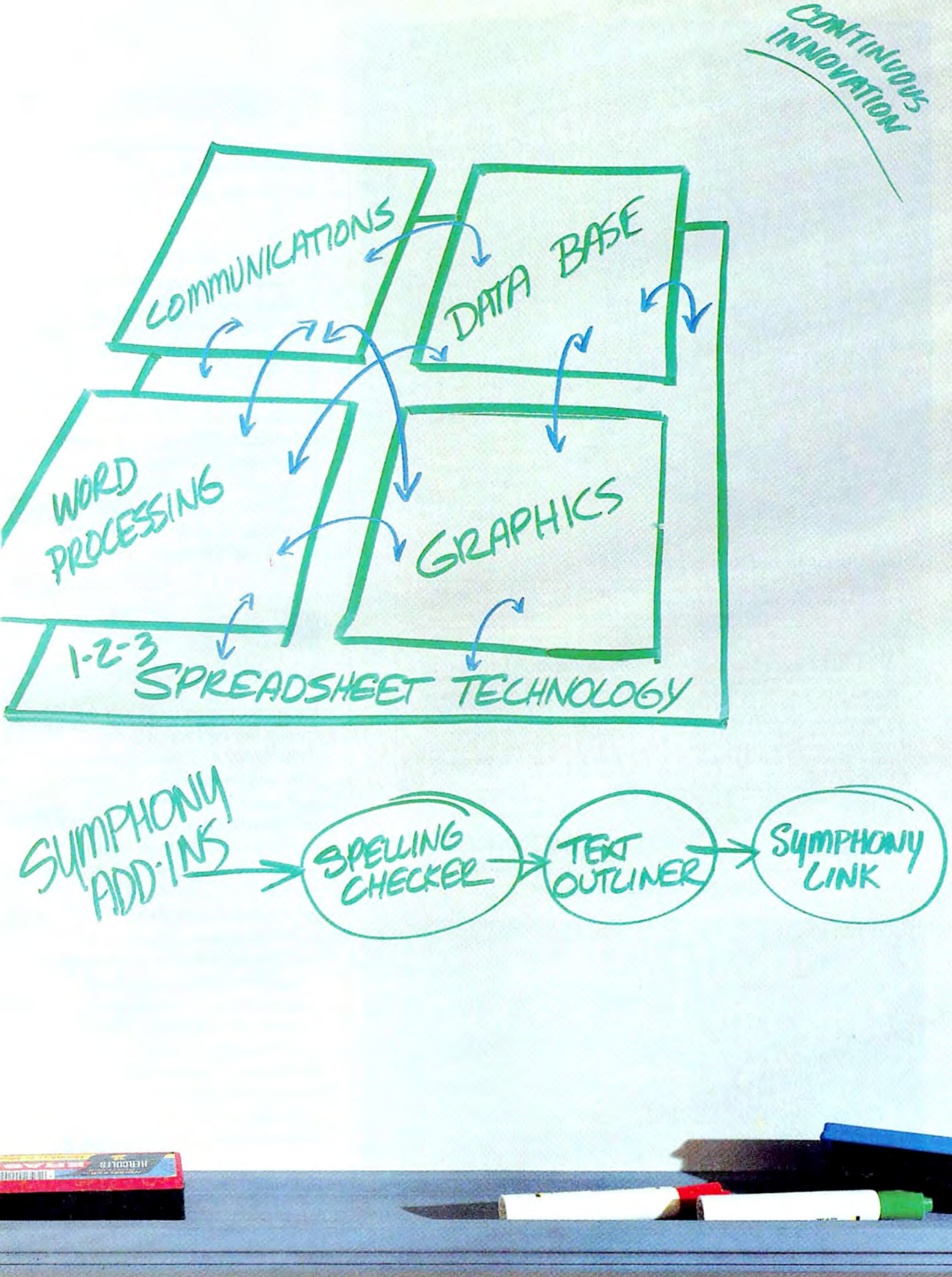
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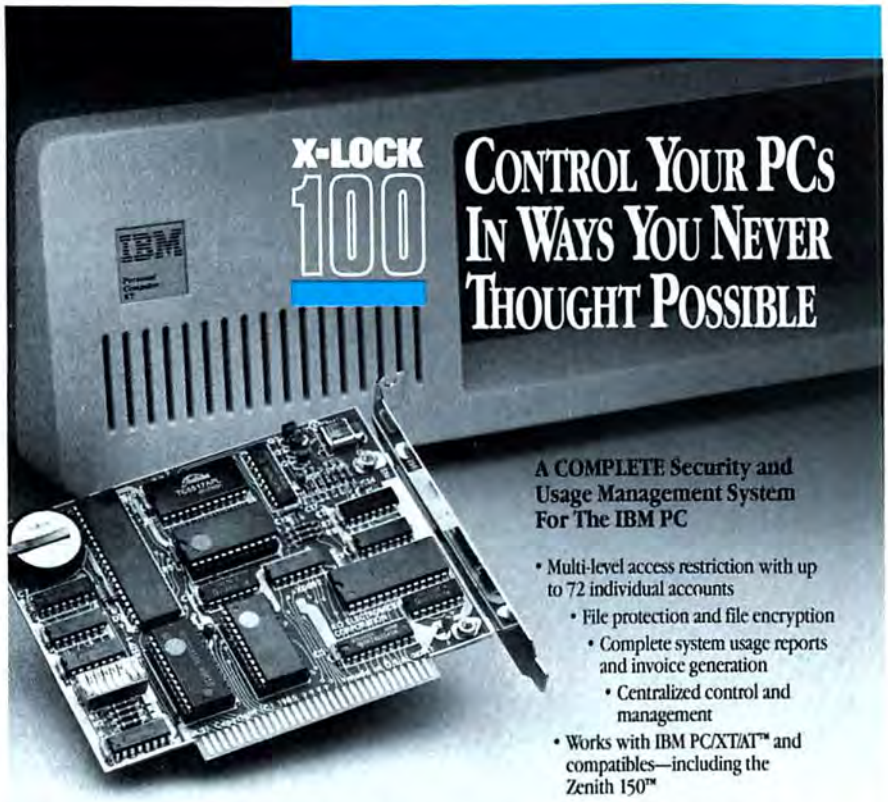

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Kimtron KT-7/PC

It's mating season for PCs, if the current lust for local area networks is any indication. But in some situations, especially in offices where PCs haven't proliferated yet, the oft-neglected multiuser route can be a more viable way to link users and share resources. Using a PC or an AT as a system unit, Kimtron's KT-7/PC system provides an ingenious entrée into the multiuser dimension.

Kimtron's system consists of three principal components: one or more ASCII terminals, *Multilink Advanced* software to host the multiuser environment, and a Kimtron Quartet interface board with four serial ports. With two boards in your machine, *Multilink*

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You can add up to four Kimtron KT-7/PC terminals to an AT or PC using a single interface board.

Fred Simson

enables you to hook up a maximum of eight terminals—if you're out of your mind. Even with an 80286 machine, the practical performance limit is more like two or three terminals.

Given that DOS can already address COM1: and COM2:, you might think it would be cheaper and easier to plug a couple of dumb terminals into the back of your machine. That would mean abandoning all other serial communications, however, plus you'd have a poky 9600-bps link. The Quartet and *Multilink* support up to 56-kilobits-per-second communications, and although the Kimtron terminals themselves can only handle 19.2 kilobits per second, that's still twice as fast as the standard IBM serial interface.

The *Multilink* environment resides above DOS, taking up only 16K for the host system plus 9K for each terminal. With expanded memory boards, *Multilink* supports up to 4.3MB of RAM. In this configuration, the host can access a full 640K, and each terminal is allocated 448K. For prioritizing tasks among terminals, a utility is provided that enables specific partitions to run more instruction cycles than others.

In addition to Kimtron's KT-7/PC, *Multilink* works with a variety of common terminals, including the IBM 3101, the DEC VT-52, the Televideo 925, and the ADDS Viewpoint. The KT-7/PC display is better suited for the link, however, because it mimics the attributes (bold, reverse, underline, and blink) used by the IBM monochrome monitor and offers the same function key assignments. However, the KT-7/PC's monochrome display produces large, chunky characters that are only slightly easier on the eyes than those produced by IBM's Color Display. You may also find the keyboard quite a bit mushier than its PC counterpart.

Naturally, there's no way to carve up a single CPU to serve several terminals without sacrificing performance. Tested using a souped-up 7.2MHz 8088-2 IBM PC with a Norton Sysinfo performance index of 1.6, a single added terminal cut the rating to 0.7. On

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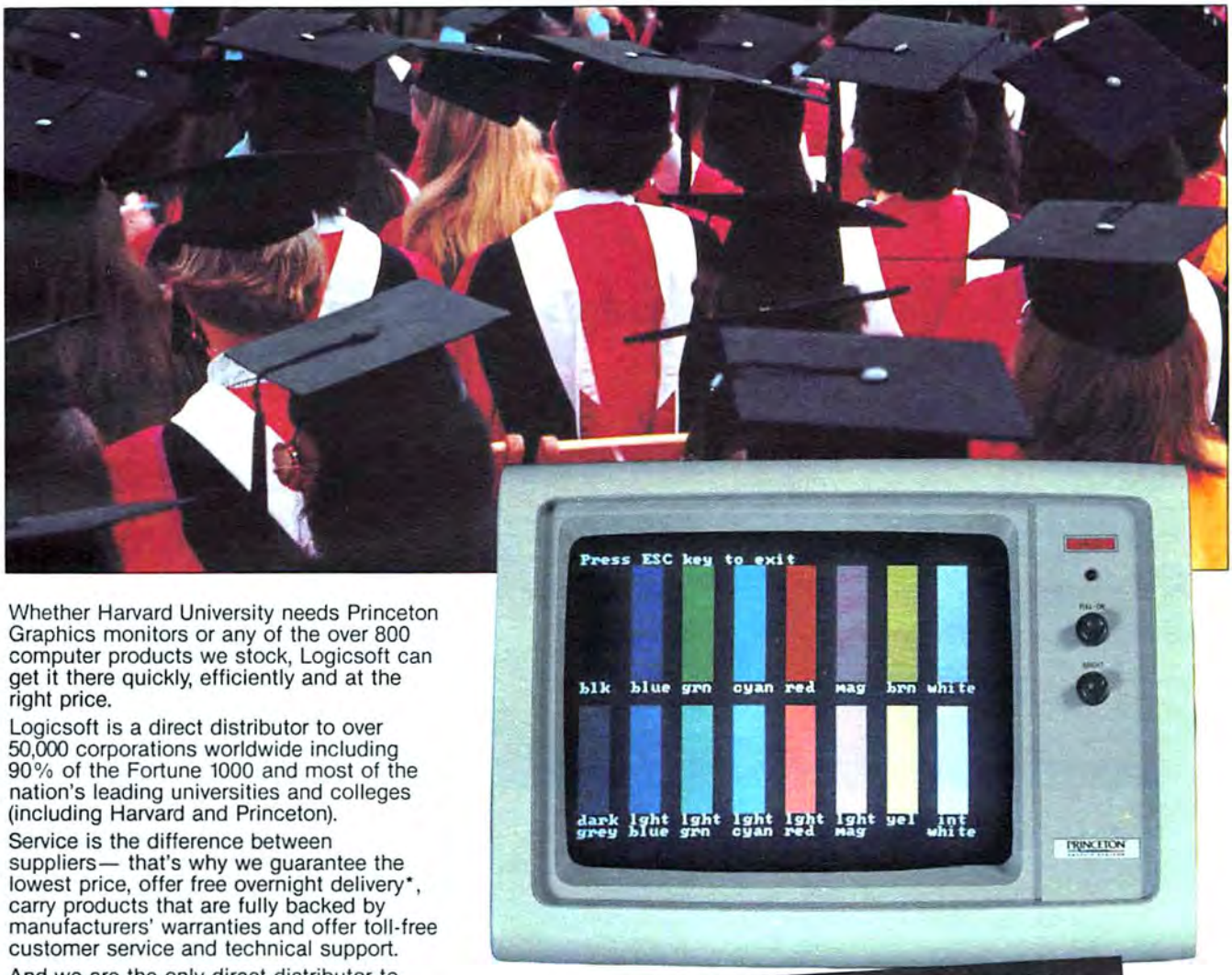

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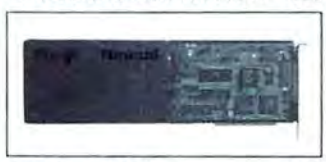

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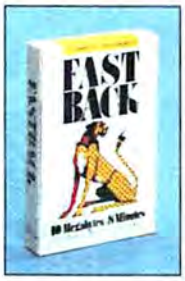

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While on the surface these performance figures are impressive, take note: Disk-intensive applications, such as a *dBASE* sort, slow the system to a grind. Additionally, when two or more terminals try to update the same disk file, the first one there generally puts the others on hold. Sometimes this delay also freezes the display or prevents keyboard input. To its credit, however, *Multilink* does allow two terminals to *view* the same disk file simultaneously.

Multilink is compatible with a fairly wide range of software, including *1-2-3, WordStar, WordPerfect, SuperCalc, Crosstalk, dBASE II* and *III*, and the *pfs* series. You must patch each of these programs, however—a procedure not quite as ominous as it sounds. Generally, all you need to do is load a RAM-resident utility, execute a batch file command, and *Multilink* makes the necessary modifications to the application. Because *Multilink* resides above DOS, however, you'll find it disastrously incompatible with device drivers and memory-resident programs such as *SideKick*.

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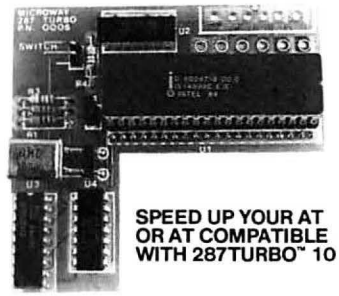

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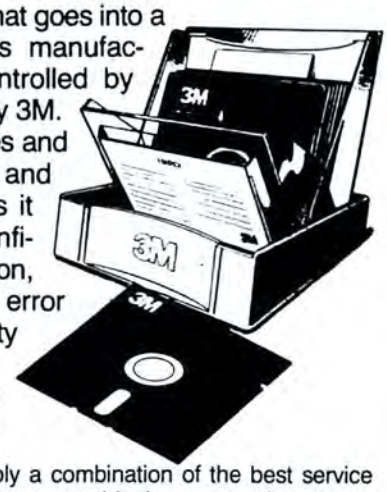

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Cauzin Softstrip System Reader

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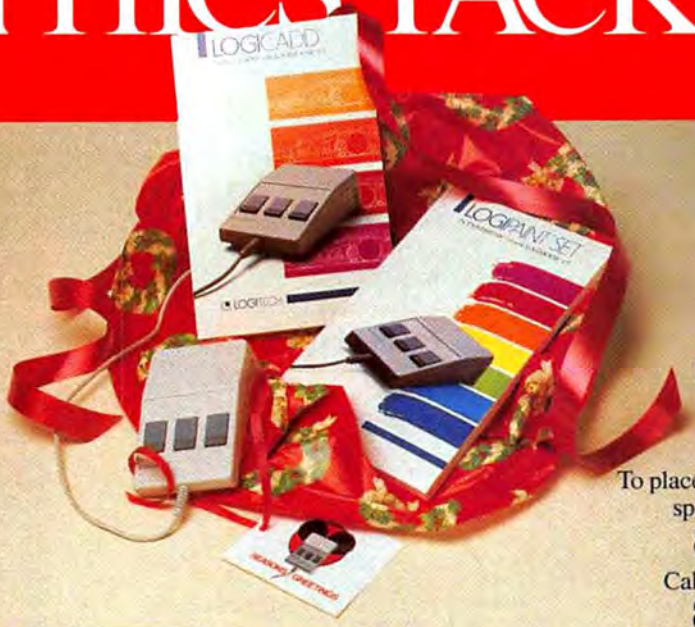

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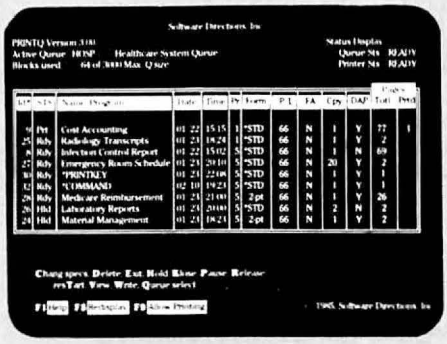

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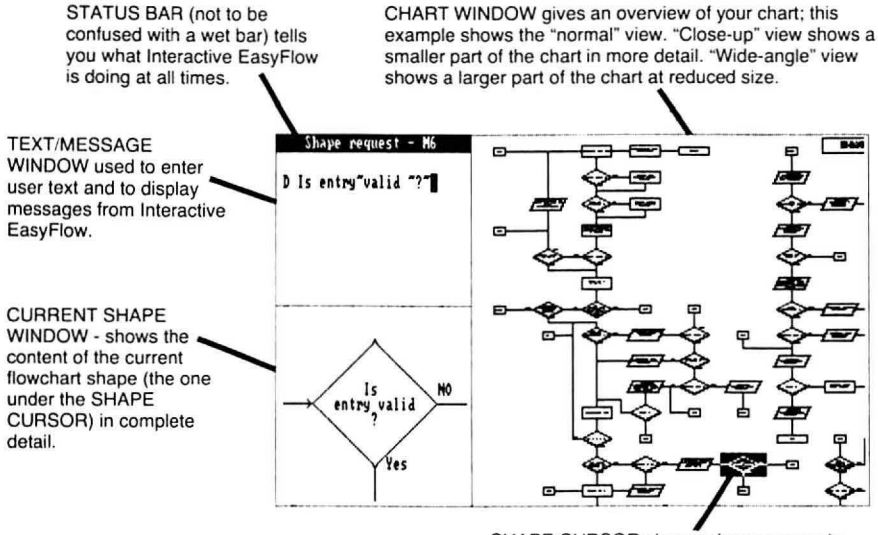

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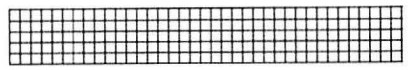

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(continues)

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REPORT BUILDER CYCLE:

Key in the report parameters on screen

Print your listings
- New report format for reference
- Report element layout

Press a key, wait 6 secs*

Key in the report data elements on screen

Report Builder automatically writes the program code and links it to your datafile

Print your listing
- Report program source code listings

Compile the report builder code using the Turbo Pascal™ compiler

Attach the new report module to your system menu

SYSTEM BUILDER CYCLE:

Paint the menu screens

Paint the application screens

Press a key, wait 6 secs*

Define the datafile(s) on the screen

System Builder automatically writes the program code and combines the datafiles into a relational database

Print your listings
- Program source code listing
- Datafile layouts
- Self-documenting program (includes screen schematics)

Compile the System Builder code using Turbo Pascal™ compiler

Start using the completed system

*System Builder will generate 2,000 lines of program code in approximately 6 seconds.

REPORT BUILDER FEATURES:

- Automatically generates Indented, Structured Source Code ready for compiling Turbo Pascal (no programming needed)
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- Supports Global Parameters such as Headings, Footers, Lines Per Page, Print Size and Ad Hoc Sorting
- Produces reports containing an unlimited number of Sub-Headings, Sub-Totals and Totals
- Page breaks on Sub-Totals
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- Use range input screens produced by System Builder to allow End Users to select portions of a report as needed (i.e. specific account ranges can be requested)
- Produces standalone Report Modules
- Easy-to-use Interface Program to access dBase Files

SYSTEM BUILDER FEATURES:

- Automatically generates Indented, Structured, Copy Book Source Code ready for compiling with Turbo Pascal (no programming needed)
- Paint Application and Menu screens using Keyboard or Microsoft Mouse™
- Finished Application screens all use System Builder's In-Line machine code for exceptional speed
- Use fully prompted Screen Guidance Templates™ to define up to 16 Datafiles per application, each record having an Unlimited Number of fields
- Define up to 16 Index Keys per application database
- Paint functions include:
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  - —Cut and paste blocks of text screen to screen
  - —Draw and erase boxes. Define colors and intensities
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- Automatically modifies datafiles without loss of data when adding/deleting a field
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- Develop systems for Floppy or Hard Disk
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- Easy-to-use Interface to access ASCII and dBase Files

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(Typical 10 screen 8 file/index application)

TASK	SYSTEM BUILDER	DBASE III™
Planning and Design	60 minutes	60 minutes
Screen Painting	15 minutes	3 hours
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Elapsed time to completed system	**1 hour and 17 minutes**	**14 hours**

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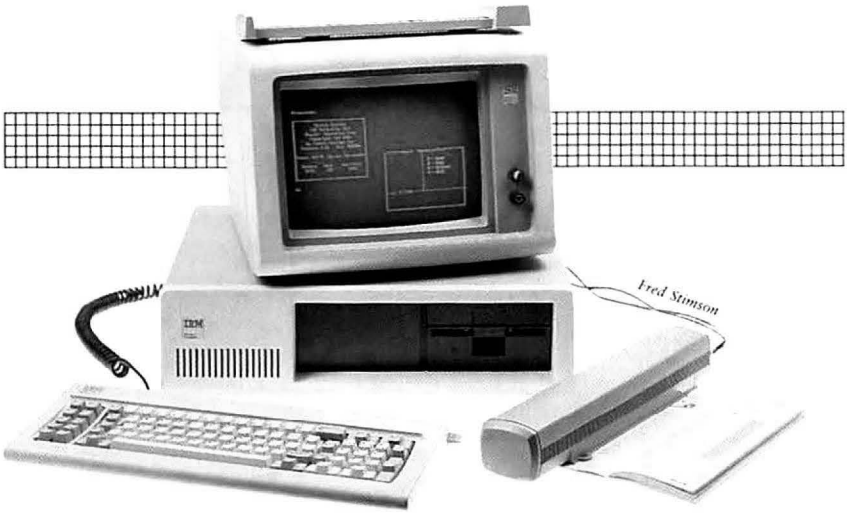

Offering a cheap way to exchange small amounts of data, the Softstrip System Reader uses a laser scanner to read hard copy PC data.

by the software are almost absurdly simple, and the installation procedure consists of hooking the Reader to your serial port and loading the RAM-resident software. To import a Softstrip file, you simply run the Reader, and it names and saves the captured file. Exporting data or programs to the *Stripper* software for Softstrip printing is equally elementary.

Parity bits at the beginning and end of each line of data ensure accurate error detection and correction. (Cauzin claims an undetected bit error slips through only once every 10 billion bits.) Strips can be marked, crumpled, stained, or reproduced on a photocopier with virtually no loss of readability.

Currently, software for the Softstrip System is compatible not only with the PC but also with the Apple II and the Macintosh. Passing small amounts of data among these machines, then, is one of the system's most obvious uses, making Softstrip code equivalent to a kind of personal computer Esperanto.

Of course, this is only one of thousands of possible applications for this new technology. Recently, a number of PC publications have printed freeware Softstrips, and Cauzin itself bundles hundreds of programs in Softstrip form with the system, from games to *1-2-3* templates. (Beginning with this issue, *.* will include Cauzin Softstrips for program listings.) Businesses will find the strips convenient for sending small amounts of data in hard copy through the mail.

As the amount of data to be transported increases, however, Softstrip's allure fades. The reading process is slow, and committing data to strip form is far from the most compact way to go. One 1.2MB floppy, for example, is equivalent to about 14 pages of Softstrip hard copy, and converting the Softstrips into computer-readable form would take well over an hour.

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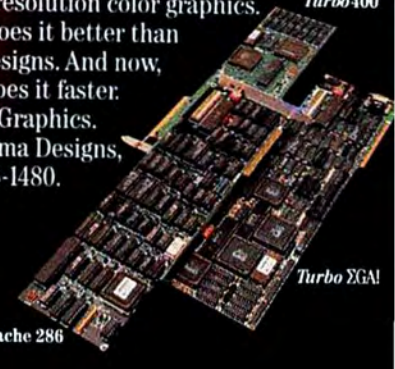

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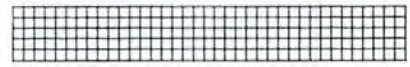

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IDEAssociates Diskit 2

Two years ago, the Bernoulli Box introduced a radical alternative to conventional mass storage: removable 10MB floppy disk cartridges. This innovative approach offered the convenience of vast, compact storage without a hard disk's immutable megabyte limit. Now, this groundbreaker has some competition in the form of IDEAssociates' Diskit 2.

Like the original Bernoulli Box, the Diskit 2 has two drives, which are assigned the last two drive letters in your system (C: and D: for a two-floppy machine). The Diskit 2 is much more compact than its mentor, offering cartridges about one-fourth the size of those used by the Box. Moreover, its two half-height drives are mounted horizontally side by side, yielding a slender 2¼-inch profile. This setup, used in a number of tape

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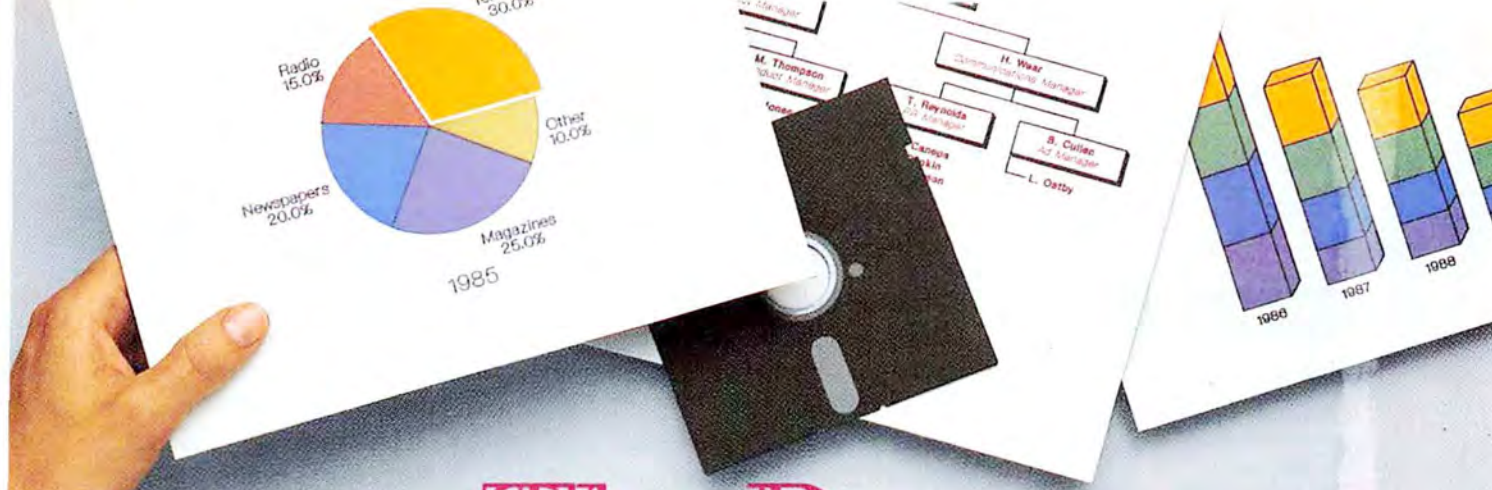

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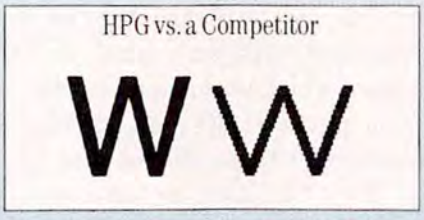

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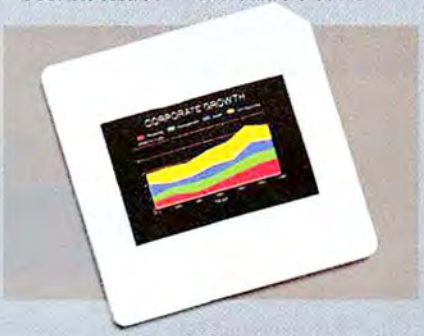

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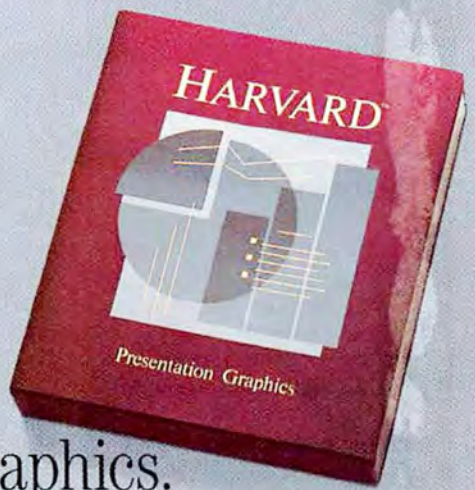

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The Diskit 2's price may cause a bit of discomfort, however—$2995 seems a bit steep in the age of incredible shrinking hardware prices. For this sizable sum you get a controller board, cables, two 10MB cartridges, and a utilities disk. Nonetheless, the unit is $700 less than the original 10MB Bernoulli.

Thanks to a simple setup procedure, the Diskit 2 will have you manipulating megabytes of data in no time. You just insert the controller board, hook up the cable, and run the menu-driven installation program—a 20-minute procedure, tops. Although light on technical specs, the manual provides more than enough installation minutiae, plus a quick-reference, ten-step installation map.

The Diskit 2 has an unmistakable "built to take it" air. The metal casing looks tougher than an IBM PC's, and the drive doors snap shut with bank-vault decisiveness. The biggest chink in the unit's armor is an exposed and sensitive power button on the front panel—a curious and potentially dangerous flaw. In addition, although the Diskit 2 is generally quieter than the typical internal hard disk, it intermittently emits a slight whirring sound, reminiscent of a midsummer insect serenade.

IDEAssociates claims a 90-millisecond average access time and a 5-megabit-per-second data transfer rate for the Diskit 2, making it a tad slower than both the XT's standard hard disk and the new 20MB Bernoulli Box (which are roughly equivalent). Running a continuous read/write disk test using sequential data fields, the Diskit 2 again fell slightly short of its two counterparts. On a random seek test, the unit's read/write times were almost twice as long as its rivals'.

In addition to marketing the Diskit 2 as a hard disk alternative, IDEAssociates is touting the unit as a portable backup device. Of course, the requisite controller either inhibits portability or jacks up the price of such an approach considerably—each machine would need a $395 controller to avoid irksome board jockeying. And although the Diskit 2 is rugged enough to weather daily transport,

(continues)

Fred Simson

Like the original Bernoulli Box, the Diskit 2 uses 10MB floppy disk cartridges, but it proffers a lower profile and price.

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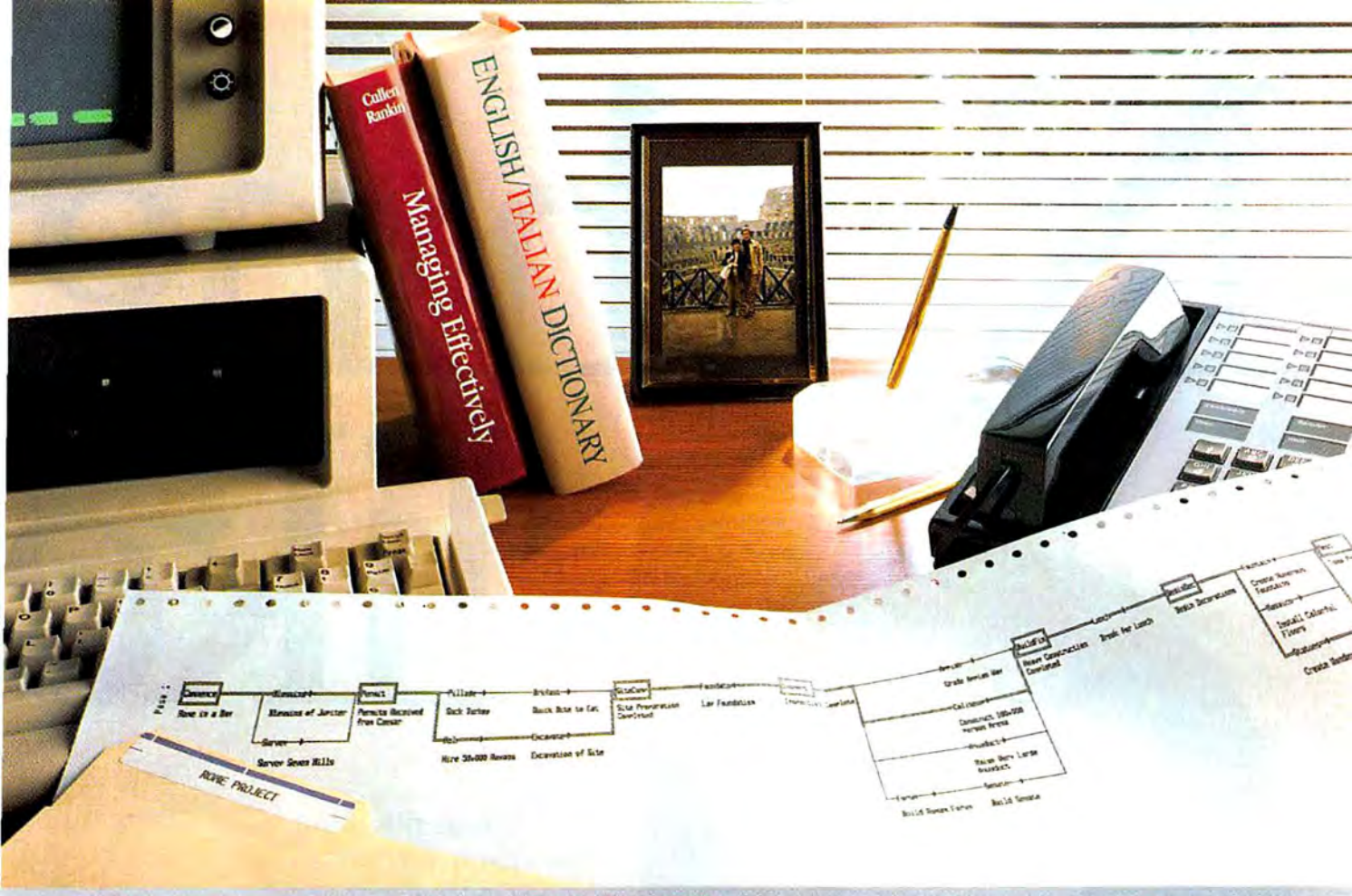

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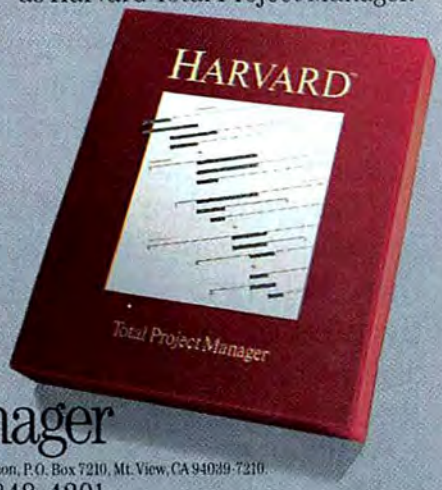
Successful project management starts with HTPM's intuitive roadmap (PERT Chart) which graphically demonstrates relationships between tasks and offers a clear view of the critical path. HTPM's Gantt Charts allow you to modify the project for the most efficient scheduling and resource allocation. You can also budget each task and compare actual costs to planned costs. If necessary, cost data can be transferred easily to Lotus™ spreadsheets. The flexible Project Calendar gives you the ability to define your workdays and tailor a project to fit your schedule.

Because most managers must juggle more than one project at a time, HTPM supplies a special feature that alerts you to over-committed resources, both within a project and across multiple projects, and helps you reallocate resources accordingly.

When a project requires the coordination of many people, good communication is vital. With HTPM you can produce comprehensive, presentation quality reports to keep the entire organization informed of the latest developments.

Any project can take on epic proportions when *you* are responsible for bringing it in on time and on budget. That's why every project manager needs HTPM. For planning, scheduling, controlling, and reporting, no PC software is as effective as Harvard Total Project Manager.



Graduate to Harvard Total Project Manager

Runs on IBM PC, Compaq, AT&T, Tandy, and other compatible MS-DOS computers. A product of Software Publishing Corporation, P.O. Box 7210, Mt. View, CA 94039-7210.

Call for a **FREE** trial size disk today! Call 1-408-848-4391.

Nothing like

Some would've settled for just another platter. But our engineers went round and round to find a way to get more data on a 3.5" disk. The result? 20 MB in one slot.

This technology makes our drives up to twice as fast as the others. It cost us plenty.

One of our engineers spent his weekends devising this system for continuously checking the heads' position, making Hardcard rugged enough for use in portables.

It isn't easy dealing with fanatics.

Any other group of engineers would have cut corners and built a plug-in 20 megabyte disk drive in no time.

But not our bunch.

They spent their hours pruning a tenth of an ounce here, a hundredth of a second there. Whenever we were ready to release the product, they were ready to tweak it again. This wasn't just a development effort. It was a tug-o'-war.

Who won?

You.

Not just because our engineers created the only one-slot, IBM® PC-compatible plug-in drive. But because they created a plug-in that's up to twice as fast, twice as rugged and three times more reliable than any on the market.

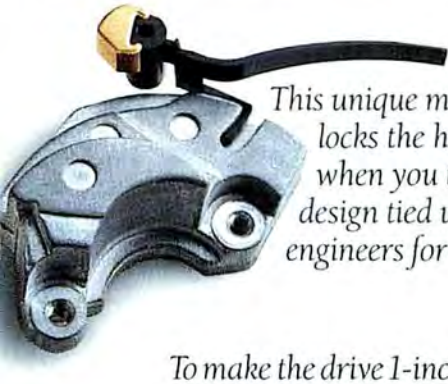
Of course, the engineers still aren't satisfied.

Now they want to squeeze all these features into a drive the size of a chip.

If you ask us, that's a bit excessive.

For a demonstration of Hardcard™ 20, call (800) 826-8022 for the dealer nearest you.

succeeds excess.



This unique mechanism automatically locks the heads out of harm's way when you turn the power off. Its design tied up three of our best engineers for months.

We spent tens of thousands of dollars testing the software in these chips. Because our engineers demanded compatibility with all the popular PC programs.

To make the drive 1-inch wide the engineers had to make the motor 1-quarter-inch thin. How long would that take? No one knew. It had never been done before.

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Circle 724 on reader service card

Hardcard™ from Plus™

who wants to lug around an 18-pound briefcase without a handle?

Mobile backups may be not its forte, but the Diskit 2 is otherwise a capable performer. Though slower than some mass storage options, it's significantly cheaper, far more compact, and built to last a lifetime. If your storage needs are unlimited, the Diskit 2 is a solid choice. *–Wes Nihei*

Diskit 2
IDEAssociates
35 Dunham Rd.
Billerica, MA 01821
617/663-6878
List price: $2995
Requirements: DOS 2.00 or later version

Ingram-Eve Short Stack

Two years ago a multifunction board that shoehorns a half megabyte of RAM and a clock/calendar onto a 5½ inch circuit board would have constituted an engineering feat nonpareil. Today, we yawn. But the Short Stack, a $250 memory expansion board from Ingram-Eve, may keep you awake a little while longer.

To pack its memory onto a half-size board, the Short Stack uses ZIP (zig-zag in-line package) chips that have all 16 pins on one side. Consequently, they're mounted on edge and take up less room than conventional RAM chips. The result is a full 512K permanently installed in a modicum of space.

The Short Stack also has the ability to assign either a 64K RAM disk or a print spooler to memory above DOS's 640K limit. This frees up a corresponding chunk of addressable memory for use by applications and RAM-resident programs. Ingram-Eve provides special RAM disk and print spooler device drivers to access this normally out-of-bounds memory.

The board comes packaged with 12 additional utility programs. Included are programmer's tools, DOS aids, and even a program that displays the time of day in large characters or in a selected corner of the screen.

Installation is worry free. You set the system board switches for a full 640K and slide the Short Stack into an open expansion slot. Add the clock/calendar utility program to an AUTOEXEC.BAT file, install a device driver in the CONFIG.SYS file (if you want a RAM disk or a print spooler), and power up.

The Short Stack isn't the answer to everyone's memory woes. It's incompatible with the IBM EGA (Enhanced Graphics Adapter) and PGA (Professional Graphics Adapter) and doesn't support software that uses the Lotus/Intel/Microsoft expanded memory specification. But while it brings little innovation to the add-on RAM market, the Short Stack's hardware/software combination provides a reasonably inexpensive solution for users trying to cram yet another memory-resident utility into the increasingly cramped confines of RAM. *–Robert Nusbaum*

Short Stack
Ingram-Eve, Inc.
301 W. 28th St., Ste. D
National City, CA 92050
619/474-1435
List price: $250
Requirements: 256K

Jim Heid is a freelance writer and a Contributing Editor for Macworld *and* Publish! *magazines. Sanjiva Nath is a programmer analyst and the author of several books on PC applications. Paul Meyers is an independent San Francisco television producer who specializes in science and technology. Wes Nihei is Editorial Assistant for* PC World. *Robert Nusbaum is a freelance programmer and writer based in Grand Rapids, Michigan.* ●

The most significant development in monochrome graphics since the Hercules Graphics Card.

Announcing the Hercules Graphics Card Plus.

Four years ago, the Hercules™ Graphics Card brought high resolution monochrome graphics to the IBM® PC for the first time. And revolutionized the world of personal computers.

Now, it's happening again.

Because now there's the Hercules Graphics Card Plus. A giant step forward in technology that creates a whole new standard for graphics hardware and a world of potential for software.

Three modes are better than two.

Until now, graphics cards have had only two modes to work with: text and graphics.

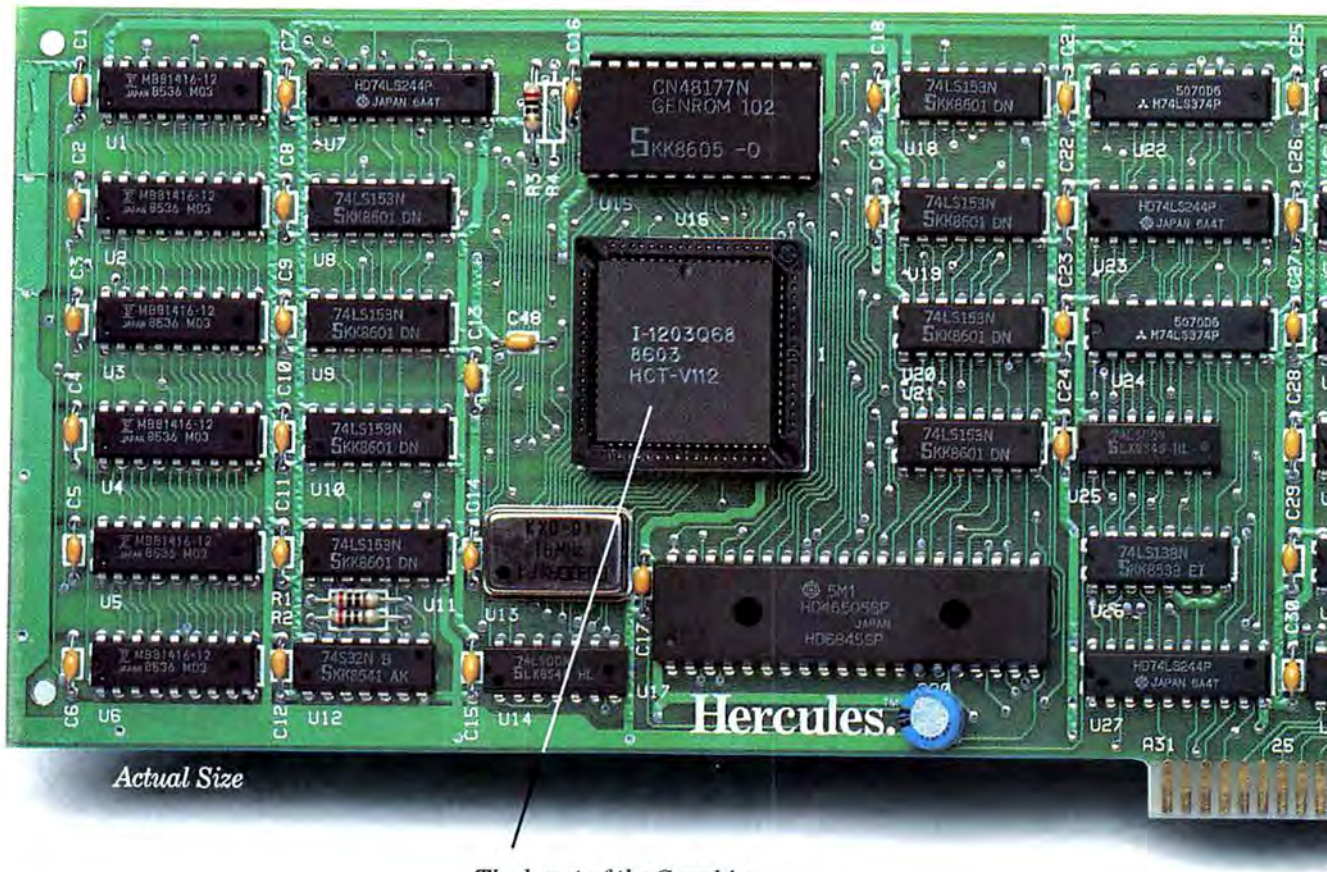
Text mode is very fast, but it's limited to 256 pre-programmed characters.

Graphics mode, on the other hand, lets your software create as many characters as you want. But for text processing, graphics mode can be slow, painfully slow.

Enter a new, third mode.

Called RamFont.™

Two years in development, RamFont gives you the best of both worlds. It blends the blinding speed of text with the flexibility of graphics.



Actual Size

The heart of the Graphics Card Plus: the V112 microchip, Hercules' next generation video processor that makes the RamFont mode possible.

Enough flexibility to blow the doors off the 256-character limit of text mode.

Because RamFont can handle an astonishing 3072 different characters of various widths and heights.

Instead of 256 canned, unchangeable ones.

The future according to RamFont.

With all these characters and fonts to work with, software will never be the same again.

RamFont word processors, for example, will put italics, boldface, and scientific characters right on the screen with standard text. So you can see what you're about to print.

RamFont spreadsheets will use smaller characters to display larger amounts of information. So you can get the big picture.

RamFont integrated packages will mix true text and graphics and turn your PC's screen into a fast-lane version of the Macintosh's.™

The Hercules Printer Cable—a $40 value, free with each Graphics Card Plus.

And if you happen to be one of those geniuses who's fluent in five languages, you'll be able to type a letter in all of them.

Simultaneously.

A Herculean feat.

How did we manage to combine the radical new RamFont on the same card with Hercules' legendary sharp text and high resolution 720x348 graphics and still be 100% compatible with the original Hercules Graphics Card?

It wasn't easy.

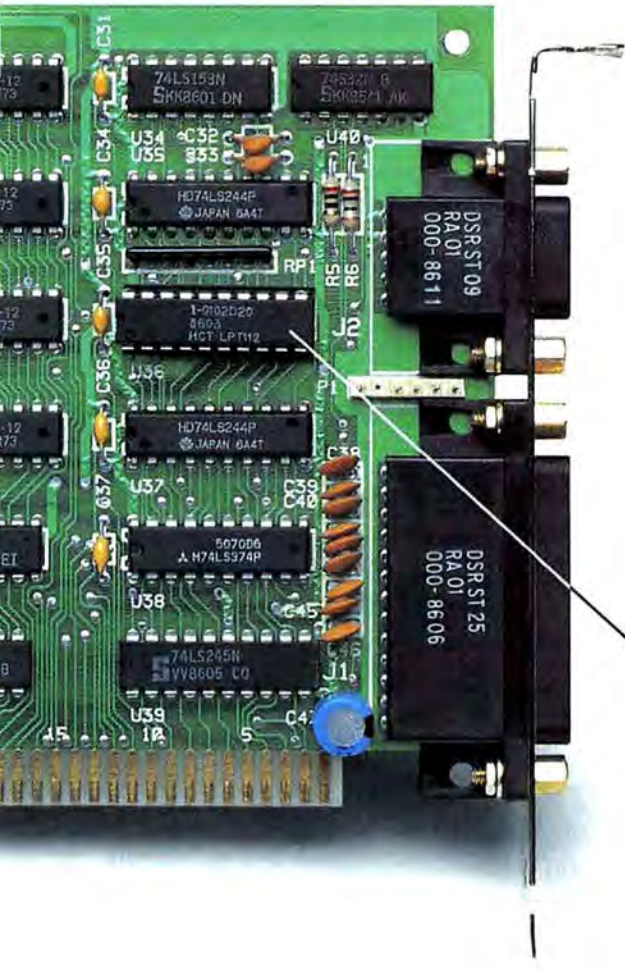
In fact, it took two years and all of the sophisticated CAD tools at our disposal to create our exclusive V112 microchip.*

This totally new generation of video processor is at the heart of every Hercules Graphics Card Plus.

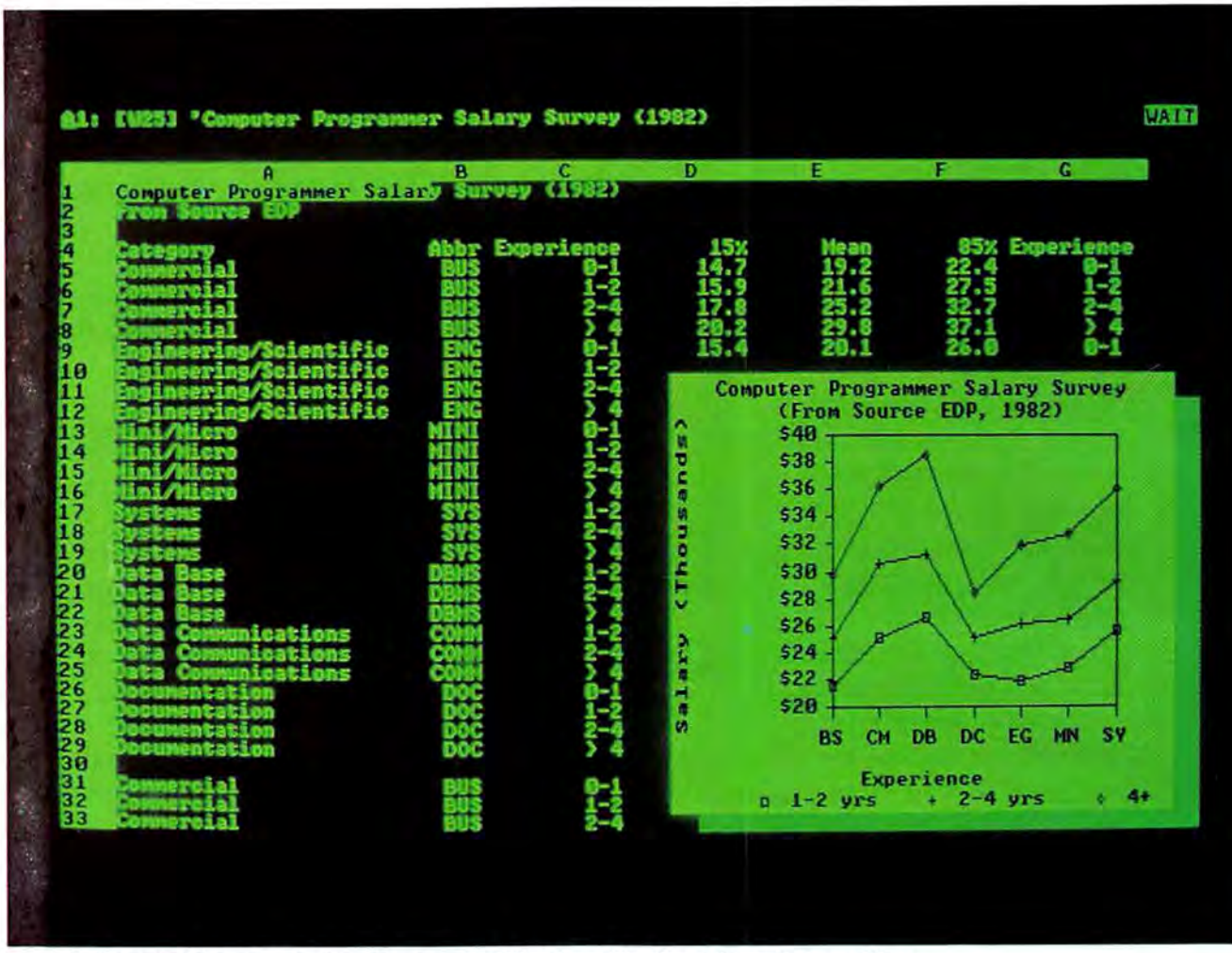
It's also at the heart of a revolution in software that's beginning right now.

Turn the page and you'll see what we mean.

**Patent applied for.*



Another Hercules innovation: the new LPT112. It's a parallel printer port on a chip.



Lotus 1-2-3 Rel. 2 in the RamFont mode of the Graphics Card Plus: fast scrolling, a 90-column by 38-row screen and a pop-up graphics window.

Software will never be the same again.

The trouble with most new hardware introductions is that there isn't any software available to introduce them to.

Not so with the new Hercules Graphics Card Plus.

It runs everything the original Hercules Graphics Card runs.

Better yet, it comes complete with the software you need to start using the revolutionary new RamFont mode right now with some of the world's favorite programs.

Lotus blossoms.

Of course, if you want to talk about the world's favorite programs, you have to start with Lotus® 1-2-3.®

You won't recognize Release 2. Because now you can put nearly twice as much information on your screen, scrolling right and left and up and down at speeds you'll remember nostalgically from the days of Version 1A.

Another thing you won't recognize is that cute little graphics window. You can thank RamFont for that.

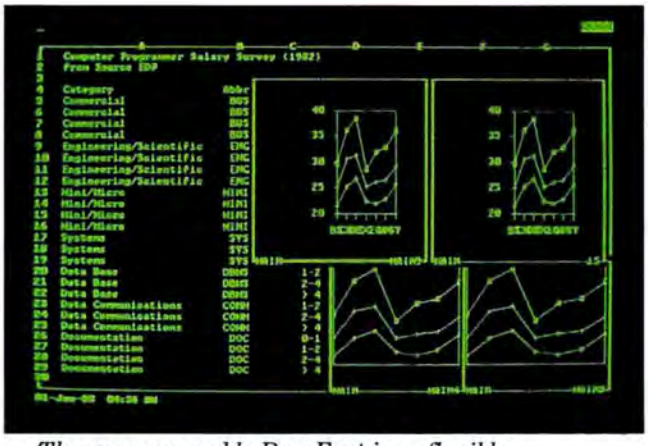
Now that RamFont is with us, you can pop up a graphics window any time you're in the mood and still keep your 1-2-3 spreadsheet in the background.

And you can do the same with Symphony,™ of course.

Or, if your tastes tend toward Ashton-Tate®'s Framework™ II, you'll be pleased to hear that you can really

The Graphics Card Plus in RamFont mode showing multiple fonts created using FontMan,™ a Hercules program that comes free with each Card.

Ashton-Tate's Framework II with italics and boldface and speed in the RamFont mode of the new Hercules Graphics Card Plus.



The programmable RamFont is so flexible, Symphony can mix true text and graphics.

Microsoft Word in RamFont mode: italics, boldface and small caps—plus speed and lots of it, at last.

burn rubber with its word processor.

The revealed Word.

Speaking of word processors, remember a couple of pages ago how we said they would be forever changed? Well, the change has already begun.

For example, the Hercules Graphics Card Plus with RamFont makes Microsoft® Word a whole new program.

Suddenly the italics, boldface, superscripts and subscripts scroll superfast. Which means you don't have to twiddle your thumbs waiting for the screen to catch up with your fingers.

More to come.

As time goes by, more and more major programs will take advantage of the extraordinary capabilities of RamFont.

Which gives you two choices.

You can buy a Hercules Graphics Card Plus and look forward to getting your socks knocked off.

Or you can buy another card and watch while technology leaves you and your socks behind.

To help you make up your mind, we've prepared a little surprise for you on the next page.

Just make sure you're sitting down.

HERCULES
Graphics Card Plus

$299.

Shocked?

We thought you'd be.

Imagine, the new Hercules Graphics Card Plus with the power of RamFont plus everything that made the original Hercules Graphics Card the monochrome standard.

At about half the old price.

Now that's progress.

Call 1-800-532-0600 ext. 203 (in Canada call 1-800-323-0601 ext. 203) for the name of an Authorized Hercules Dealer near you and we'll rush you a free info kit.

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Circle 77 on reader service card

From the Software Shelf

PC World offers first impressions of recent software releases

This month: SideKick on the road, not-so-sticky electronic notes, too-personal publishing, form-fit data formats, and Project Management 1A

Edited by Robert Luhn

Traveling SideKick

In the not-so-distant past, my desk was strewn with file folders, calendars, business cards, scribbled-on envelopes, week-old sandwiches, and Lord knows what else. Now all those scraps are buried under mounds of floppy disks, printouts, and user manuals. But I'm not worried. On the top of this heap sits the *Traveling SideKick* organizer, a panacea for the organizationally disadvantaged.

The organizer is a leatherette (read: plastic), book-size, three-ring binder similar to those sold in stationery stores. It includes a medley of blank forms for addresses, appointments, and notes; quick reference guides to Borland products; traveler's trivia, such as lists of international monetary units and telephone area codes; an ASCII table (just what every traveler needs); maps of the United States and the world; a solar-powered calculator; a pen; a floppy disk holder; and a pouch for receipts. Oh yes, it also comes with software.

The software—*Traveling SideKick*—is essentially a simple electronic address book paired with an equally simple appointment/calendar program. The package's pull-down menus, on-screen data entry/retrieval forms, and on-line help make it exceptionally easy to work with. Unlike its kissin' cousin *SideKick, Traveling SideKick* is not memory-resident—which may be a blessing in disguise if your PC's pop-up-packed memory is beginning to resemble the last period of a hockey game. Note too, that calendars produced by both programs can update one another; *Traveling SideKick* also makes a noble, if largely unsuccessful, effort to boost *SideKick*'s wan calendar-printing functions.

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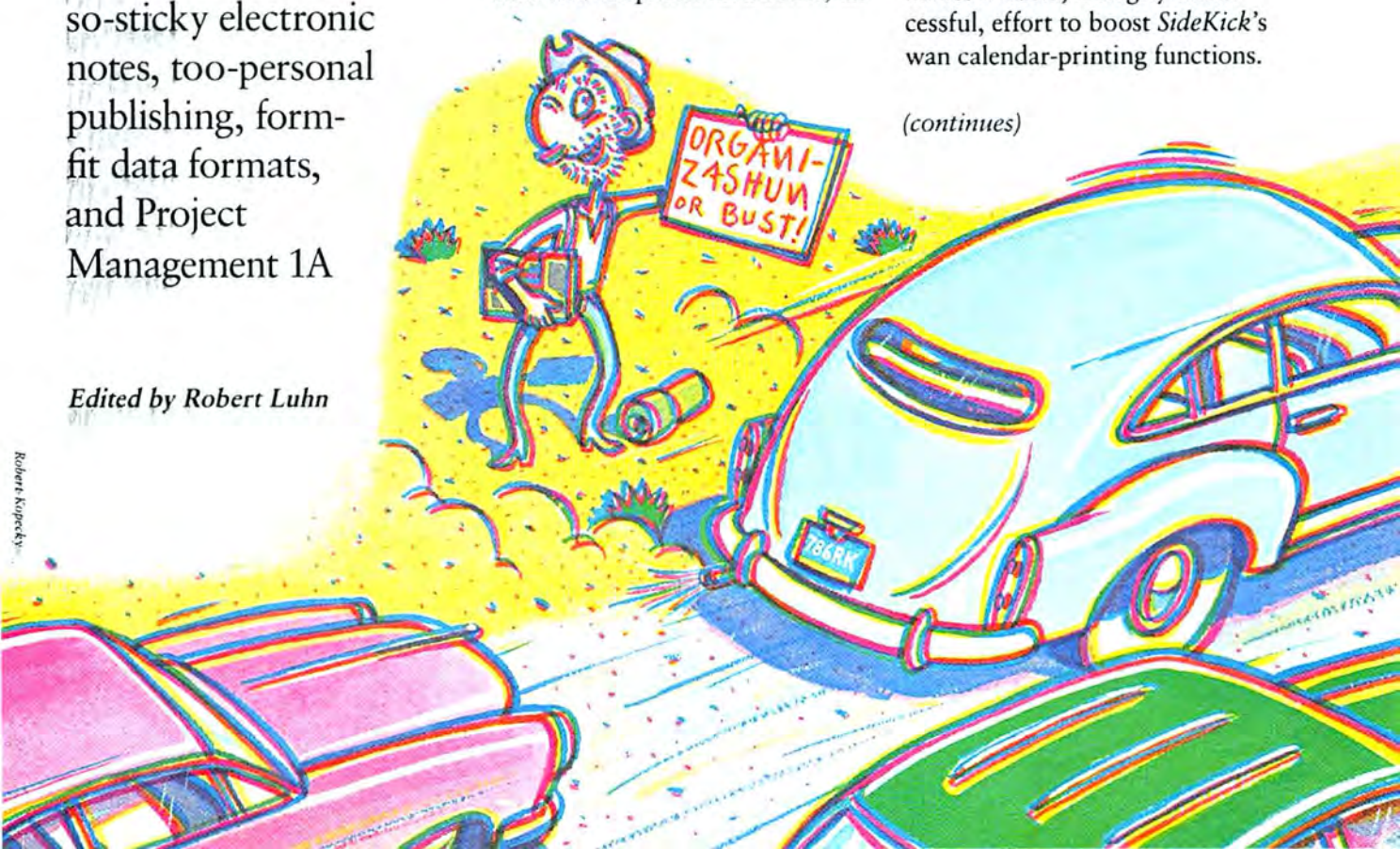

Robert Kupecky

If They've Told Us Once,

"It's the best form of PC storage I know."
PC WEEK

They've Told Us A Dozen Times.

The Bernoulli Box disk cartridge subsystem is now the proven standard in PC mass storage solutions. But don't take our word for it.

"Bernoulli Box ranks as the almost perfect tool."
PC WEEK

"Iomega's Bernoulli Box is a no-compromise disk drive that solves the problems of floppy and hard disks, offering their benefits while eliminating their shortcomings."
PC Magazine

"An add-on storage device that combines rugged durability with high speed, it offers the portability and low cost for which floppies are noted plus the huge storage capacity and snappy access speed that are the hallmarks of hard disks."
New York Times

"World Class Hard Disk Storage Award."
PC World

"The Bernoulli Box operated flawlessly during my long evaluation period."
PC Tech Journal

"Attached to an AT, the Bernoulli Box is faster than the AT's own hard disk. Attached to an XT, it is faster than an XT hard disk and even a smidgen faster than an AT. If you install a Bernoulli Box on a standard PC, its performance will make you forget any thoughts you had of eventually upgrading to an XT."
PC News

"...we now have unlimited storage capacity with greater performance than that available on the IBM XT."
Datapro Research Report

"When you add the convenience of the removable cartridge, with its instant backup potential and easy swapping of data files, the speed of data access and transfer, and the reduced risk of head crashes, you've got what could amount to a 'best buy' in mass storage systems."
Popular Computing

"Iomega's success has proven to computer makers that its disk drives work and that it can produce them reliably."
Business Week

"...megabytes of fast, reliable, removable on-line storage in such a compact configuration are practically irresistible."
PC News

"They're tough too—"
PC Magazine

"It's the best form of PC storage I know."
PC WEEK

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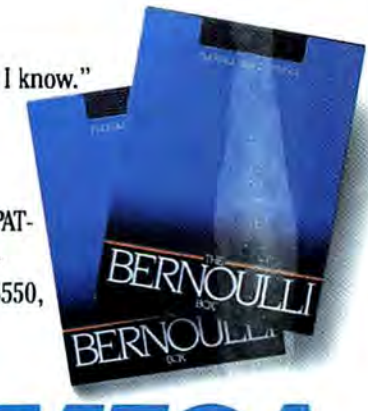

IOMEGA
BERNOULLI TECHNOLOGY

Iomega Corporation, Holly Pond Plaza, 1281 Main Street, Stamford, CT 06902

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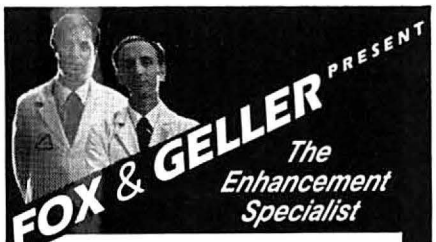

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dBASE Report Writer
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Why write programs yourself?
Let QUICKCODE do it!

dGRAPH ™
dBASE Graphics System
- Pie, line, bar charts
- Printer, plotter, or CRT
- Many automatic features

NEW dUTIL PLUS ™
dBASE Program Utility
- Finds program errors
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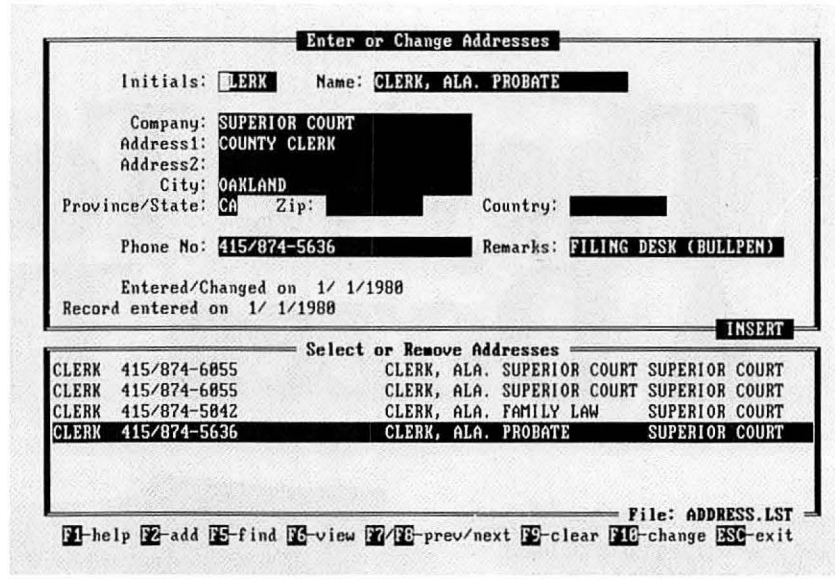

Screen 1: Traveling SideKick's data entry form makes address book entries a snap.

Names, telephone numbers, and addresses are entered (and viewed) via a data entry/retrieval form at the top of the screen while previous entries scroll by in a window below (see Screen 1). Every time you close this electronic address book, the program sorts the entire data base by name, company, or zip code field. Be forewarned that *Traveling SideKick* hinges a sort on the leftmost character in the key field. Thus, if you want to sort the address file by last name, you must enter data in last-name/first-name order. All or part of the file can be displayed on screen, saved to disk, or printed out in the form of a phone list, address book, or mailing labels.

Traveling SideKick can also import ASCII-formatted address lists from data managers using fixed or character-delimited fields, but not without considerable preconversion cleanup. You must strip out page breaks, underlining, boldface commands, and the like, and you may have to edit files extensively to ensure that fields in the source file are the same size and in exactly the same sequence as those in *Traveling SideKick*'s target records. Unless you are seeking ways to kill time, take the easy way out and type entries directly into the address book.

Those expecting a souped-up version of *SideKick*'s calendar will be sorely disappointed. Although *Traveling SideKick*'s data entry/retrieval form is a welcome touch, and although you can print out daily, weekly, or monthly calendars based on specified date ranges, you're still limited to an 8 a.m. to 8:30 p.m. calendar that records engagements in half-hour

(continues)

MANAGING YOUR CHECKBOOK?
MANAGING YOUR BUDGET?
MANAGING YOUR BILLS?
MANAGING YOUR CASH FLOW?
MANAGING YOUR TAXES?
MANAGING YOUR INSURANCE?
MANAGING YOUR STOCKS?
MANAGING YOUR BONDS?
MANAGING YOUR REAL ESTATE?
MANAGING YOUR TAX SHELTERS?
MANAGING YOUR SAVINGS?
MANAGING YOUR MORTGAGE?
MANAGING YOUR AUTO LOAN?
MANAGING YOUR RETIREMENT?
MANAGING YOUR CALENDAR?
MANAGING YOUR CHARGE ACCOUNTS?
MANAGING YOUR CAPITAL GAINS?
MANAGING YOUR ANNUITIES?
MANAGING YOUR APPOINTMENTS?
MANAGING YOUR DIVIDENDS?
MANAGING YOUR INTEREST?
MANAGING YOUR RECORDS?
MANAGING YOUR VALUABLES?
MANAGING YOUR KEOGH'S?
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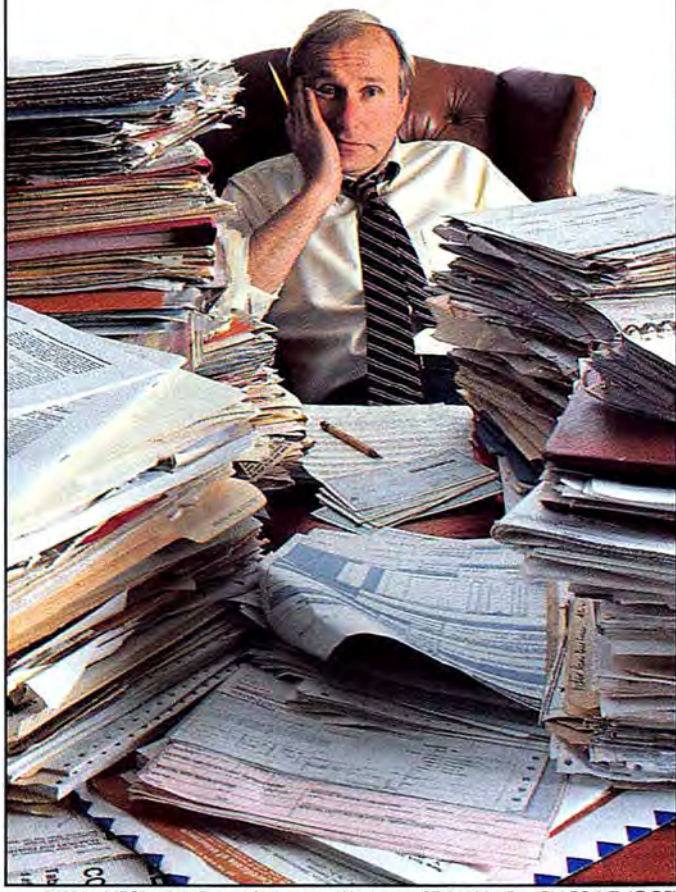
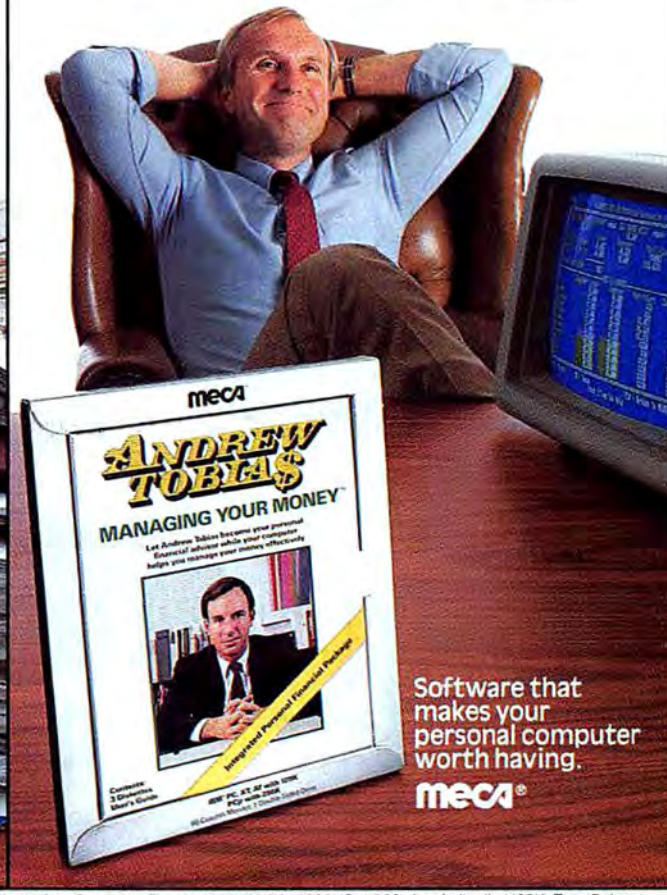
NEW IBM VERSION 3.0 WITH HOME BANKING
Plus accounts payable and receivable, 5-year tax forecasting, buy/lease comparisons, mortgage refinancing, college planning, and much more.

MANAGING YOUR MONEY® BY ANDREW TOBIAS. THE ONLY FINANCIAL SOFTWARE THAT DOES IT ALL.





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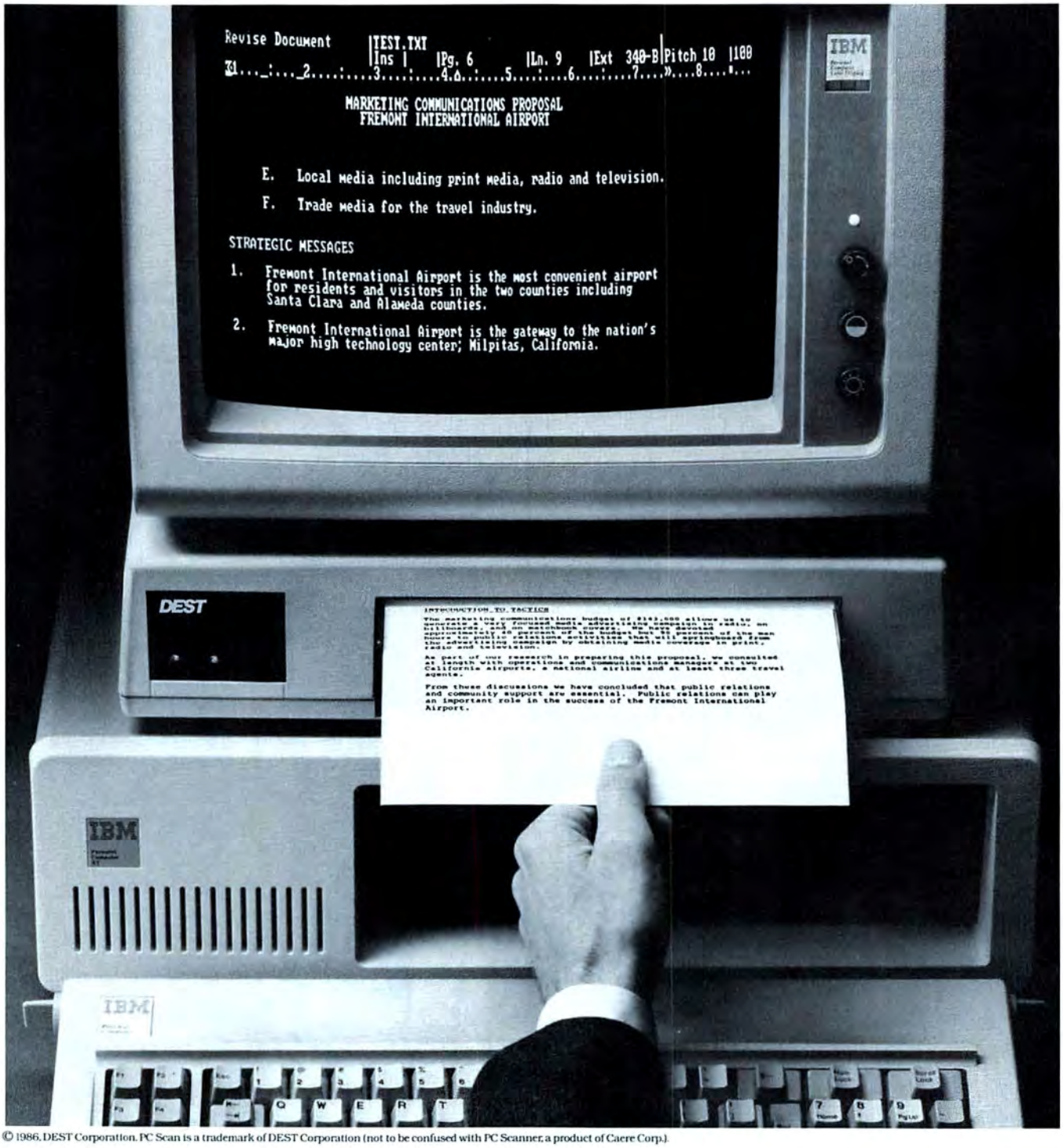
TEACH YOUR PC TO READ.



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Why? Because if your PC could read, you wouldn't have to spend so much time typing information into it.

INTRODUCING PC SCAN.™

It's the new personal page reader from DEST.

And it just might be the fastest way ever to get existing information into your PC. Not to mention the easiest.

Now, for instance, you can enter entire documents (or parts of them) directly into your PC's word processing program. Complete with tabs, indents, underlines, the works.

Without the tedium of retyping. Or reformatting.

Because, with PC Scan, all it takes is two keystrokes. It's really that simple.

IT READS 600 WORDS PER MINUTE.

That's ten times faster than a good typist. Which means you can enter an entire 40-page proposal into your PC in under 30 minutes.

And yet, for all its speed, PC Scan is incredibly accurate. More accurate than the most proficient typist.

What's more, PC Scan even admits its mis#akes. By doing just that. Inserting a pound sign whenever a character isn't clear enough to read.

So if there's ever an error, you can find it and fix it in seconds.

READ INTO IT WHAT YOU WILL.

Think of all the useful information that crosses your desk that you'd like to have in your PC, where you can use it.

Like graphs and charts. Legal briefs. Letters. Logos. Manuals. Memos. Sales reports. Resumes. Proposals. Photocopies. You name it.

PC Scan reads all this and more into many of the popular word processing and graphics programs you already have.

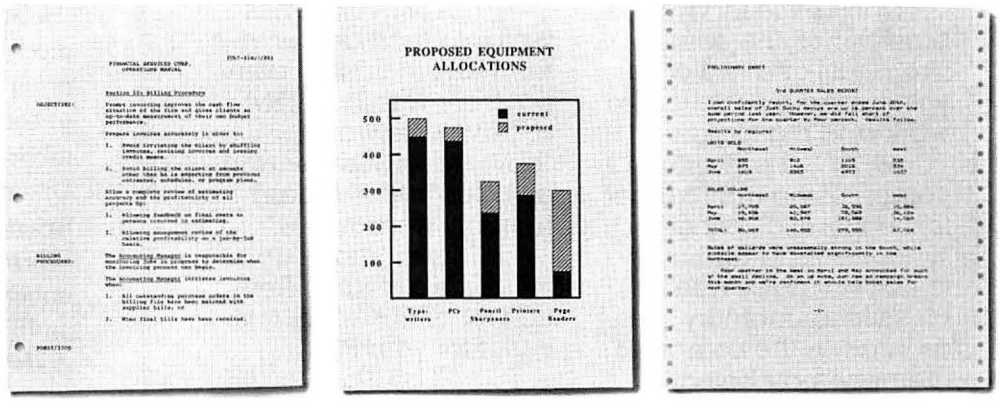
And while this technology may be new to you, it's not new to DEST.

You see, we've been making the leading line of scanners for larger computers for years. And now PC Scan brings that same technology to personal computers at a much smaller price.

IT PAYS FOR ITSELF IN MONTHS.

Read in only a few pages a day, and PC Scan will pay for itself in less than a year.

And yet the bigger payoff is the time PC Scan saves you. Time you can use for more productive things. Like acting on information. Instead of simply typing it.



Whether it's manuals, bar charts, less-than-perfect dot matrix printing or just about anything else you have on paper, PC Scan can read it all into your personal computer ten times faster than you can type it.

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If you'd like to read more about PC Scan or if you'd like to see it read, call the toll-free number below.

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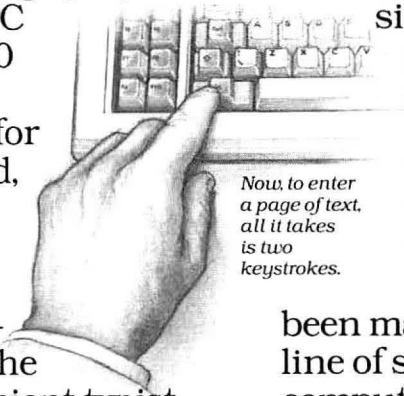

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intervals. Recurring entries cannot be posted automatically, and alarms (a feature of memory-resident calendar programs) are not available.

If you also expect the like-real leatherette organizer and *Traveling SideKick* to work together seamlessly, you're in for another disappointment. The address and calendar printouts are supposed to fit nicely into the organizer, but the program doesn't break the pages to coincide with the organizer's tabbed dividers. Thus Donald Dixon's phone number could easily end up in the ABC section. Worse still is *Traveling SideKick*'s unbearably slow print routine. On an IBM Proprinter in high-speed draft mode, an address book page with 12 entries takes almost 2 minutes to print. If you deal with as many people as I do, let your printer slug it out alone overnight.

Ordering your life via computer is inherently redundant. You typically jot down notes to yourself and later enter them into a program. For a PC-based organizer to succeed, it must minimize the redundancy and provide tools that can truly streamline your life. Until Borland takes this new software genre seriously, I'll leave *Traveling SideKick* at home—and pack the organizer. *—Jordan Breslow*

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(continues)

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THE Spreadsheet:

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- Cut & paste multiple spreadsheets
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THE Wordprocessor:

- On-line help
- Powerful editing: Erase, Copy or Cut & Paste characters, words, sentences, lines, paragraphs, pages, or user-defined blocks of text
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- User-defined page breaks, soft hyphen, tab, indent and margin settings
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THE Name & Address System:

- Up to 6 labels across and 99 labels per name
- Reads A/R customer and A/P vendor files
- Create name & address files
- Print mailing labels
- Sort files by up to 4 items
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- Sort by any character in reference field
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THE Mailmerge:

- Integrates THE Wordprocessor & THE Name & Address System
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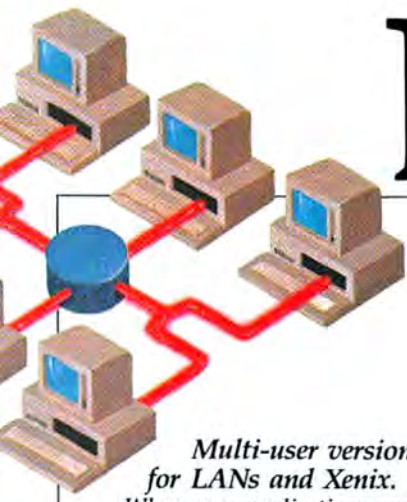

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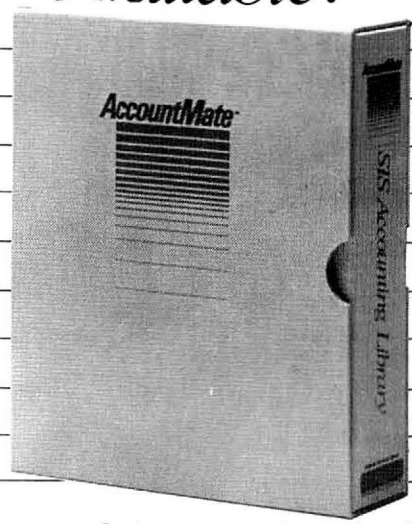

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The idea is hardly new. *Note-It*, from Turner Hall Publishing, securely sutures pop-up notes to *1-2-3* worksheet cells with just a few keystrokes (see *From the Software Shelf, PCW,* March 1986). *SmartNotes'* claim to fame is its ability to attach notes to a spreadsheet, document, data base record, DOS subdirectory, or directory entry (see Screen 2). The downside? A light breeze can blow your notes away.

Creating a note is simple enough: Move the cursor to the desired location in a file, press <Ctrl>-<F6> and <F2>, type in your comment (up to 230 characters), and close the notepad with <Esc>. Unlike *Note-It*, *SmartNotes* doesn't anchor notes to the underlying application, but

(continues)

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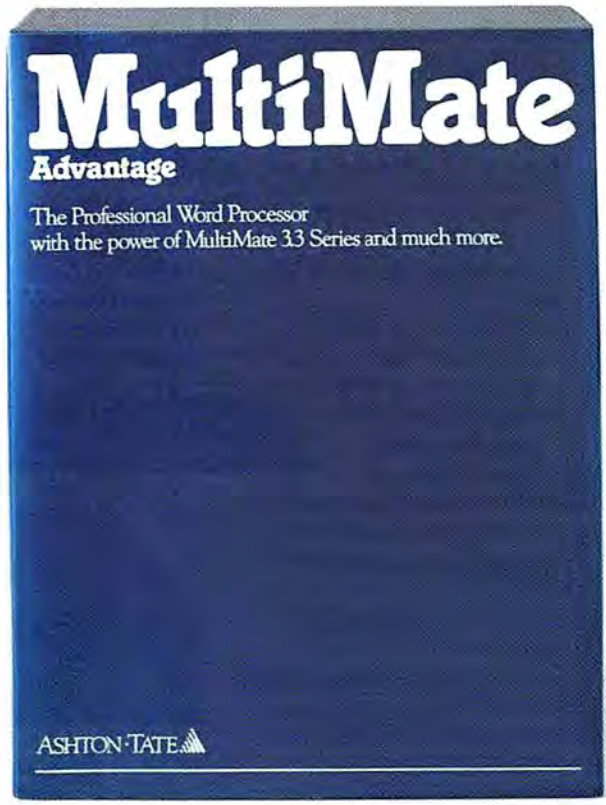

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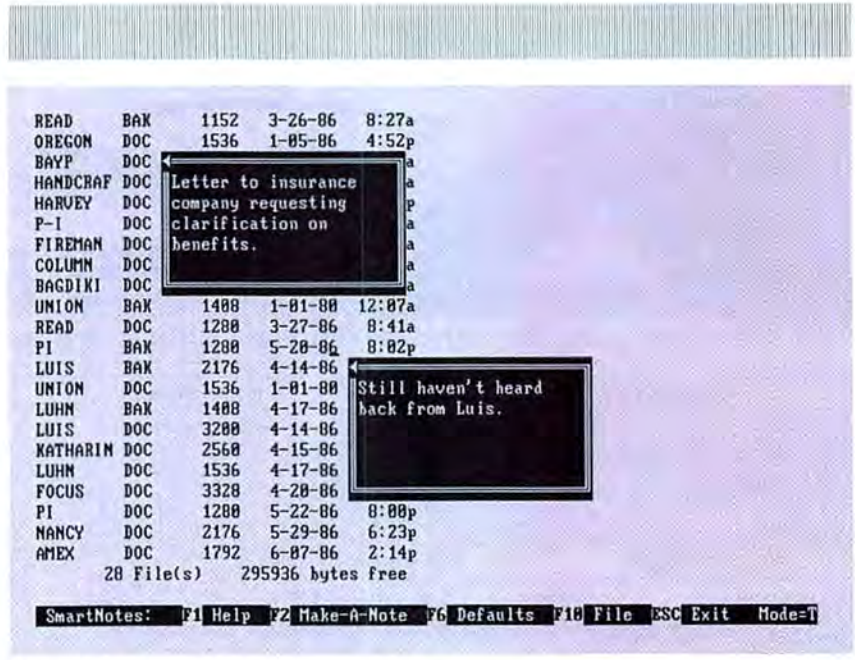

Screen 2: SmartNotes can attach an electronic note to even a directory listing.

glues them in place by recording a "context" of the 47 characters preceding the point of insertion for each note. Notes are stored in a separate file, so you must give *SmartNotes* the file name the first time you record a note. As you skip through your main application's file with <PgUp> or <PgDn>, *Smartnotes* scans the screen for recorded contexts and pops up the appropriate note when it encounters one.

In keeping with their stickum heritage, notes can be pulled up and moved elsewhere in a file. Personics cautions users not to place notes directly on top of one another, but you can overlap them. Notes can also be printed en masse with their contexts and file names. The program works amiably with other memory-resident utilities and can be loaded in almost any order. You can also change the <Ctrl>-<F6> hotkey combination to <Ctrl>-<Shift>-<Home>.

But like a Goldberg contraption, *SmartNotes* is too complicated for its own good, the result of trying to be a jack-of-all-trades notepad. With *WordStar,* for example, you would have to load *SmartNotes,* the document file, and the matching *SmartNotes* note file. If you use *SmartNotes* with a number of documents, spreadsheets, and the like, you've burdened yourself with an additional level of file management.

Tying notes to context presents even greater headaches, because if you edit text with attached notes, the notes are unshackled. You can assign a new context, but this involves running through a tedious series of program prompts. *SmartNote*'s limited talents don't

(continues)

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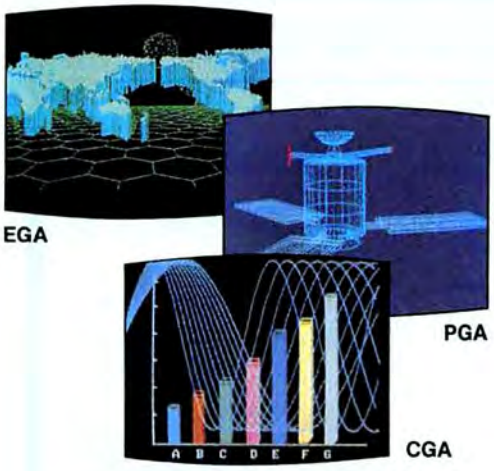

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come cheaply, either: The program requires 90K of memory, and a 140-character note soaks up 4K of disk space.

1-2-3, Symphony, Multiplan, SuperCalc, and *VisiCalc* users will be spared some of these problems because *SmartNotes* grafts notes onto specific cells. Unfortunately, the Goldberg variations continue. As with *Note-It,* a note attached to a *1-2-3* cell hangs on if you delete or insert columns or move the contents of a cell. But if you use one of the other aforementioned spreadsheet programs, this option is not available—you must move the notes yourself.

In short, unless you're willing to put up with an extra level of housekeeping and the potential of lost notes, *SmartNotes* is more of a hindrance than a help. If you need a *1-2-3* notepad, stick with *Note-It.* For the rest of us, it's back to *SideKick*'s notepad until somebody does it right. *—Patrick Marshall*

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but rather works on the files after they've been captured from a mainframe. Where *MacroPIK'r* shines is in paring huge files (in chunks as big as 2MB) and quickly formatting them for your favorite PC program. *MacroPIK'r* isn't restricted to mainframe files, either; the program can just as easily consolidate large PC-created files and convert them to any supported format.

The process is not totally automatic; *MacroPIK'r* casts files in popular data interchange formats rather than native formats such as *dBASE*'s .DBF. Thus, the program produces DIF-formatted files that can be used by *VisiCalc*, SYLK files for *Multiplan*, unadorned ASCII files for *WordStar*, and comma-delimited data for *dBASE* and *SuperCalc*. Most programs can digest data in one of these formats without a hiccup, although in the case of *dBASE* you must use the APPEND command. However, *MacroPIK'r* wisely transforms files directly into *1-2-3*'s .WKS and *Symphony*'s .WRK formats. (A soon-to-be-released version will also handle .WK1 and .WR1 formats.)

To convert all or part of a file, you browse through it with a mouse or a combination of cursor and function keys, mark the data to be formatted, and cut-and-paste it to a special work area where rows, columns, cells, and blocks of text can be juggled and trimmed. *MacroPIK'r* simplifies navigating through large files by displaying a small map of the entire file in the lower left corner of the screen. If the top third of the map is gray, you are viewing the top third of the file. The map is also active—indicate (or point to) any place on the map, press <Enter> (or click a mouse button), and that section of the file is displayed. Once you're satisfied with the arrangement of the file, *MacroPIK'r* will save it in the desired format.

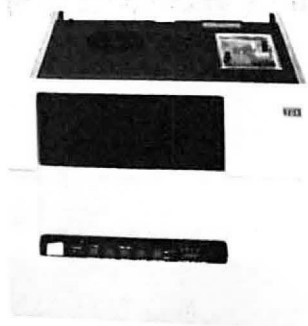
If you whack up large files frequently, you can automate much of the process with *MacroPIK'r*'s

(continues)

Telebyte Tape Drives

TDX Mag 9-track 1/2" Tape Systems from Telebyte provide faster, error-free downloading of mainframe data into your PC. You control the start-stop tape drive either from the keyboard or with Telebyte's exclusive Dataverter software for faster file transfer — the equivalent of a 720,000 bit/second datalink.

Telebyte TDX tape drives are available at either 45 or 75 ips, feature dual density (800/1600 bpi) storage and back up processed files at 2 MB/minute (up to 10 times faster than other 9-track drive systems) as a bonus.



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Circle 262 on reader service card

TEXAS INSTRUMENTS
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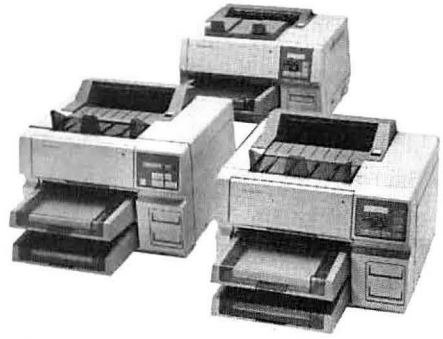
AD ANTAGE

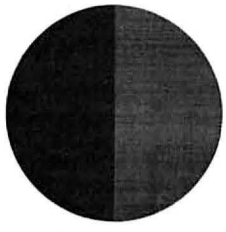
TI's new OmniLaser™ page printer can turn your PC into a desktop publishing system.



Combined with the right software, you can now have a publishing house right on your desk top.

If you have a personal computer, you are ready to get started. TI's OmniLaser with any IBM®-compatible, Macintosh™, or virtually any PC, and the right software, can help you eliminate costly typesetting, outside design work and printing. At 300-dots-per-inch resolution, the difference between laser printing and daisy wheel or dot matrix is more than mere improvement. It's light years ahead.

The OmniLaser Series 2000 family from Texas Instruments is available in three desktop models designed to address workstation and shared-resource environments at 8 and 15 pages per minute, respectively. Both the 2108 and 2115 feature the PostScript® page-description language, which allows full integration of text, graphics and scanned images on a single page. Your business communications will be more eye-appealing and carry more credibility. And the Model 2015 was designed to handle text and business graphics in a shared-resource environment. All three OmniLasers, with their standard interfaces and emulators, allow you to take full advantage of your present business computer applications, as well. And they'll give you unparalleled resolution in both text and graphics. Blacks are black, whites are white, and you control the shades of gray.



Ours Theirs

The OmniLaser uses the direct positive-imaging exposure process as opposed to the reverse-imaging exposure process used by many other laser printers. The difference, as shown above, is obvious.

Overall, TI's second-generation laser printers offer up to 10 times the duty cycle, 15 times the machine life and 5 times the paper capacity offered on their first-generation counterparts. These advances, coupled with lower maintenance cost and user-replaceable consumables, significantly reduce the costs of ownership. In fact, at pennies per page, the OmniLaser's per-page cost is among the lowest in the industry.

TI OmniLasers and the power of PostScript.

PostScript is the page-description language that drives OmniLaser Model 2108 and 2115 printers to their full capabilities, including rotated type, textures, patterns, halftones, images in any size and shape, and a wide variety of typefaces. Each font has one definition that is used as the basis for any point size. You have complete control over the size and positioning of your text and graphics. PostScript also has built-in commands for point specification, circular arcs, curves, etc. You can perfect your text and graphics on your OmniLaser and PC, and then take your original to a high-quality production facility and skip all the headaches of mechanical assembly. Whether you're composing newsletters, product data bulletins, ad proofs, business presentations, technical manuals, or any type of document, you'll find that with the power of PostScript, you are only limited by your imagination.

OmniLasers. They bring power, flexibility and affordability to the world of desktop publishing.

Turn your desk top into a publishing house. For more information on the new OmniLaser 2000 Series page printers from Texas Instruments, call toll-free **1-800-527-3500.**

TEXAS INSTRUMENTS

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PostScript is a registered trademark of Adobe Systems Incorporated.

Learn mode, which records cursor movements, commands, and other keystrokes and stores them in a special file. To rerun a session from start to finish, you merely play back this macro. You can modify the macro and use it in another edit session by replacing file names, cell coordinates, and other parameters.

Whether you need *MacroPIK'r* depends on how often you download gargantuan mainframe files—and on whether your spreadsheet or data manager can read mainframe files unassisted. If whittling and converting large mainframe and PC files are your biggest concerns, *MacroPIK'r* may be worth the investment. But keep in mind that an extra $50 buys *Infogate,* a capable micro-to-mainframe communications package that offers everything *MacroPIK'r* does and then some (see "Painless Extraction," *PCW,* July 1986). As it stands, *MacroPIK'r* is a pricey solution for a very limited problem.
—Wayne Rash

MacroPIK'r version 1.3
Samkhya Corp.
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P.O. Box 142
Petaluma, CA 94953
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The Printing Press

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(continues)

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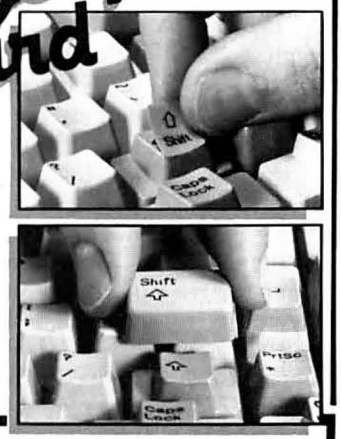

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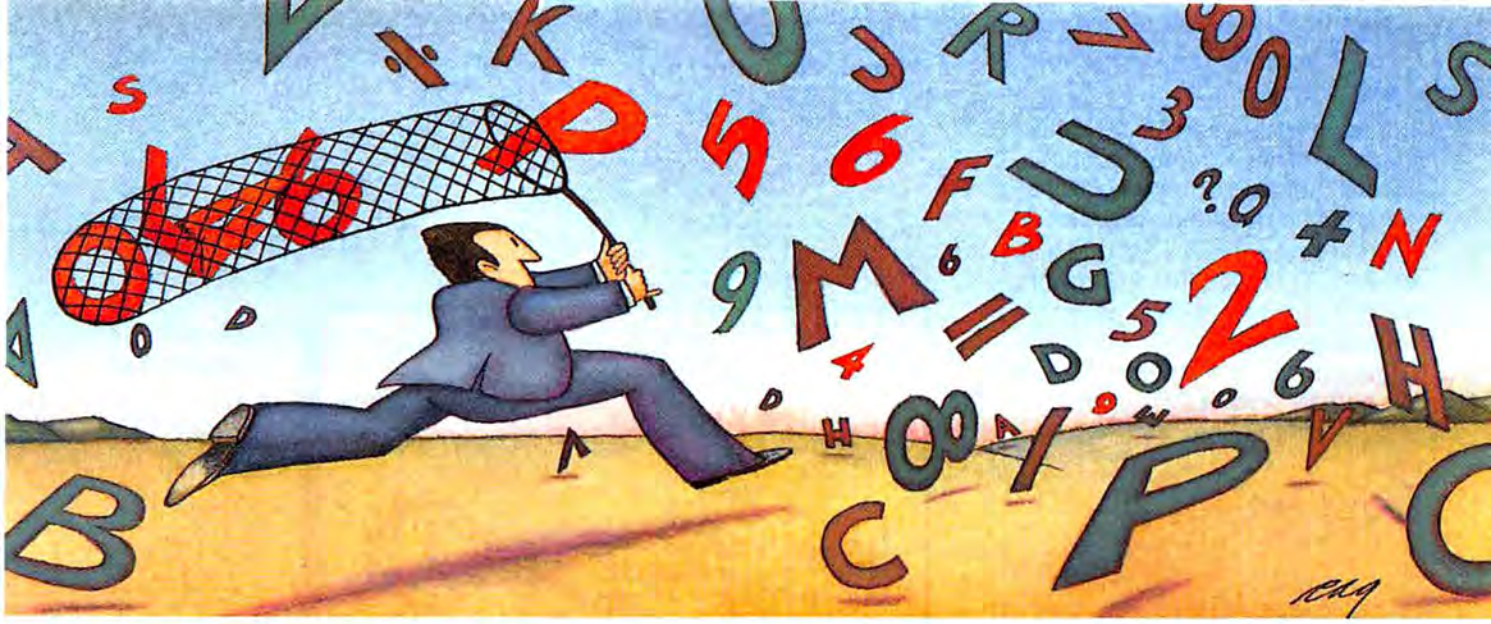


PROBLEM: The more experience your hard disk has, the harder it has to work.

THE SOFTLOGIC SOLUTION: Disk Optimizer™

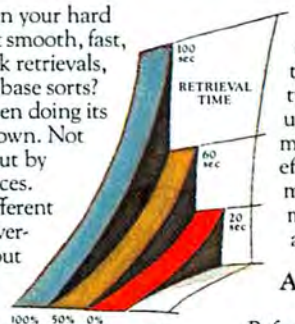
Your hard disk will run faster when it's not chasing around after files.

Remember the old days when your hard drive was new? Remember that smooth, fast, slick performance? Those quick retrievals, rapid saves, lightning-like database sorts?

Well ever since, DOS has been doing its best to slow your hard drive down. Not by slowing down the motor, but by breaking your files up into pieces. Storing different chunks in different places. Data files, programs, overlays and batches that started out in one seamless piece are now scattered all over.

Loading is slower. Sorting is slower. Retrieving, backing-up. Everything takes longer because your disk has to work harder.

Problem is, it's something that happens so gradually you may not notice the difference. At least, not until you see the dramatic improvement after using Disk Optimizer.



The more fragmented your files get, the longer they take to retrieve.

File fragmentation—It's a problem you can see.

Watch your hard drive the next time it reads or writes a file. Each "blip" of the LED means the drive-head is moving to another place on the disk—either to pick up or lay down another chunk of data.

And the truth is, head movement takes time. Far more time than actual reading and writing. What's worse, all this head movement causes extra wear and tear that can shorten the life of your drive.

Disk Optimizer—Tunes up your disk by cleaning up your files.

Disk Optimizer works by finding all the scattered pieces of your files and putting them back together where they belong. Next time your drive reads it, there's just one place to look.

And the results are often dramatic. Reading and writing times may be cut by as much as two thirds. Database sorts that used to take hundreds of head moves now proceed quickly and efficiently. And since head movement is now at an absolute minimum, your disk drive will lead a longer, more productive life.

Analyze, scrutinize, optimize.

Before you optimize, you'll probably want to analyze. So Disk Optimizer shows you, in percentages, how much fragmentation has taken place—on the entire disk, in individual directories, or for groups of files you specify using global or wildcard names.

Plus, there's built-in data security that lets you assign passwords to as many files or file groups as you want.

And the File Peeker gives you an inside look at the structure of files. It's a great way for non-programmers to learn more about computers, and a powerful tool for professionals who want to analyze the contents of their disks.

Get your hard drive back in shape—at a special low price.

When you think about it, it's simple. The longer you own your hard drive, the more you come to depend on it. But the longer you wait to get Disk Optimizer, the less performance you'll have.

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Circle 78 on reader service card

Channelmark's wit-on-a-disk may unleash your muses—and elicit groans far and wide.

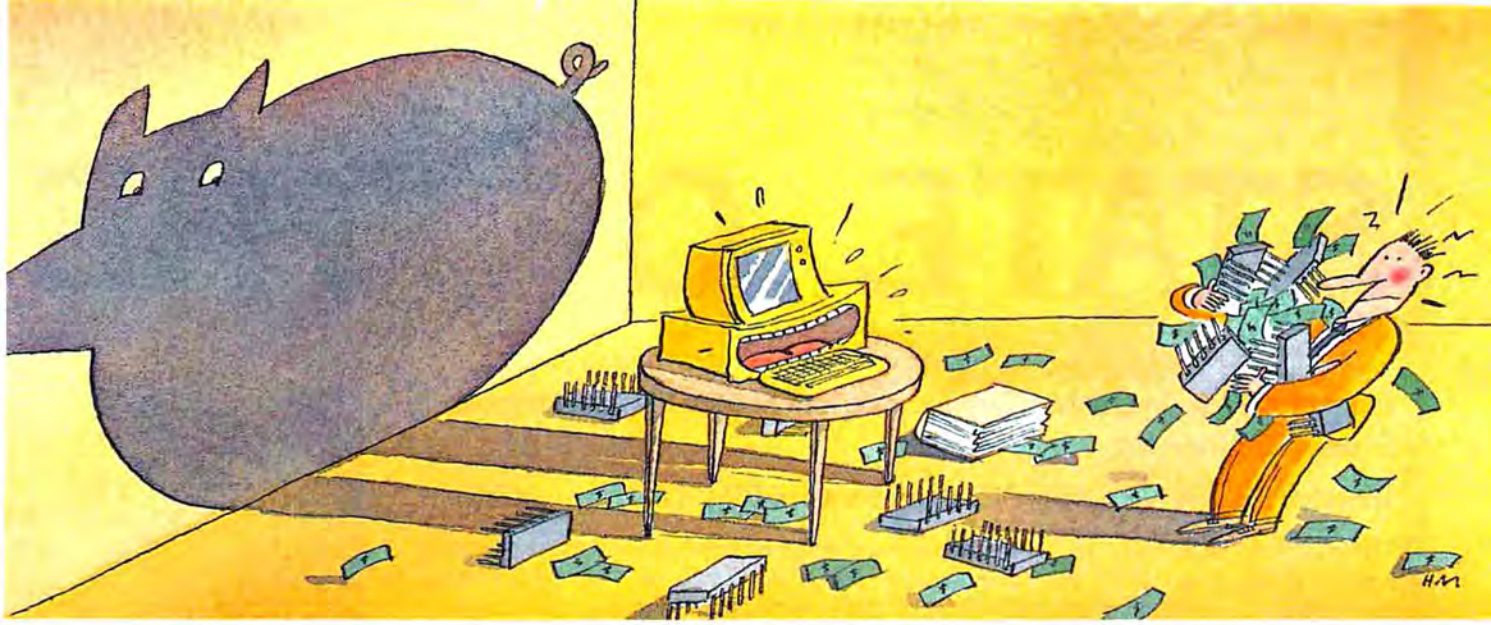
guffaw. No longer will this wag have to draw his hilarious cartoons painstakingly by hand, for now there is *The Printing Press,* the graphics workshop on a disk.

Although designed to churn out greeting cards, posters, and letterheads, *The Printing Press* will instead, I'm afraid, unleash a deluge of "You want it when?" cartoons in offices across the country (see Figure 1).

The program comes with 122 pieces of clip art. Three optional disks supply, respectively, 140 pieces of grab-bag art, 100 business illustrations, and 100 travel-related images, such as a map of the United States and a likeness of the Taj Mahal. *The Printing Press* offers eight fonts, with optional outline, 3-D, checkerboard, and textured effects and 11 background and border designs that can heighten the program's sometimes unintentional comic effects.

Documentation is provided on disk, but there is little reason to read it. By simply following the program's menus, I created my first poster in about 15 minutes. Selecting and placing clip art on a page is a matter of flipping through on-screen images, choosing one by pressing <F10>, and

(continues)



PROBLEM: Most concurrent processing systems take everything you've got, and give back very little.

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Look at products like TopView™ or Windows.™ Not only do they cost a fortune, they take gobs of RAM and half a lifetime to learn. Worse yet, they don't even run much software. And what they do run is slow.

$49.95 DoubleDOS $99.00 Windows $175.00 TopView

DoubleDOS costs less and consumes less RAM than other well-known systems.

So why not get DoubleDOS instead? It's the easy, economical, memory-efficient system that runs all your PC programs, and runs them two at a time.

With DoubleDOS, you can sort a database at the same time you write a memo. Print a spreadsheet while you update accounting. In fact, do almost any two things you want with the software you already have. Best of all, DoubleDOS is fast and simple to use. So you'll be running it in a matter of minutes.

Here's all you need to know to run DoubleDOS.

Unless you know all about .PIF files, interrupt vector swaps and the like, you won't exactly breeze through the set-up procedures for TopView and Windows. Not like DoubleDOS. Just tell it how to divide your memory, and that's it. You're ready to load and run your software right from that familiar DOS prompt.

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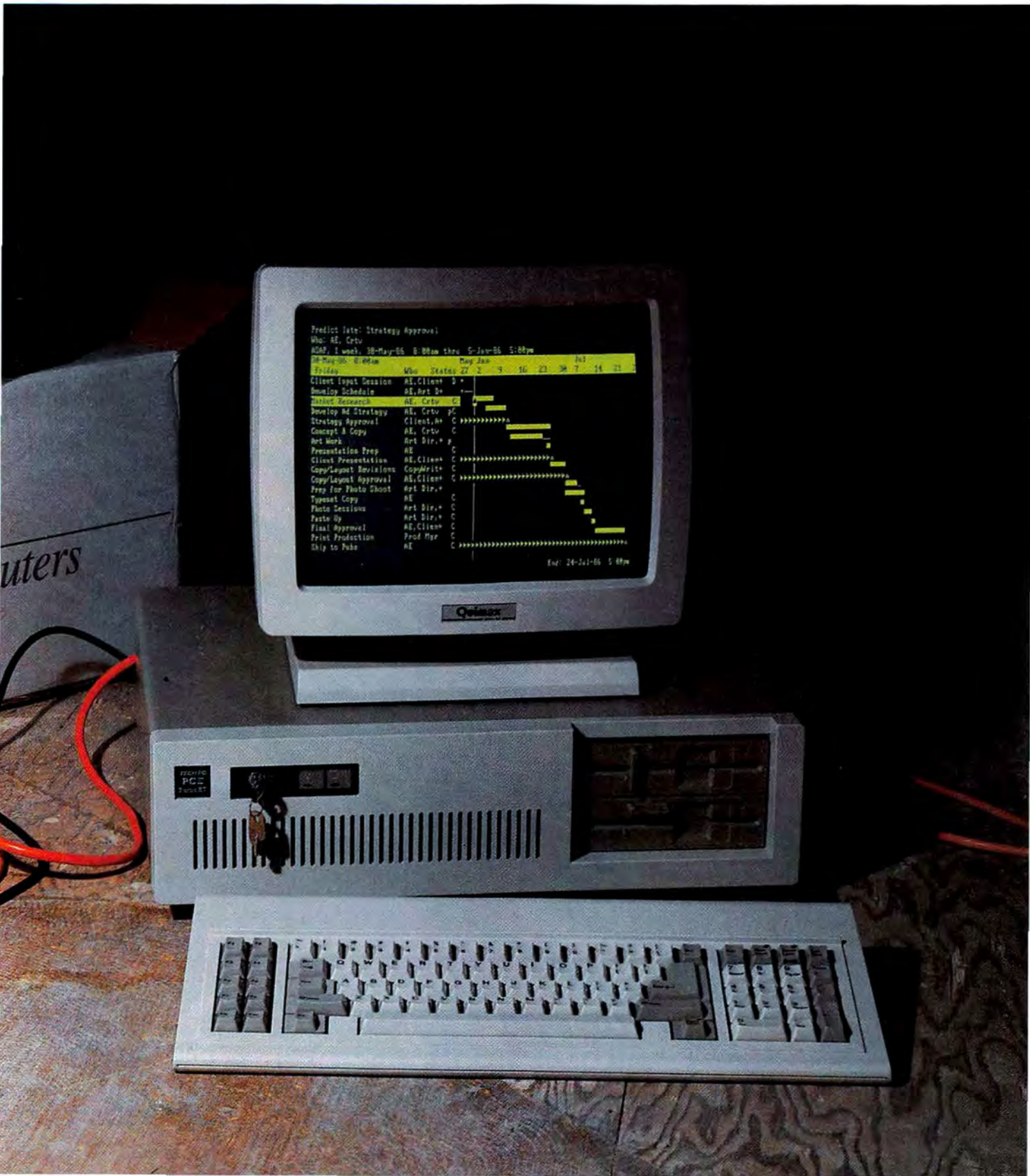

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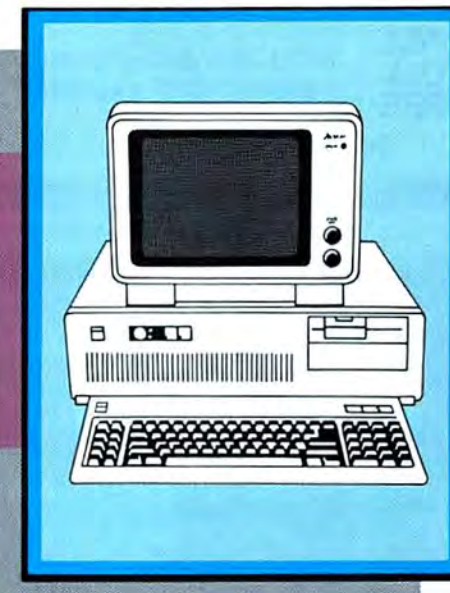

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placing it in one of the spots preordained by the program. Printing is equally simple but not particularly swift; rolling a page out of *The Printing Press* usually takes 3 to 4 minutes. The program supports a large number of dot matrix printers from IBM, Epson, Okidata, C. Itoh, IDS, NEC, Toshiba, and Star Gemini. Laser printer support, however, is conspicuously absent.

Simple as *The Printing Press* is to operate, it has its drawbacks. The fonts and clip art are sharply resolved on screen but look decidedly jagged and amateurish on the printed page. The program always centers text on the page, limits a page to two pieces of art, and confines graphics to set locations. Yet if you're careless, text can easily obliterate art, and vice versa.

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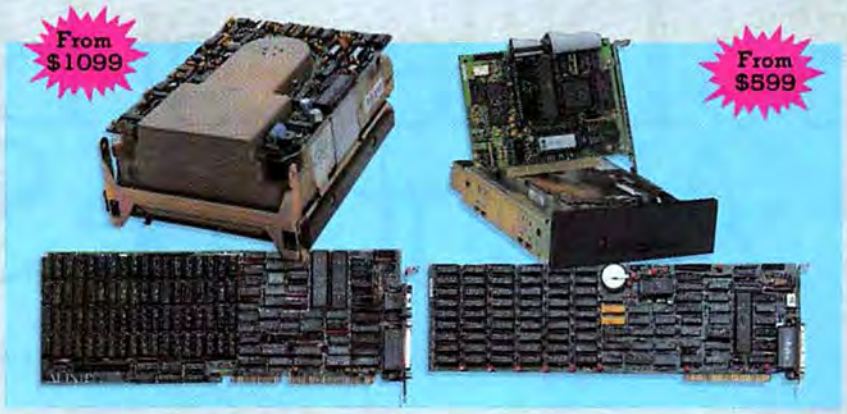

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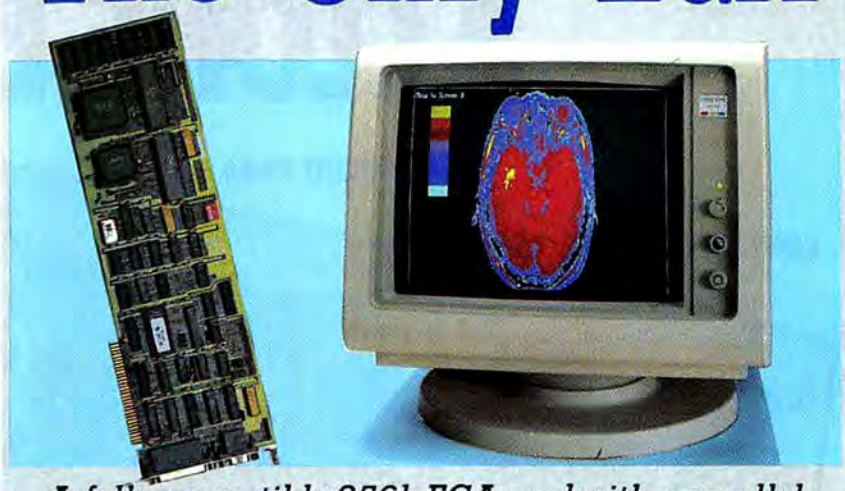
The program's graphics presentation and interactive approach also set it apart from much of the software training crowd. Individual Software has managed to present the key concepts of a somewhat arcane discipline in a manner that no textbook or classroom chalkboard can duplicate (see Screen 3). For example, not only does the program cogently discuss resource histograms (charts that depict allocation of workers, materials, and other resources over time), it allows you to view the effect on a displayed histogram as you change various resources. Similar experimentation with on-screen network charts, work-breakdown structures, Gantt charts, calendar schedules, and time/cost analysis charts demonstrates vividly the practical utility of this otherwise impenetrable discipline.

The entire tutorial can be covered in as little as 2 hours, but those still wrangling with the vocabulary and concepts of project management would do well to linger over each of the ten sections and take several days to absorb the cumulative information. Each section includes fill-in-the-blank and multiple-choice quizzes to reinforce new information, and wrong answers result in gentle and not-so-subtle hints from the program. If you are at least passingly familiar with the central principles of project management, you can skim through the introductory material and take your time with the more advanced lessons.

(continues)

The Only EGA



A fully compatible 256k EGA card with a parallel port for only $259. If you buy any display card: Color, Monochrome, Hercules, or EGA, without reading this ad, you're probably throwing away a lot of money.

BT/EGA Enhanced Graphics Adapter: 256k of memory, and parallel printer port. Works with all standard IBM displays, and compatible displays.
5150 Monochrome Display: Both text and 640x350 bit mapped graphics
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This really is the only display board you may ever need. Regardless of what monitor you buy today, this card is a clear upgrade path for the future, and the best choice today, even if you are only going to use a Monochrome Display. This means one board today does monochrome 640x350 bit mapped graphics and text, and provides a clear upgrade path to 640x350 Enhanced Color Display with no change of display board. It also runs with the 640x200, 320x200 Color Display.

Killer Features

All boards come with a full 256k of memory, and a parallel printer port. That means no extras for later, and 16 simultaneous colors displayed from a palette of 64 colors, and crisp clear text on both Monochrome and Enhanced Color Displays - features or options that are not available on other EGA boards. Since all your current software will run, you're set for today, and prepared for the standard of the future.

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Of course many of you will want to take advantage of the EGA card right away, so we are offering a special deal when you buy the board together with a Basic Time HR 31-350 monitor - you get both for just $749, or the card only for $259. This means that you can equip all your PC's now and in the future with displays and EGA cards and get the Qubie' "No Risk Guarantee", our one year warranty, and 48 hour turnaround on warranty repairs. The price is the whole price, there are no extras for freight, insurance, or credit cards.

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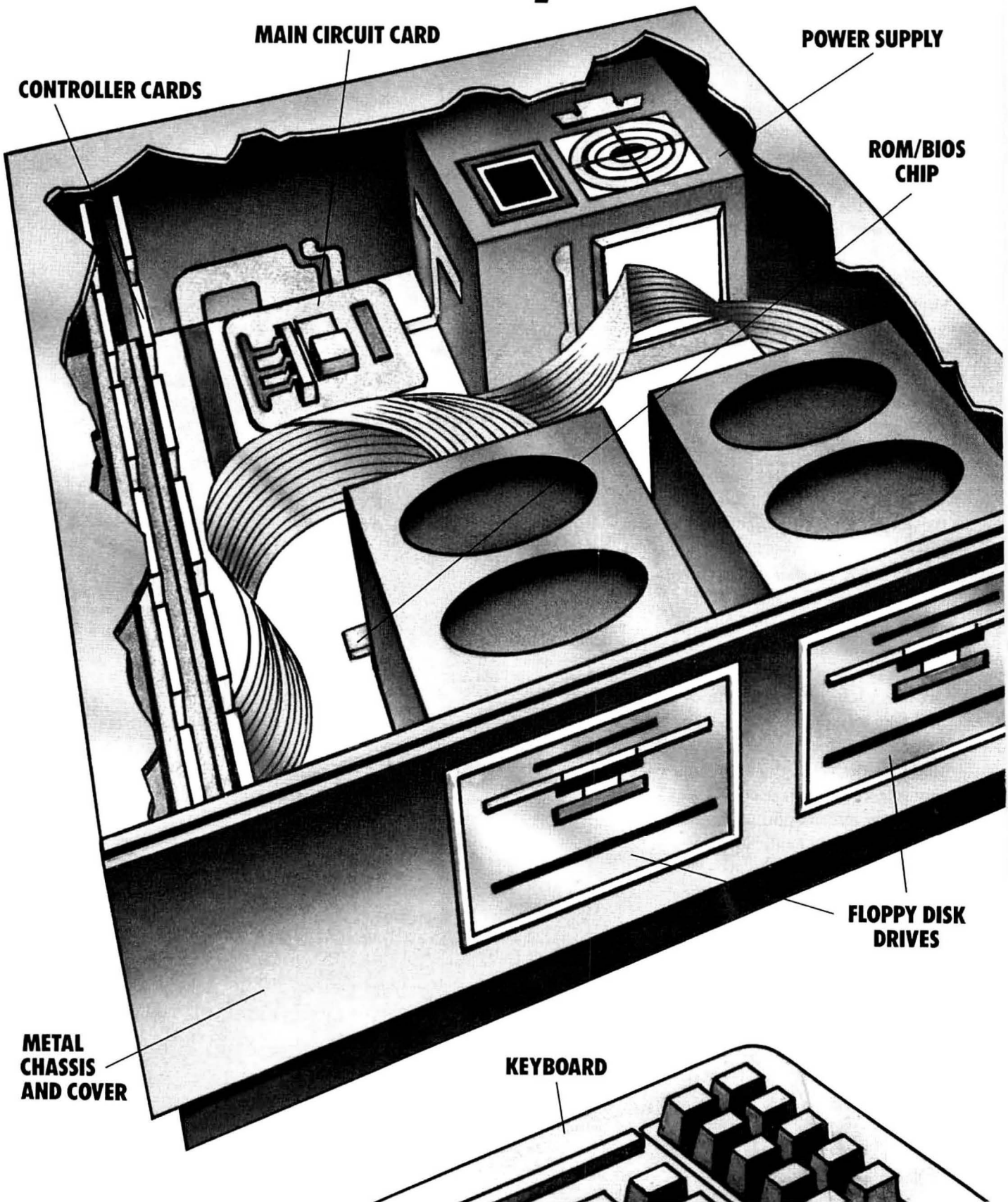

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The result is the Panasonic Business Partner and Panasonic Business Partner 286. Two powerful business allies, designed to answer your most demanding computer requirements.

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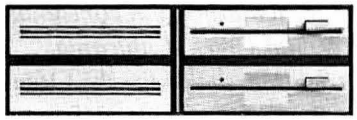
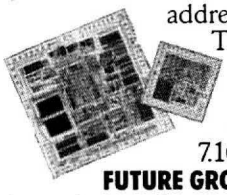
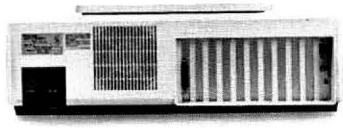


SPEED AND PERFORMANCE. The Business Partner 286 is built with maximum power and speed. Its 80286 processor runs at 6 MHz or 8 MHz, with the ability of addressing up to 15Mb RAM.

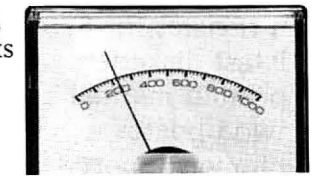


The Business Partner, with its 8086-2 processor, runs at 4.77 MHz, and for projects that need added acceleration, it will run up to 7.16 MHz.

FUTURE GROWTH. Both Business Partners have been designed to grow as your business grows. Extra slots are built in to offer you the flexibility—now and in the future—to add on cards for high resolution graphics, communications accessories and other peripherals.



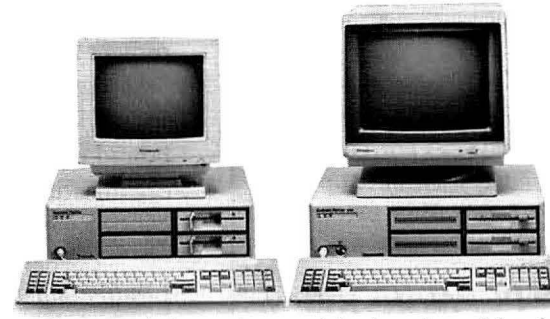
POWER TO SPARE. As your business grows, you'll put greater demands on your Business Partner. Don't worry, it can handle it. With 130 watts on the Business Partner and 220 watts on the Business Partner 286, you'll be able to drive additional peripherals and expansion boards.



IMPORTANT DESIGN CONSIDERATIONS. The deluxe, detachable keyboards on both models have been designed for comfort and ease of use. We've separated the cursor keys and numeric keys for quick, convenient access. Swivel monitors adjust for each operator. On the Business Partner 286, you can lock the cabinet with a key to help prevent tampering and prying.

SOME REASSURING LAST WORDS. You'll find the Business Partner compatible with the IBM* PC/XT. And the Business Partner 286, with the PC/AT. So you'll be able to run the most popular software. You'll also get compatibility with Panasonic's wide range of quality peripherals, for the complete Panasonic office.

And more importantly, both Business Partners are from Panasonic, the company firmly committed to building a high-quality and dependable reputation in computer products. So both are backed with a full-year limited warranty.



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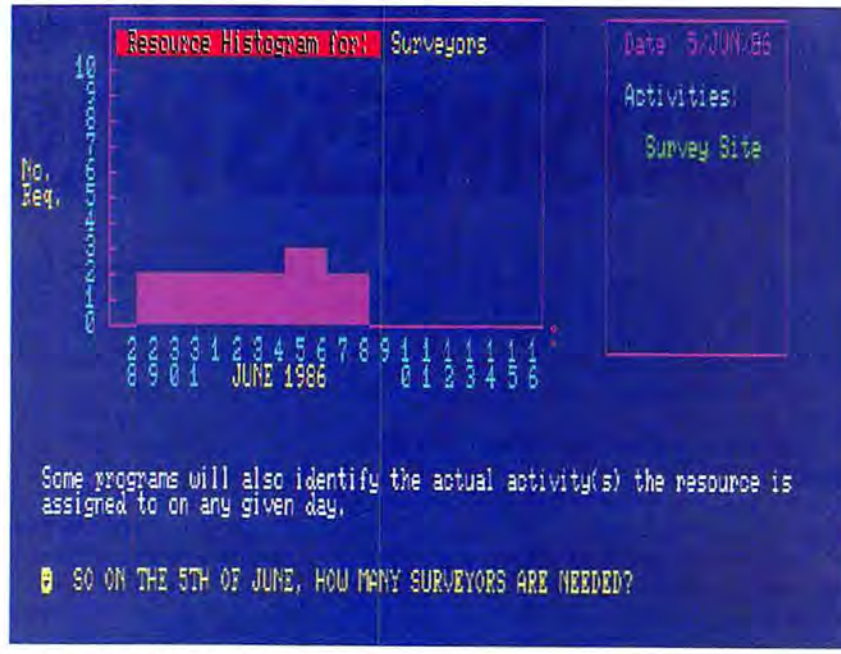

Screen 3: Individual Software's hands-on tutorial lets you experiment with a histogram and see the results.

By the time you graduate, you'll be anxious to get your hands on some real project management software. By revealing the common sense behind those mysterious PERT and Gantt charts, resource leveling, and the critical path (the yellow brick road of project management), *Individual Training for Project Management* should lure even the most hidebound anarchist into the folds of organization, efficiency, and control. *—Jon Stewart*

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Jordan Breslow is an attorney and legal automation consultant in Walnut Creek, California. Patrick Marshall edits the Opinion Page of the Oakland Tribune. *Wayne Rash is a freelance writer and a microcomputer and office automation consultant to the federal government. Berkeley writer Jason Durbin specializes in desktop publishing. Jon Stewart is an editor with the* San Francisco Chronicle.

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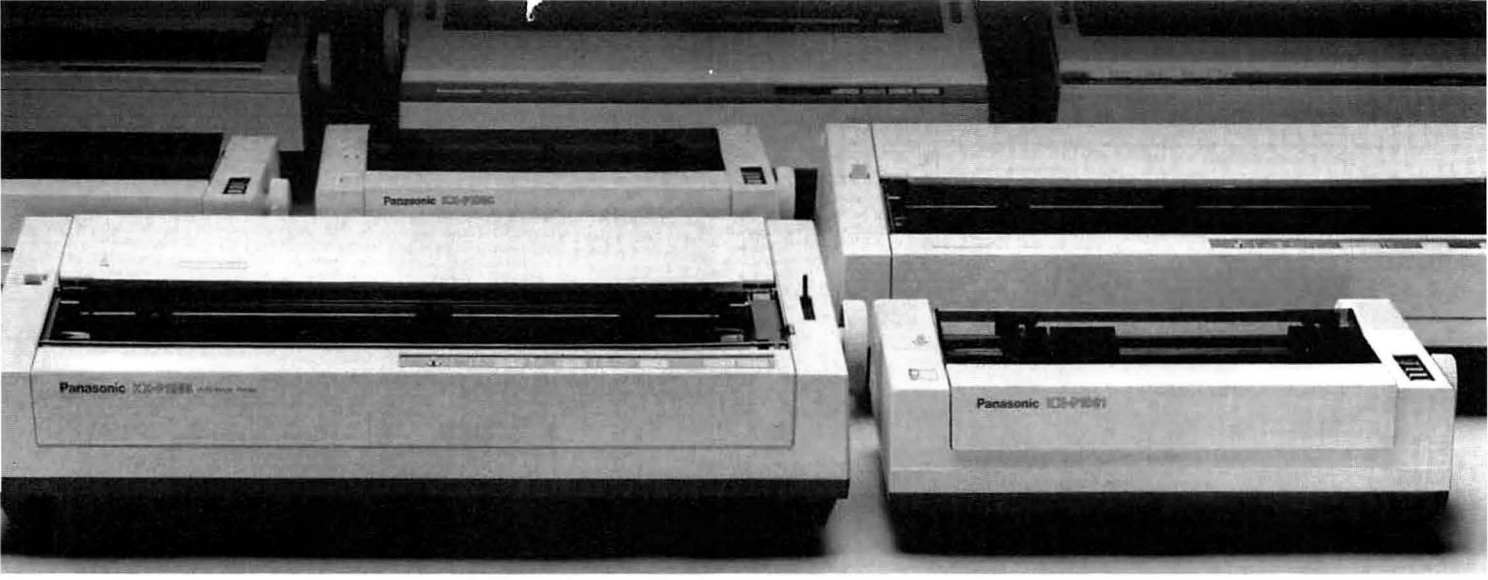

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But that shouldn't come as too big of a surprise. After all, Panasonic printers offer the advanced features and ease-of-use you've come to expect from Panasonic.

> ...their ...petition, the Panasonic machines are well made, sturdy printers that should serve well in the various applications for which they were designed. ... letter-quality text. About the ...
>
> **PC WEEK—JUNE 17, 1986**

So, whether your business is big, small or in-between, you'll find a printer with features to love every bit as much as the critics. Like—as one reviewer observed—extraordinary near-letter-quality on our dot matrix models. They also come standard with impressive high-resolution graphics capability. So you can add graphs, charts, illustrations—even your company's logo.

> ...with this little ...nter.
> As far as I'm concerned, the KX-P1091 produces not near letter quality but rather true letter quality in this mode. You'd really have to strain to distinguish it from typewriter quality. Knowing that the ... output ... to the company produced fast, courteous, and knowledgeable answers.
>
> **PC—SEPT. 17, 1985**

Not to be outdone, all our daisy wheel printers give you sophisticated advances like boldface, shadow and underline.

Of course, we've put just as much care into the human side of our printers, too. You'll find switches and buttons that let you change print sizes and styles right on the printer rather than through the computer. And, with our continuous, self re-inking ribbons, you'll find yourself changing ribbons less often. When you do, our snap-in cartridge makes it a snap.

> ...ance of the KX-P3151. It is a well-built product that promises to deliver many hours of trouble-free operation. The print quality is clear and well-defined. The alignment of characters on adjacent lines is also excellent, a sign of a well-designed paper and printwheel transport system.
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> ...gns 30.1 pounds. Like all the Panasonics we tested at, the 1592 comes with the company's exceptional two-year warranty. And like all of them, it definitely rates a look.
>
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And you'll agree: **THE EASIER, THE BETTER.**

Panasonic
Office Automation OA

Circle 588 on reader service card

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It happens all the time: your entire office staff is having a "get-together" by the printer. And if you haven't found the solution to this bottleneck yet, it's time you got the connection: The Logical Connection.™

No more slow-downs.

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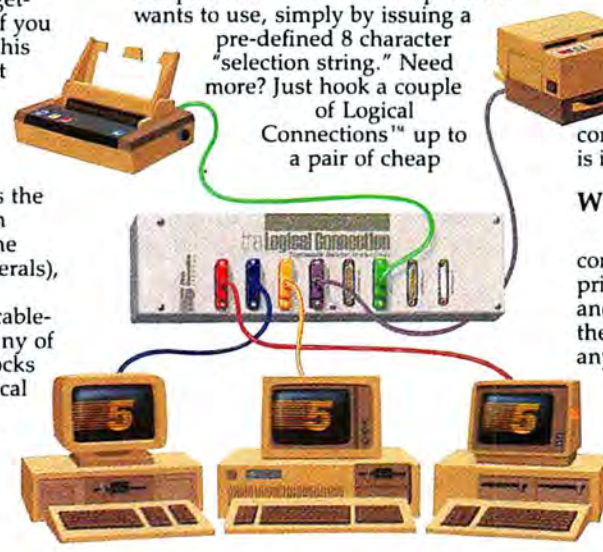
What if your printers and computers are strung out all over the building? No problem, because you can "daisy-chain" up to 45 Logical Connections™ together. Over a single twisted-pair wire like telephone wire (which, by the way, you probably already have *wired* all over the building). And each computer can choose which printer it wants to use, simply by issuing a pre-defined 8 character "selection string." Need more? Just hook a couple of Logical Connections™ up to a pair of cheap modems and let a roomful of computers talk to a roomful of printers across the country . . . or across the world.



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If you want to run a parallel daisy-wheel *and* a serial laser printer from the same computer port, no problem. And if two devices have different handshaking, baud rates, word lengths, or parities, The Logical Connection™ will do all the conversions for you *automatically*, whenever they're needed. And it will never forget your configurations, because its memory is in battery-powered RAM.

Why fight it?

So if you'd like to give *all* your computers instant access to *all* your printers (and plotters and modems and whatever else you'd like to hook them up to), *all* the time, why fight it any longer? Make the switch. Get The Logical Connection™ at your leading computer dealer today, or order direct from Fifth Generation Systems.

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From within almost any program language or application program. When the user makes a menu selection, a sequence of keystrokes is sent to the running program as if the user were typing it at the keyboard.

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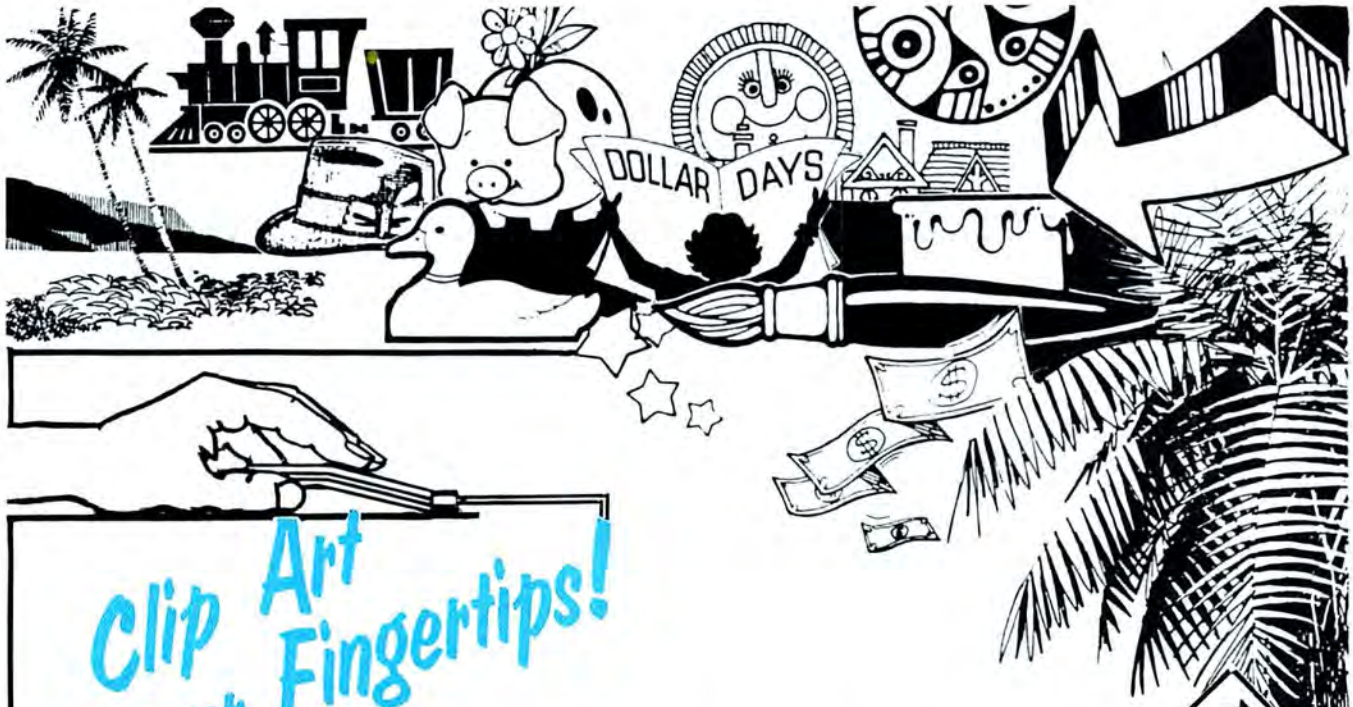

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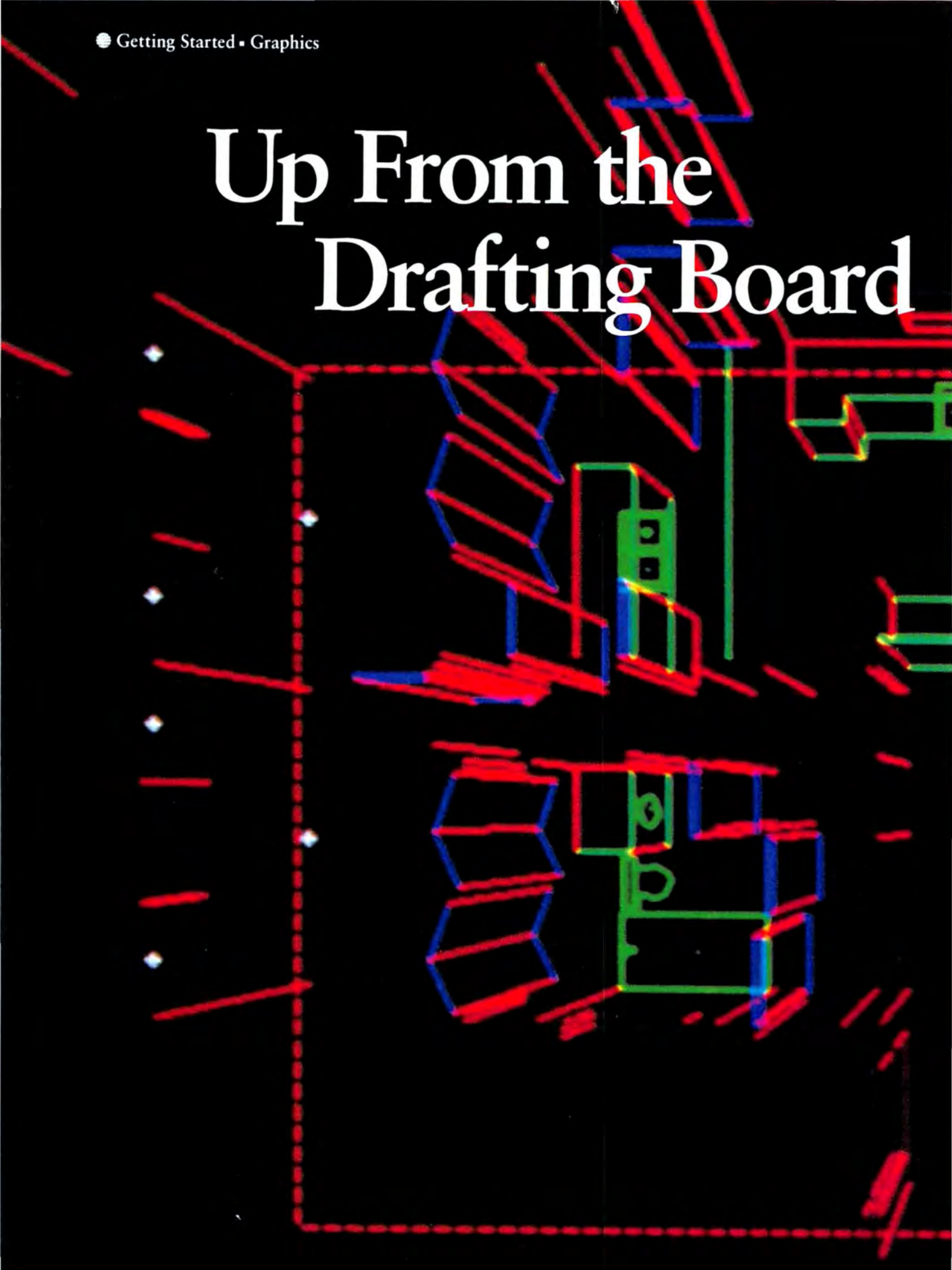
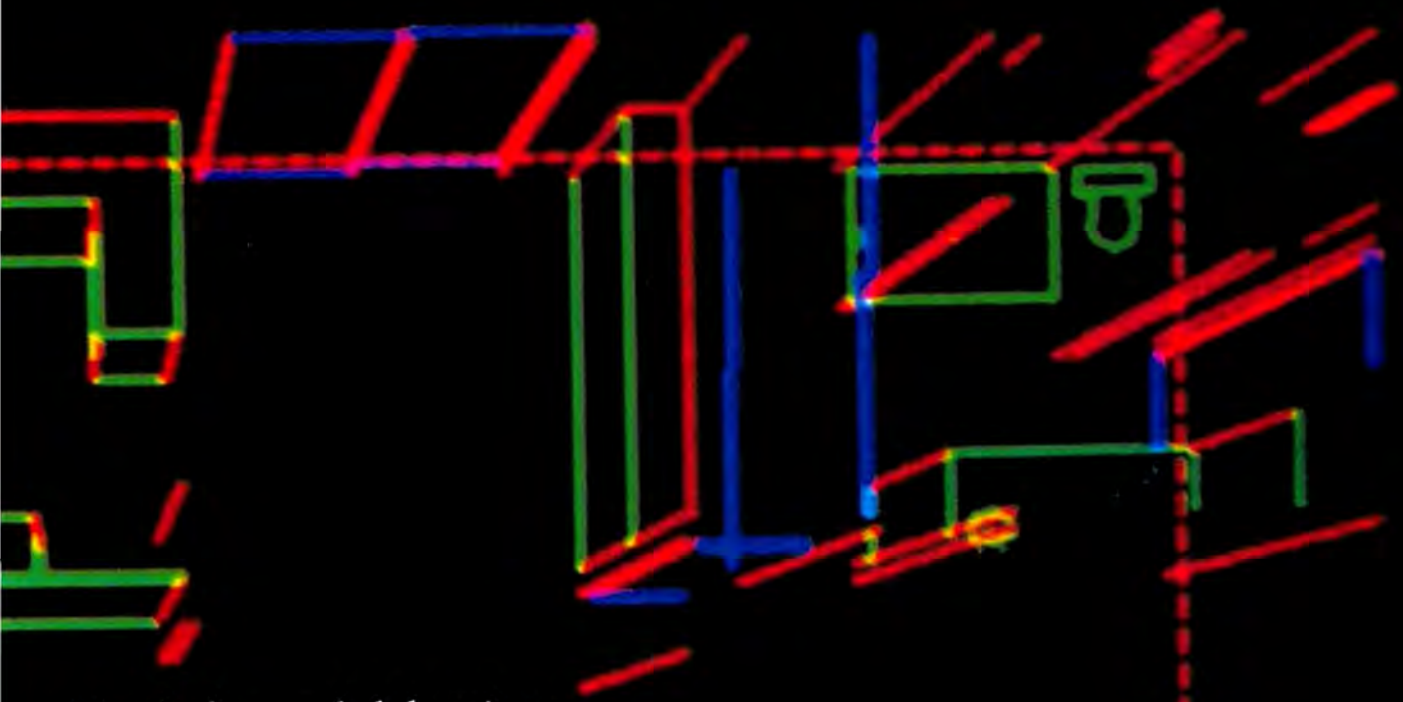
Up From the Drafting Board





Tired of crumpled drawings, jammed flat-files, and tedious change orders? A well-designed CAD system can streamline operations and lend small companies a competitive edge.

Steven Lord

If you manage a small design firm and you've been weighing the costs and benefits of automation for a while, now's the time to make the change-over to computer-aided design (CAD). Faster, cheaper computers and vastly improved software have lowered the price of an effective PC-based CAD workstation to between $3000 and $15,000. At the same time, increasingly tough foreign competition in engineering and manufacturing is forcing managers to look seriously at automation to reduce costs and improve quality. Faced with these converging trends, thousands of small mechanical and architectural design firms are mothballing their drafting boards in favor of PC-based CAD systems.

Photo courtesy of TCB Systems, Inc.

CAD offers a truckload of advantages over traditional hand drafting and layout, including shortened development cycles and vastly reduced documentation costs. Naturally, the degree to which your company can profit from these benefits depends on the type and volume of work, your organizational structure, and the specific combination of software and hardware you select.

Like any other substantial shift in work routines, switching from manual to automated CAD procedures has its complications. Aside from initial hardware and software expenses, you can expect to spend considerable time and money on system setup and operator training. Hardware glitches and major operator errors are common in the beginning, so it's wise to make sure that important designs have a hard copy backup during the transition phase. Careful planning and the help of an experienced dealer can help minimize losses, but don't expect perfection on the first try. For most CAD programs the learning curve is steep, and you can expect that the new system will slow you down rather than speed you up for at least a few weeks.

CAD Lends a Hand

At the conceptual stage of a project, the benefits of CAD are fairly limited—the groundwork primarily involves thinking, rough sketching, and calculating. Most CAD systems can't assist with these activities, although some packages provide useful links to computation-intensive engineering programs, such as those designed for finite-element analysis.

As you get into detailed layouts and part designs, however, CAD's drawing accuracy and flexibility become major pluses. Because layouts and part drawings are always perfectly to scale, you can easily detect dimensional errors, interferences, and misalignments. Depending on the power of the system and the operator's skill, detailing can be accomplished in half the time it would take on the drafting board, and the plotted output will be of uniform, excellent quality.

But in the long run, CAD systems offer their greatest benefits in modification and redesign. Days of drafting can be bypassed by simply copying a file and altering only the details that need changing. If you need to produce a left-handed or scaled version of an item already in your data base, you can generate drawings almost instantly with a few keystrokes. For a business in which future designs evolve from past ones or standard structural modules are used repeatedly, the cumulative savings can be immense.

Once you've established a data base of drawings, changing software becomes much more difficult and costly than upgrading hardware.

Efficient production of product documentation is another conspicuous CAD benefit. With a three-dimensional system, you can quickly develop exploded assembly views from design drawings. Some programs allow hidden text descriptions (or attributes) to be associated with drawing entities and extracted later for manufacturing or purchasing applications. This gambit can greatly ease the task of keeping documents updated with the latest design changes.

Storing drawings and manuals with a CAD system saves time and space. What once meant days of blue-line copying and filing can be done in minutes on floppy disks or tapes, yielding enormous reductions in storage volume. Quick backups and portability make it convenient to keep updated, secure data bases in a secondary location for disaster protection.

A CAD system can become a marketing tool as well as a way of getting your work done. Customers tend to be impressed by suppliers who keep up with the latest technology, and rightly or wrongly they have greater confidence in designs done on a CAD system. In businesses such as architecture or consumer product design where appearance is a major issue, the three-dimensional renditions offered by some CAD systems can give your firm a competitive marketing edge (see Screen 1).

Selecting the Right System

With the current abundance of hardware and software options, assembling the best system for any given environment is no easy task. If your budget is small (less than $5000 per station), the job is simpler—price eliminates many options. With a large budget, you'll want to consider dedicated workstations as well as PC-based systems. Whatever you choose, it's a sure bet that within a year something better will be available at lower cost.

Software selection is the most crucial issue. Once you've established a data base of drawings, changing software becomes much more difficult and costly than upgrading hardware. If you suddenly find yourself pushing against the limits of the package you've selected, however, the fallout from switching software can be minimized if your program is compatible with Data Exchange Format (DXF)—a standard graphics data format that allows transfer of geometric data between packages.

One of your earliest decisions will be whether you need either "2½-D" or full 3-D capabilities. Programs with these high-end functions can reduce drawing time by generating multiple views of a single model. If your chief goal is faster detail drafting at the lowest possible cost, however, then a straight 2-D drafting package priced as low as $300 may suffice.

But if you want to generate isometric views and link up with data bases for manufacturing, purchasing, and customer documentation, then a more expensive 2½-D package would be a better choice. These programs typically sell in the $1500 to $3000 range, and some connect to a limited degree with metal-forming and finite-element programs. They also tend to have fuller and more flexible sets of drawing and editing commands than low-cost 2-D programs. On the downside, 2½-D packages usually require more expensive hardware to perform at acceptable speeds.

Full 3-D packages have data structures that support a true wireframe description of an entity. Such programs offer significant capabilities over and above what's possible with 2½-D software, including the abilities to view an entity from any angle or perspective, to remove hidden lines from wireframes (see Screen 2), and—in some cases—to shade surfaces and

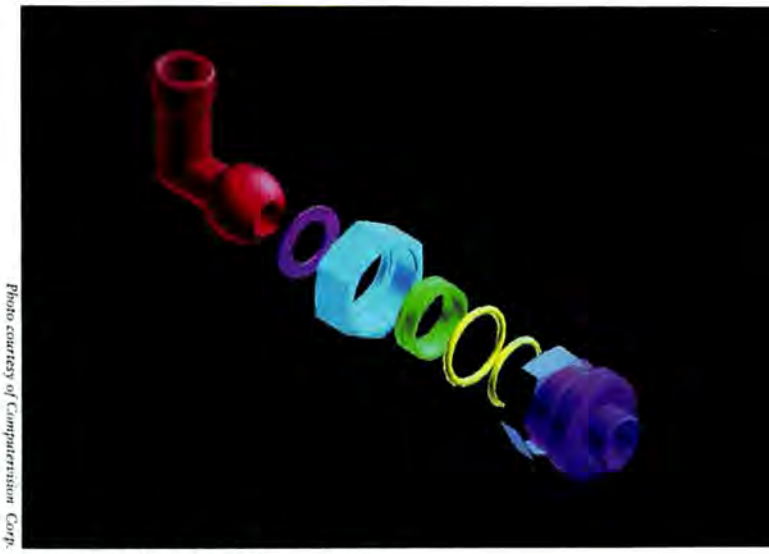


Photo courtesy of Computervision Corp.

Screen 1: With solids-modeling capabilities such as those offered by Computervision's Personal Designer, you can create fully shaded mock-ups of product designs.

Photo courtesy of TCW Systems, Inc.

Screen 2: Hidden-line wireframe models are especially useful for documentation, as shown in this screen generated by VersaCAD Advanced.

create solid models. A number of programs can automatically generate elevation and plan views from a 3-D drawing and link drafting views so that changes in one view are automatically reflected in all others. Also, since 3-D programs contain extremely detailed descriptions of the objects they represent, they have the potential for more complete integration with finite-element analysis programs and multiaxis metal-forming machines.

Generally, full-fledged 3-D CAD programs are quite costly—usually in the $2500 to $8000 range. At these prices, you should be aware that building a 3-D description of an object is often more time-consuming than straight layout and may not be justified for many projects. Also, when it comes to detail drafting, the 2½-D programs usually have faster response times.

Features to Watch For

No matter what the cost or application of CAD software, certain concerns apply. Most assessments of CAD software look at depth of features and performance. However, in terms of training time, work efficiency, and fending off frustration, a program's user interface is just as vital.

For a CAD package, the command set's organization and the input devices supported are crucial. In addition, the ability to customize your package with macros—and build your own library of frequently used symbols—is especially important. With customization, your efficiency will improve as you continue to refine your use of the program.

To some extent, a "good" user interface is whatever you feel comfortable with. Still, you're more likely to get cozy with a program that lets you pick almost any option with a pointing device without having to spend too much time running up and down menu trees (see Screen 3). Some newer programs such as *EasyCAD* and *RoboCAD* use convenient pull-down menus on a single screen, while other packages demand two monitors: one for menus, and one for drawing. Whatever the arrangement, you should be able to zoom and pan with ease and create windows holding different views or drawings.

A full set of dimensioning and annotation features is indispensable for producing professional-quality detail drawings. Unfortunately, most PC-based programs fall short in this area (*Anvil-1000MD* is a notable exception). Ideally, dimensioning formats should include vertical, horizontal, and parallel arrows and leaders; ordinate, baseline, and chained dimensions; angles, radii, and diameters; and standard drafting call-outs and feature symbols. Without a significant number of these dimensioning modes, you may spend much of your time drawing in the information using the program's general editing commands.

One extremely useful capability to look for is associative dimensioning, which adjusts dimension values automatically as you change the drawing itself. Although surprisingly few PC CAD programs offer this feature, it can be a tremendous time-saver.

Basic drawing and editing commands vary little from program to program. Beyond these essentials, you'll find the more sophisticated programs have some desirable extras, including automatic fillets and chamfers, automatic cross-hatching, conic sections, Bezier curves, and double lines. Some programs also offer rectangular and circular array creation, independent scaling of *x* and *y* axes, dynamic drag of entities, section property calculations, and highlighting of entities selected for an edit. Especially useful is a powerful multilevel undo facility, such as the one found in *VersaCAD Advanced.*

A full set of dimensioning and annotation features is indispensable for producing professional-quality detail drawings.

Several other issues arise if you're hunting for a three-dimensional CAD system. Because generating multiple views of a model is a principal reason for en-

tering the third dimension, you should look for a system that can accomplish this task with little hassle. Automatic hidden-line removal, as well as creation of meshed and shaded surfaces, is especially desirable for client presentations. If design analysis is a consideration, the ability to view sectional cuts through a

3-D programs are almost always slower than 2-D, due to the massive number of calculations required for redrawing models.

three-dimensional model, to compute three-dimensional sectional properties, and to link a completed model to a finite-element analysis program become significant factors. Computervision's *Personal Designer* excels at the latter tasks, but the $5300 base price may be a bit high for some.

If you're shooting for a documentation system that ties your drawings to a data base for purchasing or manufacturing, then the ease with which you can attach invisible text attributes to drawing entities should be a major consideration. Programs that provide this capability include *AutoCAD, VersaCAD Advanced,* and *Personal Designer.* You should carefully investigate the way each program handles this data—not to mention its compatibility with your desired data base application. All three of these programs offer complete bill of materials modules at extra cost.

Screen response time has always been an important productivity issue in CAD systems and will continue to be until CPU chips and graphics coprocessors become fast enough to make it irrelevant. Remember that three-dimensional programs are almost always slower, due to the massive number of calculations required for redrawing models. When you've pinpointed the programs that suit your purposes, run a few speed comparisons on the dealer's system before making a final selection.

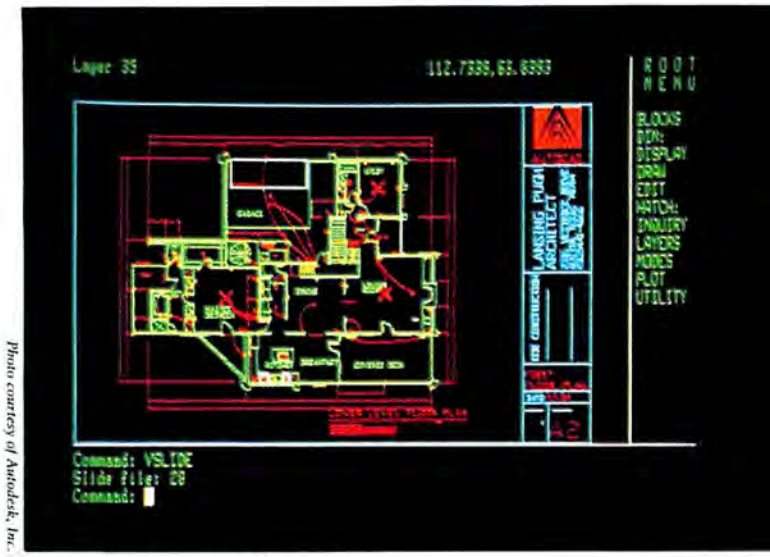


Photo courtesy of Autodesk, Inc.

Screen 3: AutoCAD's user interface offers a columnar menu arrangement typical of CAD packages.

Hardware to Fit

The number one hardware consideration is compatibility with your chosen software package. Some packages run only on a narrow range of hardware, while others handle practically any PC compatible ever built. *AutoCAD, VersaCAD,* and *Pro-Design II* are particularly adaptable, while *Anvil-1000MD* and *Personal Designer* are among the most IBM-specific.

Beyond compatibility, the selection criteria are clear: You want the fastest machine that your budget will allow and your dealer will support. For a low-end system destined for two-dimensional drafting, an 8MHz PC clone with an 8MHz 8087 math coprocessor and a $900 to $1800 price tag would be a viable choice. At the high end, a 10MHz to 12MHz AT compatible costing between $2600 and $4500 would be typical, and should include both an 80287 math coprocessor and a fast-access hard disk.

Display technology presents a tougher selection problem. A major price/performance gap exists between low-end 13-inch color displays with 640-by-400-pixel resolution and high-end 19-inch color displays with 1024-by-780-pixel resolution or greater. The former cost less than $1000 for both display adapter and monitor, while the latter may run anywhere from $3500 to $9000.

The amount of detail you can see on these displays without having to pan or zoom will have the biggest impact on your work. High-resolution displays provide three to four times the effective working area of the low-cost displays, which translates into better geometric visualization and fewer screen redraws. Most screen redraw time is spent panning or zooming, so you may well find the added expense worthwhile.

On the input side, most systems use a digitizing pad activated by a puck or stylus both for drawing and for selecting commands. Digitizing pads typically cost about $1000, and most programs support several types. Which pad you choose is mainly a matter of personal preference, although many users prefer a pad with a menu template for easier command selection.

For hard copy output in a production environment, you'll probably want a fast, multipen, E-size plotter. These are expensive machines—priced between $8000 and $16,000—but keep in mind that the cost will probably be shared among half a dozen workstations. It's usually a good idea to have a separate, inexpensive PC clone controlling the plotter so that a workstation is not tied up whenever a plot is needed. In environments where a large volume of small drawings are produced, a second, inexpensive B- or C-size plotter may be a worthwhile investment.

Changing Over

Maximizing the benefit from a new CAD system and minimizing the confusion during changeover requires serious planning. Staffers must be trained, work flow reorganized, equipment ordered and set up, and security procedures instituted. Key to this process is an effective system of file access control, file backup, and file storage.

Although operating strategies vary widely, several essential questions must be resolved in any workable system. Transmission, verification, acceptance, and control of finished drawings and documents are fundamental to either manual or automated systems. Formal procedures for passing information to your company's purchasing and manufacturing departments and for implementing design changes are equally important. Other organizational matters include controlling the flow of work from engineer to designer to draftsperson, sharing drawing files and workstations, establishing file backup and storage procedures, and securing proprietary information.

You may want to consider easing into a CAD operation in stages, even if you intend to develop a total documentation and data base system eventually.

You might start by setting up several drafting workstations and simply feed the finished plots into your existing documentation setup.

For example, you might start by setting up several drafting workstations to expedite detail drawing and simply feed the finished plots into your existing documentation setup. As design and drafting people gain experience, you can phase in more advanced features and set up project files, networks, and data bases until the full system is implemented.

Another sensible approach is to wring out the new system on a small project while other projects proceed as before. As start-up wrinkles are ironed out, you can gradually bring more projects into the system, with initial users now able to train new ones. This approach also allows you to distribute equipment and training costs over a series of projects.

Finally, the success of every system depends on the support of the people who will use it every day. The best way to ensure this is to get staffers involved early in the planning process and to give them a major part in choosing and implementing the new CAD system.

In the long run, one of the prime motivating factors for both you and your employees is that few small design firms can remain competitive without exploiting state-of-the-art tools. Some of the largest clients are also the most demanding, clamoring for fast turnaround on numerous design changes—a situation for which an automated system is tailor-made. An effective CAD system also helps minimize dull,

repetitive drafting tasks, resulting in less frustration and more gratifying work. If your company is involved in any type of design, the current crop of CAD systems offers unprecedented opportunities to speed operations, enhance job satisfaction, and reduce long-term costs. ●

Steven Lord is a mechanical engineer and freelance writer in Tewksbury, Massachusetts.

Anvil-1000MD
Manufacturing and Consulting Services, Inc.
9500 Toledo Way
Irvine, CA 92718
714/951-8858
List price: $2995
Requirements: 640K, hard disk, DOS 2.00 or later version, math coprocessor, IBM Professional Graphics Adapter
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AutoCAD
Autodesk, Inc.
2320 Marinship Way
Sausalito, CA 94965
415/332-2344
List price: $2750
Requirements: 640K, hard disk, DOS 2.00 or later version, math coprocessor
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EasyCAD
T & W Systems, Inc.
7372 Prince Dr.
Huntington Beach, CA 92647
714/847-9960
List price: $495
Requirements: 256K, one disk drive, DOS 2.00 or later version
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Personal Designer
Computervision Corp.
100 Crosby Dr.
Bedford, MA 01730
617/275-1800
List price: $5300
Requirements: 640K, hard disk, DOS 2.10 or later version, math coprocessor
Copy protected

ProDesign II
American Small Business Computers
118 S. Mill St.
Pryor, OK 74361
918/825-4844
List price: $300
Requirements: 512K, one disk drive, DOS 2.10 or later version, graphics board
Not copy protected

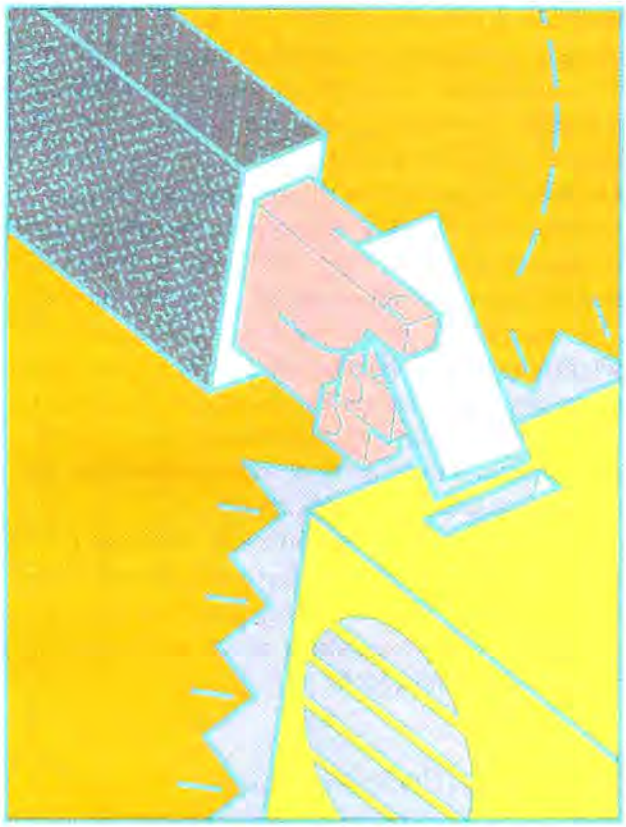
RoboCAD-PC
Robo Systems
111 Pheasant Run
Newtown, PA 18940
215/968-4422
List price: $1495
Requirements: 640K, two disk drives, DOS 2.10 or later version, Hercules Graphics Card, two serial ports
Copy protected

VersaCAD Advanced 5.0
T & W Systems, Inc.
List price: $2495
Requirements: 640K, two disk drives, DOS 2.10 or later version
Not copy protected

World Class PC

Christine Whyte

Putting a finger on the pulse of 300,000 readers is no mean feat, but for the last four years the World Class PC contest has done just that. Soliciting the opinion of *PC World* readers on their favorite software and hardware products in 39 categories is the name of the game, and each year thousands have joined in. While *PC World* provides some incentive by awarding valuable prizes to three lucky contest entrants, enthusiastic reader response demonstrates that people also simply want a chance to tell the world what they think. Judging from the votes, readers are more demanding than ever, choosing products designed to provide results fast—and with flair.



John Hersey

In 1985, stability and name recognition were key reasons for choosing favorite products. Not surprisingly, Lotus Development's *1-2-3* took top honors in four categories, and with few exceptions, *PC World* readers anointed only well-established products. This year many newcomers have crowded into the winner's circle, perhaps indicating that instead of stretching old standbys to fit the task at hand, discerning readers are turning more and more to tailor-made products to get the job done.

Prizes Galore

Without further ado, the 1986 World Class PC contest awards the winning products to three individuals whose entry forms were selected in a random drawing by 12-year-old Aaron Bunnell, son of Editor-in-Chief David Bunnell. Giving new life to the homily that the last shall be first, the grand prize winner is Albert G. Last of San Andreas, California, who until now had never won anything except a frozen turkey.

By day a telecommunications supervisor for the state of California, by night a computer science teacher at a community college, Mr. Last plans to use his World Class PC system for grading and testing his students, plus managing his personal finances and correspondence.

Mr. Last's windfall, worth $29,229.60, includes an IBM PC AT—the most acclaimed Desktop Computer for two years running—plus the winning hardware and software products in 35 categories. The favorite Local Area Network—3Com's EtherSeries—is the only winning product not awarded. (Readers also recommended a wide range of Novell networking products this year.) Our informal poll on LANs reveals that readers today have even less interest in networking than they did in 1985, with a scant 12 percent (down 4 percent from last year) bothering to write in a favorite. Will the year of the LAN ever come?

Alan A. Hobson of Brownsburg, Indiana, is second-prize winner of a Compaq Portable 286, this year's favored Transportable Computer. A hospital X-ray technician, Mr. Hobson is a self-proclaimed hacker who bought his first PC in 1982. He writes Turbo Pascal programs for fun and is working toward a bachelor's degree in computer technology.

Smallest but not least, the Data General/One for the second consecutive year captures the title as the most popular Lap-Size Computer. *PC World* awards a DG/One as third prize to Wayne C. Hume of Colorado Springs, Colorado. Mr. Hume, who has two electrical engineering degrees, owns Vintage Reproductions, a distributor of dry transfer lettering to

hobby and craft wholesalers worldwide. He expects to take the DG/One (with an enhanced Model 2 LCD display) on site when researching articles about the hobby and craft industry.

Although Data General still owns the hearts and laps of PC users, the company's landslide 69 percent vote in 1985 has been whittled away this year by a cadre of capable contenders. The Tandy and Hewlett-Packard laptops have also apparently slipped off laps in the last twelve months, while Panasonic's Executive Partner has climbed aboard—a curious situation, since this machine is much larger than Panasonic's cleverly lit ads let on. IBM's PC Convertible was still vaporware by the World Class voting deadline, but nonetheless garnered a respectable 2 percent share of the votes cast, demonstrating once again that IBM isn't nicknamed Big Blue for nothing.

PC World gives the high five to the prizewinning readers and, naturally, to those manufacturers whose products received the readers' seal of approval. Although reader selections should not be construed as endorsement by *PC World,* they are a meaningful indication of reader preference.

The tables list the winning products plus those receiving a significant percentage of the votes cast in each category. The "Others" entry represents the combined percentage for all remaining products, so a large number here indicates that many products are competing for readers' piggy banks.

First Time Up

PC World added several new categories this year to reflect the latest product developments. In the hardware arena, *PC World* created the Alternative Mass Storage category to allow for the overwhelming popularity of Iomega's Bernoulli Box, which we failed to anticipate last year, and similar devices. (The Bernoulli Box not only came out on top this year but placed second in the Hard Disk Drive category—although it doesn't use rigid magnetic media.) The new Alternative Mass Storage category also encompasses tape backup units and optical disk drives, but neither of these technologies inspired a large response from *PC World* readers.

Votes cast for the Most Promising Hardware Newcomer reveal that the right technologies at the right price and time are bound to find favor. The commercial success of the winning Hardcard and the Intel AboveBoard pay tribute to this free market formula, while continued interest in the Softstrip System Reader suggests that Cauzin Systems' clever and inexpensive approach to storage may yet gain market acceptance. And what of CD ROMs and write-once optical disk drives? The World Class jury is still out—but next year's contest may bring favorable verdicts.

Prominent among the new software categories is Outline Processing, a class of software essentially created and led by Living Videotext's *ThinkTank.* Having a big brother on the market and being bundled with *Microsoft Word* nevers hurts either, so it's no surprise that Living Videotext's *Ready* handily tied *Framework II* for second place in this category.

AutoCAD, the overwhelming Graphics—CAD winner, apparently has the market sewn up—a tribute to the program's design, its presence on the market since 1982, and the company's willingness to work with users and third-party developers to expand the universe of *AutoCAD* applications.

The Most Promising Software Newcomer, Borland's *Turbo Lightning,* had a big ad push behind its rise to fame. But advertising doesn't always make a product fly—witness reader response to industry darlings *Paradox* and *Q&A.*

Software: The New Champs

In the 21 software categories repeated from last year's contest, readers reelected 14 products and gave the nod to 7 new victors. In Word Processing, first-place *WordPerfect* and—in hot pursuit—*Microsoft Word* finally toppled *WordStar,* long-standing king of the hill. Alan Ashton, president of WordPerfect Corporation, believes the program's template-oriented approach paved the way for success: "All operations are push-button from within a template. You don't have to memorize commands or rely on pop-up menus."

In the Graphics—Business category, readers clearly desire the sophisticated look. Snatching *1-2-3* from the jaws of victory are co-winners *Chart-Master* and *Microsoft Chart,* both dedicated presentation graphics programs, as are the runners-up.

Although the individual program modules that make up software families and integrated packages seldom gain notice (with the exception of *pfs:file* and its alter ego, the *IBM Filing Assistant*), the majority of responding readers think *Framework II* is tops at

keeping it all together. One likely reason for *Framework II*'s ascension is that Ashton-Tate, responding to customer criticism, has duly strengthened the word processing and spreadsheet modules while tightening program integration overall. Program developers may well have cast their vote for FRED, *Framework II*'s command language, since it is better suited to building complex applications than are *Symphony* macros.

Proving that the era of cheap software has really arrived, *DAC-Easy Accounting* staged an astounding coup in the Accounting category, relegating *Peachtree's Business Accounting System*—last year's winner—to the bottom of the pile. (Peachtree's *Back to Basics* did receive separate votes, but not enough to make the cut.) BPI and Open Systems both have several accounting series, but readers voted for the company name rather than a specific product line.

Another surprise was ChipSoft's *TurboTax,* which appeared out of the blue in the Tax Planning or Preparation category and pushed the top three 1985 vote-getters down a notch. Company president Michael Chipman launched his program in late 1984 from a back-room office when he couldn't find any PC tax planning software to his liking. He claims *TurboTax*'s speed, familiar *1-2-3*-like interface, and $65 price tag account for its popularity.

The PC has never had much impact in the home and school markets, and so a 50 percent drop in voter response in the Education category this year is hardly startling. Given the mounting competitive pressures in higher education, however, it's interesting to note the rise of Barron's *Study Program for the SAT* over the *Spinnaker Early Learning Series*. The Training category elicited a similar lack of enthusiasm, but ATI's *Training Power Series* continues to lead the pack.

Microsoft Windows wins hands down in the Applications Integrator category, besting *TopView,* which triumphed easily last year in a relatively uncrowded field. Readers by a wide margin prefer *Windows'* graphics interface—displayed so crisply on the new crop of EGA monitors—to its character-based competitors.

Noteworthy is *Andrew Tobias' Managing Your Money*'s continued success in the Personal Management category. MECA's brainchild also doubled its percentage of reader votes in the Investment category, trouncing last year's co-winner, *Dow Jones Market Manager Plus*. However, it should be noted that Dow Jones is well represented by a number of vote-getting products.

High-Class Hardware

PC World readers go for the gusto—especially when it comes to processing power, palette-pleasing graphics, and upscale printing. Aside from the newly created categories, several recent hardware entries grabbed center stage this year. The Compaq Portable 286 succeeded last year's Transportable champ, the Compaq Portable. Readers welcomed the arrival of the EGA's higher-quality graphics standard; in one short year EGA monitors and graphics boards have grown in popularity, a trend likely to escalate as EGA look-alikes flood the market and drive prices down.

In the Printer—Dot Matrix/Near Letter Quality category, Epson's 24-pin, near letter quality LQ-1500 printer took the reins from its low-end cousin, the FX-100. But IBM looms ever present, and Epson is facing its first serious challenge in years from IBM's capable Proprinter. Results in the Printer—Other category (now open to all laser, ink jet, and letter quality printers) herald a more significant changing of the guard. Last year's letter quality winner, the NEC Spinwriter Model 3550, has given way to the Hewlett-Packard LaserJet clan.

Important players in the Hard Disk Drive category are the winning 20MB ST225 Seagate drive (available through mail-order and retail outlets) and newcomers riding the crest of the hard disk card craze: Mountain's DriveCard and the Hardcard from Plus Development, the latter also voted most promising hardware newcomer.

Although the winner's circle is still crowded with familiar names—the Hayes Smartmodem 1200 and AST's SixPakPlus among them—the runners-up in almost every category spotlight readers' growing appetite for bigger, better, faster, and more specialized products. Despite the fads, technological tangents, and financial ups and downs of the computer industry, that is one trend that's likely to continue.

PC World thanks all the readers who took the time to share their opinions and invites everyone to take part in next year's contest. Look for the 1987 World Class PC contest announcement and entry form in a future issue—your voice will be heard and your reward may indeed be "heavenly." ●

Christine Whyte is the Product Review Editor for PC World.

Hardware

Winning Products From the World Class PC Contest

	% of Votes	Product, *Manufacturer*
Desktop Computer	31	**IBM PC AT, *IBM***
		Contact your nearest authorized IBM dealer
		List price: $3995 (basic system with 512K)
	18	Compaq Deskpro 286, *Compaq Computer Corp.*
	13	IBM PC XT, *IBM*
	9	IBM PC, *IBM*
	6	AT&T 6300, *AT&T*
	23	Others
	100	Total
		86% of respondents voted in this category
Transportable Computer	34	**Compaq Portable 286 (Model 2), *Compaq Computer Corp.***
		20555 FM 149, Houston, TX 77070, 713/370-0670
		List price: $5499
	22	Compaq Portable Computer, *Compaq Computer Corp.*
	15	Compaq Portable II, *Compaq Computer Corp.*
	9	Compaq Portable Plus Computer, *Compaq Computer Corp.*
	3	IBM Portable PC, *IBM*
	3	Executive Partner, *Panasonic*
	14	Others
	100	Total
		52% of respondents voted in this category
Lap-Size Computer	21	**Data General/One, *Data General Corp.***
		4400 Computer Dr., MS E132, Westboro, MA 01580,
		617/366-8911
		List price: $2095
	13	Executive Partner, *Panasonic*
	10	Zenith Z-171 Portable, *Zenith Data Systems*
	10	Toshiba T1100, *Toshiba America, Inc.*
	5	GridCase, *Grid Systems Corp.*
	5	Kaypro 2000, *Kaypro Corp.*
	36	Others
	100	Total
		29% of respondents voted in this category
Printer–Dot Matrix/ Near Letter Quality	9	**LQ-1500, *Epson America, Inc.***
		2780 Lomita Blvd., Torrance, CA 90505, 213/539-9140
		List price: $1495
	8	IBM Proprinter, *IBM*
	6	P351, *Toshiba America, Inc.*
	6	FX-286, *Epson America, Inc.*
	5	FX-185, *Epson America, Inc.*
	5	FX-85, *Epson America, Inc.*
	61	Others
	100	Total
		70% of respondents voted in this category

Photographs by Fred Stimson

	% of Votes	Product, *Manufacturer*
Color Monitor	14	**HX-12, *Princeton Graphic Systems*** 601 Ewing St., Bldg. A, Princeton, NJ 08540, 800/221-1490 List price: $695
	14	**IBM Enhanced Color Display, *IBM*** Contact your nearest authorized IBM dealer List price: $849
	9	HX-12E, *Princeton Graphic Systems*
	8	IBM Color Display, *IBM*
	7	JC1401P3A MultiSync, *NEC Home Electronics*
	7	SR-12, *Princeton Graphic Systems*
	6	SR-12P, *Princeton Graphic Systems*
	35	Others
	100	Total
		51% of respondents voted in this category
Modem	26	**Smartmodem 1200, *Hayes Microcomputer Products, Inc.*** P.O. Box 105203, Atlanta, GA 30348, 404/449-8791 List price: $549
	23	Smartmodem 1200B, *Hayes Microcomputer Products, Inc.*
	18	Smartmodem 2400, *Hayes Microcomputer Products, Inc.*
	5	Smartmodem 2400B, *Hayes Microcomputer Products, Inc.*
	4	Courier 2400, *U.S. Robotics, Inc.*
	24	Others
	100	Total
		50% of respondents voted in this category
Memory Expansion Board	34	**SixPakPlus, *AST Research, Inc.*** 2121 Alton Ave., Irvine, CA 92714, 714/863-1333 List price: $395 (with 384K)
	15	AboveBoard, *Personal Computer Enhancement Operation, Intel Corp.*
	9	Advantage, *AST Research, Inc.*
	9	RAMpage, *AST Research, Inc.*
	4	Expanded Quadboard, *Quadram*
	3	JRAM-3, *Tall Tree Systems*
	26	Others
	100	Total
		46% of respondents voted in this category

Hardware

Winning Products From the World Class PC Contest

	% of Votes	Product, *Manufacturer*
Printer–Other	19	**LaserJet Plus, *Hewlett-Packard*** 16399 W. Bernardo Dr., San Diego, CA 92127, 619/487-4100 List price: $3995
	17	LaserJet, *Hewlett-Packard*
	6	LaserWriter, *Apple Computer, Inc.*
	4	Spinwriter Model 3550, *NEC Information Systems, Inc.*
	4	Quietwriter, *IBM*
	50	Others
	100	Total
		41% of respondents voted in this category
Graphics Board	19	**IBM Enhanced Graphics Adapter, *IBM*** Contact your nearest authorized IBM dealer List price: $524
	18	Hercules Graphics Card, *Hercules Computer Technology, Inc.*
	9	Quadram QuadEGA+, *Quadram Corp.*
	9	Hercules Color Card, *Hercules Computer Technology, Inc.*
	5	Paradise Systems Modular Graphics Card, *Paradise Systems*
	5	IBM Color/Graphics Adapter, *IBM*
	35	Others
	100	Total
		38% of respondents voted in this category
Hard Disk Drive	15	**ST 225 (20MB), *Seagate*** 920 Disc Drive, Scotts Valley, CA 95066, 800/468-DISC, 800/468-DISK in California List price: $400
	9	Bernoulli Box, *Iomega Corp.*
	8	Hardcard, *Plus Development Corp.*
	5	DriveCard, *Mountain Computer, Inc.*
	5	PC20, *Qubie Distributing*
	58	Others
	100	Total
		35% of respondents voted in this category
Alternative Mass Storage	58	**Bernoulli Box, *Iomega Corp.*** 1821 W. 4000 S, Roy, UT 84067, 801/778-1000 List price: $3695 (20MB dual-drive model)
	3	Core Tape, *Core International*
	3	Q60H, *Tecmar, Inc.*
	2	Everex Stream 60, *Everex*
	2	Sysgen XL, *Sysgen, Inc.*
	2	Masterflight 60, *Kamerman Labs*
	30	Others
	100	Total
		25% of respondents voted in this category

	% of Votes	Product, *Manufacturer*
Plotter	45	HP 7475A Plotter, ***Hewlett-Packard***
		16399 W. Bernardo Dr., San Diego, CA 92127, 800/367-4772
		List price: $1895
	10	HP 7550A Plotter, *Hewlett-Packard*
	9	HP 7470A Plotter, *Hewlett-Packard*
	4	HIPLOT DMP-40 Plotter, *Houston Instrument*
	3	1043 GT, *California Computer Products, Inc.*
	29	Others
	100	Total
		22% of respondents voted in this category
Input Device	36	Microsoft Mouse, ***Microsoft Corp.***
		10700 Northup Way, Bellevue, WA 98004, 800/426-9400, 206/828-8080
		List price: $195
	22	PC Mouse, *Mouse Systems Corp.*
	12	KB5151 Deluxe IBM PC Keyboard, *Key Tronic Corp.*
	4	The Mouse, *Maynard Electronics*
	3	Softstrip System Reader, *Cauzin Systems, Inc.*
	2	IBM PC Keyboard, *IBM*
	21	Others
	100	Total
		20% of respondents voted in this category
Local Area Network	12	EtherSeries, ***3Com Corp.***
		1365 Shorebird Way, Mountain View, CA 94043, 415/961-9602
		List price: $3565 (four-PC configuration)
	11	Token-Ring, *IBM*
	10	PC Network, *IBM*
	9	Netware 4.61, *Novell, Inc.*
	8	Advanced Netware 1.01, *Novell, Inc.*
	50	Others
	100	Total
		12% of respondents voted in this category
Most Promising Newcomer–Hardware	9	Hardcard (10MB), ***Plus Development Corp.***
		1778 McCarthy Blvd., Milpitas, CA 95035, 408/946-3700
		List price: $695
	6	Softstrip System Reader, *Cauzin Systems, Inc.*
	6	Compaq Portable II, *Compaq Computer Corp.*
	5	Leading Edge Model D, *Leading Edge Products, Inc.*
	4	AboveBoard, *Personal Computer Enhancement Operation, Intel Corp.*
	3	DriveCard, *Mountain Computer, Inc.*
	3	Tandy 3000, *Tandy*
	64	Others
	100	Total
		23% of respondents voted in this category

Software

Winning Products From the World Class PC Contest

	% of Votes	Product, *Manufacturer*
Word Processing	22	**WordPerfect, *WordPerfect Corp.***
		288 W. Center St., Orem, UT 84057, 801/227-4000
		List price: $495
	14	Microsoft Word, *Microsoft Corp.*
	12	WordStar, *MicroPro International Corp.*
	7	Textra, *Ann Arbor Software*
	5	WordStar 2000, *MicroPro International Corp.*
	5	MultiMate, *Multimate Corp.*
	35	Others
	100	Total

83% of respondents voted in this category

Spreadsheet	69	**1-2-3, *Lotus Development Corp.***
		Customer Support, 55 Cambridge Pkwy., Cambridge, MA 02142, 617/577-1100
		List price: $495
	7	SuperCalc 3, *Computer Associates*
	6	Symphony, *Lotus Development Corp.*
	5	Multiplan, *Microsoft Corp.*
	3	VP-Planner, *Paperback Software International*
	10	Others
	100	Total

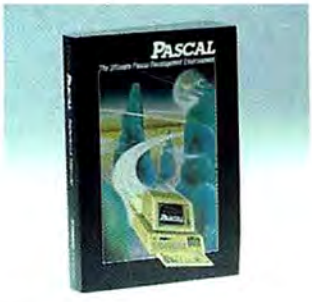
74% of respondents voted in this category

Data Management	45	**dBASE III Plus, *Ashton-Tate***
		20101 Hamilton Ave., Torrance, CA 90502-1319, 213/329-8000
		List price: $695
	12	R:base 5000, *Microrim*
	8	Reflex: The Analyst, *Borland International, Inc.*
	5	Paradox, *Ansa Software*
	30	Others
	100	Total

60% of respondents voted in this category

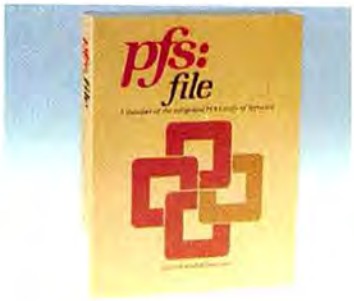
Utilities	60	**Norton Utilities, *Peter Norton Computing, Inc.***
		2210 Wilshire Blvd., Santa Monica, CA 90403, 213/453-2361
		List price: $99.95
	4	SuperKey, *Borland International, Inc.*
	4	SideKick, *Borland International, Inc.*
	3	Copy II PC, *Central Point Software, Inc.*
	3	Direct Access, *Delta Technologies*
	26	Others
	100	Total

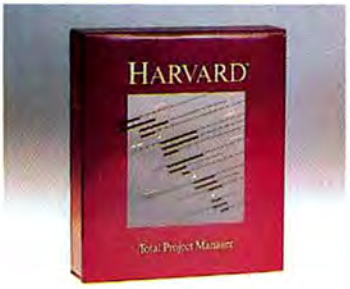
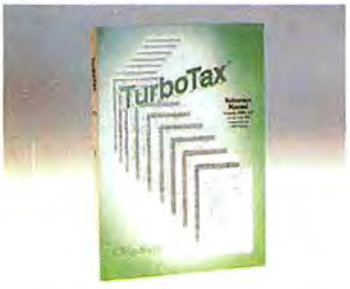
50% of respondents voted in this category

	% of Votes	Product, *Manufacturer*
Communications	39	**Crosstalk XVI, *Microstuf, Inc.*** 1000 Holcomb Woods Pkwy. #440, Roswell, GA 30076, 404/998-3998 List price: $195
	22	Smartcom II, *Hayes Microcomputer Products, Inc.*
	11	PC-Talk III, *Headlands Communications Corp.*
	5	Qmodem, *The Forbin Project*
	3	Microsoft Access, *Microsoft Corp.*
	20	Others
	100	Total
		41% of respondents voted in this category
Desktop Management	67	**SideKick, *Borland International, Inc.*** 4585 Scotts Valley Dr., Scotts Valley, CA 95066, 800/255-8008, 800/742-1133 in California, 408/438-8400 List price: $84.95 (not copy protected), $54.95 (copy protected)
	8	The Desk Organizer, *Warner Software, Inc.*
	4	Microsoft Windows, *Microsoft Corp.*
	4	PolyWindows Desk, *Polytron Corp.*
	3	Pop-Up DeskSet Plus, *Popular Programs*
	14	Others
	100	Total
		39% of respondents voted in this category
Programming Language	45	**Turbo Pascal, *Borland International, Inc.*** 4585 Scotts Valley Dr., Scotts Valley, CA 95066, 800/255-8008, 800/742-1133 in California, 408/438-8400 List price: $69.95
	9	C Compiler, *Microsoft Corp.*
	5	BASIC Compiler, *Microsoft Corp.*
	5	Lattice C Compiler, *Lifeboat Associates*
	4	IBM BASIC, *IBM*
	32	Others
	100	Total
		37% of respondents voted in this category
Integrated	34	**Framework II, *Ashton-Tate*** 20101 Hamilton Ave., Torrance, CA 90502-1319, 213/329-8000 List price: $695
	30	Symphony, *Lotus Development Corp.*
	9	1-2-3, *Lotus Development Corp.*
	8	Enable, *The Software Group*
	6	The Smart System, *Innovative Software*
	3	Ability, *Migent, Inc.*
	10	Others
	100	Total
		32% of respondents voted in this category

Software

Winning Products From the World Class PC Contest

	% of Votes	Product, *Manufacturer*
Games	26	**Microsoft Flight Simulator, *Microsoft Corp.*** 16011 N.E. 36th St., P.O. Box 97017, Redmond, WA 98073-9717, 800/426-9400, 206/882-8088 List price: $49.95
	19	Jet, *SubLogic Communications Corp.*
	11	NFL Challenge, *Xor Corp.*
	5	Sargon III, *Hayden Software*
	5	Zork I, II, and III, *Infocom, Inc.*
	34	Others
	100	Total
		31% of respondents voted in this category
Graphics–Business	15	**Chart-Master, *Decision Resources, Inc.*** 25 Sylvan Road S, Westport, CT 06880, 203/222-1974 List price: $375
	15	**Microsoft Chart, *Microsoft Corp.*** 16011 N.E. 36th St., P.O. Box 97017, Redmond, WA 98073-9717, 800/426-9400, 206/882-8080 List price: $295
	12	1-2-3, *Lotus Development Corp.*
	6	Energraphics, *Enertronics Research, Inc.*
	4	Graphwriter Combination Set, *Graphic Communications, Inc.*
	4	PC Storyboard, *IBM*
	3	Freelance, *Graphic Communications, Inc.*
	41	Others
	100	Total
		25% of respondents voted in this category
File Management	19	**pfs:file, *Software Publishing Corp.*** 1901 Landings Dr., P.O. Box 7210, Mountain View, CA 94039-7210, 415/962-8910 List price: $140
	18	PC-File III, *Buttonware, Inc.*
	10	Reflex: The Analyst, *Borland International, Inc.*
	4	dBASE III, *Ashton-Tate*
	4	Nutshell, *Leading Edge Products, Inc.*
	45	Others
	100	Total
		23% of respondents voted in this category
Accounting	32	**Dac-Easy Accounting, *Dac Software, Inc.*** 4801 Spring Valley Rd. #110B, Dallas, TX 75244, 214/458-0038 List price: $69.95
	6	Accounting software, *BPI Systems*
	5	EasyBusiness Accounting Series, *Computer Associates*
	4	Solomon III, *TLB Inc.*
	4	Accounting software, *Open Systems*
	4	Peachtree's Business Accounting System, *Peachtree Software, Inc.*
	45	Others
	100	Total
		22% of respondents voted in this category

	% of Votes	Product, *Manufacturer*
Outline Processing	31	**ThinkTank, *Living Videotext, Inc.*** 2432 Charleston Rd., Mountain View, CA 94043, 415/964-6300 List price: $195
	16	Ready, *Living Videotext, Inc.*
	16	Framework II, *Ashton-Tate*
	14	MaxThink, *MaxThink, Inc.*
	23	Others
	100	Total
		19% of respondents voted in this category
Project Management	33	**Harvard Total Project Manager, *Software Publishing Corp.*** 1901 Landings Dr., P.O. Box 7210, Mountain View, CA 94039-7210, 415/962-8910 List price: $495
	19	Microsoft Project, *Microsoft Corp.*
	11	Time Line, *Breakthrough Software*
	7	SuperProject, *Computer Associates*
	5	Primavera Project Planner, *Primavera Systems, Inc.*
	5	Project Manager Workbench, *Applied Business Technology Corp.*
	20	Others
	100	Total
		18% of respondents voted in this category
Tax Planning or Preparation	22	**TurboTax, *ChipSoft, Inc.*** 4901 Morena Blvd. #801, San Diego, CA 92117, 619/581-2233 List price: $65
	20	Tax Preparer, *HowardSoft*
	16	PC/TaxCut, *Best Programs Inc.*
	12	Andrew Tobias' Managing Your Money, *MECA*
	2	1-2-3, *Lotus Development Corp.*
	28	Others
	100	Total
		16% of respondents voted in this category
Graphics–CAD	65	**AutoCAD, *Autodesk, Inc.*** 2320 Marinship, Sausalito, CA 94965, 415/332-2344 List price: $2500
	9	ProDesign II, *American Small Business Computers, Inc.*
	2	In-a-Vision, *Micrografx, Inc.*
	2	Generic CAD, *Generic Software, Inc.*
	2	PC-Draw, *Micrografx, Inc.*
	20	Others
	100	Total
		16% of respondents voted in this category

Software

Winning Products From the World Class PC Contest

	% of Votes	Product, *Manufacturer*
Applications Integrator	56	**Microsoft Windows, *Microsoft Corp.*** 16011 N.E. 36th St., P.O. Box 97017, Redmond, WA 98073-9717, 800/426-9400, 206/882-8088 List price: $149
	16	Desqview, *Quarterdeck Office Systems*
	6	TopView, *IBM*
	22	Others
	100	Total
		15% of respondents voted in this category
Personal Management	55	**Andrew Tobias' Managing Your Money, *MECA*** 285 Riverside Ave., Westport, CT 06880, 203/222-1000 List price: $199.95
	12	Dollars and Sense, *Monogram*
	4	PC Professional Finance Program II, *Best Programs, Inc.*
	4	Traveling SideKick, *Borland International, Inc.*
	3	Sylvia Porter's Personal Finance, *Timeworks*
	3	Continental Home Accountant Plus, *Arrays, Inc./Continental Software*
	19	Others
	100	Total
		14% of respondents voted in this category
Micro-to-Mainframe Communications	13	**IRMA, *Digital Communications Associates, Inc.*** 1000 Alderman Dr., Alpharetta, GA 30201, 404/442-4000 List price: $1195
	9	Crosstalk XVI, *Microstuf, Inc.*
	4	Kermit, *The Columbia University Center for Computing Activities*
	4	Barr HASP, *Barr Systems, Inc.*
	4	IBM 3101 Emulation, *IBM*
	3	SmarTerm 220, *Persoft, Inc.*
	3	Blast, *Communications Research Group*
	60	Others
	100	Total
		13% of respondents voted in this category
Financial Modeling	39	**1-2-3, *Lotus Development Corp.*** Customer Support, 55 Cambridge Pkwy., Cambridge, MA 02142, 617/577-1100 List price: $495
	14	Javelin, *Javelin Software*
	9	Andrew Tobias' Managing Your Money, *MECA*
	6	Symphony, *Lotus Development Corp.*
	5	IFPS–Personal, *Execucom Systems Corp.*
	27	Others
	100	Total
		12% of respondents voted in this category

	% of Votes	Product, *Manufacturer*
Investment	40	**Andrew Tobias' Managing Your Money, *MECA***
		285 Riverside Ave., Westport, CT 06880, 203/222-1000
		List price: $199
	6	Dow Jones Market Manager Plus, *Dow Jones & Co., Inc.*
	5	Dow Jones Market Analyzer, *Dow Jones & Co., Inc.*
	4	1-2-3, *Lotus Development Corp.*
	4	Value Screen, *Value Line*
	3	Dow Jones Market Analyzer Plus, *Dow Jones & Co., Inc.*
	3	Signal, *Lotus Development Corp.*
	35	Others
	100	Total
		10% of respondents voted in this category
Training	22	**Training Power Series, *American Training International***
		12638 Beatrice St., Los Angeles, CA 90066, 213/823-1129
		List price: $75 each
	8	Typing Tutor III, *Simon & Schuster*
	5	Cdex Corporation Series, *Cdex Corp.*
	5	Professor DOS, *Individual Software, Inc.*
	4	Teach Yourself dBASE III, *American Training International*
	56	Others
	100	Total
		8% of respondents voted in this category
Education	7	**Study Program for the SAT, *Barron's Educational Series***
		113 Crossways Park Dr., Woodbury, NY 11797, 516/921-8750
		List price: $49.95
	6	Math Blaster, *Davidson & Associates*
	6	Spinnaker Early Learning Series, *Spinnaker Software Corp.*
	4	Mastering the SAT, *CBS Software*
	4	Newsroom, *Springboard Software, Inc.*
	4	Typing Tutor, *Simon & Schuster, Inc.*
	3	Master Type, *Scarborough Systems, Inc.*
	66	Others
	100	Total
		6% of respondents voted in this category
Most Promising Newcomer–Software	21	**Turbo Lightning, *Borland International, Inc.***
		4585 Scotts Valley Dr., Scotts Valley, CA 95066, 800/255-8008, 800/742-1133 in California, 408/438-8400
		List price: $99.95
	9	Javelin, *Javelin Software*
	8	Microsoft Windows, *Microsoft Corp.*
	7	Paradox, *Ansa Software*
	4	Reflex: The Analyst, *Borland International, Inc.*
	2	Q&A, *Symantec Corp.*
	49	Others
	100	Total
		31% of respondents voted in this category

PCs Into Plowshares

As farmers face the roughest times since the Great Depression, personal computers are being considered anew. Will the PC save the day . . . or only prolong the agony?

John Faulkner and Eric Brown

A joke making the rounds about a traveling computer salesman had farmers chuckling, but underneath the joke was a serious edge.

At the Louisiana State University Agricultural Computing Convention in Baton Rouge, farmers put on a skit that had a fast-talking salesman arriving on a farm to demonstrate a PC. As the salesman overwhelmed his host with a torrent of jargon, the farmer could only step back and blink in confusion.

Fortunately, another farmer who owned a PC stopped by and offered to translate. "You see," he explained, "the PC bus is like the front-end loader of a tractor. Sixteen bits carries more grain than 8 bits. Hardware is like a tractor, and software is like all the different kinds of plows you attach to it. Think of the CRT as the gauge on a tractor, and a port is nothing more than an electronic version of hydraulic coupling."

The farmer nodded and looked at the new machinery skeptically. Not only would he have to shell out a few thousand for the PC, but somehow he'd have to find the time to learn to use it. Still, he had to do something to break free of the economic quicksand. So what would it be? Should he buy the PC, or pick up that new plow he'd been eyeing?

A Brutal Shakeout

Like the skeptical farmer in the skit, most American growers are strapped for cash. Last year at least 50,000 farmers left the business. While there are about 1.3 million full-time farmers now, the number is expected to dip below 950,000 by 1990. The problems are complex, ranging from increasing international competition to decreasing crop prices due to surpluses. Some say that after 50 luxurious years of bountiful harvests, generous subsidies, high inflation, and casual lending, farmers have grown lax in management practices. Others say that there are simply too many farmers cultivating too much land.

In a business where profits are slipping away, the personal computer may be a cure. Yet a PC is a

Bill Cone

big investment for a struggling farmer, as much in time as in money. Thus far, PCs have made minimal inroads on the farm; it's estimated that fewer than 10 percent of farmers use computers. But over the next few years, most observers agree, a brutal shakeout will change the face of America's mainstay industry. The survivors will be those who can master the complexity of the marketplace and plan for long-term growth. For that they're going to need computers.

Along with the standard accounting programs, farmers are using PCs to study crop productivity and monitor usage of irrigation, pesticide, and fertilizer.

Until recently, Apples predominated on the farm, where they were used almost exclusively for accounting. Today the IBM PC is the standard, and more powerful software is opening up new doors for computing farmers. According to the Association of Agricultural Computing Companies, more than 750 agricultural software packages are currently available from 170 manufacturers. Along with the standard accounting programs, farmers are using PCs to study crop productivity and monitor usage of irrigation, pesticide, and fertilizer. An increasing number of farmers are going on line to analyze market reports, weather, and new agricultural techniques. New PC-based expert systems simulate the life of a crop and evaluate issues from seed growth to pesticide spraying.

Land Rich and Cash Poor

For most farmers, the PC's key role will continue to be in accounting and in helping them be accountable to the bank.

As any farmer can tell you, obtaining a loan is becoming increasingly difficult. Rural banks are failing as fast as the farmers they lend to, and bankers are growing more cautious in their investments. Whereas bankers used to appraise a farm primarily on its assets, they now gauge cash flow and profitability.

Bankers look for financial responsibility and good record keeping, and a PC accounting system can show off records in impressive style. But here's the catch: Most bankers have yet to extend the loans to buy PCs in the first place.

However, according to Marlin Edwards, director of agricultural resources for Pioneer Hi-Bred International, this trend has recently shown signs of reversal: Some banks have seen the light and now offer low-interest loans to farmers who own and operate computers.

Long an agribusiness giant specializing in hybrid seed, Pioneer recently took on the additional role of an IBM value-added reseller, selling the IBM XT with a full line of generic and customized software. A heavy dose of education accompanies each sale. Pioneer not only trains farmers how to use PCs, but also teaches general farm management practices.

"It's important for the farmer to develop a managing mind," says Edwards. "There's still too much guessing." Most farmers who remain competitive excel in the production end of the farm operation. "But," claims Edwards, "they are not handling the financial decisions as well."

Extension Agents to the Rescue

In many cases, the farmer's introduction to PCs comes via a traditional source of agricultural information, the county extension agent. Extension agents act as liaison between the grower and the experts at land grant state universities.

In California, where agriculture is a $15 billion industry, the University of California land grant system has gone further than any other in computer education and support. But Mina Ostergard, computer specialist at the U.C. Davis Cooperative Extension Service, admits that educating farmers about computers is no easy task. "Just plopping the computer down on the farm is not going to solve their problems," says Ostergard. "When you go out to the farm and put their books into the computer, in many cases it will tell them to sell out."

Ostergard suggests that farmers first need to learn basic business practices, starting with good record keeping. "Many farmers are hanging on to old ideas," says Ostergard. "The farmers need to learn to be businesspeople, and the computer is a tool they need to survive. To remain successful, farmers will have to learn this new machine just as their great-grandfathers had to learn to use the combine and the corn picker."

According to Jim Emal, extension microcomputer specialist for the University of Nebraska's Cooperative Extension Service in Lincoln, educating farmers to computers can be slow going. In 1983, 4 percent of Nebraska farmers had computers. In 1986 that figure has barely reached 6 percent. But whether or not computer use spreads among farmers, Emal is excited about the benefits for extension agents. "The PC has allowed us to zero in on specific farmers' problems," he says. "We've always been called specialists, but now we can live up to the title."

Accounting, Ag Style

Accounting is the first step in steering the farm toward sound financial management. A good set of books is necessary not only for paying taxes, managing payrolls, and applying for loans, but also for monitoring performance and planning for the future.

"The farmer is being called upon by his bank to provide much more sophisticated reporting," says Dick Landis, director of marketing at Datasphere Computer Systems in Portland, Oregon, which sells the *Terra* agricultural package. "The old single-entry accounting system has gone by the boards, and a double-entry system is a lot of work unless you have a computer."

Keeping track of payroll is the key PC application for John and Katy Hudson, who run Coastways Ranch, a diversified farming operation near Pescadero, California, growing kiwi, artichokes, berries, Christmas trees, and specialty pine. John Hudson uses Datasphere's multimodule *Terra* package on a PC AT-compatible Kaypro to handle accounts payable, payroll, and cost accounting.

Coastways employs 15 to 30 workers during harvest season. Instead of writing each IRS W-2 form by hand, Hudson can press a button and process as many as 30 forms at once. Eventually, he

Dennis Anderson

Katy and John Hudson use an AT-compatible Kaypro to help them manage their diversified farming operation near Pescadero, California.

wants to analyze his time cards to see how much labor goes into each crop and field. "I'd like to take a look at the end of the year and see how much time I put into a crop. To do that manually would take weeks."

Although *Terra* provides a depreciation module and can monitor individual fields, Hudson has yet to find the time to collect and input the data. "Record keeping is a problem," says Hudson. "I can keep track of what goes on with different crops, but I don't have the time to break that information down by field."

Joyce Morcum purchased the system three years ago when their operation became too big. "It was either buy a PC or spend all my time in the office," recounts Morcum. "The PC saves me time and money because I'm able to do the office work without hiring extra help."

Crop Management: The Next Step

Farmers are beginning to realize that maximum production does not necessarily lead to maximum profit. "You've got to take the 10 percent of land that's not profitable out of production," advises Pioneer's Edwards. "The margins are just not there. Cost containment requires an analysis of production trade-off."

'To remain successful, farmers will have to learn this new machine just as their great-grandfathers had to learn to use the combine and the corn picker.'

While Gene Morcum and his son are out on their 200-acre fruit and nut ranch in Tulare County, California, Joyce Morcum is inside at the PC, entering data into her *AgData* agricultural package from AgData. The program provides the usual general ledger, cost accounting, and payroll modules, but also adds an enterprise module that reports the income on different crops and blocks of ground. With this information, the Morcums can make better planting, management, and marketing decisions.

According to Edwards, the PC is the key to such analysis. "Nobody does better than he plans," says Edwards. "If you farm the farm a thousand ways on the computer, you'll make better decisions in the field."

At the Morcum's ranch and elsewhere, the new breed of enterprise analysis and crop management software helps the grower determine what, when, and how much to plant. Enterprise analysis modules (sometimes called cost accounting modules) are increasingly tacked on to accounting packages. They assist the farmer in applying comparative analysis between different crops, fertilizers, herbicides, and pesticides. The grower can then analyze each field by labor and equipment and determine the cost of producing a certain product.

While enterprise analysis is based on a spreadsheet framework (and can be accomplished on a generic spreadsheet), bona fide crop management software uses a data management structure to go into greater detail. With the proper data input, customized crop management software can help the farmer make decisions on questions as diverse as plant maturity and harvest moisture, row width, and pest control.

Over the last three years, Tom Weber has come to depend on a Compaq and a host of software to run his corn and feedlot operation in Dorchester County, Nebraska. Like most farmers, Weber first turned to the PC for accounting. Weber now interfaces *BPI General Accounting* with the *Aura* integrated package, primarily to move records from *BPI* into *Aura*'s spreadsheet to develop cash flow projections and calculate dry fertilizer rates.

After he got the accounting system running smoothly, Weber made the leap to crop management software, buying Pioneer's *Pioneer Crop Production System.* Previously, Weber had kept track of his crops on paper, but making sense of his records proved difficult. Because his data collection habits changed over time, he couldn't get a standardized inter-

pretation. "Looking back over the years is a lot easier now," says Weber.

The Pioneer program maintains files for individual fields, with categories for entering data and comments on soil testing, herbicide, insecticide, fertilizer, seed and cultural practices, and insect scouting. Weber ports the data from the Pioneer program into *1-2-3* for further analysis. Although the data input is laborious, "The end result is what I want," he says.

'The PC has allowed us to zero in on specific farmers' problems. We've always been called specialists, but now we can live up to the title.'

Irrigation and Pest Management

Crop management software is also available in customized packages that target specific applications. Among these, free-irrigation scheduling software provides daily assessments of how much water a crop will use and how much water is in the soil, and then subtracts the daily water usage. At a predetermined time the grower starts watering.

Pest and weed control is perhaps the most complex farm management problem facing growers. Even with the help of extension services, farmers often need to acquire the knowledge of a chemist and a lawyer to keep up with the latest pesticides, herbicides, and environmental legislation. Farmers must weigh the short-term profits of pest-free crops against the long-term effects of environmental stress on the crops, the water table, and human health.

Crop management software helps the farmer monitor this balancing act and save money in the process. By collecting the latest pest management advice, analyzing spraying habits, and keeping good records, the farmer learns what chemicals in what amounts suit particular soils and crops. More important, growers can analyze the data to vary the amount of spraying for particular sections of fields. "Many times we kill weeds that aren't there," says Pioneer's Edwards. According to Edwards, variable herbicide spraying and fertilizing can save farmers up to 25 percent.

Expert Systems

While crop management software helps organize the facts, it's still the farmer who must make the risky and complex decisions. Recently, PC-based expert systems began to refine those decisions.

Using a complex physiological model of a particular plant, an expert system combines a data base, an inference engine (a set of rules), and a general scratch pad for formulating "what if" questions. It won't be long before farmers can ask the PC questions like, I just got a hailstorm and it's June 12th. Is it worth it to replant?

"We are developing a PC-based expert system for pest management that should be available early next year," says Lowell Zelinski, farm advisor at the California State University at Fresno. Put simply, the program poses questions to the pest-besieged grower who inquires, for example, about treating an infested field. If the software determines that treatment is necessary, it might suggest the proper pesticides. Otherwise, the package would indicate when the grower should resample the field.

Similar expert systems are in various stages of development at universities around the country. The first out of the blocks should be *Comax/Gossym,* a cotton simulation system created at Mississippi State University by the Department of Agriculture (see the sidebar "Cotton Farmers Turn to Expert Systems").

Farming by Modem

Keeping up with complex marketing and farm management trends, today's farmer can no longer afford to be isolated. Telecommunications is becoming one of the farmer's most effective means of receiving information. The ability to download data and reports on commodities and weather is a prime incentive for buying a modem. Some farmers use spreadsheets to analyze the raw marketing data; others depend on marketing newsletters that are disseminated over networks.

Cotton Farmers Turn to Expert Systems

At Mississippi State University, the Department of Agriculture is in the final stages of testing a PC AT-based cotton-crop-simulation expert system called *Comax/Gossym*. Designed by Dr. Hal Lemon, the complex program offers expert advice on the timing of crop termination and irrigation and on fertilizer applications. The public domain program will be distributed through state extension services starting next year.

The system comprises two distinct programs: *Comax* and *Gossym*. The latter simulates the growth of a cotton plant, predicting how the crop will respond to various scenarios of sun, heat, rainfall, and irrigation. The farmer must enter information about cultural practices, plants per acre, row spacing, initial organic matter, and water capacity. *Gossym* also displays graphic images of the cotton plant in different stages of growth so the farmer can compare the computer model with the real thing.

Comax is an expert system shell that interprets simulator and farmer data according to IF ... THEN rules generated by agronomists and veteran farmers. After considering local weather patterns and soil and water conditions, the expert system instructs the farmer when to irrigate, when to add fertilizer, and when to terminate the crop.

The system requires an IBM XT or AT with 2MB of RAM, a math coprocessor, a graphics display, a modem, and an automated weather station that sends data to the unattended AT every night.

Mississippi farmer Kenneth Hood, who raises cotton with his brothers in Bolivar County, is one of 18 growers using the prototype *Comax/Gossym*. "This program is much more advanced than anything else on the market," says Hood, who has used the system for over a year. "All I have to do is build my own farm field profile. It really doesn't take a whole lot of time."

Hood depends on the system primarily to determine his planting schedules. "I ask what can I expect in a hot, dry year, and what can I expect in a cold, wet year, and it gives me the crop simulation."

Aside from helping to plan for the future, *Comax* assists in day-to-day fertilizer and pesticide decisions, giving advance warning if it determines a crop may become unhealthy.

Hood was skeptical at first but has come to depend on *Comax*'s expert advice. "I've tried to fool the machine, but it doesn't work," says Hood. "I input the data for my actual 1980 crop, and it came within 38 pounds of what I harvested. The program takes the guesswork out of farming." *–J. F. and E. B.*

The largest on-line agricultural service in the United States is the AgriData Network from Milwaukee-based AgriData Resources, which primarily disseminates commodities market information. Recently, AgriData entered into a venture with IBM to provide on-line services to agribusinesses; another joint venture with Satellite Broadcast Network offers select services via satellite (see the sidebar "Agridata: IBM Takes an On-Line Interest in Farming").

California provides a number of on-line data bases targeted at growers, including irrigation and pesticide data bases and one of the best on-line weather services in the country. The California Agricultural Technology Institute recently went on line with ATINet, a network designed to disseminate agricultural studies and demonstrate computer use to farmers and support agencies.

One of the most extensive sources for on-line agricultural advice is the University of Nebraska's AgNet service. The oldest national agricultural network, AgNet is primarily a conversational service. Farmers can call into AgNet and ask specific questions on subjects ranging from soil loss to pesticide management.

Farmers who use PCs also learn from one another. Agricultural PC user groups and bulletin boards are springing up all over the country, letting farmers swap programs and PC lore, buy and sell machinery, tell jokes, and share information in general.

Enterprise analysis modules assist the farmer in applying comparative analysis between different crops, fertilizers, herbicides, and pesticides.

But modem use by farmers remains in its infancy. "Telecommunications hasn't hit the West Coast quite as big as we had hoped," admits Datasphere's Landis. Except for farmers who happen to be computer hobbyists, it's primarily the big cash-crop growers who log on. According to Landis, telecommunications is more popular in the less diversified Midwest, where a greater number of farmers follow the futures markets.

Future Farmers of America

Graphics will play an increasingly important role in agricultural software. The first step will be crop management packages' inclusion of charts to help farmers visualize growth patterns and marketing trends.

At the University of Nebraska, Dr. Dennis Schulte, professor of agricultural engineering, is developing a crop simulation system that incorporates digitized imagery of crop growth. Using Chorus Data System's PCEye video capture system, Schulte and his students can monitor plant growth to predict water and nutritional needs. The simulation system digitizes video pictures of each plant and translates the images into three-dimensional pictures. The setup can predict the health of a plant under specific conditions and types of soil.

Other scientists are working on digital image processing systems that digitize infrared photos taken from airplanes and satellites. Such computer-generated maps could be downloaded by farmers into satellite dishes, digitized, and analyzed on a PC (see "PC in the Sky," *PCW,* Vol. 2, Number 13).

Even before the farmer buys a PC, the microprocessor has often invaded the farm in the guise of automated machinery. Microcontrollers monitor combines, sprayers, irrigation systems, field moisture controllers, and grain driers. Data collection devices and electronic mapping systems can be incorporated into tractors for automatic adjustment of fertilizer and pesticide equipment. Already, some farmers use hand-held computers to collect data in the field. At the end of the day this data can be dumped into a PC.

At least one scientist is experimenting with cabling microprocessors to PCs for optimum control and record keeping. At the

Agridata: IBM Takes an On-Line Interest in Farming

G. Berton Latamore

IBM may soon start delivering agricultural news, real-time commodities market quotes, and other agribusiness information to large-scale farmers and agribusinesses. Under an unusual joint development agreement with AgriData Resources announced last fall, the two companies will develop agricultural services to be provided over IBM's Information Network, a time-sharing and data services network that connects over 300 customer sites.

Apparently, IBM was attracted to AgriData because it is the world's leading provider of electronic agricultural information. According to AgriData president Richard Weening, "Ninety-six percent of North American farmers who use any interactive farm data base service subscribe to AgriData."

The services to be announced will likely be based on AgriData's existing wide range of data bases, which include real-time market quotes from all the North American commodities markets and prices at grain elevators throughout North America. This information is supplemented with electronic newsletters containing market projections and interpretations from commodities experts. Under an agreement with the Associated Press, AgriData is the exclusive provider of AP news to weekly newspapers throughout rural America, making it the world's largest clearinghouse of local agricultural news.

AgriData is no stranger to joint ventures. Last year the company teamed up with Chicago-based Satellite Business Network to launch the Satellite Data Network. The service delivers select portions of AgriData services to PCs equipped with C-band TVRO (television reception only) satellite dishes, already in wide use by farmers in remote locations (see "Satellite Earth Stations," *PCW*, May 1986). Subscribers receive a demodulator and special software that allows them to specify the information they want. The software automatically captures the appropriate pages and updates information each time a page is rebroadcast.

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University of Arizona, Dr. Bill Gensler has cabled cotton plants embedded with electrodes to custom-made underground computers, which are in turn cabled to a controlling PC AT. The AT steadily collects moisture data and stress data from the plant. Custom software then analyzes the data and tells the irrigation machines how much water the plants need for the next day.

The combination of automated machinery and computer imagery appears to be leading to agricultural robotics. Establishing the precise amount of water, herbicide, pesticide, and fertilizer that each plant needs will eventually enable robots programmed to a grid of a field to care for each plant individually. Someday farmers may be able to control the farm from a computer while robots perform all the labor.

The Haves and the Have-Nots

Not all farmers will be able to participate in the future of computerized agriculture. For some, the barrier is strictly economic: Unless more banks offer low-cost loans to farmers who buy and own PCs, the opportunity will not arrive in time. For other farmers, the obstacle is a matter of organization, time, and training. Farm software is becoming easier to use, but it's still asking a lot from a farmer who works from sunup to sundown to come in at night and learn to use a PC.

Ultimately, most farmers will have little choice but to computerize or go under. Computers may bring an end to some aspects of the small farmer's way of life. Yet even with a PC, the farmer remains a gambler, never knowing what may come next. While the PC may not make farming a failsafe venture, it can provide better information with which to gamble. ●

John Faulkner is a freelance writer who grew up on a farm in Michigan. Eric Brown is an Associate Editor for PC World. *The authors cowrote "Computers Ride the Range" (*PCW, *Vol. 2, No. 5), a report on the PC in the cattle industry.*

AgData
AgData
891 Hazel St.
Gridley, CA 95948
916/846-6203
List price: General Ledger $995, Payroll $995, Accounts Payable $695, Accounts Receivable $695, Cost Accounting $495
Requirements: 256K, two disk drives, DOS 2.10 or later version
Copy protected

Aura
BPI Systems, Inc.
3001 Bee Cave Rd.
Austin, TX 78746
512/328-5434
List price: $595
Requirements: 256K, two disk drives, DOS 2.00 or later version
Not copy protected

BPI General Accounting
BPI Systems, Inc.
List price: $595
Requirements: 256K, two disk drives (hard disk recommended), DOS 2.00 or later version, graphics board for Graphics module
Copy protected

Pioneer Crop Production System
Pioneer Hi-Bred Int'l
5721 Merle Hay Rd., P.O. Box 247
Johnston, IA 50131
800/247-2224, 800/342-2285 Iowa
List price: $650
Requirements: 256K, two disk drives, DOS 2.00 or later version
Not copy protected

Terra
Datasphere Computer Systems, Inc.
6443 S.W. Beaverton Hillsdale Hwy. #305
Portland, OR 97221
503/297-9035
List price: $1995, payroll modules $750-$1500
Requirements: 128K, two disk drives (hard disk recommended), DOS 2.00 or later version
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George Steinmetz

Timothy Leary's Looking Glass

The renowned apostle of mind expansion has transported his pilgrimage to software with an offbeat thought processor called Mind Mirror.

Clifford Guren

What price fame? For Timothy Leary, ridicule and infamy have both been on the tab. Even as he was celebrated in song and transformed into a cultural icon, Leary's significant contributions to the field of psychology receded from public consciousness. Indeed, recognition of his Harvard research work in the 1950s pales beside his reputation as drum major for the 1960s drug culture.

But today, Timothy Leary stands poised atop the high-tech wave, riding along with what he dubs "the Whiz Kid Generation." Leary has joined his academic research in psychometrics (mental measurement) to his penchant for exploring "altered states and multiple realities" and concocted a mental adventure game for the PC called *Mind Mirror.*

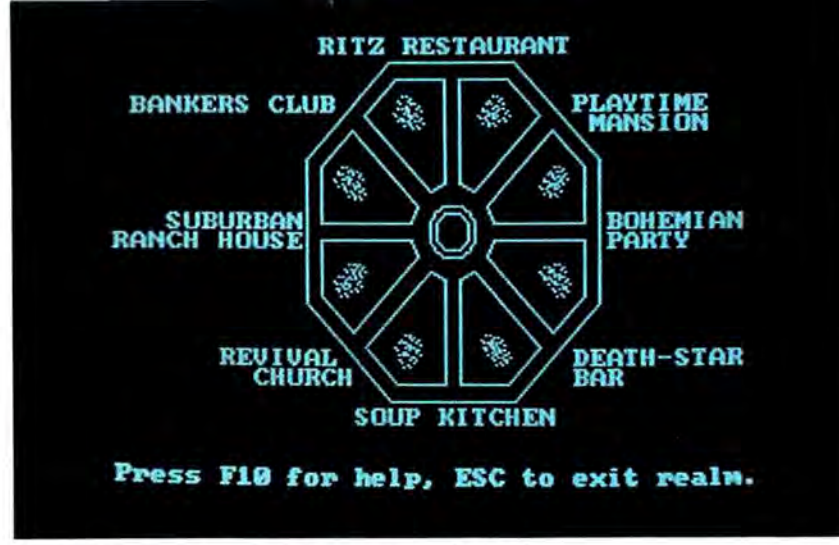
Mind Mirror, published by Electronic Arts, is a hybrid—a cross between personality programs like *Mind Prober* and simulations à la *Business Simulator* and *American Dream.* And while it inhabits that expanding realm best characterized as celebrity software, *Mind Mirror*—like *Andrew Tobias' Managing Your Money*—brings to the party more than a big-name endorsement (see "Andrew Tobias: Right on the Money" in this issue). *Mind Mirror* is fully Tim Leary's—he conceived it, wrote the text, spiced it up with the requisite new-age jargon, and worked intimately with its two programmers. To shop for a buyer, he formed Futique, a marketing company now hard at work on other offerings, and eventually approached Electronic Arts.

Mind Mirror is, in Leary's words, a "mind appliance that helps you clarify, quantify, diagram, and communicate your thoughts. And it helps you better understand the thoughts of others." After you've used the program to help boost your career or salvage your marriage, you can use it to shred any stereotype. Clearly, the name of Leary's game remains consciousness expansion; only the playing field has changed.

Whatever its trappings as entertainment, however, *Mind Mirror* is serious at its core; it's a first chance for Leary to share with the world that ostensibly knows him so well the gist of his sophisticated, academically celebrated psychological theories. Leary's research is built on Harry Stack Sullivan's work in the arena of interpersonal anxiety. Following Sullivan in the early 1950s, Leary mapped human personality; via *Mind Mirror,* the PC draws strikingly similar maps today.

Caution: Stereotypes at Risk

Using *Mind Mirror* is a bit like taking a crash course in gestalt psychology. You begin by choosing the subject—the person—you want to play. Your subject can be real or imaginary; the only stipulation is that you want to learn about that individual, or more



Screen 1: From the opening screen of Mind Mirror's Life Simulations component, you can take your subject through an interactive text odyssey led by Tim Leary.

pointedly, learn your feelings about him or her. Much as *Mind Mirror* is recreation, it's also easily adaptable to such business disciplines as personnel, management, labor negotiations, and sales—any setting where it's useful to air your preconceived notions, ideals, fears, doubts.

Suppose you want to play your manager. How does that feel? How does he or she react in various personal, social, and professional situations? You begin learning about your boss by "mind-scoping" him or her—drawing a picture of your manager as you rate that person on scales that have as their end points traits like "forceful" and "timid" or "irritable" and "friendly." *Mind Mirror,* says Leary, "doesn't give you advice or scold you. A good mirror is like a good friend, it just reflects back."

When you finish rating your subject, *Mind Mirror* translates your answers into a "mind map"—a graphic representation of the personality you've outlined. The mapping system springs whole from Leary's pioneering work in psychometrics—ideas he outlines in his books *The Interpersonal Diagnosis of Personality* (John Wiley, New York, 1957) and *Multi-Level Assessment of Personality* (Psychological Consultation Service, 1957).

Once you've mapped your idea of your subject, you role-play the character through the Life Simulations part of the program (see Screen 1). These simulations consist of what Leary calls "micro-events," like making a pitch for a contract or facing an IRS auditor. In each case, you try to react as your subject would. Once you choose a response, you can refer back to the mind map. The map plots the personality you first outlined against the personality you're playing and advises you if you're playing your subject too confidently, too creatively, and so on.

Mind Mirror is already being used by the likes of The Family Community Center in Burbank, California, as a basic therapeutic and diagnostic tool—or, in Leary's words, "a mental Nautilus system." And Leary is just as committed to broadening its potential business applications, particularly when group dynamics matter: in reconciling choices in a hiring decision, in devising job descriptions, in restructuring an organization. The program's Mind Interplay component enables a group of, say, five managers to compare their thoughts and build a sixth, collective model. Leary's goal is to elevate the entire decision-making process by "clarifying communication, making it precise and open.

"The Challenger tragedy comes down to a failure of communications," he says. "All these people were thinking things in different parts of the country, but they couldn't get their thoughts on screen or diagram the discrepancies between their modes of thinking. We simply cannot tolerate mistakes due to clumsy communication in business or government or personal life."

Playing With the Circuitry

For Leary, personal computers are a natural new frontier, a logical evolution from his explorations of consciousness via hallucinogens. "The average kid during the sixties came to drugs from television, where they were used to dialing realities. I came to drugs as a psychologist, and my approach to them has always been professional: to help myself and others learn how to open up areas of the mind. The paradox of the sixties was that when the decade came to a grinding halt, none of us knew what to do with a turned-on brain. It's like, 'I got a brain all dressed up and nowhere to go.'

"I see psychoactive drugs as chemical ways of activating different circuits of the brain," Leary continues. "We always use the best external technological metaphor for the brain.

"The history of the PC is just like that of the book. Before Gutenberg, one mainframe sat up in the palace with the cardinal and the duke, guarded by security-cleared, socially alienated hackers called monks who knew the machine language–Latin–while we were ignorant.

"My theory of intelligence and human evolution concerns the technology used for thought. As a nuts-and-bolts practical theory, you can judge the intellectual level of a species, a society, an organization, or an individual by the technologies they use for thinking. If you're limited to machine-made, wood-pulp storage systems like books, you're going to be stuck with 26 letters in an English alphabet. G-o-d spells GOD, and d-o-g spells DOG–be careful. We were in a very embarrassing position waiting for the PC to appear.

"These days, I'm waging a crusade against the keyboard. I see it as three rows of Phoenician soldiers with spears holding you away from using the machine. I'm all in favor of joysticks. In fact, I'm going to propose to Electronic Arts that in future product offerings, we refer to the return key as the advance key. 'Return' goes back to a lot of things I don't like."

For those who've been hanging around computer expos the last few years–particularly shows on the West Coast–Leary's embrace of the PC as a mind-expanding tool should come as no surprise; he's cut a ubiquitous figure at these high-tech jamborees. The man behind the persona does not surprise, either; rather, he reassures. As he writes in *Flashbacks,* his recent memoir, "I have relentlessly and faithfully pursued self-exploration, evolution, and innovation as the antidotes to terminal adulthood."

Tuning in and turning on also remain cogent concepts for Leary. "When I said 'Turn on' I meant activate, and it goes without saying that the intelligent and competent human being should be able to activate any circuit of the brain." Tuning in means "tune it back in," Leary says. "You must have some way of expressing it–through art, through music, through change in your life. Turning on in *Mind Mirror* means turning on to your subject, while the life simulations help you tune your model back in."

Leary doesn't toss around the term "life simulations" casually. "The biggest sellers in the home market have been programs like *Flight Simulator.* The last time I checked, 7 of the top 20 games were road simulations, and that's followed by the newest genre: the power simulation, the Wall Street simulation. The next obvious step, then, is the life simulator. Let's face it, in Yuppie America, you want to fly a plane, but you also want to develop your personal excellence. I think life simulation is a logical market vacuum."

Still, Leary's familiar motto tends to lose something in other people's mouths. The teaser on the *Mind Mirror* package beckons users to "tune in, turn on, boot up," a catch phrase that Leary doesn't particularly appreciate. Electronic Arts peppered its unveiling of *Mind Mirror* with thinly disguised verbal hot keys, calling the program "a street-legal trip" that enables you to give your stereotypes "the acid test." If Leary seems weighted down by the baggage of a past that too many trivialize or commercialize–even those in his camp–he merely winces, professes to understand the reasoning, and moves on.

The good doctor expects great things from his first bootable product. "The program opens up an entirely new way of knowing your mind," Leary exults. "I'm sure there's going to be a *Mind Mirror* quarterly. I've also been negotiating with a videotape cassette company to have a VCR version, like Jane Fonda's physical fitness tape. I wouldn't call it Timothy Leary's Metaphysical Fitness, but I just might call it mental fitness." Not an immodest claim, but, Leary concludes, characteristically breaking the argument down to its elements, "*Mind Mirror* helps you think better, and if you're doing that on your job and the guy next to you isn't, you're going to sell better, communicate better, move up through the organization more quickly. You don't want to be the last kid on your block to have a mind appliance, do you?" ●

Clifford Guren is a freelance technical writer in San Francisco.

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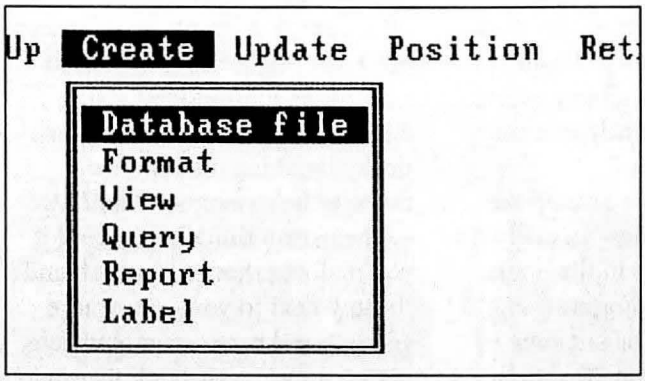

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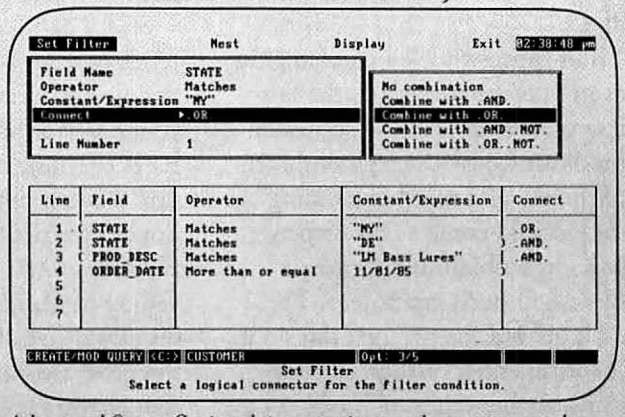

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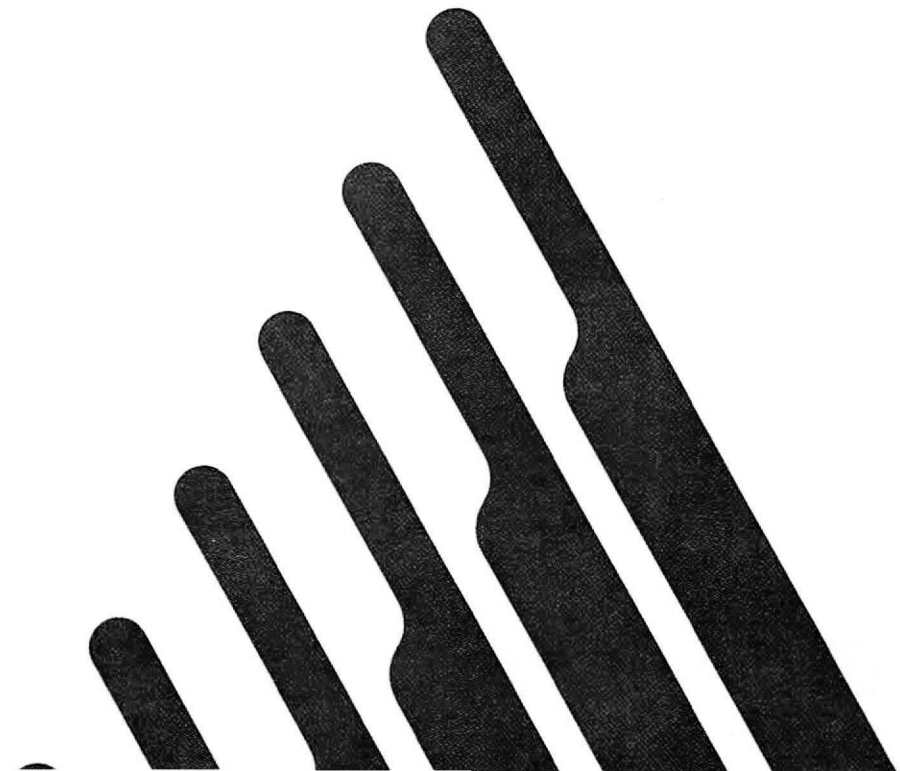

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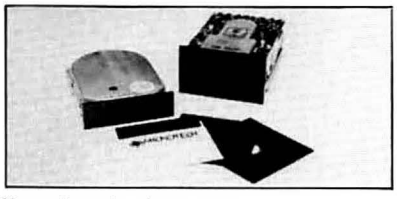

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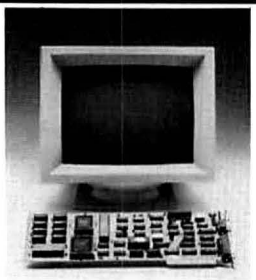

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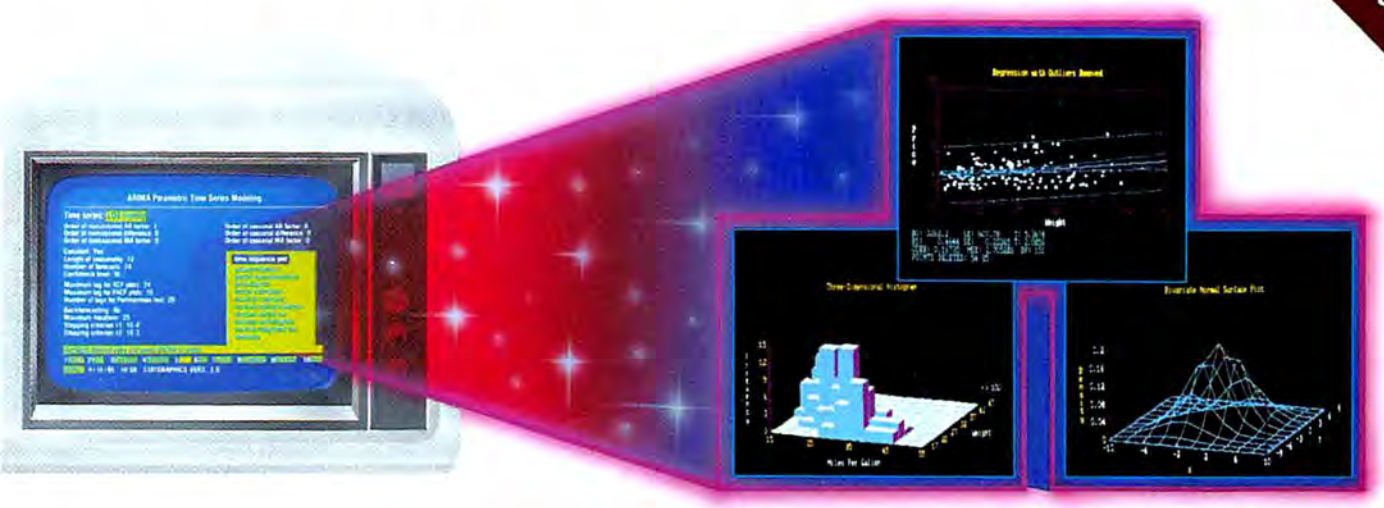

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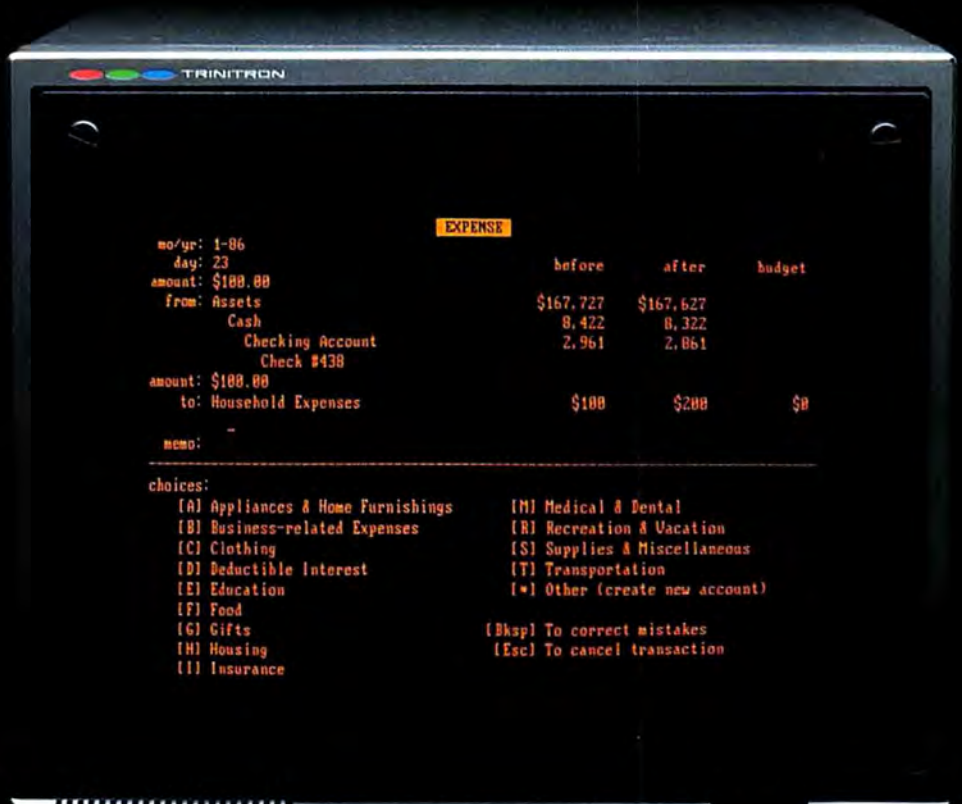

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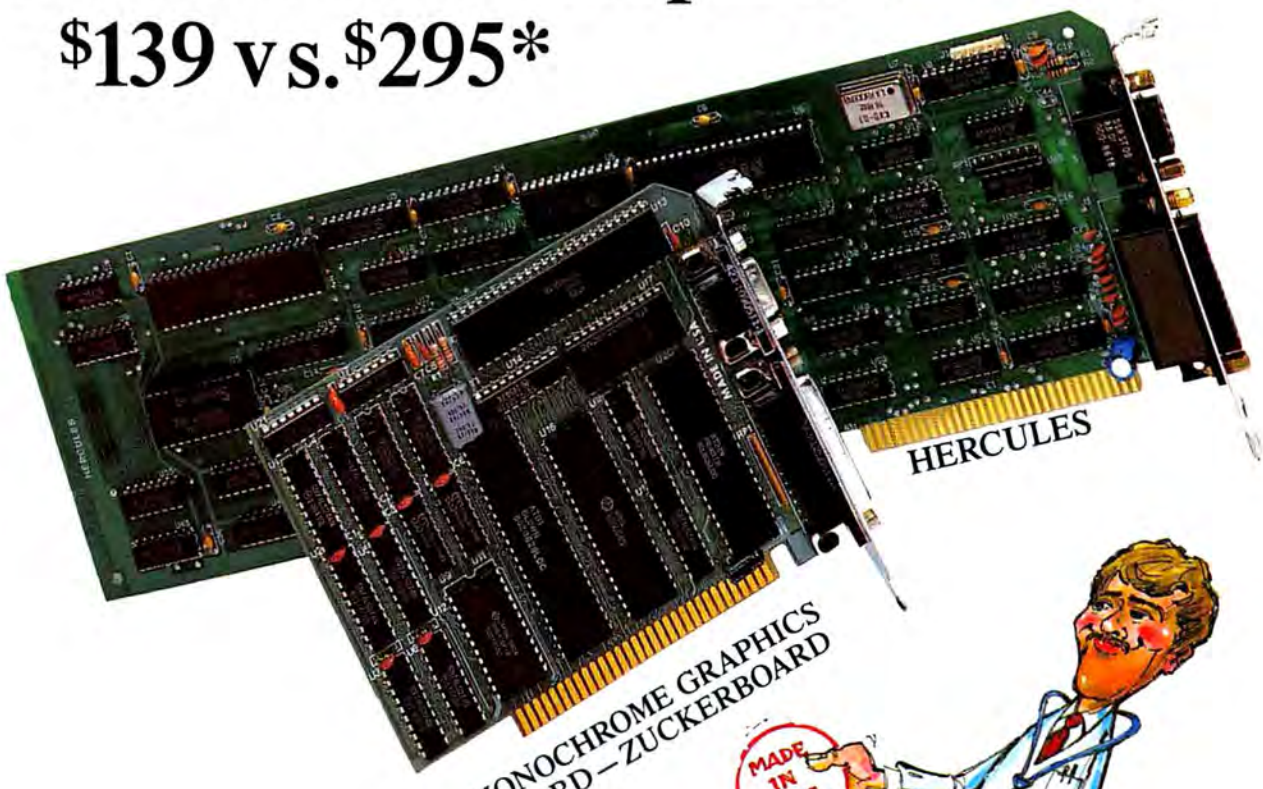

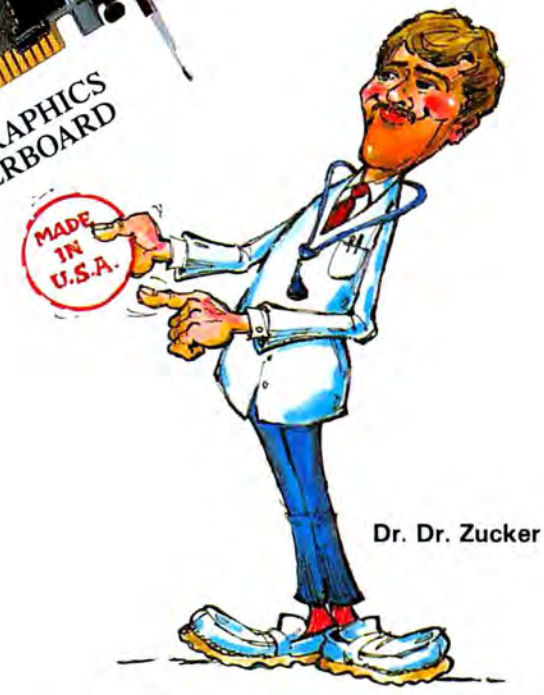

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Andrew Tobias: Right on the Money

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Stephen A. Blumenthal

Money is a singular thing. It ranks with love as man's greatest source of joy. And with his death as his greatest source of anxiety. –John Kenneth Galbraith

There's probably no better way to alleviate fiscal anxiety than through detailed planning. Fear of the unknown is, after all, the most crippling of fears. Analyzing your finances may mean reaching a bottom line that looks red instead of black, but that knowledge allows you to apply the skids before you reach the edge of a financial precipice.

Judging from the success of *Andrew Tobias' Managing Your Money,* a product of Micro Education Corporation of America (MECA), thousands of PC owners are eager to mitigate their money worries with the help of personal financial planning software. In recognition of this huge and hungry market, MECA has revamped *Managing Your Money,* now designated version 2.0, and introduced a supplemental telecommunications program, *Managing the Market,* to eliminate some of the original's shortcomings.

Meat and Potatoes

Both the old and new versions of *Managing Your Money* consist of three disks containing a series of related programs–Reminder Pad, Budget and Checkbook, Income Tax Estimator, Insurance Planner, Financial Calculator, Portfolio Manager, and Net Worth. This integrated approach is a great time-saver. If you write a check to your doctor in Budget and Checkbook, for example (see Screen 1), the program

Charles Kremper

automatically deducts the amount as a medical expense in Income Tax Estimator and subtracts it from Net Worth.

Managing Your Money performs just about every real-world financial calculation you are likely to need for home and family, like balancing your checkbook, figuring the monthly interest payment on a $120,000 mortgage at 9 percent, or analyzing how

New forecasting features help you determine how to arrive at the $75,000 you'll need to put Junior through Juilliard or to sweeten your golden years.

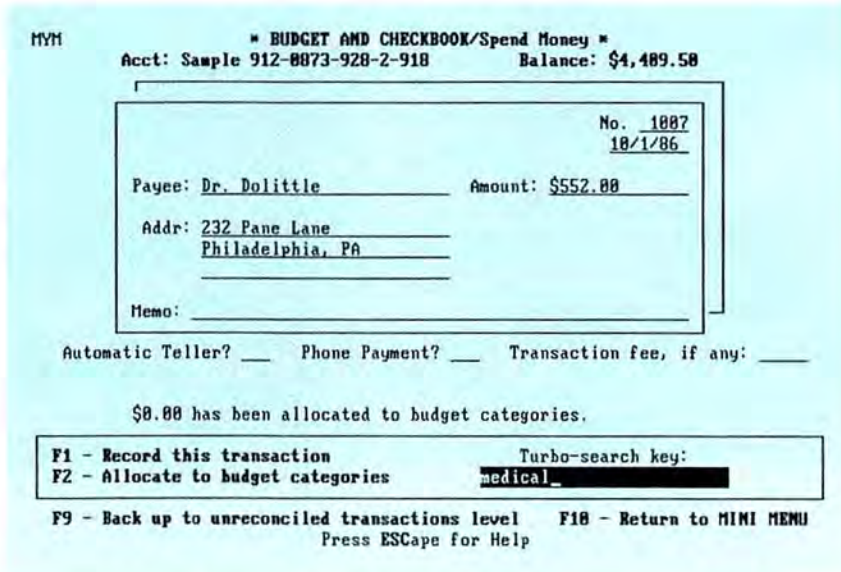
much insurance you should carry. And the chatty on-screen help function, which is context-sensitive, is by itself worth the price of admission. In addition to clarifying operational issues, the help screens provide a lucid introduction to financial management in the witty style of Tobias' bestselling book, *The Only Investment Guide You'll Ever Need* (G. K. Hall & Co., Boston, 1979).

Straddling the Line

In its first incarnation, *Managing Your Money* was a personal financial tool similar to Charles Schwab's *Financial Independence* and Monogram's *Dollars and Sense,* but version 2.0 straddles the line between home and business applications. In Budget and Checkbook, for example, you can still plan the family budget, but you now have the option of maintaining accounts payable and receivable and printing invoices complete with your company's name and address. The program will even age your receivables so you know when customers are behind in their payments.

Card File, which debuts in version 2.0, is a handy desktop utility akin to the notepad and the dialer in Borland's *SideKick.* Card File stores name and number lists, a particularly convenient feature for business purposes because you can print the Card File's contents as mailing labels (see Screen 2). Sales calls are a breeze with the new auto-dialer, a voice communications feature that connects you with anyone in your Card File.

No one should confuse *Managing Your Money* with a full-featured business accounting package. Still, if you have a small home business baking tofu cutlets or writing articles for computer magazines, *Managing Your Money* may satisfy your needs better than a more sophisticated (and more expensive) program.



Screen 1: This Budget and Checkbook screen lets you fill in checks. The Turbo-search key takes you rapidly to a specific budget category, such as "Medical," where it records the check amount.

Information Is Power

The program's greatly expanded data management capabilities benefit both home and business users. In the Budget and Checkbook section of version 2.0, you can sort through your accounts and specify automatic transactions (such as deducting a monthly rent payment). A new "variable automatic" option in this module lets you enter information for recurring monthly statements that vary in amount like credit card bills (see Screen 3).

Budget and checking transactions can be sorted by date, check number, or payee, and you can combine reconciled and unreconciled transactions to create up-to-the-minute reports. You can also sort insurance policies by the individual insured, the type of insurance, or the company, and you can extract a summary report on all your policies, complete with premium totals for life, home, car, health, and accident insurance.

Similarly, an enhanced Portfolio Management module enables you to transfer assets between portfolios. This feature might come in handy if, for example, you owned stock in an offshore oil company that hit pay dirt and you wanted to transfer the income-producing asset to a child's trust fund so that the nest egg would be taxed at the child's lower rate. (The pending revision in the tax code may restrict this kind of maneuver.)

Reminder Pad, an on-line tickler file, has been updated to include a simple data base. For each reminder you can create a pop-up window containing more information. If you want to be reminded to call your lawyer, for example, you can detail your legal questions in the pop-up window. You can spell out other projects on a To Do list and expand on that information by creating lists of related projects.

> *Managing Your Money's original documentation was so weak, a cottage industry sprang into being to explain its features and nuances.*

Version 2.0's Reminder Pad accepts twice-weekly and twice-monthly reminders in addition to

Screen 2: The Card File module lets you keep detailed information on personal acquaintances and make calls using the auto-dialer.

the one-shot, monthly, and yearly reminders sanctioned by its predecessor. All told, the new Reminder Pad features make for a comprehensive tickler system that appears on your screen on prespecified dates when you start the program.

Managing Your Money *continues to be oriented to the current calendar year. That's fine for some people, but it's a drag if you want to enter data for future years.*

Speculative Enterprises

New forecasting functions in version 2.0's Financial Calculator module allow you to predict the long-term health of your business or family finances. If you own real estate, for example, you can establish whether refinancing your mortgage is worthwhile, given last spring's dive in interest rates. If you're planning to buy real estate as rental property, you can determine its potential cash flow (see Screen 4).

When you decide to acquire a big-ticket item (such as a computer), you can calculate whether buying, leasing, or renting is the most cost-effective option, given the vagaries of depreciation.

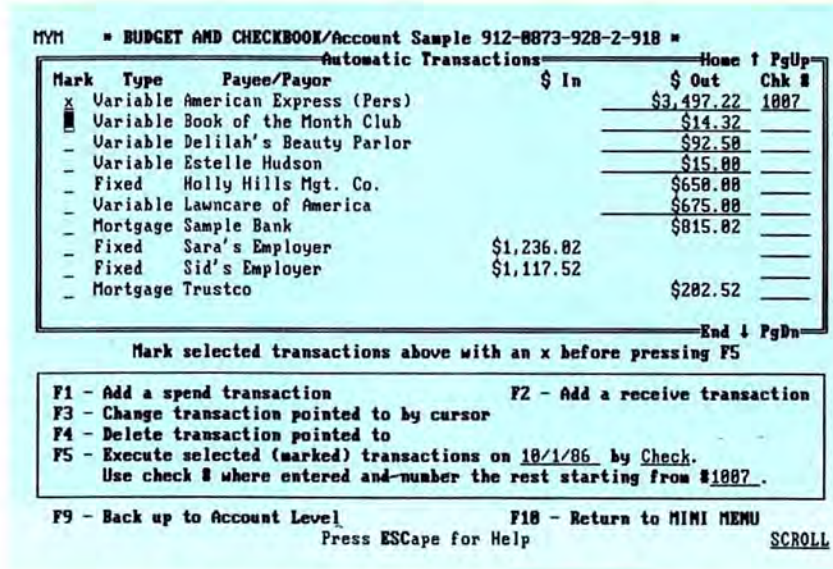
If you need to save money for college tuition payments or retirement, you can determine how to arrive at the $75,000 you'll need to put Junior through Juilliard or to sweeten your golden years. You can also calculate the effects of inflation or deflation on any given sum.

The Tax Man Cometh

The Income Tax Estimator in version 2.0 contains 155 tax categories (compared to the older version's 27) with applications for both home and business.

The module has been updated to allow for variable tax years and five-year tax planning. It can also save analytical information in ASCII files for transfer to a tax-processing service such as Fast Tax that uses the data you've sent via modem to issue completed tax returns.

Version 2.0's Income Tax Estimator now recognizes that taxes are as inevitable for farmers and people who work at home as they are for corporate types, since it includes the capacity to complete Schedule F (to report farm income), Schedule SE (for Social Security self-employment tax), and Form 2106 (for employee business expenses).



Screen 3: Managing Your Money lets you perform automatic transactions both for fixed expenses and for bills that vary in amount.

The module can be modified to reflect simple changes in the tax laws, such as in allowable deductions for married couples or for contributions on nonitemized returns. However, the pending overhaul of the tax code may require revision of this chunk of the program.

Flies in the Ointment

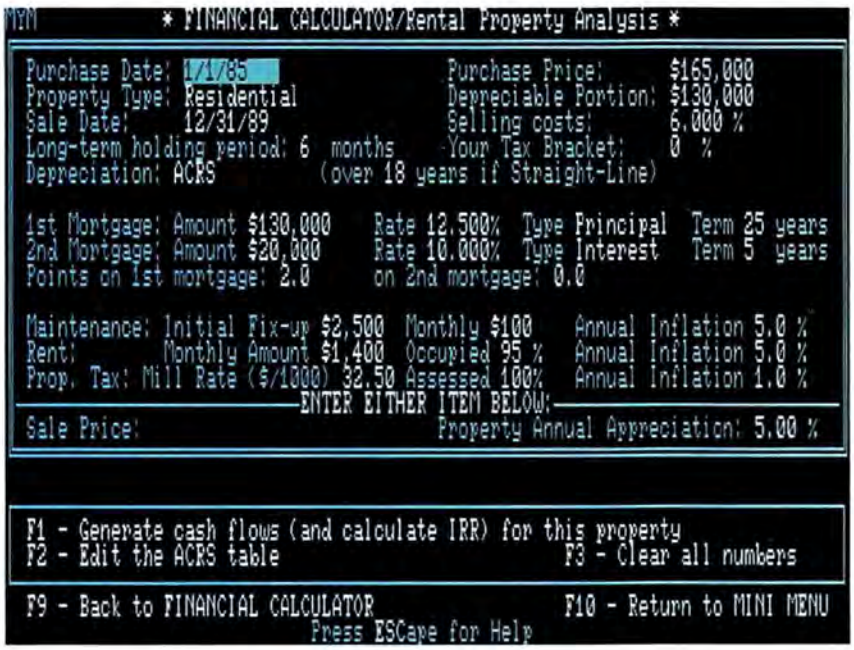
Although version 2.0 offers lots of top-notch features, a few flies remain in the ointment. To begin with, *Managing Your Money* continues to be oriented to the current calendar year. That's fine for some people, but it's a drag if you want to enter data for future years. To enter information for, say, 1987, you have to conduct a 15-minute procedure called Starting a New Year, which involves archiving the information you've entered for the current calendar year and formatting new disks for the coming year. You can inspect the archived data and use it to print reports, but you can't add it to unarchived data.

In recognition of the program's orientation to the current calendar year, the manual suggests that "you may wish to lie about the date we ask for on the title screen." If it's December, for example, and you're not planning to enter information for the last year, you're advised to pretend it's January 1 of the following year. If it's midyear, you have to either enter information for the preceding six months so that you're up-to-date or wait the year out.

Another stumbling block is the program's copy protection. In version 2.0, you don't need the copy-protected disk every time you begin. However, you do need it on certain occasions, known only to the program's creators, who, in their infinite wisdom, have added a sporadic prompt to insert the original disk "so we know it's really you." The more you use the program, the more often the prompt is supposed to appear, but I've yet to see it.

If you're using a single-drive system, be advised that you will have to swap disks about 60 times (yes, 60) to copy the original program. Get yourself a shot of Johnny Walker and relax so that by the time you actually get to use the program you won't be so frustrated that you toss it out with yesterday's paper.

Managing Your Money works with admirable speed on a hard disk but pokes along on floppies.



Screen 4: The Rental Property Analysis section of Financial Calculator can help you determine a property's monthly cash flow.

New Kid on The Block

Managing the Market, developed by MECA in conjunction with Teleware, is a telecommunications supplement to *Managing Your Money.* In *Managing Your Money,* you must manually update the price changes in your securities portfolio. That's fine if you have a modest portfolio; however, *Managing Your Money* can store more than 1300 transactions in a host of portfolio accounts. Enough people must have written "Dear Andy" letters about the agony of manual updates to convince MECA to create *Managing the Market,* a link to Dow Jones News/Retrieval data bases that automatically updates the prices of your securities.

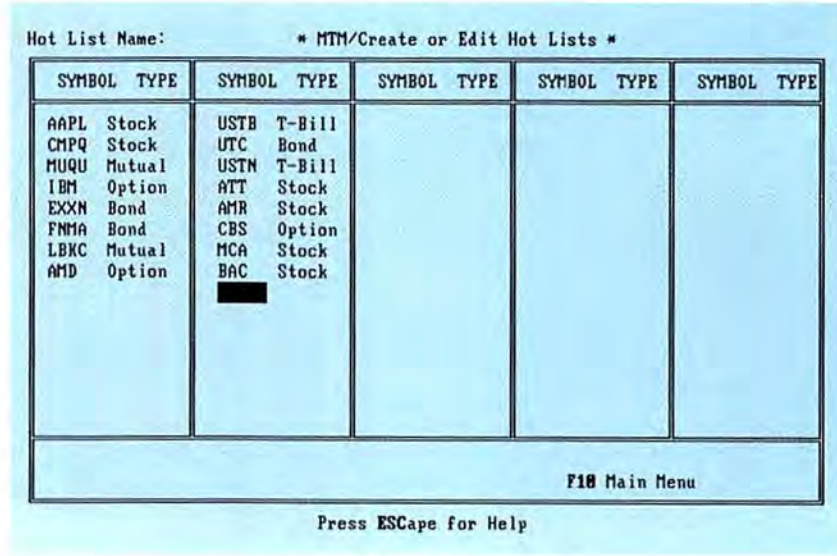
Once you've hooked into the Dow Jones data bases (via Tymnet, Telenet, or other conduits) and snapped up the latest price information, the program prompts you to save the changes for transfer to *Managing Your Money*'s Portfolio Manager module. You can save about 15K worth of information in a file on your *Managing the Market* disk, and an on-screen counter helps you determine whether you're pushing the limit.

Managing the Market enables you to update both single and multiple portfolios automatically, and, if you like, to create "hot lists" consisting of up to 225 selected securities (see Screen 5). Once you're on line to Dow Jones, you can make use of the company's news and text research facilities, as well as MCI Mail, the Official Airline Guide, electronic shopping, movie reviews, and other services. An on-screen timer lets you determine how many pennies are melting away in connect-time charges. You also get a free hour of network use and a Dow Jones News/Retrieval starter subscription worth $75.

> Managing the Market *enables you to update both single and multiple portfolios automatically and to create 'hot lists' consisting of up to 225 selected securities.*

Managing Your Money contains no menu option for *Managing the Market,* but this is only a minor inconvenience. *Managing the Market* works fine with both old and new versions of *Managing Your Money,* except that you'll need to make sure the code names of securities that you've entered into the Portfolio Manager conform to official ticker designations, upon which *Managing the Market* relies.

Screen 5: Managing the Market enables you to assemble and monitor a "hot list" of up to 225 securities.



Managing the Market can also operate as a stand-alone program and save information as DIF files for transfer to *1-2-3*.

You'll be satisfied with *Managing the Market* if all you really want from this package, other than access to the Dow Jones data bases, are price updates for your portfolio. And once connected, you have to maneuver through the Dow Jones command system, which can confuse new users despite the on-line help. While programs such as *Personal Investor, Market Manager Plus,* and *Market Microscope* contain menus to simplify using the Dow Jones data bases, *Managing the Market* simply links you and leaves you to find your own way.

Dirty Documentation

The documentation for *Managing the Market* and *Managing Your Money* provides virtually no guidance. Even though the on-screen help is witty and engaging, it's no substitute for a well-written manual. Inexcusably, MECA refused to learn from its earlier mistakes with *Managing Your Money* version 1.5. The program's original documentation was so weak, a cottage industry sprang into being to explain its features and nuances. *Managing the Market*'s documentation shares the dubious distinction of being just as feeble.

Don't even think about throwing your questions at MECA's technical support department. The company is notorious for its impenetrable phone lines.

The Proverbial Bottom Line

Overall, *Managing Your Money* is a versatile financial planning tool; its expanded features make it especially useful as an all-around program for small-business owners. If all you really need in a piece of business software is the ability to maintain accounts, compile and print mailing lists, perform cash planning, and prepare your taxes, then the new version of *Managing Your Money* can double as a business program and a family financial planning tool.

Provided your needs are simple, *Managing the Market* is a useful supplement. And while the documentation for both programs is bloodless, excellent help screens partially mitigate this shortcoming. Best of all, the programs are designed to encourage even the most recalcitrant of financial planners to reckon with the inevitable bottom line. ●

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Managing Your Money version 2.0
Micro Education Corp. of America
285 Riverside Ave.
Westport, CT 06880
800/631-MECA, 800/633-MECA
Connecticut, 203/222-9087
List price: $199.95
Requirements: 192K, one disk drive, DOS 2.00 or later version

Managing the Market
Micro Education Corp. of America
List price: $149.95
Requirements: 192K, one disk drive, DOS 2.00 or later version, 300-bps or 1200-bps modem

A Plus for dBASE III

With the release of dBASE III Plus, Ashton-Tate throws open the door to an even wider circle of aspiring data management users while keeping seasoned developers happy. But those hoping to exploit the program's new networking version may be disappointed.

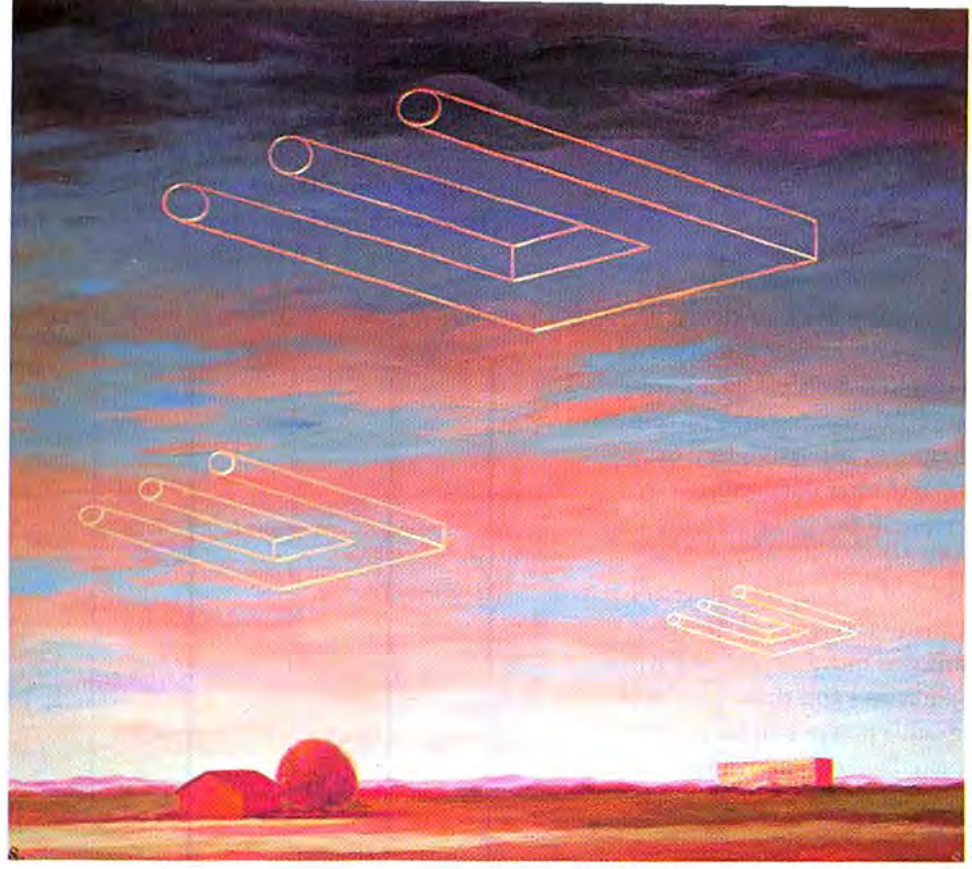
Robert Eisenberg

Market prognosticators and jealous competitors regularly predict the demise of *dBASE*. Too big, too slow, too hard to use, too mired in the past, they say. But Ashton-Tate continues to confound its critics and sink its talons further into the PC data management market.

dBASE III Plus will likely tighten the company's grip on user pocketbooks. Ashton-Tate's development team has managed to accommodate both ends of the user spectrum with a product that comes close to blending power and ease of use. The changes come not a moment too soon.

The latest tidal wave of cheap PC clones has swept thousands of new business users into the market—and many are looking for capable but easy-to-use data management programs. Application developers who once toiled in the *dBASE* quarry are being lured away by programs such as *Revelation* that incorporate full-blown programming languages. And users in the middle—those raised on *pfs:file, 1-2-3,* and other file managers—find the power, elegance, and spreadsheetlike interfaces of programs such as *Paradox* and *R:base 5000* all too alluring.

dBASE III Plus may not quash all the programs fighting for customers up and down the data management continuum, but it will certainly hold its own. New users and those climbing the upgrade path from simple file managers will be greeted by the Assistant, *dBASE*'s revamped menu-driven interface. Ashton-Tate has wisely borrowed *Framework*'s pull-down-menu structure and given neophytes (and those too busy to master a command language) all the functions necessary to interrogate and manage a multiple-file data base. The inclusion of a screen generator and an applica-



Scott Siedman

tion generator means that nonprogrammers can create custom menus and data entry screens.

dBASE's command language, the grist for the application developer's mill, has gained 36 commands and 32 functions. Some merely smooth *dBASE*'s rough edges, while others let you create smarter programs that can, for example, determine the type of monitor connected to a system or how a user last exited a menu. Still others make debugging a program a more manageable chore.

A pleasant surprise is that this new *dBASE* still runs on a 256K PC with two floppy disk drives. General operations are noticeably faster, and *dBASE III* users who need a dedicated indexing program like *Quickindex* to get home before dark will be happy to discover that *dBASE III Plus* catalogs in record time (see Figure 1). While *dBASE III Plus* is a solid upgrade to the line, the multiuser version, dBASE Administrator (included with the price of the package), leaves much to be desired.

Installation: Plus Ça Change

Some things never change. Ashton-Tate has adamantly retained copy protection on *dBASE III Plus* at a time when vendors from Microsoft to MicroPro have dropped it from their product lines. Luckily, *dBASE III Plus*'s copy-protection scheme doesn't intrude often or hamper the program's performance. Installing the program is a matter of slipping the first system disk into drive A:, typing Install, and following the on-screen instructions. If you install the program on a hard disk, copy protection is essentially invisible, and you don't have to insert a system disk to start the program. However, beware of "compatibles" that stray too far from the IBM creed. You may be able to run *dBASE III Plus* from their floppy disk drives but discover later that you cannot install the copy-protected software on the system's hard disk—the result of incompatible hard disk controllers.

Generally speaking, you need only be concerned about Ashton-Tate's software chastity belt when you back up your hard disk or move *dBASE III Plus* from one system to another. In both cases, you must first uninstall *dBASE III Plus* to retrieve the key hidden files, then back up the disk or remove the program files.

Top-Notch Assistant

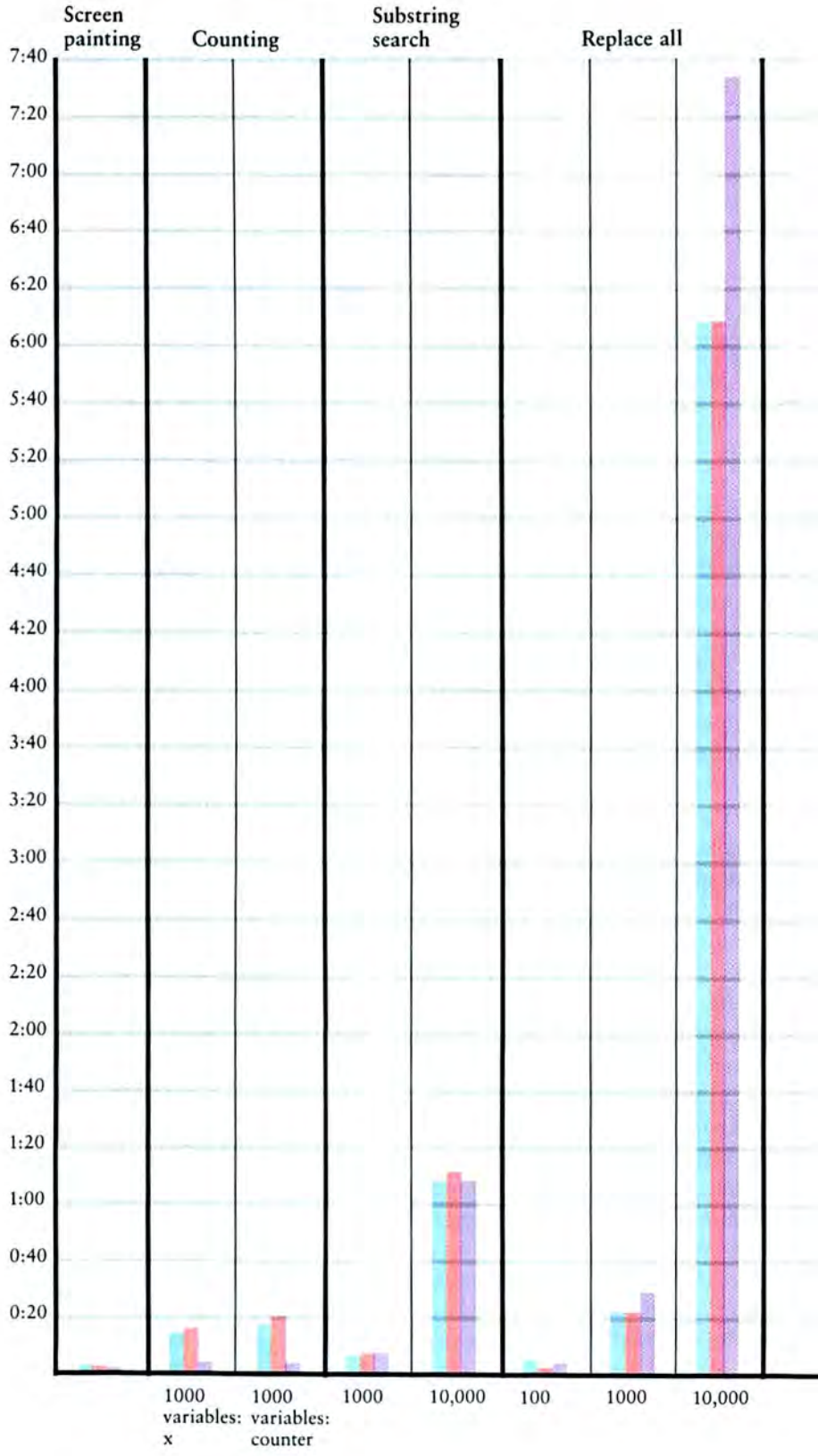
The Assistant is Ashton-Tate's answer to the immediately gratifying interfaces of *pfs:file, Nutshell,* and an array of similar programs. Instead of typing a string of commands at a dot prompt (and frequently getting the order and syntax wrong), you

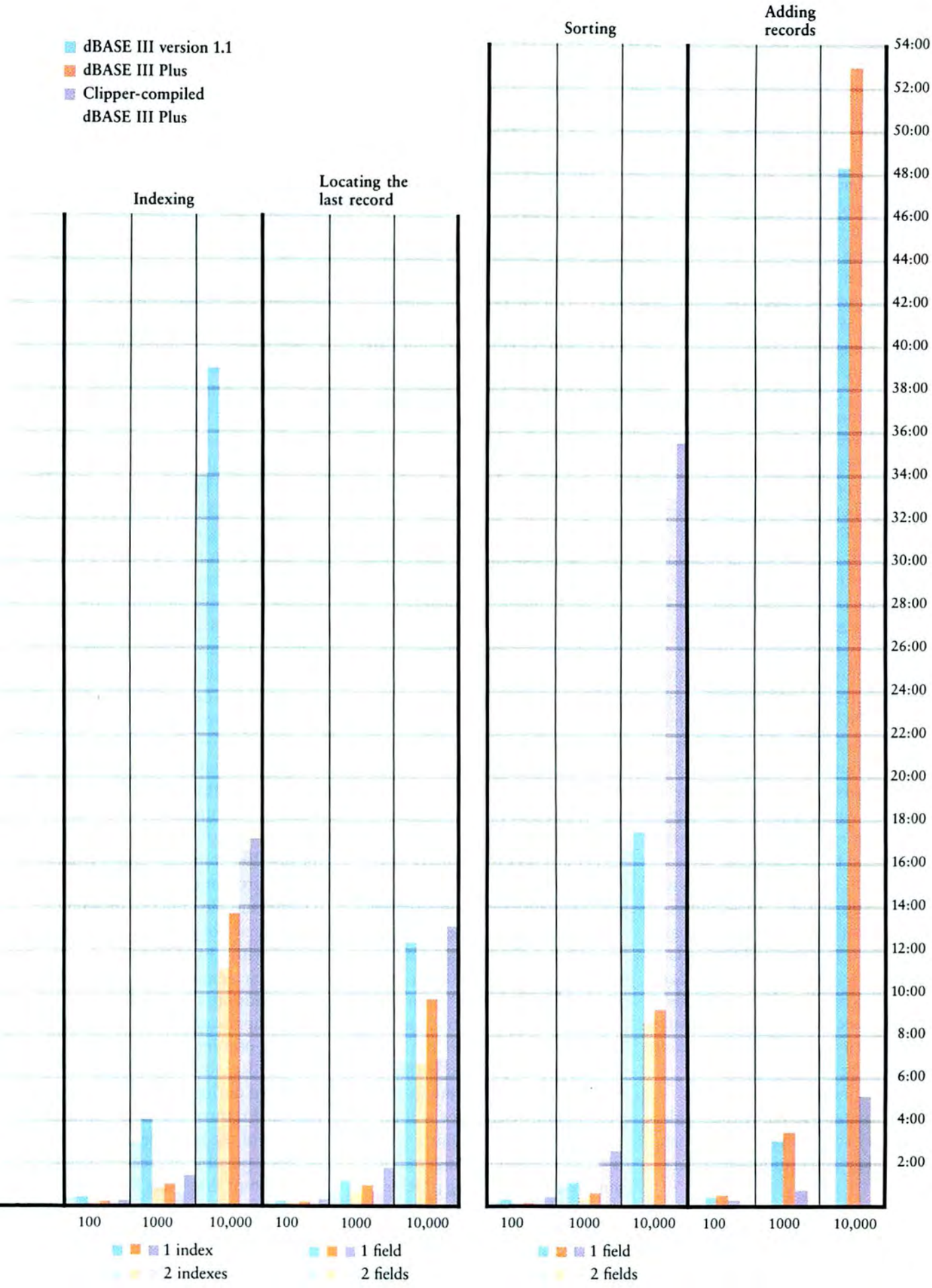
merely pull down *Framework*-style menus and select the commands. You can operate the Assistant with scant knowledge of *dBASE;* with greater familiarity, you can link multiple data bases, create custom data entry screens and reports, set up a query or view, and enter data without ever resorting to the programming that *dBASE III* would require.

Users of *dBASE III* will recall that the first version of the Assistant was mostly *1-2-3*-like window dressing and that much of the program's power still had to be extracted via the dot prompt. This time around, Ashton-Tate has included new functions and expanded others, grouped related features in more logical fashion, and added two new menus (Create and Update). The Assistant appears automatically when *dBASE III Plus* is loaded—a feature that can be disabled. Because the interface's organizing principle is clearer, no divining rod is needed to arrive at the Create menu to design the data base file structure; to append, delete, edit, or browse a data base from Update; or to extract data via the Retrieve menu.

dBASE III Plus's menu-driven Query function is Ashton-Tate's answer to *Paradox* and other data managers that offer a simpler way to retrieve data (see Screen 1). A query file can store as many as seven query statements and can be reused with the command sequence SET FILTER TO Query *filename*. For example, instead of manually entering DISPLAY ALL FOR Amount > 1000 .AND. City = "San Francisco", with Query you would select Amount from a list of fields, > from a list of operators, type in 1000, select .AND.

Figure 1: dBASE III Plus at the races with dBASE III and Clipper-compiled programs. Tests were performed on a PC's Limited AT with a 6MHz 80286 microprocessor, 1MB of RAM, and 40MB Seagate voice-coil drives. (Time in minutes and seconds.)




dBASE III version 1.1
dBASE III Plus
Clipper-compiled dBASE III Plus
Indexing
Locating the last record
Sorting
Adding records
54:00
52:00
50:00
48:00
46:00
44:00
42:00
40:00
38:00
36:00
34:00
32:00
30:00
28:00
26:00
24:00
22:00
20:00
18:00
16:00
14:00
12:00
10:00
8:00
6:00
4:00
2:00
100
1000
10,000
100
1000
10,000
100
1000
10,000
100
1000
10,000
1 index
2 indexes
1 field
2 fields
1 field
2 fields

from a list of connectors, select City and =, and type in San Francisco. You can then choose a nest option that inserts parentheses. For advanced users, aliases can be employed to enable Query to work with multiple data bases. Query is a worthy enhancement to the package, but keep two things in mind: you can only list fields from a single data base, and quotes are still required for anything in a character field.

New tools that save time and mental wear and tear or give you unique views of data have also been introduced. Prominent among them are the screen generator and View. With the screen generator, you can create custom menus by typing in text and placing fields on a "blackboard" much as in Fox & Geller's *Quickreport* (see *From the Software Shelf, PCW,* September 1986). After you save a screen, *dBASE III Plus* creates an .SCR file to hold the screen definition and an .FMT file that can be used with Set Format To commands. You can even create borders with Format's box-drawing function. You merely plant the cursor on the blackboard, press <Enter>, and stretch a box to its desired dimensions. View allows you to pull two or more data base files, their indexes, and their relationships (as expressed by the Set Relation command) into a single screen (see Screen 2). Any updates made in a View file are reflected in the source data bases.

Of course, the Assistant can take you only so far. If you need an entry screen that validates data, a turnkey application with interactive menus, or a sophisticated report, you will have to succumb and learn *dBASE III Plus*'s command language—or hire a professional programmer.

Automatic Programming

Managing multiple data bases with the Assistant is cumbersome, and writing an interactive menu system from scratch in *dBASE*'s command language is no trivial pursuit. If you don't want to wrangle with command language just yet, there is another alternative: the Applications Generator.

The Applications Generator is *dBASE III Plus*'s nod to both traditional programming tools (such as the forms utilities for COBOL and other report-oriented languages) and to contemporary PC data management features such as the Application Express in *R:base 5000*. Under your direction, the Generator can mint the necessary command language code to prepare simple menu-driven applications with custom data-entry screens and formatted reports.

Unfortunately, the Applications Generator isn't particularly flexible. Editing records is time-consuming because the program always begins with the first record, forcing you to page down to the record you need. If you select 'Remove Information' from the Applications Generator's menu, all records marked for deletion will be permanently erased without warning. For *dBASE* novices, the Applications Generator will undoubtedly save time. But if you're a serious developer interested in automating the coding process, stick with dedicated program generators like Bytel's *Genifer* or Fox & Geller's *Quickcode III.*

Taking Command

dBASE III Plus's command language is more than adequate for most demanding data management applications. Ashton-Tate, perhaps glancing nervously over its shoulder at *Paradox*'s Application Language and *Revelation*'s R/BASIC, has considerably bolstered the *dBASE* command langauge, giving developers far greater control of the programming environment. The cornucopia includes interactive debugging, a wealth of new commands, and access to programs written in C or assembly language.

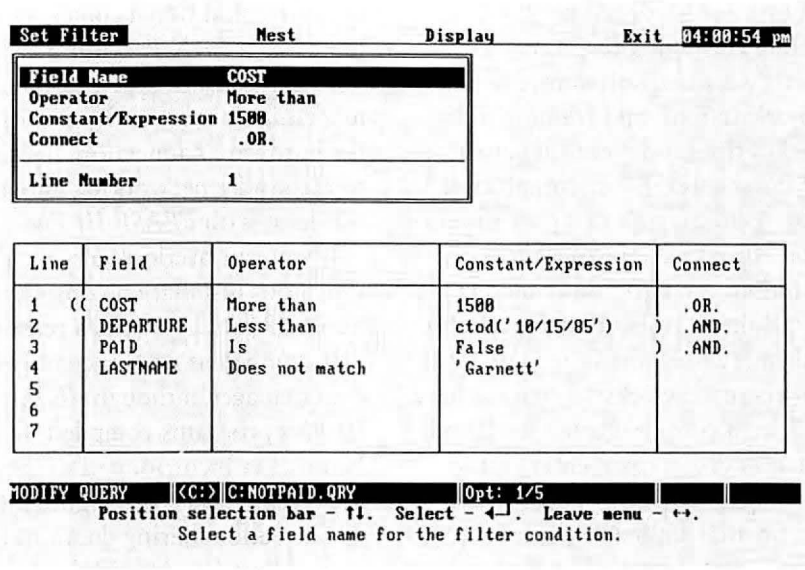
Key to *dBASE III Plus*'s enhanced debugging facility are Suspend and History. If you need to snare a program bug, Suspend lets you run an application until the program hits a snag. Once interrupted, you have complete freedom to inspect and change memory variables, data, and settings and resume program execution. If your changes work properly, you can save them permanently later.

The Set History and Set Dohistory commands enable a developer to record and play back the last 20 commands issued from the dot prompt or emanating from a command file. You can examine the sequence of commands executed with List History.

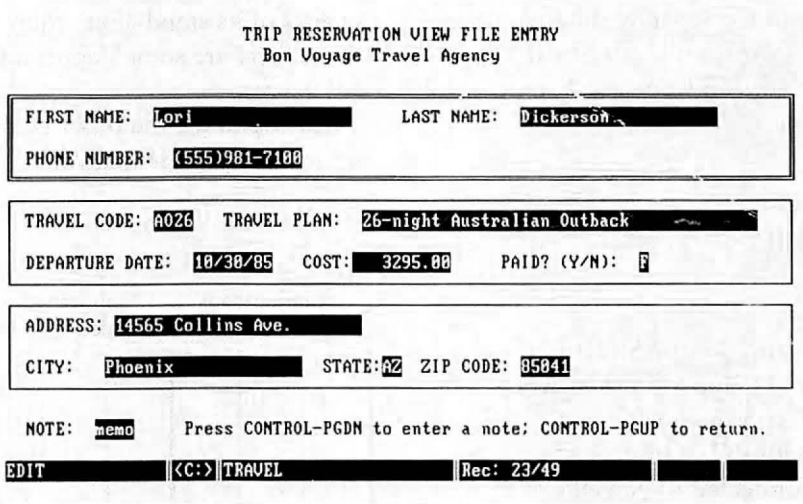
Notable among the many new commands are those that give *dBASE* applications the ability to evaluate user input and make smarter decisions. Inkey polls the keyboard during a DO ... WHILE loop and returns the ASCII code number of the last typed key. This makes it possible to create a menu or a prompt that waits for the user

to enter a response. The corresponding function Readkey tells a program how the user exited a menu or changed data on screen. On Error directs a program to branch to a specified routine if it encounters an error message. On Escape branches a program to a specific routine if the user presses <Esc>; On Key does the same when a key you have identified is pressed.

dBASE application developers hoping to protect and accelerate their programs will be dismayed to discover that *dBASE III Plus,* like its forebears, lacks a compiler. However, users can gain some measure of security with dBCODE, which encrypts and simultaneously tightens program files. Thereafter, applications can only be run with *dBASE III Plus* or *dBRUN,* an inexpensive, scaled-down version of the interpreter. Developers can also improve performance and effectively extend the *dBASE* command language by writing independent modules in C or assembly language and splicing them into the application.



Screen 1: Using the Assistant's Query feature, you can save a set of query parameters and use them again without having to retype.



Screen 2: View allows fields from multiple data bases to appear on one or more screens. Any updates to the fields are saved to their respective data bases.

dBASE on the LAN

Nineteen eighty-six surely wasn't the year of the LAN, so it shouldn't surprise anyone that Ashton-Tate's multiuser implementation of *dBASE III Plus,* called dBASE Administrator, is something less than revolutionary. Sculpted for the IBM PC Network and Novell's Advanced Netware/86 system, the dBASE Administrator provides essential record and file locking, eight security levels of file access, and file encryption.

Be forewarned that setting up this multiuser *dBASE* on a LAN is

a task for hardened network veterans. Installing the necessary hardware and software, adding workstations, and training users takes time and plentiful patience. Matters are further complicated by Ashton-Tate's myopic insistence on copy protection—at the workstation level! You don't merely install the dBASE Administrator on the network's file server and add users; each workstation must have its own copy-protected, serialized access disk to gain entry to the networked data. An access disk is intimately linked to a workstation—once installed, it cannot be used elsewhere on the network. Also, the dBASE Administrator cannot occupy the same disk with any version of *dBASE*—even if the two use separate subdirectories.

Worse still, *dBASE III Plus* includes only one access disk. To obtain three additional copies, you must buy a *LAN Pack* for $995. When the cost of software *per workstation* exceeds the cost of the hardware connection, it's time to reconsider networking altogether—at least with *dBASE III Plus*.

If you can overlook price and ridiculous installation considerations, *dBASE III Plus* is a reasonably competent and efficient LAN data manager, although *dBASE III Plus* programs compiled by Nantucket Incorporated's *Clipper* are usually faster (see Figure 2). The need for sharing data can be compelling if a network is at the heart of a reservation system or order/entry system juggling customer, order, and inventory files. Although this multiuser *dBASE* smacks of its stand-alone equivalent, there are some important differences.

Moving to the multiuser package is a bit like opening your bachelor apartment to a family of acrobats—privacy is hard to come by and you must learn to compromise. From the dot prompt, you can use a file in a shared or exclusive mode. Type Use *filename*, and everyone on the network is allowed to read the file. Type Use *filename* Exclusive, and no one can alter the file until you release control. The file can still be viewed at other workstations, but any attempt to edit will be greeted with a beep and the message 'Record locked'. Any associated index files that are open at the time are similarly affected. If you only want to change a record, you can use the file in shared mode and simply reserve that record.

There are a few other rules to follow. A file must be the only one open when its structure is created or modified, or when you use commands that affect all records, such as Insert, Reindex, Pack, and Zap. With other commands, such as Browse, Index, and Append, the dBASE Administrator automatically slaps a lock on a file. While this is done for a good reason, it means that everyone else needing the file will have to wait—even if you're modifying only a few records in the file. An experienced *dBASE* programmer can modify these commands to minimize the data gridlock, but great care must be taken. It's easy to unwittingly allow two users to modify the same file at the same time. Such a "deadly embrace" either destroys the data or crashes the dBASE Administrator. In short, don't be a *dBASE* network pioneer unless you know how to circle your wagons.

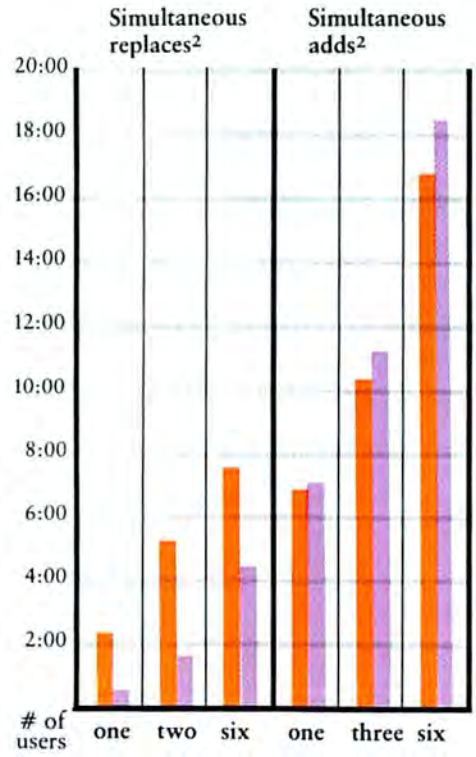


Figure 2: dBASE III Plus and Clipper on the LAN. Tests were performed with PC's Limited ATs connected to Novell's Advanced Netware/86 local area network using the V2.0 operating system. (Time in minutes and seconds.)

[1] Using Communications Horizon's LAN-Libraries, which allows Clipper-compiled dBASE programs to run on a network

[2] 1000 per user

Massive Manuals

dBASE III Plus's two-volume documentation set tips the scales at 10 pounds, 2 ounces—a 6-pound gain over *dBASE III*'s user manuals. To Ashton-Tate's credit, this latest field guide to the company's cash cow is lucidly written and, for the most part, well organized. The first volume covers program fundamentals for first-time users, while the second discusses the command language, installation of the dBASE Administrator, and programming for a multiple-user setup. The biggest complaint? Commands and functions are presented in a continuous stream, but page headings don't list the item under discussion. The chapter numbering scheme and the use of individual volume indexes also tend to obscure rather than enlighten.

Pluses and Minuses

Taken individually, the enhancements to *dBASE* are apt and superbly implemented. Many tasks that previously required the services of a programmer—setting up custom menus and formatted screens and generating relatively complex reports—can be performed by the nonprogrammer. New users can finally get ahold of the beast, and *dBASE* pros will exult in the continued growth of the command language.

Amidst the well-deserved huzzahs, however, a few raspberries are heard. *dBASE III Plus*'s designers haven't been oblivious to the competition, but perhaps they should have looked over their shoulders more often. Although copy protection is not yet passé, Borland and now Microsoft have shunned it. In the case of the *dBASE Administrator* and the access disks, copy protection is simply absurd.

The spreadsheetlike presentation of data heralded by Ansa Software's *Paradox* and justifiably hailed by reviewers and users alike is not evident in *dBASE III Plus*—perhaps to Ashton-Tate's peril. Reporting is another key area where *Paradox* excels and *dBASE III Plus* lags behind—the only improvement in this release of *dBASE* is the ability to format numbers with commas.

But *dBASE III Plus* raises a more fundamental concern. Much of the program's power comes from combining commands. View, Query, Filter, and others all have a background effect on retrieval commands such as List and Report Form. The advantage to this approach is that a substantial amount of data can be filtered to your specifications; the danger is that what you see is not always what you've got. Data can be misinterpreted when you're unaware of background settings, and errors in a programmer's command files are even harder to detect when they stem not from one erroneous command but from the combination of several commands.

In the final analysis, developers will revel in the new possibilities; first-time users will find the Assistant a generous helping hand. Ashton-Tate has made the beast far more manageable—but remember, when you take it out for a walk, make sure you're on the right end of the leash. ●

Robert Eisenberg is a dBASE *programmer at The Lambda Group, a San Francisco consulting firm specializing in the integration of personal computers in business.*

dBASE III Plus
Ashton-Tate
20101 Hamilton Ave.
Torrance, CA 90502
213/329-8000
List price: $695 (including dBASE III Plus Administrator)
Requirements: 256K, two disk drives (hard disk recommended), DOS 2.00 or later version; dBASE III Plus Administrator on Novell Netware/86 640K (file server), 384K (workstation), DOS 3.10; Administrator on IBM PC Network 640K (messenger), 512K (receiver), 448K (redirector), DOS 3.10
Copy protected

dBRUN
Ashton-Tate
List price: $250 for five disks
Requirements: 256K, two disk drives (hard disk recommended), DOS 2.00 or later version
Not copy protected

LAN Pack
Ashton-Tate
List price: $995 (includes three access disks)
Requirements: PC Network or any network that uses a 100 percent PC-DOS-compatible operating system, such as Novell 1.01

Mapping Strategies

Business graphics may not do the trick when it comes to analyzing or presenting a geographical message. But a PC-based mapping package such as Atlas AMP, Map-Master, or Randmap can turn your PC into an analytical atlas—and create maps you can show off with pride.

Dennis Dykstra

Someone once said that if Napoléon had had better mapmakers, he could have conquered Russia. Although the Russians might disagree with that conjecture, it does point up the importance of maps in the modern world. Maps are essential, if commonplace, tools for most of us; they guide us through strange cities, help us plot our vacation plans, and give us a daily overview of the nation's weather.

Managers in business and government are relying increasingly on maps, which are often more effective than business graphics or tables of data. Now, with the advent of mapping software for PCs, that information can be provided quickly and inexpensively.

Maps represent geographic data, including the location of physical features, such as roads and streams, and political features, such as county or state boundaries. A computer mapping package must be capable of drawing these elements on a video

screen and producing maps with a hard copy device such as a dot matrix printer or pen plotter. The main purpose of mapping software, however, is to superimpose demographic, statistical, or business data on top of a map's physical or political boundaries in order to reveal geographic trends and relationships. Such maps are commonly referred to as thematic maps, because they concentrate on a particular theme rather than on the geography itself.

Mapping programs are useful in a surprising variety of businesses and applications. Market researchers use them to identify areas where advertising expenditures would be most effective; sales managers, to monitor and compare sales performance in different regions; school districts, to route buses more efficiently as population centers shift; mail-order houses, to analyze the effectiveness of direct-mail campaigns; and banks, to determine the best locations for automatic teller machines. After field-testing by political campaign managers in 1984 (see "The New Political Machine," *PCW,* Vol. 2, No. 9), PC mapping programs are now firmly entrenched as essential campaign software; with such programs, candidates can use demographic information and up-to-the-minute data from polls to target areas most susceptible to increased advertising or last-minute campaigning.

PC-based mapping packages range from libraries of map images provided with general-purpose graphics software (such as Lotus's *Freelance*) to full-scale mapping programs that can merge geographic information with statistical data. The three mapping packages reviewed here are of the latter type; two are based on packages that were reviewed almost two years ago in *PC World* (see "GeoGraphics," *PCW,* January 1985). These are *Atlas AMP (Advanced Mapping Package),* an enhanced version of the *Atlas* package from Strategic Locations Planning (SLP); and *Randmap*

from Rand McNally. *Randmap* is based on a package called *Statmap* that was originally produced by Ganesa Group International and has undergone much revision. The third package, *Map-Master,* is a new product from Decision Resources. Table 1 compares the three packages' features.

Computer Mapping Basics

Mapping packages typically require two types of information: physical and statistical. The physical organization of the map is defined by data contained in a *boundary file.* A particular boundary file might include a set of *x-y* coordinates defining the outline of a city, a sales region, the United States, or the entire world. Each entity to be displayed on the map is represented in the boundary file as a set of coordinates called a *polygon.* On a map of the United States, for instance, one such polygon would be Oregon and another would be Kansas.

Statistical information to be superimposed on the map is contained in a *data file.* The data in this file must be matched with the polygons in the boundary file. If you want to draw a map showing the number of horses in each county of Kentucky, for example, the data file must include 120 horse-population entries, one for each polygon (county) in Kentucky.

All the packages reviewed can display maps on color monitors and produce color plots on paper or transparencies by using any of a variety of pen plotters. The packages' support for other kinds of output devices varies, however. All three companies are continually adding new output capabilities, so it is advisable to call for their latest lists of supported equipment.

How to Make a Map

The first step in preparing a map is to select the boundary file from which the map will be drawn (for example, a map of the United States). You might want the map to include all polygons, or you might select only a few of them—the New England states, for example. After specifying the polygons to appear on the map, you enter the data to be plotted, such as the income per capita for each polygon. This data can be entered directly from the keyboard, imported from a spreadsheet or data base file, or read in from a proprietary data file provided with the mapping package. Each package comes with some proprietary boundary and data files; additional files are available at extra cost. Prices of boundary and data files vary considerably by file and by vendor, ranging from $65 to $2000 per file.

After entering or selecting the data to be used, you can set the number of data ranges to be represented on the map and the limits for each range (for example, income per capita less than $10,000 per year). You may also select the shading pattern for each range, and perhaps enter a descriptive phrase (to appear in the legend) that explains the symbols and shading. Then you enter one or more map titles.

The next step is to direct the mapping program to draw the map on screen. If you are satisfied with the result, you can save the image on disk or redirect the output to a hard copy device. You might zoom in on part of the map to enlarge a particular section or zoom out to shrink the map. Or you might revise the title or legend, change some of the shading patterns, or add labels to identify each polygon. You could even add an additional variable to the map to create an overlay. For instance, you could add data on the average number of years of education for each state and show the relationship of education to income per capita with color or shading.

All three mapping packages reviewed have these capabilities. However, they vary in degree of support for the various options and in the speed and ease with which they produce maps.

Although Atlas AMP *is faster than the other programs reviewed, the disk-intensive graphics manipulations of all three mapping programs make for slow going.*

Atlas AMP

If you're an advocate of open architecture in software, then *Atlas AMP* is your kind of package. It's the only one of the three reviewed that allows you to create and enter your own boundary files (although a new version of *Randmap,* due out this fall, will reportedly add this capability). A land development company, for

Table 1: Comparison of mapping program features

Feature	Atlas AMP 1.2	Map-Master 1.0	Randmap 1.2
Graphics boards supported	Everex, Genoa, Hercules, IBM CGA and EGA, Paradise, Plantronics, STB, Tecmar	IBM CGA, EGA, and PGA and compatibles	Amdek, Conographic, Hercules, IBM CGA and EGA, Plantronics, Quadram, Tecmar
Plotters supported	24 plotters currently reported compatible including Amdek, Epson, Hewlett-Packard, Houston Instrument, IBM, Numonics, Sweet-P	44 plotters currently reported compatible including Amdek, Apple, Calcomp, C. Itoh, Epson, Gould, Hewlett-Packard, Hitachi, Houston Instrument, IBM, Mannesmann, NEC, Panasonic, Roland, Strobe, Sweet-P, Yokogawa	Hewlett-Packard and plotters capable of emulating HP 7221C, 722IT, 7475A, or 7550A plotters
Film recorders supported	None	Bell & Howell CDI-IV, General Parametrics' VideoShow, Hewlett-Packard 7510, Polaroid Palette	None
Input devices supported for creating boundary files	Keyboard entry of *x-y* coordinates **Mice:** Microsoft, Mouse Systems, Summagraphics **Joysticks:** any IBM compatible **Graphics tablets:** Calcomp, GTCO, Hitachi, Houston Instrument, Kurta, Numonics, Summagraphics	None; boundary files cannot be created by the user	None; boundary files cannot be created by the user
Graphics image cataloging	BSAVE format	Proprietary format	Proprietary format
Slide show capability	Yes	No (but compatible with General Parametrics' VideoShow)	Yes
Produce exploded maps	No	Yes	No
Produce dot density maps	Yes	No	Yes
Zoom	Yes	Yes	Yes
Edit boundary files	Yes	Yes	Yes
Data file import capability	Flat ASCII, dBASE COPY, DIF	ASCII, DIF, SYLK	ASCII, DIF, dBASE DBF
Maximum data ranges per map	20	8	10

Table 2: Boundary and data file availability

Feature	Atlas AMP 1.2	Map-Master 1.0	Randmap 1.2
Boundary files provided with package	U.S. (50 states and D.C.); San Francisco by ZIP code boundaries	U.S. (50 states and D.C.); Louisiana by county; Manhattan by ZIP code boundaries	U.S. (50 states, D.C., and Puerto Rico)
Boundary files available at extra cost	50 states; U.S. by county; U.S. by Metropolitan Statistical Area (MSA); U.S. by Areas of Dominant Influence (ADI); U.S. by Designated Marketing Areas (DMA); U.S. MSAs by 3-digit and 5-digit ZIP codes; world by country; U.S. by 3-digit ZIP codes; U.S. rural areas by 5-digit ZIP codes; U.S. congressional districts; U.S. census tracts by MSA; U.S. block groups by MSA; U.S. major cities and highways; Canada by province, census division, federal election districts, census tracts for major cities	50 states; U.S. by county; U.S. by MSA; U.S. by ADI; U.S by DMA; U.S. MSAs by 3-digit and 5-digit ZIP codes; world by country	50 states and Puerto Rico; U.S. by county; U.S. by MSA; U.S. by ADI; U.S. by DMA; U.S. by Selling Areas/Marketing, Inc. (SAMI); U.S. by Basic Trading Areas (BTA); U.S. by Major Trading Areas (MTA); U.S. by 3-digit and 5-digit ZIP codes; U.S. census tracts; U.S. by minor civil divisions; U.S. congressional districts
Data files provided with package	**For each state:** 11 variables (population, number of households, etc.) **For San Francisco:** 19 variables for each 5-digit ZIP code area (income, population by several classes, housing data, taxes paid, etc.)	**For each state:** 5 variables (population, median age, retail sales, etc.) **For Louisiana:** 5 variables for each county (same as above) **For Manhattan:** 17 variables for each 3-digit and 5-digit ZIP code area (income and population for several years and categories)	**For each state:** 1 variable (population)
Data files available at extra cost	Population; age distribution; age distribution by sex; median age, income, rent, and housing value; household income; family income; education and occupation; employment and establishments; occupation counts; retail store sales; merchandise line sales counts; employment by major industry; company counts by standard; industrial classification code by 5-digit ZIP code; retail potential; demographic and economic data for countries of the world; demographic data for Canada	Population; age distribution; population of women; median age; household income; income per capita; total effective buying income; total retail sales; buying power index	Population; overview of demographics by county, ADI, MSA, and state; basic demographic; planners' demographic; employment and establishments; occupation; retail sales and establishment counts; merchandise line sales counts

example, could create boundary files for proposed development properties, merge them with spreadsheet data on projected revenues from home sales, and then plot the resulting thematic maps using *Atlas AMP*.

Of the three packages, *Atlas AMP* comes with the best collection of data files (see Table 2). As with the other programs, you can also enter your own data files. *Atlas AMP* can import data files in a number of formats: "flat ASCII" files (in which the entries are separated by commas), files created by means of the *dBASE* COPY command, and DIF (data interchange format) files created by spreadsheets such as *1-2-3*.

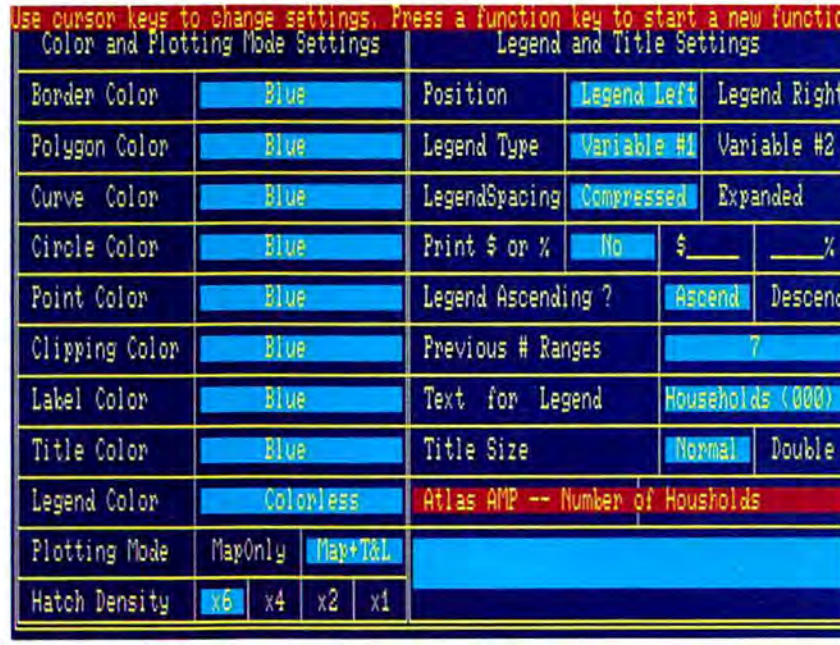
Atlas AMP relies on the use of function keys with fixed definitions to control program flow. To jog the user's memory, the program provides ample help screens and a somewhat ambiguous plastic function key template. Until you're proficient with the program, it's easy to lose track of where you are and what should come next. The advantage of a function key system is that it is much faster than a menu-based approach. The disadvantage is that you have to struggle up a steeper learning curve. In the long run, however, you'll appreciate the ability to move quickly around the program without having to step through a series of menus. Although *Atlas AMP* is faster than the other programs reviewed, the disk-intensive graphics manipulations of all three make for slow going, and menus only bog things down further.

Once you've figured out the function keys, setting up and changing map details is comparatively easy. You enter settings for color, plotting modes, and text through a single template accessed by pressing <F2> (see Screen 1). Similarly, data range specifications are entered via a matrix called up with <F5> (see Screen 2). This screen also summarizes the statistical content of the data being plotted. (*Map-Master* summaries are less extensive, and *Randmap* doesn't supply any.)

Atlas AMP enjoys a slight edge in the features competition. You can include 20 data ranges on a single map, twice as many as with the other programs. Like *Randmap, Atlas AMP* can produce "dot-density" maps (see Screen 3).

The *Atlas AMP* package includes four utility programs. DataEdit allows you to create and edit data files using a spreadsheetlike format. It also lets you generate data reports with summary statistics and calculate new variables using formulas. PostPlot enables you to plot a map previously created with *Atlas AMP*. It supports several plotters not directly supported by *Atlas AMP*. Slides lets you present a slide show on any graphics monitor by displaying map images in the order and duration you specify. Since *Atlas AMP* stores map images in BASICA's BSAVE format, you can also use Slides to present images created with other graphics programs that support BSAVE. Finally, with HatchMod you can edit hatching patterns and colors. (*Atlas AMP* boundary files can be stored in ASCII format and edited with a standard text editor.) For extra cost, SLP offers a full-fledged map editor called *MapEdit* and two enhanced versions of *Atlas AMP* (see the sidebar "SLP Options: MapEdit, ExpressMap, and WorlData").

Screen 1: Atlas AMP's editing template for selecting color and plotting mode settings and for entering the title and legend



Atlas AMP's manual is one of the weakest points of the package. Although the abundance of detail is welcome, the manual is organized functionally rather than alphabetically, and it contains no index. You could easily develop a finger blister flipping pages back and forth.

One nice touch is a short tutorial at the beginning of the manual called "How to Create a Map in Less Than Five Minutes." Surprisingly, the title is accurate. After five minutes you feel like you've accomplished something. More comprehensive tutorials then take you through increasingly complex options.

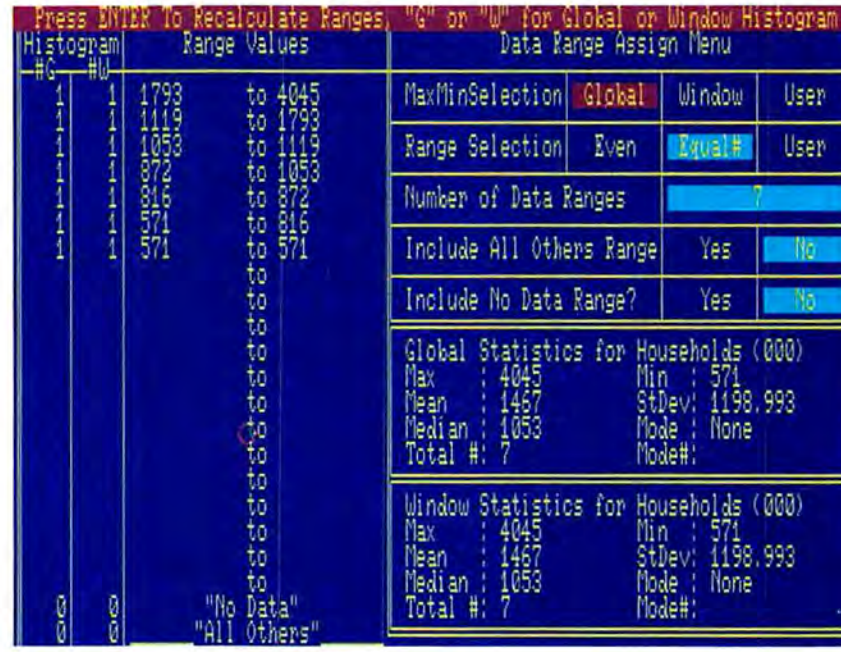
Map-Master

Although Decision Resources' *Map-Master* has the lowest price of the three mapping packages reviewed, its professional packaging and software design are the most expensive looking. Almost every aspect of the package is well designed and carefully executed.

Map-Master's manual is well organized, with brief but complete sections on installing software and interfacing hardware. The program is the only one of the three reviewed that's copy protected, but it requires no key disk, and you can uninstall the program and reinstall it on another PC. The manual also includes a thorough tutorial section, including a five-minute lesson, an index, and a comprehensive reference section arranged in alphabetical order.

Map-Master is completely menu-driven (see Screen 4), and the menus are well designed. The

Screen 2: Matrix for the calculation and display of information on the variable being plotted by Atlas AMP. Seven ranges have been specified. On the lower right, summaries of statistics are calculated automatically.



Screen 3: Atlas AMP dot-density map of seven midwestern states. The number of dots for each state is generated from demographic data, and dots are plotted randomly within each state.

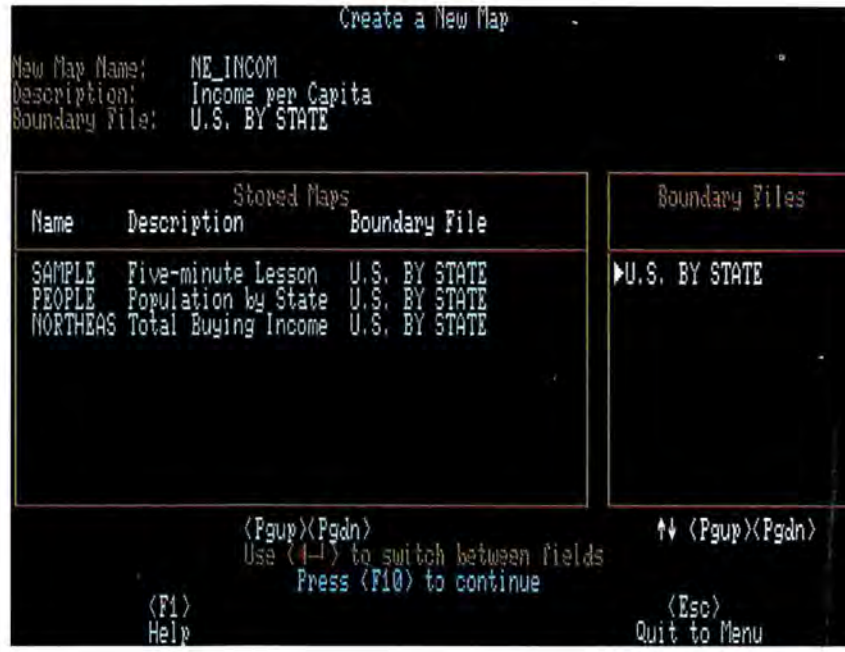
program's biggest problem is its exceptionally slow keyboard response. This may be acceptable when you're learning the system, but it becomes increasingly burdensome as you grow more proficient.

Map-Master is strongly oriented toward the preparation of printed or plotted maps, using the screen mainly as a previewing device. It supports the greatest variety of hard copy output devices of any of the packages reviewed, including most pen plotters and several high-resolution film recorders. (Both *Atlas AMP* and *Randmap* promise compatibility with film recorders in the near future.) *Map-Master* is also the only one of the three programs to exploit the high-resolution plotting capabilities of dot matrix printers. Because *Map-Master* plots directly onto the dot matrix printer, it produces maps of surprisingly high quality. *Atlas AMP* and *Randmap* use conventional screen dump routines.

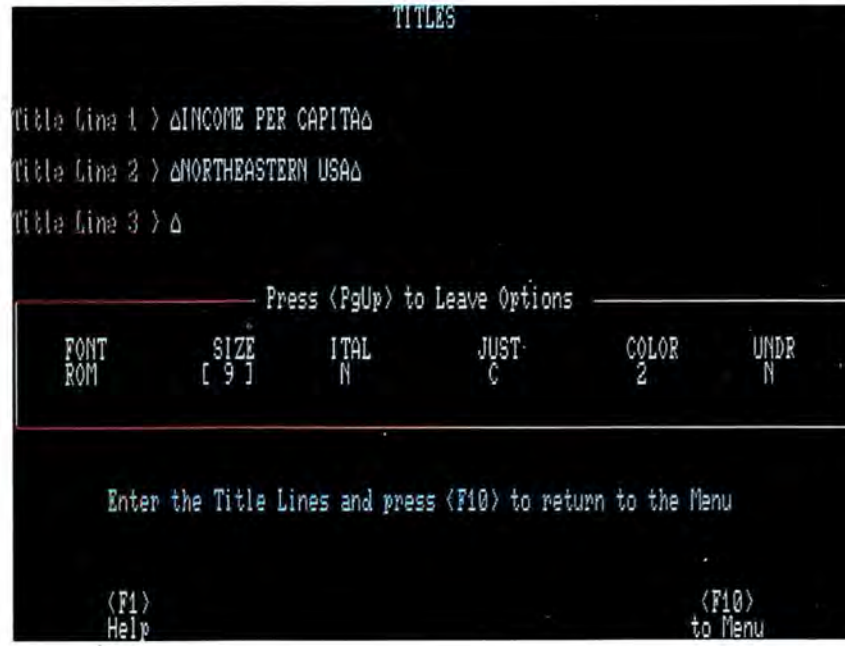
Map-Master is unusual in that it does not use the IBM PC's built-in character set for printing titles and labels on maps that are displayed on the screen. Instead, you can select any of seven fonts and 16 type sizes (see Screen 5); the program draws the characters on the screen just as it would plot them with a pen plotter. Because the screen is a relatively low-resolution device, screen characters may be hard to read unless you specify the larger sizes.

Of the three mapping packages, only *Map-Master* can produce

Screen 4: Map-Master's map creation menu. Maps created previously and stored can also be loaded from this menu.



Screen 5: Map-Master's menu for editing the map title. For each title line you can specify any of seven fonts; 16 type sizes; three methods of justification; italics, underlined, or normal type; and at least three colors, depending on your graphics board.



SLP Options: MapEdit, ExpressMap, and WorlData

In addition to *Atlas AMP,* Strategic Locations Planning offers a line of integrated programs to meet specific needs: *MapEdit,* a boundary file editor; *ExpressMap,* an enhanced version of *Atlas AMP;* and *WorlData,* a global mapping package.

MapEdit, the boundary file editor, permits you to create and aggregate maps, rotate boundary files, and copy or delete map elements (polygons, curves, circles, and points). You can also project latitude-longitude files (convert the latitude and longitude coordinates to screen *x-y* coordinates using a cartographic projection algorithm) and "unproject" projected files (convert them to raw latitude-longitude coordinates).

MapEdit gives you far more direct control over boundary files than either *Map-Master* or *Randmap.* You can create maps with a graphics tablet, the cursor keys, a mouse, or a joystick. *MapEdit* is a bargain if you get it at the discount price of $149 with *Atlas AMP.*

ExpressMap is an enhanced version of *Atlas AMP* that includes *Keyworks,* a keyboard macro package from Alpha Software, and several additional boundary files for the United States: Areas of Dominant Influence, Designated Marketing Areas, and Metropolitan Statistical Areas. *ExpressMap*'s built-in keyboard macros let you tailor the program to your own applications and automatically generate maps with just a few keystrokes. Its capabilities are essentially the same as *Atlas AMP*'s, except that it runs much faster—you can whiz through a session in no time. In addition, you become a registered owner of *Keyworks* and can use it for other keystroke-saving duties. *Keyworks* is integrated into *ExpressMap,* so you don't have to define the keystrokes yourself.

WorlData is a global mapping system that includes *Atlas AMP* plus boundary files for all the countries of the world and the locations of their capital cities, and data files containing key demographic and economic data for each country such as information on population, income, and education. The *WorlData* package represents a savings of about $150 over the cost of purchasing *Atlas AMP* and the global boundary files separately. —*D. D.*

"exploded" maps (although *Atlas AMP* can do so indirectly via the optional *MapEdit* utility). An example of one such exploded map produced by *Map-Master* is shown in Screen 6.

One disagreeable aspect of *Map-Master* is its closed system structure. Users can create their own data files and import data from programs like *1-2-3*, but they cannot create their own boundary files. Even though an extensive list of boundary files is available from Decision Resources, users who have specialized mapping needs will need to order custom-made boundary files from Decision Resources or from a third-party supplier licensed by the company.

Randmap

Randmap has one important marketing advantage over both *Atlas AMP* and *Map-Master:* instant name recognition. Its distributor, Rand McNally, is one of the world's best-known cartographic publishers. Most Americans probably have at least one Rand McNally map in the glove compartment and possibly a Rand McNally atlas at home.

Randmap's documentation is slightly better than *Atlas AMP*'s, but it does not match *Map-Master*'s standards. The manual discusses the major features of the package clearly and includes a comprehensive tutorial (but no five-minute map). Although the table of contents is detailed, the lack of an index means that you will spend a fair amount of time searching through the manual.

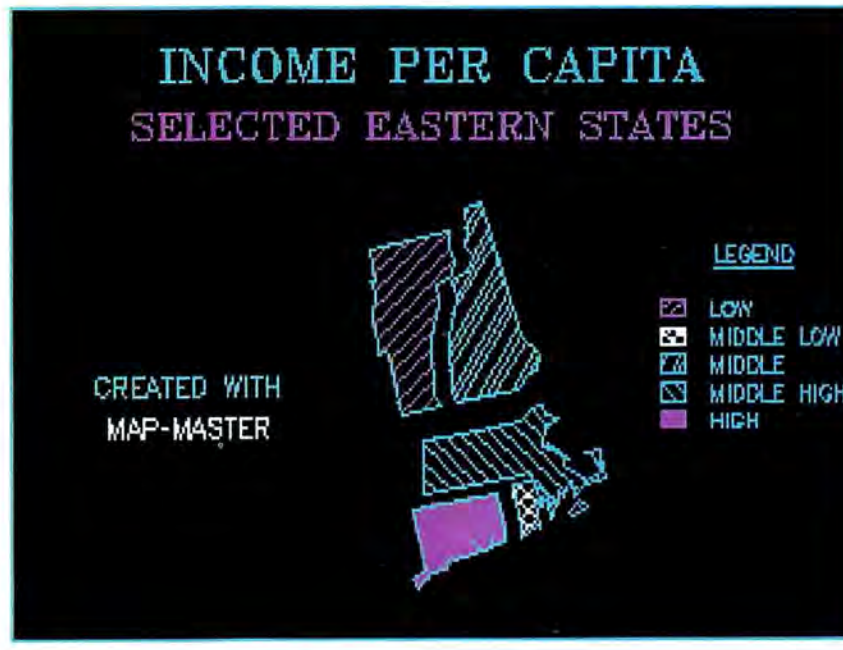
Randmap has been designed specifically for use with a hard disk, but it also runs on floppy systems. Rand McNally warns, however, that mapping certain large or complex areas may be impossible without a hard disk. The manual provides installation instructions only for hard disk systems. It took me 15 minutes to figure out how to set it up for use with my dual-floppy system, and I suspect that a novice user would not be able to unravel the mystery at all.

Randmap's menus are easily the most attractive and intuitive of the three packages (see Screen 7). After you've used the package a few times, you'll whiz through the series of menus. Response times are not as fast as with *Atlas AMP* but are generally faster than with *Map-Master*. *Randmap* also supports several mice, so if you are adept with such creatures you can speed up the creation process.

Like *Atlas AMP*, *Randmap* uses the built-in character set of the IBM PC for labeling maps on the display screen, but it lets you choose the color of the labels (see Screen 8). *Randmap* supplies ten different shading patterns, but the patterns themselves cannot be changed (see Screen 9).

The *Randmap* package includes two helpful utilities. Randcat catalogs and displays map images. Its slide-show facility is similar to

Screen 6: Exploded map of New England created with Map-Master. Data on average income per capita was calculated using Map-Master's calculated variable option. Two variables, total income and population, were loaded into Map-Master's memory, and income per capita was calculated by dividing population into total income.



that of *Atlas AMP* but is more convenient. Images are stored in a proprietary format, however, so you cannot use Randcat to display BSAVE-format images.

The Coords utility program lets you edit boundary files. As with *Map-Master*, boundary files are stored in a proprietary (non-ASCII) format, so you can't use a text editor to edit them. Coords allows you to extract polygons, merge two coordinate files, or flip a coordinate file on the *x*- or *y*-axis. Flipping the axes allows you to give the map its correct orientation on reverse transparencies.

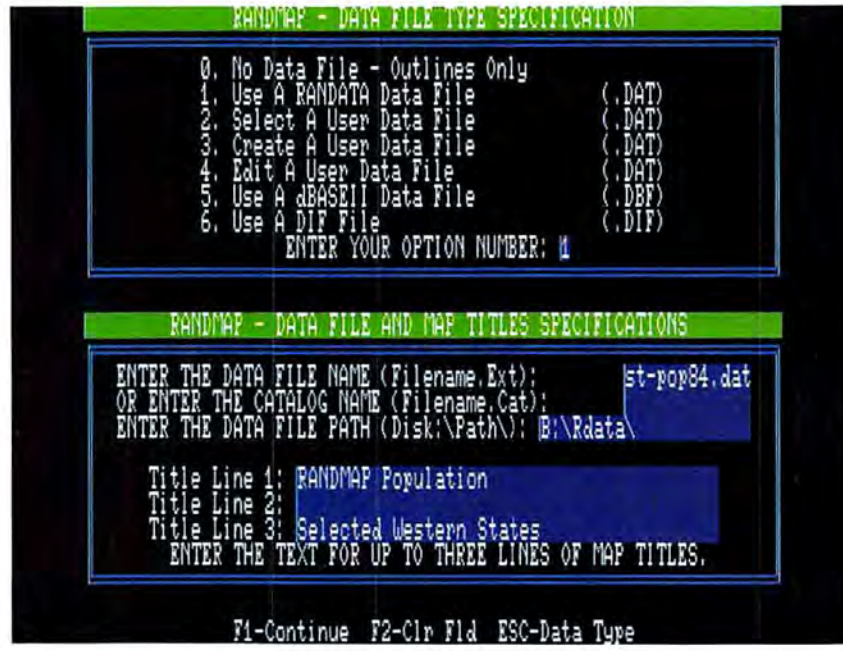
One weakness of the *Randmap* package is that it comes with only one data file, which gives the population in each of the 50 states plus the District of Columbia and Puerto Rico. Both *Atlas AMP* and *Map-Master* provide much more data in their basic packages. A large selection of statistical data files is available separately from Rand McNally, however, under its Randata label. *Randmap* also accepts ASCII files and DIF spreadsheet files and has the unique ability to read files in the DBF format used by *dBASE*.

A Lasting Commitment

All three programs are well designed and quite capable. However, because boundary and data files cannot be transferred from one mapping package to another, it's important that you choose a package you will be able to live with over the long haul.

For overall value, my first choice is *Atlas AMP*, especially in conjunction with *MapEdit*. It allows

Screen 7: Randmap menu for the specification of the data file and map titles. From the top menu, option 1 has been selected. The name and path name of this file, which contains 1984 data on total population in each state, are specified in the bottom menu.



Screen 8: Randmap's map option menu. Here, option 3 has been selected, calling up the menu below, where you can change the palette number, the colors and tile patterns associated with the ranges, and the title and polygon border colors.

you to create your own boundary files and store images in the convenient BSAVE format, and it's very fast once you've passed the learning stage. On the downside, a relatively hard-to-use manual and a nonintuitive function key orientation will tend to discourage novice users.

Occasional mapmakers will probably prefer *Map-Master.* Its menu orientation and excellent manual make for exceptionally smooth sailing. Its wide selection of fonts and excellent support of hard copy devices are exemplary. For daily use by full-time advanced mapmakers, however, its slow keyboard response and long plotting times are potential problems.

Randmap is a good, solid program. It's not as slick as *Map-Master* or as fast on its feet as *Atlas AMP,* but it will produce attractive, high-quality maps. Its solitary data file will restrict its market, however. With the promised capability to accept user-created boundary files and additional support for hard copy output devices, *Randmap* should be a viable choice.

Computer mapping is an exciting new field, and fresh applications surface continually. With the availability of software like *Atlas AMP, Map-Master,* and *Randmap,* computer mapping is now accessible to anyone who can use a PC. ●

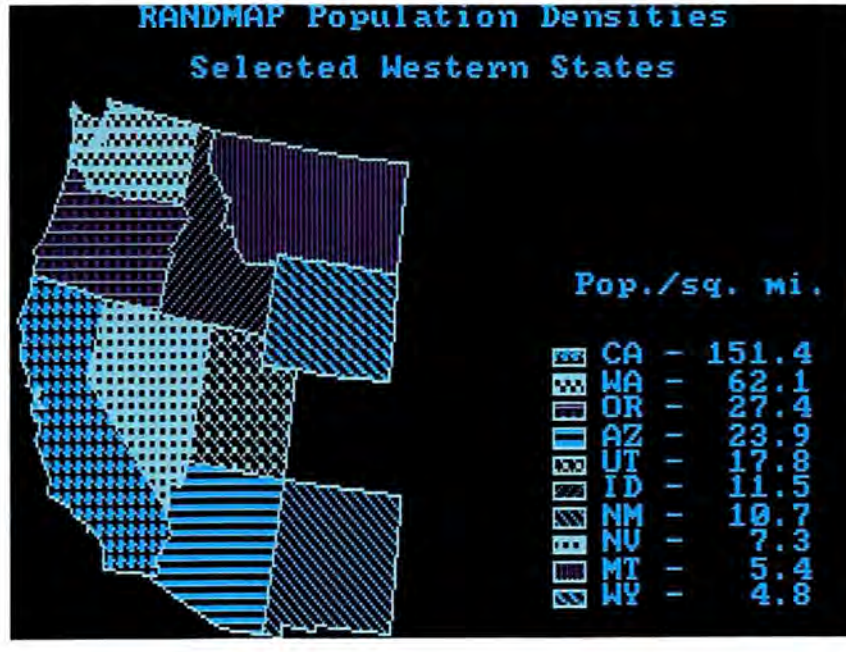
Dennis Dykstra, a professor at Northern Arizona University in Flagstaff, also develops software and does freelance technical writing. From 1983 to 1985 he worked at a research institute in Vienna, Austria, using computer mapping systems to analyze world trade.

Atlas AMP
Strategic Locations Planning
4030 Moorpark Ave. #123
San Jose, CA 95117
408/985-7400
List price: $449, ExpressMap $499, WorlData $900, MapEdit $249 ($149 if bought with Atlas AMP, ExpressMap, or WorlData)
Requirements: 320K (448K for ExpressMap), two disk drives, DOS 2.00 or later version, graphics board and monitor

Map-Master
Decision Resources, Inc.
25 Sylvan Rd. S
Westport, CT 06880
203/222-1974
List price: $395
Requirements: 384K, two disk drives, DOS 2.00 or later version, graphics board and monitor

Randmap
Rand McNally & Co.
P.O. Box 7600
Chicago, IL 60680
312/673-6277
List price: $495
Requirements: 256K, two disk drives (hard disk recommended), DOS 2.00 or later version, graphics board and monitor

Screen 9: Map of the population densities of ten western states created with Randmap. The population density data was entered at the keyboard.



CD ROM: The Little Leviathan

Imagine having 220,000 pages of information on a 5¼-inch disk. CD ROM data bases can put whole libraries at your fingertips—but at a price. PC World examines the first CD ROM releases for the Philips CM 100 CD ROM player.

Reed McManus

We've all been told the optical disk revolution is upon us. Some day soon, says the soothsayer, our lives will be reshaped by the optical disk's awesome powers: Copious amounts of text storage, exquisite audio, and reality-defying graphics and animation will combine in an interactive medium that will rocket PC users into the twenty-first century. Anachronistic floppy and hard drives will be left behind as quaint relics of a simpler magnetic time.

Before booking a suite at the nearest space station, however, remember that commercial compact disk technology—an early round in the volley of expected optical devices—is in its infancy. Unlike your trusty floppy drive or hard disk, the CD ROM (compact disk read-only memory) is a distribution medium rather than a storage device. You can't write data to a CD ROM or erase information from it. And current CD ROM data base offerings are relatively mundane, consisting of information that has been readily available on hard copy and microfilm and through on-line services. Most CD ROM data bases, in fact, use search and retrieval methods that mimic those of the on-line services to make the experience more familiar.

Even so, you shouldn't dismiss CD ROMs for lack of panache. Although relatively new, the CD ROM is a compact, portable, and virtually indestructible medium that holds 550MB of data—the equivalent of more than 1500 floppy disks.

Currently available CD ROM data bases appeal to two distinct institutional markets: researchers in business and government who need access to huge amounts of specialized data, and generalists who use bulky reference books such as encyclopedias, catalogs, dictionaries, and telephone directories. At press time only four programs were available for the specialist: one corporate financial index, called *Compact Disclosure,* and three scientific data bases: *Medline, Aquatic Sciences and Fisheries,* and the *Life Sciences*

Collection. For the generalist, the only PC-compatible CD ROM data base extant at press time was Grolier's *Electronic Encyclopedia*.

CD ROM data bases are a real boon to on-line users. With on-line services, you must carefully construct your search criteria before logging on and think quickly once the meter is running. Some services offer menus, but to make the best use of costly connect time you must learn labyrinthine commands. With CD ROM data bases, on the other hand, you can browse through information at your leisure without worrying about on-line charges, much less mainframe downtime. And some information vendors distribute CD ROM updates on an annual subscription basis, an arrangement far preferable to paying a variable monthly on-line tab. Of course, buying a CD ROM data base means buying or renting a CD player. But you may recoup your investment quickly if you use on-line services often (see Table 1).

As CD ROM data bases grow in popularity, on-line vendors will be forced to redefine their services. Currently, on-line vendors provide historical information not yet available on compact disks. The Medline data base offered on line by Dialog, for example, goes back to 1966, while the CD ROM files contain information only from mid-1984 on, which is updated quarterly. But since archiving data is the raison d'être of CD ROM, on-line vendors may soon decide to focus their efforts on what CD ROM can't supply: up-to-the-minute reports.

Providers of CD ROM data bases offer a handsome alternative to traditional, time-consuming research methods and to pay-as-you-go on-line searching. But for now, major clients are limited to Fortune 500 companies, financial institutions, and government agencies—in short, organizations that can afford to lay down the lucre for this new technology, either by buying existing CD ROM data bases or by having them specially fabricated. A library of general-interest CD ROMs is probably several years down the road.

CD ROM players and disks are built to last—an important consideration, given the notoriously indelicate users who frequent libraries and schools.

CD ROM Lineage

CD ROM is the PC spin-off of the now-familiar compact audio disk. It borrows heavily from the extensive research that produced the audio disk, and its disks can be mastered and reproduced in the same factories, all of which keeps CD ROM drives and disks relatively inexpensive. The encoding process in both cases is similar: A laser burns pits into a glass master disk. A pit represents the binary digit 1, while the absence of a pit represents a 0. When a laser in the CD ROM player reads a plastic and aluminum replica of the CD ROM master, the microscopic pits scatter the laser's beam. An optical unit measures the changes in reflectivity, which the player's circuitry translates into a binary signal that a PC can read. Like audio disks, CD ROMs are prerecorded and unerasable. But despite this kinship, you can't play a CD ROM on an audio CD player.

CD ROM players and disks are built to last—an important consideration, given the notoriously indelicate users who frequent libraries and schools. CD players are virtually invulnerable to the catastrophic head crashes that plague hard disk drives, because CD read mechanisms float several millimeters off the disk surface—2000 times higher than the read/write heads on hard disks. CD ROMs are strengthened with the same material used for bulletproof windows and can withstand fingerprints, heat, minor scratches, and constant use. Vendors claim a CD ROM can retain its data uncorrupted for ten years.

Time Is of the Essence

CD ROM players work more slowly than hard disk drives because data is accessed serially instead of randomly. A CD ROM player's average seek time is approximately 1 second, compared to 30 to 70 milliseconds for a contemporary hard disk, and it transfers data at a mere 1.5 megabits per second, compared to 5 megabits per second for most hard disks. Once a CD ROM player has

found a track, however, it can scoop up 1MB of data in the same time a hard disk can grab only 16K. The player can also access an adjoining track in less than a millisecond.

Access time is influenced, for better or for worse, by the search and retrieval software accompanying the CD ROM data base. But either way, when you consider the torpor and the expense of on-line searches, objections to CD ROM retrieval speed evaporate.

Table 1: Cost comparison of CD ROM data bases and their on-line counterparts

Data base	Cost of CD ROM	Hourly cost on Dialog	Break-even point (in hours)[1]
Electronic Encyclopedia	$1495[2]	$45	33.2
Compact Disclosure	$4500[3]	$45	100
Medline	$1475[3]	$36	41
Life Sciences	$1475[3]	$87	17
ASFA	$2250[3]	$87	25.9

[1] Hours of on-line time that would equal cost of CD ROM
[2] Includes purchase of CD reader
[3] Includes yearly updates and rental of CD reader

A Question of Standards

Buying into CD ROM exposes the user to all the pitfalls of an industry groping for standards. So far, CD ROM manufacturers have agreed to basic storage formats such as disk size, maximum amount of stored data, and error correction codes. Beyond these, however, the common path diverges. While integration has become the byword in workaday PC computing, in the land of the CD ROM it's every data base for itself. Every CD ROM data base and its accompanying floppy-based access software abides by different rules. As a result, you can't use Grolier's access software to get at data on a *Medline* CD ROM—you must use *Medline*'s software and learn an entirely new set of rules.

A comprehensive set of CD ROM standards was due in August 1986, but Sony and Philips, two key optical drive manufacturers, delayed that happy moment by announcing an additional standard in progress: compact disk-interactive (CD-I), which incorporates sound, graphics, and text. An all-inclusive, upwardly compatible standard would certainly help the CD ROM marketplace grow, but this budding, competitive industry extends no guarantees. The CD ROM products you buy today may be incompatible with systems five years down the road.

The CD ROM remains handicapped by its read-only status, and consequently, optical storage alternatives are creeping into the market. Some optical drives for the PC, such as the ISI Model 525 and Optotech's 5984, allow you to write and read data but not to erase it (see "Optical Disks: First Light," *PC World*, February 1986). Such write-once, read-many (WORM) drives use high-intensity lasers to burn pits into blank disks and low-intensity lasers to read the binary signals. Still to come are erasable optical disks, including those in CD format, which use lasers to heat a spot on a special magnetic disk, predictably changing the spot's charge and thus its optical properties. But don't hold your breath: True read/write optical disk drives are not expected to hit the market before 1987 or 1988.

Hard-To-Get Hardware

Although at least nine companies have announced PC-compatible CD ROM players, the Philips CM 100 player was the first CD ROM drive released in the United States. Philips drives, which are not available through retail outlets, are routed through original equipment manufacturers (OEMs), who build them into compatibles or pair them with hard disks and other traditional storage devices.

Users can usually buy or rent CD ROM players when subscribing to data base services. But if the price of CD ROM players follows the historic downward trend in mass storage costs, some data base companies may throw in a player for free when you purchase costly software—a twist on typical bundling strategies.

The Philips drive is a breeze to install and to use. It's a "plug and run" peripheral, with an on/off switch and a run switch (which is unnecessary, because once you load the access software, the CD ROM disk starts spinning in the player). Hooking up the system is simple: You drop a full length controller board into an available slot on a PC, an XT, an AT, or a compatible and connect a cable. Where the cable attaches to the controller board is not immediately clear, because the board has two identical high-speed serial ports. The manual recommends that you use only the bottom port. According to a Philips spokesperson, the top port is for a second Philips drive.

Philips's drive and controller board manuals are designed with OEMs in mind, so they naturally provide more technical information than hands-on help. But despite the paucity of guidance, the CM 100 is extremely easy to install. Given the unit's sturdiness (and relative simplicity), it's surprising that Philips offers only a 90-day warranty.

The Lonely Vanguard

The blitzkrieg success of the audio CD has yet to convince information providers, from The Source to the *Encyclopedia Britannica,* to jump on the CD ROM bandwagon. As of June 1986, only five CD ROM data bases were available for the Philips drive. But on-line vendors are testing the waters with CD ROM versions of their wares, and with more than 2000 on-line data bases in existence, the CD ROM void may be filled quickly. At least 75 CD ROM data bases have already been announced, although clearly most haven't hit the streets yet. Meanwhile, the CD ROM industry is chasing its own tail. CD ROM data bases won't gain a foothold in corporate America (the first bastion) until more players are sold, yet businesses won't buy players until more data bases are available. Acceptance in the consumer marketplace awaits a standard like the CD-I and the corresponding rush of graphics- and sound-oriented encyclopedias, games, tutorials, newspapers, and other products.

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A Five-Inch Encyclopedia

Academics and researchers care little for snazzy presentations, but graphics and sound are key to the CD ROM's success in the home and the public library. Grolier's comprehensively indexed, 20-volume *Electronic Encyclopedia* on a single 5-inch CD ROM is a laudable first effort aimed at the consumer market, but the idea is ahead of the technology. Although it's faster, easier, and more fun to search the *Electronic Encyclopedia* than its paperbound equivalent, all you get is text, with none of the illustrations you've come to expect from an encyclopedia. This is not surprising when you consider that a graphic consumes far more disk space than text. Although a contemporary CD ROM can indeed hold images, sound, and the like, the CD-I standard is designed to let program developers greatly compress such noncharacter data.

Of course, speedier searching has its advantages. The *Electronic Encyclopedia* can find all references to any given subject in a matter of seconds, saving you painstaking research time. And at $199 for the CD ROM and access software, the *Electronic Encyclopedia* is $239 cheaper (and many pounds lighter) than its 20-volume bound counterpart. Of course, that's assuming you have the player, which comes bundled with the software for an additional $1296.

Performing a search is a simple three-step process. From the main menu you select the search option, type in the words or phrases you want to find (up to 46 characters), and press a function key to send the program racing through the disk's 50MB index. The system will display an alphabetical list of articles where the words occur. Specify the article you want by highlighting the title using the cur-

sor keys, then pressing <Enter>. In 5 to 15 seconds the article pops onto the screen with the identified words highlighted.

The *Electronic Encyclopedia* is entirely menu-driven, and its clear, well-organized manual describes helpful methods for making your search as specific as possible. To retrieve all articles on Soviet joint fishing ventures in the Pacific, you could search for *fishing*. But this maneuver would dredge up everything from lures to salmon spawning. To help you hone the search, the *Electronic Encyclopedia* provides the equivalent of Boolean operators: 'along with', for example, replaces AND. Thus, to focus on your desired theme, you might type *Soviet* or *Russia* at the 'along with' prompt, and further narrow the field by adding *joint venture* at the following 'along with' prompt. By typing *Atlantic* after 'but not', you could exclude references to that body of water (see Screen 1).

You can also specify whether the program should look for key words or phrases throughout the entire data base or limit the search to titles, text, bibliographies, fact boxes, or tables. You can use wild cards and specify the proximity of searched-for words. The program will find them in any relationship you specify: back-to-back (as in *civil disobedience*) or within a designated number of intervening words (up to 999).

Once you've displayed an article, you can view it in outline form by merely pressing a function key. You can also save your search criteria for later use or add them to new queries.

Printing one paragraph, selected paragraphs, or an entire article from the CD ROM is a matter of issuing a few menu commands. To control the look of printed pages, you can specify spacing, number of columns, justification, and hyphenation.

Printing an article may be a piece of cake, but saving information to a floppy or hard disk is an arduous process because the program only lets you save one paragraph at a time. The size of the paragraph is limited only by how much data your destination disk can hold, and each succeeding paragraph is appended to the designated file until you stop the process. But you can't cut and paste sections from different articles and save them to the same file. You must also remember to change the name of the current save file when you change articles, or the program will write over the previously stored information.

You can save data in *WordStar* format or in .PRN format for use with other programs. You can also save Grolier print parameters for later use in a .PRN file.

Screen 1: A complex word search using the Electronic Encyclopedia. Boolean logical operators appear in plain English in the word entry area. An asterisk is a word expander; FISHER*, for example, will find FISHERY and FISHERIES.

Perils of Perusal

The *Electronic Encyclopedia* executes its appointed tasks efficiently until you browse through a long list of article titles. Only 19 citations appear on screen at one time. To see the next set of titles, you must wait for the program to read them from the disk—an addition to the player's already slow retrieval time.

Grolier also mysteriously fails to take advantage of the cross-referencing possibilities afforded by a CD ROM retrieval system. At the end of an article on aviation, for example, is the note, 'See seaplane'. But you can't jump to this citation directly; you must initiate a new search. Similarly, a capitalized word in an article indicates a cross-reference. But you must initiate a new search to display the relevant article.

If Grolier's *Electronic Encyclopedia* were a compendium of dry medical abstracts geared to the specialist, its no-frills presentation wouldn't be objectionable. But an encyclopedia is both an educational and a research tool. Without graphics, Grolier's loses much of its educational appeal, and as a pure research tool, it has difficulty competing with the *Encyclopedia Britannica.*

Specialized CD ROM

Four CD ROM data bases for the Philips player have emerged for specialized markets. Unlike Grolier's *Electronic Encyclopedia,* they are bibliographic data bases, containing abstracts and other selected data rather than the full text of source documents. *Compact Disclosure* provides information on 10,000 public companies that file annual and periodic reports with the Securities and Exchange Commission. *Medline* covers material entered into the National Library of Medicine's Medline data base since October 1984. The *Life Sciences Collection* data base contains abstracts from the same period but focuses on animal behavior, biochemistry, ecology, genetics, microbiology, and other scientific fields—and a whopping 98,000 abstracts are added each year. The *Aquatic Sciences and Fisheries (ASFA)* data base includes 110,000 abstracts dating from 1977. *Compact Disclosure* is published by Maryland's Disclosure Information Group, and the last three data bases, by its subsidiary, Cambridge Scientific Abstracts. The data bases are updated quarterly, offer help, and are also available through on-line services.

The four data bases are both menu- and command-driven. The menu mode is designed for new users at sea in megabytes of data. The command mode is not nearly as intuitive but permits faster, more intricate searches. Those who have used Dialog on line will be swimming ably in no time.

Compact Disclosure

Compact Disclosure gives you access to a wealth of corporate data, including annual earnings, brief business descriptions, and excerpts from shareholder reports. Calling up information on Microsoft Corporation, for example, opens the books on the company's cash position, receivables, and total current assets. This data base is aimed at brokers, investors, financial analysts, and corporate and business school libraries.

Compact Disclosure's command system mirrors that of its on-line sibling, Disclosure II. The obtuse command syntax is not for the faint of heart, but it does allow you to string together up to 77 characters in a single search, combining Boolean operators (AND, OR, XOR, and NOT), proximity operators, and nested search statements. You can also use wild cards to retrieve singular and plural terms and save search commands and search results on a floppy or hard disk. Using operators (greater than, less than, between two figures, and negatives), you can focus a search to retrieve specific financial information.

With Compact Disclosure, *you can print complete company records and selected information from 14 categories, such as company name, company profile, financial data, ownership, and management.*

Not surprisingly, the menu system is a less thorough and agile means of getting at data. A typical operation may involve plowing through six menus. Because Boolean operators aren't available in menu mode, you must build a complex search piece by piece. You begin by processing a simple search and return to the main menu to narrow its scope. Each time you modify a search, the program retains your previous search criteria. You can hone a search in this fashion 99 times, but after

two or three such sessions, you'll probably be eager to learn the command system.

Compact Disclosure provides the same data via Dialog, but CD ROM lets you examine the data with a fine-tooth comb. Unlike Dialog, for example, *Compact Disclosure* allows you to specify searches by type of currency and by proximity within a sentence. You can also display the field name that triggered a successful word or phrase match, display the specific sentence containing the key words that triggered a "hit," and abbreviate financial search commands. Instead of Dialog's 100 search fields, the CD ROM provides 238, including ticker symbol, full or partial company name, type of business, geographic location, and type of financial data. Dow Jones News/Retrieval, that oracle of the bottom line, is limited to just one—the ticker symbol.

Eminently Printable

With *Compact Disclosure,* you can print complete company records and selected information from 14 categories, such as company name, company profile, financial data, ownership, and management. The data is printed directly from the CD ROM and appears on paper exactly as it does on screen.

You can download data from *Compact Disclosure* to any storage device. Once saved, *Compact Disclosure*'s utilities can convert data to DIF format for use by spreadsheet programs. You also have the option of creating mailing labels.

The price tag for *Compact Disclosure* with access software, updates, and the rental of a CD ROM player is a hefty $4500. The Disclosure Information Group won't sell the Philips drive to customers because it doesn't want to lock them into equipment that may be obsolete in the near future—telling testimony to the industry's volatility.

Cambridge Scientific Abstracts

The three scientific data bases—*Medline, Aquatic Sciences and Fisheries,* and the *Life Sciences Collection*—contain bibliographic reports on the physiological and biological sciences. Doctors, researchers, and other specialists are their primary clientele. These CD ROMs provide the same information found on line, and share a similar query language and *1-2-3*-like menu structure. All three programs use identical access software, so you can swap CD ROMs without loading a new access program. The command system follows *Compact Disclosure*'s example, with some semantic differences. For example, *Compact Disclosure* uses a question mark to expand a word in a search, while the Cambridge Scientific Abstracts (CSA) data bases use an asterisk.

The Cambridge Scientific Abstracts data bases use identical access software, so you can swap CD ROMs without loading a new access program.

Given the limitations of CSA's menu system—lack of context-sensitive help and searches limited to two words of 20 characters each or one phrase of unlimited length—you may opt for the command mode. Here you can specify excruciatingly precise searches by stringing together up to 250 characters with nested logic (i.e., Boolean operators within Boolean operators). You can also pare the search to one field, such as author, title, or abstract; or expand it to include the entire data base.

Let's say you want to find documents on Soviet joint fishing ventures in the Pacific. In command mode, you could type: s (Soviet [TI] OR Russia* [TI]) AND (joint [DE] W1 venture* [DE]) AND fish* [AB] AND Pacific [AB].

The nested Boolean operator *OR* indicates that either *Soviet* or *Russia* must be present in the search results. *AND* further specifies that *Soviet* or *Russia* must be joined by *joint venture* and *fish* and *Pacific.*

Bracketed operators in commands narrow the search: *[TI]* limits it to the title; *[DE],* to the abstract summary; while *[AB]* designates the abstract itself. *W1* is a nested proximity operator, indicating that *joint* and *venture* must be found within one word of each

other. The asterisk directs the program to look for variants on the word *fish*, such as *fishery*.

Keep in mind that this is no relational data base. A phrase search is confined to a single field, that is, the system can't search for *Tweedledum and Tweedledee* by abstract and by title simultaneously.

You can print data directly from the CD ROMs in only one format: one double-spaced record per page. Worse still, you cannot save information to a floppy or hard disk. Although some professional researchers may find this limitation acceptable, those who collect and manage such data with the PC will be sorely disappointed.

Trouble in Paradise

CSA's access software has its quirks. If an abstract runs longer than one screen, the top lines of the text scroll irretrievably past your eyes, forcing you to print out the abstract to read it. Another annoying problem is that the program highlights all component words of a phrase along with the desired phrase itself. For example, a *Medline* search for references to the *Centers for Disease Control* brought the correct matches, but every instance of the word *for* was also highlighted.

Although CSA will not transfer CD ROM data to a floppy or hard disk, it automatically saves search criteria, allowing you to print and display previous searches or use them in a new search. But be prepared to swap floppies or buy a hard disk—a typical search file takes up 12K.

Back to the Future

Though current CD ROM data bases cover few subject areas, they are fast, efficient, and relatively easy to use. For business and government researchers, they provide a gold mine of cross-referenced information, albeit minus the full-color illustrations. Specialists who regularly plow through reams of archival data will find sweet relief in having a fast, cross-referenced tool at their fingertips. Likewise, heavy on-line users will revel in escaping the tyranny of metered search charges.

For workaday PC users, the CD ROM is distant thunder, but as drive prices drop and more pedestrian data bases arrive on the scene, this vertical market may become decidedly horizontal. When standards develop and the technology becomes truly multimedia, the CD ROM could have an even greater impact than its audio cousin.

Reed McManus is a Contributing Editor for PC World.

Aquatic Sciences and Fisheries version 1.0
Cambridge Scientific Abstracts
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Bethesda, MD 20816
800/638-8076, 301/951-1400
List price: with CD ROM player $1750, with CD ROM player and updates $2250
Requirements: 256K (512K recommended), DOS 2.00 or later version

Compact Disclosure version 2.0
Disclosure Information Group
List price: with CD ROM player $3500, with CD ROM player and quarterly updates $4500
Requirements: 256K (512K recommended), DOS 2.00 or later version

The Electronic Encyclopedia version 1.01
Grolier Electronic Publishing, Inc.
Sherman Turnpike
Danbury, CT 06816
800/858-8858, 203/797-3500
List price: CD ROM and access software $199 (includes one-year warranty), with CD ROM player $1495; yearly updates $24.95
Requirements: 256K, DOS 2.00 or later version

Life Sciences Collection version 1.0
Cambridge Scientific Abstracts
List price: with quarterly updates $975, with quarterly updates and CD ROM player $1475
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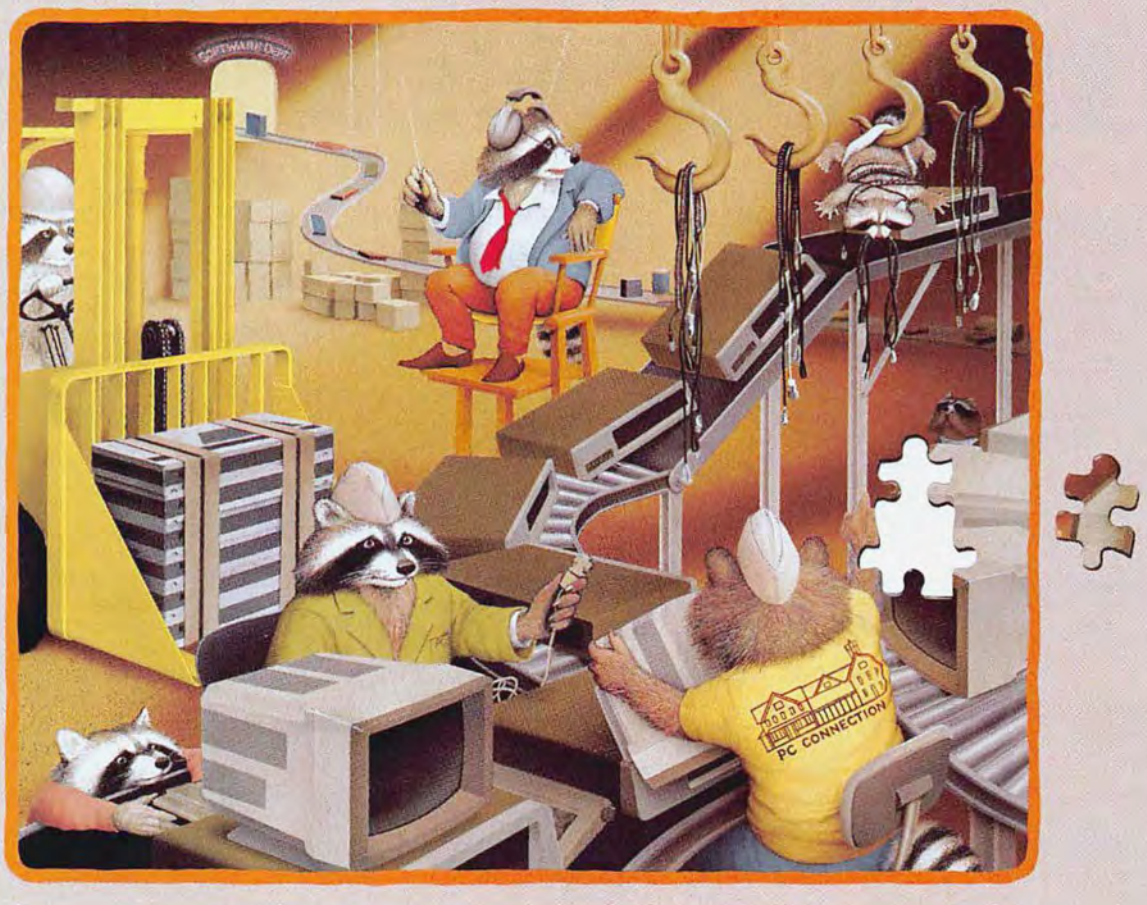

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The PC Prescription

PC programs on the clinical cutting edge are helping medical professionals prescribe correct drug dosages and administer medication with unprecedented accuracy.

Charles Piller and Michael Castleman

Are personal computers likely to replace your personal physician? Not quite. Are they capable of standing in for the doctor when drug dosages need to be determined?

Increasingly, the answer is yes.

A new breed of medical software for the PC is beginning to play a major role in the way drug dosages are calculated and administered to patients, both in and out of the hospital. Pharmaceutical experts and programmers have collaborated to produce easy-to-use programs that calculate optimal dose regimens with far higher reliability than doctors can achieve on their own.

Mainframe variants of these programs have been around for a decade, but their use has been limited to large institutions. As such programs are modified for the PC, drug-dosage software is likely to become a significant therapeutic tool for health professionals.

A Matter of Life and Death

For some patients, drug-dosage software can literally be a lifesaver. People respond differently to the same drug under similar circumstances, and individual dosage recommendations contain an element of subjectivity. Inevitably, medical professionals commit dosage errors—sometimes with disastrous consequences.

With "narrow-margin" drugs, this problem becomes a matter of life and death. These drugs, such as lidocaine, an anesthetic used to stabilize the heartbeat of heart attack victims, have a very narrow therapeutic spectrum. At doses even slightly below the spectrum, lidocaine has little or no effect. At doses slightly above, it becomes toxic and can trigger life-threatening arrhythmia, or irregular heartbeat.

Dosage errors cannot always be blamed on the physician, because such therapies push the bounds of medical science. Precise rules for choosing the appropriate concentration of drugs such as lidocaine simply do not exist. No doctor sees enough patients to unfailingly predict narrow-margin drug toxicity problems, according to Dr. Roger Jelliffe, clinical pharmacologist and cardiologist at the University of Southern California (USC) and a trailblazer in the automation of drug administration.

Jelliffe directs a team of mathematicians, clinical pharmacists, and physicians engaged in applied pharmacokinetics, a field in its infancy. Jelliffe's team is at the forefront of those developing software aimed at reducing dosage errors. Such programs make use of a vast array of data, including population standards and individual drug responses, to calculate a dosage regimen.

Jelliffe is convinced of the efficacy of drug calibration via software. "Whenever physicians use techniques of this type," he says, "their rates of success exceed what their intuition dictates."

Yet bringing the PC and specialized software into the treatment loop by no means ends human involvement. "The programs give you guidelines, but you still have a judgment call to make—you must look at the patient," says Richard Cornell, pharmacy director at the Community Hospital of the Monterey Peninsula, which uses the USC programs to determine dosages of lidocaine and the antibiotic gentamicin. Like Jelliffe, however, Cornell considers the software a major improvement on traditional decision methods, which blend expertise, intuition, and guesswork.

Like many emerging fields, pharmacokinetics has its true believers. But unlike advocates of some new technologies, devotees of dosage software can cite hard evidence to justify their optimism.

Although mainframe time-sharing versions of drug-dosage programs were introduced commercially in 1974, they have not been widely adopted. Jelliffe suggests physicians have been reluctant to embrace this kind of automation for "cultural reasons." Medical professionals rely heavily on intuition, he explains, "because they believe the human body is so complex that it defies analysis." In the past two years, however, the PC, accessible and convenient tool that it is, has turned heads—and is turning around wary practitioners.

Options for Administration

Hardware requirements vary for the programs now on the market, but most run on a PC, an AT, or a compatible with 256K. Some programs need only a floppy disk drive; others demand additional hardware such as a graphics adapter and a graphics monitor. The USC software requires 512K and an 8087 math coprocessor.

Drug-dosage software comes in three basic strains: programs that calculate dosage of a single drug, several specific drug types, and narrow-margin drugs. Some producers of this software have branched out to write programs designed primarily for research; these measure a drug's effects rather than calculating dosages.

Typical of the single-drug programs is *Warfcalc,* manufactured by Biotrack of Sunnyvale, California. *Warfcalc* determines dosages for warfarin, an anticoagulant commonly used in the treatment of stroke, phlebitis, or other blood-clotting-related disorders. Besides the programs for lidocaine and gentamicin administration that the USC group currently markets, it plans to release packages for five antibiotics, five heart medications, and an asthma drug. Abbott Laboratories, a major pharmaceutical producer, will market software for five drugs by mid-1987.

Medical Engineering, Inc. (MEI), of Fort Myers, Florida, produces *Simkin,* a program that can be used for ten narrow-margin drugs in four categories—antibiotics, antiarrythmics, and medications for seizures and asthma. Abbott Labs also distributes a program that manages several narrow-margin antibiotics. (Screen 1 shows the company's *Aminoglycoside Program* in action.)

Two programs in USC's *PC-Pack*—a three-program offering that combines two generic packages with a gentamicin manager—can be used for most narrow-margin drugs, although both are more difficult to use than their single-drug counterparts. Biotrack is preparing a generic narrow-margin program for release before year's end. In addition, that firm is working on a data manager that will compile information from several drug analysis programs to help clinicians develop an overall treatment plan for each

patient. If successful, the program will represent a significant advance in clinical drug analysis by personal computers.

On the research front, the USC contingent has once again been leading the pack. Its *PC-Adapt* consolidates six programs tailored for academic research on the behavior and interaction of drugs in the body.

Clinical Realities

Like many emerging fields, pharmacokinetics has its true believers. But unlike advocates of some new technologies, devotees of dosage software can cite hard evidence to justify their optimism. Numerous clinical studies indicate that drug-dosage software determines medication levels far more accurately than doctors can using traditional methods. In a test of the USC lidocaine program, 15 times as many patients receiving conventional therapy needed additional medication as did patients whose dosages were calculated by computer.

Similarly, in a study of hospitalized patients, *Warfcalc* maintained effective medication levels nearly twice as often as doctors calculating dosage levels without a PC. On average, *Warfcalc* patients required medication for only eight days, compared with ten days for the control group, and they were discharged from the hospital three days earlier than patients on conventional warfarin therapy. In outpatient studies, the *Warfcalc* patients remained within the therapeutic range 94 percent of the time, compared to 71 percent for the patients on conventional therapy.

In a study of hospitalized patients, Warfcalc *maintained effective medication levels nearly twice as often as doctors calculating dosage levels without a PC.*

At the Monterey hospital, staff members put the USC lidocaine and gentamicin packages through their paces daily. "Everyone is very enthusiastic about the programs," Cornell says, vowing to evaluate future drug-administration offerings as they become available.

Nancy Clendaniel

With a PC-controlled servo pump mixing and administering certain narrow-margin drugs, Dr. Roger Jelliffe can deliver highly responsive patient care.

Devising Dosages

Most of the dosage programs on the market function in roughly the same way. Each contains data accrued during years of clinical research on how a drug operates with various diseases and population groups. The attending clinician keys in patient characteristics, including weight and age, and often information on respiratory, kidney, heart, and liver functions. A baseline reading of the individual's drug metabolism may be obtained by administering a specific dose and measuring the level of the drug in the patient's blood. This reading is then entered into the program.

From here, it's the PC's show. Programs use a sophisticated mathematical model to weight each factor according to the individual's characteristics, then suggest a dosage regimen. Some programs also predict patient response over an extended period. The physician never relinquishes control, of course, but the software enables him or her to fine-tune a more precise dosage.

One big advantage of dosage software is its ability to factor in crucial related information, including whether the patient smokes, uses alcohol, or routinely requires other medication. *Warfcalc,* for exam-

ple, provides an on-screen list of drugs that increase or decrease the rate at which the body metabolizes warfarin (see Screen 2).

Most dosage programs are models of simplicity—they are highly interactive and menu-driven. Learning-time varies from about 15 minutes for *Warfcalc* to a few hours for minimal proficiency with the heavier-weight USC programs. *Warfcalc* even prepares and prints patient instructions (see Screen 3) and provides physicians with a list of available warfarin products, by dosage and color of tablet.

In some hospital corridors, however, on-line hand-holding may be too much of a good thing. One review of *Warfcalc* in the *Annals of Internal Medicine* gave the program generally high marks, but criticized as excessive its reliance on menus. Biotrack is currently revising the program to allow experienced users to skip menus and enter data and commands directly.

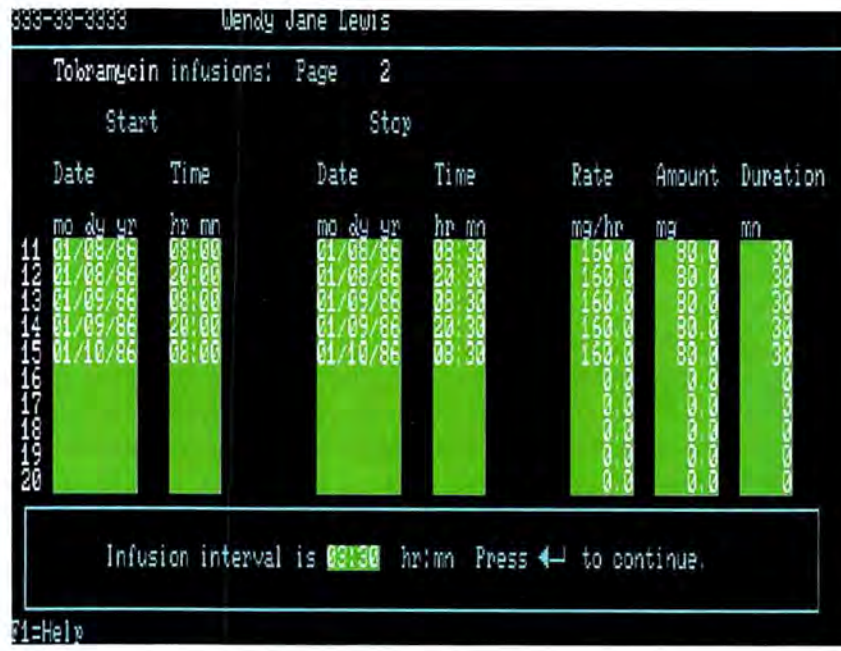
Beyond Recommendations

As physicians in increasing numbers use these first-generation drug-dosage programs on PCs, researchers at USC are working on their successors. Jelliffe notes that the up-and-coming generation will be more sophisticated because "programs will look at the condition of people, as well as the reliability of machines, to decide how skeptical [the programs] should be in drawing conclusions." While not quite expert systems, this new round of software figures to greatly increase the PC's intervention in the treatment regimen.

The question is not whether drug-dosage software will catch on, but how quickly. Washington holds a clue to the answer.

If, for example, the concentration of a particular drug in a patient's blood is 20 percent or more above the recommended level, a "skeptical" program would not as a matter of course reduce the dosage by a set amount. Instead, it would assess the uncertainties in the process, based on clinical experience, and then adjust the dosage.

But dosage calculation is only part of the problem in administering certain narrow-margin drugs. The intravenous flow of lidocaine to critically ill victims of heart disease, for instance, may require fre-



Screen 1: Abbott Laboratories' Aminoglycoside package permits quick and efficient monitoring of dosage intervals.

quent, minute adjustments. Even vigilant clinicians can have difficulty making these adjustments correctly and at the right time.

In 1982 a revolutionary new peripheral—a computer controlled, ultrasensitive infusion pump to regulate intravenous dosage—enabled mainframe drug-dosage programs to administer drugs precisely. Using the pump, physicians could approve the program's dosage recommendation, then let the computer both calculate the optimum drug-delivery regimen and control release of the drug into the intravenous solution.

USC's pharmacokinetics group is currently adapting this "smart pump" for use with the PC. Jelliffe believes these devices hold enormous promise, "enhancing the reliability and safety of patient care with a number of drugs." He anticipates their implementation by intensive and coronary care units and emergency rooms.

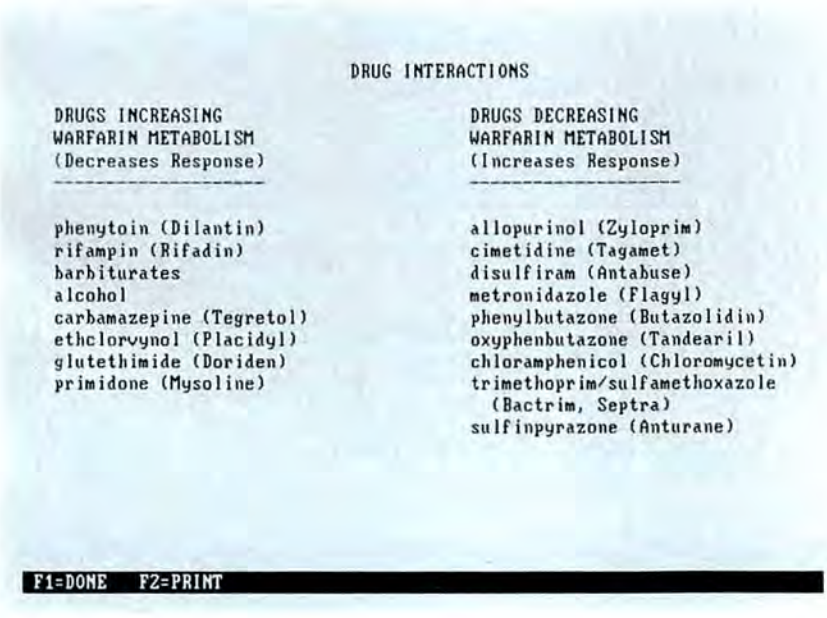
With the smart pump, the PC and software resemble a continuous feedback loop. The doctor feeds blood test results into the PC, which calculates new dosage levels. The information is used to set infusion rates—how often the drug is added to the patient's intravenous fluid and the quantity that is administered. The infusion instructions are then sent to the PC-linked pump, which administers the drug.

Jelliffe emphasizes that these systems are not completely automated: "Someone on the medical team will always be needed to enter data describing the patient, to carefully evaluate the clinical response to treatment, and especially to choose the appropriate therapeutic goals."

Picking Up the Tab

Along with improving patient care by reducing adverse drug reactions, cost-effectiveness is clearly a major motivation behind pharmacokinetic software. While it's too soon to tell whether increased dosage accuracy translates to long-term savings, professional users believe they're more than getting their money's worth. "I have no doubt that these programs help get patients out of the hospital more quickly," says Monterey Community's Cornell.

In addition, a PC linked to a smart pump can free up overworked critical-care nurses. And all drug-dosage programs save staff time by automatically organizing patient records.



Screen 2: Warfcalc provides an on-screen list of drugs that affect warfarin metabolism.

Only a handful of corporate and academic labs now produce drug-dosage software, but new players are beginning to enter this fertile market. Among the core group of early adopters are the 60 hospitals and clinics that have purchased *Simkin,* MEI's multiple-drug program, and the more than 30 hospitals that rely on USC's software. Other software vendors decline to discuss exact sales figures but cite major medical centers nationwide as customers.

Eventually, pharmacokinetic software may find its way into the individual practitioner's office, but specialty clinics and group practices currently remain the strongest candidates for these programs. Biotrack, for example, estimates that nearly 400 clinics around the country specialize in anticoagulation therapy—and all may be ripe for *Warfcalc.*

The Light Touch of Regulation

Given its apparent viability, the question is not whether drug-dosage software will catch on, but how quickly. Washington holds a clue to the answer. Until recently, pharmacokinetic programs were essentially unchecked by regulation. The rationale was that the physician continues to treat the patient; the PC is merely a tool. Then too, pharmacokinetics boasts an unblemished track record. According to USC's Jelliffe, the software has not been mentioned in a single malpractice suit since its 1974 introduction on mainframes.

Now, however, federal law classifies the software as a "medical device," and as such it is subject to Food and Drug Administration (FDA) scrutiny. That classification notwithstanding, the FDA seems inclined to keep its hands off.

Roger Schneider, associate director of the FDA's Center for Devices and Radiological Health, suggests the problems posed by pharmacokinetic software are minimal. "We don't see any disasters or any urgent public health need," he says. Schneider observes that while surgical implants and other devices used in medical procedures pose inherent risks and uncertainties, there's a predictability about the calculations performed by PC-based dosage software.

Still, Schneider adds, some manufacturers bypass the FDA's documentation and reporting requirements. For this reason, the FDA is currently preparing a draft policy on medical software for developers and vendors.

Even if the FDA's moves lead to more careful government scrutiny of medical software, Washington isn't apt to change its stance as a major backer

Screen 3: While primarily aids to physicians, programs like Warfcalc also offer instructions to patients undergoing drug therapy.

```
                    PATIENT INSTRUCTIONS

1.  Take your tablet(s) at the same time each day.
2.  If you forget to take pills one day, don't take
    a double dose the next day.
3.  Have your prescription refilled before you run out.
4.  Avoid taking aspirin or aspirin-containing products.
5.  Consult your pharmacist or physician prior to taking
    any new medication.
6.  Contact your doctor immediately if you see any of
    these bleeding signs:

          -bleeding from nose or mouth
          -blood in urine (red or dark brown urine)
          -black or bloody stools
          -easy bruising or sudden appearance of
           black or blue spots
          -severe headaches
          -excessive menstrual bleeding
          -coughing up blood
          -bleeding gums

F1=DONE      F2=PRINT
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of pharmacokinetic research. The Division of Research Resources of the National Institutes of Health (NIH), for example, has provided the USC team with more than $1.2 million.

Says Dr. Susan Stimler, director of NIH's Biomedical Research Technology Program, "Our reviewers are very enthusiastic about the progress made and prospects for the future, both for research and clinical practice."

Even if the FDA's moves lead to more careful government scrutiny of medical software, Washington isn't apt to change its stance as a major backer of pharmacokinetic research.

In fact, drug-dosage software for the PC is a source of uncharacteristic unanimity among regulators, researchers, funding agencies, and users. And as these programs and similar software-based treatment tools are added to the physician's medical bag, increasing numbers of patients will have the most elemental reason of all to appreciate the doctor's computer: They are alive.

Charles Piller is a writer at the Univerity of California Medical Center in San Francisco. Michael Castleman, a widely published medical writer, is the editor of Medical Self-Care *magazine.*

PC-Adapt, PC-Pack
Roger Jelliffe, M.D.
Laboratory of Applied Pharmacokinetics
USC School of Medicine
2011 Zonal Ave.
Los Angeles, CA 90033
213/224-7173
List price: available at no charge to parties interested in commenting
Requirements: 512K, two disk drives, 8087 coprocessor

Simkin
Medical Engineering, Inc.
3355 Fowler St.
Fort Myers, FL 33901
813/939-5211
List price: $3500, plus $1500/year clinical update service
Requirements: 256K, two disk drives, graphics board, plotter or printer

Theophylline and Aminoglycoside Programs
Abbott Laboratories
Diagnostics Division
Abbott Park
North Chicago, IL 60064
800/323-9100
List price: not yet determined; demonstration copies available.
Requirements: 256K, two disk drives, graphics board, 8087 coprocessor

Warfcalc
Biotrack Corp.
430 Oakmead Pkwy.
Sunnyvale, CA 94086
408/733-1960
List price: $495, 25-patient demonstration program $50
Requirements: 256K, one disk drive

TARGA's Video Vision

AT&T's acclaimed TARGA 16 image-capture and display board builds a bridge between analog video and the PC, creating superlative pictures in an astonishing array of colors.

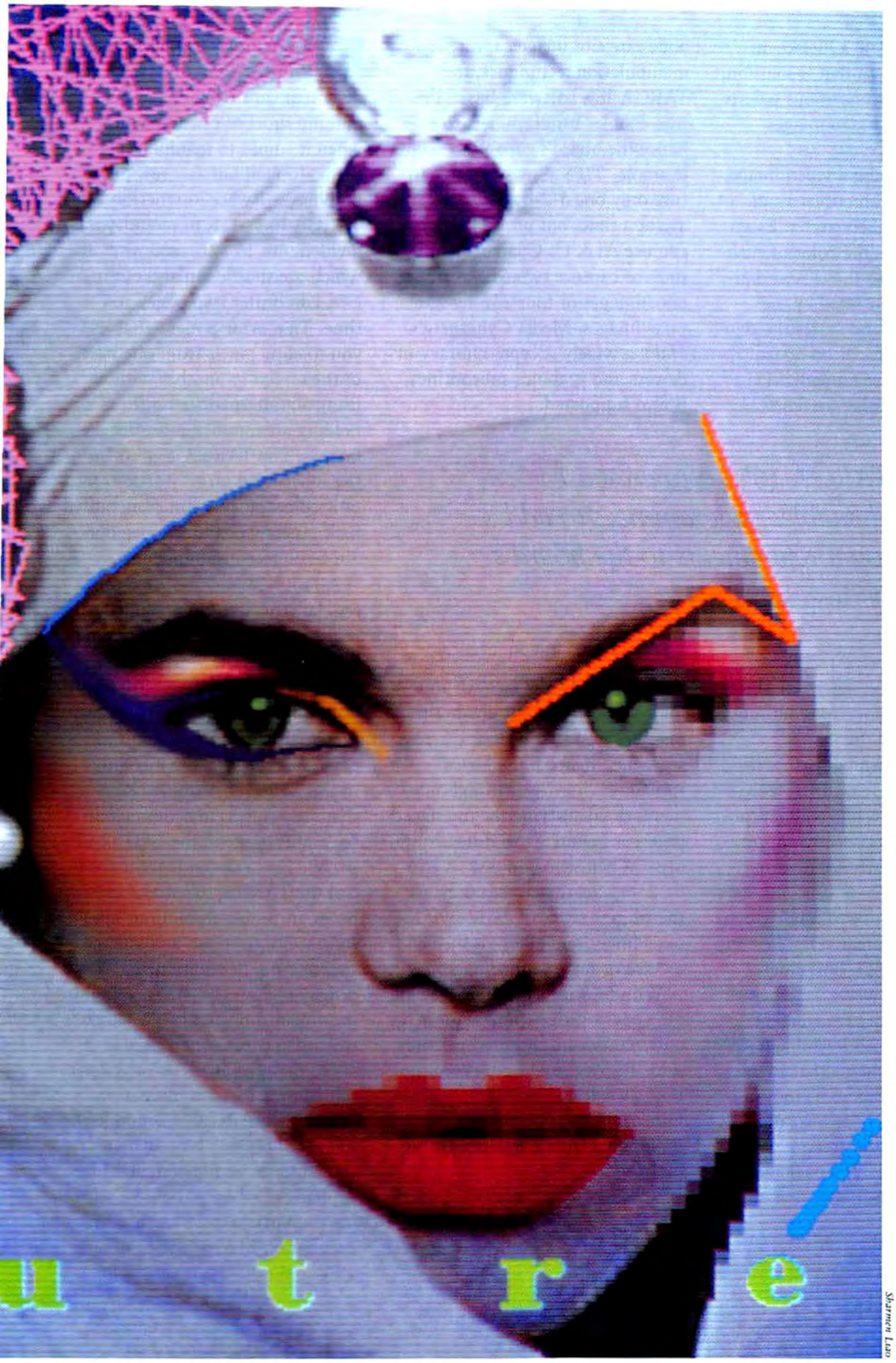
Bill Crider

Stunning, near-photographic images are finally gracing the PC. After years of settling for 4-, 8-, or 16-color displays, you can now capture and manipulate images that approach the subtle shadings and rich palette of color television. For graphic artists, educators, and independent video producers, PC-based electronic photography and image processing mean dazzling graphics at affordable prices.

The Truevision Advanced Raster Graphics Adapter (TARGA) expansion boards are at the cutting edge of the new imaging technology. Developed at AT&T's legendary Electronic Photography and Imaging Center (EPICenter), the TARGA 16 and the TARGA 32 can grab an image from a color video camera, a VCR, or a broadcast signal and hold it in on-board RAM for boundless manipulation. Of the two boards, the $2995 TARGA 16 has the largest software following, led by the sublime *Truevision Image Processing Software (TIPS)* package (created for AT&T by Island Graphics). On an analog RGB monitor, the TARGA 16 can display 32,768 colors with 512-by-512-pixel resolution, while *TIPS* gives you control over each hue right down to the pixel level. What does that mean in real, non-numeric terms? Pictures that will knock your socks off.

A Port to the Real World

The quality of a captured image depends far more on multiplicity of colors than on resolution. With 16, 64, or even 256 colors, a 1024-by-1024-pixel display would still have insufficient color



Shaman Luo

gradation to create a lifelike image. At one-fourth that resolution, the TARGA 16's enormous palette makes digitized video images come alive.

When capturing a video image, the TARGA 16 functions as an analog-to-digital converter. Essentially, it matches the color of each analog pixel with the closest digital counterpart offered by the board's palette and stores the digital image in 512K of on-board memory. Because no digital PC monitor can display the TARGA 16's 32,768-color spectrum, the board must reconvert its output into analog RGB form.

One distinguishing feature of TARGA's image-capturing technique is speed. While competitors take up to 1½ seconds to capture an image, the TARGA 16 snaps one up in just 1/30 of a second. Part of this hustle is due to a fast video controller chip created by Western Electric for AT&T. The chief explanation, however, is a memory management arrangement known as Row Addressable RAM (RARAM), a scheme that enables a row of 4000 bits to be moved into memory at once instead of 1 bit or 1 byte at a time.

Although the *TIPS* package distributed by AT&T supports a wide range of image capture and manipulation techniques, the TARGA 16's software-based design enables programmers to enhance the board's capabilities. For example, *TIPS* allows you to capture only one 512-by-512-pixel image at a time, but programmers can use AT&T's C language routines to capture two 512-by-256-pixel images or four 256-by-256-pixel images. Media Cybernetics' *Halo,* a widely accepted library of drivers and graphics subroutines, is also supported.

The TARGA 16's software-based design enables programmers to add their own refinements to the board's capabilities.

Interestingly, the two- or four-image mode does not divide the memory into two or four discrete segments. Instead, the board spreads each image throughout memory, identifying the interlaced pixels as belonging to different images. When saved on disk, a 256-by-256-pixel image uses only 1/16 the storage space of a 512-by-512-pixel image and takes 1/16 the time to save or retrieve the image.

With four full-screen images in memory, a programmer can merge and manipulate captured pictures with alacrity. And because of the board's colossal palette, low-resolution images appear more packed with pixels than they actually are.

Managing Display Memory

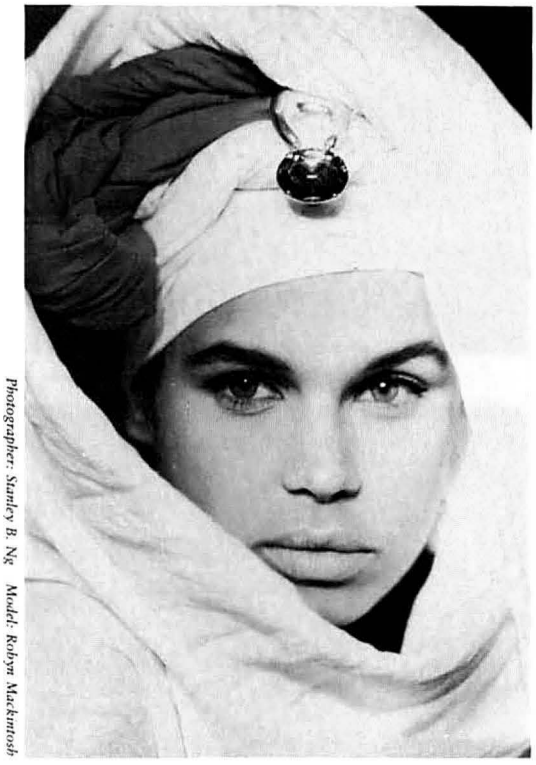
If the TARGA 16 is a speed demon at capturing images, it's nothing short of phenomenal when it comes to manipulating them. To facilitate fast response to graphics software instructions, the TARGA 16's 512K of memory is divided into 16 32K sections, which are shuffled in and out of a 64K edit buffer two pages at a time. That arrangement enables you to copy pixels from one part of the screen to another without using an intermediate buffer as a holding area, unlike most display boards. The TARGA 16 puts both the source and target portions into 64K edit segments simultaneously, making copy or block move operations almost instantaneous.

All told, 34 memory registers regulate the TARGA 16, and each register is completely programmable. To determine which 32K pages will reside in the 64K edit buffer, for example, the pages' addresses are introduced into the page select registers (which are 2 of the 12 8-bit control registers that are mapped into the switch-selectable range of the CPU's I/O space). These dozen registers control the TARGA 16's major attributes, including resolution, hue, saturation, contrast, and video source type. In addition, 22 9-bit display registers are integrated into the video timing controller to control video capture and display.

On the pixel level, color is determined by a 16-bit combination (hence the TARGA 16's moniker). For every pixel, 5 bits each are assigned to the red, green, and blue primaries (for a total of 15), allowing each primary 2^5 (or 32) different shades. Mixing and matching among the 32-shade sets yields

32^3 or 32,768 colors, the total number of hues available on the TARGA 16.

The remaining 16th bit is used to determine whether a pixel's color originates from a video source or from the PC. These "overlay" pixels are superimposed on the captured video image and remain unaltered when the image changes. This effect is often used in broadcast television to superimpose titles or captions on the screen. With TARGA's *TIPS* software, you can overlay not only text characters but also a battery of paint and drawing effects.



Photographer: Stanley B. Ng Model: Robyn Mackintosh

Video retouching is one of the TARGA board's most spectacular applications. This photo was altered to produce the preceding full-color image using AT&T's Truevision Image Processing Software, which also generated the stylish text overlay.

Creating a Good Image

The *TIPS* graphics package offers all the standard drawing, text, and painting functions, but it's as much like the average paint program as the space shuttle is like a hang glider. Like many of its inferiors, *TIPS* supports fills, squares, arcs, lines, polygons, circles, ovals, and freehand drawing, but its selection of type fonts and sizes is unusually broad. And it leaves the rest of the pack in the dust by offering fractals whose complex algorithms can generate pseudorandom surfaces to add texture to images.

In addition to being able to perform normal block copying and relocation procedures, you can "slide" an outlined portion of the screen so that it leaves a trail of blended duplicate images. Other special effects are offered, including airbrushing and antialiasing for smoothing the jagged edges. A blending function averages color values in a specified area, and you can paint with patterns instead of colors if you so choose. And when you're finished with an area of the screen, you can protect it from future changes. Plainly, *TIPS*'s bag of tricks is practically bottomless.

Because of the board's colossal palette, low-resolution images appear more packed with pixels than they actually are.

TIPS's menus are icon-oriented and mouse-driven, forming pop-up squares of 25 icons on the screen. When the main menu is displayed, the four most recently used subicons are displayed alongside the main choices. The color icon on the main menu calls up a working palette containing 256 colors.

If you don't see the color you want, you simply switch to another 256-color palette. Or, you can bring up yet another menu and construct a color using a sliding scale by manipulating hue, saturation, and intensity. If you want a color somewhere between two shades, you can choose a color spread. For example, you might select eight or ten gradations between two shades of yellow. You can also "grab" a color from any

This TARGA fantasy combines several overlaid images to create an arresting, hard-edged collage. Enlarging an area of the image reveals the multiplicity of colors that compose even subtle shades.

pixel on the screen, an especially useful feature for blending or retouching images.

TIPS runs on 256K, but 512K or 640K speeds its performance appreciably. And because each captured image occupies about 400K on disk, a hard drive is a must. If you plan on using the TARGA and *TIPS* regularly, a Bernoulli Box with removable 10MB or 20MB cartridges might be one of the most workable solutions. (I managed to fill 10MB in 10 minutes without difficulty.)

On the output side, photographing the screen or committing pictures to videotape are currently the best ways to record a TARGA image. If you're willing to sacrifice resolution, the Epson JX-80 or the IBM 3852 Color Inkjet Printer are the two color printers that *TIPS* supports. In black-and-white, an Epson FX-85 (or a compatible) is your only choice.

As an add-on for its *TIPS* package, AT&T offers *PC Carousel*, a slide-show package similar in concept to IBM's *PC Storyboard*. The only annoying thing about *PC Carousel* is the time it takes to load a screen from disk into memory before you can display it. Even with minimum delay, you must wait about 30 seconds between screens during a presentation.

Who Needs It?

Currently, the TARGA boards are products in search of a market. In a scenario highly unusual for the PC industry, EPI-Center's gurus were essentially given carte blanche to develop technology for technology's sake, and AT&T has done little to push the TARGA product line. Yet once the appropriate vertical market software is developed, the possible uses are mind-boggling.

The most obvious application of TARGA technology lies in commercial art. Graphic artists go wild over *TIPS* because it enables them to modify photographic images quickly without time-consuming retouches or the mess of airbrushes and paints. The board's ability to capture and combine images could help bring about a new look for low-end advertising and possibly encourage more sophisticated PC-based fine art—especially if developers come up with a hard copy output device that matches the adapter's screen display.

Because the TARGA 16 is compatible with broadcast video, low-budget video entrepreneurs have been among the first to exploit the board's wizardry. The TARGA 16 can generate its own video raster sync signal, or it can genlock (synchronize) with an external signal—a must in studio work where video input and output devices vary.

Small cable stations and independent producers should revel in the board's ability to create overlay titles at a fraction of the cost of conventional character generators. Furthermore, logos, station IDs, and show openers can exhibit a polish normally restricted to systems costing upwards of $30,000. And with hardware and software support growing, producers are already employing the TARGA 16 to create frames for animated sequences. One company is using TARGA animation to display a series of CAT scans, providing doctors with a valuable diagnostic tool.

Still an infant application, solid modeling software for the TARGA is being explored by third-party software developers. At the high end of PC CAD and animation technology, solid modeling can reap substantial benefits from the subtle color resolution and shading available on the TARGA.

Low-budget video entrepreneurs have been among the first to exploit the board's wizardry.

Moreover, the board's high-speed design helps shorten the long redraw times associated with the solid modeling process.

The TARGA is also a natural for creating image data bases. Unlike picture data burned into laser disks and CD ROM, TARGA images can be overwritten, paving the way for temporary image repositories. One possible application is in the area of security, where personnel mug shots could be retrieved immediately for identification purposes. Similarly, creating a picture inventory of valuable items—from museum pieces to office equipment—could streamline insurance records and expedite recovery of stolen goods. As mass storage capacity becomes less of an issue, TARGA image libraries should gain a market niche.

The ability to telecommunicate TARGA images gives the board a leg up on similar technologies. Although full-color images take about 6 minutes to transmit at 2400 bits per second (bps), AT&T's *Still-Frame Teleconferencing Software (STS)* supports speeds of up to 9600 bps, theoretically cutting image transfer time to about 1½ minutes. One unique feature of *STS* is that it transmits an entire picture in the first 25 percent of the transmission time, but at one-fourth the resolution—a desirable feature where low-resolution images are all that are required. The remaining 75 percent of the time is devoted to enhancing the resolution of the picture.

Still-frame transmission has many applications. Business teleconferees can transmit images over normal phone lines, and on-line product data bases can use captured TARGA images to give shopping by PC a shot in the arm. More important, critical graphics data can be transmitted instantly. For example, if a surgeon needed a second opinion on an X ray, he or she could transmit a captured image of the negative to a colleague by using a PC and a video camera. If need be, the surgeon could zoom in on a crucial area of the X ray and transmit a follow-up image.

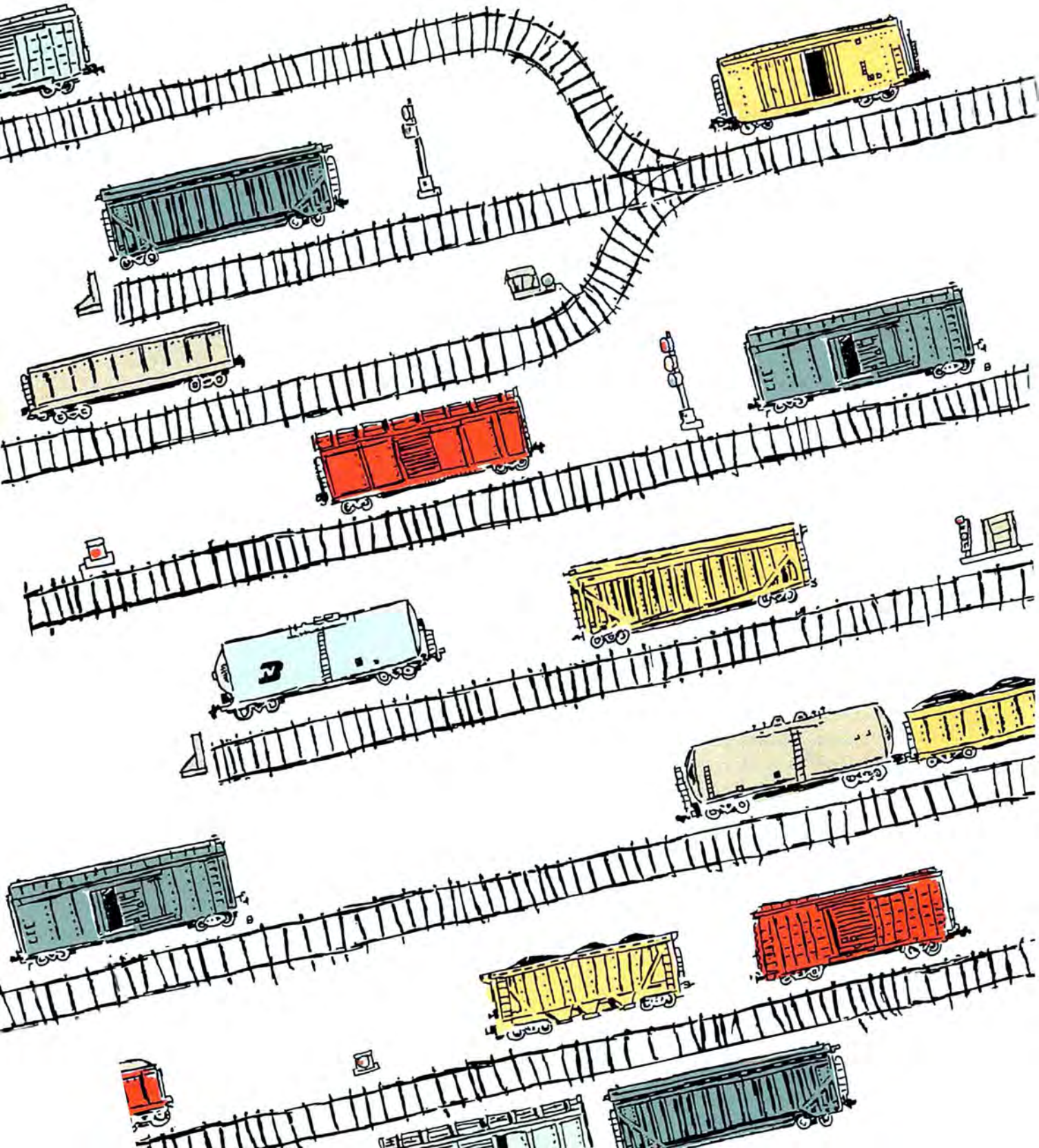
Essentially, any PC-based image-processing application can benefit from the TARGA's unique capabilities. Plastic surgeons can model proposed changes, archeologists can preview restorations, and architects can use captured images to plan building renovations. Incredibly, researchers are even tailoring color-recognition machine vision applications to the board.

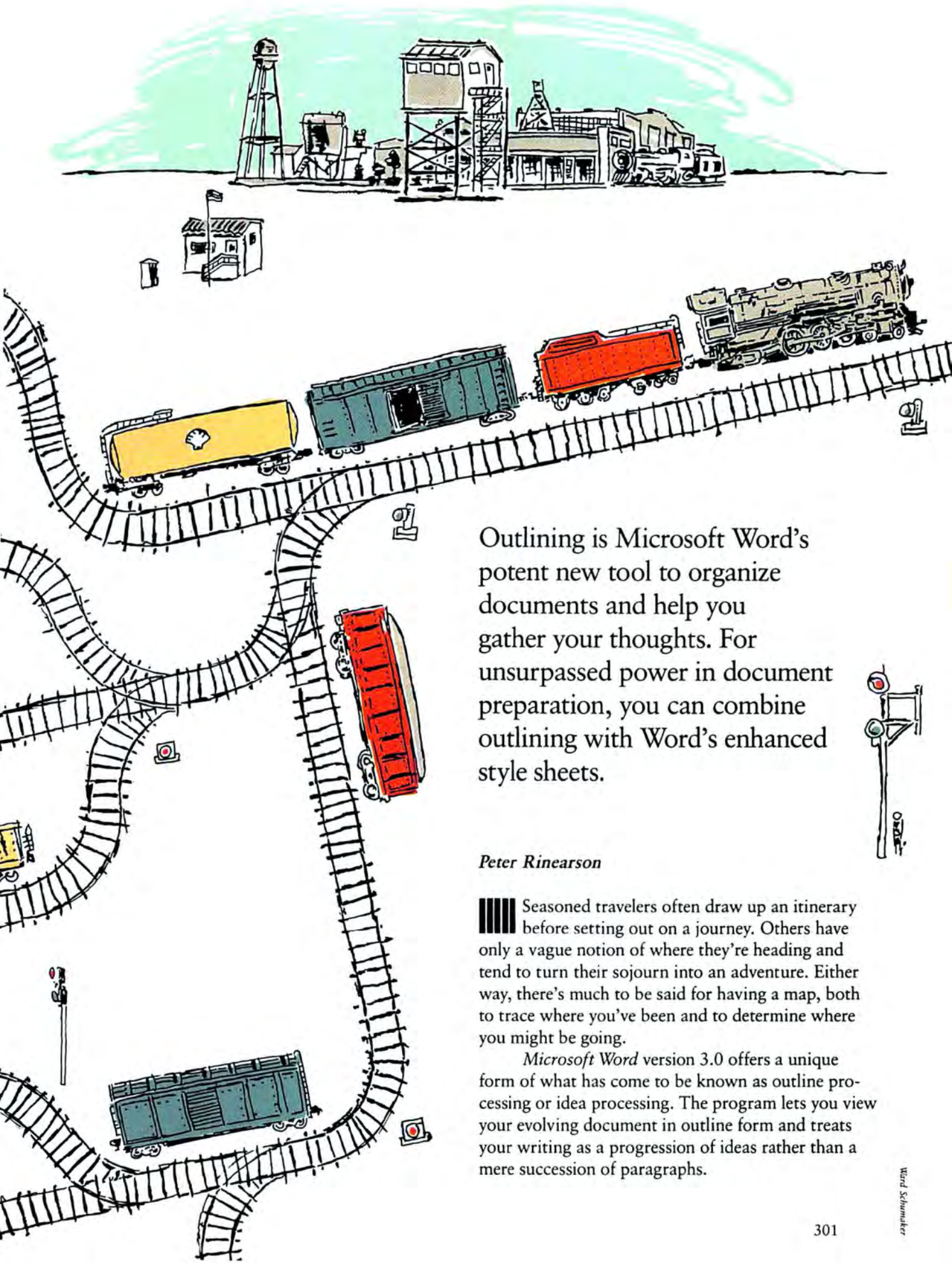
That the TARGA image-capture and display boards are setting a new standard for graphics excellence is undeniable. Clearly, the radical memory-management innovations behind the boards' staggering color transformations are the stuff of which technological legends are made. By keeping the price low and interest among third-party software developers high, EPICenter has ensured that these multifaceted gems find homes in the far corners of the PC marketplace. ●

Bill Crider is a microcomputer training consultant and a Contributing Editor for PC World.

Truevision Advanced Raster Graphics Adapter
AT&T Electronic Photography and Imaging Center
2002 Wellesley Blvd.
Indianapolis, IN 46219
317/352-6120
List price: TARGA 16 $2995, Truevision Image Processing Software $1250, PC Carousel $150, Truevision Still-Frame Teleconferencing Software $695 per site
Requirements: 256K, hard disk

Outlining With Style





Outlining is Microsoft Word's potent new tool to organize documents and help you gather your thoughts. For unsurpassed power in document preparation, you can combine outlining with Word's enhanced style sheets.

Peter Rinearson

Seasoned travelers often draw up an itinerary before setting out on a journey. Others have only a vague notion of where they're heading and tend to turn their sojourn into an adventure. Either way, there's much to be said for having a map, both to trace where you've been and to determine where you might be going.

Microsoft Word version 3.0 offers a unique form of what has come to be known as outline processing or idea processing. The program lets you view your evolving document in outline form and treats your writing as a progression of ideas rather than a mere succession of paragraphs.

Ward Schumaker

Midway through a writing project, for example, you can switch from normal document mode to outline mode and review what you've already written. You can view your draft as concisely or in as much detail as you desire. You can look ahead to ideas and passages that are only partly formed, and judge where and how they might fit into the document you're fashioning. In short, the outline can map your journey from the beginning of a document to its end.

This outlining capability is one of many enhancements incorporated into the third major release of *Word* (see *From the Software Shelf, PCW,* September 1986).

One of *Word*'s more interesting new wrinkles is a broader role for the style sheet, the program's flexible tool for shaping the format of what you write. As you learn how to marry the style sheet to the outline features, the benefits of style sheets will appear more substantial than ever.

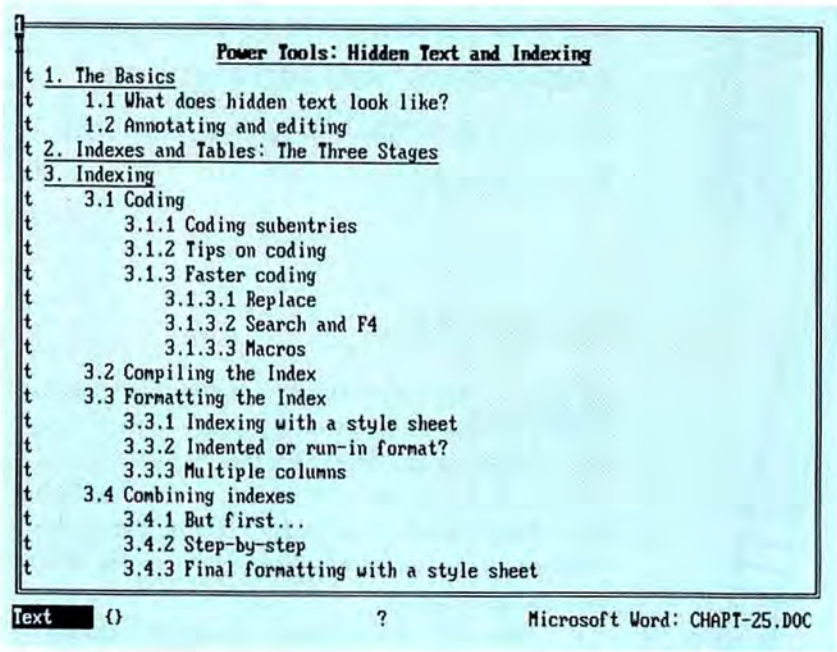
Word remains a program that you can employ in rudimentary but satisfactory ways after a few hours of practice. This article assumes you understand the fundamentals of *Word;* even if you don't, however, following the steps will give you a sense of the more sophisticated side of *Word*'s personality.

Outlining Outlined

Outlining is a modest term to describe *Word*'s organizational talents. You can compose and print a formal outline, of course. *Word* will number it for you automatically, if you like (see Screen 1). The numbering can follow any of several schemes.

But the real value of *Word*'s outlining is that it lets you see and edit, on an ongoing basis, an up-to-date model of your document. You can collect ideas under headings and collapse this text so that it vanishes from the screen. You can adjust not only the order of the headings and subheadings that remain but also their relative importance, or level. As with any outline, the higher a heading's level, the less it is indented (see Screen 2).

With a *Word* outline mapping your document, you don't have to scan 15 screens to find an idea; instead, it's summarized on a single line in the outline model. Similarly, you needn't scroll through a long document to move a subsection; simply rearrange lines in the model, and the larger document reflects the changes automatically.



Screen 1: The outline of a chapter from the author's book on Microsoft Word, after the Library Number command was used to automatically number each outline entry

You can even look at a document in one window and its outline in another—and when you edit one, the other changes accordingly. If you're counting outlining features, some dedicated outlining programs have more; *Word*'s special virtue is the way it puts documents and outlines on intimate terms.

The Latest in Style Sheets

Whether or not you use outlining, style sheets are the key to unlocking *Microsoft Word*'s full potential. With style sheets, you effectively have a second keyboard with 123 keys. These keys are dedicated to formatting: Each applies a format or set of formats to whatever text you select. Each formatting instruction is called a style. A collection of styles forms a style sheet, which can be viewed or edited by entering *Word*'s Gallery (see Screen 3).

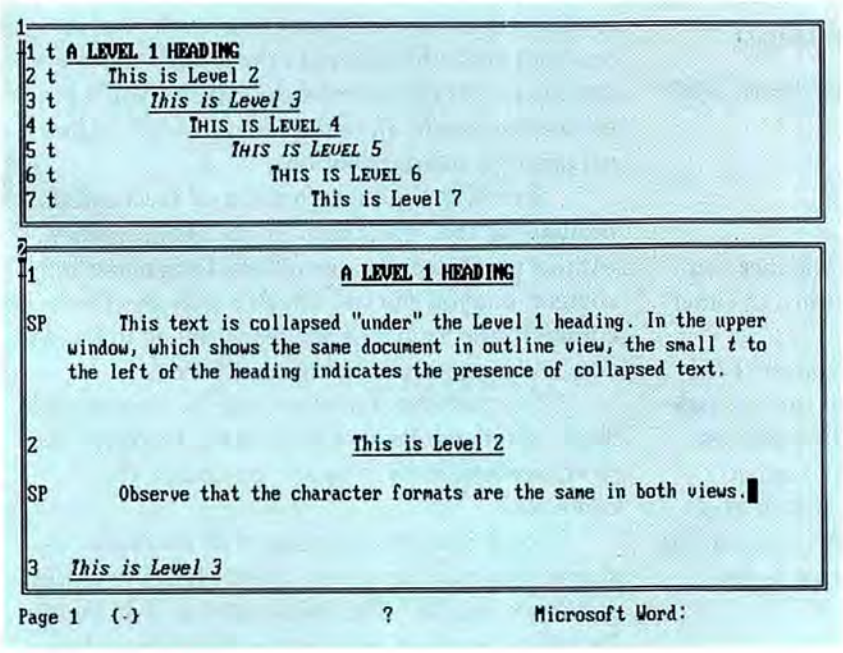
You can change the formatting associated with any key at will or change the formatting of all keys at once. Once defined as a style, using a format is a matter of pressing <Alt> and entering a code of one or two characters. Although a style sheet can contain as many as 123 styles, you may get by with a sheet that has as few as 1 or 2 styles.

And because you can change all the formatting styles at once by switching to a different style sheet, *Word* takes on different personalities for specific word processing applications. Style sheets enable you to quickly customize the look of any document or set of documents (see "Dress Up Your Documents," *PCW*, September 1985).

At your option, several *dedicated styles* can control the look of certain aspects of a document, such as page layout, page numbers, footnotes, and footnote reference marks. All you do is assign formatting to the styles; *Word* applies the styles to appropriate elements of the document automatically. *Word* knows what a footnote is, for example, and applies the footnote style.

You can override dedicated styles with alternate styles or formatting commands. Customized styles might handle block quotations in a manuscript, the return address on a letter, or elaborate tab stops for creating a table.

Word version 3.0 introduces several new user-defined dedicated styles. Four are devoted to parts of an index, and another four, to levels in a table of contents. If you use *Word*'s Library Index command to index a document, *Word* will at your request assign



Screen 2: By splitting the screen into two windows, you can simultaneously display a document and its outline. The Heading levels are expressed as indentation in an outline but as formatted paragraphs in a document.

the proper index styles (type size, typeface, and attributes–bold, italic, and so on) to the levels of the index. If you use the Library Table command to compile a table of contents, *Word* will automatically assign table styles where appropriate.

Headings Up

Word also reserves up to seven styles for formatting the headings and subheadings of a document. These Heading level styles not only allow you to quickly create headings in a document but also permit adjustment of outline Heading levels. Indeed, heading styles are the key to fully integrating documents and their outlines.

For each Heading level style, you can design a specific format. For example, you can decree that all Level 1 (top-level) headings will have boldfaced, underlined, uppercase letters and be centered on the page, while all Level 2 headings will be underlined and centered, but not uppercase or bold. A Level 3 heading might be flush left and underlined, and so forth.

Furthermore, you can assign the key code 1 to the Level 1 style, the key code 2 to the Level 2 style, on down to the key code 7 for the Level 7 style. With a style sheet in place, it doesn't matter whether you are working with a document or its outline. In either case, you control headings identically.

Style sheet character formatting carries over to outline view, although paragraph formatting does not.

In document view, for example, you can hold down <Alt> and press the number 1 to turn a single-line paragraph into a Level 1 heading. Instantly, its characters are boldfaced, underlined, and uppercase–or made to conform with whatever style you designed. Change your mind? Press <Alt>-2, and the line becomes a Level 2 heading, formatted as you specified in the style sheet.

When you're in outline view, headings are indented to reflect their relative level. When you switch to document view, the headings assume the format dictated by the style sheet. In sum, then, any change in a heading's level in document view is reflected in outline view, and vice versa; likewise, a heading's character formatting (underlining, italics, and so on) is the same in document view and outline view.

Like *Word* itself, the outlining feature can be used in simple ways or sophisticated ones. Fortunately, you can do much with relatively little learning.

Style Sheet Meets Outline

You can use *Word*'s outlining without a style sheet, but the few minutes invested in creating one are richly rewarded with bolstered performance. The following step-by-step discussion assumes you've made the style sheet named 'headings' described in the sidebar "Creating With Style," or that you've added its four Heading level styles to an existing style sheet.

In creating part of an outline, you can add body text and then collapse it out of sight. The sample outline presented in this article happens to pertain to a book on stage magicians, but its format could work as well for a business proposal.

Note that for some kinds of documents, such as technical reports, you'll want to keep the outline headings and subheadings in the printed version of the document. But for most documents, you'll probably delete some or all of the Heading levels before final printing and distribution.

Start *Word* and attach the style sheet called headings to the "document" in the blank window. (At this point, the document lacks both name and content, but you can still attach a style sheet to it; accordingly, the format of any work you do in the window will be governed by the style sheet.)

To attach the style sheet, use the Format Style Sheet command: Press **< Esc > F S S**, then type the word **headings**. Press **< Enter >** to execute the command.

You'll immediately notice that the diamond-shaped end mark on screen moves right five spaces and down one line. This is because the style sheet's Paragraph Standard style (key code SP) has taken control of the first paragraph in the document–a

paragraph that currently lacks content. Next you will turn on the style bar with the Window Options command. The style bar displays the key codes of paragraph styles to the left of the paragraphs on which they work.

Press **< Esc > -W 0** to pick Window Options, press **< Tab >** four times to move to the style bar field, and press **< Space >** to highlight the word 'Yes'; hit **< Enter >** to execute the command. You'll see the letters 'SP' appear in the style bar, to the left of the first paragraph of the blank document.

Hit **< Enter >** two or three times to create more standard paragraphs and to move the end mark out of the way. Press **< CursorUp >** until you've returned to the top line of the document.

Moving Between Views

Switch from document view to outline view by holding **< Shift >** and pressing **< F2 >**. The highlighted word 'Text' will appear in the lower left corner of your screen. This indicates that you're in outline view and that the selected line (where the cursor is) is body text rather than a Heading level. Notice that a 'T' appears after the key code 'SP'. The 'T' also indicates the line contains text rather than a heading.

Change the text line to a heading line by holding down **< Alt >** and typing the key code for the heading. Our style sheet contains four heading styles, numbered 1 through 4. Because you want to begin an outline with a Level 1 heading, type **< Alt > -1.**

Several things change immediately. The 'SP' disappears and the 'T' is replaced by the key code '1'. The text indicator at the bottom of the screen changes to 'Level 1', and the line loses the standard paragraph's .5-inch left indentation. Now the line is flush left, as we expect a top-level heading in an outline to be.

Type **Part One: The Magic of Magic.** You'll see that as you type the heading, it's automatically capitalized, boldfaced, and underlined, in accordance with the formatting established in the style sheet's Heading level 1 style. Style sheet character formatting

```
1   SP Paragraph Standard                          STANDARD PARAGRAPH
       Courier (modern a) 12. Flush left (first line indent 0.5"), space
       before 1 li.
2   1  Paragraph Heading level 1                   HEADING LEVEL 1
       Courier (modern a) 12 Bold Underlined Uppercase. Centered, space
       before 2 li (keep in one column, keep with following paragraph).
3   2  Paragraph Heading level 2                   HEADING LEVEL 2
       Courier (modern a) 12 Underlined. Centered, space before 2 li (keep
       in one column, keep with following paragraph).
4   3  Paragraph Heading level 3                   HEADING LEVEL 3
       Courier (modern a) 12 Italic Underlined. Flush left, space before 2
       li (keep in one column, keep with following paragraph).
5   4  Paragraph Heading level 4                   HEADING LEVEL 4
       Courier (modern a) 12 Underlined Small caps. Flush left, space
       before 2 li (keep in one column, keep with following paragraph).
6   5  Paragraph Heading level 5                   HEADING LEVEL 5
       Courier (modern a) 12 Italic Small caps. Flush left, space before 2
       li (keep in one column, keep with following paragraph).
7   6  Paragraph Heading level 6                   HEADING LEVEL 6

COMMAND: Copy Delete Exit Format Help
         Insert Name Print Transfer Undo
Edit style sheet or choose Exit to see document
GALLERY {}                        ?              Microsoft Word: PCWORLD.STY
```

Screen 3: The style sheet used to create Screen 2. The numbers on the far left merely number the styles in the style sheet. The next column, however, contains key codes for styles and numbers corresponding to various Heading level styles (1 for Heading level 1, and so on).

Creating With Style

You can create a simple style sheet and put it to work immediately. Begin from the normal Edit menu in document view. Press **< Esc >** and the letter **G** to enter the Gallery of styles. The Gallery will be blank, and the Gallery menu will appear at the bottom.

Press the letter **I** for the Gallery's Insert command. Use it to insert a new style—in this case the first style—into a style sheet. Initially, you'll create a Paragraph Standard style that *Word* will use once it's defined to format any paragraph in the document that you haven't deliberately formatted in a different way. In the Insert command's key code field, type **SP**. Instead of <Enter>, press **< Tab >** to move to the next field, which is called usage.

Press **< Space >** once to select Paragraph, then press **< Tab >** again to move to the next field, variant. In the variant field, type **standard.** (You could also press a cursor key or click the right mouse button to bring to the screen a list of all possible paragraph style variants. The list begins with the choice 'Standard'.)

Move to the remark field by pressing **< Tab >**, and type **STANDARD PARAGRAPH.** (You can type anything you like, or leave the remark field blank.) Before you press <Enter> to execute the Insert command, note that the Gallery window remains blank and the command fields at the bottom show the choices you've made thus far.

Press **< Enter >**, executing the Insert command. The style will be inserted at the top of the Gallery; highlighting will indicate that it is selected. Any formatting you do in the Gallery will apply to any style or styles currently selected.

Select the Format Paragraph command by pressing **F** and then **P**. **< Tab >** to the first line field and type **.5**, then **< Tab >** to the "space before" field and type **1** (see Screen A). Press **< Enter >** to execute the Format Paragraph command, which will apply the formatting to the Paragraph Standard style. The highlighted description of the style will be updated to reflect the change.

Press **< CursorDown >** to move the highlight bar away from the new style. The first style is now complete, and its formatting description shows that every standard paragraph in a document formatted accordingly will be in 12-point type, with paragraphs in flush-left alignment with a first-line indent of ½ inch, preceded by a blank line space. The diamond-shaped end mark is now selected, indicating that the next style will be inserted at the end of the style sheet.

You've seen how to create the first style in a style sheet. Screen B shows the entire style sheet.

Follow the same procedure—starting with the Insert command and ending with formatting—to create all the Heading level paragraph styles. Only four Heading level styles are shown, but you can create as many as seven. For the four, use the key codes 1, 2, 3, and 4, and pick the usage Paragraph in each instance. For vari-

ants, use Heading level 1, Heading level 2, and so on. If you prefer to select these names from a list of possible variants rather than typing them in, use the cursor keys to display the list.

When using the Format Paragraph command to specify whether a heading should be centered and how many blank lines should precede or follow it, you may also pick Yes in the 'keep together' and 'keep follow' fields. This combination ensures that no multiline heading will be split across two pages during printing and that no heading will be printed at the bottom of a page without at least two lines of text following it.

Use the Format Character command to specify such character formatting as italics and boldface. (Whether your screen can show the character formatting depends on the graphics capabilities of your system.)

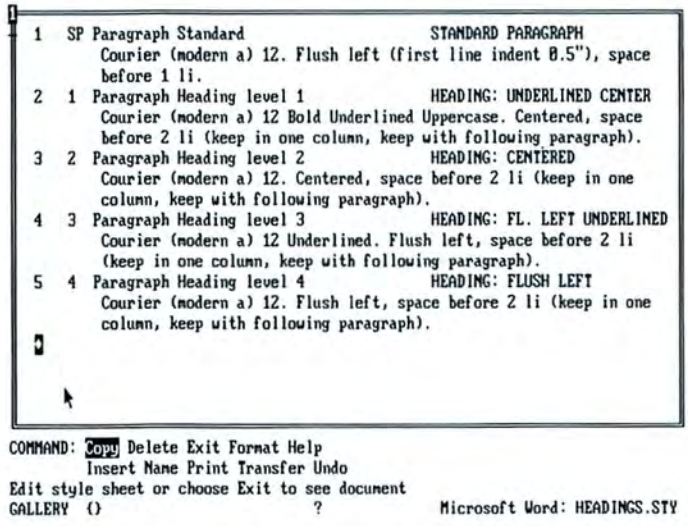
When you're finished inserting and formatting styles, use the Gallery's Transfer Save command (press **T**, then **S**). Type the name **headings** and press **<Enter>**.

If you want a printed copy of the style sheet, press **P** for Print.

That's it. To leave the Gallery and return to document view, press **E** for Exit.

Whenever you want to govern a document or outline with this style sheet, you can attach the style to that file with the Format Style Sheet command. With the document on the screen, type **<Esc> F S S** (for Format Style Sheet), type the name **headings**, then press **<Enter>**. *—P. R.*

Screen A: Once a style has been inserted into a style sheet, you can format it for particular line spacing and indentation.



Screen B: A complete style sheet for four levels of heading. Note that the left column of numbers in the style sheet merely shows the order that the styles happen to be in. The second row of numbers, under the 'SP', shows the key codes for the associated Heading level styles.

carries over to outline view, although paragraph formatting (such as centering) does not. Honoring paragraph formatting would obviously defeat the indentation of outline levels–and thus the utility of the outline itself.

At the end of the heading line, press **< Enter >** to end the paragraph and move to the next line. Level 1 will continue to be indicated in the lower corner. The cursor will be positioned directly below the first line.

To make this line a second-level heading, indented from the heading above it, press **< Alt > -2**, the key code for the Level 2 heading. The cursor moves four characters to the right–which is one level in outline view–and the indicator in the lower left corner of the screen displays 'Level 2'.

Type **A Short History of Legerdemain and Illusion** and press **< Enter >** to move to a new line, which will also be at Level 2. Next, type **Magic By Any Other Name** and press **< Enter >**. Thus far, you've typed the book's first section name as a Level 1 heading, and two chapter titles as Level 2 headings. Press **< Alt > -3** to move down one more level. The lower left corner now indicates Level 3; type **Illusionists.** This entry will be underlined, in keeping with Heading level 3 style in the headings style sheet.

Keeping a Level Head

You can change a heading's level even after it has been typed, by simply holding down <Alt> and typing the key code for a different Heading level style.

Try it. Change the levels of the headings you've entered, and then change them back again. You can turn a heading into body text by typing the key code for a standard paragraph, <Alt>-SP. And you can change body text into a heading by typing the key code of the heading.

You don't have to use a style sheet to change a Heading level. Instead, you can press <Alt>-9 to *promote* a heading by one level, and <Alt>-0 to *demote* it by a level. At first glance, the <Alt>-9 and <Alt>-0 keys seem peculiar choices for raising and lowering Heading levels. Note, however, that both numeric keys also show parenthesis marks. The left parenthesis on the 9 is consistent with <Alt>-9's promoting an outline heading to the left. Similarly, the 0's right parenthesis suggests demotion to the right.

Once you have restored the headings to their original levels, move the cursor up to the end of the second line, after '... and Illusion'. Switch from out-

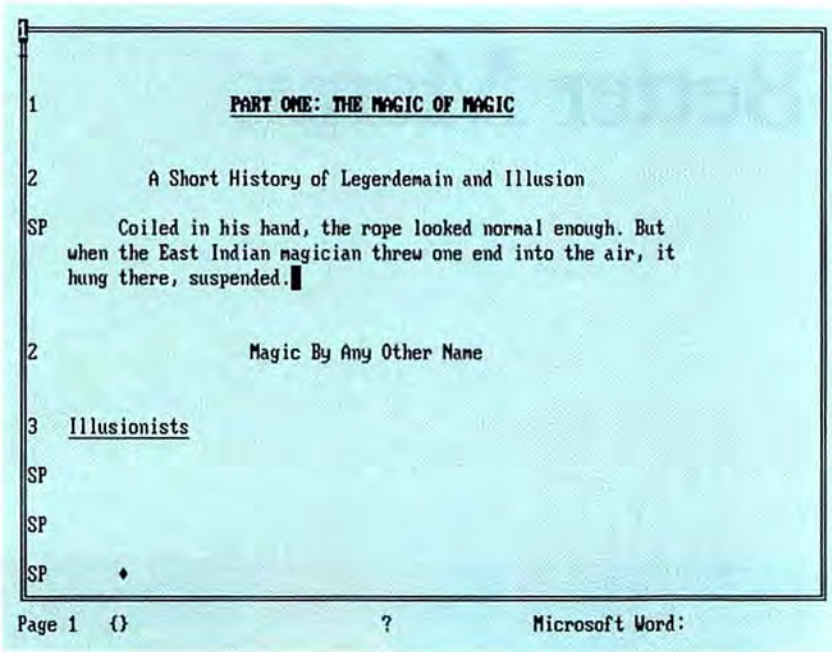
Much of the power of Word's *outlining feature is its capability to collapse subheadings and text.*

line view to document view by pressing **< Shift > - < F2 >**. Suddenly, the levels of heading assume paragraph formatting traits as well as character formatting. You can switch between document view and outline view with **< Shift > - < F2 >** as often as you like.

In document view, with the cursor immediately following the words '... and Illusion' on the top line of the document, press **< Enter >** to create a new paragraph. This paragraph, like the paragraph from which it sprang, will be at Level 2. Change the new Level 2 heading to a standard paragraph by holding down **< Alt >** and typing **SP**. Type the paragraph shown in Screen 4.

Switch again from document view to outline view with **< Shift > - < F2 >**. Watch as the headings return to their outline indentation while the paragraph you typed as body text (SP) remains on the screen as a standard paragraph. It's all right to display a little body text when in outline view, but an outline doesn't do you much good if it's cluttered with body text.

To keep things clean, move the cursor up to the heading directly above the body text and collapse the text below it. Do this by holding down **< Shift >** and pressing the **< GrayMinus >** key. The paragraph will disappear, and in the selection bar next to the heading a small 't' will appear, indicating the presence of collapsed text. (To recall or expand collapsed text you would hold down the <Shift> key and press the <GrayPlus> key.)



Screen 4: In document view, the two Level 2 headings—which bracket the text—become standard paragraphs with just three keystrokes.

Additional Tricks

Much of the power of *Word*'s outlining feature is this capability to collapse subheadings and text. Subheadings can be collapsed and expanded in much the same way as body text—useful in situations that merit only the most important levels of heading from a detailed outline. A heading that contains collapsed subheadings—or subheadings and text—is marked in the selection bar with a plus sign.

To expand all subheadings below a selected heading, press the gray asterisk (*). To reveal just those subheadings one level below the selected heading, press <GrayPlus>. To collapse all subheadings below a selected heading, press <GrayMinus>.

With nonessential subheadings (and accompanying text) out of sight, you can examine the order and relationship of important headings—and thus gain understanding of a document's underlying structure. Should you need more detail on a point, you can get it by temporarily expanding a portion of the outline. (Remember that reshuffling the outline means reshuffling the document.)

There's always more to learn, of course. Outlining can be considerably more sophisticated than our example. But even this short exercise illustrates how much you can do with *Word*, and how easily.

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Microsoft Word 3.0
Microsoft Corp.
16011 N.E. 36th Way
Box 97017
Redmond, WA 98073-9717
206/882-8080
List price: $450
Requirements: 256K, two disk drives, DOS 2.00 or later version

BASICally Better Menus

Some call them front ends, others call them shells. For anyone who yearns for something better than the DOS prompt, menu systems can be a blessing. Two advanced menu-making alternatives using batch commands and BASIC are explored.

Lawrence J. Magid

Mercedes McDonald

DOS is every user's first adversary. Over time a grudging fondness devlops for this most essential of PC programs. But even hardened users will probably admit that there must be a better way to get at programs and access DOS functions.

One solution is to buy a front-end menu program. Installing a front end conceals the uncommunicative DOS, replacing it with an informative system that makes formatting a disk, running a program, or navigating through a thicket of subdirectories a matter of picking a number off the screen.

Although the market features a number of these programs, creating your own is surprisingly easy and gives you complete control over the look and the scope of the menu (see Screen 1).

One do-it-yourself method relies on batch files and DOS's TYPE command (see "Serving Up DOS," *PCW*, February 1986). But with a bit of BASIC, you have more flexible alternatives. The first enlists BASIC 3.0's SHELL command; the second, any version of BASIC combined with two batch files and a RAM disk.

The BASIC Foundation

BASIC's functions give a menu system the ability to check for input errors, choose text colors, and branch to submenus that let you perform mundane but vital tasks such as formatting disks, copying files, and backing up hard disks.

BASIC can also effectively insulate the user from DOS, preventing inexperienced users from accidentally erasing files or those with suspect motives from gaining entry to restricted data or programs. However, such a system cannot prevent a determined (and sophisticated) user from breaking and entering—and wreaking havoc.

A BASIC SHELL Game

One way to build a menu system with BASIC is to display menu options with the PRINT command, accept keyboard input via the reserved variable INKEY$, and execute the appropriate commercial program or DOS command from within the menu program with BASIC's SHELL command. The BASIC interpreter and the menu program remain in memory while the chosen menu option executes. Although SHELL can deal with batch files and programs that have .COM and .EXE file extensions, it cannot run another interpreted BASIC program or load a memory-resident utility such as *SideKick* or *ProKey*.

With IBM's BASIC.COM, the short menu program SHELL.BAS takes up about 21K of memory (see Listing 1). With the BASIC, BASICA, or GW BASIC supplied on disk with most PC compatibles, the memory overhead can jump to 80K.

At the beginning of SHELL-.BAS, the screen is cleared and set in 80-column text mode. On a monitor driven by an IBM Monochrome Display Adapter, the program prints 'BASIC Shell Menu' underlined and skips two lines. If the monitor is hooked up to a graphics board, you will have to replace COLOR 1,0 on line 10 with COLOR 0,7 to display the title in inverse video.

Lines 30 through 90 print the menu selections and the prompt 'Enter choice:_' to the screen. Line 100 sets the variable CHOICE to 0 and begins a WHILE... WEND loop that displays the date and time while resetting the value of CHOICE based on keyboard input. (The program considers alphabetic characters, punctuation, and other symbols to be 0.) As long as CHOICE is less than 1 or greater than 6 (the number of menu options), the loop continues.

A valid menu selection ends the loop, and line 150 (PRINT CHOICE) displays it on screen. The ON... GOSUB statement, based on the numeric value of CHOICE, branches execution to a section of the program. If CHOICE = 1, the program jumps to line 1000; if CHOICE = 2, the subroutine at line 2000 does the honors. The ON... GOSUB construct also eliminates the need for a cascade of IF statements, but it does require that menu choices be numeric.

```
BASIC Shell Menu

Lotus 123.....................1
WordStar......................2
WordPerfect...................3
Check a disk..................4
Copy a file...................5
Exit to DOS...................6

                    Enter choice: _
```

Screen 1: A simple menu screen is easy to create using BASIC.

If you have only passing acquaintance with labels, branching, and replaceable parameters, keep in mind that a batch file is composed of statements that can be issued directly from the DOS command line.

The SHELL commands starting at lines 1000, 2000, and 3000 load the programs tied respectively to menu choices 1, 2, and 3. (The sequence of SHELL commands on each line is the same as if you'd entered the individual commands, such as CD/123, at the command line.) Each swatch of code representing a selection ends with RETURN, which sends execution back to line 170 and hence to line 10, which displays the menu.

To check a disk (menu option 4) the program takes advantage of BASIC's ability to query the user for additional information. On line 4010, INPUT$(1) tells the program to proceed after accepting a single keystroke. This tactic eliminates the need for the user to press <Enter> after typing the disk drive letter, which is then assigned to the DRIVE$ variable. The variable CHK$ on line 4020 is assigned DOS's CHKDSK command, a space, the drive letter passed to DRIVE$, and a colon. SHELL CHK$ passes the entire command (for example, CHKDSK B:) to DOS. RETURN then sends control back to line 170 and pops up the menu anew.

The fifth menu item is processed in much the same manner, although SHELL.BAS asks for information about the files to be copied. Menu option 6 exits to DOS; typing EXIT at the DOS prompt returns the menu.

The menu system described here is just a starting point—those familiar with BASIC can dress up the menu and add options. But SHELL's modest talents do limit the menu's capabilities. As noted earlier, certain kinds of programs cannot be executed using SHELL. Furthermore, before a SHELL

command executes, BASIC accesses COMMAND.COM in the root directory of the disk from which the system was started, which slows down operations. With DOS 3.00 and later versions, copying COMMAND.COM to a RAM disk (E: in this example) and issuing the DOS command SET COMSPEC = E:\COMMAND.COM minimizes that delay. To set COMSPEC for earlier DOS versions, see "Command Redirection," *.*, *PCW*, July 1985.

Batch Files and BASIC

The second BASIC menu system eschews the SHELL command and instead relies largely on two batch files. MENU.BAS displays the menu, accepts user input, and creates NEXT.BAT on the fly in a RAM disk. NEXT.BAT is a small batch file that temporarily holds the latest menu selection and passes it on to MENU.BAT, a master batch file that calls the appropriate routine. For acceptable performance, BASIC, MENU.BAS, and both batch files are kept in a RAM disk (drive E:). A 32K RAM disk is adequate on an IBM PC; compatible systems (which lack BASIC in ROM) must dedicate more memory to the task (see "A BASIC Problem With Compatibles" in this month's *Help Screen*).

With this batch/BASIC menu system, fewer restrictions apply and operations are noticeably faster than with the previous method. You can use any version of BASIC and invoke any program or command from the menu—including memory-resident and interpreted BASIC programs.

The master batch file, MENU.BAT (see Listing 2), can be written with a text editor or any word processing program that creates ASCII files. MENU.BAT doesn't change unless you add or subtract entries from the menu.

```
9  'Set up screen ----------------------------------------
10 KEY OFF : CLS : SCREEN 0,1,0,0 : WIDTH 80 : COLOR 1,0
19 'Print title line and menu choices ----------------------
20 PRINT "BASIC Shell Menu" : COLOR 7,0 : PRINT : PRINT
30 PRINT "Lotus 1-2-3.........................1"
40 PRINT "WordStar............................2"
50 PRINT "WordPerfect.........................3"
60 PRINT "Check a disk........................4"
70 PRINT "Copy a file.........................5"
80 PRINT "Exit to DOS.........................6"
90 PRINT : LOCATE 14,24,0 : PRINT "Enter choice: _";
99 'Print date and time while waiting for input ------------
100 CHOICE=0 : WHILE CHOICE<1 OR CHOICE>6
110     CHOICE=VAL(INKEY$)
120     LOCATE 1,65 : PRINT DATE$
130     LOCATE 2,65 : PRINT TIME$
140 WEND
149 'Print and GOSUB to choice; then redisplay menu --------
150 LOCATE 14,37,1 : PRINT CHOICE
160 ON CHOICE GOSUB 1000,2000,3000,4000,5000,6000
170 GOTO 10
999 'Choice 1: Lotus 1-2-3 ---------------------------------
1000 SHELL "CD \LOTUS" : SHELL "123" : SHELL "CD \"
1010 RETURN
1999 'Choice 2: WordStar ----------------------------------
2000 SHELL "CD \WS" : SHELL "WS" : SHELL "CD \"
2010 RETURN
2999 'Choice 3: WordPerfect -------------------------------
3000 SHELL "CD \WP" : SHELL "WP" : SHELL "CD \"
3010 RETURN
3999 'Choice 4: Check a disk ------------------------------
4000 CLS : PRINT "Enter letter name of drive to check: ";
4010 DRIVE$=INPUT$(1) : PRINT DRIVE$
4020 CHK$="CHKDSK "+DRIVE$+":" : SHELL CHK$
4030 LOCATE 25,1 : SHELL "PAUSE"
4040 RETURN
4999 'Choice 5: Copy a file -------------------------------
5000 CLS : INPUT "Enter source file name: ", SOURCE$
5010 INPUT "Enter target drive and/or file name: ", TARGET$
5020 COPY$="COPY "+SOURCE$+" "+TARGET$ : SHELL COPY$
5030 RETURN
5999 'Choice 6: Exit to DOS -------------------------------
6000 CLS : PRINT "Type EXIT to return to the menu." : PRINT
6010 SHELL
6020 RETURN
```

Listing 1: The SHELL.BAS program runs a menu system with the aid of PRINT, INKEY$, and SHELL commands.

MENU.BAT begins with ECHO OFF, which suppresses the display of the batch file's commands. The next two lines clear the screen and designate C: as the default drive. GOTO CHOICE%1 branches execution to various labels linked to a value—in other words, a menu selection—that replaces the DOS variable %1.

If you have only passing acquaintance with labels, branching, and replaceable parameters, keep

in mind that a batch file is composed of statements that can be issued directly from the DOS command line. If a command is followed by parameters (such as a disk drive and file name) you can represent those parameters in the batch file with the "replaceable parameters" %1, %2, %3, and so on. As the batch file executes, DOS replaces every occurrence of %1 with the first parameter, every %2 with the second parameter, and so on.

For example, if you invoke MENU.BAT at the command line by typing MENU 7 4 <Enter>, the 7 and the 4 replace %1 and %2, respectively, wherever they appear in MENU.BAT. If you only enter MENU, both %1 and %2 are null and no value is passed for either replaceable parameter. In this case, GOTO CHOICE%1 is simply read as GOTO CHOICE and execution jumps to the line following the label :CHOICE. That line–E:BASIC E:MENU–runs MENU.BAS, the menu program stored in the RAM disk (see Listing 3).

You'll notice that lines 9-149 in MENU.BAS and SHELL.BAS are almost identical. These lines set the display modes; display menu choices, the date, and the time; and assign menu choices to the CHOICE variable. Line 150 of MENU.BAS clears the variables PARAM2$ and PARAM3$–which are used only if menu option 4 or 5 is chosen–of any previous assignments. Line 160

```
ECHO OFF
CLS
C:
GOTO CHOICE%1

:CHOICE     Display menu, write and call next.bat
E:BASIC E:MENU
E:NEXT

:CHOICE1    Lotus 1-2-3
CD \LOTUS
123
CD \
GOTO CHOICE

:CHOICE2    WordStar
CD \WS
WS
CD \
GOTO CHOICE

:CHOICE3    WordPerfect
CD \ WP
WP
CD \
GOTO CHOICE

:CHOICE4    Check a disk
CHKDSK %2
PAUSE
GOTO CHOICE

:CHOICE5    Copy a file
COPY %2 %3
GOTO CHOICE

:CHOICE6    Exit to DOS
ECHO Type E:MENU to return to the menu
ECHO ON
```

Listing 2: MENU.BAT is the menu system's workhorse.

diverts program flow to the selected subroutines starting at lines 1000, 2000, 3000, 4000, 5000, and 6000.

If you pick 1, 2, or 3 from the menu, MENU.BAS RETURNs operations to line 170. Line 170 OPENs (creates) the NEXT.BAT file in the RAM disk. Line 180 defines the contents of NEXT.BAT, namely MENU, followed by a space and the number picked from the menu. For example, if you choose menu option 2 to run *WordStar,* NEXT.BAT will contain the command MENU 2. Line 190 CLOSEs (saves) NEXT.BAT, and line 200 ends the BASIC program and returns control to the seventh line in MENU.BAT. The sole command on this line, E:NEXT, calls the newly created NEXT.BAT into play.

Since *WordStar* was selected, NEXT.BAT issues the command MENU 2. MENU.BAT runs, and GOTO CHOICE%1 is now interpreted as GOTO CHOICE2. Execution branches to the line after

the label :CHOICE2, changes to the *WordStar* subdirectory (\WS), runs *WordStar,* and, when *WordStar* is exited, changes back to the root directory. GOTO CHOICE branches execution back to the sixth line (E:BASIC E:MENU), running MENU.BAS and starting the process anew.

If you select option 4, 'Check a disk', line 160 of MENU.BAS branches execution to line 4000. The menu program asks which drive to check, then passes the letter you type to DRIVE$ on line 4010. Line 4020 defines the variable PARAM2$ as the drive letter plus a colon. Execution RETURNs to line 170, recreating NEXT.BAT. Line 180 puts MENU 4, plus the contents of PARAM2$, into NEXT.BAT. If you typed in A as the drive, NEXT.BAT's contents would be MENU 4 A:.

At line 200, SYSTEM terminates the BASIC program, returning control to DOS. But because MENU.BAT is active, control actually returns to the line in MENU.BAT following E:BASIC E:MENU. MENU.BAT calls NEXT.BAT, which faithfully issues the command MENU 4 A:. Line 4 of MENU.BAT is now read as GOTO CHOICE4. On the line immediately below the label :CHOICE4 is CHKDSK %2. The variable parameter %2 is replaced by A:, and MENU.BAT sends out the command CHKDSK A:. PAUSE gives you a chance to read the results; pressing any key executes GOTO CHOICE, and MENU.BAS is run once more.

```
9  'Set up screen ----------------------------------------
10 KEY OFF : CLS : SCREEN 0,1,0,0 : WIDTH 80 : COLOR 1,0
19 'Print title line and menu choices
20 PRINT "BASIC/Batch File Menu" : COLOR 7,0 : PRINT : PRINT
30 PRINT "Lotus 1-2-3.........................1"
40 PRINT "WordStar............................2"
50 PRINT "WordPerfect.........................3"
60 PRINT "Check a disk........................4"
70 PRINT "Copy a file.........................5"
80 PRINT "Exit to DOS.........................6"
90 PRINT : LOCATE 14,24,0 : PRINT "Enter choice: _";
99 'Print date and time while waiting for input ------------
100 CHOICE=0 : WHILE CHOICE<1 OR CHOICE>6
110     CHOICE=VAL(INKEY$)
120     LOCATE 1,65 : PRINT DATE$
130     LOCATE 2,65 : PRINT TIME$
140 WEND
149 'Print and GOSUB to choice; then redisplay menu --------
150 LOCATE 14,37,1 : PRINT CHOICE : PARAM2$="" : PARAM3$=""
160 ON CHOICE GOSUB 1000,2000,3000,4000,5000,6000
170 OPEN "E:NEXT.BAT" FOR OUTPUT AS #1
180 PRINT #1,"MENU";STR$(CHOICE);" ";PARAM2$;" ";PARAM3$
190 CLOSE
200 SYSTEM
999 'Choice 1: Lotus 1-2-3 ---------------------------------
1000 RETURN
1999 'Choice 2: WordStar ----------------------------------
2000 RETURN
2999 'Choice 3: WordPerfect -------------------------------
3000 RETURN
3999 'Choice 4: Check a disk ------------------------------
4000 CLS : PRINT "Enter letter name of drive to check: ";
4010 DRIVE$=INPUT$(1) : PRINT DRIVE$
4020 PARAM2$=DRIVE$+":"
4030 RETURN
4999 'Choice 5: Copy a file -------------------------------
5000 CLS : INPUT "Enter source file name: ", SOURCE$
5010 INPUT "Enter target drive and/or file name: ", TARGET$
5020 PARAM2$=SOURCE$ : PARAM3$=TARGET$
5030 RETURN
5999 'Choice 6: Exit to DOS -------------------------------
6000 CLS
6010 RETURN
```

Listing 3: The MENU.BAS program displays the menu and modifies the contents of the temporary file, NEXT.BAT.

The processes marshaled by selecting item 5 from the menu are much the same, except that a third variable, PARAM3$, joins the crew. When you select item 6, MENU.BAS defines NEXT.BAT's contents as MENU 6. :CHOICE 6 is found, the message 'Type E:MENU to return to the menu' appears, echo is turned on, and the batch file suddenly ends. And when any batch file ends, DOS reasserts control. Of course, to display the menu again, you simply type E:MENU.

```
COPY \DOS\BASIC.COM E:
COPY \MENU\MENU.* E:
E:MENU
```

Listing 4: Fast access—these lines copy BASIC and the MENU files into a RAM disk, then bring up the menu.

To display this menu system every time a PC is turned on or restarted, add the lines in Listing 4 to your system's AUTOEXEC.BAT file. The first two lines copy BASIC.COM, MENU.BAS, and MENU.BAT to the RAM disk drive (E:). E:MENU runs MENU.BAT.

Throughout all this jumping to and fro among MENU.BAS, MENU.BAT, and NEXT.BAT, keep in mind that although MENU.BAS displays the menu and modifies the contents of NEXT.BAT, MENU.BAT is the real workhorse. Also, when MENU.BAT calls another batch file, it loses control and cannot regain it unless called by another batch file. So don't use this menu system to run other batch files unless they end with the command E:MENU.

Forever Making Menus

It's easy to make menu selections with the PC's function keys instead of number keys. Just use BASIC's KEY statement at the beginning of the program to redefine the function keys for the appropriate menu options. For example, the statement KEY 1,"1" assigns the character 1 to <F1>. Refer to the KEY and KEY(*n*) statements in the BASIC manual for further programming ideas.

There are other ways to enhance the menu. You merely have to tap your desires, creativity, and understanding of BASIC. With this approach to menu making, you have full access to all BASIC commands, including those that display the PC's extended ASCII character set. If you need characters from foreign alphabets, special symbols, or graphics characters, they're available. BASICA, of course, can provide even fancier bells and whistles, notably true graphics and sound, but you will have to set aside at least an additional 10K of memory.

It's easy to make menu selections with the PC's function keys instead of number keys.

One way to speed up menu creation and display time is by using *MenuMaker,* which is included on the disk that comes with *The Fully Powered PC* book. *MenuMaker,* written in BASIC by the late Andrew Fluegelman, creates menus and data entry/retrieval screens that utilize the PC's full range of ASCII characters. *MenuMaker's* handiwork can be displayed by any BASIC program using the BLOAD command.

As you can see, many paths lead to the Ultimate DOS Interface. Getting there may take a little doing, but consider the alternative.

Lawrence J. Magid is chairman of Know How, a San Francisco-based computer training company. He is a nationally syndicated computer columnist for the Los Angeles Times, *a guest computer commentator for the ABC Talkradio Network, and the coauthor of* The Fully Powered PC *(Simon & Schuster Inc., New York, 1985) and* Advanced WordPerfect: Features and Techniques *(Osborne/McGraw Hill, Berkeley, 1986).*

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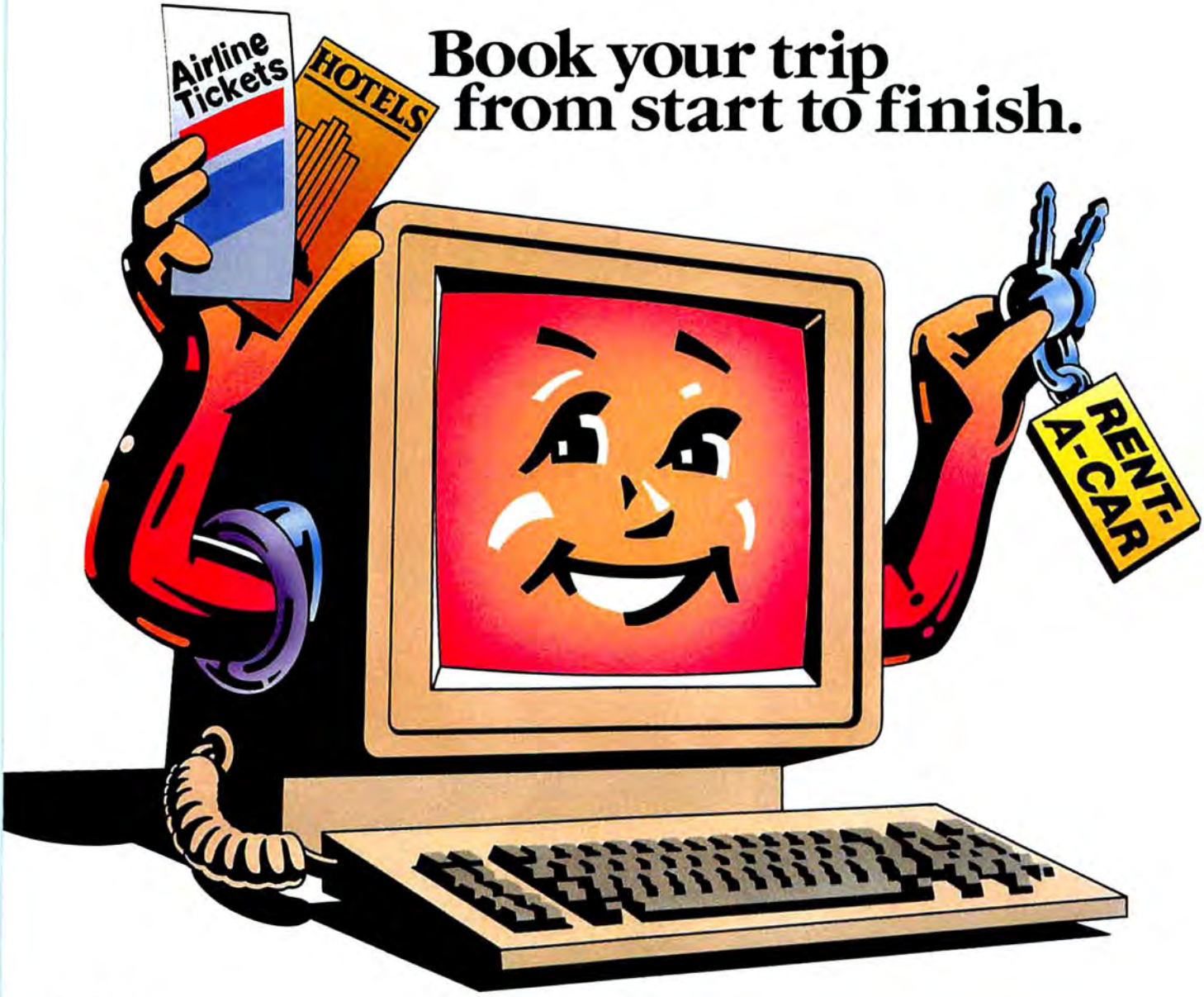

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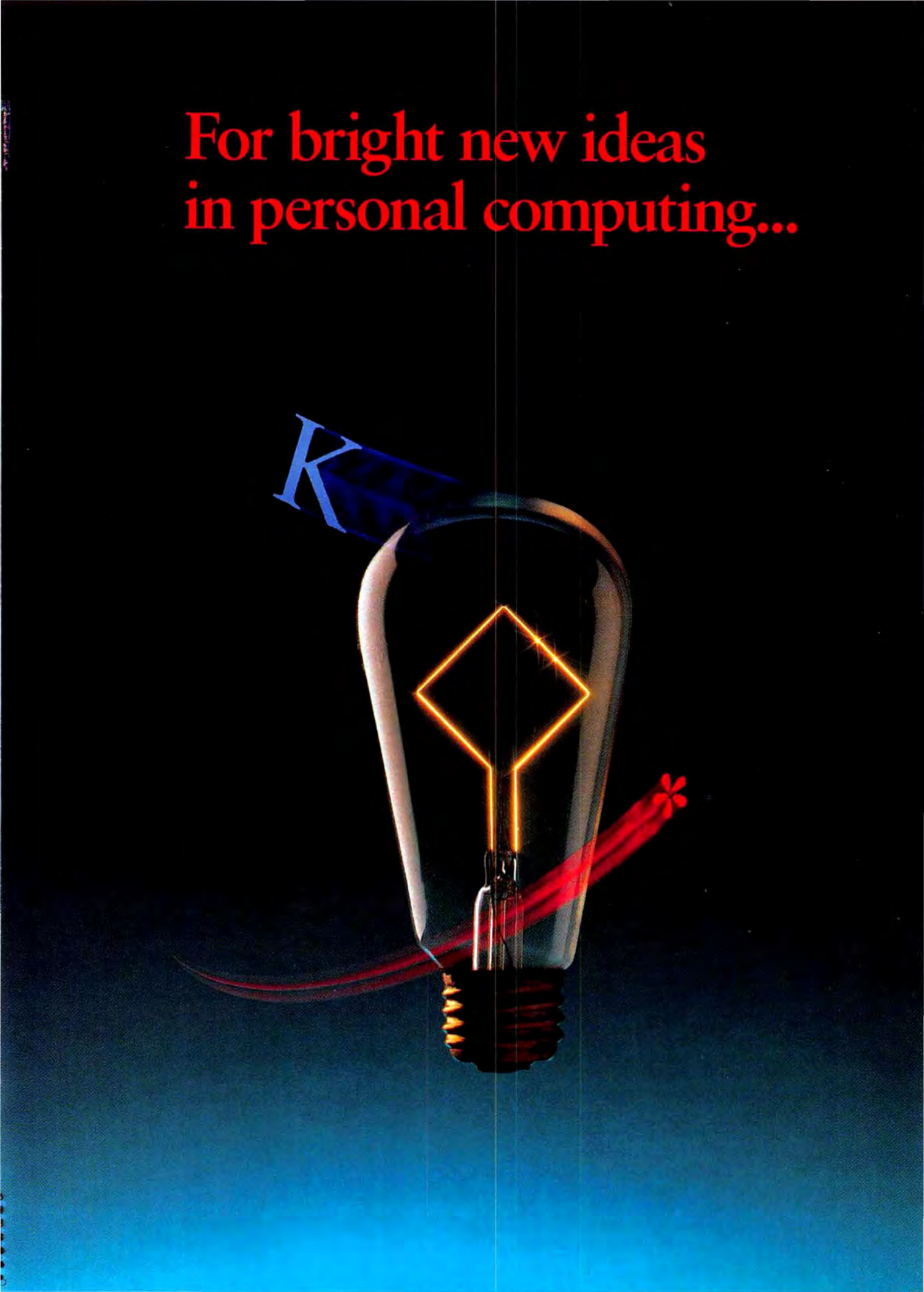

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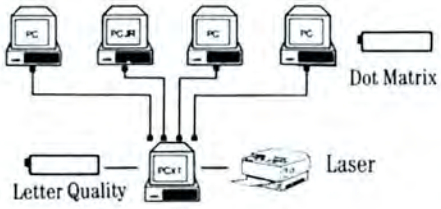

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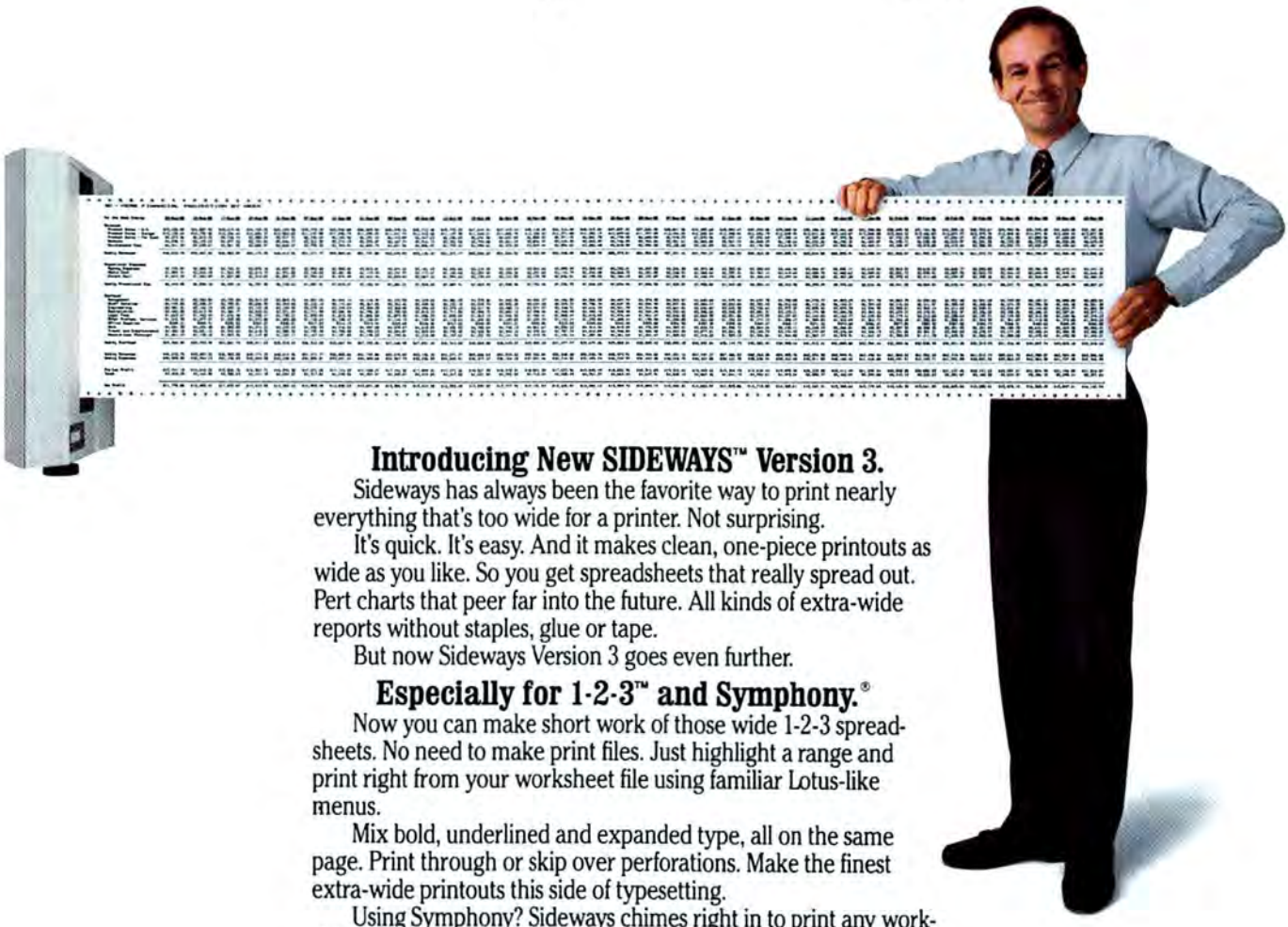

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Password: Communicate

Information and insights on the PC communications marketplace

This month: IBM overwhelms the marketplace with a cavalcade of Token-Ring-to-mainframe links, and CMQ descends from Canada to challenge the on-line financial services giants

Edited by Eric Brown

Micro to Mainframe

IBM's Token-Ring-to-Mainframe Blitz

For several years IBM customers have been searching for some hint of a master plan to eliminate the confusion surrounding micro-to-mainframe communications. In particular, users have requested a strategy for connecting PC local area networks (LANs) to mainframes and departmental computers. In the meantime, various stopgap techniques have provided access, the most common solution taking the form of a gateway: a specially equipped PC that can convert data between LANs and mainframes. While current gateways get the job done, they remain difficult to use, slow, and expensive (see "Gateways at LAN's End," *PCW*, August 1986).

Computer users have finally received their answer from IBM. Starting with the announcement of its Token-Ring network last fall, IBM has bombarded the industry with announcements of hundreds of connectivity products. This summer's product blitz included additional PC- and Token-Ring-to-mainframe links and enhancements, most of which won't be available until the summer and fall of 1987. The key announcements centered around new communications controllers that should supply vastly improved gateways between the Token-Ring and S/370 mainframes; software that acts as a moderator during micro-to-mainframe sessions; and links between the Token-Ring and

(continues)

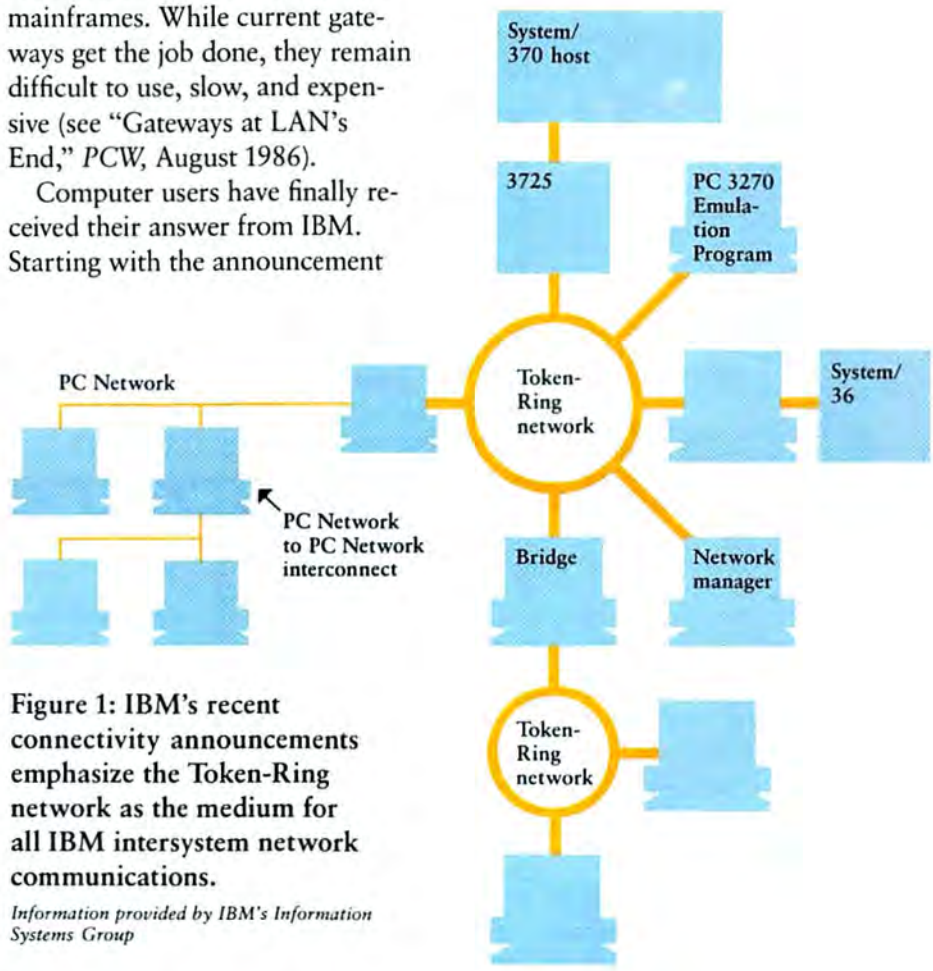

Figure 1: IBM's recent connectivity announcements emphasize the Token-Ring network as the medium for all IBM intersystem network communications.

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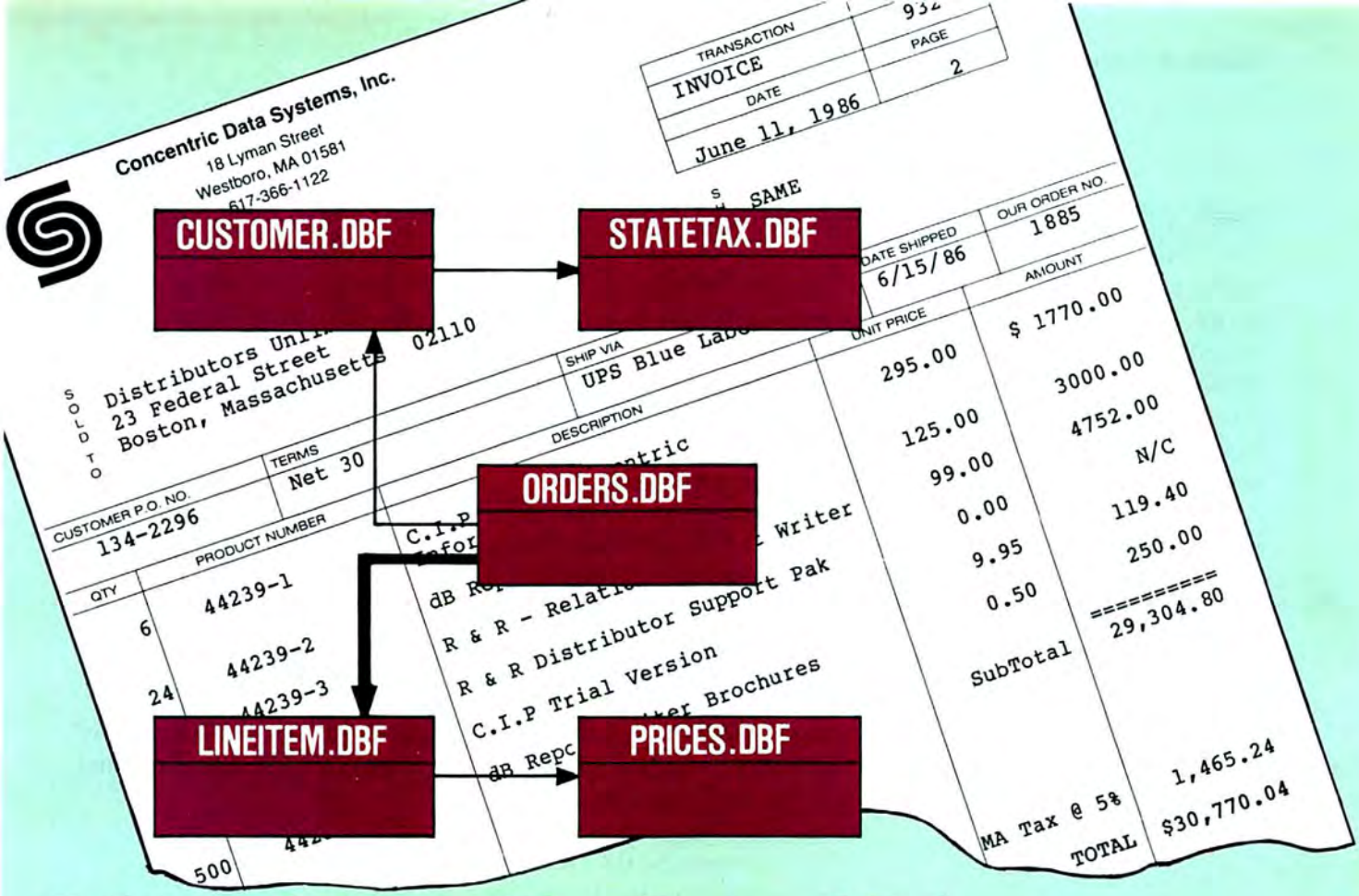

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the IBM PC Network, the IBM PC RT, and enhanced versions of System/36 and System/38 departmental computers. IBM's direction is unmistakable: The Token-Ring will play a key role in IBM's mainframe network architecture.

In the past, IBM devices wanting to access the mainframe had to speak the language of the mainframe, in most cases, IBM's Systems Network Architecture (SNA). For PCs to do so usually required the services of some type of protocol converter and/or software emulator. The main disadvantage to this setup is its lack of a functional interface capable of supporting the full range of mainframe operations. For the first time, IBM has reversed its "catch me if you can" approach by adding conversion capabilities to mainframe peripherals.

IBM announced two key additions to its 3725 communications controller that specifically support communications with the Token-Ring: The Token-Ring Attachment Base (TAB) and the Token-Ring Interface Coupler (TIC). The combination provides a direct, high-speed connection without the need for more expensive protocol converters. Data arriving at the 3725 is accepted by the TIC, which restructures the Token-Ring data format into a format readable by the 3725. After formatting, the data is moved to the TAB, which performs a series of control operations on it to produce a data stream compatible with SNA.

IBM also introduced the 3720 communications controller, a scaled-down version of the 3725. The 3720 attaches directly to the Token-Ring, using a coupler device similar to the 3725's TAB and TIC functions. Unlike the 3725, which is primarily intended for large networks, the 3720 is geared toward small networks and comes

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in only four basic models, two of which will support the LAN-to-mainframe link.

Another product in the works is the 3174 cluster controller, which is expected to replace IBM's coaxial-connection workhorse, the 3274. In addition to supporting the ubiquitous 3270-type terminals, the more powerful 3174 performs protocol conversion for as many as 24 ASCII terminals and connects to S/370 mainframes by either a channel attachment or a remote attachment. Conversely, the 3174 allows 3270 displays and printers to attach to hosts asynchronously. Two 3174 models also link 3270 displays and printers with the IBM Token-Ring.

On the Token-Ring side of the connection, IBM revealed several new software products, including the *Token-Ring Network Bridge Program* and the *Token-Ring Network Manager.* With the *Token-Ring Network Bridge Program* IBM embraces the concept of a PC-based software link between its major LAN components. Similar to a gateway, a bridge serves as a control point as well as a connection between two independent environments, whether they be mainframe networks or other LANs. The program will encourage departmental users to independently implement LANs and employ the bridge capability only when they need to connect to other token rings or mainframes (see Figure 1).

Running on a PC XT or PC AT, the *Token-Ring Network Manager* will provide network management and problem determination procedures for the LAN it is attached to. Problems or events occurring in other LANs will not be detected unless each LAN incorporates similar hardware and software. In a large multi-LAN environment, investigating problems as they propagate across LANs might reach unthinkable

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proportions. Yet the *Network Manager* is an important first step toward solving one of the stickiest problems of interconnectivity and cooperative processing: the lack of an omniscient network manager that can spot trouble throughout the network.

Perhaps the most significant of IBM's embryonic products is the *Enhanced Connectivity Facilities (ECF)*, a set of menu-driven programs that reside on both the PC and the host. Together they provide a uniform structure for exchanging information between the two environments.

Currently, PC users often cannot access host data even when a workable physical link exists. A common problem is the users' unfamiliarity with the various system procedures embedded in host systems such as TSO and CMS. *ECF* will provide expanded access to host data and files in a variety of formats and make it easier for the PC user to take advantage of mainframe storage and peripheral devices. *ECF* includes not only improved terminal emulation (in the form of the *PC 3270 Emulation Program* version 3.0, due in January 1987) but also automatic file transfer, data retrieval, and conversion facilities. One key improvement is *ECF*'s ability to select host data at either file or record level using predefined menus or DOS commands.

To perform these feats, *ECF* masks the low-level host procedures from the end user and streamlines access to the host through three major *ECF* components: requesters, which run on the PC and allow users to request host services and data; servers, which execute on the host; and routers for both the PC and the mainframe. On the PC end, the router (which will be added to

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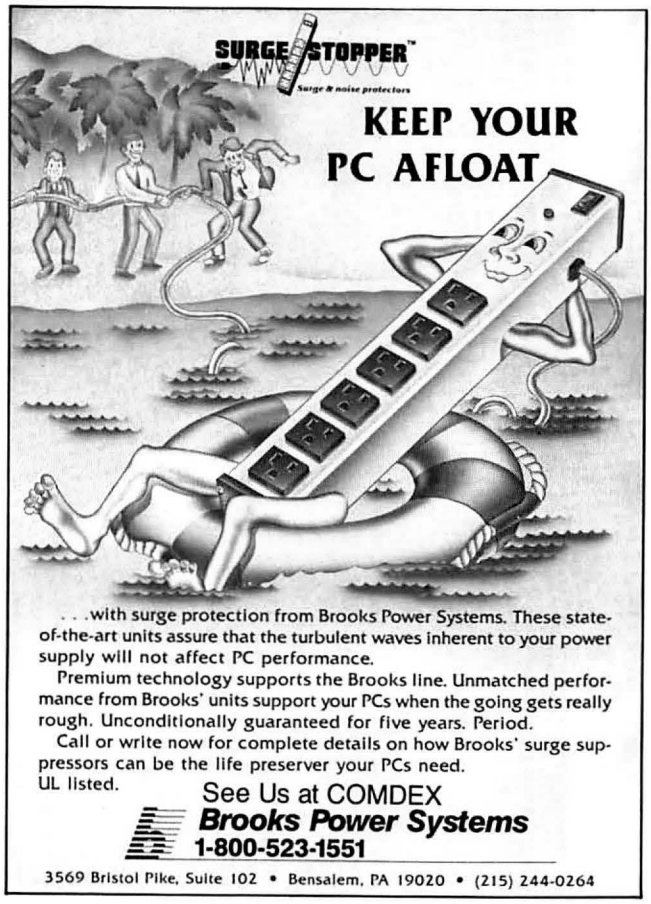

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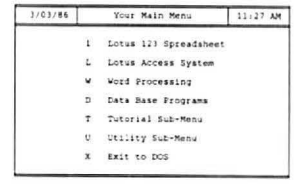

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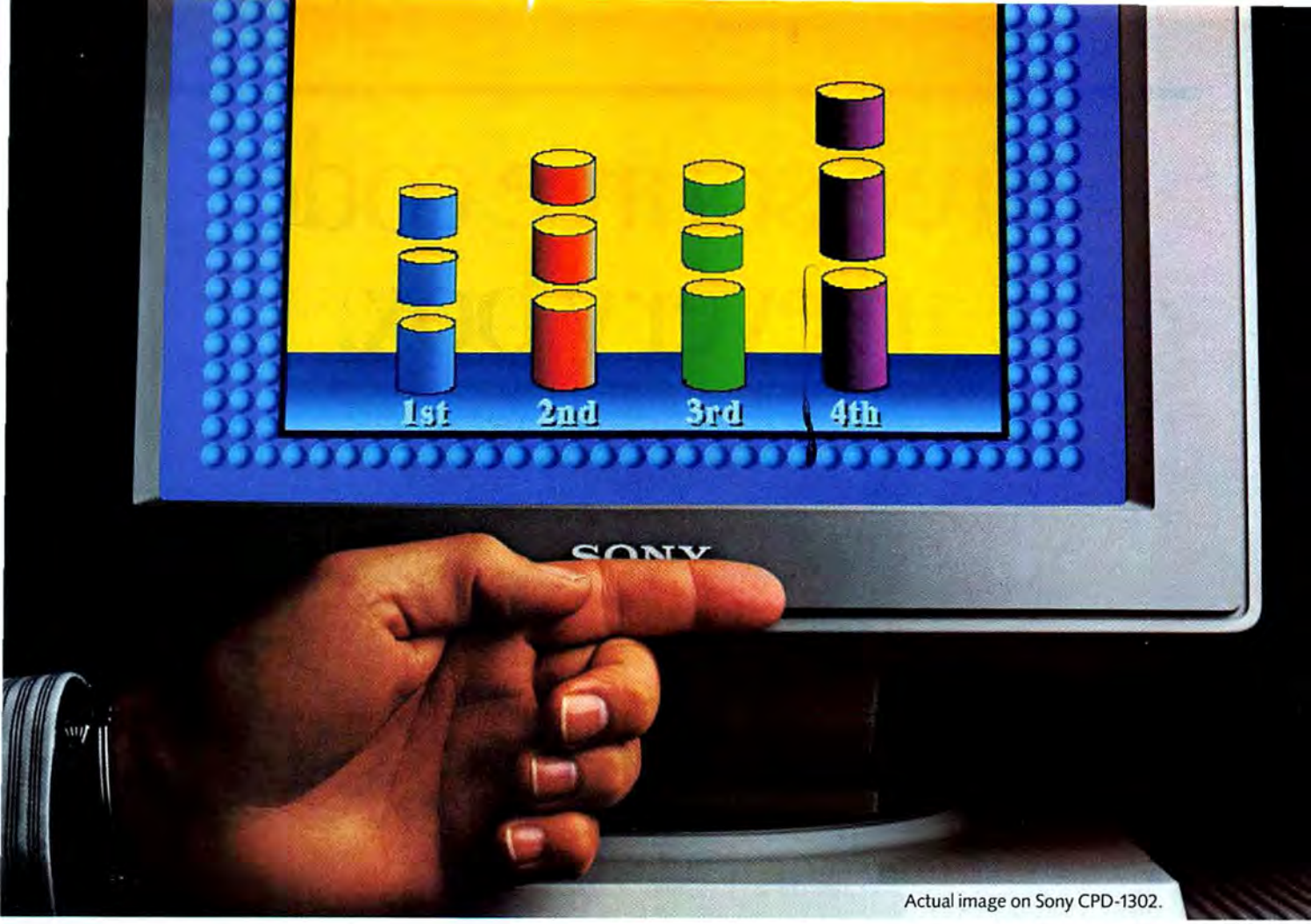

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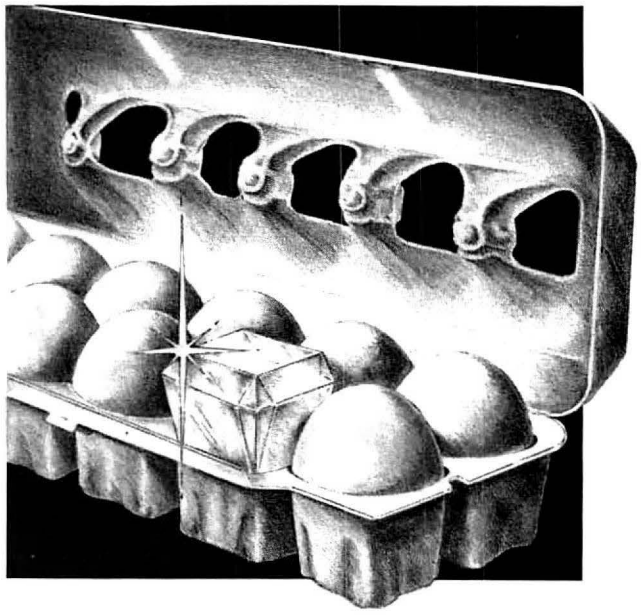

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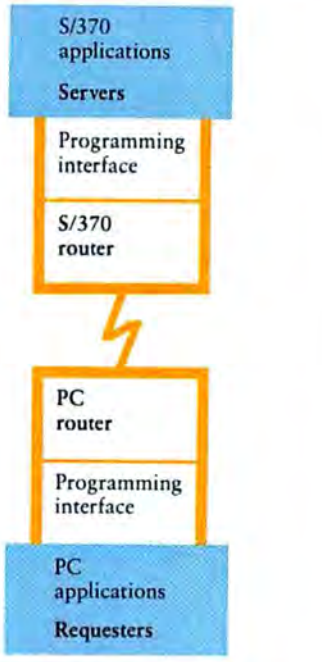

Figure 2: New mainframe and PC software programs called Enhanced Connectivity Facilities (ECF) orchestrate micro-to-mainframe file transfers. ECF represents an intermediate step between 3270 terminal emulation and future distributed processing techniques using LU 6.2.

Information provided by IBM's Information Systems Group

IBM's new *PC 3270 Emulation Program*) accepts requests from the PC requester function and transfers them to the host router, which activates the appropriate server function to process them. A similar action occurs in reverse when the host server transfers data to a PC user (see Figure 2).

One shortcoming of *ECF* is that it only supports LU 2 protocols (similar to 3270 protocols). However, IBM plans to selectively add support for LU 6.2 in the coming

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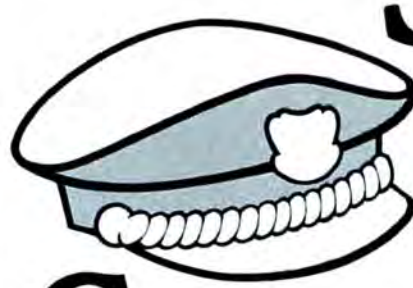

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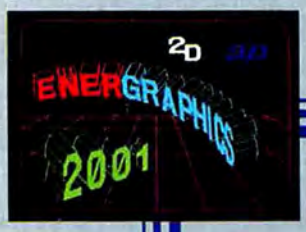

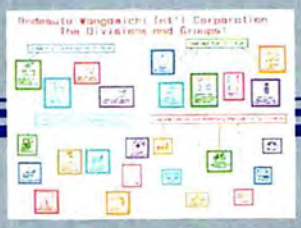

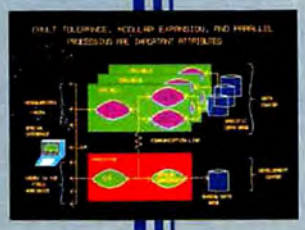

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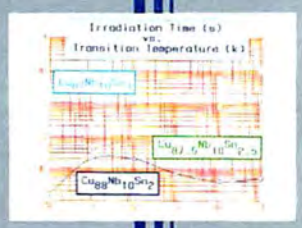

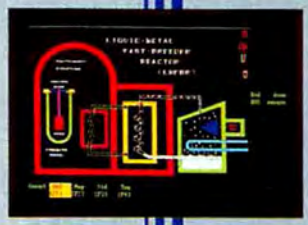

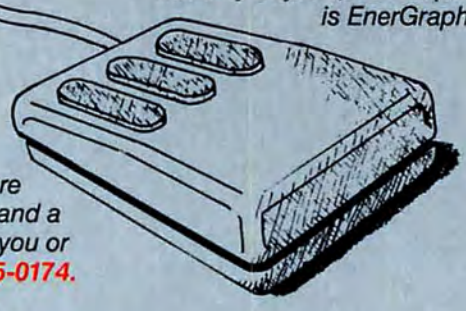

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months (see "Peering Into the Future with LU 6.2," *PCW*, June 1986).

In other announcements, IBM further emphasized that the Token-Ring will be its preferred gateway not only to mainframes but also to other networks and departmental computers. By announcing Token-Ring and Ethernet adapter boards for its fledgling PC RT, IBM has encouraged speculation that the RT may find a niche as a LAN server. The Token-Ring multiprotocol adapter board, powered by an Intel 80C51 controller chip, operates as an independent communications subsystem, thus freeing up the RT processor for other tasks.

And Big Blue has not forgotten its slow-selling PC Network. The *Token-Ring/PC Network Interconnect Program* will provide a gateway from IBM's older LAN to its newer Token-Ring.

Two other beleaguered product lines—the System/36 and System/38 minicomputers—have been upgraded with greater memory and storage capabilities and connected to the Token-Ring. Attaching to the network through a PC AT, System/36 and System/38 users will be able to directly access the facilities of the Token-Ring.

IBM has also improved communications between the System/36 and the System/38 with enhancements that begin to forge a trail toward peer-to-peer distributed processing. Even using Advanced Program-to-Program Communications (APPC) usually requires the services of an intervening S/370 host. But now, a new product

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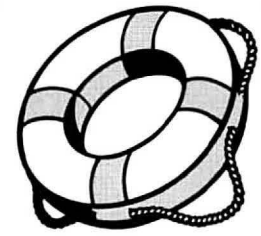

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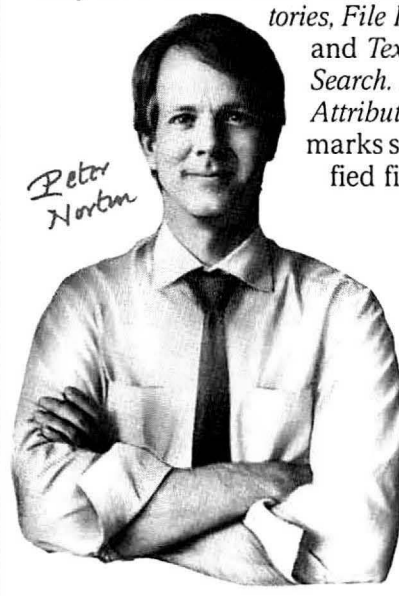

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called Advanced Peer-to-Peer Networking (APPN) allows users to communicate across multiple interconnected System/36s and System/38s without host support.

IBM has begun to build an infrastructure that will allow PCs to actively participate in the mainframe application environment. Eventually, system and application developers using APPC and LU 6.2 protocols will be able to proceed with little regard to the operating environment in which their programs will eventually run. However, the new products only provide a framework for the really tough work facing programmers. IBM's Token-Ring links will constitute the communications pathway, but distributed processing must be defined in applications software.

In the meantime more pressing issues await LAN users who want to connect to IBM mainframes. It remains to be seen if and to what extent Token-Ring performance will degrade during large-scale data transfers with mainframes, hindering other applications in the process. IBM concedes that the inter-ring bridge may be a bottleneck under these conditions.

Despite certain ambiguities, IBM's announcements have definite substance. For the first time, Big Blue has defined how PCs will access the mainframe. Users must now begin to define how they will implement the sophisticated LU 6.2 architecture if they are to eventually exploit the capabilities of IBM's product set.
–Ed Eisenberger

(continues)

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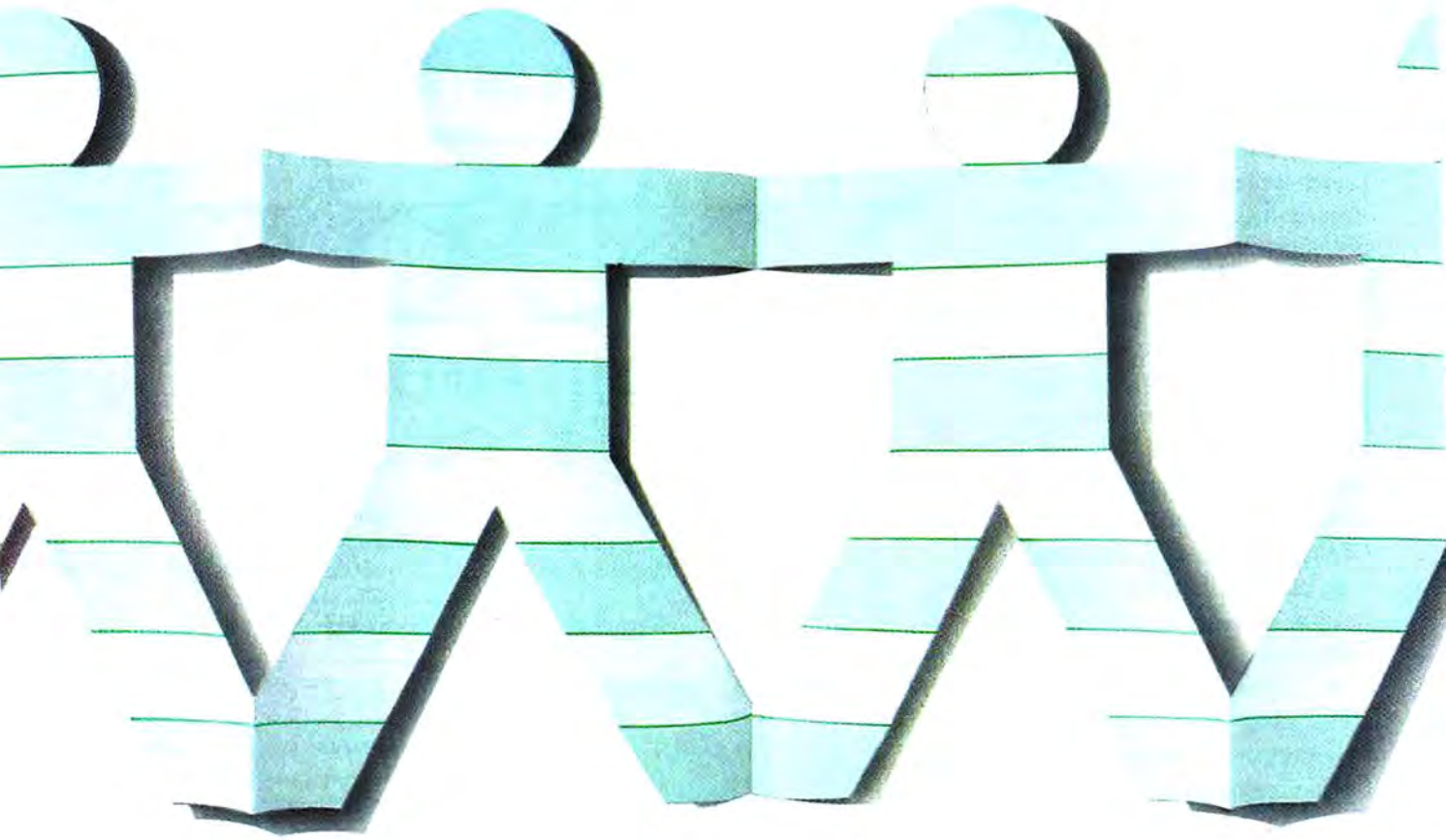

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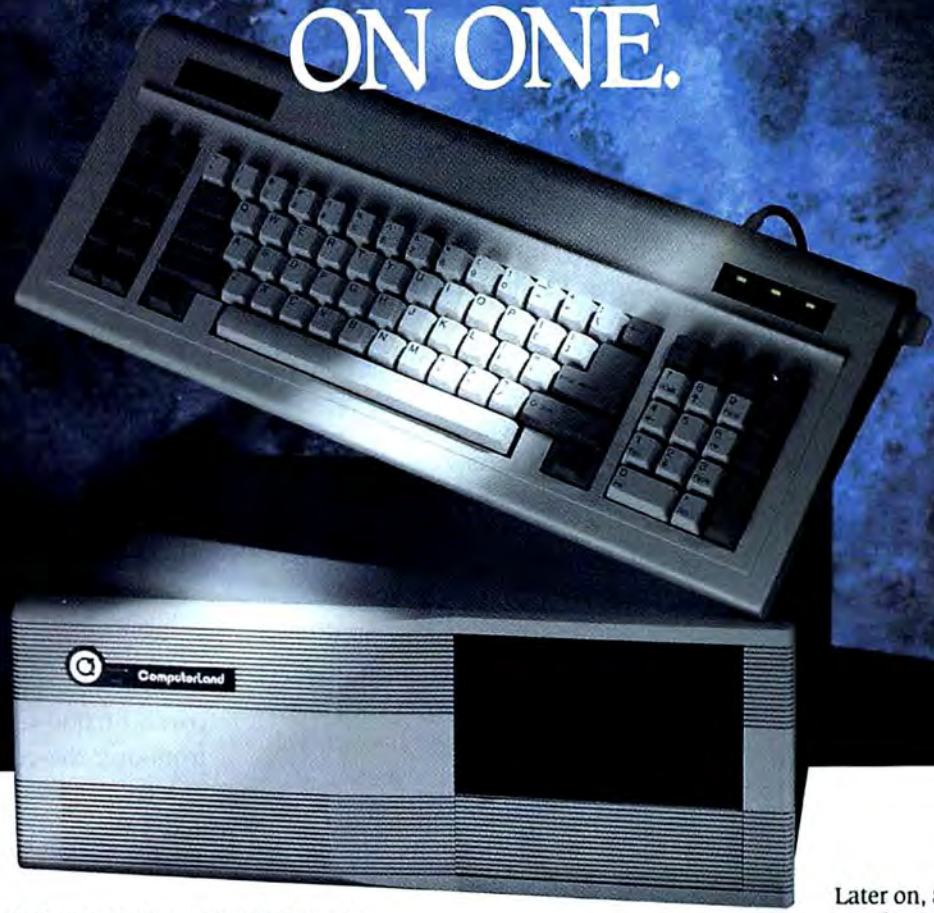

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On Line

CMQ: The Full Market Picture

Want to be an informed on-line investor? Here's an example of what you're up against. When a new political crisis develops in the Near East, the price of oil is likely to jump, causing currency prices to fluctuate. Before you know it, Arab oil magnates have moved their fortunes into the Zurich gold market, forcing the price up. Then large U.S. investors move their money out of Wall Street and into the London gold market to profit from the lag in price change between Great Britain and Switzerland. As a result, the stock market goes down. A week later, as the crisis cools down, the big investors return to the U.S. markets looking for bargains.

Long-term economic trends are reshaping the investment markets. Once-stable securities such as government bonds have become volatile. Once-separate markets–stocks, energy, money, and precious metals–have become so tightly interlinked that a change in one is immediately reflected in the others. This powerful combination in turn interacts with other markets such as government-backed mortgages. Investors can profit from these market interactions, but they must be able to see the minute-to-minute changes in all the major trading markets; by the time a trend shows up on the stock market ticker it may be too late.

On-line investment services such as Dow Jones News/Retrieval grew up in the middle of this maelstrom and are designed to provide instant information on investments. While these services have been successful at reporting on the North American stock markets, they lack coverage of the other markets, which are covered exclusively by Telerate Systems. And Telerate, the preeminent information supplier for money, bonds, T-bills, foreign exchange, and precious metals markets, doesn't cover the stock markets.

So where can you get market information covering the entire trading spectrum? Until recently, you could only find such a one-stop on-line trading post on professional broker services such as Quotron–and you can't access Quotron with a PC. Quotron's one-stop monopoly was challenged this spring when Toronto-based CMQ, the leading on-line investment service in Canada, entered the U.S. market from its stateside base in New York. CMQ covers 60,000 securities ranging from over-the-counter stocks to government-backed mortgages, and is the exclusive supplier of Telerate data in Canada. CMQ's latest addition, Lynx, provides the first direct data feed from the London Stock Exchange to the United States.

CMQ also supplies a complete analysis package–*Quick Chart*–which enables you to chart the activity of any single security or to compare any two securities. Its ex-

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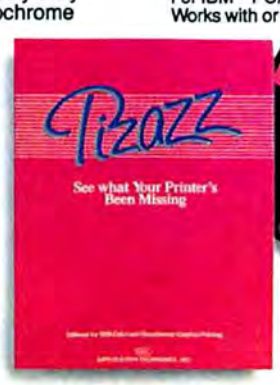

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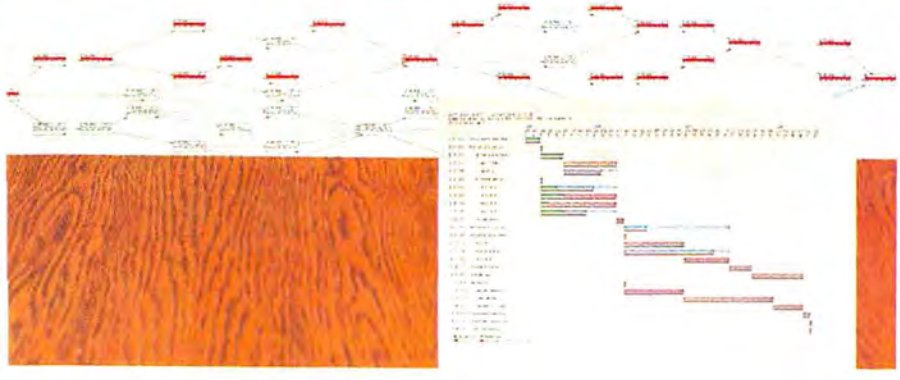

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The board provides dynamically updated multiwindow displays so that you can look at any of the CMQ services and other services simultaneously. CMQ's and Telerate's data displays are updated on the same screen at the same time. When you are not displaying these services, the terminal or board can maintain contact with them, so you can switch from one to another at the touch of a button. Because the coprocessor board uses its own processor to maintain all these communications contacts, the PC remains available to run local applications. CMQ's stock quote pages are formatted to allow their automatic insertion into popular spreadsheet programs for analysis.

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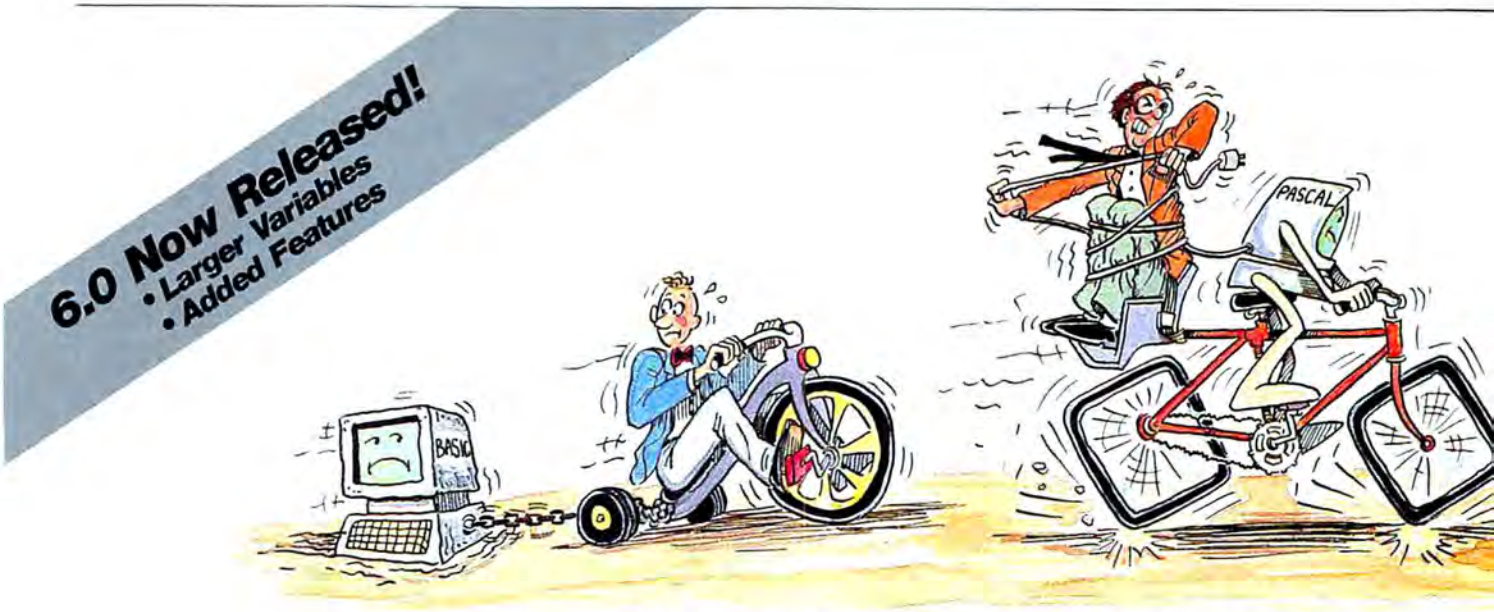

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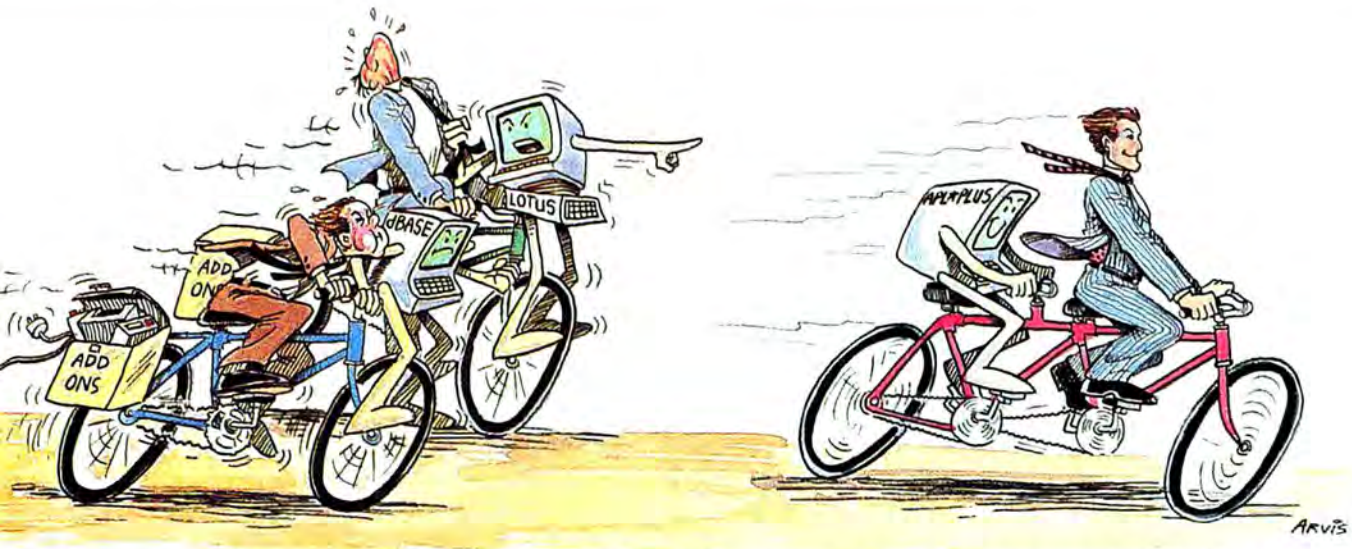
Ed Eisenberger is a senior consultant at General Electric Information Services. G. Berton Latamore is a writer in South Burlington, Vermont, and the editor of VideoPrint, *a videotex industry newsletter.* ●



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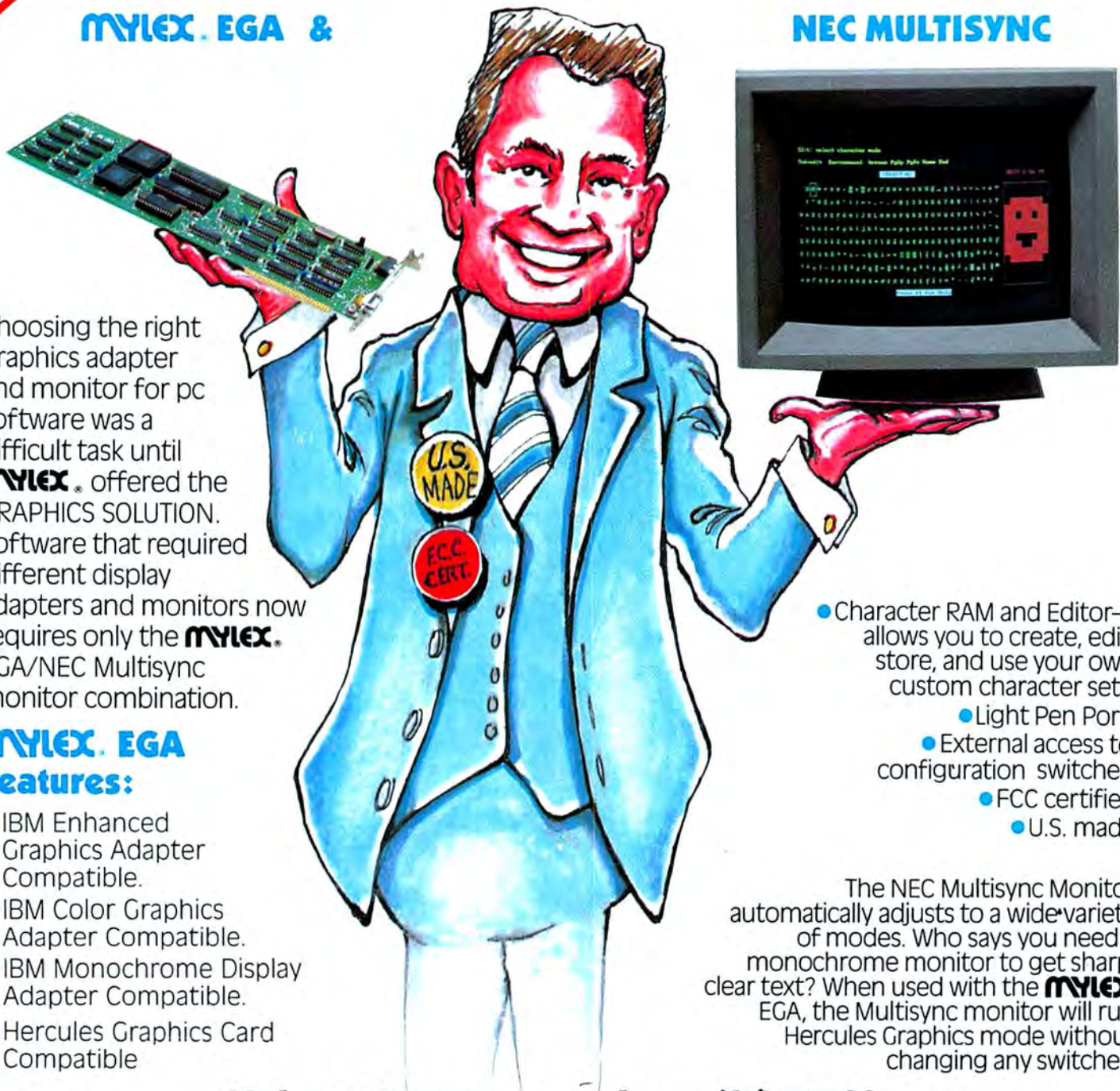

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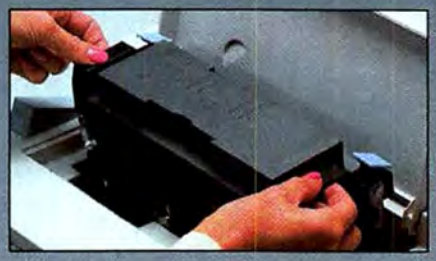

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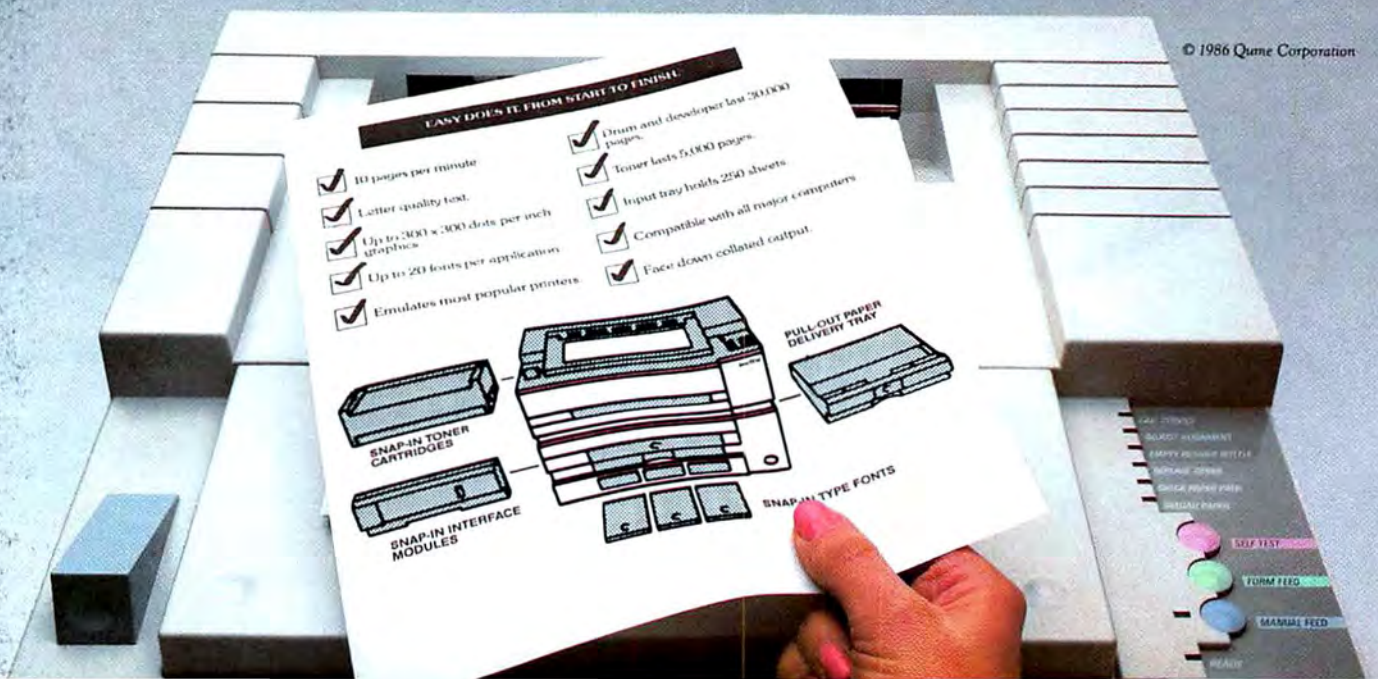

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The Help Screen

PC World offers answers and advice at every level

This month: more BASIC mysteries unravelled, running the PC with a BASIC-built menu, saving BASIC image arrays to disk, the meaning of <DIR>, restarting the PC without diagnostics, the straight dope on drive doors, and how to ship disks overseas

Karl Koessel

A BASIC Problem With Compatibles

Q. *I bought an XT compatible for home use, and it runs all the software I normally use at work. But it won't run the programs on the DOS Supplemental Programs disk that came with my office IBM XT. Someone told me that those programs won't run because compatibles lack the 40K of read-only memory (ROM) found in the IBM XT. If this is the case, can I get a disk with the equivalent 40K of code—or is there a program I can type in?*

Joseph J. Jen
Cherry Hill, New Jersey

A. Save your fingers. Disks holding this key code are available. The programs on the DOS Supplemental Programs disk that you can't run end with the file name extension .BAS, indicating they are programs written in the BASIC language. BASIC (for Beginners All-purpose Symbolic Instruction Code) is a "high-level" language that enables you to write programs with English-like commands, such as PRINT, COLOR, and GET. Because the PC's microprocessor cannot directly understand such commands, you must first load a BASIC interpreter to translate each line of a program into "machine executable" code.

All IBM PCs include a stripped-down version of the BASIC interpreter, known as Cassette BASIC, in 40K worth of ROM chips soldered onto the main circuit board of the machine. Whenever an IBM PC is turned on or restarted without DOS in drive A: or C:, Cassette BASIC automatically appears. It cannot read from or write to disks, but rather uses cassette tapes via the cassette port located next to the keyboard connector at the rear of the computer. (The IBM PC AT and many PC compatibles lack a cassette port.)

Cassette BASIC is also the core, or "kernel," of IBM's BASIC and Advanced BASIC (BASICA) interpreters, which are included on the IBM DOS disk as BASIC.COM and BASICA.COM, respectively. Those .COM files are merely padding around the kernel—they aren't complete interpreters and thus can't work unless the BASIC stored in ROM is present. Because your compatible lacks this ROM BASIC kernel, it can't run IBM's BASIC and BASICA.

Most compatible manufacturers offer a full BASIC interpreter—the equivalent of Cassette BASIC, BASIC.COM, and BASICA.COM—on disk. The interpreter is almost always a version of Microsoft's GW BASIC.

DOS Commands From a BASIC Menu

Q. *Using BASIC's CHAIN and RUN commands, I have written a master menu program that lets me run a variety of BASIC programs and then return to the master menu. However, I haven't figured out how to modify the menu system so it can issue DOS commands or run commercial applications.*

For example, I would like to put WordStar, SuperCalc, *and several BASIC programs on the same disk and control them from the master menu. It would also be useful to call and run utility programs, such as CHKDSK, from a BASIC program. Any suggestions?*

Phillip Bugg
Colorado Springs, Colorado

(continues)

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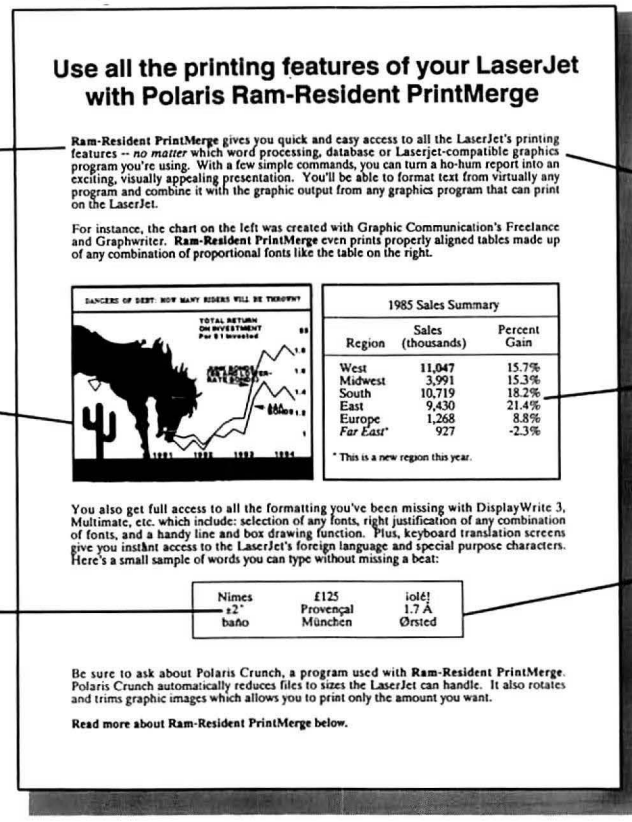

Use all the printing features of your LaserJet with Polaris Ram-Resident PrintMerge

Ram-Resident PrintMerge gives you quick and easy access to all the LaserJet's printing features -- *no matter* which word processing, database or Laserjet-compatible graphics program you're using. With a few simple commands, you can turn a ho-hum report into an exciting, visually appealing presentation. You'll be able to format text from virtually any program and combine it with the graphic output from any graphics program that can print on the LaserJet.

For instance, the chart on the left was created with Graphic Communication's Freelance and Graphwriter. **Ram-Resident PrintMerge** even prints properly aligned tables made up of any combination of proportional fonts like the table on the right.

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1985 Sales Summary

Region	Sales (thousands)	Percent Gain
West	11,047	15.7%
Midwest	3,991	15.3%
South	10,719	18.2%
East	9,430	21.4%
Europe	1,268	8.8%
*Far East**	927	-2.3%

* This is a new region this year.

You also get full access to all the formatting you've been missing with DisplayWrite 3, Multimate, etc. which include: selection of any fonts, right justification of any combination of fonts, and a handy line and box drawing function. Plus, keyboard translation screens give you instant access to the LaserJet's foreign language and special purpose characters. Here's a small sample of words you can type without missing a beat:

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±2°	Provençal	1.7 Å
baño	München	Ørsted

Be sure to ask about Polaris Crunch, a program used with **Ram-Resident PrintMerge**. Polaris Crunch automatically reduces files to sizes the LaserJet can handle. It also rotates and trims graphic images which allows you to print only the amount you want.

Read more about Ram-Resident PrintMerge below.

Justify any proportionally spaced text

Align tables printed with proportional fonts

Draw lines and boxes

Your software only lets you use a small fraction of the LaserJet's printing capabilities. Unfortunately, that also limits how precisely you communicate your message. That's why you need Polaris Ram-Resident PrintMerge.

It's the only program that puts you in direct control of all the LaserJet's printing capabilities—so you control what your document looks like, not the limitations of your software.

You'll be able to add graphics right in the middle of your text. Use all the LaserJet fonts and extended characters wherever you like. And print it all beautifully with Ram-Resident PrintMerge's justification and line-drawing abilities. What's more, Ram-Resident PrintMerge works with the software you're already using, so it's very easy to learn.

Since Ram-Resident PrintMerge lets you merge graphics from virtually any program that prints on the LaserJet, you can reinforce complex ideas with illustrations right in the text. You can merge the graphic output or save a screen image, and merge either in any of four print resolutions. If your graphics are too large for your LaserJet to handle, try Polaris Crunch, a separate program that compresses, rotates and trims images.

Recommended by HEWLETT PACKARD

With the help of Ram-Resident PrintMerge's useful formatting features, your document will be as impressive as its contents. You'll be able to use LaserJet fonts in any combination for more attractive, readable text. And justify right-hand margins and align table columns printed with proportional fonts—even if they're downloaded from diskettes. For extra emphasis, use Ram-Resident PrintMerge's line and box drawing capabilities and the LaserJet PLUS patterns to highlight important ideas.

And when you need to use extended or foreign language characters, Ram-Resident PrintMerge's five keyboard translation screens will put them at your fingertips instantly.

But even with all these features, Ram-Resident PrintMerge is truly easy to use.

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R:base 5000
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PC Crayon
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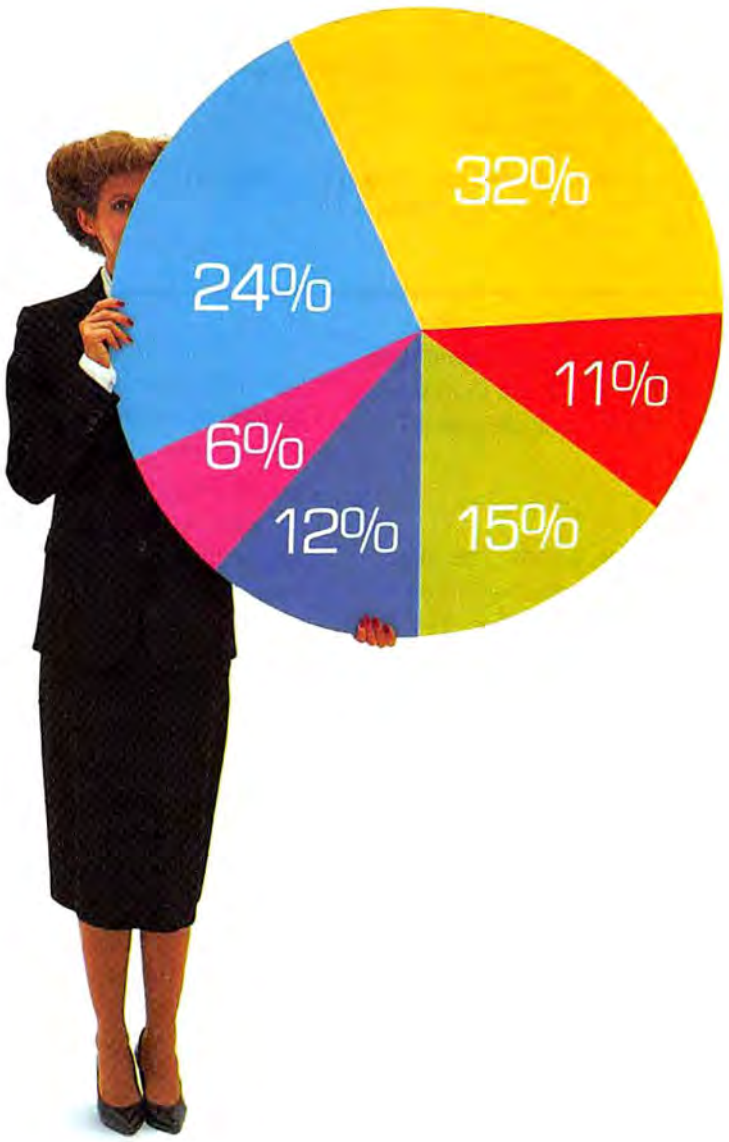

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Circle 534 on reader service card

A. The answer lies between these covers in "BASICally Better Menus." The article explores two techniques for creating a BASIC menu system that can call other programs and DOS functions.

BSAVE Image Arrays to Disk

Q. *I use BASICA's PUT and GET graphics statements frequently, but there is one procedure I can't figure out. It involves writing image arrays (set by GET) to disk so that another program can set an image array variable with the contents of that file instead of drawing and GETting the image. This sounds far easier than redrawing an image every time a program is executed. Can you help?*

Brian D. Chambers
Cairo, Egypt

A. Recording a BASIC image array in a disk file and reading that file to set an image variable is simpler than using GET and PUT. To save an image array to disk, issue the DEF SEG statement to set BASIC's data segment as the current memory segment, and execute the BSAVE (binary save) command.

The BSAVE command, which saves any portion of memory to disk, requires three parameters: the filespec of the file being saved, the offset (number of bytes) into the current memory segment where the first byte of data representing the image begins, and the number of bytes to be saved (see Listing 1).

The filespec requires a file name, but it can include a drive specifier and, with BASIC 2.0 and later versions, a path. The offset should point to the beginning of the image array variable. You accomplish this by specifying the array's first element, (0), with the VARPTR function. You already know the size of the variable array because you had to calculate the number of bytes that the image array required to properly DIMension the array. In this example, the image is 34 bytes. Because a single-precision array dedicates 4 bytes per element, a nine-element array will reserve sufficient space.

Listing 1 also demonstrates how to load a saved image array. Issue a DEF SEG statement to set BASIC's data segment as the current memory segment, then execute the BLOAD (binary load) command to put the image data into memory. BLOAD requires just two parameters: the filespec and the offset of the current memory segment where the image file should be placed. Point to the beginning of the image array variable with the aid of the VARPTR function.

```
10 SCREEN 1 : CLS
20 LINE (0,0)-(10,10), 3, B
30 CIRCLE (5,5), 5, 1
40 PAINT (5,5), 2, 1
50 DIM IMAGE(22)
60 GET (0,0)-(10,10), IMAGE
70 DEF SEG
80 BSAVE "image.fil", VARPTR(IMAGE(0)), 88
90 ERASE IMAGE
100 DIM IMAGE(22)
110 DEF SEG
120 BLOAD "image.fil", VARPTR(IMAGE(0))
130 PUT (100,100), IMAGE
140 LOCATE 13
```

Listing 1: BSAVE can save an image array variable into a disk file, and BLOAD can load image array data from a file into a variable.

Fully Powered PC <DIR>ections

Q. *When I request a directory of the disk that comes with* The Fully Powered PC *(Simon and Schuster/PC World Books, New York, 1985), I receive the list shown in Figure 1. Is the disk damaged or does the problem lie with my 8086-based Otrona Attaché?*

Theodore W. Hurst
Chicago, Illinois

A. The disk is fine, and compatible with your Otrona Attaché, but you should read the book before using the disk. On the inside of the back cover, you will find directions for viewing the file READTHIS. The file explains the organization of the other files on the

(continues)

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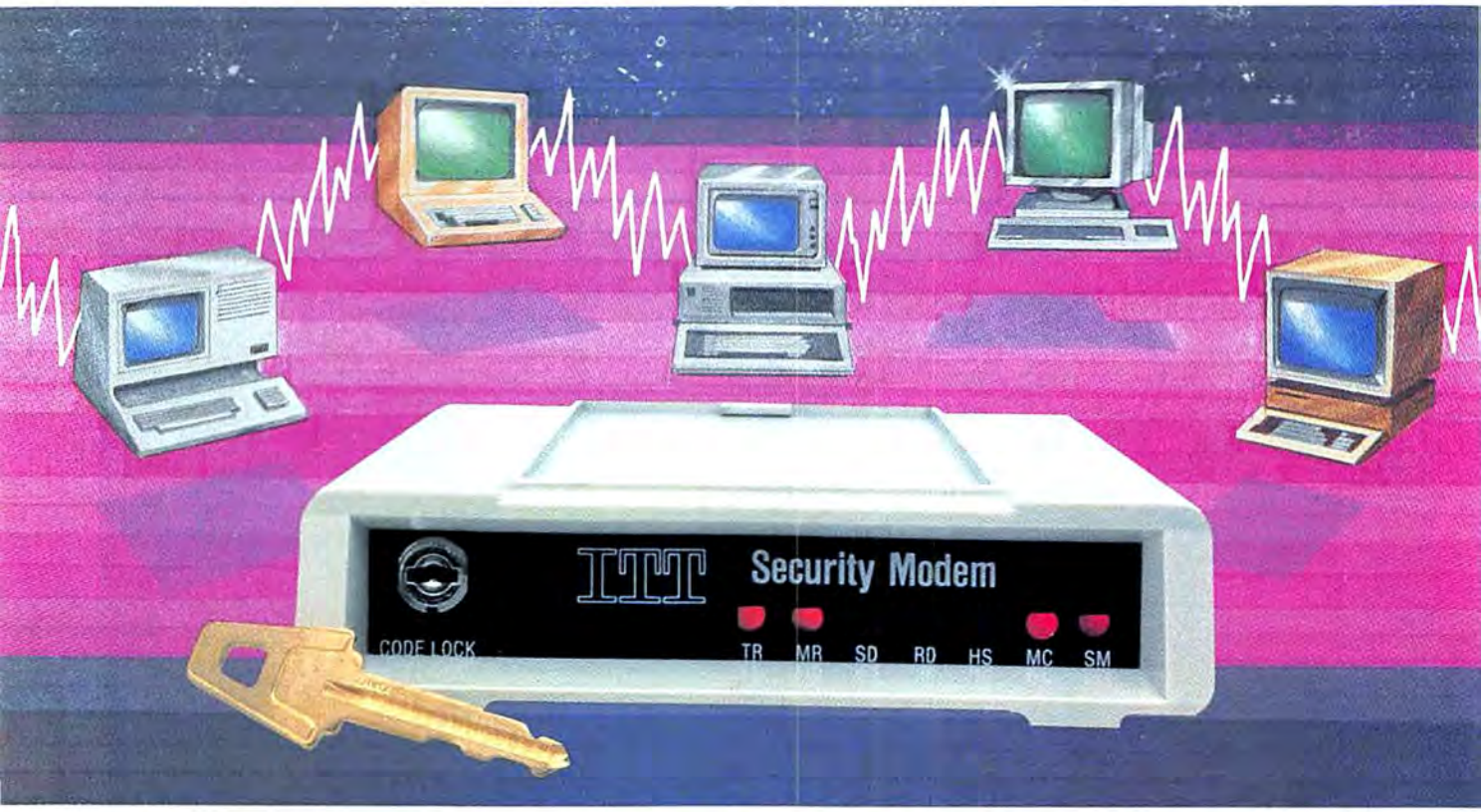

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```
A>DIR B:

 Volume in drive B is PCW UTILITY
 Directory of  B:\

EXEC         <DIR>       2-12-85   1:42p
MENUMAKR     <DIR>       2-12-85   1:42p
MISC         <DIR>       2-12-85   1:42p
PUBDOM       <DIR>       2-12-85   1:42p
RAMDISK      <DIR>       2-12-85   1:42p
SYSTEM1      <DIR>       2-12-85   1:42p
SYSTEM2      <DIR>       2-12-85   1:42p
READTHIS       19852     4-02-85  10:52a
        8 File(s)      9216 bytes free
```

Figure 1: The directory listing of the PC World Utilities disk that accompanies the book The Fully Powered PC

disk. Given your question, I assume that you are not familiar with subdirectories, whose names appear in a directory listing followed by '<DIR>' instead of a file size (such as '19852' following 'READTHIS'). Chapter 6 in the book explains how to create, remove, and use subdirectories.

PC Restart Sans Diagnostics

Q. *On page 93 of* The Fully Powered PC *is a short listing for REBOOT.BAS. The program restarts the PC from a batch file—but as a "cold boot," complete with the power-on diagnostics. I would like to initiate a "warm boot" instead, as if I had pressed <Ctrl>-<Alt>-<Del>, thus saving some time. My objective is the same as that outlined in the text: to remove a RAM disk and memory-resident programs in one quick step and replace them with a different set.*

Tim P. Morton
Portland, Oregon

A. A short program that restarts the PC minus diagnostics is fairly simple to write in BASIC. But it's just as easy in assembly language. Place a blank, formatted disk in drive A: and a copy of DEBUG .COM from the DOS Supplemental Programs disk in drive B:. (You can also use DEBUG from your hard disk.) At the A> prompt type **B:DEBUG <Enter>** (or **C:DEBUG <Enter>** for hard disk users). DEBUG's hyphen prompt will appear. Type **A <Enter>** (for assemble). Carefully enter the following, pressing **<Enter>** at the end of each line:

```
MOV DX,40
MOV DS,DX
MOV BX,72
MOV WORD PTR [BX],1234
JMP FFFF:0
```

(continues)

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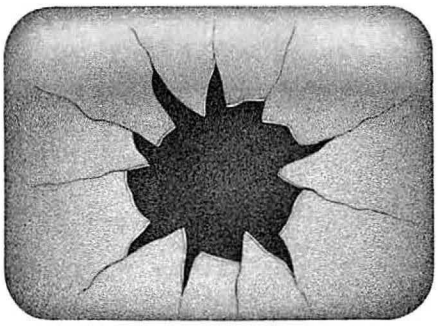
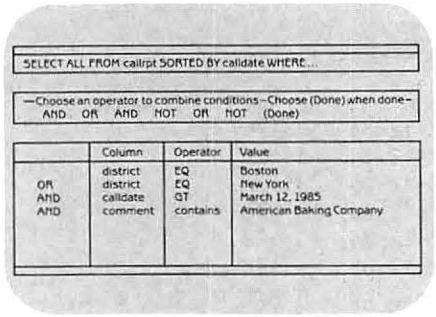
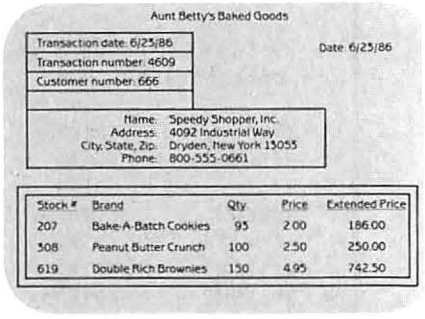


A typical DBMS user's screen, after the 497th line of code.



An R:BASE System V Prompt-By-Example (PBE) screen. With PBE's query capabilities, you can retrieve just the information you need. Without programming.



A data entry screen designed without programming, using Forms EXPRESS.

With most database management software for the IBM PC family and compatibles, you're quickly confronted with a painful reality: the only way to make your package live up to its promise is to learn its programming language. Which can take months. Then you have to write the code, line after frustrating line.

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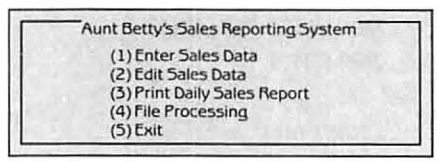
Finally, you can tie it all together with Application EXPRESS. First, you design your own multi-level system of menus. Your first menu level might look like this:



For each menu choice, you assign an action. For example, to define menu choice #3, choose the action "PRINT," select the report you just created in Reports EXPRESS, and specify the appropriate data sorting and selection criteria. Then Application EXPRESS automatically writes the program code.

Which means you've just created a very sophisticated program to deliver the full power of your DBMS. And you've done it all without learning how to program. From this point on, every time you want to run a report, all you do is choose item #3. With one simple keystroke, you've got it.

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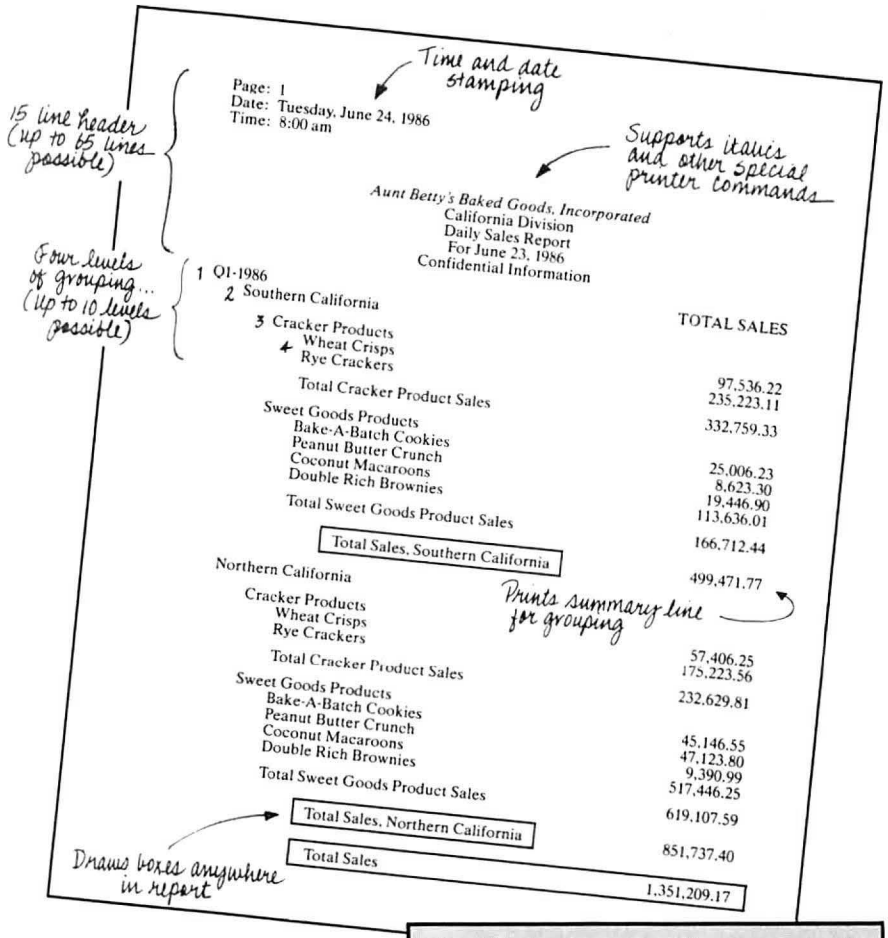

A program to print this report daily, with a one-keystroke menu pick, was developed without programming using R:BASE System V's EXPRESS Technology. Whether you know how to program or not, R:BASE System V is the shortest distance to your data management solution.

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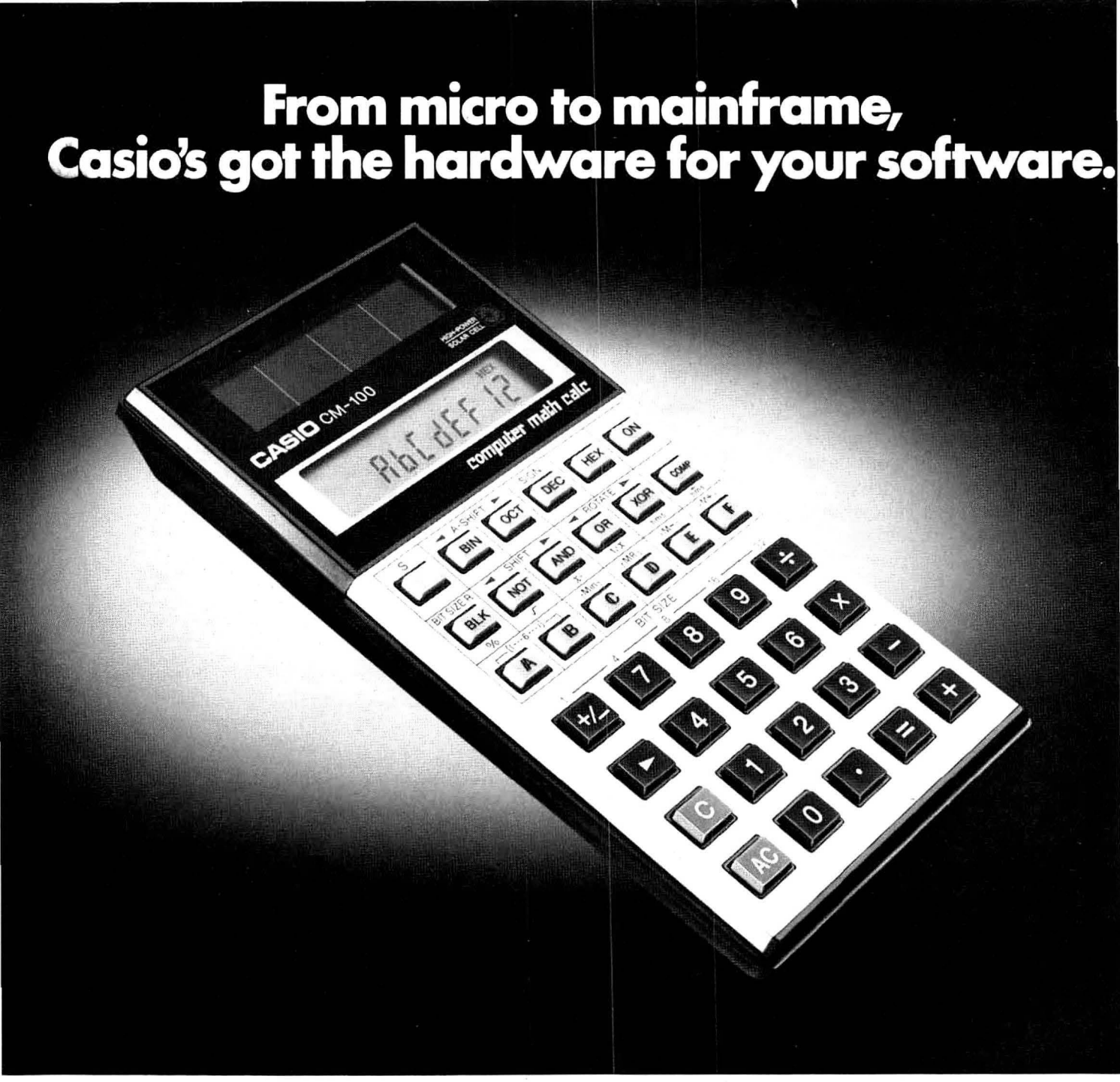

At first glance, it may look like an ordinary calculator, but the Casio solar CM-100 is anything but. It's an extraordinary software tool that's as useful in programming an Apple™ as it is a mainframe IBM.™

The key to the CM-100's incredible flexibility is Casio's adjustable bit-size selector which can be set to suit any size computer up to 32 bits. And its block display which can, by scrolling blocks of 8 digits at a time, display up to a 32 bit word.

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Perhaps what is most extraordinary about the CM-100 though, is not how much it can do, but how little it costs to do it. The CM-100 is the only calculator that'll let you do all your software figuring for less than you'd figure to pay for an average ($25.00) textbook.

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Circle 746 on reader service card

Press **< Enter >** again and the hyphen prompt reappears. Type **R CX < Enter >**. Zeroes will appear, followed by a colon prompt and the cursor. Type **11 < Enter >** to indicate the file's size, then **N WARMBOOT.COM < Enter >** to name the file, and **W < Enter > Q < Enter >** to write the file to disk and quit DEBUG. Test the newly created program by typing **WARMBOOT < Enter >**.

This program works like REBOOT.BAS but ensures that the PC's "reset flag" is set to the value 1234 hexadecimal. Any other value results in a cold boot. To create a reboot program that *does* include the power-on diagnostics, follow the instructions for WARMBOOT.COM but substitute a different value for 1234 and name the file COLDBOOT.COM.

An Open and Shut Case

Q. Ever since I acquired a Hardcard for my IBM PC, I have had a compelling desire to keep floppy disks in drives A: and B:. I dedicate the latter to BackTrack, *a hard disk backup program, and drive A: to a copy of DOS that I use only when I want to reset the PC with a different configuration from that stored on the Hardcard. I leave drive A:'s disk drive door open except when I'm resetting the PC.*

My question is, what problems can occur if I keep floppies in the disk drives with the drive door left open or closed?

Carl H. Williams
Honolulu, Hawaii

(continues)

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A. If the drive door is left open, no harm will come to the door or the disk. However, keeping the door closed can lead to problems, whether or not a disk is inside. (Older full-height floppy drives are more susceptible to this problem because they use plastic door frames that are easily distorted by heat and pressure. Their durable half-height counterparts, made out of metal, usually don't suffer this fate.) When the door is closed, an attached frame clamps the disk (if present) against a capstanlike wheel. Over time, shutting the door warps the plastic frame. Eventually, the drive will no longer clamp the disk with sufficient pressure to spin the disk properly—and you won't be able to read from or write to the disk without actually pressing down on the door in the direction of the clamping action for the duration of the disk access. My advice is to leave floppy disk drive doors open whenever drives are not in use.

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Q. I will be moving to Japan in 1987 and plan to take my Compaq Deskpro and software along. I am concerned that during the move my software will be damaged by the heat and humidity. An overseas packing crate doesn't seem to be a particularly good container for the disks, but carrying them with me is not an option. Are there any precautions I can take to maximize their chances for survival?

Also, should I worry about plugging my Deskpro into a local

(continues)

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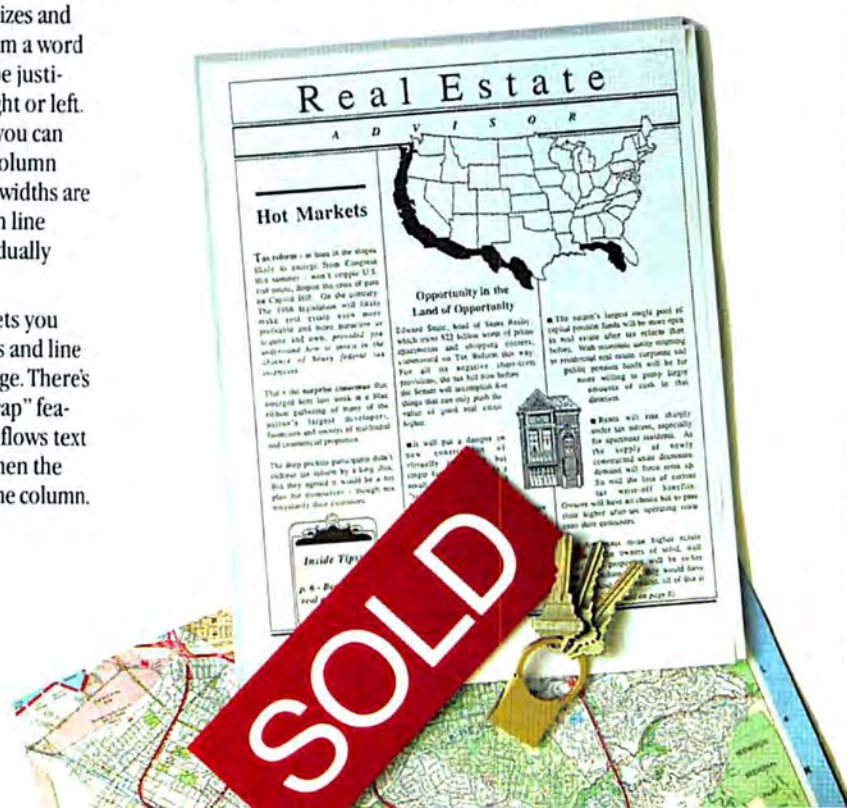

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50 Hz outlet? My machine, after all, was designed for 60 Hz current. How will this and other idiosyncrasies of Japan's electrical system affect my machine?
Robert K. Callaway
Monterey, California

A. The best way to get your disks to Japan is to have a friend in the States ship them via air freight after you arrive. If possible, ship copies only, not originals. And, of course, insure the package. If this is not feasible, ship them in a metal cooler, preferably one with a clamp so that it can be opened easily for inspection. This should insulate them from heat. As an added precaution, include a few packages of silica gel (available at photo supply stores) to guard against moisture.

In eastern Japan (Kanto), alternating current is supplied at 100 volts, 50 Hz (cycles per second). But in Osaka and points west (Kansai), 100-volt power is provided at 60 Hz. If your monitor is powered by the Deskpro and the computer isn't packed with watt-hungry components, your system should be able to work anywhere in Japan. Contact the nearest Japanese Embassy (yours is in San Francisco) for specific information about the area where you will be living. *Ganbatte.*

Do you have any questions concerning the IBM PC or compatibles? Send them to The Help Screen, PC World, *501 Second St. #600, San Francisco, CA 94107, or electronically to CompuServe 74055,412, MCI Mail PC-WORLD, or The Source STE908.*

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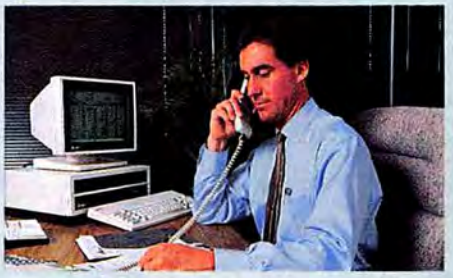

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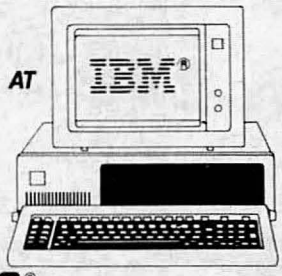

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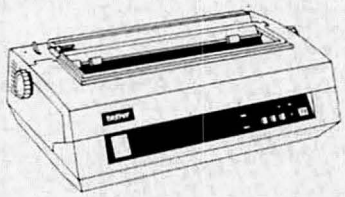

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LQ-800 – 80 col., 24-pin head . $Call
LQ-1000 – 132 col., 24-pin head $Call
DX-20 – 20cps Daisywheel . . . $Call
DX-35 – 35cps Daisywheel . . . $Call

OKIDATA

182P, 120 cps, 80 Col., Parallel . $239
84P, 200 cps, 136 col. Parallel. . $649
192P, 160 cps, 80 col. Parallel . . $365
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293P, 200cps, 136 column, colors $675
Parallel or Serial I/F Card for 293. $95
2410P, 350 cps, 136 col. Parallel $1895

IBM

IBM ProPrinter – 200cps, 80 col .$399
Proprinter XL – above but 132 cc $625
IBM Color Jet – 80 column . . . $645
IBM QuietWriter III -60cps, 132 cl $1295
IBM Wheel Printer – 25cps, 132 $1,445

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Diablo 630 API, 40 cps daisywheel printer . . . . . *Sale Price* $1,295

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P321 – 180cps, 24-pin head. . . $475
P341 – 220cps, 24-pin head. . . $799
P351 – 288cps, 24-pin head. . . $999

RICOH

RP1500Q – 40cps daisywheel printer, $1,495 value. *Special purchase* $695

CITIZEN

MSP-10 – 80 column. . . . . $Call
MSP-15 – 132 column . . . . . $Call
MSP-20 – 80 column. . . . . $Call
MSP-25 – 132 column . . . . . $Call
Premium 35 . . . . . $Call

STAR GEMINI

SB-10, 24-pin, 80 column . . . $450

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2050 Similar to 3550 but 19 cps $595
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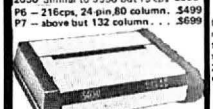
P7 – above but 132 column. . . . $699



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High speed, heavy duty, 18-pin dot matrix printers for business use.
3404 – 400cps, serial interface . . Call

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Sheet Feeder SF-40 for M-1509. . Call

HR-15XL – 17cps daisywheel printer, 3K buffer, two color printing, can be used as a typewriter w/optional keyboard. Parallel . . *Sale* $315
Keyboard for HR-15 . . . . . $149
Tractor for HR-15 . . . . . $119
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HR-35 – 36cps daisywheel, para $725
DM-40 – 160cps, 24-pin dot matrix, 136 col., with tractor, para . . $899

FORTIS – *by Brother*

Fortis 15XL – 17cps daisywheel printer w/3K buffer. Parallel . .$SALE!
Fortis DM-20 – 160 cps dot matrix, 136 col., NLQ mode, both parallel and serial interfaces. $525
Fortis DX-25 – 25cps daisywheel, 132 column, 7K buffer, quiet operation, built-in parallel & serial. $480
Fortis DH45 – Dual head printer, 160 cps dot matrix, 36 cps daisywheel. Epson, Diablo compatible . . .$585.
Tractor for 15XL/HR-25. . . . . $119
Keyboard for 15XL. $149
Cutsheet Feeder for HR-15/25 . $189
SF-200 Feeder for DM-40/2024L.$275

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KX-P1091, 120 cps, 80 columns, with near letter quality mode . . . $Call.
KX-P1092 . . . . . $Call
KX-P1093 . . . . . $Call
KX-P3151 . . . . . $Call

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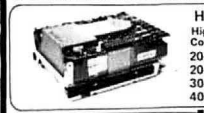

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High performance full height hard disks. Complete with cable and mounting rails.

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$105 ea. 360K DRIVE FOR IBM-AT

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Memory installed on card	64K	256K	384K
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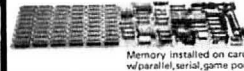

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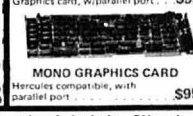

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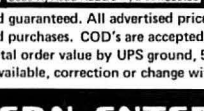

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KX-P1092 . . . . . $Call
KX-P1093 . . . . . $Call
KX-P3151 . . . . . $Call

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Hayes 1200, external, 1200 baud $365
Hayes 1200B, internal w/software $339
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Hayes Transient 1000 . . . . . .$325
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Watson Voice/Data Modem . . . $375
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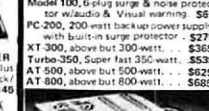

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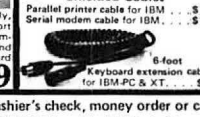

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Princeton MAX-12, 12" amber. $169
Taxan 116, 12" amber composite $129
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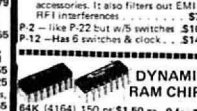

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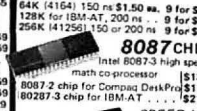

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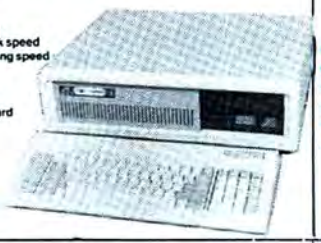

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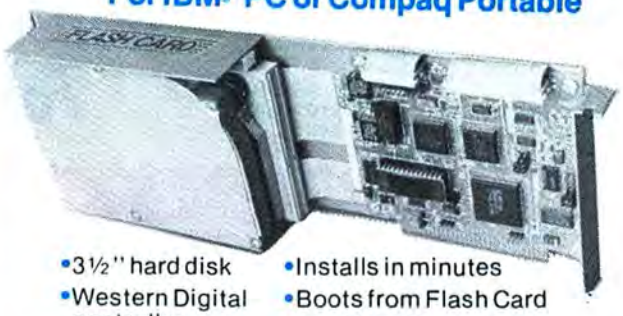

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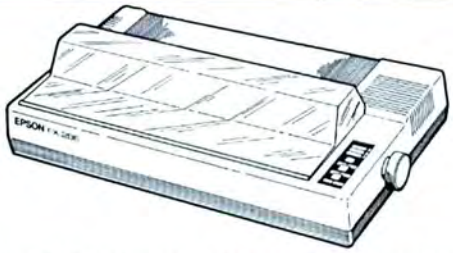

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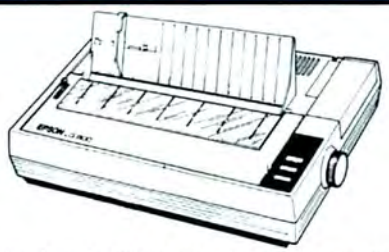

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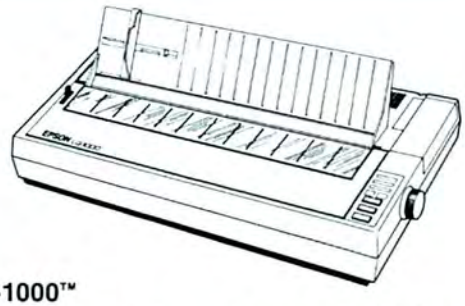

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OCTOBER CASE HISTORY

A physical rehabilitation and pain management clinic in Hot Springs, Ark., has begun a trial program using the SOFTSTRIP System to reduce the huge volumes of medical paperwork in physician's offices, clinics and hospitals. Dr. Henrik Madsen, medical director and administrator of the Hot Springs clinic, is deeply involved in the management aspects of health care as well as medicine itself. One of the biggest problems facing the proper administration of medical offices, clinics and hospitals is paper. Voluminous patient records accumulate rapidly, soon cramming all available shelf space. All of those records are hand or typewritten papers.

Using the Softstrip System, Dr. Madsen's clinic is recording patient records on data strips. Those strips are filed in place of the written medical records, significantly reducing the amount of shelf space needed, as well as handling times. In addition, recall of medical records to the clinic's IBM PC computer can be done quickly using data strips.

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Star-Dot-Star

A global exchange of personal computer discoveries

Split-second timing with DOS, an on-screen key status indicator, smaller Turbo Pascal files, hidden programming tools from DOS, and more

Edited by Steven Cook

Computer magazines have long attempted to devise an inexpensive, universal method for distributing computer-readable information to their readers. *Star-Dot-Star* publishes programs every month, but of course you must type them in, a tedious and error-prone process at best.

Star-Dot-Star's X-MAKER.BAS program was created in an attempt to reduce the burden associated with getting software from printed page to floppy disk, and many more elaborate techniques have been tried. In late 1983, *PC World* became the first magazine to bind a demo on a disk into each magazine mailed to subscribers. Two years later, we inserted two demo disks into our November 1985 issue.

A publication called *Interface Age* once bound within its pages a thin vinyl record. When the record was played, the signal could be transferred to cassette tape and fed into a personal computer via the cassette input jack. The experiment met with mixed success and was never repeated.

Optical character recognition (OCR), bar code readers, even a variation on the magnetic ink readers used by banks to record checks: All have been considered, and each approach has disadvantages. OCR is too error-prone; a bar code takes up too much space—almost a full square inch for just 8 bytes of data; printing magnetically inked characters is an expensive proposition, and devices that can read them are far too pricey for the average PC user.

In the absence of a cost-effective data publishing technology, some magazines have offered monthly floppy disks for an additional fee, and a few operate their own computer bulletin boards. Readers with modems can call the bulletin boards and transfer programs directly into their computers.

Bulletin boards are probably the most popular alternative, but they have their drawbacks. The speed and quality of transmission is restricted by the telephone lines. Some bulletin boards are so busy that they often cannot be accessed for hours on end, and for many users there are long distance charges to consider. Still others

(continues)

```
10 DEFINT A-Z:CLS:KEY OFF:DEF FNHEX(X$)=VAL("&h"+X$)
20 LOCATE 3,1:PRINT "X-Maker":READ F$
30 LOCATE 5,1,1: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 5,1,1:PRINT "Press any key except ESC to create ";F$;": ";
100 A$=INPUT$(1):PRINT:IF A$=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

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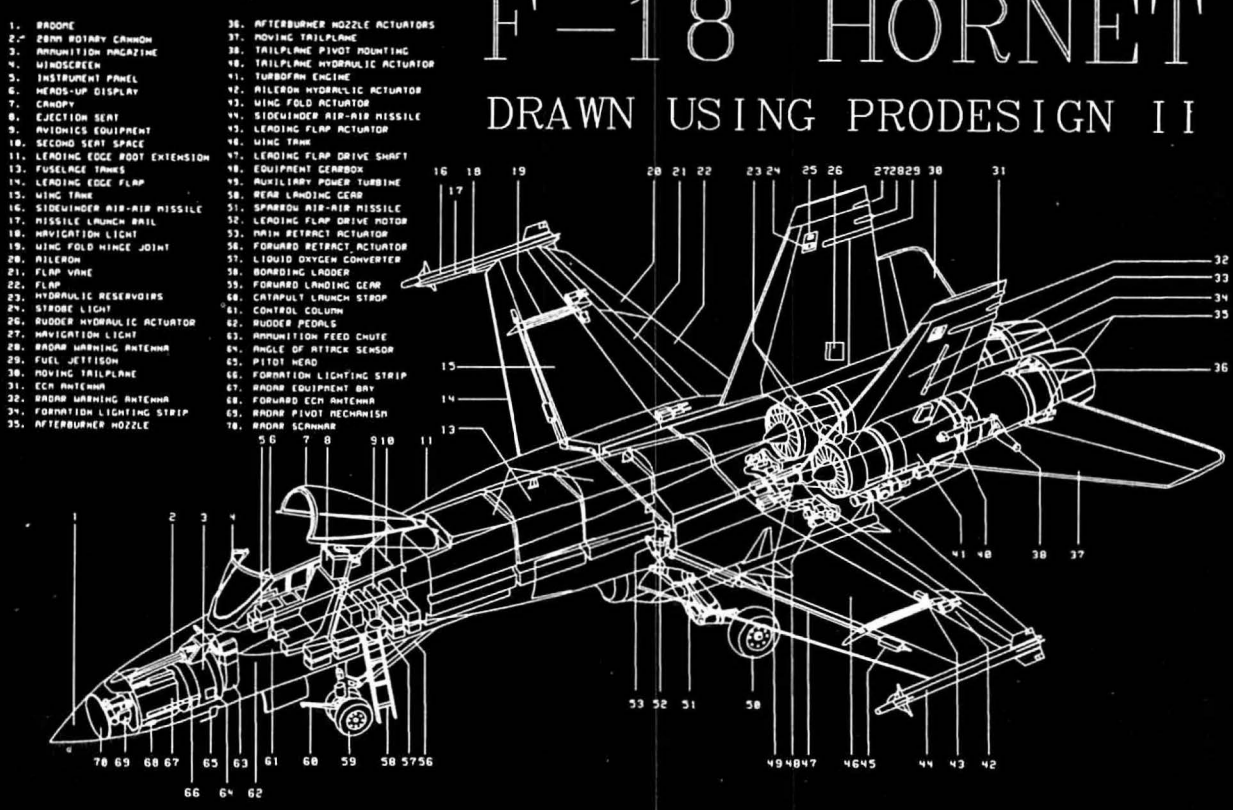

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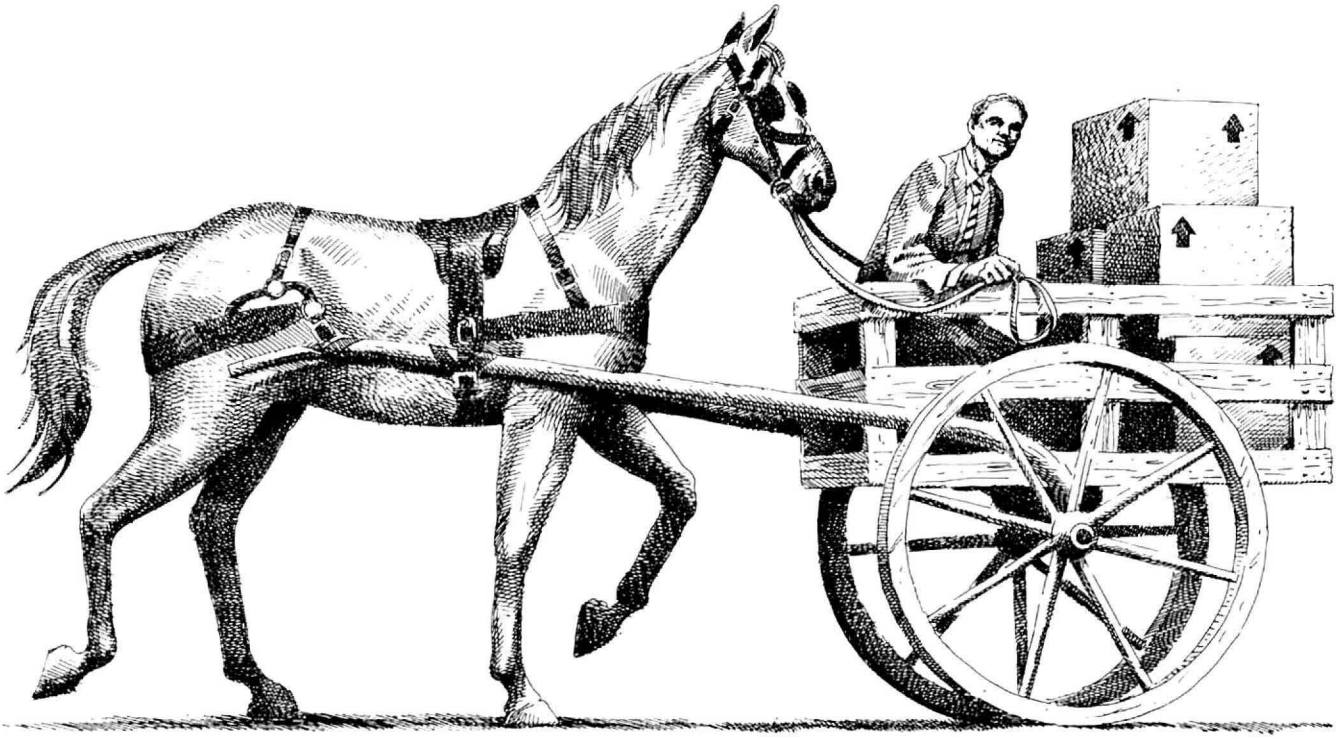

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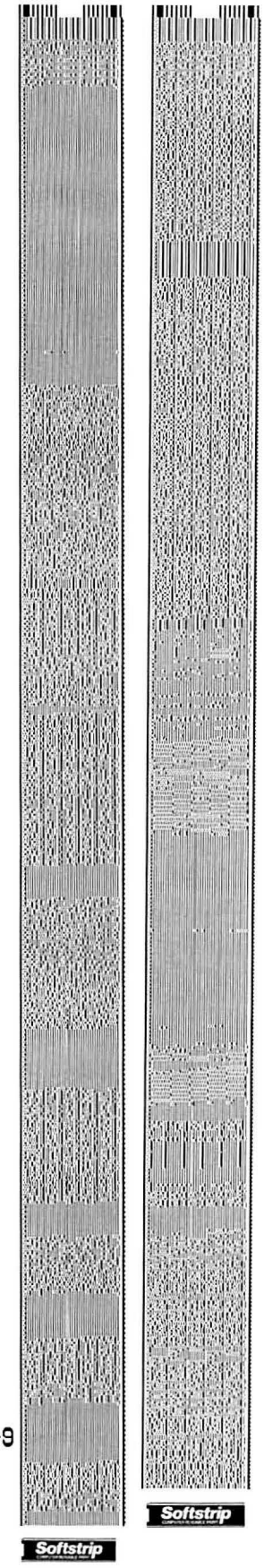

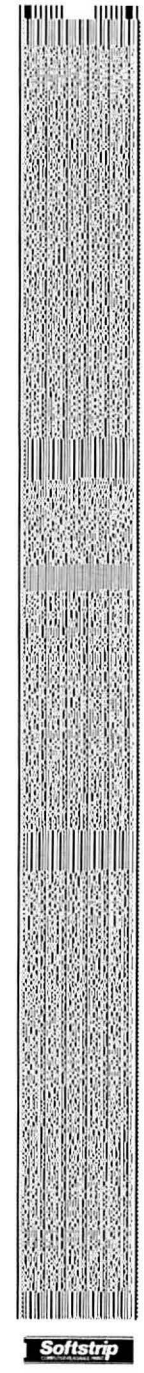

These three Softstrips contain *.*'s September and October program listings.

find the complexities of telecommunications beyond their comprehension or patience.

Cauzin Systems of Waterbury, Connecticut, offers a low-cost ($200) device capable of reading Cauzin's unique Softstrip data format. You may have noticed the jacquard-like strips in Cauzin's advertisements. The black-on-white image can easily be reproduced in a magazine, and a 6-inch strip holds over 3000 bytes.

Cauzin's Softstrip System is an excellent solution to a nettlesome problem, and *PC World* is pleased to now provide *Star-Dot-Star* programs in Softstrip format. Softstrips enable us to offer larger and more powerful software programs that help you get the most out of your PC–without spraining your fingers. As an additional bonus, this month's Softstrips include the programs from *.*, September 1986.

Of course, we will continue to print programs in "human-readable" form as well, but for worthwhile yet weighty programs, Softstrips will be particularly welcome.

Split-Second Timing

System clock time accurate to 1/100 second is possible with a pinch of BASIC and some help from DOS. With such a stopwatch you can, for example, generate far more exact benchmarks. Unfortunately, BASIC's reserved variable TIME$ will not return fractions of a second, effectively preventing BASIC

(continues)

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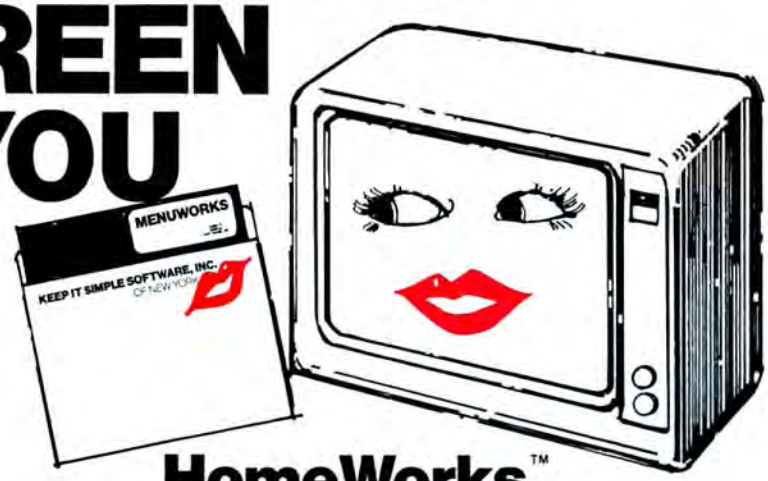

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```
100 ' Program 100THS.BAS
110 DEF SEG : DEFINT A-Z : DEFSNG T : KEY OFF : CLS
120 ' function to add leading zeros to values
130 DEF FNA$(X)=RIGHT$("0"+MID$(STR$(X),2,2),2)
140 ' place subroutine into memory
150 FOR I=1 TO 31
160     READ CODE$
170     PRG$ = PRG$ + CHR$(VAL("&H"+CODE$))
180 NEXT
190 ' call the subroutine
200 TPTR = VARPTR(PRG$)
210 TIME = PEEK(TPTR+1) + (256*PEEK(TPTR+2))
220 CALL TIME(HRS,MIN,SEC,HND)
230 ' add leading zeros and display the time
240 HR$ = FNA$(HRS) : MN$ = FNA$(MIN)
250 SC$ = FNA$(SEC) : HN$ = FNA$(HND)
260 LOCATE 12,15,0
270 PRINT HR$ + ":" + MN$ + ":" + SC$ + "." + HN$
280 GOTO 200
290 ' data for the machine language subroutine
300 DATA 55,8b,ec,b4,2c,cd,21,8b,5e,0c,88,2f,8b,5e,0a,88
310 DATA 0f,8b,5e,08,88,37,8b,5e,06,88,17,5d,ca,08,00
```

100THS.BAS: A BASIC program to retrieve time accurate to 1/100 second

routines from being timed this precisely.

The machine language subroutine demonstrated in 100THS-.BAS enables BASIC to read the hundredths-of-a-second values kept by DOS and to display them on screen. The program puts the subroutine into memory and executes it with BASIC's CALL command.

The format for calling the subroutine is CALL TIME(*hours, minutes, seconds, hundredths*), where *hours, minutes, seconds,* and *hundredths* are integer variables to which the corresponding values will be passed. You must include a variable for each value, and all four variables must be integer type.

Harry Manoharan
Oklahoma City, Oklahoma

Border Patrol

My compatible's <CapsLock> and <NumLock> keys lack status lights, so I decided to put the screen border to work as a lock status indicator with PATROL-.COM, a small memory-resident program. PATROL.COM assigns and displays a border color (or shade of gray on a monochrome graphics monitor) based on the status of the <CapsLock> and <NumLock> keys. (PATROL-.COM is designed for a monitor connected to a Color/Graphics Adapter or compatible board; it will not work on systems using the Monochrome Display Adapter or an Enhanced Graphics Adapter, because these video boards do not display borders.) The lock status can now be determined by merely glancing at the screen.

When either the <CapsLock> or the <NumLock> key is pressed, the new lock status changes the border to the pre-assigned color. Another program may change the border color, but

(continues)

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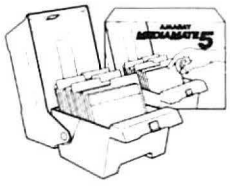

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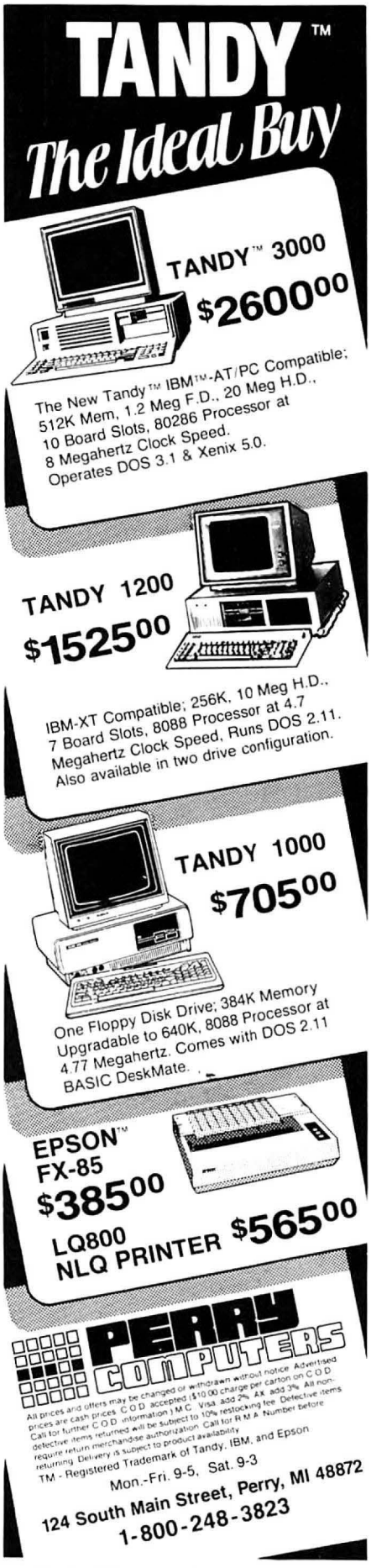

Circle 238 on reader service card

Color number	Color on color monitor	Shades of gray on B&W monitor
0	black	black
1	blue	light gray
2	green	light gray
3	cyan	light gray
4	red	light gray
5	magenta	light gray
6	brown	light gray
7	light gray	dark gray
8	dark gray	bright white
9	light blue	bright white
A	light green	bright white
B	light cyan	bright white
C	light red	bright white
D	light magenta	bright white
E	yellow	bright white
F	bright white	bright white

COLORS: Select color values from this figure for PATROL.COM.

PATROL.COM usually restores the assigned color, if not immediately, then as soon as you exit the program or push either the <CapsLock> or the <NumLock> key. Load PATROL.COM only once from the DOS prompt or put PATROL in the AUTOEXEC.BAT file.

Keep in mind that PATROL.COM works only in text modes. It relies on the keyboard and video interrupts, respectively, to check on the lock status and to reactivate the program. Because all keystrokes are passed on to DOS unaltered, PATROL.COM should work with all programs.

After you create the program, you can change the default colors (blue, cyan, magenta, and gray) that respectively represent <CapsLock> and <NumLock> off, <NumLock> active, <CapsLock> active, and both <CapsLock> and <NumLock> active. In color mode, you can select from 16 colors to indicate the various lock states; in black-and-white mode, PATROL.COM displays 4 shades of gray. Follow the steps in PATROLMOD, replacing *a, b, c,* and *d* with the desired color settings shown in COLORS. The new colors take effect when you restart the system and run PATROL.COM again.

The shades parenthetically listed in COLORS refer to the corresponding display on a monochrome graphics monitor in black-and-white video mode (MODE BW). I find that blue, magenta, dark gray, and bright yellow (1, 5, 7, E) look best on most monochrome monitors.

BASIC and some commercial programs automatically set the

(continues)

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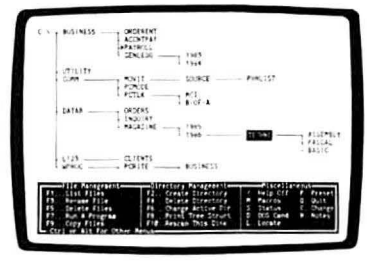

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Circle 783 on reader service card

display to the black-and-white video mode. If the border isn't set at 0, 7, 8, or F (that is, essentially black or white), screen flicker will be particularly annoying when scrolling. The Color/Graphics Adapter and compatible boards always cause some flicker during scrolling, and displaying a border exacerbates the problem. You can eliminate this eyesore by patching PATROL.COM to work only in video mode 3, the same mode set by the DOS command MODE CO80. Use the scheme described earlier for resetting PATROL-.COM's colors, but change the second line in PATROLMOD to read E 157 75.

Furthermore, BASIC is not "well behaved" and will not restore the video mode set before BASIC ran. A color display will remain in black-and-white mode even if you exit to DOS. Reestablish color mode by typing MODE CO80 at the DOS prompt.

In some cases the display may bloom (change size slightly) if the intensity of the border changes radically. You can minimize this effect by confining all color choices to 1 through 6 or 7 through E.

Clifford Vander Yacht
Jackson, Michigan

Editor's note: To create PATROL-.COM, load BASIC, type in the lines shown in X-MAKER.BAS followed by the lines in PATROL-.DAT, then type **RUN** *and press* **< Enter >** *. Remember that if DEBUG is not available from a hard disk, before you follow the steps in*

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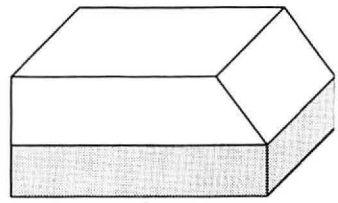

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```
1000 DATA "PATROL.COM"
1010 DATA 1,EB,71,01,03,05,07,00,00,00,00,00,00,00,00,FF,03,-1,D3
1020 DATA 2,FB,E8,27,00,2E,FF,2E,06,01,FB,80,FC,00,75,0A,2E,-1,D0
1030 DATA 3,A2,0F,01,2E,C6,06,0E,01,FF,9C,2E,FF,1E,0A,01,2E,-1,73
1040 DATA 4,80,3E,0E,01,FF,75,03,E8,01,00,CF,53,1E,2B,DB,8E,-1,F3
1050 DATA 5,DB,8B,1E,17,04,1F,81,E3,60,00,2E,3A,1E,0E,01,74,-1,85
1060 DATA 6,20,2E,80,3E,0F,01,03,77,18,50,51,52,2E,88,1E,0E,-1,AD
1070 DATA 7,01,B1,05,D3,EB,2E,8A,87,02,01,BA,D9,03,EE,5A,59,-1,2F
1080 DATA 8,58,5B,C3,B8,09,35,CD,21,89,1E,06,01,8C,06,08,01,-1,17
1090 DATA 9,BA,10,01,B8,09,25,CD,21,B8,10,35,CD,21,89,1E,0A,-1,FF
1100 DATA 10,01,8C,06,0C,01,BA,19,01,B8,10,25,CD,21,BA,A9,01,-1,EA
1110 DATA 11,B4,09,CD,21,BA,73,01,CD,27,42,6F,72,64,65,72,20,-1,A5
1120 DATA 12,50,41,54,52,4F,4C,20,69,6E,73,74,61,6C,6C,65,64,-1,F4
1130 DATA 13,0D,0A,24,-1,D8,-1
```

PATROL.DAT: Add these lines to X-MAKER.BAS to create PATROL.COM.

PATROLMOD, you must first make a disk holding a copy of the DEBUG.COM program (from the DOS Supplementary Programs disk) and the PATROL.COM file, and place that disk in drive A:.

```
A>DEBUG PATROL.COM
-E 102 a b c d
-W
Writing 200 bytes
-Q
A>
```

PATROLMOD: Follow these steps to change colors set by PATROL.COM.

Turbo Disk Data

I wrote the Turbo Pascal function FREE.PAS to determine the amount of space available on a disk. The function uses Turbo Pascal's MSDOS command to retrieve the pertinent values from the disk (sector size in bytes, cluster size in sectors, number of free clusters), perform the necessary calculations, and return the result to the program using FREE.PAS.

Martine Wedlake
Shawnigan Lake, British Columbia

Editor's note: You may wish to change the value of the disk drive number to refer to a specific drive rather than to the default drive. Alternatively, you can modify the function to accept a drive number as a parameter.

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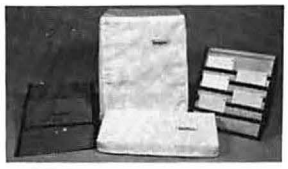

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Circle 171 on reader service card

```
program free;

function free:real;

type
  registers=record case integer of
              1: (AX,BX,CX,DX,BP,DI,SI,DS,ES,Flags:integer);
              2: (AL,AH,BL,BH,CL,CH,DL,DH:Byte);
            end;

var
  reg:registers;

begin
  with reg do
  begin
    ah := $36         {DOS function number}
    dl := $00;        {drive number: 00=default, 01=A, 02=B, etc.}
    MSDOS(reg);       {call DOS}
    free := 1.0*ax*bx*cx  {multiply by 1.0 to create a real value}
  end;
end;

begin
  writeln('Free space = ',free:7:0);
end.
```

FREE.PAS: A Turbo Pascal function that returns the amount of unused space available on a disk

```
program run;

var
  chnf:file;
  p1  :string[25] absolute cseg:$0080;
  runf:string[25];

begin
  runf := p1;
  runf := copy(runf,2,length(runf));
  runf := concat(runf,'.CHN');
  assign(chnf,runf);
  writeln(runf);
  chain(chnf);
end.
```

RUN.PAS: A Turbo Pascal program to execute .CHN files

To save disk space and make my life easier, I wrote RUN.PAS, a Turbo Pascal program that simply chains to the .CHN file you specify. If you compile RUN.PAS into a RUN.COM file, it will load the entire library into memory for use by all .CHN files. To execute a .CHN file, type **RUN** *filename* at the DOS prompt.

In the process of writing RUN.COM I discovered that Turbo Pascal cannot run a .CHN file that uses more memory than the .COM program that calls it. You can avoid this problem by setting certain compiler options before you compile RUN.PAS.

First, create RUN.PAS from the listing and save it to disk. Press **O** to display the compiler options

(continues)

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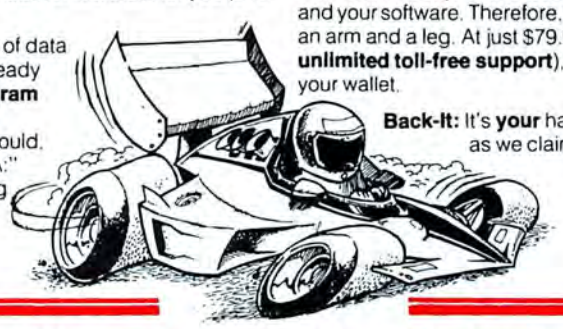

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from Turbo Pascal's main menu. Select **C** for a .COM file, press **O** to specify the minimum code segment, and type in the listed maximum value. Press **D** to repeat the process for the minimum data segment. Press **A** and then type the maximum free dynamic memory, in this case **FFFF**. **Q** returns you to the main menu, and pressing **C** compiles the program.

Jonathan Suite
Concord, California

Where Am I?

Each new version of DOS adds a new set of tools to the programmer's workbench, and the DOS 3.*xx* generation is no exception. One of its more useful additions is easily overlooked.

The *DOS Technical Reference* manual states that just beyond the end of the "traditional" environment, DOS places the name of the currently running program or process loaded by the EXEC function call (48H). The manual further notes that the file name will be preceded by the drive and directory where the file is located. This makes it easy for a program to find its own name and, more important, to determine where it is located–very useful when loading overlays or configuration files.

The Turbo Pascal program SELF.PAS demonstrates how the technique can be implemented.

Darren Michael Armstrong-Allen
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(continues)

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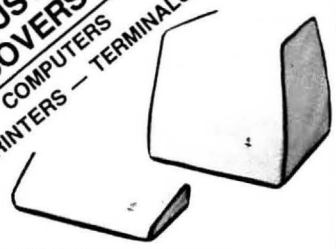

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```
program self;

type
   s64 = string[64];

function self: s64;  {Requires PC/MS-DOS v3.00 or later}

var
   envseg : integer absolute cseg:$002C;
   i      : integer;
   temp   : s64;

begin
   i := 0;
   temp := '';

   {read through the environment until we get to the end [2 null bytes]}
   while MemW[envseg:i]<>0 do i := i + 1;
   i := i + 4;    {skip the two null bytes and word count}
   {get the d:\path\filename.ext as passed to the EXEC function}
   while Mem[envseg:i] <> 0 do
      begin
         temp := temp + chr(Mem[envseg:i]);
         i := i + 1;
      end;
   self := temp;
end;   { func Self }

begin
   writeln('This program was ran as "',Self,'".');
end.
```

SELF.PAS: A Turbo Pascal program to demonstrate DOS 3.xx's program-location feature

Editor's note: Remember, you must have DOS version 3.00 or higher for the program to operate properly.

Color Correction

The BASIC program published with "Colors With 1-2-3 Release 2" (*.*, *PCW*, July 1986) contains an error that transposes the values for foreground and background colors. To correct the program, change line 360 to read **360 IF K=1 THEN IF P > 7 THEN 350**, and change lines 620 and 630 to read **620 DATA "Background: "** and **630 DATA "Foreground: "**, respectively. The program will not work properly for all variations of 123.SET.

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3c. If you answered "yes", what types of VAX computers do you currently own and what types of VAX computers do you plan to purchase within the next twelve months? (PLEASE RESPOND WITH SPECIFIC QUANTITIES)

MODEL	QTY. CURRENTLY OWNED	QTY. PLANNED FOR PURCHASE IN NEXT 12 MOS.
A. VAX 8800		
B. VAX 8650		
C. VAX 8600		
D. VAX 8500		
E. VAX 8300		
F. VAX 8200		
G. VAX 11-785		
H. VAX 11-782		
I. VAX 11-780		
J. VAX 11-750		
K. VAX 11-725/730		
L. MICROVAX II		
M. MICROVAX I		
N. PDP-11 (Any Model)		
O. MICRO PDP-11 (Any Model)		
P. PRO		
Q. VAX mate		
R. Rainbow		
S. DEC mate		
T. DECsystem 10/20		
U. IBM MAINFRAME		
V. IBM MINI		
W. IBM PC or Compatible (Any Model)		
Z. OTHER BRANDS (Specify Models Only):		

4. In your job, do you help to purchase, recommend, specify or approve any of the VAX-related hardware, software, peripherals, or services listed below?
☐ Yes ☐ No

(IF YES, PLEASE CIRCLE ALL THOSE THAT APPLY)

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02. Mainframe Computers
03. Minicomputers
04. Microcomputers

PERIPHERAL EQUIPMENT:
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07. Laser/Non-Impact Printers
08. Matrix Printers
09. Line Printers
10. Disk Drives
11. CD-ROM/Optical Disk Subsystems
12. Tape Drives/Subsystems
13. Memory Boards
14. Portable, Teleprinter Terminals
15. Video Display Terminals
16. Graphics Terminals/Work Stations
17. Graphics Input Devices
18. Plotters
19. Disk Controllers
20. Tape Controllers
21. Communications Controllers
22. Multiplexors/Concentrators
23. Local Area Networks
24. Wide Area Networks
25. Modems
26. A/D, D/A, I/O Hardware
27. Array Processors
28. Database Engines
29. Security Hardware
30. Power Supplies/Conditioners
31. Chassis/Backplanes/Racks
32. Cables

SOFTWARE:
33. Communications
34. Accounting
35. Order Entry/Inventory
36. Payroll
37. Time Billing
38. Financial Planners/Spreadsheets
39. Project Managers
40. Word Processors
41. Language Compilers and Interpreters
42. Database Managers
43. Graphics CAD/CAM
44. Engineering/Scientific
45. Utilities/Development Aids
46. Data Security
47. MRP Software
48. Business Graphics
49. Videotex
50. AI/Expert Systems
51. Resource Accounting
52. 4GL/Natural Language

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54. Education/Training
55. Software/Systems Design Consulting
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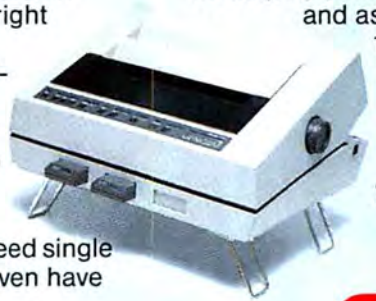

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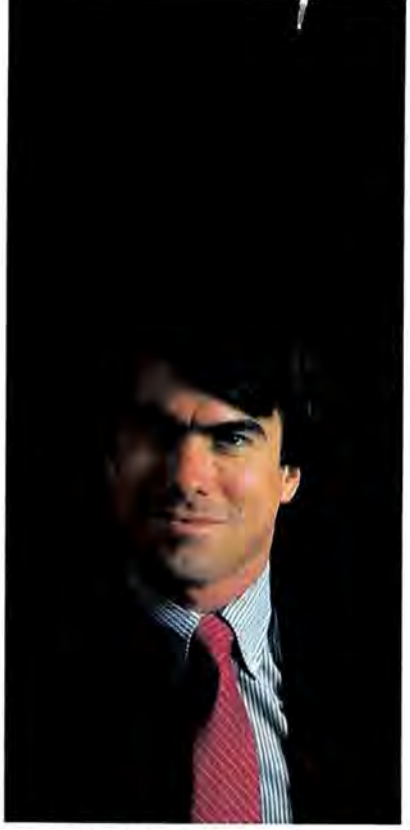

Kevin Strehlo

Where Are the Spreadsheet Disasters?

Everyone has heard a spreadsheet disaster story or two, but the apparent crisis in spreadsheet reliability may only be an exaggeration of a minor problem.

Have you heard the one about a multimillion-dollar mistake made by an oil company analyst and caught by a green but diligent assistant? It turns out that this and many other disaster stories trace their heritage back to a single opinion piece that ran in the *Wall Street Journal.*

Robert Freeman, now the marketing manager for an electronic mail program, says he ran into several actual spreadsheet disasters during the years he worked for the consulting firm Input. After he left consulting, Freeman wrote about four such catastrophes in a wonderful Op Ed piece for the *Journal* called "Slip of the Chip."

Is it possible that what seems to be a major problem is actually a mountain made out of these four compelling little molehills? Any consultant trying to make a living needs to convince people that he or she is needed. And what better way to get yourself hired to prevent disaster than to repeat the most compelling disaster stories you have heard?

If erroneous spreadsheets are ubiquitous, why do they always happen to some nameless other guy and not to people we know?

Stanley Kugell, author of *Javelin,* says his research shows that 90 percent of the spreadsheets used in large corporations contain serious flaws. But Kugell is pushing a product designed to be less error-prone than the leading spreadsheets, so his numbers might be taken with some large grains of salt.

Just how big is the problem? Imagine the havoc if only 25 percent of mainframe computer programs were faulty. America would be up in arms. We'd see data processing people burned at the stake in flaming pyres of erroneous bills and misleading printouts. Can spreadsheet disaster be nearly this widespread and go unnoticed?

Even now, two years after Freeman's Op Ed piece first appeared, the people who run companies built on the premise that spreadsheets are prone to error—people like Jack Grushcow, author of *The Spreadsheet Auditor*—can't name

(continues)

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any fresh incidents. Even though such stories would be great publicity for their spreadsheet documentation and debugging products, the best they can do is repeat Freeman's tired tales. Perhaps this is because they are told disaster stories in confidence—perhaps not.

I've looked, and come up with next to nothing. Once, from behind the mirror of a focus group discussion, I heard the microcomputer coordinator of a San Francisco hospital discuss a narrow escape from disaster when a spreadsheet was created to calculate the work load of nurses. The bottom-line recommendation was to cut the nursing staff by 20 percent. Only an outraged nursing supervisor, who knew her department was, if anything, understaffed, prevented a disastrous nursing shortage.

But even in this case of disaster averted, the microcomputer coordinator wouldn't publicly acknowledge the story. He wasn't willing to make his organization look bad by acknowledging its spreadsheet incompetence.

Do spreadsheet mistakes go undocumented because organizations are disinclined to discuss internal foibles? Or is it that very few spreadsheets flawed enough to do real damage slip by undetected?

Perhaps the discussion has been led astray by a focus on the sensational. Maybe we should focus instead on minor irritants, which certainly are not hard to document. And one of the primary irritants is the failure of spreadsheet jockeys everywhere to provide decent documentation.

Brook Cantor, a microcomputer specialist for Bank of America, cites the example of a complex *1-2-3* spreadsheet he was asked to modify by one of the bank's largest subsidiaries. It had been

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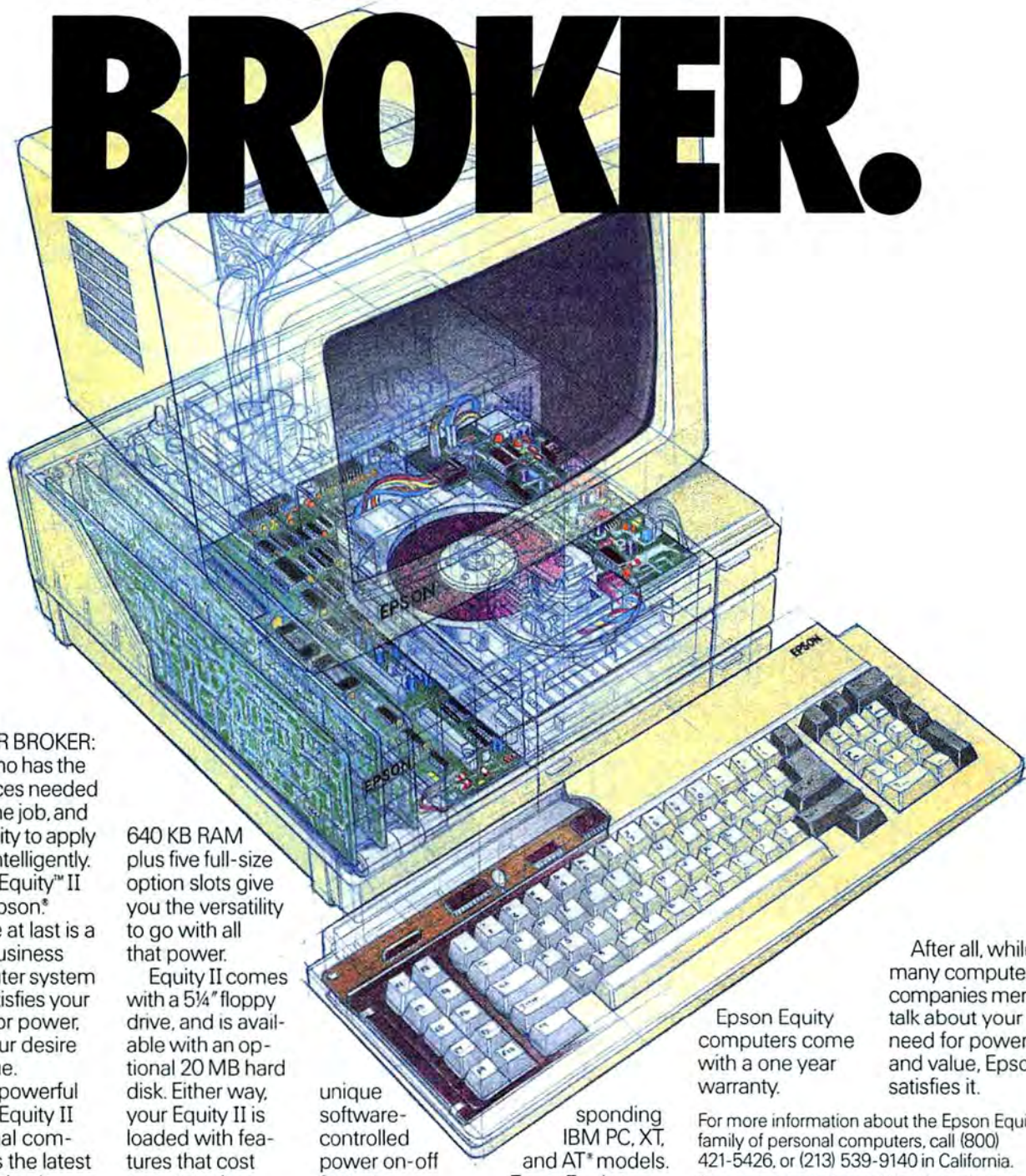

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written by a contractor, it was completely undocumented, and the contractor had long since disappeared.

"It was a credit application for asset-based lending," Cantor says. "It was one of the subsidiary's standard tools—they based many of their credit decisions on it." And although it seemed to work just fine, no one had any idea how. When bank employees needed to alter the spreadsheet to perform calculations on a monthly rather than an annual basis, they were as helpless as drivers who don't know which end of a Volkswagen Beetle to check for engine trouble.

It took Cantor more than a week to figure out how everything in the spreadsheet fit together—where multiple references occurred, what data function calls were made to what criterion ranges, and so on. And he says he wouldn't have gotten anywhere without some help.

In this case, he used Consumer Software's *Spreadsheet Auditor.* "Without that program, it couldn't have been done," he says. "It would have been faster to write a new spreadsheet from scratch." Cantor also uses *Cell/Mate,* a product from Clarity Software that provides automatic documentation by translating a *1-2-3* spreadsheet into a series of English-like statements.

With all that's riding on spreadsheets, why isn't proper documentation required? "Beats me," Cantor says. Although it might seem logical that the well-established DP auditor groups would force some discipline on spreadsheet users, Cantor says the scheme probably isn't feasible. "Most of the internal DP auditors I've known seem to have their hands full just getting users to change their mainframe password every 60 to 90 days," he says.

If not DP, then who? "I don't know," Cantor says. "In a large organization like this, it's pretty hard to tell who's responsible for what."

(continues)

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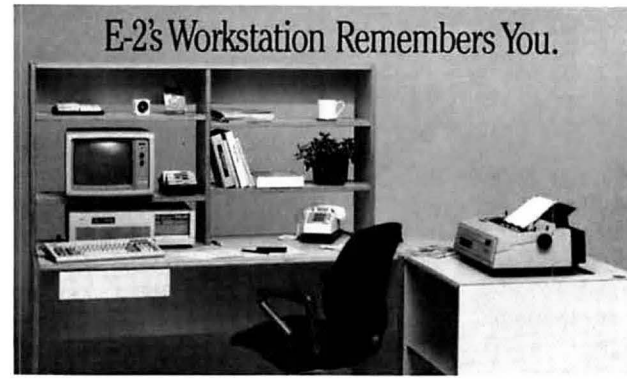

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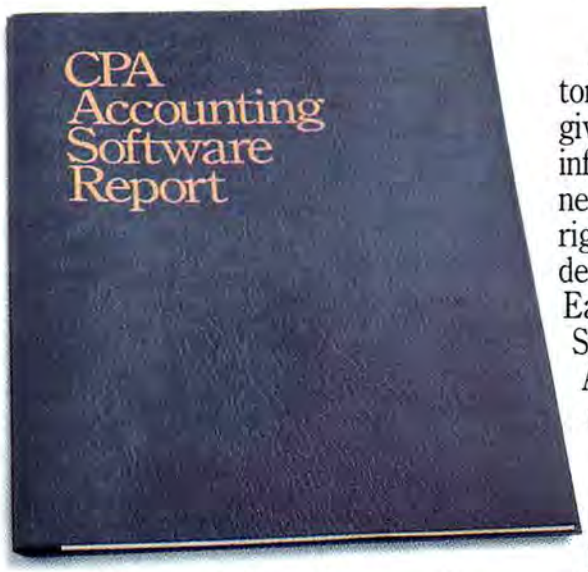

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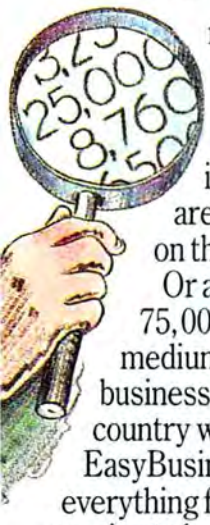

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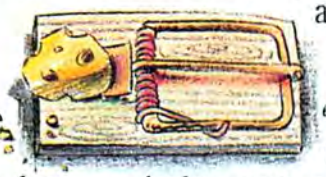

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Controlling spreadsheets when responsibility for them is diffused throughout a company is not easy. You need voluntary compliance with good spreadsheet practices—but that only comes when people are aware of the pitfalls.

Janet Beiner, who supports more than 200 PC users in the Denver office of Big Eight accounting firm Coopers & Lybrand, says discipline is strict when it comes to the accounting spreadsheets the company builds in auditing clients' books. The code of accepted accounting practices requires that each spreadsheet have written documentation, and a supervisor has to sign off on each spreadsheet's accuracy.

"But we do a lot of spreadsheets for internal management purposes," she says. "With those, it's the typical programmer attitude, where people say 'Wow, look at how great this works,' rather than 'Hey, check out my documentation and how hard it is to introduce errors.'"

To bring the company's attention to the potential problems of faulty spreadsheets, Beiner helped put together a seminar called Victoria's Venture. The idea was that a spreadsheet about a fictitious house of ill repute would keep the crowd's attention.

In the seminar, the mapping function of *The Spreadsheet Auditor* showed an auditorium full of accountants how Victoria's spreadsheet went awry. Embedded in a field of *f*'s—which signifies a range of cells containing formulas—the character indicating an integer suddenly appeared. A formula had been overwritten with a number, one of the more common spreadsheet mistakes. And while a fudged worksheet might give reasonable answers the first time, on subsequent uses the value in the fudged cell will never change. Disaster could result. Elsewhere in the Victoria's Venture spreadsheet, a row was added at the top of a range and not included in the corresponding @sum range command.

(continues)

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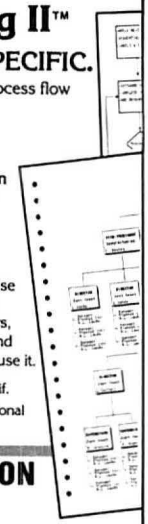

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Circle 103 on reader service card

Kevin Strehlo

Yet Beiner says the mistakes in the Victoria's Venture spreadsheet are the closest she's come to a real spreadsheet disaster.

How much effort, then, should be expended to prevent a problem that may or may not be serious? Is the extreme caution of Courtney Smith justified? Before Smith uses a spreadsheet to make commodities trading decisions for 21st Security in New York, he "bench checks" it, a practice carried over from his days as a mainframe programmer. Back then, because computer time was so expensive, a program was verified on paper —step-by-step and calculation-by-calculation—before it was tried on the computer.

Maybe Smith's caution is justified, and maybe he's not cautious enough. Testing a spreadsheet by entering a value of 1 in each cell of a data input range can make incorrectly defined ranges quite obvious, for example. "Crossfoot totals"—an extra row and column of formulas that double-check a spreadsheet's @sum totals—may be worth the extra effort. So might a corporate requirement to use tools like *The Spreadsheet Auditor* or *The Cambridge Spreadsheet Analyst* to document and check every spreadsheet thoroughly.

On the other hand, if someone in your organization is already checking spreadsheets for accuracy and the results for common sense, the return on extreme caution might not justify the effort.

With your help, dear reader, maybe we can get to the bottom

(continues)

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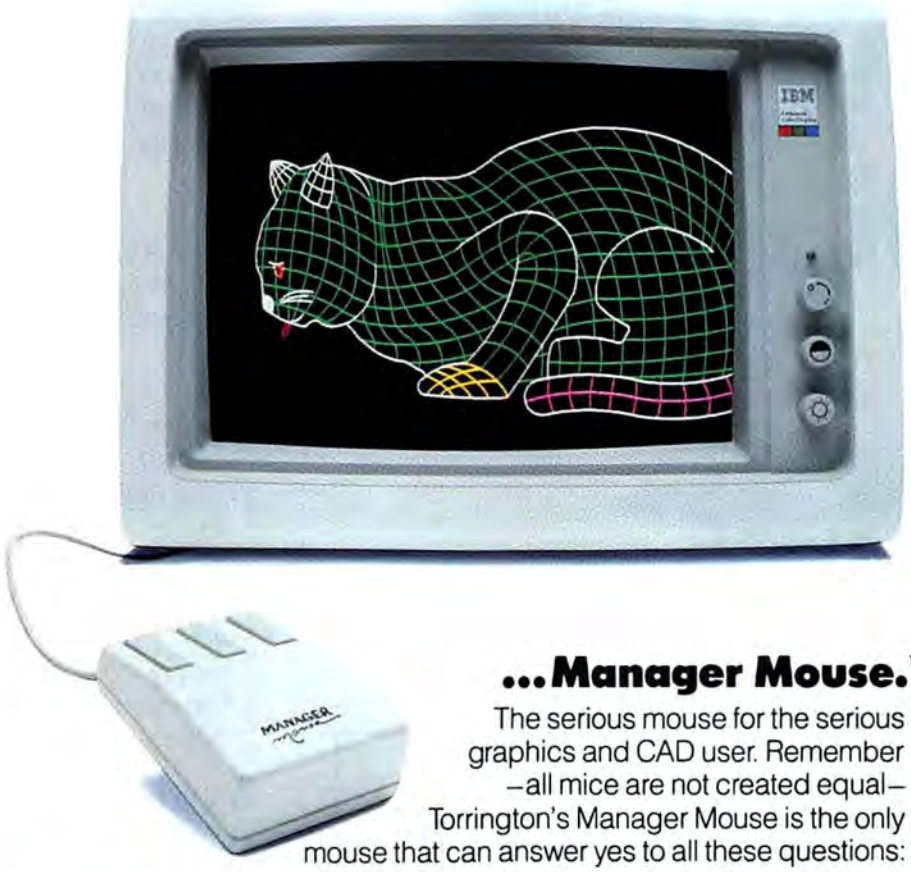

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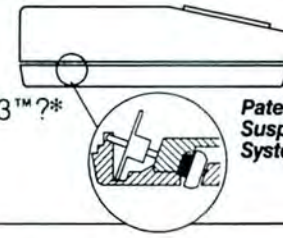

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line here. If you have outstanding examples of how spreadsheet disasters have been uncovered or averted, or why they aren't really a big deal at all, please drop me a line in care of *PC World*.

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

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1. Your primary job function:

- ☐ (A) Corporate or general management
- ☐ (B) Department manager
- ☐ (C) MIS manager
- ☐ (D) Professional
- ☐ (E) Other _____

2. Number of employees in your company:

- ☐ (1) 25 or less
- ☐ (2) 26-99
- ☐ (3) 100-499
- ☐ (4) 500-999
- ☐ (5) 1000 or more

3. Information requested for:

- ☐ (A) Business applications
- ☐ (B) Home applications

4. Reason for inquiring:

- ☐ (1) Plan to buy–next 3 months
- ☐ (2) Plan to buy–4-6 months
- ☐ (3) Plan to buy–7-12 months
- ☐ (4) Plan to buy–beyond 12 months
- ☐ (5) Reference only

5. For how many IBM PCs and compatibles do you buy products? (Include both company and personal units, please.)

- ☐ (A) 1
- ☐ (B) 2-4
- ☐ (C) 5-9
- ☐ (D) 10 or more

6. How much do you expect to spend in the next 12 months for peripherals and other add-ons?

- ☐ Less than $250
- ☐ $250-$499
- ☐ $500-$999
- ☐ $1000 or more

7. How much do you plan to spend in the next 12 months for software?

- ☐ Less than $250
- ☐ $250-$499
- ☐ $500-$999
- ☐ $1000 or more

8. How much do you plan to spend in the next 12 months for personal computers?

- ☐ (1) Less than $2500
- ☐ (2) $2500-$4999
- ☐ (3) $5000-$9999
- ☐ (4) $10,000 or more

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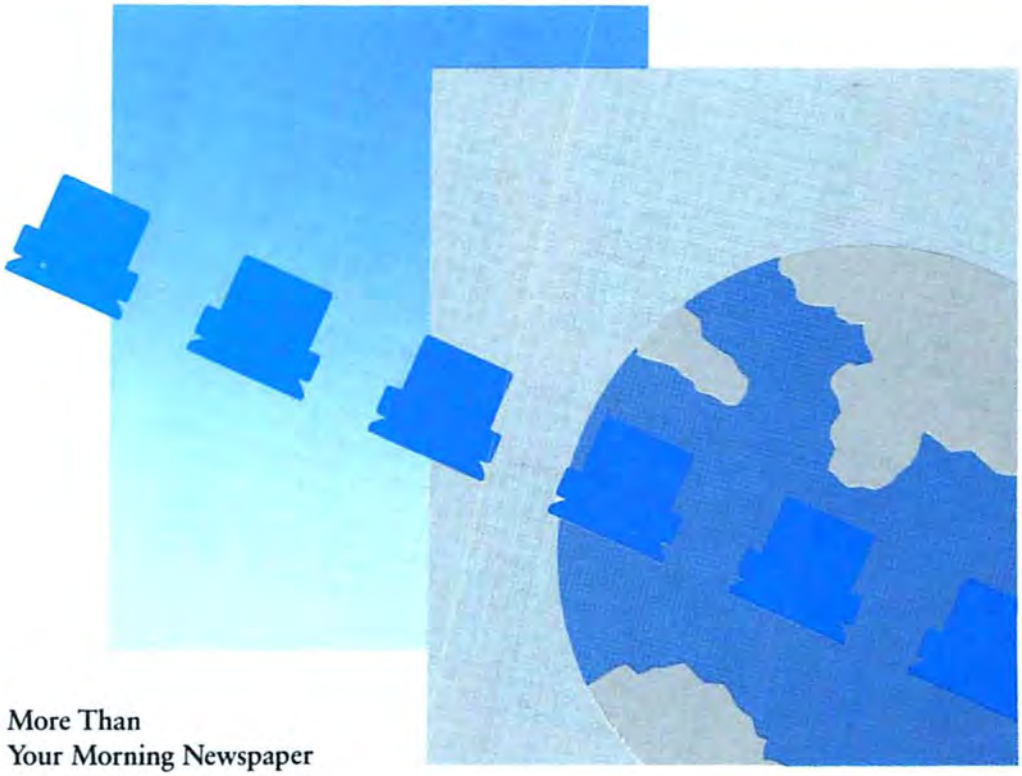
November Preview

Communications



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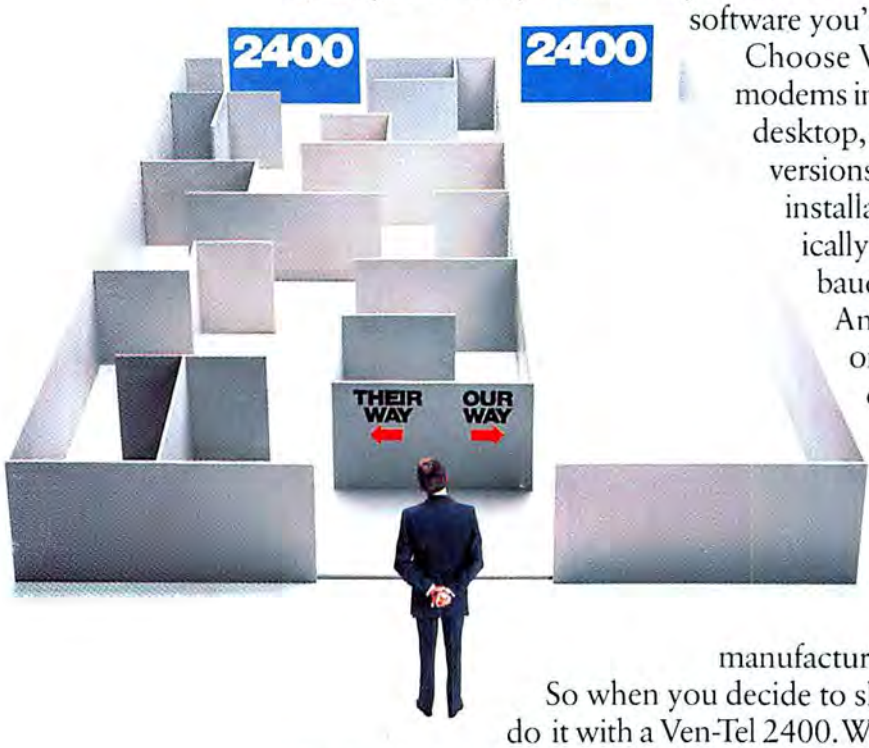

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