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The Comprehensive Guide to IBM Personal Computers and Compatibles
March 1986

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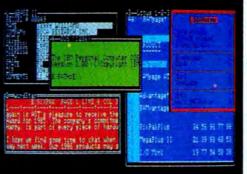
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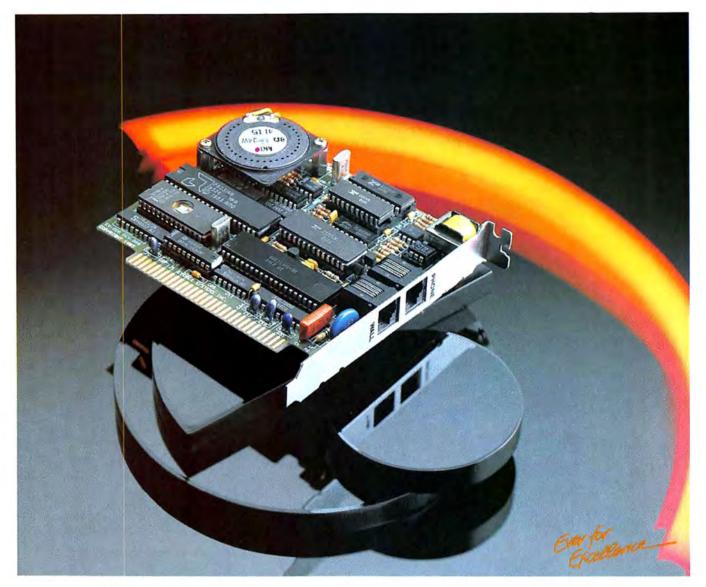
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# The Myth of the MIS Manager

**David Bunnell**

What's in store after the revolution: Will the aristocrats and the anarchists sit down to tea?

Not long ago I attended an industry outlook conference in Palo Alto sponsored by Technologic Partners, publisher of the *Computer Letter*. Various industry gurus at the seminar made forecasts, and although many pronouncements were predictable, there was one that seemed prophetic.

More accurately, it was an observation of a trend that has just now become recognizable.

Ed Esber, president of Ashton-Tate, gave a humorous account of some myths about the personal computer industry. He said it was high time they were dispelled.

The audience chuckled at his list of winners: the myth of the suggested retail price, the myth that integrated software is dead, the Philippe (Borland International) Kahn syndrome: "If you lower the price, you make it up in volume," and the myth that the customer always wants more features in software.

Ed related that he had always wanted to come up with four useless software features just to stack them up against the competition. Everyone laughed appreciatively.

But when Ed debunked the next bit of folklore—the myth that the MIS manager has lost his power—a thoughtful silence prevailed in the room.

"Actually, he's reasserting himself more and more," Ed observed about the role of the management information systems director in today's corporate environment.
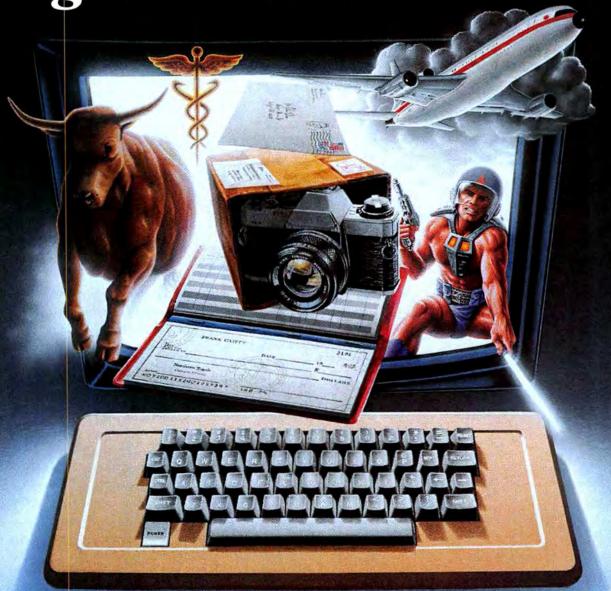
While it's been true that until recently the MIS manager has been complaining, like Rodney Dangerfield, that "I don't get no respect," Ed Esber's point is well taken.

The tide is turning, and the once-mighty autocrat of systems programming is again being regarded as a valuable citizen in the computing community.

This was brought into vivid focus for me when I received a copy of a new book written by a former colleague of mine, Forrest M. Mims, III. Mims worked with me back in 1973 at a company called MITS in Albuquerque, New Mexico. The personal computer

*(continues)*

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David Bunnell

business was just beginning when the computer pioneer and founder of MITS, Ed Roberts, brought out the world's first personal computer, the Altair 8800.

Forrest Mims's book, *Silicon-nections: Coming of Age in the Electronic Era* (McGraw-Hill, 1986, $16.95), is an incredible account of those days written from the perspective of someone who was, so to speak, present in the delivery room when personal computing was born.

It's full of never-before-published historical documents and rare references that I've never seen anywhere else. It's really an essential addition to anyone's reading list of computing reminis-cences—sort of a *Ten Days That Shook the World* of the computer revolution.

What got to me in the book was discovering a reprint of an irate letter written by an autocratic MIS manager to *Personal Computing*, the magazine that I had founded after I left MITS in 1977. The letter appeared in the Sep-tember/October 1979 issue.

Remember, those were the days before there was an Apple II, a Ra-dio Shack TRS-80, or an IBM PC. We printed articles about com-puter stores, interviews with per-sonalities, and colorful ads for computers made by now-extinct companies like MITS, Processor Technology, Southwest Technical Products, and other pioneers. And we were promoting a concept called the "Lemonade Computer

*(continues)*

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Service Company." This was a regular section that offered readers helpful advice on how to start up small businesses using personal computers.

Apparently, that idea proved a little too much for our blue-blooded correspondent. You can see from his letter just how far we've come since those turbulent days:

"Many of the things you say and imply in your magazine are very upsetting to me.... Your lack of respect for the institutions we have established is both rude and shortsighted. You should be grateful that the industry is making personal computers available to private individuals instead of pretending that just anybody should be allowed to use computers in any way he wants to. You should know that strong movement is under way to establish legal standards for licensing computer programmers.... The shabby Lemonade operator will become a memory of the past unless he learns his work properly, shows authorities that he deserves professional standing, and can really contribute to society. Cancel my subscription."

Rereading this letter reminds me how the personal computer really created a counterculture to the established computer culture of the day. That culture was dominated, of course, by the computer high priests—the MIS managers, who made all the decisions about computers in large institutions. In that sense, computers were thoroughly controlled because they

*(continues)*

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David Bunnell

were big systems, and you had to be tied into the system in order to use one.

Then the personal computer came along and liberated people from those constraints. This was instigated largely by a group of young electronic hobbyists who wanted to have their own computers and not be part of the corporate system. They didn't fancy the idea of being slaves to the MIS manager and the large computer systems.

Naturally, such rebelliousness created a negative reaction among the higher powers, as reflected in the letter to *Personal Computing*.

The question I'd like to pose is: Have we come full circle?

Are the MIS managers indeed regaining control of the personal computer, or will it continue to be out of their hands? Traditionally, they controlled the small department that had power over all a company's computers and software. They could, therefore, constrain users to do certain things in a certain way.

Today, people using personal computers spill outside of the MIS department into all the departments of a corporation. All the managers have them, all the accountants, all the inventory people, all the marketing folk. That's how MIS managers lost control of their electronic flock in the first place.

Yet the problem from the corporate viewpoint is, how do you make sure that the information you're getting is consistent? You have to control what users are doing to an extent.

*(continues)*

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For example, an average user cannot possibly have the time to examine all the underlying assumptions and formulas contained in every spreadsheet. If one little cell reference in the formula or in the assumption is inaccurate, it can throw off all the results. As a manager, you could end up agreeing to a budget or to a new project that was based on a false assumption you weren't even aware of.

So it's vital that the MIS manager continue to influence the way the computer is used throughout the entire organization. You do need some simple standardization when users exchange data. Only then can you have reasonable assurance that the assumptions and the formulas and the way things are done are valid.

The real challenge is not one of who controls or doesn't control personal computing. Rather, it's one of creating a balance so that the people with the expertise in personal computers and mainframes can influence the organization—but not have the power to stifle it.

What we really need is an evolution of MIS managers rather than a reinstatement of them as the ultimate power brokers.

The thrust of personal computing among the freethinking young hackers in the early days was to create a state of anarchy. Their battle cry was: "Forget MIS managers! They're dinosaurs."

First, the hackers declared independence, then they had their revolution, and finally they did away with the landlords.

*(continues)*

David Bunnell

Now that the industry has matured and mellowed, it's time for a new era of understanding between the creative spirits and the new and more secular class of the computer priesthood.

After all, the MIS manager does have the knowledge to evaluate systems and software better than most other people in the company. The alternative, when people use a hundred different programs without rhyme or reason, is chaos. We find ourselves operating within a software Tower of Babel.

I firmly believe that now is the time for accommodation on both sides. MIS managers must give up a certain amount of control—they don't have to determine every single piece of hardware or software that's bought by a corporation. But they should know what's going to be bought ahead of time so they can advise users and work with them to determine the best strategies.

At the same time, users should regard the MIS manager as an ally.

It's like having an absolute monarchy turn into a constitutional monarchy. The king still has a lot of power and influence and a certain degree of control, but not the absolute final decision.

So, it's true all right. We have come full circle.

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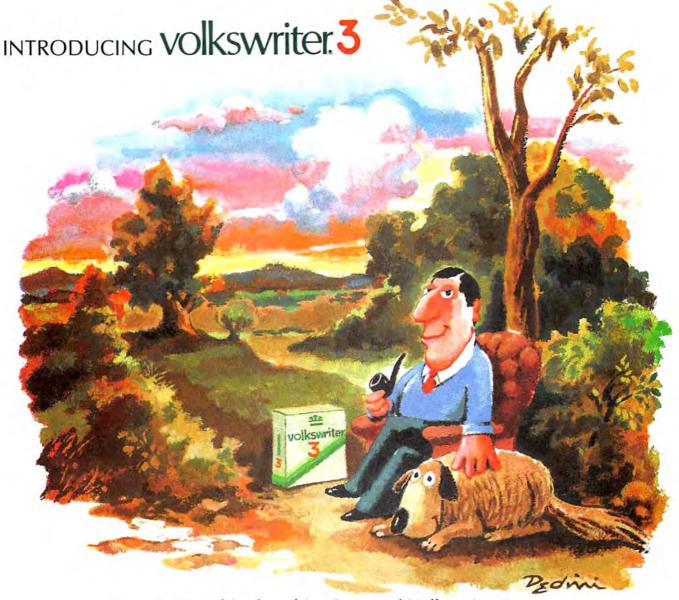
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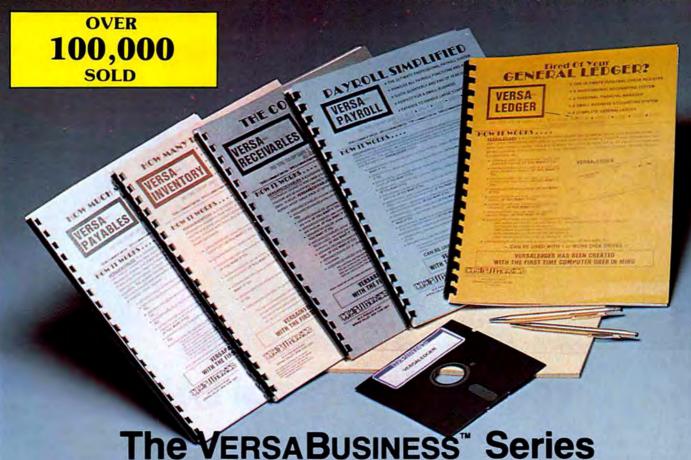
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John C. Dvorak

# The PC and the Decline of Western Civilization

Computer users have become dangerously dependent on software and overly zealous in their quest for perfection. That zeal may spell doom for polite society.

Personal computers are turning Americans into time-wasting wimps. The battle cry of the computer revolution heralds the PC as the angel of increased productivity. A personal computer on every desk is ballyhooed as a surefire way to improve worker output and work quality.

Does that pitch give you pause? Might the precise opposite be true? Could computers, inherently time-consuming as they are, actually be hindering productivity?

What do we use the machines for? Tasks like writing, managing data, accounting, forecasting and analysis, and telecommunications. While there's no denying that a couple of Crays will save time in calculating a satellite's course to Saturn, can measurable time saving be ascribed to our beloved PCs?

Consider the ubiquitous spreadsheet. What happens in the office? Time saving—or time wasting? In bygone days, departmental budgets were prepared by hand. The demands of manual accounting kept budgets as simple (and therefore understandable) as possible.

With a spreadsheet program, you can delve into intricate detail, play "what if" games, and produce a needlessly complicated document. If a company isn't limited to a particular spreadsheet, data may be transferred to another program and rearranged until it's just right.

Getting things "just right" is the personal computer's biggest bugaboo. Memos that were once handwritten now live through several iterations that often incorporate only petty changes. The vaunted paperless office has become a bonanza for paper manufacturers as computer users plow through endless reams to perfect the last word or the last figure.

The worst offenders in this fruitless pursuit of perfection are "friendly," high-resolution computers like Apple's Macintosh. With the Mac you can draw on screen and then edit your drawing in fine detail with a mode called FatBits. FatBits enlarges part of the picture and lets you manipulate the image pixel by pixel. I know people who missed their children's
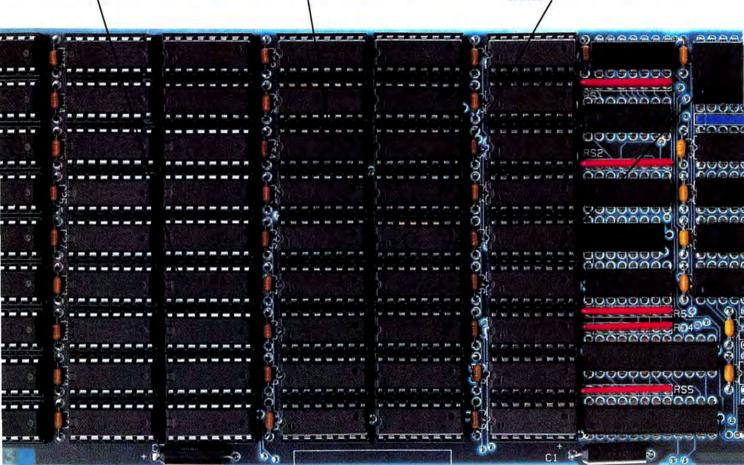
*(continues)*

# Diary of an

I traded my 16K machine and all those disks for Lotus® 1-2-3 and 256K. And immediately got the urge to merge. I started by merging regional statements in Maine. But before I could get to Iowa, I ran out of gas.

At 512K, I discovered what the coordinates IV169 looked like. I was so far out there it felt like I was walking on the moon. It didn't take long to find out 512K was nothing more than a walk around the block.

640K! Loads of space until I fell in love with integrated software and was back to cutting up files again. Sure, the other functions make my worksheet more persuasive, but I'm back to slugging in and out disks. Shades of 16K.

Old war stories of how you fought your way up through the memory ranks are great to remember as long as you don't have to relive them. And you don't.

Thanks to one incredible breakthrough. Above™ Board PS.

Above Board is the memory board that drove the Lotus®/Intel/Microsoft® expanded memory specification, Infoworld's 1985 Peripheral Product of the Year.

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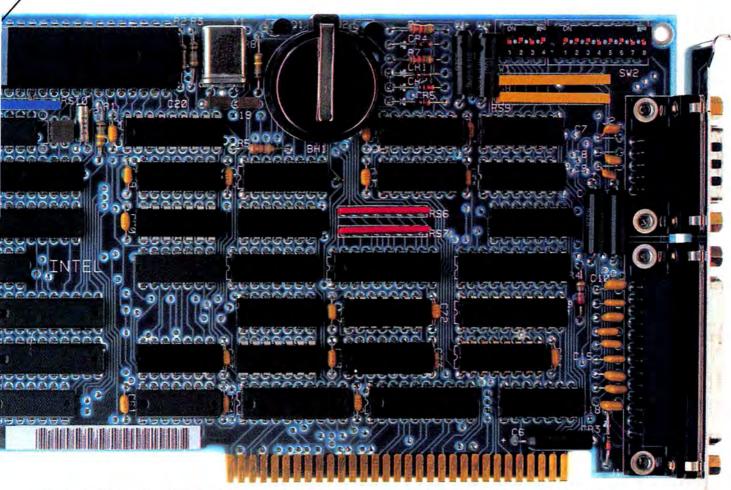
Above Board PS has the parallel and serial ports, clock, print buffer, and RAM disk you'd expect from a conventional multifunction board.

But why buy a conventional board when Above Board PS can take you from 256K all the way to 1.5 megabytes in one fell swoop, without even pausing for a breath at 640K.

So you don't need to hot-wire your way to the top anymore. With Above Board PS, the split worksheet is history. The new norm is windowing, pop-ups, and

# overachiever.

I'm on my way to 1.5 MB and I'm not looking back. Monster spreadsheets, killer models, Microsoft® Windows, and all kinds of pop-up utilities so I can juggle a bunch of balls at once.



RAM speed on everything—even databasing and word processing.

The second-biggest difference between Above Board PS and conventional multifunction boards is the unconventional warranty on it. Five years instead of the usual two.

Ease of installation is nothing to sneeze at either. Its software installs with as few as three keystrokes. It even intelligently customizes your memory allocation.

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Features: ● Text is automatically centered, character by character, within shapes as you type it ● Text formatting controls allow you to over-ride the automatic formating where desired ● Lines are created by specifying the starting and ending points - the program automatically generates the route ● Powerful editing facilities allow shapes and even entire rows and columns of shapes to be inserted or deleted; lines are automatically re-routed as necessary ● Large chart size (up to 16 shapes wide by 16 shapes high) allows very large flowcharts and organization charts to be handled with ease ● Charts can be larger than the screen - the window into the chart scrolls both horizontally and vertically as necessary ● Flexible printer interface allows it to work with all

printers, not just dot matrix printers. Wide charts can be printed in strips Also works with Hewlett-Packard 7475A (and compatible) plotters ● Twenty standard flowcharting shapes included ● Common shapes supplied in three sizes ● Extensive manual (125 pages) includes many examples ● Context sensitive "help" facility provides immediate assistance at any time ● Any number of titles can be placed on a chart ● Commentary text blocks can be placed anywhere in the chart ● Fast: written in 8088 assembler ● Plus many more features than we can mention here.

Requires at least 256K memory, DOS-2 or higher and an IBM or Hercules compatible graphics card.

Order direct for only **$149.95** + $2.00 S&H (USA/Canada), $10.00 (foreign). Payment by MO, check, VISA, COD or Company PO. Rush orders accepted ($15.00 S&H; USA/Canada only). Rush orders received by noon will be delivered the next business day (to most locations).

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

STATUS BAR (not to be confused with a wet bar) tells you what Interactive EasyFlow is doing at all times.

CHART WINDOW gives an overview of your chart; this example shows the "normal" view. "Close-up" view shows a smaller part of the chart in more detail. "Wide-angle" view shows a larger part of the chart at reduced size.

TEXT/MESSAGE WINDOW used to enter user text and to display messages from Interactive EasyFlow.

CURRENT SHAPE WINDOW - shows the content of the current flowchart shape (the one under the SHAPE CURSOR) in complete detail.



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SHAPE CURSOR shows where you are in the chart. Cursor keys move it around; chart window scrolls if you run off the edge of the window.

**Circle 489 on reader service card**

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John C. Dvorak

youth getting it "just right" with FatBits.

For the PC user with a business graphics program, the scenario is much the same: continuous experimentation with pie charts, bar charts, line charts, three-dimensional charts. Creation is a perpetual process of sizing, scaling, and exploding—and then tinkering with colors until the entire thing is perfect.

In the past most people hired a graphics professional to handle major presentations. Now the inclination is do it yourself—and waste endless hours while you're at it. Ironically, this monumental effort rarely yields perfect results. More often, the outcome is mediocre bordering on terrible.

Although spending a dollar to save a dime probably does underlie the overuse or misuse of computers, the real problem is surely the abysmal results of such efforts. Bad graphics are only the tip of the iceberg.

To illustrate just how deep the iceberg extends, consider the form letter obviously sent by computer. At first, the idea seemed inspired: produce mailbags full of apparently personal letters without the effort of creating each one individually. A good mail merge program provided the means, fusing a mailing list with boilerplate text to produce scads of personalized missives. In no time, however, this inspiration evolved into the mail merge/word processing syndrome. PC users got carried away and failed to keep things simple. Our

*(continues)*

# How does WordPerfect top 4.0? Extra credit.

**WordPerfect 4.1 Performance Report** *A +5 extra points*

**A** lot of people have been saying a lot of good things about WordPerfect, lately. In fact, our 4.0 version has been called the industry standard for word processing.

Of course, our first reaction was smiles all around (and a celebration or two). Our second reaction? Back to work on WordPerfect. Not because it isn't already a great program. But because the one thing that has made WordPerfect a success is our commitment to constant improvement. Reaching for perfection.

The latest result of that commitment is WordPerfect 4.1. And with several new features, it scores more than a few extra points.

## 1. Thesaurus

With a built-in thesaurus, WordPerfect 4.1 lets you choose synonyms for any words in your document.

## 2. Split Screen

By splitting the screen horizontally, you can view two documents at the same time. And editing either document or moving text between the two windows is fast and easy.

## 3. Text Columns

Columns are displayed side-by-side on the screen. In addition to newspaper-style columns, WordPerfect 4.1 includes parallel columns, ideal for scripts.

## 4. Line Drawing

Horizontal and vertical lines can be drawn and configured to form boxes or other graphic applications. Many available line styles include single, double and asterisks.

## 5. Sort

WordPerfect 4.1 allows you to sort lines, paragraphs or merge files alphabetically.

Other new WordPerfect 4.1 features include an expanded spelling dictionary, improved critical error handling, improved proportional spacing, three-level undelete, type-thru and more.
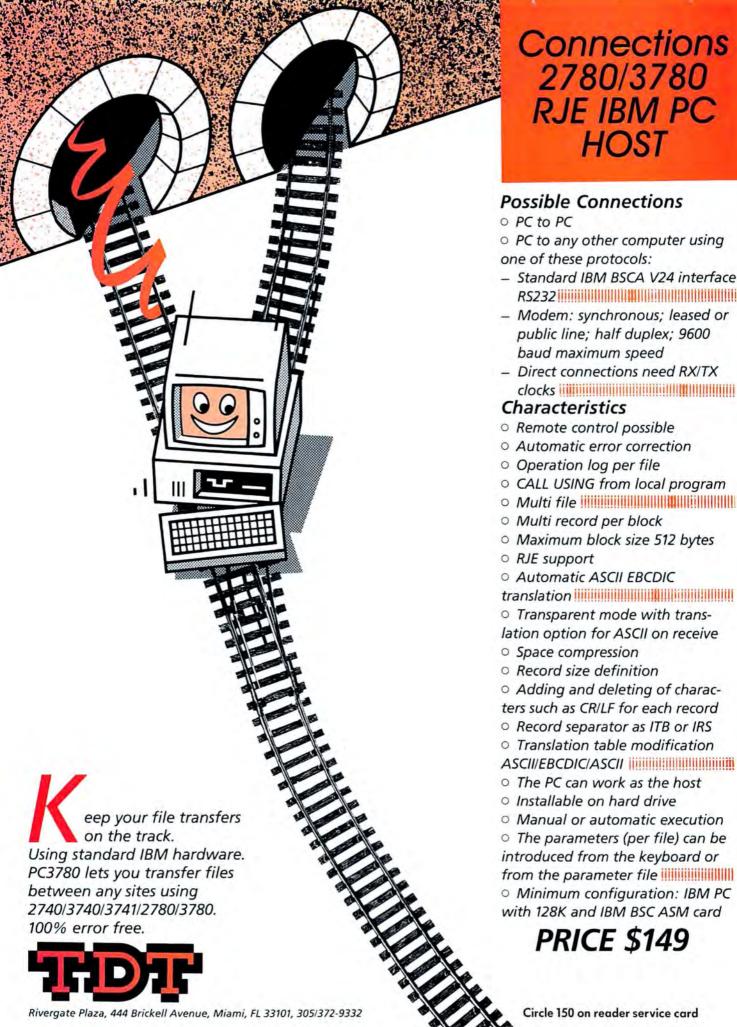
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MathPlan has a close relationship with the most praised word processing program on the market. Budgets, tables and graphs created with MathPlan move easily into WordPerfect documents. And text from WordPerfect moves into your worksheet with equal aplomb.

### MathPlan has graphics flexibility.

Sure, you get great graphics on a color monitor with MathPlan. But if you don't happen to have a color

monitor and don't want the extra expense, you'll appreciate MathPlan's ability to generate striking, clear graphs on a monochrome monitor with character graphics. Then print the graph right from the program.

### A few other things $495 won't buy.

MathPlan's virtual memory eliminates the annoying problem of running out of memory even though most of your spreadsheet is still empty. You'll actually be able to use more cells in MathPlan's spreadsheet than in one twice its size.

MathPlan's useful linking feature lets you connect two worksheets and exchange data between them easily and automatically.

When you set up your own models with MathPlan, you can also create your own help messages for cells in the model.

All in all, MathPlan is easy to use, cost-effective, powerful and fast.

So why should you pay twice as much for the leading spreadsheet when

you get a full measure of spreadsheet capabilities from MathPlan? Good question.

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intrepid users decide that because they only have to write it once they'll make the letter long and complex. The recipient wins a form letter that is doubly annoying: It's obviously mail-merged *and* it's lengthy—and, thus, is even more insulting than the mimeographed letter with the name typed at the top. Why bother with automation?
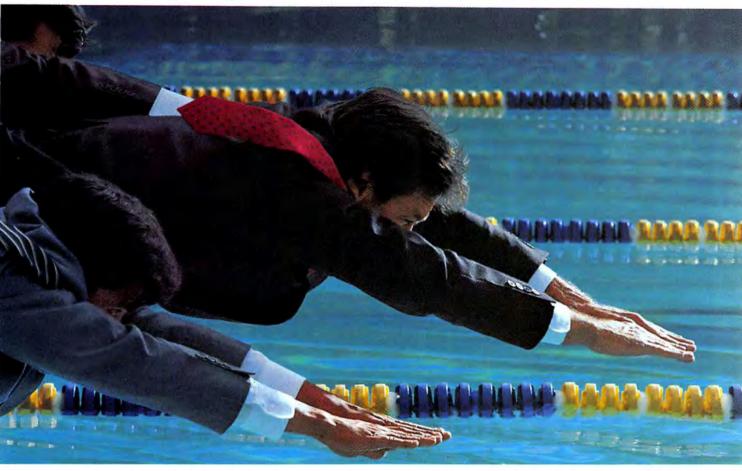
Even more lamentable is the nagging desire among some computer users to embrace every last feature of a mail merge system—like inserting your first or last name throughout the text. Let's face it, no truly personal letter reads, "Dear JIM, How are you today, JIM? Well, JIM, it's been a long time since we've talked. So I'll call you later, JIM. Until then, goodbye, JIM. Sincerely, Frank Lee Boring." So much for effective communication.

Other software genres offer their own variations on the theme of wasted effort. The software-based recipe filing system must be a time-devouring joke. Aside from the copious amount of data in a real cookbook that you can't stuff into a PC in any easy-to-use form, the cookbook is cheaper and more portable than a recipe program. What's the advantage of automating this information? The same holds true for a computer-based Rolodex. Who needs it?

We're increasingly in the throes of a new breed of counterproductive software: decision-making programs. Don't misunderstand; when it comes to a decision like

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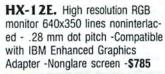
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buy-versus-lease where cash flow is involved, a computer can calculate alternatives nicely. But we've already seen decision-making software used to select the brand of coffee to feed the office percolator. Certainly users are relinquishing at least common sense when they turn to computers for such trivial decisions.

We must realize—and soon—that office PC use is on the verge of rendering white-collar workers helpless without the approval of their software. The individual's decision-making prowess will vanish as the apprehension grows that everything must be validated (repeatedly) with computer-generated rationale and reams of output.

Soon blue-collar workers will have computers at their disposal, and the same syndrome will plague them. The result of this abandonment of responsibility may well be the end of civilization as we know it.

Then again, I could be wrong. I have this program that will help determine the accuracy of my thesis. Let's see ... ●

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

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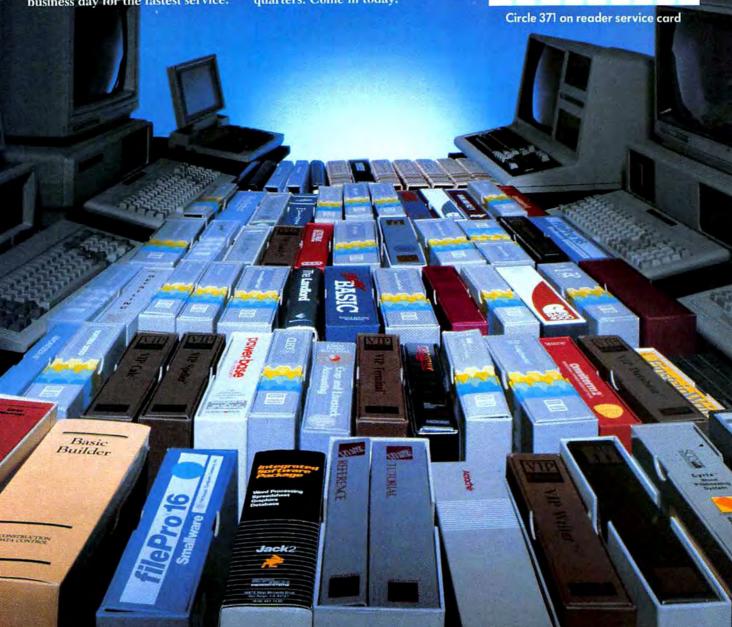
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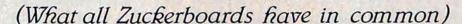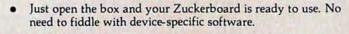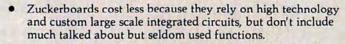
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**Circle 517 on reader service card**

# Letters

*Reactions and responses from the PC World community*

## Brave New Column

Three cheers for George Morrow's perceptive and brave column, *The Newest Oxymoron*, in the November 1985 issue. Morrow has once again performed a socially difficult but morally correct task by pointing out that the Emperor has no clothes. Without a doubt, computers are deterministic and humans are intuitive. Although pitchmen for "artificial intelligence" software claim a computer can infer like the human intellect, that is simply not true.

Natural language interfaces are not a boon to the computer-illiterate: They merely introduce uncertainty into the human-machine dialog. My software tools should be powerful, not independent. My hammer should be strong, simple, and well-balanced, but I don't want it to make assumptions about nails.

Labeling a medical diagnosis program "intelligent" is like calling a dictionary a poet. Just like its predecessors, *integrated* and *user-friendly, artificial intelligence* is this year's buzzword. The technology-hungry market is gullible enough to believe promises with little basis in practical fact.

Morrow's low opinion of programmers is legendary. His *Quotations From Chairman Morrow* includes this gem: "Anyone who trusts a programmer deserves what happens to him." It grieves me to think that people of the software persuasion might discount his cogent observations regarding artificial intelligence as those of a disgruntled hardware chauvinist. As a confirmed software guy who's been writing and selling business software since the days when George Morrow sold S-100 RAM boards, I offer my wholehearted support of his viewpoint: Anyone who trusts artificial intelligence software deserves what happens to them.

*Alan Cooper*
*Atherton, California*

## Never Say Never

I'm disappointed in George Morrow's editorial in the November issue. While his assessment of expert systems and natural language processing on personal computers is accurate, it makes a blanket condemnation of artificial intelligence. Artificial intelligence is a new field, and the tools for its development are just now being formulated. To condemn it on this basis is akin to denying the usefulness of computers because of the kinematics of abacus beads.

A more fundamental error is the assumption that artificial intelligence is a dead-end street and that machines can never think. Never mind that this conclusion was reached by an organic processor that is fundamentally no different than a silicon processor, or that this point has been argued repeatedly since the thirties and settled to the satisfaction of most computer science researchers.

Instead, I want to caution your readers on the danger of the it-can't-be-done attitude. Progress is never made by giving up before the starting gun goes off, and nothing is more defeating than a defeatist's attitude.

*Duane Vore*
*Springboro, Ohio*

*(continues)*

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Letters

## Desperately Seeking 2.0

There has been much ado about software pirating and its moral and legal ramifications, but what about the moral and legal ramifications of the following?

Microsoft licenses AT&T to sell *Microsoft Word 1.1* and *Multiplan 1.2* in AT&T packaging. However, when *Word 2.0* and *Multiplan 2.0* were issued, those of us who purchased the programs through AT&T were left holding a very large shaft.

Is Microsoft withholding the update from AT&T? Is AT&T withholding the update from the consumer?

Whatever the case, we are without, and numerous calls to AT&T since February 1985 have revealed that no one in AT&T knows what's going on. Calls to Microsoft resulted in a much more conclusive response—"It's not our problem."

So what are the alternatives? Pirate the software rather than pay $500 to buy the upgraded version? Or buy one of the many great integrated packages, which do much, much more for about the same price?

I opt for the latter. Even using a pirated copy would support a company that couldn't care less about my business.

*Clyde M. Crocker*
*Seattle, Washington*

*Microsoft's Greg Slyngstad, program manager for* Microsoft Word, *informs us that Microsoft has shipped its 2.0 updates for both* Word *and* Multiplan *to* AT&T.

*Apparently, the updates are securely stored somewhere inside AT&T's labyrinthine infrastructure. Our own circuitous journey through the telecommunication giant's corporate communications maze ended up at the technical hot line (800/922-0354), where a staff person revealed that AT&T is currently mailing notices to its* Word 1.1 *customers from "somewhere in Colorado" informing them how to obtain the 2.0 update. No phone number or price is available to the public. The Microsoft upgrade price tag to those who bought the retail version from Microsoft, however, is $50. Updates from AT&T, it seems, may come to those who wait. —Ed.*

## No Escape From Dissension

"Escape From the Second Dimension" in the November 1985 issue purported to examine three-dimensional spreadsheets, but it was not up to *PC World's* normally excellent standards.

Since October 1983, Schuchardt Software Systems has marketed a three-dimensional spreadsheet, *InteCalc,* which is currently used by IBM, the United States Air Force, and the state of California, among others. *InteCalc* has received favorable reviews in other computer publications. However, not only was the product completely omitted from the *PC World* article, but a number of products with limited claim to be either two- or three-dimensional spreadsheets were mysteriously included.

Additionally, the author of the article, Jeff Angus, is an employee

*(continues)*

of Boeing Computer Services—the developer of *BoeingCalc*. The article is in fact a story about *Boeing Calc*, not about the variety of three-dimensional spreadsheets available today, as implied.

Larry Strober
Executive Vice President
Schuchardt Software
    Systems, Inc.
San Rafael, California

*PC World "State of the Art" articles such as "Escape From the Second Dimension" report on advanced technologies or products just entering the personal computing marketplace. They are not intended to be evaluative product reviews or comprehensive listings.*

*We selected Angus, whose affiliation with Boeing Computer Services was clearly stated, to author the article because of his expertise in this subject area. —Ed.*

## No Reprise for Review
I was disappointed that *PC World* did not publish its *Annual Software Review* at the end of 1985 as it did in 1984 and 1983. Both volumes were excellent sources of PC software titles. With another year having rolled by, I'd again like to know what's available and what's new. Any suggestions on where to look?

Harry Heim
Novato, California

*Thanks for your kind words about our two previous efforts. For 1985, we felt that readers might want more than a product compendium. Accordingly, our December issue offered an in-depth look at the year in terms of a*

dozen categories, assessed coming trends in hardware and software, and topped this off with the designation of roughly 20 products as PC World pacesetters.

*Annual reviews may come and go, but the parade of PC products is virtually endless. For the latest information, check out the* IBM Software Directory, *published by Bowker; the* Guide to IBM PC Software, *published by Datapro/ McGraw Hill;* IBM PC Expansion and Software Guide, *published by Que;* The Software Catalog, *published by Elsevier;* IBM Personal Computer & XT/The Software Guide, *published by Micro Information Publishing; and* The Book of IBM Software 1985, *published by Arrays.*

*Even more immediate information is available from Direct-Net's on-line data base of over 5000 hardware and software products. Call Direct-Net at 800/223-0822 (800/824-5526 in Cailfornia). —Ed.*

## Ads Infinitum
C'mon now. I know *PC World* needs to make money, but why not give your readers a little consideration? In the October 1985 issue of *PC World* I clipped over 200 pages of advertising, which left approximately 140 pages of editorial text remaining. In a magazine that averages 375 pages, it is difficult to stay interested in articles that string across so many pages.

Greg Weismantel
St. Charles, Illinois

*(continues)*

*The sobering economic reality of magazine publishing is that ads finance editorial. But along with an increase in the number of ad pages this past year, PC World has augmented its editorial output. We also see ads as a source of product information for users.*

*We hope readers (especially those with the patience to count ad pages) will grin and bear the few seconds it takes to flip through the pages when our writing proves worthy. —Ed.*

### Product Update

MIDI-minded readers can save the cost of a phone call: Inquiries about Noteworthy Systems' PC to MIDI Card, discussed in "MIDI: The Music Interface" (*PCW*, October 1985), can be sent to Gentle Electric, P.O. Box 132, Delta, CO 81416, 303/874-8054.

Toshiba P351 owners seeking *Paperscreen* for Epson emulation ("Dot Matrix Triple Play," *PCW*, November 1985) can obtain the utility from M.A.P Systems, 1120 Nasa Rd. One #415, Houston, TX 77058, 713/333-9640.

Information about *Boeing Calc* ("Escape From the Second Dimension," *PCW*, November 1985) is available from Boeing Computer Services, whose phone number is 800/551-0800.

*Letters should be mailed to Letters, PC World, 555 De Haro St., San Francisco, CA 94107, or sent electronically to MCI Mail PCWORLD, CompuServe 74055,412, The Source STE908, or Direct-Net 500. We reserve the right to edit letters. Letters should not exceed 300 words.* ●

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And you'll be able to enter programs without typing a single line.

There is also software for you to generate your own strips. Letting you send everything from correspondence to business information using our new technology.

BASIC Business Subroutines

Soon everyone will be stripping as data strips appear in popular magazines, computer books and text books.

Find out how much you can reveal by stripping. Just take this ad to your computer dealer for a demonstration of the Cauzin Softstrip System Reader.

Or for more information and the name of the dealer nearest you, call Cauzin at 1-800-533-7323. In Connecticut, call 573-0150.

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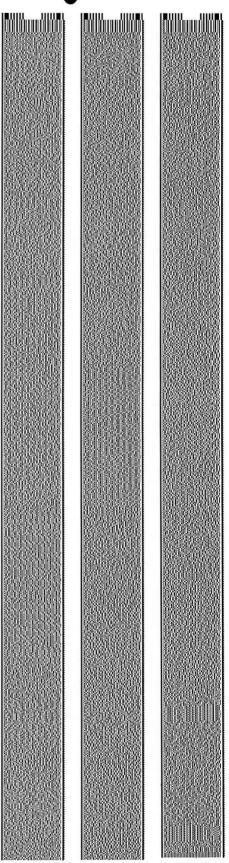
# A GAME THAT'S OFF THE WALLS

The data strips on the right contain a program called RICOCHET which is brought to you by Peter Rice of Athens, Georgia. It's a game that challenges your skill, patience, and IBM Graphics Adapter.

Peter has given you the choice of constructing a polygonal boundary within which the game will be played, or allowing the computer to do it for you. When the boundary is completed, a gun and four targets will appear. You shoot the gun and the bullet ricochets off the boundary until it quits, hits something, or hits the gun. Use the left and right arrows to rotate the gun and F10 to fire. When the SHIFT key is held down, the gun rotates faster, and even faster still when the CTRL key is held down.

Read the strips into your computer and then enter BASIC to RUN the program. If you choose to create your own boundary, use the F1 key and four arrow keys to move the dot of light a short distance. Press F1 again and a line will appear. Keep moving the dot to create the polygon, and be sure the lines do not enter the shaded area.

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# F O R E V E R

# On the Eve of a Revolution?

*For small businesses, the new anthem is: Don't hesitate, automate.*

Small businesses around the country stand poised on the threshold of the personal computer age. Apprehensive about automating, but fearful of being left in the dust by their more aggressive competitors, owners of small businesses are ready to uncork a major—and long delayed—investment in PCs.

That's the primary conclusion of a recent Pacific Bell survey of more than 500 small businesses in

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. —Ken Greenberg*
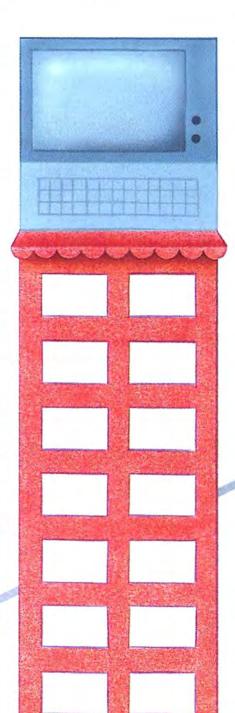
California. The San Francisco-based telephone company found that among businesses with fewer than 100 employees, 58 percent either own a computer or plan to buy one in the next three years.

Pacific Bell sponsored the survey to better plan its future network services for the state's 535,000 small businesses, according to John Lockton, the firm's executive vice president of marketing.

According to the survey, the pace of automation is picking up. Among computer-equipped companies, 62 percent bought their machines within the last two years. Computers pack special appeal for rapidly growing concerns: PCs have found a home within some 41 percent of firms that show five or more years of steadily rising revenues. Less successful ventures have been more tentative about automating—PCs are used in 22 percent of small companies with flat sales and just 15 percent of firms with declining revenues.

Small businesses report that doing the books is the key impetus to automating. Of the firms with computers, 65 percent use them for accounting, 27 percent for administration, 18 percent for sales and marketing, 13 percent for purchasing/inventory control, and 13 percent for finance.
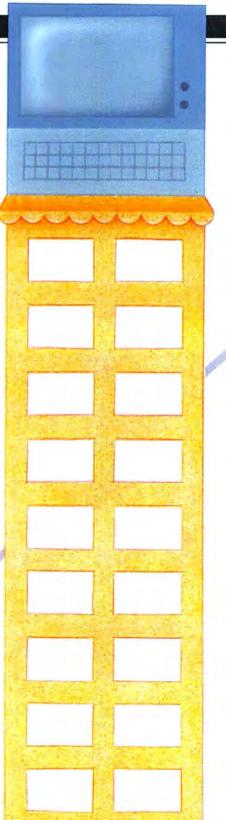
Not surprisingly, once they finally overcome their trepidation and purchase a PC, owners and managers of small businesses wonder how they ever managed without one. A partner in a small advertising agency, for example, says that his computer has slashed the time spent estimating jobs from as much as an hour to as little as 5 minutes. In addition to reducing paperwork errors, the PC has wowed clients by enabling the agency to pull up data in seconds. "We've obtained jobs I'm sure we wouldn't have otherwise," says the partner.

Small businesses still have much to learn about the applications and permutations of personal computers. Among those firms with PCs, 49 percent already own or plan to buy a modem within the next few years. But within the sample as a whole, 37 percent have no idea what a modem is, 23 percent are unfamiliar with electronic mail, and 22 percent cannot define remote data base access. Among the 35 percent of small firms that already own a PC, only 8 percent access remote data bases and just 13 percent transmit data—which makes their robust interest in telecommunications hardware a bit hard to fathom.
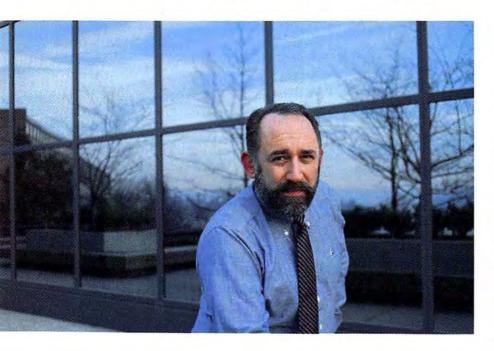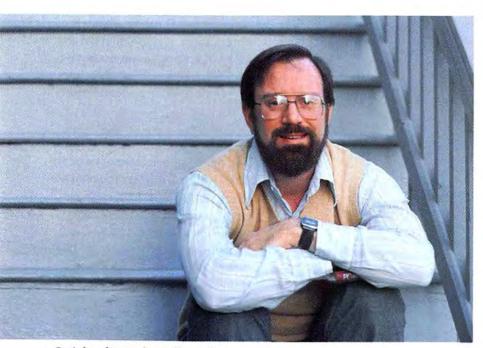
Telecommunications may well be growing by word of mouth. The general manager of an import firm, for instance, is banking on PC communications to increase profitability. He says that his PC has already reduced order processing time by 80 percent and expects to save up to four days on inquiries to overseas suppliers when he eventually goes on line.

(This infatuation with personal computing apparently hasn't yet taken hold in the boardrooms of big business. A recent Arthur Young study suggests that the majority of corporate top brass eschew PCs, opting instead for the telephone as their principal productivity tool.)

Small business should provide hardware and software firms with a rich lode of consumers, virtually all of whom will enter the computer market with high expectations. A mere 6 percent of the sample doubted computers could increase their efficiency or productivity. And a whopping 80 percent dismissed concerns about a possible negative side to automation— a cheery score the industry can surely hum all the way to Wall Street. *–John Eckhouse*

# Shareware Grows Up



*The vicissitudes of commerce are moving some programs out of the public domain.*

Shareware—an idea that emerged in the personal computer industry's youth as a marketing experiment and an exercise in good faith—has proven a success beyond all expectations. For the three top shareware vendors in today's maturing market, the honor system approach to software distribution has outgrown its cottage-industry trappings.

To varying degrees, these vendors are going commercial, and others may follow suit. Two authors—Jim Button with *PC-File* and Bob Wallace with *PC-Write*—have already taken the plunge. Patricia Fluegelman is preparing a release of her late husband Andrew's *PC-Talk*. For *PC-Talk* and *PC-File*, the move to retail shelves is evolutionary; both products will appear commercially as new versions, notably different from their shareware incarnations.

All three products made innocuous debuts on bulletin boards, serving as alternatives to high-priced commercial—and often buggy and poorly supported—application and utility software. Eschewing splashy ads and copy protection (policies that persist to this day), shareware authors offered their handiwork to anyone and everyone, asking only that



Quicksoft's Bob Wallace (bottom) is gently introducing PC-Write to the commercial marketplace. For Buttonware's Jim Button, it's full speed ahead.

customers send a small fee if satisfied. Payment brought bound manuals, telephone support, and software updates. Shareware has always been a two-way street; because users were encouraged to copy and distribute programs, user involvement has invariably led to user-instigated program improvements.

Shareware has grown largely via the grapevine, and distribution quickly encompassed mail order as well as bulletin boards. Precise figures on the size of the shareware business remain elusive, although most shareware authors agree these three firms have the market cornered. Jim Button estimates 1985 revenues of Buttonware, his company, at $1.5 million, a figure he suggests is roughly half the potential market. Wallace's Quicksoft and Fluegelman's Headlands Communications reportedly take in about half that amount each. Button counts some 25,000 registered *PC-File* users—a total appreciably below the number of actual copies in use, according to the shareware maven.

Going commercial with an inexpensive product isn't necessarily a simple matter, as Adam Osborne and Philippe Kahn can attest. After all, there's little incentive for a retailer to push a $70 word processor when margins are substantially higher on a $250 product. Noting that the retail entry point
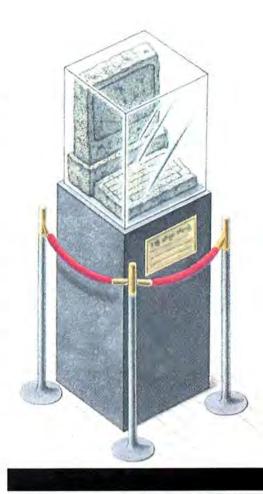
is about $150, Button priced his commercial offering at $149 and dubbed the product *PC-File/R*. This beefier package consists of a relational data manager, a word processor, a mail merge feature, and a pop-up help facility. Current *PC-File* users can upgrade to *PC-File/R* for $99. Buttonware also markets a spreadsheet and a word processor on the cheap.

Retail sales now contribute 5 percent to the bottom line of Wallace's Quicksoft, and the company is registering about 120 users a week. Retailers are bundling *PC-Write* with PCs as well as selling the program for a nominal $10 fee. Registering with Quicksoft runs an additional $75 and entitles users to free upgrades.

With the release of *PC-Talk III* in early 1983, the communications package from freeware pioneer Andrew Fluegelman outsold every other PC communications program but *Crosstalk XVI* and *Smartcom II*. Registered *PC-Talk* owners can step up to *PC-Talk 4*— a substantially different package— for a small fee, but the new iteration of *PC-Talk* is principally a retail item and will carry a price tag just under $100. The program adds a macro language and the ability to manipulate files during a communications session.

There's every indication that even as these stalwarts of simpler times enter a complex new ball game, they'll remain faithful to their origins. —*Christine McGeever*



## PCs as Museum Pieces

Quietly, almost unobtrusively, personal computers have become entrenched in our lives. They may at times befuddle or bewilder us, but for an ever greater number of tasks, they have become indispensable.

Now, the Smithsonian Institution is preparing to step back and assess the impact of today's technological artifacts. The nation's premier museum is planning a 12,000-square-foot exhibition entitled "The Information Revolution." The display, to be housed in the National Museum of American History on the mall in Washington, D.C., will be quadruple the size of the current computer exhibit. A quarter of that space

*(continues)*

# Love at First Byte

Manufacturers of PC compatibles who've been jilted by the market may do well to turn from Chapter 11 to the pages of Bram Stoker. Like his legendary count, the Gavilan Mobile Computer and the Otrona 2001 have risen from the crypt to again wander the world.

In 1983 Gavilan was a promising trailblazer among a pack of laptop computer manufacturers, but was diverted into bankruptcy court when design flaws and manufacturing delays disrupted ship dates. Financially strapped, the company faded into oblivion in November 1984.

## PCs as Museum Pieces
*(continued)*

will be devoted to post-1972 developments—what museum officials call the era of "computers for everyone."

The Smithsonian is clearly smitten with high tech. Institution secretary Robert McC. Adams terms the information revolution "the dominant achievement and characteristic of our lives." Workstations will dot the exhibition, making hands-on participation integral to the display. Primary exhibition areas will be linked via a "Techwalk"—space devoted to in-depth analysis of ideas and instrumentation. The Information Revolution, which will be partially underwritten by a $4.3 million fund-raising effort, opens in 1989.

Or so it seemed. A public auction to dispose of remaining inventory—which included production versions of the portable, along with parts and accessories—attracted interested vendors, ex-Gavilan employees, and bargainhunters. From this nucleus of diehards emerged a network of Gavilan aficionados that eventually dubbed itself the Gavilan Users Group (GUG).

Under the watchful eye of one Robert Brown, the group has literally resurrected the doomed machine, using spare parts to build new units—and using initiative and commitment to give the once-phantom portable a global presence. The 10-pound Gavilan Computer with a 16-line liquid crystal display and two 3½-inch floppy disk drives runs $800. According to Brown, 1500 Gavilans are in use from China and the USSR to Latin America. GUG maintains 12 branches in the United States.

Woes about PC incompatibility are minimal. The club is steadily amassing a software library as members copy new DOS applications to 3½-inch media and patch programs for Gavilan compatibility. Several Silicon Valley vendors sell and support the revived machine, and ailing Gavilans receive care at an official repair service in the San Jose area.

Assuming no well-heeled angel underwrites the new machine,

Brown predicts the Gavilan can hang on another seven years before exhausting the supply of spare parts. He encourages Gavilan owners to contact him through GUG (780 Manx Ave., Campbell, CA 95008, 408/379-2774).

What drives him to lead the Gavilan crusade? Says Brown, "I bought one."

Devotees of the similarly star-crossed Otrona 2001 can expect that machine to endure at least into the next millennium—providing they live in Asia. Accent Technology of Kuala Lumpur, Malaysia, has acquired manufacturing rights to the Otrona, which was developed by Lingemann Designs of Boulder, Colorado, and enjoyed a brief fling with government purchasing agents until the ax fell in 1984. Accent acquired rights to the Otrona line for $400,000, then invested another $2.5 million in design refinements.

Accent is part of the Melewar Corporation, which is backed by the Negri Sembilan royal family. The company will rename the Otrona the Accent 2001, a machine general manager Rene Michael Teo calls "Malaysian high-tech with an American accent."
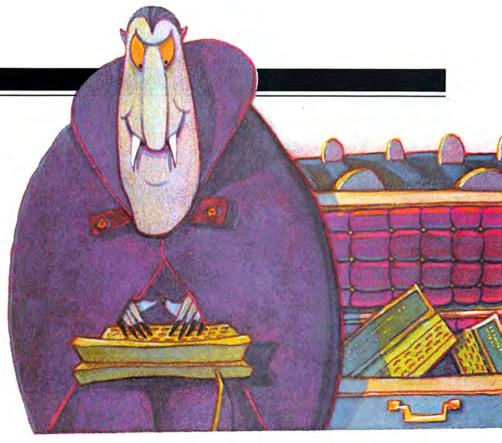
The 2001 was regarded as a "convertible compatible," owing to its hybrid transportable/desktop design. The 18-pound unit will be assembled entirely in Malaysia. "We'll sell the machine to ASEAN countries [Malaysia, Singapore, Philippines, Indonesia, Brunei, and

Thailand] and Hong Kong, where we can be competitive," Teo says.

The Malaysian plant will turn out 5000 units annually—with a little help from the Malaysian government, preferential tax treatment in ASEAN countries, and assistance from designer Ron Lingemann himself.

So friends and neighbors of compatibles past, take heart—that eerie rattling in the night may be your machine coming back from the dead. —*Sally Adamson Taylor and Wes Nihei*

## Move Over, Dr. Ruth

You certainly can't say PCs are indifferent to human concerns. *IntraCourse*, a new package that bills itself as a "computer program for sex," seems intent on proving just how personal computers can get.

Hovering somewhere between a parlor game and a behavioral analysis tool, *IntraCourse* invites you to explore your sexual makeup and your compatibility with the opposite sex, then compare your findings with statistical norms.

Designed by a team of programmers, graphic artists, and clinical psychologists, *IntraCourse* is built around a question-and-answer format; it adjusts its line of inquiry to your responses. According to IntraCorp, publisher of this sizzling new package, the program is endowed with an artificial intelligence component that puts the odds of two people deriving the same analysis at a billion to one. While couples are encouraged to use the software to see if they're simpatico, the company also promotes the product for lighthearted "group or game situations."

Like a financial model, *IntraCourse*'s analysis of sexual relationships enables you to compare the ideal with the real, yielding a "relationship disparity" quotient. Other measures in this sexual spreadsheet evaluate attractions, sensuality/awareness, sexual personality, and sexual behavior patterns. Although *IntraCourse* prescribes remedial action for some sexual dysfunctions, the program is humble enough to suggest that in certain situations you would do well to consult a real live therapist.

*IntraCourse* is enthusiastically endorsed by the queen of pop psychology, Dr. Joyce Brothers, who assures prospective buyers that the product can provide an "easy-to-read, informative, and often surprising synopsis of the user's personality." IntraCorp also promises a comprehensive sexual dictionary, password protection of sensitive data, and bar graphs comparing your sexuality with that of the rest of the world. If you're still feeling tentative, you'll be glad to learn that the product has been extensively tested.... —*Miriam Medom*

# The PC of Galilee

In his book *Engines of the Mind*, science writer Joel Shurkin notes that if necessity is the mother of invention, then war is its grandmother. That surely applies in Israel, where military needs have spurred development of a sophisticated data management program that can be mastered by any user, working alone, in less than a day.

The program, known as *Iris*, is new on the data management market, but it's managed to win over a few thousand users in Israel and Europe. Tests performed by the Israeli Ministry of Defense show *Iris* to be more than a match for *dBASE II* and *Condor*.

*Iris* is menu-driven, offers a programming language, and can hold up to 32,650 records in one file with a maximum record length of 2800 characters and a maximum of 79 fields in one record. Like a refugee from the Tower of Babel, *Iris* converses in English, French, German, and Hebrew, among other languages.

*Iris*'s do-it-yourself quality has proven a boon to the Israel Defense Forces. The IDF has put *Iris* through its paces in the field—often entrusting the program to technically unskilled troops, many of whom are recent immigrants from North Africa.

Software isn't the lone Israeli contribution to the computer business. With the introduction of the Teri, an 8086-based PC compatible, Israeli industry has entered the hardware market. Here too, the demands of defense have shaped the product.

The Teri is a completely integrated unit, featuring a built-in dot matrix printer, a clock/calendar, a modem, and TTY emulation, as well as dual floppy disk drives and a security card activator. The machine comes with 192K and a 12-inch monitor that can be collapsed into the system unit when not in use. The Teri lists for $3600.

Although assembled entirely in Israel, the Teri was developed by an American group operating in that country. Like machines "made in America," roughly half the components are imported.
*—Marina Hirsch*

# Big Blue's News

1985 came and went without a new PC from IBM (unless you're counting the System/36 PC–hardly a machine for the masses–or various terminal-oriented permutations of the AT). Right?

Wrong. True, Entry Systems Division was mum, but IBM/Japan had a few well-chosen words. The Japanese group designed, manufactured, and introduced the JX—a sleek, coal-black machine that certainly doesn't look Big Bluish.

The JX is currently starring in double-page ads in the *Far Eastern Economic Review* with the tag line, "so advanced, it's the most affordable IBM personal computer of them all." Indeed; in Singapore $1440 buys a model with 64K and a high-resolution color monitor.

The machine's slim system unit houses an 8088 CPU and two 3½-inch floppy disk drives. IBM is offering bilingual (Japanese-English) and English-only versions of the unit; the latter includes a 1-megabit ROM chip. Ed Nanas, IBM's Tokyo communications director, describes the JX's market only as "business and education."

If you'd like a look at the JX, book passage to Japan, Singapore, Hong Kong, Malaysia, Australia, or New Zealand. While supplies last. *—Sally Adamson Taylor*

*John Eckhouse is a business and technology reporter for the* San Francisco Chronicle; *Sally Adamson Taylor writes on technology from the Far East; Marina Hirsch is a writer for Autodesk, Inc.; Christine McGeever is an Assistant Editor for PC World; Wes Nihei is the magazine's Editorial Assistant; and Miriam Medom continues her crusade to keep software honest.* ◓

# TODAY IS THE BLACKEST DAY IN DOT MATRIX PRINTER HISTORY.

It would pay you to mark it on your calendar.

Because today is the day we introduce our new Pinwriter™ P5XL dot matrix printer. The only dot matrix printer available capable of producing the rich, black printing you associate with a letter-quality printer. Because it's the only one designed to use a multi-strike film ribbon—the same ribbon used in typewriters and letter-quality printers.

> **A LITTLE BLACK MAGIC.**
>
> Actual line printed with the Pinwriter P5XL printer.

Black letter-quality printing is only the beginning. The Pinwriter P5XL printer can also use an optional ribbon to print in seven other colors. And it has the finest graphics resolution of any impact printer you can buy. Plus it's very fast and exceptionally quiet.
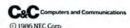
It's only natural that the first dot matrix printer with true letter-quality printing should be an NEC. After all we make Spinwriter® letter-quality printers, the most popular line today, as well as the Pinwriter P5 dot matrix printer, the most advanced 24-pin printer.

The Pinwriter P5XL printer is part of the most extensive line of 24-pin printers available. You'll find a model designed to fit every need and budget. See them at your dealer or call 1-800-343-4418 (in MA 617-264-8635). Or write: NEC Information Systems, Dept. 1610, 1414 Massachusetts Ave., Boxborough, MA 01719.

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

**NEC**

NEC Information Systems, Inc.

**C&C** Computers and Communications

© 1986 NEC Corp.

Circle 124 on reader service card

# HOW TO MAKE A GREAT IMPRESSION AT THE OFFICE

# With the Hewlett-Packard LaserJet Printer.

# 1986 World Class PC Contest

In the fourth annual World Class PC contest, *PC World* invites you to vote for your favorite hardware and software products—and become eligible to win valuable prizes.

*Christine Whyte*

The trumpets have sounded to herald a by now familiar springtime ritual—the annual World Class PC contest. Honoring the democratic way, *PC World* presents readers with a unique opportunity to exercise the right to vote—don't miss this chance to tell us your favorite products by filling out the enclosed entry form. In each category you are familiar with, vote for one product you would recommend for outstanding performance and value.

The election results will be announced in *PC World*'s October issue. The leading vote-getter in each category will be designated a World Class Winner, and the most acclaimed runners-up will be listed to share in the glory. Scrutiny of past contest results reveals that this contest is not merely a popularity poll but a trusty barometer of industry trends.

And now for the icing on the cake. By simply sharing your opinion and paying for a stamp, you put your entry in the hat for the random drawing that will award the World Class products to three lucky readers, also to be announced in October. The first-prize winner will become the proud owner of an entire World Class PC system, worth approximately $30,000. This system will comprise the readers' most esteemed desktop computer plus the most popular product in each of 33 hardware and software categories. Second prize will be the readers' choice of the best transportable computer (designed to be portable but bigger than lap-size), and third prize will be the winning lap-size computer. All computers must be PC compatible.

*PC World* thanks everyone who takes the time to vote in the contest. The results not only provide valuable guidelines to readers' interests but also are an accolade for the winning products.

Product categories that are not self-explanatory are defined here to help you in casting your votes.

*Alternative Mass Storage*  With the exception of hard disk drives, includes all types of mass storage such as removable cartridges, tape backup units, optical disk drives, and bubble memory.

*Printer–Dot Matrix/NLQ*
Provides dot matrix (draft) mode, or combines dot matrix and near letter quality (NLQ) print modes.

*Printer–Other* Includes laser, ink jet, and letter quality (daisy wheel) printers.

*Graphics Board* Monochrome and color graphics boards may receive votes.

*Memory Expansion Board* Provides additional memory (RAM) and may also provide other features such as a clock/calendar, parallel port, or serial port.

*Local Area Network* The only category that will not be awarded as part of the World Class PC system. We include it on the ballot to find out how many of our readers are familiar with LANs and to discover their preferences.

*Outline Processing* Primarily organizes ideas and notes in an outline form.

*Data Management and File Management* The first type includes the more powerful, typically relational data base programs that feature large record capacity, sophisticated report writers, and command languages. File management programs–those that function like index cards– operate on only one file at a time and are often used for mailing list maintenance.

*Communications and Micro-to-Mainframe Communications* The first group includes general communications programs for using electronic mail, bulletin boards, and information services. Programs in the latter group are

designed for terminal emulation and data conversion.

*Graphics–Business and CAD* Business graphics programs are used for business presentations and usually produce several types of charts. CAD (computer-aided design) programs are used for drafting and modeling work in design, engineering, and architectural applications.

*Integrated* Includes several applications, such as word processing, spreadsheet, graphics, and data management, that share a command structure and data. The applications may be on one disk or in separate modules.

*Applications Integrator* An operating system extension–often called an operating or windowing environment–that integrates any number of off-the-shelf application programs.

*Project Management* Manages resources and scheduling of projects and tasks.

*Investment* Performs portfolio management, technical and fundamental analysis, and stock information retrieval.

*Financial Modeling* Creates and analyzes complex financial models and may include a spreadsheet, a goal-seeking function, tax tables, depreciation schedules, a regression analysis function, and a programming language.

*Training and Education* Training programs provide tutorials on such subjects as typing and on PC applications–for example, word processing and spreadsheets. Education programs teach classroom subjects such as math or prepare students for college entrance tests.

*Desktop Management* Duplicates the functions of such accessories as a Rolodex, a notepad, a calculator, a calendar, and an appointment scheduler.

*Utilities* Programs that perform a wide variety of functions not typically provided by the operating system, such as keyboard enhancement, file conversion, file recovery, program development, disk emulation, and printer support.

*Personal Management* Manages personal finances, keeps household records, and organizes personal data.

*Most Promising Newcomer* Which recent arrivals–in both hardware and software–are making a splash? For purposes of this category, "recent" is any product released within the preceding six months. You may vote for a product you've cited in another classification.

*Contest Rules* Each person may enter the contest only once. Entries must be printed by hand or typed on the form included in *PC World* or on a reasonable facsimile of that form. Employees of product manufacturers are eligible to vote for any products other than those sold by their company. Your entry must include your product votes and your name, address, and daytime phone number. Entries must be postmarked no later than April 15, 1986. Employees of PC World Communications, Inc., and CW Communications, Inc., are not eligible. Please tape the form closed; do NOT staple the form. Thank you and good luck! ☰

# 1986 World Class Entry Form
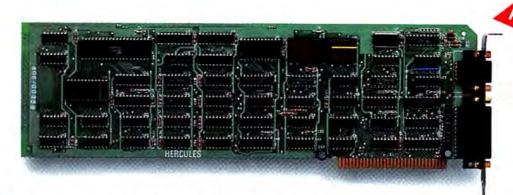
Dear Reader: Please use this entry form to vote for products you are familiar with and would recommend, based on their performance and value. Choose one product per category; it is not necessary to vote in all categories. Eligible products must be IBM PC compatible and commercially available as of March 1, 1986. Note: To ensure accuracy, a vote will not be counted unless the following three items are provided: (1) correct product name, (2) manufacturer name, and (3) model number (for hardware only). Please print or type your entry and submit it by April 15, 1986.

Name _____

Company _____

Address _____

City _____ State _____

Zip _____ Phone _____

## Hardware

| | Manufacturer | Product | Model |
|---|---|---|---|
| Desktop Computer (first prize) | | | |
| Transportable Computer (second prize) | | | |
| Lap-Size Computer (third prize) | | | |
| Color Monitor | | | |
| Hard Disk Drive | | | |
| Alternative Mass Storage | | | |
| Printer—Dot Matrix/NLQ | | | |
| Printer—Other | | | |
| Plotter | | | |
| Modem | | | |
| Graphics Board | | | |
| Memory Expansion Board | | | |
| Input Device | | | |
| Local Area Network | | | |
| Most Promising Newcomer | | | |

## Software

| | Manufacturer | Product |
|---|---|---|
| Spreadsheet | | |
| Word Processing | | |
| Outline Processing | | |
| Data Management | | |
| File Management | | |
| Communications | | |
| Micro-to-Mainframe Communications | | |
| Graphics—Business | | |
| Graphics—CAD | | |
| Integrated | | |
| Applications Integrator | | |
| Accounting | | |
| Project Management | | |
| Investment | | |
| Tax Planning or Preparation | | |
| Financial Modeling | | |
| Training | | |
| Education | | |
| Desktop Management | | |
| Utilities | | |
| Personal Management | | |
| Game | | |
| Programming Language | | |
| Most Promising Newcomer | | |

# 1986 World Class PC Entry Form

Place
Stamp
Here

**1986 World Class PC Entry Form**
PC World
555 De Haro St.
San Francisco, CA 94107

# The New
# Tandy 3000

## The difference is power
## ...and affordability.

Introducing the Tandy 3000 personal computer, the affordable alternative to the IBM® PC/AT. Here's the power you need to manage your business, either alone, or in a multiuser system.

### Unmatched compatibility

The Tandy 3000 uses the advanced MS-DOS 3.1 operating system. And since the Tandy 3000 is compatible with programs designed for the PC/AT, as well as the PC/XT, it cuts through today's software confusion. Choose from literally thousands of powerful applications.

### Power to share

The Tandy 3000 is designed to use the forthcoming XENIX 5.0 multiuser operating system. Two to six people in an office can share the

3000's high speed and storage simultaneously from low-cost data terminals. The Tandy 3000 is the total solution to office performance.

### High-performance design

The Tandy 3000 (25-4001, $2599) operates at twice the speed of the industry standard, has 512K of main memory (expandable to 640K on the main board), a high-capacity floppy disk drive, a serial/parallel adapter and ten expansion slots.

Or choose the Tandy 3000 HD (25-4010, $3599) with a built-in 20-megabyte hard disk drive for fast access to volumes of data.

The Tandy 3000 has the power to put you in command! Ask for a demonstration at your nearest Radio Shack Computer Center.

**Circle 351 on reader service card**

# The Help Screen

## PC World offers answers and advice at every level

::::::::::::::::::::::::::::

This month: keeping the contents of RAM alive when the PC is off, consolidating noncontiguous files, executing BASIC applications directly from DOS, seeing the light (pen), and more

*Karl Koessel*

---

*Battery-Powered RAM*
Q. *Having worked with a battery-operated laptop computer for the past few years, I appreciate its ability to retain programs and files in memory when the machine is off. This capability also eliminates the possibility of losing data due to an AC power failure (even when the machine is powered via its AC adapter).*

*Why isn't this RAM retention feature found in desktop personal computers? It probably wouldn't cost more than a few dollars to install a small nickel-cadmium battery and the necessary circuitry to keep the computer's RAM active overnight or during a brief power outage. Such a capacity would eliminate the need to restart the computer from disk every time it's turned on.*

Robert D. Gillette
Cincinnati, Ohio

A. Although adding a small battery and the appropriate connections to a desktop's RAM would indeed be cheap, doing so would not supply enough power to energize the larger machine's memory. RAM chips used in battery-powered portables differ from those in desktop PCs. Laptops use CMOS (complementary metal oxide semiconductor) RAM chips, whose appetite for power is meager but whose price tag is steep. The NMOS (negative-channel metal oxide semiconductor) chips in desktops are power-hungry but don't cost much and are generally much faster than CMOS chips. Manufacturers of full-size PCs rely on NMOS RAM chips to keep prices low.

It is possible, however, to retain data in a desktop PC's NMOS memory while the machine is off if the chips are supplied enough power. This can be accomplished with a RAM board powered by its own AC line. (I don't recommend storing data that hasn't been backed up in this RAM; AC-backed RAM will lose its contents if power fails.) Tecmar recently announced an AC-powered NMOS board for PCs, XTs, and compatibles. Known as MegaFunction, the product sports a serial port, a parallel port, a clock/calendar, and 1.25MB of RAM compatible with the Lotus/Intel/Microsoft Expanded Memory Specification, plus a connector for a 2MB daughterboard. You can park programs in a RAM disk (Tecmar includes RAM-disk software with the board) and know that they'll remain there when the PC is turned off (assuming, of course, that the MegaFunction's separate power line remains on).
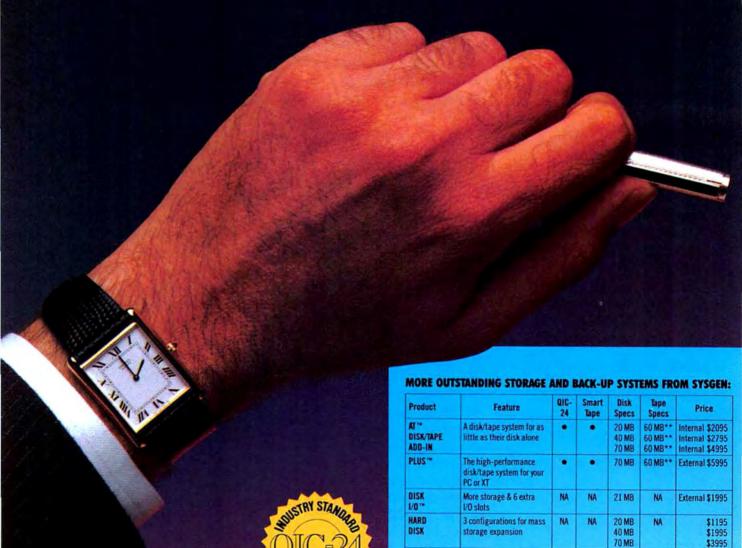
Similarly, Thesys offers Fastfile, a 5.4-inch by 9.7-inch by 12.4-inch AC-powered desktop unit that connects to the PC via the supplied expansion board and cable. Fastfile contains 5MB of NMOS RAM with error detection, error correction, its own uninterruptable (battery-backed) power supply, and a fan. Although it's a good buy at $2900, I understand that Thesys will be replacing the 5MB model with a 20MB version for the same price.

*Fastfile*
*Thesys Memory Products Corp.*
*7345 E. Acoma Dr.*
*Scottsdale, AZ 85260*
*602/991-7356*
*List price: $2900*
*Requirements: DOS 2.00 or later version*

MegaFunction
Tecmar
6225 Cochran Rd.
Solon, OH 44139-3377
216/349-0600
List price: $895
Requirements: IBM PC, XT, or
  compatible, one disk drive,
  DOS 2.00 or later version

### Fixing Fragmented Files

Q. *While using a popular utility
program to explore the hidden re-
cesses of my XT's hard disk, I dis-
covered that my data manage-
ment program's executable (.EXE)
file occupies 36 clusters but is dis-
persed across 11 separate areas of
the disk. In addition, one data file*
*that takes up 43 clusters is broken
into 24 pieces.*

*Is it advisable to consolidate
these files into contiguous clusters
to reduce both disk read time and
wear on the disk's read/write head
mechanism? The only obvious
way of doing so involves copying
each directory to floppies (which
will require a few boxes of disks),
reformatting the hard disk, re-
creating the directory structure,
and finally copying files from
the floppy disks back to their ap-
propriate subdirectories on the
hard disk. Or would it be better to
use the DOS commands BACKUP
and RESTORE? If it is wise to*
*consolidate files, can you suggest a
better technique?*
  Ronald C. Sheff
  Great Neck, New York

A. Readers without disk utilities
can check a hard (or floppy) disk
for fragmented files by using the
external DOS **CHKDSK** *d*:*.*
command, where *d* indicates the
drive containing the disk to be
checked.

From what you've told me, your
fragmented files are not yet a
problem. I doubt you would notice
any difference if they were con-
tiguous. You can also rest assured
that the read/write head and its ac-
tuator (head positioner) aren't

*(continues)*

being subjected to excessive use. In a hard disk–unlike a floppy drive–the read/write head never touches the disk, and thus there's no wear on the head or the disk media. The actuator is probably sturdy enough to outlast the hard disk platters' bearings.

If the data on your hard disk changes frequently, I'd certainly recommend consolidating your data files to minimize read time. Because you actually want the hard disk files reorganized rather than simply backed up, take a look at the *Disk Optimizer* from SoftLogic Solutions. This utility not only rewrites your files into contiguous disk clusters (on a hard or floppy disk), it rearranges sub-directory and file name entries so that subdirectories are listed alphabetically in their parent directories before file name entries.

Your letter also implies that you are not backing up your hard disk and could use some advice toward that end. Relying on DOS's BACKUP and RESTORE commands is far better than using the COPY command and reestablishing the directory structure. (You'll still need to shell out for a few boxes of floppy disks, of course.)

You may find that a backup utility is faster and easier than the DOS commands; *BackRest* from Stok Software and *Bakup* from Software Integration are just such utilities. Whatever you use, take care that you're performing a file-by-file restore, not an image restore.

If you have a few XTs or PCs with hard disks, consider a portable tape backup device that plugs into the floppy disk controller board's external port; OneReel Tape from Sigma Designs and the BackPac from Portable Solutions (formerly BackPac International) fit in this category. Although this solution is more expensive, it's far easier than using floppy disks.

*BackPac*
*Portable Solutions Inc.*
*1701 Directors Blvd. #250*

*(continues)*

Austin, TX 78744
512/448-4965
List price: 10MB $895, 23MB
$1295, larger versions available
Requirements: floppy disk
controller with an external
female 37-pin connector, 256K,
DOS 2.00 or later version

BackRest
Stok Software, Inc.
17 W. 17th St.
New York, NY 10011
212/243-1444
List price: $180
Requirements: IBM PC, XT, AT,
or compatible; 64K; DOS 1.10
or later version; backup media
addressable as a drive

Bakup
Software Integration, Inc.
9800 S. Sepulveda Blvd. #214
Los Angeles, CA 90045
213/776-3406
List price: $179.95
Requirements: IBM PC, XT, AT,
or compatible; 256K (384K for
hard disks over 22MB), DOS
2.00 or later version; backup
media addressable as a drive

Disk Optimizer
SoftLogic Solutions, Inc.
530 Chestnut St.
Manchester, NH 03101
603/644-5555
List price: $49.95
Requirements: IBM PC, XT, AT,
or compatible; 128K; one disk
drive; DOS 2.00 or later
version; one free cluster per disk

OneReel Tape
Sigma Designs, Inc.
2023 O'Toole Ave.

# It's the best thing since 1-2-3.

We asked current 1-2-3® users how to get more out of 1-2-3.

And you told us.

Introducing 1-2-3 Release 2 from Lotus.®

**New 1-2-3 is more powerful and a lot more versatile.**

You wanted to handle larger jobs with 1-2-3. Now you can. The new 1-2-3 worksheet has been expanded to 8192 rows – 4 times its original size. And your worksheet is actually more flexible because advanced memory management allocates memory more efficiently and allows data to be stored anywhere on the worksheet. When used with new expanded memory boards, new 1-2-3 can address memory beyond 640K.

New 1-2-3 is designed to support the Intel® 8087/80287 math coprocessors so you can now do many calculations faster. We've even added some features that make it possible to do things like regression analysis, string functions and string arithmetic. And new 1-2-3 comes with 40 new macro commands so you can work more efficiently and a lot more productively.

Now you can start 1-2-3 directly off a hard disk without putting a system disk in the floppy disk drive.

**But we still kept things simple.**

In many respects, new 1-2-3 isn't any different from the original. You wanted us to keep things simple and we did. If you're already familiar with 1-2-3, you're ready to use new 1-2-3.

You don't have to retrain. And new 1-2-3 can read and process existing 1-2-3 files so that virtually all applications already developed can be used.*
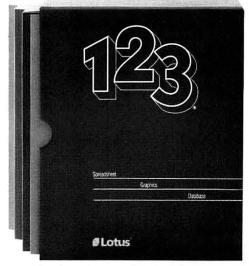
**It's even easy to upgrade to new 1-2-3.**

If you're a registered 1-2-3 user and want to upgrade to new 1-2-3, you'll find all the details in a mailing from Lotus. If you haven't registered yet, complete and send in your Warranty Registration Card or call 1-800-TRADEUP** so we can send you the mailing.

The cost of the Upgrade product is $150. You are eligible for a free upgrade if you purchased 1-2-3 Release 1A on or after April 24, 1985.

And for everyone who upgrades, there's also a rebate offer of $40 on the Intel Above™ Board, the first expanded memory board certified by Lotus.

We think you'll find new 1-2-3 the best thing since, well, 1-2-3.

*Suggested retail price of new 1-2-3 is $495. 1-2-3 Release 2 requires 256K of memory. The minimum memory requirement for 1-2-3 Release 1A is 192K.*

San Jose, CA 95131
408/943-9480
List price: 10MB $945
Requirements: floppy disk controller with an external female 37-pin connector, 192K, DOS 2.00 or later version

### DOS to BASIC Application— Directly

Q. I've been developing application programs in BASIC for use at my office. I'm finding it difficult to explain to others the steps involved in running a BASIC application—that is, the need to first load the BASIC interpreter, then load and run the program. Because I lack the expertise to develop assembly language programs, I was wondering if you could suggest a .COM or .EXE program (which I could create using DEBUG) that can be accessed from DOS and will load and run BASIC programs.
  Duane W. Hansel
  New Ulm, Minnesota

A. The BASIC interpreter is already capable of automatically loading and running a BASIC program after the interpreter has been loaded. (The advanced interpreter, BASICA, of course, has identical capabilities.) If, for example, the BASIC program is called PROGRAM.BAS, at the DOS prompt have the user type **BASIC PROGRAM** (or **BASICA PROGRAM** if features of PROGRAM.BAS require the advanced interpreter) and then press **< Enter >**. The command BASIC and the desired program name

*(continues)*

# Get your data in shape.

## Introducing
## 1-2-3 Report Writer.™

Now you can get customized reports and forms right from your 1-2-3® database files.

With 1-2-3 Report Writer,* a separate, stand-alone product, you can create and print professional looking documents in minutes. You can use 1-2-3 Report Writer for personnel reports, sales analyses, claim forms, invoices, purchase orders, and even mailing labels.

You select the data you want to see and see it the way you want it. Emphasize a point with an underline, italics or a bold heading. Change field names, widths and formats simply by using a cursor key. Or insert multi-line headers and footers, delete unwanted fields, and sort on up to four levels.

1-2-3 Report Writer can even do your most common calculations: averages, totals, subtotals, counts and minimums/maximums. And customized formats can be saved for generating periodic reports with updated information.
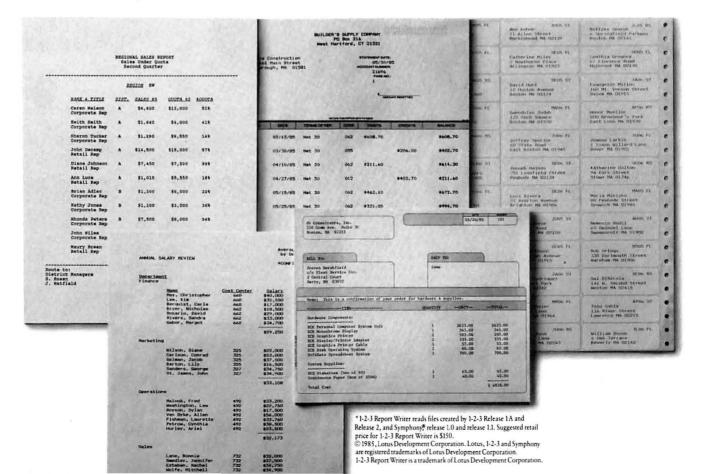
If you're familiar with 1-2-3, you'll immediately feel comfortable with 1-2-3 Report Writer. Similar menus and prompts guide you until you have exactly the report you want. It's that easy.
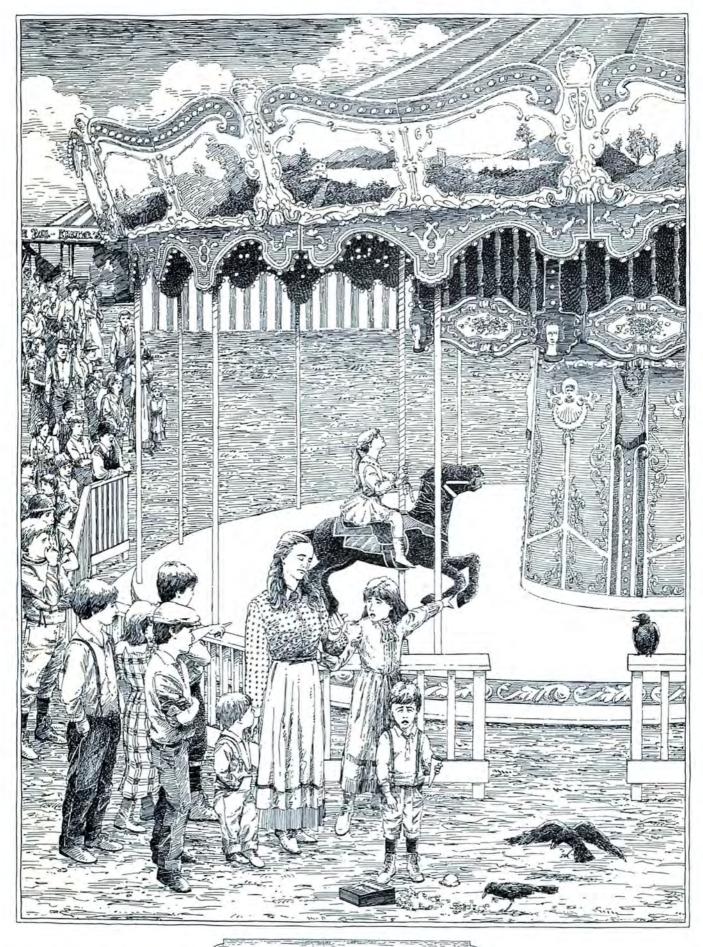
If you'd like to make your database look better, look at 1-2-3 Report Writer from Lotus.® For more information, see your local authorized Lotus dealer. Or for a demonstration of 1-2-3 Report Writer, send $5.00 along with your name and address to 1-2-3 Report Writer Demo Disk, Dept. NC, P.O. Box 4036, Woburn, MA 01888.

**1̃2̃3̃® Report Writer™**

**◢ Lotus®**

COMMON SENSE IN DATABASE MANAGEMENT
NUMBER FIVE IN A SERIES.

# SOME THINGS CAN NEVER BE SHARED. OTHER THINGS SHOULD BE.

The people who make database software have some strange logic. They tell you information is the most valuable thing in the world. And then they design their products for single-user systems. Which means that every time different people actually need to use your data, they have to stand in line for it.

## INTRODUCING R:BASE™ 5000 MULTI-USER.

At Microrim, we have a much better idea of the way offices work. So we've developed a multi-user version of R:base 5000 that lets users update their database while other people analyze it. And we've made this new version fully compatible with our single-user version. Which means any application you develop on the single-user version today can be run on our multi-user version tomorrow.

## DATAPRO RANKS R:BASE 5000 #1.

Of course, we gave the multi-user version all the features that convinced the Datapro Research Corporation to rate our single-user version as the best DBMS on the market. But we've also designed it to make optimum use of all the extra capabilities offered by the IBM PC Network (IBM PC DOS 3.1). To optimize data sharing, R:base 5000 Multi-User takes full advantage of the front end processing power of the PC. As a result, multiple users will be able to work with the same database at the same time.

While editing, data integrity is protected by a locking mechanism that operates at the item level. This important feature lets the other users work with columns and rows of the same table. Instead of making them wait around for the other guy to finish his editing job.

## SEE FOR YOURSELF: 1-800-547-4000.

The full price is $1500, complete with three sets of documentation. But if you believe in common sense as much as we do, you won't make a decision this big till you get your hands on a copy and see for yourself. And that's just what we'd like you to do. For only $50, we'll send you a copy of the program that has all the features, one set of documentation, and all the functionality of the full product, except for limitations on the numbers of rows, columns and tables.

Just call 1-800-547-4000 and ask for Dept. 897. From Oregon, or outside the U.S., call 1-503-684-3000, Dept. 897. Or head straight for a leading software store or computer dealer.

And see how nice it is to take advantage of information. Instead of taking turns at it.

# R:BASE 5000 MULTI-USER
## FROM MICRORIM

### IT ALL COMES DOWN TO COMMON SENSE.

each may be prefixed with a drive specifier to indicate the drive(s) holding the file(s).

You can simplify matters even further. For each BASIC program, create an appropriately named batch file that contains the necessary command as outlined in the previous paragraph. Continuing with that example, at the DOS prompt type **COPY CON PROGRAM.BAT** < Enter > **BASICA PROGRAM**, and then press function key < F6 > (or press < Ctrl > -Z) and < Enter > . Now the user can just type **PROGRAM** and press < Enter > . This command will invoke the batch file PROGRAM-.BAT, which in turn will load the BASIC interpreter and load and run PROGRAM.BAS. To bring the user back to DOS when done, you might want to add the BASIC command SYSTEM to the end of each BASIC program's exit routine.

Alternatively, you might consider buying a BASIC compiler. Compiled BASIC programs do not need to be interpreted; at the DOS prompt, the user simply enters the name of the compiled BASIC program. A compiler generates programs that run much faster than interpreted versions. I must caution you, however, that compilers also generate headaches as you learn their more restrictive structure and syntax. You'll also find that various compilers do not support some interpretive BASIC commands.

### No-Hands Screen Dump From BASIC

*Q. I've written a number of BASIC programs for the construction firm where I work, and I'm now attempting to do something that should be quite simple. At a particular point in this new program, I want the screen printed automatically, as though <Shift>-<PrtSc> were pressed—*

*(continues)*

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**Market Share**

PWP 20.6%

DEM 21.5%

D&W 13.6%

1993 MAKE DECISIONS For Demo, Inc.
MENU: Marketing Prod Operations Finance |Sales Income-Statement Balance-Sheet

| --MARKETING--  -EAST- | DECISION FOR 1992 | DECISION FOR 1993 | UNITS | % CHANGE |
|---|---|---|---|---|
| 1. Price of Pet-Bot | 35.50 | 39.00 | dollars | + 10% |
| 2. Advertising Pet-Bot | 500 | 600 | $1000's | + 20 |
| 3. Salesforce Size | 15 | 18 | people | |
| 4. Commission on Sales | 2.0 | 2.0 | percent | |
| 5. % Sales on Credit | 55 | 65 | percent | |

| Decision Aids | DEM | PWP | D&W | SMI | T |
|---|---|---|---|---|---|
| '92 Price: | 35.50 | 32.27 | 38.35 | 31.88 | 3 |
| '92 Market Share: | 21.5 | 20.8 | 13.8 | 23.7 | |
| '92 Production Cost/Unit: | 17.88 | | | | |

List of Available Options
•[Esc] - Return to Menu    •[F1] - Help
•[↑] & [↓] To move between decisions.  •[←] & [

**BUSINESS SIMULATOR**

*without the user needing to lift a finger. Can you help?*
    Stanley I. Corman
    Chicago, Illinois

**A.** Open your BASIC manual to Appendix B. There you'll find two examples of how to call an assembly language subroutine from BASIC. The identical subroutine in both examples calls the PC's built-in <Shift>-<PrtSc> routine. Before your program makes the call, however, it should first prompt the user to turn on the printer and position the paper.

*Light Pen, Heavy Problem*
*Q. I'm working with an IBM Portable PC at a remote construction site in northern Saudi Arabia; the nearest town, Riyadh, is 6½ hours away by car. I recently purchased a light pen that came without instructions or software. According to the IBM Hardware Maintenance and Service manual, the unused connector labeled P2 on the Color/Graphics Adapter is intended for a light pen.*

*I plugged in the light pen and tried using it with 1-2-3, Symphony, GEM Draw, and a few other programs. It didn't work. My diagnostics disks do not acknowledge that the light pen is connected. How do I tell the system that the light pen is installed, and what's needed to get it to work with my applications? Please help—I really am in the desert.*
    David R. Albright
    KKMC, Saudi Arabia

# CE AT WORK

**A.** The current version of the Hardware Maintenance and Service manual's Advanced Diagnostics program does offer a light pen test in the Color/Graphics Monitor Adapter Test menu. The Guide to Operations manual's Diagnostics program, however, does not test for a light pen. From your letter, I can't tell whether you lack a diagnostic test for the light pen or are using a test that the light pen fails.

Software must be written to work with light pens. The applications you mention do not support a light pen, working or not. Applications can, however, be written in BASIC to work with a light pen. Look up the ON PEN statement and the related PEN statements and function in the BASIC manual. (Note that ON PEN is available in BASICA only.)

FTG Data Systems, a light pen source that recently announced a light pen and circuitry capable of single-pixel resolution (versus the typical light pen's character resolution), has a list of software that works with FTG's pens. Interested readers can write the company at P.O. Box 615, Stanton, CA 90680.

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

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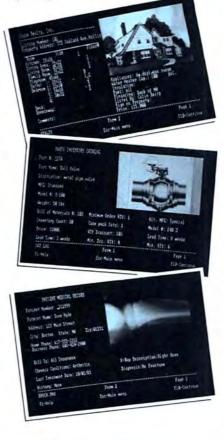
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**Electronic Cataloging** — pictures of products can be combined with a data base system containing product specifications, pricing, availability and much more.

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# Stock Market Analysis: Two Views

Before you turn your PC loose on your securities portfolio, try this short course in the art and science of stock picking—and learn how Wall Street theory has found its way into software.

*Stephen A. Blumenthal*

▌▌▌▌ Few topics are as important to most of us as making money, and the siren song of the stock market is perfect background music for a dream of wealth and power. Software developers have sensed this potential for pay dirt and worked overtime to produce securities analysis programs, many of which are touted as having the wherewithal to propel you into Fat City.

Investment packages are, however, as beguiling and arcane as the markets themselves. The least complicated offspring in this family of software are *portfolio managers*, which are designed to help you balance or weight your holdings to best achieve your investment goals (see "The Portfolio Masters," *PCW*, March 1985). Once you've determined whether those goals favor generation of immediate income or long-term growth, you're a candidate for analysis of the *technical* or *fundamental* kind. The two approaches to analysis employ different means to point you in the direction of a particular stock or bond to buy or sell.

Of course, there's been a wee bit of overstatement about what a PC can and should do for the "average" investor. If you make a few trades a year, the only investment software you truly need is a portfolio manager. In the rush to put your PC to good

use, remember that brokerage firms are babysitting mainframes that are dedicated to sifting through gargantuan amounts of financial data–and might just be better equipped to perform the forecasting and analysis tasks described in this article. If, however,

> *Fundamental analysis consists of a quest for value. Ideally, value takes the form of a market anomaly.*

you've caught the bug and are willing to invest substantial time and healthy chunks of your disposable income in the stock market, a primer on securities analysis is in order.

While predictions of any kind should always be viewed with a healthy skepticism, you ought to at least be aware of time-tested research methods that attempt to predict stock prices–methods that represent some improvement on searching the entrails of a sheep. In the best traditions of the stock market, however, permit me to hedge: No discussion of this length can fully decipher subjects as complex as fundamental and technical securities analysis.

### Fundamentally Sound

Fundamental analysis attempts to find stocks that are underpriced by examining company-specific financial data, such as earnings, debt/equity ratios, or sales. These figures are then compared to data from other companies in the same industry. There's a minimum of voodoo in this approach, assuming you believe that the past is a reliable harbinger of the future. The quality of research is judged by the degree to which it incorporates various levels of information, from published financial data to interviews with top management.

Fundamental analysis consists of a quest for value. Ideally, value takes the form of a market anomaly: the price of a stock represents an incorrect or unjustifiably pessimistic evaluation of a company's prospects. In addition, the fundamental analyst seeks to understand why the market is underpricing the stock. To gain this insight–and to ensure that attention to financial data does not obscure the forest for the trees–the researcher may need to view the company from several nonfinancial vantage points. These may include assessing the impact of macroeconomic or political factors or of developments in domestic, tax, or international policy.

Fundamental analysis is not completely objective and, like any attempt to predict the future, contains a generous shot of subjectivity as well. Which is another way of saying that perhaps sheep entrails were not altogether devoid of meaning.

The researcher's goal is to know a company so well that he or she possesses information the marketplace does not. When the investment community realizes what the researcher has known for some time, all that toil is rewarded. Hordes rush in to buy or sell, and if you heeded the research recommendation early enough, you'll get rich. That was the idea, wasn't it?

### On Further Analysis

The mechanics of fundamental analysis are fairly straightforward; you could be following an arbitrarily selected list of stocks or industry groups, such as oil, aerospace, or technology. To follow those issues you must obtain current prices. You then supplement price information with data on the company's financial characteristics. This involves retrieving a host of standardized calculations, like price/earnings ratios and beta (that is, stock price volatility), as well as such historical data as earnings during the last three quarters.

Having collected the raw data and performed the appropriate calculations, the analyst evaluates and ranks stocks using the performance criteria he or she believes are most likely to affect the stock price. While the relative importance of various criteria–like price/earnings ratios–varies from industry to industry, the weighting process clearly leaves room for personal preferences and prejudices.

Fundamental analysis thus enables you to amass financial information, which you can then filter on the basis of your preferred indicators and fashion into a report that ranks the information according to those priorities. If you wanted a company that had, at a minimum, four quarters of increased earnings, a five-year compounded earnings rate in excess of 10 percent, a dividend of $1.25 per share, and 10 million shares outstanding, you would use your chosen criteria to identify that stock and place it at the apex of your list.

While the whys and wherefores of fundamental analysis are reasonably comprehensible, remember that there's no such thing as too much research. The more information collected and analyzed, the more likely you are to stumble on some salient tidbit. Still, investing requires the human touch. Science and art meet at the analyst's ability to distinguish those key bits and pieces of financial information. The relationship between the investor and computer-derived information recalls Michelangelo's remark that the statue was already inside the stone—all he did was chip away the excess.

### Technical Techniques

Technical analysis attempts to predict the direction of stock price movements by studying previous price fluctuations and comparing them to data on historical trading volume. Students of this analytical school believe that activities within the securities markets themselves frequently affect stock prices and that data relevant to such variation is rarely reflected in a company's financial reports. Technical analysts work in the context of the market as a whole, mindful that a company with good "fundamentals" can see its stock pulled down by systemic (that is, industrywide) or market (cyclical) factors.

Technical analysis is premised on the notion that an imbalance in a stock's supply and demand is reflected in price movements and fluctuations in the number of shares traded. The technical analyst uses charts to track price and volume movements, seeking to discern patterns that have telegraphed previous upward or downward trends. Over time, technical analysts have cataloged a plethora of patterns, conferring on them such names as "head and shoulders." The recognition of a pattern early in its development is

the standard by which technical expertise is evaluated. If a characteristic pattern is recognized in the current market, predictions are made in the belief that the past is a useful way of predicting the future. (Back to the entrails.)

### Charter Members

Fluctuations in stock and index prices are grist for technical analysis, and charts are its crowning glory. The process begins with the selection of historical price and volume data for a specified length of time, such as 180 days. This elongated snapshot becomes a benchmark against which current price and volume information is evaluated. Graphic representations of price movements over time are then created; such charts indicate certain historic barriers, known on the downside as support levels and on the upside as resistance levels. A current price breaking through a support or resistance level is considered a highly significant market development.

The analyst then graphs price movements of published stock indexes, such as the Standard & Poor's (S&P's) 500, obtaining a profile of the subject stock's performance against the backdrop of the general market. Charts may be made of several categories of average price movements for a subject stock. One

*Technical analysts have cataloged a plethora of patterns, conferring on them such names as 'head and shoulders.'*

might be a simple average in which the points on the chart represent successive closing prices divided by the number of days in the calculation.

A more useful calculated graph is the *moving average*, a kind of overlapping snapshot in which successive prices are charted over a constant period of time; for example, you collect prices for 20 successive

days and, starting with the 12th day, plot points representing the simple average of nine successive values (days 1-12, 2-13, 3-14, and so on, through days 9-20).

In its affection for statistics and minutiae, technical analysis is the Wall Street equivalent of baseball. Technical analysis encompasses calculations of *weighted averages* and *exponentially weighted averages*—the mathematics of which are roughly akin to determining a pitcher's ERA. Weighted averages are obtained via sophisticated calculations that give more weight to recent closing prices and less to older prices. Exponentially weighted averages—derived using a logarithmic rather than a geometric scale—value certain days during a given time period more than others.

The analyst compares current closing prices with various moving averages as well as with price support and resistance levels. Trend lines are developed, and *momentum indicators*—that is, difference curves—are plotted. These curves (also known as oscillators) plot the daily difference between two indicators that the analyst considers important, such as the closing price and a weighted moving average. The idea is to determine whether the price of the stock is more volatile than its moving average. If it is, the market price may be too high or too low.

### Grains of Salt

The financial community is split on the relative merits of fundamental and technical approaches to securities analysis. Before you buy any technical analysis program, you should know that quite a few investment mavens charged with making decisions involving quite a few dollars do not believe technical analysis, no matter how well done, works at all. They attribute success to fundamental analysis alone.

You'll also do yourself an injustice if you fail to consider, at least momentarily, the arguments of another conclave of savants who follow the "random walk" theory. They hypothesize that at any given time the market has incorporated all relevant information and reflects the appropriate price for a stock. This kind of analysis is no fun at all and puts a damper on the sale of analytical software tools, because it lays open the possibility that study doesn't make one whit of difference. For now, we needn't be too concerned about the agnostics of securities analysis.

### Software to the Rescue

There's nothing truly new about technical and fundamental analysis software. What's different today is that you no longer have to be a research professional employed by an insurance company, a brokerage house, or a bank to find or afford it. Dozens of programs put the most elaborate analysis within reach of the individual investor.

*There's been a wee bit of overstatement about what a PC can and should do for the 'average' investor. If you make a few trades a year, the only investment software you truly need is a portfolio manager.*

While product features, prices, and implementations vary widely, securities analysis is inherently time-sensitive and thus demands the most current price and volume information. Many analytical programs, although moderately priced, require a subscription to one information service or another. This in itself isn't a heinous offense, but it may add significantly to the cost of program operation.

Accordingly, any securities analysis program worth its salt will update prices via a link with Dow Jones News/Retrieval, CompuServe, or another online stock pricing information service (see "Data on Your Dial" in *PCW*, February 1985). These quotes are rarely "real time" because of the high cost; instead they usually are on a 15-minute delay.

### Features of Fundamentals

The principal aspect of fundamental analysis software is information collection. Massaging data is, for the most part, limited to establishing simple mathematical relationships between values, such as price/earnings. Because data collection is a straightforward process, software operation should be equally uncomplicated. A program should enable you to create and edit stock and industry lists, access popular commercial financial data bases, and view the data you've

downloaded on your chosen stocks or industry groups. Stocks must then be screened according to selected criteria and listed in priority order, based on your favorite indicators. If a program offers this minimal functionality, deciding among similarly configured programs may be best done on the basis of price.

It's especially worthwhile to examine the program's ability to access public data bases—an essential feature in fundamental analysis. In every analysis, you'll need to update all stock and industry data. The simpler packages enable you to update only price and volume data.

Some fundamental analysis programs, like S&P's *StockPak II*, offer no on-line option. Instead, you receive monthly data disks that chronicle your monitored stocks. This approach carries with it two problems: it can be extremely costly, and the information tends to be dated. While *StockPak II* includes a free six-month subscription to the S&P information service, a year's renewal to S&P's Over-the-Counter data base alone will set you back nearly $500. These maintenance fees tend to separate serious investors from those just browsing in the marketplace.

In addition to on-line access, the better fundamental analysis programs offer a full complement of features. In creating and editing stock lists you should be able to erase or rename an existing list, add or delete individual items, and change the ticker symbols used to identify securities. The program should let you set support and resistance levels (usually based on stock performance histories obtained from an on-line service) and should alert you when a level is broken.

A top-notch fundamental analysis program will also enable you to create your own formulas with raw data (comparing, for example, price to sales volume rather than price to earnings) as well as download a calculation outright.

Screening data on industry groups and individual stocks is part of what separates fundamental analysis software from information retrieval or portfolio management packages. The screening function enables you to sort lists of prospective purchases and sales. You may, for instance, want to rank issues by highest dividend or lowest price. The number of such



Screen 1: Telescan Analyzer, a technical analysis package, enables you to plot moving averages against a major stock index; in the lower portion of the screen, you can graph the differences between the averages.

user-defined indexes that you can factor into a screening decision is important; the better fundamental analysis programs support 20 or more.

Dow Jones/Irwin's *Market Microscope* tosses in a capability that transcends simple analysis and heads straight for market monitoring. Should the screening process fail to identify an acceptable investment candidate, the program will monitor a group of stocks and inform you if one or more reaches a critical price level. *Market Microscope*'s automatic updating capacity pulls in the latest information from various Dow Jones data bases. A price breakthrough automatically triggers a Price Alert Report, which offers buy or sell recommendations on the stocks you're monitoring.

### The Technical Edge

Because it tends to reduce the world to charts and numbers, technical analysis has a special affinity for computers. But remember that we're still dwelling in the realm of prognostication, so this approach only *seems* scientific.

Any technical analysis program should offer a comprehensive battery of features, including the capability to manually *and* automatically download from on-line services individual quotes, volume data, and historical and current price information. An ability to manipulate six months of historical data is

mandatory; handling a year's worth of information is better. A program should display your portfolio of stocks and integrate current quotes into the portfolio, regardless of whether they've been entered automatically or manually. The slicker packages can check quote dates for gaps, such as holidays during which no trading occurred.

Broderbund's *Synstock*, for example, downloads information from up to three sources–Dow Jones News/Retrieval, CompuServe, and Warner

*Technical analysis attempts to predict the direction of stock price movements by studying previous price fluctuations and comparing them to data on historical trading volume.*

Computer Systems. The program updates stock quotes from the keyboard or from a downloaded quote file, deletes stock quote data from portfolios, and lists stock quotes, sorting them by trading date. Dow Jones's new *Market Analyzer Plus* virtually runs on automatic pilot, enabling you to preselect a logon time; it then automatically downloads requested information and updates historical data files and portfolio records.

Because charting is the essence of technical analysis, programs must automatically produce stock charts pursuant to criteria you establish. Packages like *Synstock* and Dow Jones's older *Market Analyzer* offer an "autorun" capability that graphs data without establishing new graph settings for each analysis.

Charting features range from the esoteric to the essential. You'll probably begin with simple and moving averages, which in turn graduate to weighted and exponentially weighted moving averages. *Market Analyzer* is even capable of creating a graph line offset by a specific value; that is, an offset of 1.05 plots

points 5 percent over the "normal" position of a moving average. Volume charts and charts of moving averages, along with line and bar momentum indicator charts, are among the more sophisticated features included in top-drawer technical analysis packages (see Screen 1).

But creating comparison charts is by far the most important capability in any technical analysis program. One class of comparison charts provides simultaneous comparisons of price activity for several stocks; a second illustrates so-called relative strength. Such charts show price fluctuations relative to a fixed stock or stock average, such as S&P's 500 Index (see Screens 2 and 3).

Charts generated by *Synstock* show the highest and lowest prices for a time period, daily price variation and daily close, beginning and ending dates for the period, and relative strength (in volume). *Market Analyzer* displays average daily volume, along with the number of days or weeks of information stored and available for retrieval. If you request 50 days of price data on IBM, for example, the program might note that an additional 180 days is available. The program also extrapolates equal dollar investments in several securities over time.

*Market Analyzer Plus* adds to its predecessor's chart repertoire split-screen capabilities and histograms that illustrate the performance of followed stocks according to a half-dozen different calculations–for example, today's closing price relative to the average daily volume over a specified period. The package also churns out summary reports filled with such juicy insights as which stocks pack the greatest profit potential per dollar, based on current trends.

### More Than Public Utilities

Although fundamental and technical packages are judged primarily on the thoroughness of their analysis and on their ease of use, such programs should also offer many of the conveniences now found in software generally, including a full complement of utilities.

Features that simplify life for the investor start with a program's ability to address a serial port and a modem easily. Every package in this genre should contain automatic logon sequences for the popular

information services. Analysis software should support a wide range of printers and plotters and provide a capacity to recover damaged stock data files. Other useful utilities enable you to import stock data files from other programs (like *1-2-3*) and to store data as ASCII or DIF files to hasten data export. The truly helpful packages even enable you to instantly alphabetize a stock list, list the stock symbols in use on the current data disk, and change a ticker symbol on the data disk without disturbing other information.

### Turning Dreams Into Gold

As mystical as it may seem, there's little hocus-pocus to this process—but neither is there much intuition involved in fundamental or technical analysis. When you mimic what professional investors do, you'll need more than a modicum of training. It's true that securities analysis isn't something you learn from software—but well-implemented programs can shorten the learning curve considerably.

Study and practice in either of these disciplines is apt to pay dividends, but the fundamental (pardon the pun) issue is whether your stake in the market jus-
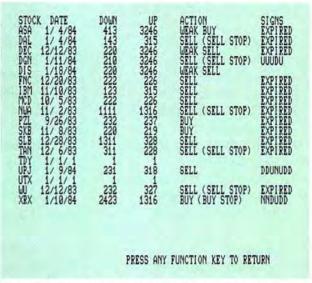
*Creating comparison charts is by far the most important capability in any technical analysis program.*
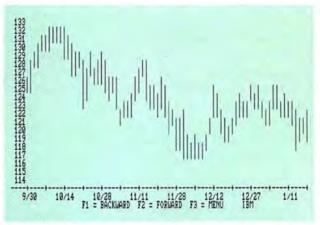
tifies a major investment of time and energy. It's always worthwhile to think hard about whether you need programs of this ilk.

Of course, you very well may. As financial wizard Paul Erdman once said, "The entire essence of America is the hope to first make money, then make money with money, then make lots of money with lots of money." Think of this software genre as filled with the tools of the professional, and use them accordingly. The information you need is surely out there; like Michelangelo, you just need to chip away the excess. ◉

*(continues)*

| STOCK | DATE | DOWN | UP | ACTION | SIGNS |
|-------|------|------|-----|--------|-------|
| ASA | 1/ 4/84 | 413 | 3246 | WEAK BUY | EXPIRED |
| DAL | 1/ 4/84 | 143 | 315 | SELL (SELL STOP) | EXPIRED |
| DEC | 12/12/83 | 220 | 3246 | WEAK SELL | EXPIRED |
| DGN | 1/11/84 | 210 | 3246 | SELL (SELL STOP) | UUUDU |
| DIS | 1/18/84 | 220 | 3246 | WEAK SELL | |
| FNC | 12/20/83 | 222 | 226 | SELL | EXPIRED |
| IBM | 11/10/83 | 123 | 315 | SELL | EXPIRED |
| MCD | 10/ 5/83 | 222 | 226 | SELL | EXPIRED |
| NWA | 11/ 2/83 | 1111 | 1316 | SELL (SELL STOP) | EXPIRED |
| PZL | 9/26/83 | 232 | 237 | BUY | EXPIRED |
| SKB | 11/ 8/83 | 220 | 219 | BUY | EXPIRED |
| SLB | 12/28/83 | 1311 | 328 | SELL | EXPIRED |
| TAN | 12/ 6/83 | 311 | 228 | SELL (SELL STOP) | EXPIRED |
| TDY | 1/ 1/ 1 | 1 | 1 | | |
| UPJ | 1/ 9/84 | 231 | 318 | SELL | DDUNUDD |
| UTX | 1/ 1/ 1 | 1 | 1 | | |
| WU | 12/12/83 | 232 | 327 | SELL (SELL STOP) | EXPIRED |
| XRX | 1/10/84 | 2423 | 1316 | BUY (BUY STOP) | NNDUDD |

PRESS ANY FUNCTION KEY TO RETURN

Screen 2: The Brandon Stock System, another technical analysis program, provides an action summary for a range of issues—complete with buy/ sell recommendations derived from historical data on stock price volatility.



9/30   10/14   10/28   11/11   11/28   12/12   12/27   1/11
F1 = BACKWARD  F2 = FORWARD  F3 = MENU   IBM

Screen 3: The Brandon Stock System also enables you to graph the price history of a single stock—in this instance, IBM's. If you need more than a three-month glimpse of stock performance, additional data is just a scroll away.

## Fundamental Analysis Software

The Active Investor Series
Interactive Data Corp.
30 Wyman St.
Waltham, MA 02254-9113
800/482-2002, 800/462-4303
  Massachusetts
List price: $495, data charges
  3 cents/day/issue
Requirements: 192K, two disk
  drives or hard disk, IBM
  graphics board, modem

Compustock
A. S. Gibson & Sons, Inc.
P.O. Box 130
Bountiful, UT 84010
Requirements: 128K, two disk
  drives, DOS 2.00 or later
  version; graphics board
  recommended

Dow Jones Market Microscope,
  Dow Jones Spreadsheet Link
Dow Jones & Co.
P.O. Box 300
Princeton, NJ 08540
800/257-5114
List price: Market Microscope
  $699, Spreadsheet Link $249
Requirements: Market
  Microscope 128K, two disk
  drives, modem; Spreadsheet
  Link 128K, one disk drive,
  modem

The Evaluation Form
P.O. Box N
Bradenton, FL 33510
813/778-5515
List price: $100
Requirements: 64K, one disk
  drive

The Fundamental Investor
Savant Corp.
P.O. Box 440278
Houston, TX 77244
800/231-9900, 713/556-8363
  Texas
List price: $395
Requirements: 320K, two disk
  drives

Micro PMS
The Boston Company
One Boston Pl.
Boston, MA 02106
800/468-8324
List price: $495 per year, Dow
  Jones Interface option $25
Requirements: 128K, two disk
  drives or hard disk, modem for
  Dow Jones Interface

Micro/Scan
Isys Corp.
Box 214
Cambridge, MA 02238
617/491-6221
List price: $6000 to $35,000 per
  year, depending on data base
  and level of service
Requirements: XT, AT, or
  compatible; 512K; 10MB hard
  disk

StockPak II
Standard & Poor's
Microsystems Dept.

25 Broadway, 15th Flr.
New York, NY 10004
212/208-8000
List price: $348 per year for
  monthly data base disks, $211
  per year for quarterly data base
  disks
Requirements: 128K, one disk
  drive, color graphics board

Value/Screen
Value Line, Inc.
711 Third Ave.
New York, NY 10017
212/687-3965
List price: $348 per year for
  monthly disks, $211 per year for
  quarterly disks
Requirements: 256K, two disk
  drives

## Technical Analysis Software

Brandon Stock System
Brandon Information
  Management
#99-N, 66 West Germantown
  Pike
Plymouth Meeting, PA 19462
215/828-3249
List price: $325
Requirements: 128K, two disk
  drives or hard disk, Hayes-
  compatible modem; IBM or
  Epson graphics printer
  recommended

Chart Analysis
Professional Farm Software
219 Parkade
Cedar Falls, IA 50613
319/277-1278
List price: $275, $90 rental disk
Requirements: 128K, two disk
  drives or hard disk, color
  graphics board

Dow Jones Market Analyzer,
  Dow Jones Market Analyzer
  Plus
Dow Jones & Company
List price: Market Analyzer
  $349, Market Analyzer Plus
  $449, connect charges for Dow
  Jones News/Retrieval
Requirements: Market Analyzer
  128K, one disk drive; Market
  Analyzer Plus 256K, two disk
  drives (hard disk recom-
  mended), DOS 2.00 or later
  version, IBM Color/Graphics
  Adapter, Hayes Smartmodem

Market Trend Analysis System,
  Buy/Sell Trend Analysis System
Personal Equity Computing, Inc.
P.O. Box 2105
Ocean, NJ 07712
800/431-6082
List price: Market Trend Analysis
  $350, Buy/Sell Trend Analysis
  $295
Requirements: 128K, one disk
  drive (two recommended),
  Hayes Smartmodem, IBM or
  Epson graphics printer; color
  monitor recommended

N-Squared Stock & Futures
  Analyzer
N-Squared Computing
5318 Forest Ridge Rd.
Silverton, OR 97381
503/873-5906
List price: $295, optional
  Interface program $45
Requirements: 256K, one disk
  drive, color graphics board,
  modem with Interface program

STOX/C
Sydney Dataproducts, Inc.
11075 Santa Monica Blvd. #100
Los Angeles, CA 90025
213/479-4621
List price: $105
Requirements: 92K, one disk
  drive, color graphics board,
  Hayes-compatible modem, IBM
  or Epson graphics printer

Synstock
Broderbund Software
17 Paul Dr.
San Rafael, CA 94903
415/479-1120
List price: $99.95
Requirements: 192K, one disk
  drive, DOS 2.10 or later
  version, IBM Color/Graphics
  Adapter
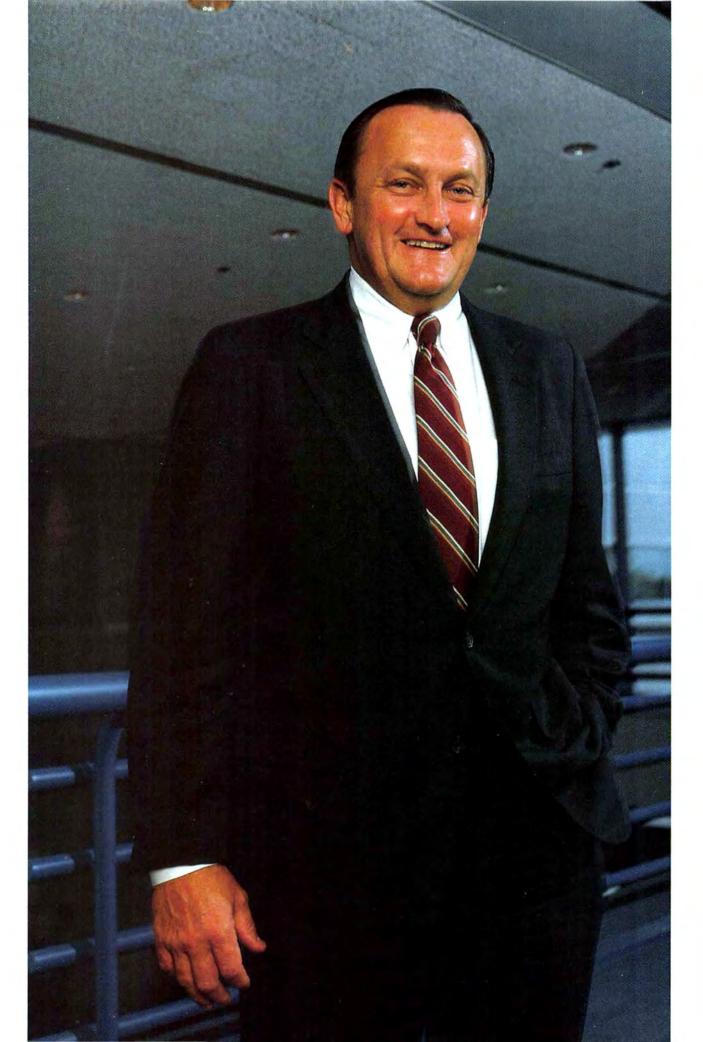
The Technical Investor
Savant Corp.
List price: $395
Requirements: 256K, two disk
  drives or hard disk

Telescan Analyzer
Telescan, Inc.
11011 Richmond Ave. #600
Houston, TX 77042
800/752-7001 ext. 903,

800/442-4799 ext. 903 Texas
List price: $49.95, Telescan
  Database connect charges
Requirements: 256K, one disk
  drive, DOS 2.10 or later
  version, color graphics board,
  1200-bps Hayes-compatible
  modem, Telescan Database

Wall Street Window
Software Dynamics
8260 Greensboro Dr. #137
McLean, VA 22102
800/854-9700
List price: $395
Requirements: 192K, two disk
  drives or hard disk, mono-
  chrome or color graphics board,
  modem or Lotus Signal
  optional

Winning on Wall Street
Summa Software Corp.
P.O. Box 2046
Beaverton, OR 97075
503/644-3212
List price: $695
Requirements: 192K, two disk
  drives or hard disk, Hayes-
  compatible modem, color
  graphics board, IBM or Epson
  graphics printer

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

# A Candid Conversation With William Lowe

The head of IBM's PC division extols open architecture, small business, and cooperative processing in this exclusive PC World interview.

*Edited by Ken Greenberg*

▥ IBM's Entry Systems Division (ESD)—which gave birth to the IBM PC and arguably sparked the business personal computer revolution—is regarded as the epitome of the entrepreneurial spirit within a corporate setting. As personal computing has matured, ESD has not so much reflected that maturity as sponsored it. Now, with a burgeoning product line and an increasingly diverse population of users, the division is itself coping with maturity as it works to balance the computing interests of Wall Street with those of Main Street.

Personal computing has indeed come a long way since ESD modestly projected unit sales in the hundreds of thousands; the division's influence continues to exceed its now staggering sales figures. ESD's lineup includes hits and near-misses as well as products that the marketplace has bumped and bruised: the PC, the XT, the AT, the Portable PC, the PCjr, and the PC Network—plus peripherals, communications products, software, and terminal incarnations and scaled-down versions of major systems.

Overseeing it all is William Lowe, an engineer by trade and an IBM loyalist of long standing. In February 1985, during his 23rd year with IBM, Lowe succeeded Phillip "Don" Estridge as ESD president. Lowe, who holds a B.S. in physics from Lafayette

'We believe that voice, graphics, and image are natural adjuncts to the office support we have today.'

College, joined IBM as an engineer in 1962. In 1978 he was named director of IBM's Boca Raton, Florida, laboratory. Three years later he was appointed Systems Product Division (SPD) general manager, moving to Rochester, Minnesota. Lowe became that division's vice president for systems in June 1982; several months later he was named SPD's vice president for development. In August 1983 Lowe was on the move again, this time as assistant group executive of the Information Systems and Communications Group.

Earlier this winter *PC World* Publisher David Bunnell and Editor Harry Miller met with Lowe at ESD headquarters in Boca Raton. An edited transcript of that encounter follows.

*Miller:* It's been said that the PC is the heart of IBM's large-account strategy, which, if true, would indicate an "intelligent workstation" orientation rather than one that treats the PC as a personal productivity tool. Has the PC's position changed within IBM?

*Lowe:* I've said that the PC is key to IBM's strategies, but we haven't stopped focusing on the PC

as a personal productivity tool. That, of course, is where we began. If you look ahead five years, however, a major area of opportunity will involve integrating the PC into large-account strategies–having it work with other equipment. In an office setting, for instance, we've attached the PC to our local area networks [LANs] and our intermediate machines and large systems. The PC has won wide acceptance in large accounts; now, by connecting a stand-alone, an intermediate, or a large system to PCs, you can have a consistent user interface.

*Miller:* Will this large-account strategy dictate the design of future PCs?

*Lowe:* I don't think so. We start with the workstation as the base, and we add office software and communications capabilities in order to provide solutions for large accounts.

*Miller:* Let's take it from the other direction. What factors are most influential in shaping a product strategy? Is the PC largely determining what that common interface will be?

*Lowe:* The PC, because of its broad acceptance and its ability to connect to intermediate and large processors, has a great deal of leverage when such decisions are made. It's extremely important at IBM that our architecture and our product have the broad business acceptance that they do. For ESD, taking advantage of that acceptance is a high point of leverage.

### Big Commitment to Small Business

*Miller:* What are your growth projections for PCs–or workstations–tied into large accounts?

*Lowe:* Even with this great acceptance in large accounts, 1985 saw greater growth in small businesses. We also expect increasing acceptance in education and the home. I anticipate that the percentage of placements will remain about where it was in 1985, with roughly 40 percent of IBM's machines placed in large accounts.

*Bunnell:* Is it your feeling that the small business market will ultimately be much bigger than the large corporate market?

*Lowe:* According to the surveys I've seen, there were higher unit sales in small business than among large businesses during '85. We're very interested in supporting vertically integrated solutions for small businesses.

My background is the old General Systems Division at IBM, where we were involved in introducing the System/3, the System/34, and the System/36–really

IBM's first small business commercial computing machines. A lot of folks here in Boca share that heritage. I think we understand those problems—the integration of operating system software, application software, hardware, and support—that small businesses need solved. We're trying to extend that support by helping our retail distribution chain provide it. I vote for a closer relationship with retailers so they can provide small businesses with vertical support, which seems to be extremely important.

*Bunnell:* Do you see any strategic conflict between the small business market and the corporate market?

*Lowe:* I really don't. I do see a number of small businesses that don't have the advantage of an information systems department, where people can put together a set of applications for the executive or the professional. The small business person instead must either hire someone with the systems background or get a third party to provide the necessary insight. I see the provision of that service as acute.

*Bunnell:* Do you use a PC?

*Lowe:* Yes. I use it more at home than at work. I've got an XT tied into home banking, but frankly the kids are the primary users. They prepare their school reports on the machine.

### ■ Counting on Third Parties

*Miller:* IBM has recently entered into alliances with third parties—whether actively bundling products or merely marketing these non-IBM offerings. What's the genesis of this rather untraditional approach?

*Lowe:* When we entered the PC business, we decided that the best sales tool for our product—the way to make it more interesting—was to have as much application software as we could. We also decided that all good ideas weren't going to come from within IBM, so we encouraged others to write applications for our product, made development machines available to software developers early on, and identified the software interfaces that we would maintain. We built a new interface as we introduced the LAN, and as we will when we introduce cooperative processing. We want people to be confident enough to make an investment.

*Miller:* My previous question partly alluded to software. IBM has clearly been the leader in hardware, not in terms of innovation, but with high-quality products. IBM hasn't necessarily held that position in software, at least at the PC level.

> *'I am surprised at how many people pay attention to what we say and do. Prior to this job I wasn't accustomed to that kind of attention.'*

*Lowe:* We've been pretty successful with some of our software packages. Concerning our investment in software over time, you can expect that we will identify areas where we can strategically support our [hardware] products by providing our own software. But in a world where thousands of software packages exist for our product, it would be unwise to develop all software internally. That's why we feel it's important to keep an open interface and continuously rely upon vendors.

*Miller:* The communications arena looms as increasingly important in computing at any level. How will future PC products be shaped by the Rolm acquisition and IBM's partnership with MCI?

*Lowe:* We've already released several PC-based products under the Rolm banner. We work closely with them, particularly on projects that pertain to future voice offerings for the PC. And we believe that voice, graphics, and image are natural adjuncts to the office support we have today.

*Bunnell:* You recently announced a voice/data standard. Users seem to be anticipating a future full of applications that use voice recognition and speech synthesis, as well as those that integrate the telephone and the PC. When will this fusion happen in a meaningful way?

*Lowe:* I can't really say how long it will take. I'm very excited about our voice product; I think it will be great to phone your PC and get an audio version of a message that your secretary typed into the machine. We've made development support available to a broad range of third parties who will be putting voice commands into their popular software packages.

### TopView Gets Graphics?

*Bunnell:* I understand that ESD is bringing in graphics personnel from another IBM group. I'm interested in whether IBM will, in one way or another, support *Microsoft Windows* as a graphics interface.

*Lowe:* The addition of these people will provide us with more leadership in graphics from both a hardware and a software point of view. I won't speculate on what graphics standard we will support in our new operating systems offerings, but I can say that we will endorse a standard graphics interface just as we supported today's standard text interface.

*Miller:* Your announcement of an operating system accord between Microsoft and IBM didn't completely silence the rumor mill. Reports persist that IBM will not be supporting DOS 4.00, whenever that comes around. How do you view that accord?

*Lowe:* I'm very pleased we have that joint development agreement, and I expect that [Microsoft chairman] Bill [Gates] would probably respond the same way. We've had a long relationship with Microsoft, and it has served us very well; we called on them before we actually presented the PC proposal to our executive management. Before I came to ESD, discussions were already under way to build upon both that relationship and the product we use today. The accord confirms DOS as our base; we are clearly dedicated to expanding DOS and maintaining family compatibility with the software systems currently in use. You can expect IBM and Microsoft to be doing that together.

*Bunnell:* I'm interested in your statement that IBM will be supporting a graphics interface in future DOS releases. How does *TopView,* a text interface, fit into that?

*Lowe:* It was a text-based interface. Without speculating about how we plan to converge *TopView* with the graphics interface, it's true that we have a large group of customers dedicated to *TopView,* and we're going to maintain their investment. At the same time, any modern operating system environment should have a standard graphics interface as well. We expect to do that.

*Miller:* As Bill Gates says, one of the difficulties in coming up with a version of DOS that supports the 80286's protected side is compatibility with existing software, so that today's applications don't have to be rewritten. Is that your objective as well?

*Lowe:* Yes, right.

*Miller:* Going public with the Microsoft agreement and making a statement denying the existence of the PCII were fairly surprising developments for IBM—particularly talking about the nonexistence of a future product. How does your style of interaction with the outside world fit with what people expect from IBM?

*Lowe:* I must tell you that I was surprised at how many people pay attention to what we say and

> *'When we entered the PC business, we decided that the best sales tool for our product—the way to make it more interesting—was to have as much application software as we could.'*

do. Prior to this job I wasn't accustomed to that kind of attention, and I'd say my style toward the outside is perhaps more guarded than it had been.

Both announcements were purposely made public. With Microsoft, a lot of questions existed about whether IBM was going to go proprietary, close down the interface, and not support third-party software. I thought it was important for our customers and the community supporting our product to understand that we're maintaining an open architecture strategy—and encouraging third parties to write applications and invest in our product. Frankly, that seems self-serving, but we feel it's important that people know applications will be written for our products.

Speculation about the PCII escalated in late June when one newspaper published a survey of end users, a percentage of whom said they already had one. I knew that our silence was affecting retailers and our competition. We didn't have a product under development, so when I had the opportunity, I just

told the media we had no PCII. When reporters pressed me on what I meant, I said, "That sort of product was not under development when I arrived, and there is no PCII in our plan now."

### Prepping for a New Generation

*Bunnell:* We could see a similar flurry of rumors this year about IBM introducing an 80386-based machine. Is such a machine a possibility in 1986?

*Lowe:* I'm not going to speculate on schedules, but clearly the 386 is interesting. You know, it's taken a long time for the software to take advantage of the 286. Our users will be best served by our totally supporting the 286 and bringing the 386 in at some future time, when the technology is right and fully supported. My focus right now—my largest investment—is on providing 286 software support so the AT can fulfill its potential.

*Bunnell:* Can you elaborate a bit on what needs to happen with software in the 286 environment?

*Lowe:* Two areas have very high priority: putting applications above the 640K boundary [in the 286's real mode] and also supporting the 286 fully with the operating system. A commitment to communications support would help large accounts take advantage of the PC's productivity, and we'll focus on that as well. The net is that many very good but large applications exist and could be run on the machine in a multitasking mode but can't be accommodated now.

*Miller:* Speaking of breaking the 640K barrier, do you have a preference for either of the expanded memory specifications now on the market? Or would you rather wait for the operating system itself to handle that task?

*Lowe:* Some capabilities exceed 640K today. Some techniques could be brought to market earlier than complete operating systems support, and I'm interested in doing that. I'm also interested in having full operating system support for the 286's protected mode as soon as possible.

*Miller:* When IBM announced the Token-Ring network, I was a bit surprised that it was so attractively priced.

*Lowe:* That surprised you? [Laughter.]

*Miller:* Principally because it's priced so close to the PC Network. These days, where does the PC Network live in IBM's strategy?

*Lowe:* We've been attempting to explain our network positioning since August 1984. We said then that we'd be offering three networks, and that's still our intention. The Token-Ring supports large enterprises and is designed to handle their networking needs over the long term. Although we have a limited number of products attached to it today, I think people recognize the Token-Ring as a main product offering from IBM.

The PC Network is one we think will be attractive in departmental and education environments and as the primary network in small businesses. We are committed to offering an industrial network based on the characteristics of the GM MAP [Manufacturing Automation Protocol] project, which we've been a part of. We intend to bridge the three networks and supply gateways from all three LANs and to the large data processing environment. We've also provided the BIOS interface for PCs. We think there's a business opportunity for all three—and a need for all three.

*Miller:* Users will be able to hook the PC Network and the Token-Ring network together as a kind of broadband to baseband ...

*Lowe:* From a gateway or a data flow point of view, the connection is not a problem.

### A Trip to Software LAN

*Miller:* LANs have long been plagued by a dearth of multiuser software—particularly data management software—to support them. How is IBM addressing that need?

*Lowe:* The operating system environment we want to put in place will be capable of handling communications and multiple applications simultaneously, as well as taking into account a networking environment.

*Miller:* But is LAN support now fully included within the operating system?

*Lowe:* Local networking support belongs at the operating system level, with the communications support that fits accordingly. The question is, can the operating system run large multiple applications at the same time? Cooperative processing should offer users the ability to share resources between a PC and an intermediate-size or large system. You need to enable

multiple users to share a single data base by means of applications that can take advantage of that environment. We're focused on putting the tools in place. Cooperative processing, data base management, and a backbone communications capability—all are important.

*Miller:* How does the System/36 PC fit with the Token-Ring?

> '*Although we have a limited number of products attached to it today, I think people recognize the Token-Ring as a main product offering from IBM.*'

*Lowe:* We always try to provide the broadest range of applications and solutions for customers to choose from. At SPD, we decided to do a 370-PC, the System/36 PC, and the Series/1 PC. The reasoning was that we wanted to bring the Series/1, the System/36, and the 370 architecture—or extensions of it—into the PC price and functionality range. I'm often asked if that means one line is competing against other lines. I suppose it does, but for some customers using the System/36 PC makes sense; for others it's appropriate to use the PC Network and a number of PCs.

*Miller:* The PC has been an incredibly successful product. How long a life do you think any given product can have?

*Lowe:* The vitality of the PC surprised me during the course of 1985, and my expectations are high for this year. I won't estimate its longevity, because every time I've done that in the past, the product at hand has outlived my projections. The question of longevity isn't new. If you've got a good, solid product with a broad range of applications, and you can continue to improve its cost base, you can remain price-competitive.

*Bunnell:* So reports that IBM will discontinue manufacturing the PC in the near future probably aren't true.

*Lowe:* I certainly won't confirm such rumors. I believe we can improve the base cost and therefore the price of PC offerings. As we bring down the cost of the base PC—and therefore its price—and work on the potential of products we might someday announce, opportunities will be even broader. We are attempting to provide compatible machines at very aggressive prices. But sorting out the way our existing products and future products might interact in the marketplace isn't something I'd choose to do right now.

### ▪ Evolution of the Entrepreneurs

*Miller:* I'm interested in your thoughts on the shifts within Entry Systems Division and its relationship to IBM as a whole. The manufacturing operation appears to have changed radically. Where is the division headed, and how will these changes affect users?

*Lowe:* When we launched the PC, Don [Estridge] and I spent a great deal of time putting the organization together. We assembled a division that bought the services it needed from the primary organization here. Everything else was consolidated under single managers, and we called that entrepreneurial. The initial manufacturing, product development, marketing, and service responsibilities were all tied closely together.

We were striving to manufacture a product that could help increase personal productivity. We expected to sell in excess of 250,000 units. As the division grew and we built our initial products, we replicated the original start-up process several times.

When you reach a certain point in an organization's growth, you find yourself with a multiplicity of projects that must be managed in a consistent way so they work together. You've seen some of our competitors having difficulty with that transition.

We dealt with a transition of sorts ourselves. A few of our products didn't work well with each other—software products, in particular. We're now taking advantage of what IBM has learned over the years about managing large electronic development activities; our goal is to provide a very powerful oper-

ating system, new products, and new software tools that will work well together.

From an organizational point of view, you can accomplish certain things only if you have the proper motivation and the proper interaction. With our large accounts—which must communicate and connect with intermediate and large processors—we've seen an obvious need for established, understood interfaces. As a result of the divisional structure we've put in place, what you'll see over time are consistent products from IBM. We'll maintain the product family concept, software compatibility, and a set of offerings that work within large accounts because of our organizational structure.
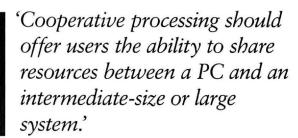
*Miller:* A bit earlier, you mentioned distribution. Not long ago, IBM readjusted its marketing approach. How will that provide PC users with better support?

*Lowe:* In terms of direct sales, we went from a national small account/large account strategy to geographical coverage. Most of our large and intermediate-size customers will see the same account executive. This new reporting structure will merely enable us to deal more efficiently with inventory management and delivery. On the retail side, we really haven't changed any responsibilities. The national distribution division still manages our retail operations. Our recent decision to discontinue establishment of new franchise locations strongly supports our authorized dealers, and dealers see it that way as well. We hope this kind of action will make dealers realize how much we value them.

*Bunnell:* Earlier this month, I attended a computer industry seminar in Palo Alto. It seemed that anybody who was anybody was represented, except IBM—yet IBM was a prime topic of discussion. Can we expect you or your staff to participate more in industry forums and the like?

*Lowe:* I get out frequently. I don't know if it's frequent enough for external observers, but given the level of activity here, it varies between once and three or four times a month—and I know other members of our staff do as well. So yes, we plan to participate in industry discussions and in the growth of the business, because it's certainly in our best interests to do so.

*Bunnell:* Accurately or not, 1985 was characterized as a sluggish year for the personal computer business, even though for every fading Apple you could probably find a booming Compaq. How optimistic are you that the industry at large has turned the corner?

> *'Cooperative processing should offer users the ability to share resources between a PC and an intermediate-size or large system.'*

*Lowe:* I recognize that the industry in general hasn't experienced the growth that we have. But we're winding up a strong year, and for anybody who wonders where the business is headed, opportunities are healthy in every segment—large business, small business, government, education, and the home. We're enthusiastic about continuing to build upon our compatible family and to maintain open architecture. We want applications to be written for our products, and we want to provide better price/performance answers throughout '86 and beyond. We're very bullish. ◉

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

# Launching Javelin

All it takes to roll out breakthrough software is brains, years of experience in the business, and the energy of youth. Meet Stan Kugell.

*Edited by Ken Greenberg*

‖‖‖ Stanley Kugell never goes anywhere without his orb. The president of Javelin Software is liable at any moment to brandish a lucite decahedron containing a golden nucleus; it's both a mascot and a paradigm come to life. The orb, a metaphor for ten views on a central information base, has become the symbol of *Javelin*, but no more so than Kugell himself (see "Javelin: Beyond Rows and Columns" in this issue).

Kugell, 26, is an authentic wunderkind in an industry where the average age has finally reached the far side of 30. He is soft-spoken and studious but radiates the confidence that befits a man who has launched three companies.

Although he lacks a formal degree, Kugell began hanging around MIT at age 14, studied at Stanford's artificial intelligence lab, and at 16, took a job at Xerox's Palo Alto Research Center (PARC). There he specialized in software interface design.

Kugell left PARC to become a partner in Buckminster Corporation, which manufactured motion control equipment and the software to run it. He eventually sold Buckminster and moved on, helping to start Computer Pictures, a pioneering business graphics venture. Kugell and a colleague designed *Trend Spotter,* an early charting program, and *Touch Trak,* an adaptation of *Trend Spotter* for touch screens. They sold out to Cullinet, which incorporated both products in its *Golden-Gate* integrated package.
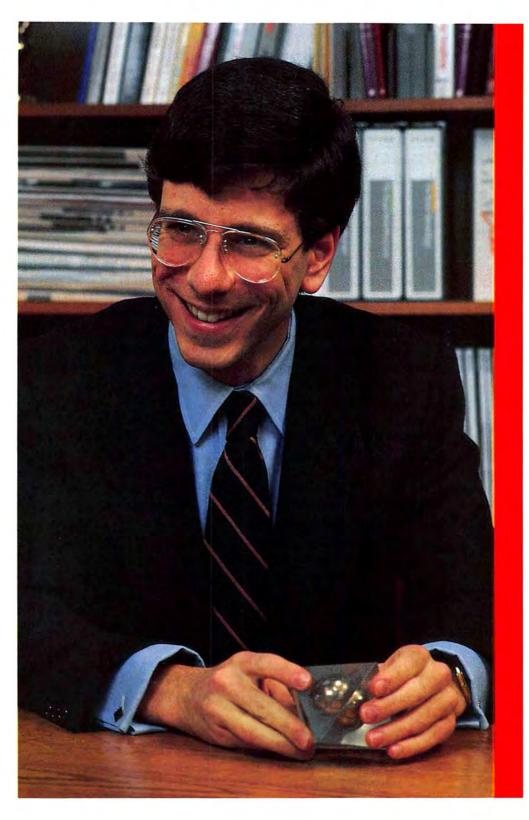
Kugell and Computer Pictures colleague Robert Firmin then formed Javelin Software and embarked on the creation of a new approach to data analysis. Firmin, formerly with Prime Computer and IBM, is now chairman and CEO of Javelin. The resumes of both men convinced venture capitalist Hambrecht & Quist to provide financial backing for the fledgling firm. The rest is recent history.

*PC World* Editor Harry Miller and Senior Editor Ken Greenberg recently asked Kugell to ruminate on the company and the product he and his partners hope to shepherd to software supremacy. An edited transcript follows.

## ▪ Analyzing Analysis

*Miller: Javelin,* a multifaceted analysis tool, is something very new, both in content and in market niche. How did all this begin?

*Kugell:* For Rob Firmin and myself, designing the program was 50 percent inspiration and 50 percent perspiration. Rob is an expert in business analysis, planning, and

'Relative to spreadsheets, it's not a question of *what you have to learn to use* Javelin, *it's what you can forget.'*
—Stanley Kugell

reporting. My field is computer software design–making software easy to use.

We started the design process in a phoneless cabin in Vermont, communicating about our different disciplines. In a loose, give-and-take way, we experimented with what a PC could do to solve business analysis problems. Those discussions gave us a framework for *Javelin*–including the notion that time would be a key part of the system and that you could have multiple views of a central information base.

*Miller: Javelin* represents a move away from the way most computer programs force people to think about problem solving. The most distinctive thing about the product may well be its ten views. How did you determine what those would be? And why stop at ten?

*Kugell:* We didn't really choose ten views per se–we thought of all the ways people want to work with information and created a view appropriate to each of those ways. We then came up with user interface techniques that would accomplish that. There's a lot still on the shelf.

*Miller:* Even with the ten views, it's interesting that only two windows are on the screen at any time. Is that part of your design philosophy?

*Kugell:* Two views seem to work out well; three also would have been possible. The higher the PC's resolution, the more windows you can have, and sometimes it's appropriate to have as many as three. Windows really come into their own when they provide views on a central information base.

*Greenberg:* The program seems elegant rather than cluttered or overpowering. It's not simple but it's comprehensible, and each view is useful–not merely window dressing.

*Kugell:* I appreciate your saying that because I've strived throughout my career as a software designer to reduce an area such as business analysis to simple components, which somehow magically play together and produce a powerful result.

Relative to spreadsheets, it's not a question of what you have to learn to use *Javelin,* it's what you can forget. You can forget that the computer is hard to use, you can forget having to figure out how to trick the spreadsheet into consolidating or into building four reports on the same data. It's a human, rather than a mechanical, approach.

### ▪ A Class by Itself?

*Miller:* People mistakenly call *Javelin* a spreadsheet, but *business analysis and reporting system* doesn't really roll off the tongue. How should the product be classified?

*Kugell:* We still like to refer to it as a business analysts' and reporting tool.

*Greenberg:* Do you consider spreadsheets an evolutionary step?

*Kugell:* There's no question that the spreadsheet was a brilliant invention, but at age 7, it may be the oldest technology that hasn't yet been supplanted in this industry. Spreadsheets are now being used in ways that [*VisiCalc* creators

Dan] Bricklin and [Bob] Frankston never intended. Worksheets are fine for simple problems of a page or so of numbers, but individuals in organizations now find themselves spending more time trying to get their spreadsheets to work and less time thinking about and understanding their real business issues. A spreadsheet with hundreds of rows and columns all tied together with cryptic formulas can become an awful mess. There's no way a human being can manage that. But *Javelin* provides the necessary organization.

*Greenberg:* What about the tremendous amount of third-party support that makes *1-2-3* so accessible? Templates are getting people's jobs done–there's been a great investment in them.

*Kugell:* Sure, the current technology is getting certain jobs done, but it's also creating problems. It's been said that if your product is as much an improvement on *1-2-3* as *1-2-3* was on *VisiCalc,* you'll be a major success. What we've said is, "We're now liberating you from that entire matrix." And people are responding. Many templates built with spreadsheets are a band-aid solution and people are reexamining if they really want to get stuck with the same spreadsheet maintenance headaches.

### ▪ In Search of an Aftermarket

*Miller:* But clearly that third-party support is a key reason behind *1-2-3*'s success. Do you anticipate that *Javelin* will inspire similar support?

*Kugell:* We have received numerous inquiries from major third-party vendors, such as data suppliers, who want to connect to *Javelin* and make use of its central information base. That information base means you can have more thorough tools, which can reach into the data base and pull out a variable by name. You can say, "Show me total sales." *Javelin* offers tremendous system-building capabilities for value-added resellers.

*Miller:* Are there things you can do in *1-2-3* or *1-2-3* release 2 that aren't yet possible with *Javelin?*

*Kugell:* I don't know of any, and I've been looking hard. That reflects the strength of our development process. We involved companies all over the country, including Merrill Lynch, Citibank, Bank of America, General Electric, and United Airlines. They recognized problems with spreadsheets and wanted to find a superior technology. During development, we delivered six versions of *Javelin.* Our key users identified some essentials we hadn't thought of, which we then incorporated in the product.

*Greenberg:* If *Javelin* is designed to render *1-2-3* obsolete, is it intentional that *Javelin* doesn't accept *1-2-3* formulas?

*Kugell:* Yes. It's technically possible for the program to accept them, but it doesn't for two reasons. First, *1-2-3* works in a real column format, which we're getting away from, so importing formulas doesn't make sense. The second reason is probably more important: Our market research indicates that 30 percent of the



'*Javelin represents a move away from the way most computer programs force people to think about problem solving.*'
—*Harry Miller*

worksheets in use in major corporations contain undetected errors. We're saying that confidence in your results is important. You import the data, so you don't have to rekey anything, but then you rebuild the formulas using plain language, rather than A4 and D5.

Our customers particularly like *Javelin* because they never have to rebuild its models. When someone new comes into a department and has to rebuild a spreadsheet model from scratch, they find that the program's logic won't permit it; it's like trying to trace one strand of spaghetti through a giant ball.

*Miller:* Obviously, lots of people, perhaps millions, know the spreadsheet metaphor.

*Kugell:* Yes, but part of the cell-by-cell work that spreadsheet users do—such as copying data

across columns and rows—is really a burden rather than a benefit. You also want to control factors individually; to be able, for example, to say, my costs are going to grow at a certain percentage rate for 12 months and then at a different percentage rate for 10 months, and so on.

*Javelin* makes it very easy to do that. And it does something a spreadsheet can't do: It provides a Notes view to help you keep track of all those variations in one place. In a spreadsheet, changes are lost somewhere in the cells, and unless you're willing to read and decode the formula for each cell, you won't find out you made certain assumptions.

### A Pitch for Novices

*Greenberg:* Aside from the million people who already know spreadsheets, it seems that breakthrough software expands the market. To what extent are you counting on that?

*Kugell:* Our financial projections suggest we'll be a very successful and stable company with a modest penetration into the spreadsheet marketplace. But from what I can see, our program will make the computer usable by a population that had difficulty with the spreadsheet, and will be a much better tool for experts who have pushed the spreadsheet beyond its limits. There's always been the hope that some day senior management would use computers. For the first time top management can, through *Javelin*, understand what their analysts are doing and see the assumptions behind their results.

*Miller:* The media hype is saying, "Here comes *Javelin*, it's

the program is such a significant step forward that it really is worth switching. In addition, we have already seen users who have given up spreadsheets and who are using *Javelin*.

*Greenberg:* I know a software developer who's been wondering when somebody would introduce a product that enables you to generate numbers by manipulating a graph. Now you can do so with *Javelin*, but why would you?

*Kugell:* Business management often thinks in just that way. A product manager will say, "I figure the product will take off something like this, ramping up slowly and then leveling off ... ," and will draw a curve on a piece of paper.

*Miller:* I love that feature. But don't you see the potential danger at the same time? You draw this curve, but suddenly it's a precise number, which has the ring of truth. It's antithetical to the whole approach you're taking to document assumptions.

which the data was entered. Frankly, the hardest part of the learning curve will be getting in the habit of using the Notes view to document assumptions.

*Kugell:* The logic of *Javelin* is self-documenting, which largely solves the annotation problem. As for the assumptions themselves—until we have an artificially intelligent computer that says, "Now wait a minute, where did you get that?" we won't be able to solve *that* problem.

### Inspired by AI

*Greenberg:* Your background includes artificial intelligence R&D. Does *Javelin* rely on that technology?

*Kugell:* *Javelin* isn't AI, but many of us involved in the design and development of the product benefited tremendously from AI research and user interface technology. Those breakthroughs were developed at AI labs in places like Xerox PARC, MIT, and Stanford.

*Miller:* Let's return to the corporate environment for a moment. What about communication with mainframe data bases? We're starting to see a great deal of work in that area. Sooner or later the connections will become more transparent—where the data comes from or goes to. It's not obvious how *Javelin* fits into that scheme.

*Kugell:* The important thing is to compare *Javelin* with spreadsheets. Spreadsheets make tracking data impossible. They don't

### 'Our market research indicates that 30 percent of the worksheets in use in major corporations contain undetected errors.'

going to knock *1-2-3* out of the marketplace," which seems a pretty silly approach, even if you do feel that way.

*Kugell:* Everyone likes to see interesting activities in the marketplace and interesting challengers like *Javelin* come along. I think people have reacted accordingly—as our users have—because

*Kugell:* This is the "garbage in, garbage out" problem, but *Javelin* substantially alleviates it. If you can put in the Notes view that this is my seat-of-the-pants estimate for how a projection is going to grow, there's no problem. Users need to understand that when they enter data via a graph, they're putting in an approximation.

*Miller:* Right, but there's no way to document the view in

have a central information base, so exchanging data between a spreadsheet and a mainframe or between a spreadsheet and a network is invariably error-prone.

*Javelin* was built from the ground up with importing and exporting facilities—and more can be added to allow it to bring in variables from a corporate data base by name. A spreadsheet can't do

*Miller:* Besides the program's obvious business analysis, planning, and reporting applications, what other business areas is *Javelin* well suited to?

*Kugell:* Our users are telling us that anywhere a spreadsheet is in use, and anywhere that plans, historical information, or forecasts are under consideration, *Javelin* is appropriate.

*Miller:* Your background indicates that you've been playing with computers since you were 7, and from the sound of it, did almost nothing else. Maybe you can dispel that.

*Kugell:* When I was younger, I really did spend most of my time playing with computers. The company my father was working for had a warehouse space problem, so when I was 12 the firm installed a minicomputer in our basement. I already had been programming computers for a while, so this was a dream come true. I spent days and nights in the basement and even installed a buzzer system so I could be called for dinner but otherwise be left undisturbed. Making computers fun and useful has always been of interest to me, but I knew the rest of the world was alienated by them. I simply wanted to share my excitement with other people. ◓

> *'For the first time top management can understand what their analysts are doing and see the assumptions behind their results.'*

that, because there's no name to the line item—it's just a bunch of numbers in a bunch of cells.

*Miller:* What's really useful is for a manager to communicate the underlying structure of a model to his or her supervisor, but not everyone in top management is going to be using a computer. The information has to be available on paper too. Does a *Javelin* report turn out to be a book on ten views of the data?

*Kugell: Javelin* enables you to present what's relevant and not be faced with a spreadsheet 1000 columns wide and 20,000 rows deep. If the issue is strategic or structural, you can print out Diagram views; if it's a question about what the income statement will look like for the next five years, you can print out just that part of it, and so on.

Suppose we want to compute cash flow based on total sales. You book sales in January, but you don't necessarily get the cash in January or February. You collect it over time. The same applies to February sales. That kind of time-delay problem occurs in almost every business model. Spreadsheets give you no tool to deal with this very simple concept. In *Javelin* we created what we call the time-delay building block.

*Miller:* Is it likely that *Javelin*'s central information base will show up in your company's future offerings?

*Kugell:* Yes. The central information base concept and the multiview paradigm are appropriate for all types of applications. They give people the flexibility to work with a problem the way they want at a particular moment, rather than having to think the way the computer does.

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

# Once I had a byte

*that became errant and wild,*
*and started destroying all of my files. It lost all my data,*
*spoiled the show; there was no doubt about it,*
*some chip had to go.*

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# Javelin:
# Beyond Rows
# and Columns

Javelin takes a fresh slant on an age-old problem. Will the new approach be a good enough reason to stop using the ubiquitous spreadsheet?

William Urschel

Problem: Analyze the financial performance of the product line you're responsible for, project future trends, and communicate the results to the vice president of finance, your associates, and potential investors.

Solution: Pull out your copy of 1-2-3, retrieve a spreadsheet file, develop formulas and equations based on relative cell addresses, and hope for the best. Right?

Well, not necessarily. *Javelin* from Javelin Software is being promoted as the "new modeling tool." Offering a different paradigm, the program purports

to replace the spreadsheet and change the way we approach quantitative business problems. For a certain group of computer users (or potential users), these manufacturer's claims may indeed ring true. Others won't break their spreadsheet habits so easily. *Javelin* doesn't so much change the approach to solving problems as refine it. Declaring the spreadsheet obsolete is like saying we no longer need printed pages on which the words run from left to right. In fact, the worksheet metaphor still plays an important role in solving problems with *Javelin*.

Neither *Javelin*'s features nor its technology is groundbreaking. The program can be envisioned as a fancy, free-form data base that uses worksheets, graphs, and tables as both input and output forms. If you could combine parts of *1-2-3*, *Reflex*, *pfs:plan*, *VP-Planner*, and *Note-It*, you could closely approximate *Javelin*'s functionality, but the program does a very nice job of integrating and packaging its abundant features for maximum usefulness.

### ■ Hello, Central, Give Me ...

*Javelin* is evolutionary rather than revolutionary. The program is essentially a specialized data management system with a worksheet and graphs that act as a front end for entering and retrieving data from the data base. The core of the product is a central information base with ten different *views*, or ways to enter and access data; alter the data in one view and it will automatically be updated in all of them.

With a classic spreadsheet such as *1-2-3*, what you see is what you get; with *Javelin*, the worksheet, graphs, and tables draw from a larger pool of related information. Any time the data you are manipulating exceeds what can be displayed on one or two screens, the *Javelin* approach starts to look better. Furthermore, the multiple views (especially the Formulas, Diagram, and Notes views) provide the tools for documenting and communicating the assumptions and logic behind a complex model, one of *Javelin*'s key advantages.

### ■ Easy Model Building

To define a problem using *1-2-3*, you might enter data into a row of cells known as A5, B5, C5, and so on. For convenience you might assign a range name to that row of data, calling it, say, Nebraska Sales, and adding the titles January, February, and March at the top of the columns. In *Javelin* you work in exactly the opposite direction. You begin by naming a variable (Nebraska Sales), then entering the data for that variable for January, February, March, and so on; that data goes into a central data base. The data appears in a matrix form, a graph, or a table only when you specifically request one of those views.

*Javelin* permits only two types of variables: *time series variables* and *constants*. Time series variables can be measured in one of seven units: days, weeks, months, quarters, years, or one of two user-defined time intervals initially called A and B. A constant is simply a variable that doesn't change over time, such as a commission rate that is always 15 percent. Constants must be truly constant; any variation at all requires a time series variable.

A crucial difference between *1-2-3*'s named ranges and *Javelin*'s variables is that a *Javelin* variable is automatically assigned a time factor (unless it's a

> ■ *The core of the product is a central information base with ten different 'views,' or ways to enter and access data.*

constant); every data point is a juncture of a variable and a time period. You could think of the variable name Nebraska Sales as the *Javelin* "row," and the time element March 1986 as the corresponding "column."

Initially you might expect using plain English variable names and time factors to be cumbersome and time-consuming. But *Javelin*'s Spell key makes it easy. When you type in the name of an existing variable (or anything else named in *Javelin*), you can stop after a letter or two and press the Spell (<Tab>) key, and the program will finish typing the word. If there is more than one logical choice, a Possibilities menu

full of likely options pops up (see Screen 1). To complete the entry, you just place the cursor on the correct name and press <Enter>. As you become accustomed to the Spell key, you learn how much of a hint you have to give *Javelin* to get a reasonably small list of possibilities.

English variable names and time series are also easy because *Javelin* "knows" a lot about time factors. Each variable has a user-definable time factor; that is, once you enter the first time period for a variable, the program knows what time periods should follow logically. For example, if you start with JAN86, *Javelin* will fill in FEB86, and so on. In most cases the program simply increments the time period by a day, week, month, quarter, or year every time you press the <Enter> key. It also makes sure you don't accidentally combine two variables that use different time units. You can't add Oklahoma Sales figures by week to Nebraska Sales figures by month, for example, unless you take the deliberate step of combining or splitting the variables to match the time periods.

In the process of building a *Javelin* model, you'll find that setting up a time series variable with an English name is no more of a bother than picking a row or column in *1-2-3* and assigning a range name. Furthermore, the variable name is dynamically attached to the data. That is, the name moves with the data, unlike a *1-2-3* range name, which is tied to cell addresses. In practice, this subtle difference translates into operating efficiency and speed, since in most of the *Javelin* views (Worksheet, Graph, Table, and so on) you have to type in the variable name only once to call up entire "rows" of data, with entries for each time period automatically placed in the correct "columns." It's as if you had to use only the row number in a *1-2-3* worksheet, and the correct column letters would be added automatically.

### A View From the Decahedron

In *Javelin*, you can look at and (usually) enter data into the program's central information base in any of ten ways. The Table, Diagram, Worksheet, Formulas, Quick graph, Chart, Graph, and Notes views are the means for data entry and retrieval, while the Errors and Macro views provide utility functions. When you first load the program, the screen is horizontally split into two windows; the Diagram view occupies the top half of the screen, the Table view the bottom half. You change the view in each window with the main menu's View option. The upper and lower windows don't necessarily have to show two views on the same data—they might well provide the same view on different tables. The Sync key (<F3>) causes both windows (in whatever views) to show the same variable and the same time duration (see Screen 2).



Screen 1: The Possibilities dialogue box presents likely choices for variable names or almost anything else you're too lazy to type out.
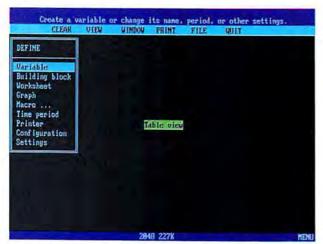


Screen 2: The Sync key causes both windows to display the same variable and the same time period, regardless of the view used in either window. This example uses the Chart and Table views.

A *Framework*-style pull-down menu (see Screen 3) controls program operations—loading files, changing views, defining models or variables. Although mouse support would seem a natural, *Javelin* doesn't include it. Pop-up dialogue boxes prompt you for information as necessary. All of this fancy screen action is fast and well designed, making program operation as much fun as it is efficient.

Thanks to clear manuals, extensive context-sensitive help screens, and a series of case studies that serve as an on-line tutorial, *Javelin* is accessible and easy to learn. Novices and experienced users alike will feel well supported. The demonstration disk is equally well done and inviting.

### A Table for 21, Please

The Table view provides a straightforward way to enter raw data. You define a variable by giving it a name. A settings sheet (see Screen 4) enables you to establish the variable's time value (if you'd like something other than the default monthly time periods). Once the variable is defined, the table becomes a simple list of 21 appropriate time periods (days, weeks, months, quarters, and so on). You enter data into the blanks corresponding to the specific dates. Pressing the <Enter> key repeatedly causes the same data to be entered for each successive time period.



Screen 3: The Javelin main menu. The Define menu option enables you to set up new variables, building blocks, and other parameters.

To enter data for another time series variable, you define the variable using the same procedure; the table will clear, displaying the new variable name at the top. To enter a constant (for example, one called Commission Rate), on the edit line at the top of the screen just type Commission Rate = .15 and press <Enter>. *Javelin* understands that simple assignment and automatically creates a constant called Commission Rate.

Things get interesting when you start creating variables from variables. For example, suppose you established the two time series variables mentioned earlier, Oklahoma Shoe Sales and Nebraska Shoe Sales, both using weekly time periods. You could then build a new variable called Total Shoe Sales simply by typing Total Shoe Sales = Oklahoma Shoe Sales + Nebraska Shoe Sales <Enter>. This new entity would naturally be a time series variable, covering the same time span in the same increments as the two original variables.

### Sketching the Structure

Once you define several related variables, the Diagram view springs to life. This view offers a visual representation of the relationships—the structure and flow of the data—among the variables in a model. So far the diagram of the sample model is simple: The names Oklahoma Shoe Sales and Nebraska Shoe Sales are connected by lines to Total Shoe Sales (see Screen 5). As you define and add more variables, the



Screen 4: The Variable Settings sheet establishes formats, time periods, and methods of coordinating time units with other variables.

model becomes more complex and grows horizontally; you can view it by scrolling laterally in the window.

Therein, however, lies one of the program's biggest flaws: Following the diagram's logic is often difficult. This horizontal scrolling seems unnatural—the vertical organizational chart in the Rollup building block (see the discussion under "Erector Set") is much easier to follow. Whether you're moving vertically or horizontally, however, getting lost is easy when the model features several branching points; you can travel far along any given path without finding the relationship you're seeking. While you could force the diagram to jump to a given variable, you still can't see exactly where that piece fits into the overall puzzle. Unfortunately, your view of the structure doesn't improve when you devote the entire screen to the Diagram view. Perhaps a "long distance" perspective would help, where the elements could be "zoomed out" so the entire chart could be seen at once. Several spreadsheet analysis programs do this for *1-2-3*, displaying entries in the matrix as one-letter markers.

Another problem, regardless of perspective, is that the lines connecting the various elements in the Diagram view do not always define the nature of the relationship between one element and another; they only indicate that the variables are connected. The Diagram view sometimes displays the underlying formula, but when the relationship is complex it gives nary a hint. The manual doesn't tell you how to make the Diagram view more useful: Fill an accompanying window with the Formulas view and "sync" the windows with the <F3> key.

### White-Collar Worksheet

*Javelin* worksheets have a Spartan look, eschewing row numbers or column headings; when you first select a worksheet nothing but the title appears. It's up to you to decide which variables from the central data pool to display. Unlike with traditional spreadsheets, the data is often entered before you even see the worksheet matrix. Remember that the *Javelin* worksheet is just another pretty face on the central information base, rather than the data base itself.

One option that's always available is to expand a view to fill the whole window rather than just half. I found myself doing this every time I worked in the Worksheet view.

You fill the *Javelin* worksheet with data by placing the cursor in the left border and typing in a variable name, such as Oklahoma Shoe Sales. Nothing happens until you move the cursor into the top border of the first column and enter a date, say JAN86. Instantly the January 1986 sales figures for

*The Table view provides a straightforward way to enter raw data.*

Oklahoma appear in the cell at the intersection of the variable name and date. The cursor automatically moves one column to the right; press <Enter> again and FEB86 appears in the top border, with the corresponding data displayed beneath it. If you continue pressing <Enter>, you add succeeding months until you run out of data.

If you return to the left border and type in Nebraska Shoe Sales, the Nebraska data for the months listed at the top instantly appears across the matrix. Here's where *Javelin* shows its speed; by contrast, *1-2-3* requires that you enter data into every one of those cells.



Screen 5: The Diagram view tracks the logic and structure of a model.

As with the Table, Quick graph, and Chart views, you can enter data from the Worksheet view. If you place the cursor in one of the data cells and type in a new number—changing March sales for Nebraska from 98 to 77, for example—all views will reflect that alteration to the central data base.

You can also create new variables from the Worksheet view. Simply type the variable name in the left border and start entering data. Alternatively, you

> **Much to** Javelin's *credit,*
> *functions are self-prompting.*
> *It's a far cry from counting*
> *parentheses.*

can list or create the variables as indented subheads. For example, if the three variables were Nebraska Shoe Sales, Nebraska Commissions, and Nebraska Bonuses, you could list them as they appear in Screen 6. *Javelin* would interpret each as though you had typed out the full variable name. Similarly, you can stack variable names in the top border. The *Javelin* manual indicates that the number of indentations is unlimited.

Accomplished spreadsheet modelers will need to overcome old habits and learn to use the left border of the *Javelin* matrix as a scratch pad, entering a "shopping list" of variable categories followed by specific variables. You can add to and delete from this list fairly easily, specify dates in the columns, then enter data in the cells. Still, I found myself sketching even fairly simple *Javelin* models on paper before trying to define variables. I missed the visual mapping and all the ruminative moving and copying you can do within a matrix, and I missed the feeling of being someplace in the model. Also conspicuous by their absence: data query and extract functions. *Javelin* is not as useful as *1-2-3* for managing lists.

Although you can enter data in this view, the worksheet's primary function is to provide a quick report on the data base. The worksheet boasts one potentially spectacular feature: a quick conversion to

three dimensions, accomplished just by entering a date or another delimiter in the upper left corner. Suppose, for example, you had 20 shoe stores in as many states, and you wanted to build one generic worksheet for all instead of 20 nearly identical worksheets. You'd create a worksheet with sales, commissions, and bonuses down the left border and dates across the top. To extract the appropriate data you would put the cursor in the upper left corner and type in the branch name—Nebraska, for example. Instantly all the Nebraska sales, commissions, and bonuses for all those dates would appear in the worksheet. Replace the word Nebraska with Oklahoma and the data instantly changes.

The *Javelin* worksheet is highly automated, but experienced *1-2-3* and *Symphony* users might feel disappointed by its relatively crude formatting functions. You can add labels (using *1-2-3*-style prefixes) and an additional horizontal border (with the border entries affecting the cells below them), but the process of formatting individual cells or specific ranges is not slick. For example, to create a single cell containing a total you have to fashion an "exception" cell through a special *WORKSHEET menu. Unfortunately, the Worksheet view lacks a Move command; moving data requires an awkward combination of Copy and cell-by-cell Delete commands.

Formatting functions cannot operate on any range except a single cell or a row. Other missing facilities: special format headings, page number control, and automatic date insertion on printed reports. *Javelin* does not accommodate formatting of long printouts.

### At the Junction
*Javelin*'s designers built a useful set of mathematical @ functions into the program. Compared to *1-2-3*'s @ functions, *Javelin* comes up short in the higher math department, lacking arc cosine, arc sine, arc tangent, and about half a dozen other functions. Also missing are a random number generator and values for true, false, error, and so forth. On the other hand, the package has plenty of capabilities that are more likely to be helpful to business users. These include special sum functions, like Rolling Sum, Total Sum, and Year-to-Date and Quarter-to-Date (both based on a user-defined fiscal year that defaults to a calendar year). The Previous function increments the value of a variable, as in $X = X + 1$. *Javelin* offers a

variety of period conversion, calendar, and understandable statistical functions. I particularly like Predict, which returns the predicted value of Y when X = Xvalue. What's missing from both Javelin and 1-2-3 release 1A are string functions capable of manipulating character strings in formulas.

Much to Javelin's credit, functions are self-prompting. That is, as you type the @ function, the information line (second from the top of the screen) shows what you should type next (see Screen 6), and the Spell key offers parameter choices that might be used as an argument to the function. It's a far cry from counting parentheses.

Overall, most users will be better served by the Javelin function library than by the 1-2-3 release 1A set, but science- or math-oriented 1-2-3 users won't want to defect; they'd miss some of their favorite tools.

### How Fast Do Spears Fly?
The model built for this evaluation consists of a simple projection of annual costs and returns for a mythical software start-up. I used identical data to create models in 1-2-3 and Javelin. The 1-2-3 version takes up about 23K of RAM and 19K of disk space, whereas the Javelin model consumes 36K of RAM and about 23K of disk space. At this size, the 1-2-3 worksheet is still snappy on my Compaq Deskpro. The similar Javelin model walks; a slowdown is evident as the model grows beyond 20K. Like 1-2-3 release 2, Javelin can take advantage of up to 8MB of RAM under the Lotus/Intel/Microsoft Expanded Memory Specification, and it supports the 8087 or 80287 math coprocessors.

1-2-3 takes less than half a second to refresh the screen, and a 1-2-3 <End>-<Home> maneuver or a <PgDn> or <PgUp> is instantaneous. Javelin lacks a Move command, but the Copy command takes 2.5 seconds to perform a similar operation, and you still must delete the duplicate data from the source cell. In even a very small Javelin worksheet, it takes half a second to get home and a full second for the screen to "bubble" up or down after a <PgUp> or <PgDn>; larger models slow operation even further.

A simple 1-2-3 manual recalculation requires less than a second; the Javelin model takes slightly

more than 5 seconds. It's easy to see why Javelin lacks an "automatic recalculation" setting. Javelin's sluggish execution speed is evident in all views. The price you pay for more comprehensible models is longer command sequences and slower recalculations and screen refreshes.

While these performance ratings are important, they are sometimes offset by efficiencies; even though commands may take extra keystrokes, some models are simply easier to build in Javelin. It is also noteworthy that no speed degradation is evident on 80286-based machines.

### Variables + Relationships = Formulas
Toward the worthy goal of tracing a model's underlying assumptions, the Formulas view is most helpful: It lists in alphabetical order by variable name all the formulas you have built. Alternatively, you can view formulas by their roots with the most general on top and subordinate formulas indented beneath it in outline form. Both variations are useful, but the roots method is particularly handy for tracing your logic, especially when synchronized with the Diagram view. Because the basic formulas can apply to many cells and the elements are in English, scanning this list is



Screen 6: As you define a function, the information line (second from the top of the screen) keeps track of the arguments or data that the function expects.
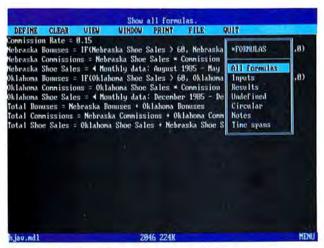
far easier than reading a *1-2-3* worksheet cell by cell. Furthermore, the Formulas view acts as a data dictionary for your models—retrieving, for example, all formulas used as inputs, those containing results, and those with currently undefined variables, with circular references, and with notes attached (see Screen 7). The Formulas view lacks the useful ability to retrieve all constant variables as a subset of those used as inputs.

### Connecting the Dots

If you often step back from the day-to-day data points and try to deduce the trends your business follows, you may get a kick out of the Quick graph view. It displays the data for a given variable in the form of a line graph, with a value scale up the *y*-axis and time increments along the *x*-axis. This graph requires graphics hardware, however, and when you select a Quick graph view it always takes over the screen.

What makes this view so much fun is that it provides yet another data entry method for the central information base. As you use the cursor to move the line up and down for each period, you are changing the data in the data base (see Screen 8). The graph is scaled automatically so you always see the entire vertical axis. (You will need to scroll horizontally, however.) To enter more precise figures than cursor movements permit, you can type a number in directly. A Quick graph view is instantly available with a press of the <F8> key.

### Passing the Bar

In its data entry and reporting capacity, the Chart view (see Screen 2) resembles the Quick graph view. Instead of a line graph, the Chart view uses a simple ASCII-character-based bar chart that requires no special graphics hardware and can share the screen with another view. As with Quick graph, you manipulate the bars with the cursor keys.

Entering data through a graph brings up a potential problem: Meaningless or poorly rationalized data can be entered all too easily. Numbers from a computer printout take on an air of authenticity they often don't deserve. If the data was created with an artistic flick of the cursor, this authoritative aura is even more suspect. Pictures are often drawn to portray our hopes rather than our honest expectations.

Worse, *Javelin* provides no way to determine where any of the data originated, other than the Notes view, which requires that you be perhaps unnaturally disciplined. It's also left up to you to print out the views of the data needed to document or illustrate assumptions or data sources.



Screen 7: The *Formulas menu helps you home in to display only those formulas you really want to see.



Screen 8: You can enter data into the central information base by simply moving the cursor (the box) around on the Quick graph view.

## Presenting the Graph View

A third graphics-oriented view, called the Graph view, functions only in the display mode and is designed for presentation graphics. Like the Quick graph view, it requires graphics hardware and claims the entire screen.

None of the seven types of graphs (line, bar, stacked bar, percent bar, horizontal bar, exploded or whole pie chart, and x-y scatter plot) is visually earth-shaking. Noticeably absent is the high-low-close graph form. Except for the pie chart, however, each graph type can display up to seven variables at once, and all the graphs are extremely easy to define and display. You won't need even a glance at the documentation.

## Finding Faults

Should you try to enter an invalid formula, you'll be greeted by the word 'Error' in the bottom right corner of your screen. To locate your blunder, switch to the Errors view.

The Errors view displays a list of the formulas that contain time-period errors or undefined variables. You can refine this list with commands on the *ERRORS menu. Happily, *Javelin* doesn't stop you each time you enter an erroneous formula. It's much more convenient to enter formulas in a batch, then correct them all at once.

## Passing Notes

The Notes view enables you to attach a memo to any variable or building block in your model. You might record the data's origin or how reliable it is, or perhaps explain the logic behind a complicated formula.

The Notes view provides only the bare essential word processing features—word wrap and cursor movements—but places no limit on the size of a note. Unfortunately, *Javelin* doesn't provide an easy way to print all notes in a given model. You can use the Formulas view to determine which variables have notes attached, but printing those notes is a tedious and repetitive process. The Notes view is not as tightly integrated with the rest of the views as you might expect. It would be nice to have notes sharing a page with data from a Worksheet or Graph view; instead *Javelin* relegates text to footnote status by printing each note on a separate page.

The Notes view is an excellent idea, but *Note-It* for *1-2-3* performs a similar yet more exacting function by assigning a note to a specific cell. You might want to explain why sales figures went up or down in a given month, for example, and it's just not as natural to describe such a "blip" at a more general level.

## Erector Set

*Javelin* includes five special processes called "building blocks." You can name up to five existing variables as inputs for the process and name a corresponding variable for the results. Any *Javelin* model may use as many combinations of building blocks as needed to get the job done. Although they operate on the central data base, building blocks are evident only in the Diagram view.

The Time Delay building block is a simple way to account for the lag time in collecting receivables or in forecasting responses from a direct-mail campaign. Constructing the same function would require a great deal of time and energy in *1-2-3* or *Symphony*, and it would probably be chock-full of errors the first time out.

The Rollup building block is a wonderfully simple way to integrate separate *Javelin* models. You can consolidate variables from a variety of models by means of an organization chart, and it's easy to keep the logic straight even if you're pulling in variables from ten models or more. But be aware of two drawbacks: You must be absolutely sure the variable names are consistent (Sales can't mean dollar sales in one model and unit sales in another), and there is no selection process within a variable; you get the whole row—data for all the time periods—every time.

The Import Data building block reads *1-2-3* worksheet files, bringing both the labels and the data into a *Javelin* worksheet. Once the labels are imported, it's easy to create variable names and formulas to define the imported data; you can then erase the old label. Unfortunately, *Javelin* can't import *1-2-3* formulas at all.

The Lookup Table building block is similar in function to a lookup table in *1-2-3* or *Symphony* but is much simpler to understand. Tax tables, for example, are a snap. You place the numbers that determine

the tax brackets on one side of the divider and put the reference numbers (and, if desired, multiplication factors) on the other.

The Curve building block represents the relationship between two variables as a curve. Curve operates much like the Quick graph view, except that it defines the interaction of two variables. You could, for example, use a curve to visually represent the effect of sales volume on distribution costs.

### Economical Macros

*Javelin* provides macro capability with a learn mode; that is, the program can record keystrokes in a file and play them back. As in *1-2-3*, basic macro commands supply the logic for programming the operation of *Javelin*. You can create macros by one of two methods: Set the program in Record mode by selecting an option on the Define menu, or type the desired keystrokes directly into a Macro view window. Unlike *1-2-3* macros, which are stored in specific cells on the worksheet, *Javelin* macros are stored in a separate disk file. Once you give the macro file a name, however, you can run it by pressing <F7> and then entering the macro's name or choosing it with the Spell key. If you limit the name to one letter you can also invoke the macro by simultaneously pressing <Alt> and that letter. *Javelin* provides the option of running the macro step by step, useful for debugging a long macro.

The commands for conditional logic, branching, and interactive macros are more or less on a par with *1-2-3* release 1A commands. *Javelin* macros don't require as many cursor movements because the program isn't matrix bound, but they do have many more menu options to negotiate because *Javelin* commands break each operation into more steps. For example, to create a custom menu in *1-2-3* you enter a single command (/XM) with two or more options. In *Javelin* you use three commands, @SELECT to begin the menu, @CHOICE for each item on the menu, and then @ENDSELECT to terminate the menu. A simple prompt requires two commands, one to prompt you for data and another to read the input. This is yet another way in which the program seems easier to learn than *1-2-3* but is not necessarily easier to use.

*Javelin* also features autostart macros. Just as *1-2-3* looks for a file called AUTO123.WKS each time it is loaded and calls that file if it exists, *Javelin* seeks a macro file called AUTOEXEC each time it starts.

### Reporting Targets

*Javelin* is designed to report and communicate results as much as to analyze data. Thus you should be able to easily format a *Javelin* report that contains all the display features of a *1-2-3* worksheet. A "define" screen enables you to create headers and footers with page numbers, dates, and the current time. You can set the margins to suit your preferences, specify that the borders repeat on every page, and enter printer initialization strings, just as you can with *1-2-3*. *Javelin* enables you to append one ASCII file to another when you print to disk, while *1-2-3* does not.

Unfortunately, the *Javelin* worksheet (which is the principal "report" view) is not nearly as easy to format as a *1-2-3* worksheet. Because *Javelin* has no Move command, you are forced to copy and then delete data. Further, each individual command seems to take at least one more keystroke than the *1-2-3* equivalent. If you want to include items other than time series variables on the worksheet, you must enter them individually as "exception cells." For example, to print a reference of constant variables only, you'd have to create a small worksheet with each constant represented as an exception cell. This would mean typing in each variable at least twice—once to define it and again on the worksheet as a reference. To add insult to injury, the print menu disappears each time you select an option, such as 'align' or 'page', forcing you to invoke it from the main menu again.

In short, the Worksheet view offers an adequate, but not extensive, report writing facility. It lacks some of the formatting flexibility found in *1-2-3 Report Writer*. More important, the system is designed to use more than one format or view to communicate the results, yet no simple way exists to create a printed report containing several views. You'd have to create a macro for frequent reports that combine Worksheet, Graph, and Diagram views, for example.

### A New Standard Bearer?

Is *Javelin* a reliable and useful product? Can you use it to analyze and solve the quantitative business problems it is designed to address? The answer to both questions is simply yes. If your problem involves time series analysis, *Javelin* may be ideal. However, because *Javelin* is heavily oriented toward such analysis, problems based on parameters other than

time are solved only by working around the program's inherent prejudices. It's a good, solid program, but as far as greatness goes, sliced bread's position is still safe.

One reason for the success of *VisiCalc* and *1-2-3* is that those programs gave electronic form to a common business metaphor—the accountant's spreadsheet. *Javelin* adds several other metaphors to accommodate those who approach quantitative business problems in terms of formulas, diagrams, or graphs. Furthermore, *Javelin* attempts to free the user from monitoring essentially meaningless cell addresses, instead referring to specific data points by a variable

> *If your problem involves time series analysis,* Javelin *may be ideal.*

name and time period. Theoretically, at least, saving a step in such mental translations should result in more reliable models.

These design goals are relevant to the needs of many current and potential spreadsheet users, and to the extent that they've been met I applaud the designers. But the product is not without its flaws: The Diagram view is awkward to follow as the model grows in complexity, yet it is the manipulation of large models that the Diagram view is intended to simplify. *Javelin* starts up with a display of the Diagram and Table views: The Chart and Formulas or Formulas and Table views might have been more sensible defaults. Recalculation and screen refresh is somewhat slow on an 8088-based PC. None of these problems, however, is substantial enough to dissuade you from using the program.

*Javelin* will probably find its earliest acceptance in the corporate market, especially in finance and accounting departments. Its added conveniences may just be enough to make it a useful tool for treasurers and financial officers who would prefer to continue conversing in English rather than in cell addresses.

The size of the models you regularly use may also determine the method you prefer: For simple two-dimensional worksheets—scratch-pad-type

work—*1-2-3* is faster and more straightforward. In those cases, having everything on the table, so to speak, is an asset. As soon as the model grows more complicated, however, *Javelin* may make it easier to switch than fight.

Most people design spreadsheets for convenience rather than accountability, with a patchwork of range names and fixed values instead of generic variables. *Javelin* helps create some order out of chaos because it excels at imposing a structure on your model and forcing you to use variables for everything. If you've been plagued by awkward and cryptic models or are concerned about the underlying logic of your reports, *Javelin* may be the answer. On the other hand, those gifted few who can intuitively keep a worksheet straight and create and use a table of range names will find *Javelin*'s hand-holding features a hindrance. Some of us are quite comfortable with the spreadsheet metaphor we've been using.

To supplant a standard, you have to do just about everything better. Witness the way *1-2-3* walked away with *VisiCalc*'s market not just by adding graphics, data management features, and macros, but by outperforming *VisiCalc* in all of the latter's capabilities. *Javelin* is a fine specialized tool, but it's not as flexible or universal as *1-2-3*.

For those users who feel that the design of spreadsheets is prone to errors and who regularly create complex time series models, *Javelin* is a major step forward. But the old standby's flexibility, as well as users' spreadsheet-oriented habits, will certainly keep many current *1-2-3* devotees loyal. ⬤

*William Urschel is a freelance writer and author of accounting software.*

# Unconventional Outliners

Whether you're writing reports or planning projects, outlining programs can help pave the way. Freestyle, Fact Cruncher, and MaxThink all start with an outline processor and then branch out in unique directions.

*Charles Spezzano*

You can't scan the classified employment ads for corporate managers without seeing terms like *diversity, innovation, creativity, challenge,* and the ever popular *chance to have an impact.* There's no questioning the seductive appeal of such language, yet the day-to-day reality of being a manager often boils down to the rather demanding work of overseeing projects and writing reports.
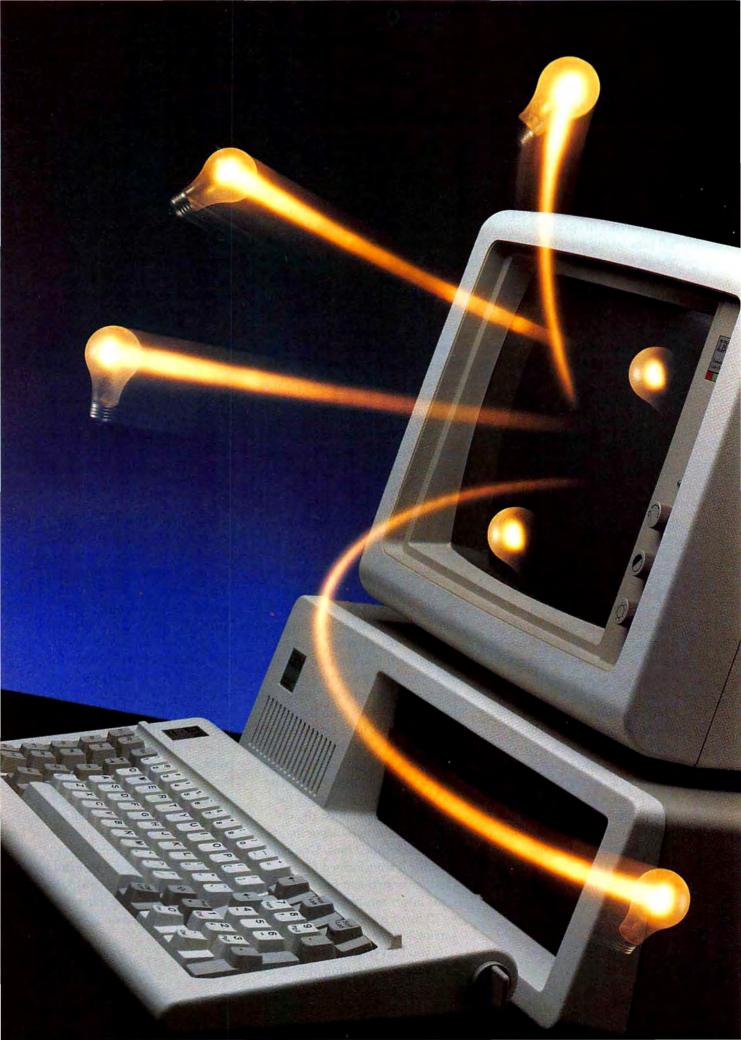
Whatever their scope, projects and reports require organization as well as creativity. You can turn to your spreadsheet or data manager for help in organizing the numerical side of the report, but what about the people, the events, and the ideas?

A host of programs promises to do for facts and ideas what a spreadsheet does for figures: organize them into a structure that makes them more manageable, meaningful, and useful. These new packages come in two basic guises: text data management systems (or idea processors), which let you create sets of electronic index cards that you can search through by keywords; and outline processors, which encourage you to list your thoughts in the order they come to mind and then shuffle and sort them into outline format.

Thus far, the outliners are more in demand. Several years ago, Living Videotext introduced outlining to the PC with the popular *ThinkTank;* Ashton-Tate refined the concept with its integrated package, *Framework.* (See *From the Software Shelf* in this issue for a review of Living Videotext's new RAM-resident outliner, *Ready!,* and "Reinforced Framework," also in this issue, for a look at Ashton-Tate's new update.) Soon other companies were designing programs around outliners, stretching the concept into useful and sometimes bizarre applications. *MaxThink* (MaxThink Inc.), *Freestyle* (Select Information Systems), and *Fact Cruncher* (Info-Structures) all have outline processors as their conceptual core, yet aside from the ability to create outlines, there is little resemblance between the programs.

*MaxThink* is a "pure" outliner that builds upon *ThinkTank's* foundations. Like its predecessor, *MaxThink* is not a complete word processor, but it has enough features to handle many writing chores. *MaxThink* goes far beyond *ThinkTank* in its profusion of commands, which help you Classify, Prioritize, Sort, Join, and Separate ideas and facts. In contrast, *Freestyle* is a complete word processor with a strong outlining

feature built-in. *Fact Cruncher* combines an outliner and a data manager into a unique project management program.

## ■ MaxThink

*MaxThink* is tangible proof of the virtues of specialization. A full-time, stand-alone outline processor, *MaxThink* does its job with more sophistication and flamboyance than any other outliner on the market. Its polished design compensates for the mimeographed manual, which, appropriately, quickly gathers dust. After half an hour's practice, you can navigate this program independently, with only occasional trips back to the documentation.

*MaxThink* drips with advanced outlining features. In fact, if you're not inclined to be playful in the initial stages of your writing or project planning, *MaxThink* may overwhelm you at first. The manual's insistent invitation to explore the seemingly endless ways of listing, reorganizing, combining, and cross-linking information will make you feel like you're being dragged onto a roller coaster by a friend who won't take your anxious *no* for an answer.

*Brainstorming* *MaxThink* operates by means of hierarchical menus and submenus, both displayed at the bottom of the screen. With experience, you can bypass these in favor of function key commands or by entering a sequence of characters on the command line. You begin an outline by typing a title at the top of the screen and then listing topics. The most natural way to do this is to type anything that comes to mind. Pressing <F10> automatically adds a consecutively numbered and appropriately indented new line to the outline for your next thought.

Once you create a list, you can choose commands from *MaxThink*'s Brainstorming menu to gradually sculpt it into a framework for your report or project outline. You'll probably want to start with the Prioritize command. Prioritize lets you order random items by rank, based on the relative importance or urgency you assign each item. A line divides your list into ranked and unranked segments (see Screen 1). You transfer each topic from the unranked segment below the line to the ranked segment above it by typing the topic's number or moving the pointer and pressing <Enter>. *MaxThink* automatically numbers each new topic as it joins the ranks of the prioritized.

A more exotic idea-sorting method uses the Binsort command, which enables you to sort items into various "bin" categories you establish, such as "right now," "tomorrow," "in the near future," and "only under extreme duress from division manager." Items can be marked as bins with the <F5> key. Once they have been knighted in this fashion, the bins move to the top of your list, separated from the remaining topics by an ersatz picket fence running across the screen. You then assign the remaining items into one or another of the established bins. Gradually your list is transformed from a random assortment of events or ideas into a meaningful set of topics. Binsort is especially helpful in sorting long, complex lists.

If you find yourself staring at a list without any notion of how to organize it, you can use the Randomize command to sort the list into one random order after another until the proximity of several items triggers the notion of a possible category. Other commands let you sort lists alphabetically, Join topics together, Divide topics into items by word, sentence, or paragraph, Fence topics into segments, and Categorize topics into subtopics. The list of commands goes on.

*A Ration of Annotation* Once a skeleton outline is assembled, you can Annotate it, that is, start writing. Because annotated text is indented, it does not interrupt the visual flow of the outline. The annotating process gradually transforms an outline into a document with headings, subheadings, and text.

*MaxThink*'s word processor provides a range of text editing features broad enough to write an entire report; however, like *ThinkTank,* it offers little in the way of formatting functions. You'll probably want to use *MaxThink* up to a point and then port the outline over to your favorite word processor. *MaxThink* can save files in *WordStar* or ASCII format.

No matter how complex a *MaxThink* outline becomes, you can collapse it to display only major headings or the first few levels of subheadings (see Screen 2). Collapsing data furnishes the main advantage of an outline processor—reducing an otherwise unmanageable array of information into a pattern you can grasp in a glance. Then you can expand it again and continue on your way.

## Freestyle

You can think of *Freestyle* either as an outliner with a full-featured word processor or as a word processor with a flexible, tightly integrated outliner. The menu-driven word processor, a version of Select Information Systems' *Select* software, contains several unique features in addition to its outline function.

*Freestyle* comes with a thorough 233-page manual and an on-screen tutorial that should put you in control of the package in about 90 minutes. The core program offers the joys and sorrows of all menu-heavy word processors. The menus start out as buffers against the frustration of getting acquainted with a new program but soon become hurdles in your path. The version reviewed–1.5– executes commands much more quickly than the original program, but the extra keystrokes required to navigate the numerous menus and submenus limit performance.

If menus don't bother you, *Freestyle*'s numerous capabilities are worth a closer look–the pro-gram's ability to simplify complex features is refreshing. For example, the program's mail merge is logical, flexible, and easy to use. *Freestyle*'s handling of science and foreign language characters is another elegant feature. Just press <GrayPlus> in combination with another key to insert the special math, Greek, and other foreign language characters in your text. A Draw command lets you create regular lines, thick shaded lines, or lines that end in arrowheads. You

```
  0   Uses of MaxThink♦
      1   evaluating♦
      2   analyzing♦
  ➔   3   outlining♦
      4   ++++++++++++++++++ P R I O R I T I Z E ++++++++++++++++++++♦
      5   word processing♦
      6   prioritizing♦
      7   creating parallelism and sequence♦
      8   selecting♦
      9   problem solving♦
     10   perceiving♦
     11   making lists♦
     12   collecting information♦
     13   synthesizing♦
     14   writing♦
     15   organizing♦
     16   thinking♦



  PATH: █


  Please enter path for Prioritize
  TEXT      2        PATH: 0.3              200K Bytes \sample1
```

Screen 1: With MaxThink's Prioritize command, you can quickly reorder a list of topics from most important to least important. When you select a topic, it disappears from below the separator and reappears above the line in the position requested.

```
  0   ADVANCED SPREADSHEET MANAGEMENT♦
  ➔   1   Formats for display of data♦
      2   Aligning data within cells♦
      3   Changing the Widths of Columns♦
      4   Protecting Cells and Ranges Against Data Entry♦
      5   Erasing a cell, range, or spreadsheet♦
      6   Adding and Removing Rows and Columns♦
      7   Copying and Moving Cells or Ranges♦
      8   Redimensioning a Spreadsheet♦
      9   Moving Around a Spreadsheet♦
     10   Viewing Nonadjacent Parts of a Spreadsheet♦
          1   Splitting a Spreadsheet Window
     11   Formulas♦
          1   Operators
          2   Order of Precedence
     12   Global Recalculation Command♦
          1   manual recalculation
          2   iteration and circular references
          3   step recalculation
     13   Listing Settings and Formulas♦

  MAIN: Brainstorm    Copy    Delete    Edit    Files    Get    Help    Insert
        Jump    Move    Options    Put    Quit    TPL    Set_marker    Undo
     Menu of Brainstorm commands
  TEXT      3        PATH: 0.1              200K Bytes \spread
```

Screen 2: A MaxThink outline with topics and subtopics displayed. Subtopics can be hidden (collapsed) by pressing < Ctrl > - < CursorLeft > and displayed (expanded) by pressing < Ctrl > - < CursorRight > .

can use these to construct boxes, charts, and simple drawings in the middle of your text.

The Check command, which brings up the Superspell program from a separate disk, proofreads your documents for spelling errors against a 10,000-word dictionary. Unlike some more sophisticated spelling checkers, Superspell doesn't suggest correct spellings for misspelled words, nor does it replace them during the proofreading process; it simply marks them for later editing.

*Headings Up*   The *Freestyle* outliner is a deluxe version of the automatic table of contents generators included in some high-end word processing programs, such as *WordPerfect* and *MultiMate Advantage*. If you have written a report with section headings, you can go back and mark each one for inclusion in the outline (see Screen 3). This reverse outlining can be time-consuming if you have many section headings and subheadings, but it can turn *Freestyle* into an idea processor as well as a table of contents generator. Because *Freestyle* documents are limited only by disk space, you can write a number of letters, memos, reports, articles, and notes in a single file and mark each item's title as an outline heading. Then, using search and move commands, you can piece together a document from these smaller elements as you do with the "index cards" you collect with a text management system.

You can also create the outline headings first, move them around until they satisfy you, and then transfer the outline to the word processor, where you can insert text. However you use the program, the real power of *Freestyle's* outlining system comes into play after the document is written and outlined. One unique feature is a bar chart to the right of the outline that shows the relative length of each section. This helps you to identify imbalances in the treatment of your subtopics (see Screen 4).

In addition, by moving back and forth between the text of the document and the document outline, you can simplify otherwise cumbersome editing chores. For example, as in *Framework*, you can copy or move a large section of text within a document simply by moving the section heading within the outline. However, because *Freestyle* has no expand or collapse feature and treats all outline entries as equal (that is, without hierarchy), you must highlight the associated subheadings and move them with the heading.

*Freestyle* differs from full-time outliners in its failure to "understand" the relationship between headings and subheadings. The only way to identify an outline entry as a subheading of the line above it is to move the cursor over a few spaces before entering the subheading line. There is no command for creating a subheading, and the <Tab> key and <Space> bar don't work in outline mode.

Overall, *Freestyle* is a thoughtfully designed word processor and outliner intended for managers who neither like to write nor have time to spare for reading manuals and memorizing commands. Although the word processor is hampered by ubiquitous menus and the outliner is limited by the lack of hierarchy, *Freestyle* stands out as one of the few full-featured word processors that embody a tightly integrated outline processor.

### Fact Cruncher

*Fact Cruncher* offers an interesting alternative to the usual crop of project managers with their emphasis on PERT charts, Gantt charts, and critical path analyses. Often, managers find these programs difficult to learn and impractical to use.

*Fact Cruncher* aims to provide a simpler substitute but is only partially successful. Its concept is fascinating, but the design proves too esoteric. *Fact Cruncher* attempts to disguise a data manager in the familiar form of an outliner. Each line in the outline is actually a data base record composed of up to nine fields. These records/lines can be sorted by fields such as date, type of project, the employee the project is assigned to, or any other useful document or project information.

Since each line constitutes a data base record, you can search for subsets of records that match criteria specified for any field. For example, you could quickly identify steps in a project that had been completed by a certain date or those that pertained only to product distribution.

*Fact Cruncher* was created for writing system and program documentation, and it hasn't fully made the transition to a tool for managers and professionals. When reading the manual, you get the feeling that the publishers of *Fact Cruncher* haven't quite decided if

its audience is the business manager or the programmer. The already difficult concept of an outliner/data manager is complicated by the use of overly technical terms for field names.

***Fascinating Fields***   Unlike *Freestyle, Fact Cruncher* is fully aware of the relationship between headings and subheadings. You create a record by entering the Component Description—the actual text of the outline heading. *Fact Cruncher* assigns a line number to this item, which is renumbered if a line is added or deleted above it in the outline. Based on the item's indentation, the record also receives a level number, which can be displayed in one of three traditional styles: Classic, Decimal, and Program. These identifiers are automatically revised when you rearrange the outline.

Next, you enter the Component Type and Component ID. The Component ID categorizes components within the data base, and the Component Type is an abbreviated prefix of that identifier. For example, certain lines in a project outline might describe the results of research on consumer preferences. Another category might contain lines describing specific arrangements for product packaging and promotion. You could tag the lines with the appropriate

```
( Insert Outline Draw Erase Use Tab Key Goto Format Quit Help Next
Document: C:OU.                         Char: 23 Line:  45 Page:    4
---------L----+----+----+----+----+----+----+----+----+---------R----
        No matter how complex a <<MaxThink>> outline becomes you can
        collapse it so that only major headings or the first few levels
        of subheadings are displayed (see Screen 2). Then you can expand
        it again. Expanding and collapsing furnish the main advantage of
        an outline processor--reducing an otherwise unmanageable array of
        information into a pattern you can grasp in a glance.



        You can think of <<Freestyle>> as either an outliner with a
        fully-featured word processor or as a word processor with a
        flexible, tightly integrated outliner. The menu-driven word
        processor, a version of Summa Technology's ██████ software,
        contains several unique features in addition to the outline
        function.

        <<Freestyle>> comes with a consummate 233-page manual, and an
        on-screen tutorial that should put you in control of the package
        in about 90 minutes. The core program offers the joys and sorrows
        of all menu-heavy word processors. The menus start out as a
        buffer against the frustration of getting acquainted with a new
```
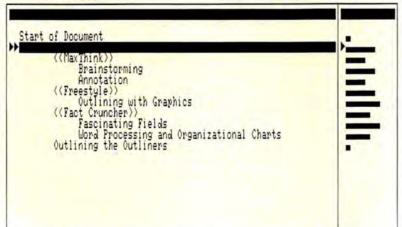
Screen 3: Freestyle's menu-driven word processor is a version of the Select program. Among other features, Freestyle provides mail merge, spell checking, and box graphics. The highlighting around the word "Freestyle" indicates that it has been selected for inclusion in the outline shown in Screen 4.

```
)OUTLINE: Insert Move Copy Zap Goto Write View Attach Reference Help    <ESC>
Document: C:OU.                         Char: 43 Line:   8 Page:    2

  ┌──────────────────────────────────┬──────────┐
  │ Start of Document                │ ▪        │
  ▶▶                                  ▶          │
  │    <<MaxThink>>                   │          │
  │        Brainstorming             │          │
  │        Annotation                │          │
  │    <<Freestyle>>                 │          │
  │        Outlining with Graphics   │          │
  │    <<Fact Cruncher>>             │          │
  │        Fascinating Fields        │          │
  │        Word Processing and Organizational Charts │
  │    Outlining the Outliners        │ ▪        │
  │                                   │          │
  └──────────────────────────────────┴──────────┘
```

Screen 4: Freestyle's outliner can be connected directly to headings and subheadings in the main article. Although the outliner provides no expand or collapse features, you can easily move large sections of text in the main article by simply moving the headings in the outline. On the right, a bar chart shows the relative lengths of each section.

Component Type and ID, and then search on either the abbreviation or the full identifier to group similar components (see Screen 5).

To enter the next two fields–Output Type and Output ID–you need to scroll horizontally to the second half of *Fact Cruncher*'s outline screen (see Screen 6). Unfortunately, the manual lets these two fields remain mysteries: "The names Output Type and Output ID originated in an early version of *Fact Cruncher* used exclusively for documenting computer software. You will see in the examples that these fields may be used for such a variety of purposes that no name is adequately descriptive." If the person writing the manual can't conceptualize two of the fields in the data base, how many users are likely to understand them?

The next two fields are more intelligible; Completion Status and Schedule Status allow you to assign codes to each line in the outline, identifying the current status and priority of the corresponding project component. Searching on these fields allows for rapid retrieval of unfinished activities. You can tag items with beginning and ending dates and search accordingly; you can even search for items "in context," expanding the scope of the search to encompass the records immediately above the selected records in the outline structure.

Finally, the program furnishes three "flag" fields. Flag 1 is set by *Fact Cruncher* to mark lines added or changed on the latest edition of the outline, thus creating a project management audit trail. The other flags are used for special processing of records to identify, for example, records that match any of the selection criteria used in a search.

**A Program Divided** *Fact Cruncher* is equipped with a simple but adequate word processor. However, it provides no easy way to relate text created with the word processor to lines in the out-

Screen 5: The first screen of Fact Cruncher's two-screen-wide outliner contains the Component Description along with the two most important fields–Component Type (CT) and Component ID. Each line in a Fact Cruncher outline is a data base record that can be searched on nine fields.

| Description | CT | Comp Id |
|---|---|---|
| Chapters 1 through 6 | | EX-2 |
| Introduction | CH | 1 |
| What Fact Crunching is All About | CS | 1-1 |
| Why Fact Cruncher Can Help You | CS | 1-2 |
| How Fact Cruncher Can Help You | CS | 1-3 |
| Learning To Use Fact Cruncher | CS | 1-4 |
| Requirements | CS | 1-5 |
| Overview | CH | 2 |
| Fact Cruncher Files | CS | 2-1 |
| Outline Files | CS | 2-2 |
| Text Files | CS | 2-3 |
| Data Files | CS | 2-4 |
| Reports | CS | 2-5 |
| File Utilities | CS | 2-6 |
| Getting Started | CH | 3 |
| Using This Manual | CS | 3-1 |
| Detailed Table of Contents | CS | 3-2 |
| Index | CS | 3-3 |
| Exercises | CS | 3-4 |
| Example Files | CS | 3-5 |

Screen 6: Pressing < Ctrl > - < CursorRight > displays the right half of the Fact Cruncher outline. Fact Cruncher automatically assigns a Level Number (LV) and Line Number to each line in the outline.

| CT | Comp Id | OT | Out Id | LV | C | S | F | F | F | Line# |
|---|---|---|---|---|---|---|---|---|---|---|
| | EX-2 | | | 00 | | | | | | 00001 |
| CH | 1 | | | 01 | | | | | | 00002 |
| CS | 1-1 | | | 02 | | | | | | 00003 |
| CS | 1-2 | | | 02 | | | | | | 00004 |
| CS | 1-3 | | | 02 | | | | | | 00005 |
| CS | 1-4 | | | 02 | | | | | | 00006 |
| CS | 1-5 | | | 02 | | | | | | 00007 |
| CH | 2 | | | 01 | | | | | | 00008 |
| CS | 2-1 | | | 02 | | | | | | 00009 |
| CS | 2-2 | | | 02 | | | | | | 00010 |
| CS | 2-3 | | | 02 | | | | | | 00011 |
| CS | 2-4 | | | 02 | | | | | | 00012 |
| CS | 2-5 | | | 02 | | | | | | 00013 |
| CS | 2-6 | | | 02 | | | | | | 00014 |
| CH | 3 | | | 01 | | | | | | 00015 |
| CS | 3-1 | | | 02 | | | | | | 00016 |
| CS | 3-2 | | | 02 | | | | | | 00017 |
| CS | 3-3 | | | 02 | | | | | | 00018 |
| CS | 3-4 | | | 02 | | | | | | 00019 |
| CS | 3-5 | | | 02 | | | | | | 00020 |

line. This deficiency severely limits the use of *Fact Cruncher* for report generation. The best you can do is convert an outline to a text file in table of contents format and then use the word processor to add text under the headings and subheadings. You could also print the outline file to disk to create an ASCII file that could be imported into another word processor. Once you do that, however, you no longer have the maneuvering power of an outliner at your fingertips. With *Fact Cruncher* you either write or you outline, but not both at the same time.

The word processor supports search and replace, underlining, boldface, and block move, copy, and delete. Its most noteworthy feature is the unique format field, which is displayed in a column running down the left side of the screen. The format field allows you to store sets of formatting commands separately from the text and use them over and over as style sheets.

*Fact Cruncher* also comes with a couple of crowd-pleasing extras. You can display outlines in organization chart format at any time by pressing <Ctrl>-<F6>, and a split screen option allows you to compare two files and move text between them.

If *Fact Cruncher* spoke English and allowed you to expand an outline with the actual text of the document, the clever concept of a data base outliner might hit the mark. However, as it stands now the program is more of a curiosity than a practical outlining tool.

## ■ Outlining the Outliners

Although *MaxThink* provides no data management features and is not a full-featured word processor, it is the most powerful pure outline processor on the market. It lets you restructure lists more easily and in more ways than any other program available. Few managers would feel they wasted money with the purchase of *MaxThink*.

If you're in the market for a new word processor that happens to outline as well as write, *Freestyle* might be what you need. Like most outliners, it allows quick and easy movement of outline sections along with their associated text. You can also move back and forth between the document and the outline, but you cannot collapse and expand the levels of subheadings.

If you can adjust to *Fact Cruncher*'s unusual lingo and can benefit from breaking each line of your outline into multiple data base fields, the program may prove an interesting alternative to traditional project management tools. Its ability to retrieve selected items from within a lengthy outline according to carefully specified search criteria gives it one type of organizing power not shared by *Freestyle* or *MaxThink*.

Claims for outliners and idea processors are among the most exaggerated in the software world. They promise to transform you from a dull, ordinary thinker into a creative genius. While none of the products reviewed here, or anywhere else for that matter, is likely to prove quite so miraculous, an outliner can be a useful tool. ◓

*Charles Spezzano is a psychologist and freelance writer in Denver, Colorado. He is the author of* Using Enable *(Que Corporation, Indianapolis, 1986) and* Introduction to Enable, Educational Version *(John Wiley, New York, 1986).*

# A Most Ingenious Paradox

According to conventional market wisdom, the data management race belongs to the swift, the easy, and the powerful. Ansa Software has covered all three bets with Paradox, a program that marries powerful data management and spreadsheetlike simplicity in one package.

*Nicholas M. Baran*

In this age of infoglut, a program that effectively and charmingly manages a morass of data is bound to be popular. *Paradox*, a full-fledged relational data management system from Ansa Software, is likely to have its dance card filled—it's as fast and familiar as *1-2-3* and as flexible as *dBASE III*. In just a few hours, those with modest data management experience can install *Paradox* and begin creating and querying data bases. In the same amount of time, experienced users of *1-2-3*, *dBASE*, *R:base*, and similar programs can be writing macros, extracting and linking data from multiple files simultaneously, and puttering with PAL, the *Paradox* application language.

Ansa has wisely mimicked *1-2-3*'s interface, command structure, and spreadsheetlike presentation of data. Data is not dropped into a black hole, only to reappear (usually in the wrong format) at print time. You can readily enter and view data in either a table or a data entry form. Unlike *dBASE III*

and *R:base 5000*, there is no command syntax to master, no mute "dot" prompt to ponder. With *Paradox* the learning curve is considerably flattened.

As befits a state-of-the-art product, *Paradox* takes some cues from artificial intelligence and mainframe programs. *Paradox*'s "machine reasoning" feature automatically selects the fastest way to sort, conduct a search, link data bases, and so on; virtual memory techniques ensure that needed data is swapped from disk to memory in the most efficient manner, so that megabyte-size data bases can be easily managed and quickly accessed. As a result, *Paradox* is typically much faster than *dBASE III* and *R:base 5000*, although not in all situations.

Central to *Paradox*'s charm is its "query-by-example" method of extracting data. Instead of typing lengthy procedural statements, you merely select menu commands

and enter a few keystrokes. Data is stored in *1-2-3*-style tables. To get an answer to a query, you display the appropriate tables and match the columns you need. *Paradox* will collate the data and display an Answer table (see Screen 1). At first glance, the process seems easy as pie.

But a cursory session with *Paradox* is deceptive; further acquaintance reveals the program's breadth and complexity. Ansa naturally promotes *Paradox*'s ease of use and intuitive design, but both qualities tend to elude the user as data management tasks grow more complex. Although *Paradox* handles some common data management operations with remarkable ease, it nearly rivals *dBASE III* for convoluted report generation. In short, for all its trimmings and deservedly praised innovations, *Paradox* is still firmly rooted

in the contemporary data management world. Given the dominance of *dBASE II* and *III* and the ascent of *R:base 5000*, *Reflex*, and *Q&A*, *Paradox* may face an uphill battle wooing first-time users and converting veterans.

### Paradox Basics

Installing *Paradox* on a hard disk (highly recommended, since it consumes nearly 400K of disk space) is a matter of following a few program prompts and copying four floppy disks. Unlike *Framework* and some other elephantine programs, *Paradox* doesn't cram your hard disk with hidden files; it even thoughtfully renames an existing CONFIG.SYS file. However, *Paradox* is something of a memory hog; there's literally no room on a 512K system after DOS and *Paradox* are loaded. Adding a small memory-resident utility such as *TenKey* immediately elicits a memory-full error and returns you

to DOS. Unfortunately, *Paradox* can't use the megabytes of expanded memory available on an AboveBoard—640K is the limit. Considering that *Paradox* prefers to hold data almost exclusively in RAM, this double limitation is curious indeed. However, *Paradox* can write to, store temporary files in, or be copied into a megabyte-size RAM disk.

A minor restriction is the program's copy-protection scheme, which allows you to use *Paradox* on only one hard disk system at a time. If you have an AT at work and an XT at home, you can install *Paradox* on both and merely use a floppy "key" disk when loading the program. Performance is not affected. Ansa also provides a backup system disk in case the first one is damaged and *Paradox* must be uninstalled.

### Setting the Table

Those who curse *dBASE*'s dot prompt sigh with relief when gazing upon *Paradox*'s clean and comprehensible *1-2-3*-like command line. To view data, you move the cursor to View and press <Enter>; as in *1-2-3*, available files are listed below the command line. Move the cursor to the appropriate file name, press <Enter> again, and a table packed with data springs into view.

The table is *Paradox*'s fundamental data structure. A row represents a single record; each column represents a field type. The number of tables is limited solely by available disk storage. A table can encompass 65,535 records; each record, as many as 255 fields, for a total of 4000 characters.

```
Viewing Answer table: Record 1 of 11                    ▓▓▓ ▲═

QUANT═══════════Customer══════════Part no═══Quan ordered══Order date═
    10    Hubbard & Johnson        10028         60        2/20/84
    11    Eichrome                 21733         50        2/19/84
    12    Korner                   27001         55        2/19/84
    13    Kelly                    12599         50        2/16/84
    14    Hechinger's              21733         60        2/15/84
    15    Kelly                    10028        130        2/12/84
    16    Orchard Supply           27001         60        1/10/84
    17    Handyman                 21733         35       11/02/83

ANSWER══════════Customer═════════Quan ordered═
     1    Fred's Corner Hardware       53
     2    Handyman                    108
     3    Harvey Jeane               1000
     4    Hechinger's                  60
     5    Hubbard & Johnson            60
     6    Kelly                        53
     7    Kelly                       130
     8    Korner                       55
     9    Korner                       70
    10    Korner                      130
    11    Orchard Supply               60
```

Screen 1: The result of a Paradox query. The Answer table displays the results; behind it lies the original table.

Fields can hold 255 characters each and can be designated as alphanumeric, numeric, dollar, or date types (see Table 1).

Although essentially identical to the file and table structures used in *dBASE III* and *R:base 5000*, the *Paradox* approach allows you to segregate data into related groups more easily and thus eliminate redundancy. For example, customer names and addresses might be stored in one table and order information in another; each distinct set of data is tracked separately, but sets can be combined when preparing reports or invoices.

Creating a table is straightforward. Select Create from the command line and name the new table. *Paradox* displays a table definition screen where you name each column and designate the field type and column width. If you've used *dBASE*'s CREATE command or the *R:base* Application Express, the process will seem quite familiar. Columns can be labeled as keys, which may speed up searching and sorting.

Enter data in the table as you would in a *1-2-3* worksheet. If you tire of the tabular format and long to view one record at a time, *Paradox* provides a fill-in-the-blanks data entry form directly tied to the table (see Screen 2). Data captured in the form immediately updates the table and vice versa. Though you have tremendous flexibility in relating tables, a data entry form is permanently shackled to a single table—you can't create a

## Table 1: Paradox vital statistics

| | | |
|---|---|---|
| Requirements | RAM | 512K |
| | Hard disk | Recommended |
| | Key disk | Yes[1] |
| Features | 8087/80287 support | Yes |
| | AboveBoard support | No |
| | On-line help | Yes |
| | Menu- or command-driven | Menu |
| | Supports DOS subdirectories | Yes |
| | Data encryption | Yes |
| | Data formatting | Yes |
| | Date operations | Yes |
| | Calculated fields | Yes |
| | Customizable data entry screens | Yes |
| | Text editor | Yes |
| | Command language | Yes |
| | Macro capabilities | Yes |
| | Statistical functions | Yes |
| | Financial functions | Yes |
| | Graphics capabilities | No |
| | Relational structure | Yes |
| | Data entry validation | Yes |
| | Multiple file linking | Yes |
| Capacity | Maximum tables | Limited by storage |
| | Maximum records | 65,535 |
| | Maximum record length (characters) | 4000 |
| | Number of digits of precision | 16 |
| | Maximum fields per record | 255 |
| | Variable field length | No |
| | Maximum number of sort keys | 255 |
| | Global search and replace | Yes |
| File export/import | ASCII delimited | Yes |
| | ASCII text | Yes |
| | dBASE II/III | Yes |
| | 1-2-3 | Yes |
| | Symphony | Yes |
| | pfs:file | Yes |
| | VisiCalc.DIF | Yes |
| Report generator | Report from multiple files | No[2] |
| | Customizable formats | Yes |
| | Multiple levels of subtotaling | Yes |
| | Save to disk | Yes |

[1] Only on a floppy disk system
[2] Same effect possible by merging multiple tables into a single Answer table

generic form and apply it to another *Paradox* table. Ansa claims that data entry is so simple that a multiple-table capability is unnecessary, but in day-to-day operations, this inability is annoying.
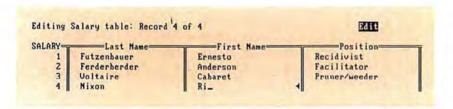
*Paradox* alleviates some of this angst by providing data validation. Like almost all data managers, *Paradox* won't accept text entry in a numeric field or vice versa. Beyond this, you can verify entered data using values stored in a separate lookup table, for example when payroll amounts must fall within a specified range.
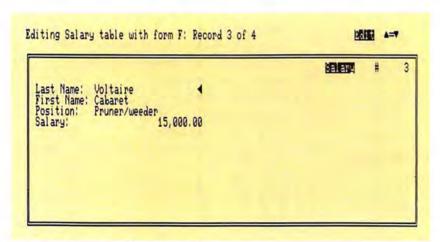
### Query-by-Example

One of *Paradox*'s most impressive talents is the ease and speed with which it lets you view, query, and manipulate tables on screen. You can dart among any number of tables by pressing <F3> (Up-Image) and <F4> (Down-Image), stop and edit records, and then move on. To extract data, select Ask from the command line to awaken *Paradox*'s query-by-example function. *Paradox* displays a query form that duplicates the selected table's field structure, minus the data. To identify columns for *Paradox* to search, place a check mark in the appropriate fields with <F6>; to

relate the various tables, insert an "example"—an identical character or string of characters that *Paradox* can match—in each table. The results of the query are displayed in a temporary Answer table. For example, querying the Customer, Products, and Order tables produces an Answer table listing customers, the products they bought, stock numbers, and dates of purchase (see Screen 3). Keep in mind that an Answer table is overwritten the next time a query is performed; to save results, you must rename the table and save it to disk.

Linking multiple tables is not an unusual task to ask of a data base manager; both *dBASE III* and *R:base 5000* make such connections with varying degrees of success. In *dBASE III*, operating on more than one file means delving into the mysteries of command language—unless you're willing to use the sluggish JOIN command. *R:base 5000* is faster, but limited to two tables at a time. A *Paradox* query can relate as many as 16 tables at once. Although filling out the necessary query forms is somewhat imposing, the process is far more intuitive than typing UNION CUSTTABLE WITH ORDTABLE FORMING NEWTABLE USING FIELD1 FIELD2 FIELD3—as you would in *R:base*.

Like any good data manager, *Paradox* can further refine queries with standard arithmetic operators ( =, -, * and /) and Boolean operators (<, >, =, and so on). For example, you could cull those customers who ordered products costing more than $500 by insert-

```
Editing Salary table: Record 4 of 4                          Edit
SALARY═══════Last Name══════    ═════First Name═════   ═══Position═══
    1    Futzenbauer              Ernesto               Recidivist
    2    Ferderberder             Anderson              Facilitator
    3    Voltaire                 Cabaret               Pruner/weeder
    4    Nixon                    Ri_                ◀
```

```
Editing Salary table with form F: Record 3 of 4        ████ ▲═▼

                                          ██████  #    3

    Last Name:   Voltaire          ◀
    First Name:  Cabaret
    Position:    Pruner/weeder
    Salary:            15,000.00
```

**Screen 2: Data can be captured in either a Paradox table (above) or a standard entry form (below).**

ing >500 in the Price field of the Products table. For more complex financial applications, *Paradox* offers an impressive range of functions, including average, lowest value, highest value, and count values; using PAL, you can tap advanced functions such as standard deviation, mortgage payment calculation, future value and present value, and transcendental functions. Besides matching, selecting, and calculating, *Paradox* performs global changes ("consult", changeto "contract"), deletes and inserts records, and matches incomplete character strings.

### The Paradox Express

Those resigned to *dBASE*'s disk-dragging performance are unfailingly impressed with *Paradox*'s speed. Operations that typically tie up *dBASE* or *R:base* for minutes are completed by *Paradox* in a fraction of the time. *Paradox* displays a 2000-record table in a split second; a complex, multiple-table query takes a second or two. The secret to such swiftness lies in Ansa's artful combination of machine reasoning with tried-and-true memory management techniques.
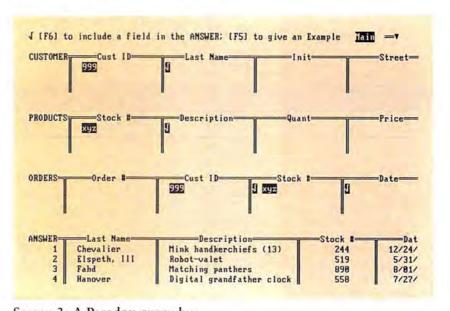
*Paradox*'s machine-reasoning feature is essentially a method for optimizing a data base search based on the size of the tables involved, the number of key fields, the type of query, and which elements of the query must be solved first. Once a query is entered, *Paradox* breaks it down into subqueries, may create temporary indexes to speed the search, and

generates procedural representations—algorithms not unlike the command sequences that process queries in *dBASE* or *R:base*. *Paradox* weighs all the variables, then determines and executes the fastest method of fulfilling the request.

Clever memory management is the other half of the performance story. Like a master chef on a shoestring budget, *Paradox* squeezes as much as it can from the resources at hand. In much the same way as a totally memory-resident spreadsheet program operates, *Paradox* always opts to work on data in memory; like *WordStar*, it reserves as much memory as possible for data by relegating program overlay files (with less commonly used functions) to disk. When memory is

tight or a table is immense, *Paradox*'s virtual memory function takes over, swapping data in and out of memory as needed. The basic technique, developed during the days of RAM-deficient mainframes, permits *Paradox* to manipulate tables far exceeding system memory without appreciably eroding performance. Disk-bound programs such as *dBASE III* and *R:base* are left in *Paradox*'s dust (see Table 2).

### Macros and More

As one computer sage recently noted, "Last year's utility is next year's enhancement." Although *Paradox* is new to the world, Ansa wisely included a



Screen 3: A Paradox query-by-example and the resulting Answer table. Paradox completes a search by matching identical "examples" (in this case, xyz and 999) in each queried table; field names need not be the same.

macro processor—the productivity tool of spreadsheet and word processing connoisseurs. Akin to a pared-down *SuperKey*, *Paradox* can record keystrokes in a script that can be stored and played back at any time. For example, if you frequently query Customer and Order tables to produce an Answer table listing orders per customer, you can automate the entire process—menu selections, text entry, and cursor movement—by capturing the keystrokes in a script file. The script file is actually a miniature PAL program that can be edited and incorporated into larger PAL applications.

*Paradox*'s script utility is head and shoulders above *R:base 5000*'s Application Express and nearly matches the power of a full-featured macro processor. Any op-

eration can be recorded by *Paradox*; the Application Express is limited to very specific functions such as data base creation and menu generation. A complicated query requires the power of the *R:base 5000* command language—and the requisite programming skills.

In the realm of data import and export utilities, *Paradox* is no slouch either. Ever conscious of the software upgrade path, *Paradox* effortlessly digests data files from *dBASE II* and *III*, *1-2-3*, *Symphony*, and *pfs:file*, plus DIF and ASCII files, with a handful of menu selections. (*1-2-3* and *dBASE* users take note: *Paradox* cannot convert macros or program files.) Exporting *Paradox* files is equally simple and nearly flawless: The *Paradox*-to-ASCII conversion produced files with fields properly delimited by quota-

tion marks; transferring data to *dBASE III* also worked well, although integers were converted into real numbers.

■ **Printing Paradox**
*Paradox* incorporates a complete and powerful report generator—so powerful, in fact, that Ansa devotes nearly 120 pages to the subject in the user manual. For those with modest reporting needs, *Paradox* offers an instant report option that spits out data in a simple columnar format. But leaving *Paradox*'s report generator unexplored is like passing a candy store without sampling its wares.

*Paradox* users surely won't complain about report flexibility. Reports can be tabular or free-form. The program will calculate new fields and summary fields, automatically insert the current date (in one of eight formats), and accommodate as many as 16 control breaks (such as subtotals). You can group related information (and automatically sort records in established groups); use titles, headers, and footers; easily squeeze, expand, or move columns; and generate mailing labels and form letters. However, designing a report that taps these powerful features is no trivial exercise. While it beats mastering *dBASE* @SAY commands, you'll quickly discover that creating a report with *Paradox* belies Ansa's ease of use claims.

In keeping with its example-oriented nature, *Paradox* takes a what-you-see-is-what-you-get approach to design—to the extent of supplying a sample report that you sculpt to suit your application (see Screen 4). If you select the tabular

### Table 2: Paradox faces down the competition*

| | R:base 5000 | dBASE III | Paradox |
|---|---|---|---|
| *Test 1* | | | |
| Load an ASCII file delimited by quotes | 4:09 | 0:36 | 0:34 |
| *Test 2* | | | |
| Sort file to a new table (three fields, all text, 66 bytes each) | 4:20 | 1:18 | 0:19 |
| *Test 3* | | | |
| Globally change all occurrences of a value | 0:08 | 0:13 | 0:17 |
| *Test 4* | | | |
| Find and edit record | 0:10 | 0:12 | 0:12 |
| *Test 5* | | | |
| Query two tables and extract specific records from both[1] | 5:07 | 55:00[2] | 0:28 |

*Tests performed on an 85K, 1200-record file (except where noted) using an IBM PC with 640K and a 20MB Microscience hard disk drive

[1] Using a 400K, 2150-record table and a 12K, 196-record table

[2] Without programming, the only command available is JOIN, which is notoriously slow.

layout, *Paradox* initially arranges fields in familiar rows and columns—the ideal configuration for most financial reports. The free-form option eschews columns and associated restrictions; using a combination of program commands and cursor keys, you can plant fields and records wherever you like. Such flexibility is vital for printing on checks, invoices, purchase orders, and other preprinted forms.

At the conceptual center of any *Paradox* report are *bands,* which control formatting, and *groups,* which manage data. Bands—shown as horizontal lines on the screen during report creation—are like concentric rectangles, each controlling a specific report area (see Figure 1). The outermost report band encompasses recurring report-level information, such as headings; the page band handles page-specific items: pagination, page breaks, date field, and so on. The group band, which is responsible for collecting records, includes a footer used for calculating subtotals; the table band contains the body of the report—data and field labels.
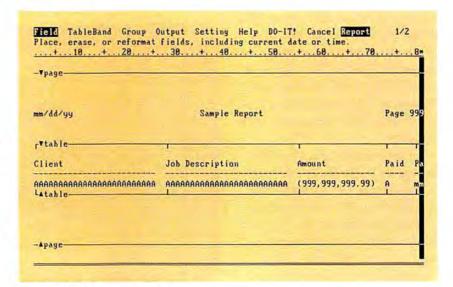
The band's counterpart in the report design process is the group. Much as a band governs the report format, a group controls how data is arranged and collected. With this conceptual lasso you grab related data, sort it, and calculate summary information such as subtotals, totals, and averages. A group can encompass a field, a range of values in a field, a set of records, or even groups within groups. The latter condition arises frequently; for example, a customer order report might list customers in alphabetical order, with purchases subtotaled and sorted

by product type. This simple situation alone involves three groups. Needless to say, the more complex a report, the more you will wrestle with—and occasionally lose to—*Paradox's* unique formatting metaphors.

There are a few other catches. A custom report is forever married to its table—you can't create one format and apply it to other tables. You can circumvent this prominent flaw by at least recording your design steps in a script file and later replaying them. The other catch? *Paradox's* insistence on using only one table as the basis of a report. *R:base 5000,* for example, offers a "lookup" variable that draws data from a number of sources. With *Paradox,* you must first assemble an answer table and then print a report. In some ways it's analogous to rebuilding your car every time you want to take a drive.

■ **Programming With PAL**

The best thing about *Paradox's* application language, PAL, is that you don't have to use it much. It's there if you need it, but most users won't require more than *Paradox's* basic features, report generator, and scripts function. PAL is intended primarily for data base programmers and developers of turnkey applications.

PAL's syntax was intentionally designed to resemble the *dBASE* command language so that developers would suffer minimal culture shock when moving up to *Paradox.* But PAL is no clone. Aside from its treasure chest of mathematical, statistical, transcendental, and financial functions, PAL includes a full-screen editor and significant improvements in menu generation.



Screen 4: To create a custom Paradox report, you build on an example. This generic tabular report specification includes the basic report elements: header, date, and page fields; columns as specified in the source table; and value fields (AAA and 999) for alphanumeric and numeric data.

The Showmenu command makes it easy to create *1-2-3*-like menus for data entry, queries, and printing. The necessary commands for running these options can be saved as individual PAL script files and called from the menu. For example, '"Entry"' in the second line of Listing 1 appears as an option in the displayed menu. (The phrase following the colon is a program comment.) Place the cursor on 'Entry' in the menu, press <Enter>, and because the statement 'CASE x = "Entry"' is true, the PLAY command executes the appropriate PAL script.

PAL also features a one-dimensional array that can be dimensioned up to a value of 15,000. Among other things, this allows you to move entire records from one table to another easily—or you can perform more typical programming tasks such as manipulating values in a loop or storing a sequence of variable values. PAL programs can also be structured as a series of procedures in the manner of Pascal. The number of public and private variables is unlimited, and password protection is available when file security is called for.

Serious programmers will delight in PAL's interactive debugger, general flexibility, and high-level-language feel. It's well suited to a host of scientific, engineering, and financial applications. If you need to quickly create turnkey applications requiring serious computation, *Paradox* should be your first choice.

## Paradox by the Book

In the tradition of *1-2-3*, *Paradox* is accompanied by ample in-context on-line help. Unfortunately, the help needs help—screens are cluttered and confusing. *Paradox*'s user manuals, however, are well written and crisply designed. The set includes an introductory guide, a general user manual, a PAL manual, plus two very helpful "quick" guides for *1-2-3* and *dBASE II* and *III* users who want to get up and running fast. The user manual is your primary source; it devotes a chapter to each main menu option in turn, prefacing major sections with a brief conceptual overview. The discussions are generally lucid, but Ansa should definitely rethink the lengthy chapter on reports and include more examples in the query-by-example section.

The "quick" guides are probably the first place most business users will start. Concise and to the point, they slant the introduction to *Paradox* in terms of *1-2-3* and *dBASE*. Each guide includes a glossary that defines *Paradox* commands and their *dBASE* or *1-2-3* equivalents. The PAL manual is a thorough reference that documents every PAL structure, function, and command and provides ample program listings; the *Paradox* Sample Tables disk also includes a complete PAL program for dissection.

## "How Quaint the Ways of Paradox"

"Ease of use" was the catchphrase among data management vendors in 1985. Ansa has capitalized on this sentiment, trumpeting *Paradox* as the "data base management program of powerful capabilities and complex functions [that] is easy to learn, swift to act, and simple to use." It's hard to deny
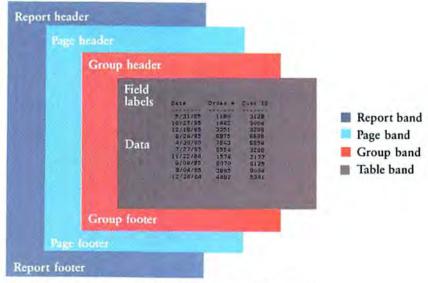


Figure 1: Bands control the formatting of a report. Each concentric rectangle encompasses a different level—the report band encompasses report-level header and footer fields; the page band, page headers (such as page number and date fields); and so on to the table band, which contains the data in the report.

Paradox's power—but ease of use claims should be taken with several grains of salt.

Granted, querying a simple data base, viewing tables, and entering data are relatively facile endeavors. But learning to type CREATE, SELECT, or BROWSE in *R:base* or *dBASE* isn't that taxing either. *Paradox's* query-by-example feature is also promoted as being intuitive, and it is—to a point. Plucking records from a single table or pairing them with those in a second table is straightforward enough. But more complicated operations—using calculations and operators, linking a number of tables, and in particular, generating a complex report—can be daunting.

For example, I created a table for tracking client invoices. I set up columns for client names and amounts due, plus a 1-character column where I could enter Y or N to represent paid or not paid. The goal was to query the table and quickly list paid-up clients and calculate total monies received. The equivalent *R:base 5000* command sequence would be SELECT NAME AMOUNT=S FROM CLIENT WHERE PAID EQ Y. Direct, but not particularly intuitive.

My simple *Paradox* application quickly became ensnarled. The first time around only records with an uppercase Y were selected. (I'd forgotten that unlike *R:base 5000*, *Paradox* is fussy about case.) I used the Like Y operator, ran the query, and elicited separate totals for Y and y. The error? I made the mistake of placing a check mark in the Paid column of the query form. The check mark instructs *Paradox* to group

records by like values—hence the separate totals. Although correcting this problem was simple, it illustrates the kind of mental readjustment you have to make when moving up to *Paradox*.

The exercise also revealed one of *Paradox's* biggest drawbacks—limited on-screen reporting. I discovered that *Paradox* would display paid-up clients or a total—but not both at the same time. To get the desired output I had to use the report generator. For a program so adept at data retrieval, this constraint is surprising.

A word of advice for *Paradox* users: Back up your files. Because *Paradox* manipulates data in memory, the chance of a "crash" or similar catastrophe is ever present. At one point in my testing I added an indexed field to a 2000-record table. *Paradox* worked for several minutes and discovered it didn't have enough memory to fulfill my request. The program spat out 'Resource limit exceeded: out of memory' and returned to DOS. The table was destroyed and two smaller tables residing in memory at the time were also ruined. Until future versions of the program more carefully monitor available

memory—and inform the user about potential problems—back up essential tables regularly.

In spite of its blind spots and not-always-intuitive nature, *Paradox* is a significant step in the right direction. It offers power, performance, and yes, ease of use, that should make *dBASE* and *R:base* users think twice. ⬤

*Nicholas M. Baran, a San Francisco-based technical writer and consultant specializing in data management and communications, is the coauthor of* Using R:base 5000 *(Osborne/McGraw-Hill, Berkeley, California, 1985).*

*Paradox*
*Ansa Software*
*1301 Shoreway Rd. #221*
*Belmont, CA 94002*
*415/595-4469*
*List price: $695*
*Requirements: 512K, two disk*
  *drives, DOS 2.00 or later*
  *version; hard disk*
  *recommended*

```
SHOWMENU
    "Entry" : "Enter records in the Order Table",
    "Reports" : "Print the Orders per Customer Report"
    "Query" : "List payments from the Order and Customer Tables"
TO x
SWITCH
  CASE x = "Entry" : PLAY "Entry"
  CASE x = "Reports" : PLAY "CustReport"
    .
    .
ENDSWITCH
```

Listing 1: PAL script files are the key to generating custom Paradox applications. SHOWMENU displays menu selections; SWITCH plays back the appropriate PAL program.

# Reinforced
# Framework

Ashton-Tate smooths
the rough edges from
Framework to deliver
Framework II—an
integrated package
with improved
memory management,
a beefed-up word
processor, and a new,
fully integrated
telecommunications
module.

*Bill Crider*

▐▐▐▐ If you're familiar with
▐▐▐▐ *Framework*, you know it's
an integrated package with a style
of its own. Coupling outline pro-
cessing with a unique, windowlike
method of file handling, *Frame-
work* has changed the way many
people plan and execute their
work. The program can handle a
project from conception right
down to combining text, graphics,
and numeric data in a single
report.

But *Framework* has also culled
its share of criticism, even from its
biggest fans. Personally, I've

worked around the eccentricities of this potent program for over a year. Like the foibles and blemishes of a sputtering old television, *Framework's* shortcomings have become more annoying the longer I've had to put up with them. Poor memory management, the lack of a true mail merge facility, cumbersome print formatting, tacked-on telecommunications—

ways. First, it made better use of existing RAM simply by tightening the program's code. Every type of frame can now be two to five times larger in the same memory configuration. Second, the company adopted the Lotus/Intel/ Microsoft expanded memory standard. With the appropriate memory boards, *Framework II* can address up to 8MB of RAM.

past, pressing <Ins> recalled the last menu used. With *Framework II*, pressing <Ins> a second time recalls the most recently executed menu option. If that option calls a submenu, pressing <Ins> a third time recalls that submenu's last selected item. This is a real keystroke saver when you're doing repetitive operations, such as adding subpoints to an outline.
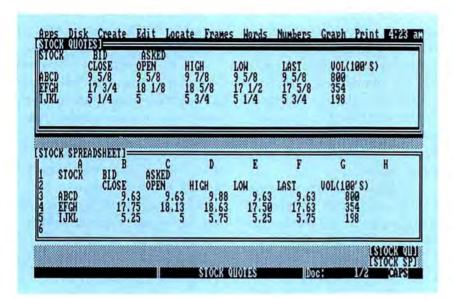
Using the <Ctrl> key plus the cursor keys also saves keystrokes. In the old version you could only drag a frame to a new location one space at a time; holding down <Ctrl> now gives you eight spaces per keystroke. *Framework II* incorporates similar cursor movement enhancements throughout the program, the most extended of which is the new GOTO command. You can use GOTO to find a cell in a spreadsheet or even to navigate from a location in one module to a specified destination in another.

> **Unlike some software vendors that prefer to ignore their competitors, Ashton-Tate believes that making it easy to import and export data improves the salability of its product.**

these and a dozen other quirks have taxed my patience time and again.

Just when I'd abandoned hope of relief, Ashton-Tate came to the rescue. To put it simply, *Framework II* corrects almost every problem that plagued the original. The telecommunications component is now fully integrated with the rest of the program, and the word processor has gone from an also-ran to a star performer. This exemplary successor even adds powerful integrating features, plus congenial new ways to exchange data with outside progams.

### Shoring Up and Slimming Down

There's no polite way to say it—the old *Framework* was a memory hog. On an average 256K system, spreadsheets were limited to a few hundred cells, and data bases hit the random access wall at a few hundred records. Ashton-Tate addressed these limitations in two

Another problem was limited compatibility among *Framework's* modules. Although you could tack together blocks of data from different applications and print them on the same report, there was no way to move, say, text from a spreadsheet into a word processing document. Now not only can you transfer text between modules, but fractions and percentages change to decimals when you move them from a word processing frame into a spreadsheet (see Screen 1). Similarly, numbers in parentheses change to negative numbers.

Some new features in *Framework II* are simply commonsense conveniences. For example, the Undo command now works on frame labels—a nice addition, when you consider that frame labels can be up to 64K in length. The new version also makes moving among menus easier. In the

### Ins and Outs

*Framework* has always been generous about sharing data with other programs. Unlike some software vendors that prefer to ignore their competitors, Ashton-Tate believes that making it easy to import *and* export data improves the salability of its product.

*Framework II* adds *MultiMate* and IBM's DCA and *DisplayWrite* formats to its list of import capabilities and continues to accommodate *WordStar, 1-2-3, dBASE II*

```
 Apps  Disk  Create  Edit  Locate  Frames  Words  Numbers  Graph  Print  4:23 am
[STOCK QUOTES]
[STOCK    BID       ASKED
          CLOSE     OPEN      HIGH      LOW       LAST      VOL(100'S)
ABCD      9 5/8     9 5/8     9 7/8     9 5/8     9 5/8     800
EFGH      17 3/4    18 1/8    18 5/8    17 1/2    17 5/8    354
IJKL      5 1/4     5         5 3/4     5 1/4     5 3/4     198



[STOCK SPREADSHEET]
       A         B         C         D         E         F         G         H
1    STOCK     BID       ASKED
2              CLOSE     OPEN      HIGH      LOW       LAST      VOL(100'S)
3    ABCD        9.63      9.63      9.88      9.63      9.63      800
4    EFGH       17.75     18.13     18.63     17.50     17.63     354
5    IJKL        5.25      5         5.75      5.25      5.75      198
6

                                                         [STOCK QU]
                                                         [STOCK SP]
                    STOCK QUOTES            Doc:   1/2    CAPS
```

Screen 1: Fractions in a word processing frame automatically convert to decimals when transferred to a spreadsheet frame.

and *III*, and any ASCII or DIF file. The old *Framework* could only generate ASCII and dBASE files; *Framework II* has the added ability to export files in *WordStar, MultiMate, DisplayWrite;* and DCA formats. Furthermore, if your data exchange needs go beyond the powers of these built-in conversion utilities, you can add up to three more programs to both the Import and Export menus by writing short programs in FRED, *Framework II*'s internal programming language.

If you're attached to another program, you can even integrate it into *Framework II*. All you do is run the new Setup program and type in the outside program's name, path name, and execution command, and the program appears as an option on *Framework II*'s new Apps menu. When you select an outside program, *Framework II* remains RAM-resident

but inactive. *dBASE III* is already listed on the Apps menu, but you can replace it with any program you desire, and add up to two more applications as well.

The Setup program is probably the biggest new convenience in *Framework II*. To change the old *Framework*'s default settings, you had to edit the setup file within a word processing frame. The new menu-driven Setup program is external to the desktop and enables you to choose the appropriate settings from the outset.

### A Family Affair
The organization of *Framework II*'s documentation is a vast improvement over that of its predecessor. Now organized by level of difficulty, the program literature progresses from a getting-started booklet to an extensive tutorial, followed by a reference manual and a compendium of advanced topics. All four manuals are clearly written and well illustrated. Ashton-Tate has also revised the interactive disk tutorial

to cover much more ground, although the silly "Spy Academy" subject matter remains.

Perhaps the biggest difficulty in learning and using *Framework* was keeping track of the relationships among frames. The new documentation addresses this conceptual problem by using family relationships as metaphors. Subframes are called "children" of the frames that contain them, while containing frames are referred to as "parents" or "ancestors." Two frames on the same level within one containing frame are "siblings"; if they're in separate containing frames, they're "cousins."

To explain the effects of these relationships, the documentation introduces two new concepts: *inheritance* and *scope*. Unless you make deliberate changes, all subframe attributes (such as print formatting) are "inherited" from parent frames. Scope refers to the effect of commands. For example, the scope of any command you issue within a parent frame extends to all of that frame's children, but not to its cousins or siblings.

Another helpful set of analogies relates to the office environment. As in the previous version of *Framework*, the screen is called the desktop. This analogy is carried further in the new documentation, which refers to disk drives as File Cabinets and active files as Trays.

### Checking Out the Library

The new name for the frame that stores macro commands is the Library Cabinet, but the frame has some fresh capabilities as well as a new moniker. Formerly called MACLIB, the Library Cabinet can now hold printing templates, a phone book, and special assumption frames. Unlike its predecessor, the Library Cabinet automatically loads onto the desktop when you execute *Framework II*.

The Library Cabinet supports the same macro capabilities as its forerunner, while sporting a new way of recalling saved keystrokes. This added capability enables you to assign abbreviations to keystroke sequences. To execute a given sequence, you type the designated abbreviation followed by <Alt>-<Backspace>. Although you can save any string of commands or text that you could save as a macro, the advantage of abbreviations is that you can summon them mnemonically, making this new function ideal for developing a phrase library.

Previously, you had to know FRED to devise printing templates. Using standard word processing commands, you can now enter specific printing formats into frames and store them in the Library Cabinet. When you're ready to print a document, you simply choose the appropriate template from the Library.

*Framework II*'s phone book is actually a data base frame containing frequently used names, addresses, and phone numbers. When you're in telecommunications mode, moving the cursor to an entry and pressing <Alt>-<F10> instructs your modem to dial the listed number. You can also use this directory as a data base for the program's new mail merge facility.

Designed to hold information used throughout the program, assumption frames are another new feature in the Library Cabinet. Like macros, assumption frames can be used in any *Framework II* application, but they differ from macros in that they hold information rather than commands. For example, you can enter your name, address, and title into an assumption frame, and *Framework II* will use this information to print return addresses on your correspondence. Among other things, assumption frames can also hold constants used in calculations, such as interest or inflation rates. You can then refer to these assumptions by name in a spreadsheet formula. When an assumption changes, the spreadsheets that refer to it automatically reflect the alteration.

### Crackerjack Word Crunching

Aside from the inherent benefits provided by outline processing, *Framework*'s old word processor was, at best, mediocre. The editing features weren't so bad, but print formatting was difficult and page breaks were invisible on screen. The program lacked a spelling checker, and if you wanted a mail merge, you were once again dependent on FRED.
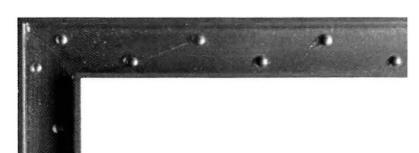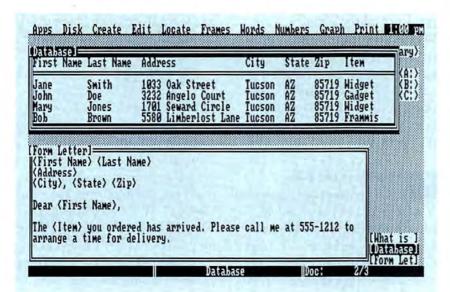
The *Framework II* word processor is on a par with the best of the competition—stand-alone or otherwise. For any given memory configuration, you can now create documents twice as long as before. You can also control page breaks, which appear on screen. Hard and soft hyphens and spaces are now available, giving you better control over line breaks.

Print formatting has been drastically simplified. Margins, line spacing, line length, and even a choice of your printer's condensed or quality modes are all listed on a formatting menu. *Framework II* also allows you to include the date or time in headers or footers in one of four formats.
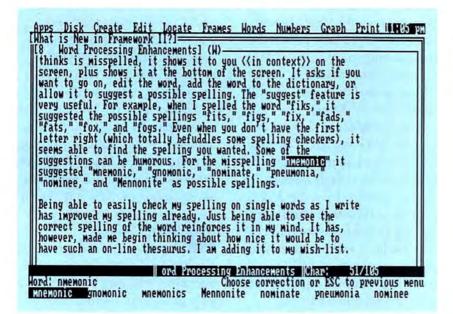
When Ashton-Tate set out to rectify its previous omission of a mail merge facility, it didn't settle for a half-hearted solution. The new offering may be the friendliest mail merge available. You can load the data base and the boilerplate document onto the desktop simultaneously, making it easy to visualize the relationship between the output document and its constituent elements (see Screen 2). Each relevant field in the data base is represented by a field marker in the boilerplate. Once you've set up the merge, you select 'Mailmerge Using' from the Apps menu, and *Framework II* takes over. The Apps menu also has a label-printing option for mass mailings.

*Framework II*'s 80,000-word spelling checker flags a misspelled word in context while simultaneously displaying alternatives at the bottom of the screen (see Screen 3). Once the word is

```
 Apps  Disk  Create  Edit  Locate  Frames  Words  Numbers  Graph  Print 1:00 PM
┌[Database]═══════════════════════════════════════════════════════════┐ary)
│First Name Last Name  Address            City    State Zip   Item     │
│                                                                      │⟨A:⟩
│Jane       Smith      1033 Oak Street     Tucson  AZ    85719 Widget  │⟨B:⟩
│John       Doe        3232 Angelo Court   Tucson  AZ    85719 Gadget  │⟨C:⟩
│Mary       Jones      1701 Seward Circle  Tucson  AZ    85719 Widget  │
│Bob        Brown      5580 Limberlost Lane Tucson AZ    85719 Frammis │
│                                                                      │
└──────────────────────────────────────────────────────────────────────┘
┌[Form Letter]═════════════════════════════════════════════════════════┐
│⟨First Name⟩ ⟨Last Name⟩                                              │
│⟨Address⟩                                                             │
│⟨City⟩, ⟨State⟩ ⟨Zip⟩                                                 │
│                                                                      │
│Dear ⟨First Name⟩,                                                    │
│                                                                      │
│The ⟨Item⟩ you ordered has arrived. Please call me at 555-1212 to     │
│arrange a time for delivery.                                          │[What is ]
│                                                                      │[Database]
└──────────────────────────────────────────────────────────────────────┘[Form Let]
                          Database            Doc:      2/3
```

Screen 2: Framework II's mail merge displays both the data base and the boilerplate document on screen.

```
 Apps  Disk  Create  Edit  Locate  Frames  Words  Numbers  Graph  Print 1:05 PM
┌[What is New in Framework II?]════════════════════════════════════════┐
│[8   Word Processing Enhancements] (W)════════════════════════════════│
│ thinks is misspelled, it shows it to you ⟨⟨in context⟩⟩ on the       │
│ screen, plus shows it at the bottom of the screen. It asks if you    │
│ want to go on, edit the word, add the word to the dictionary, or     │
│ allow it to suggest a possible spelling. The "suggest" feature is    │
│ very useful. For example, when I spelled the word "fiks," it         │
│ suggested the possible spellings "fits," "figs," "fix," "fads,"      │
│ "fats," "fox," and "fogs." Even when you don't have the first        │
│ letter right (which totally befuddles some spelling checkers), it    │
│ seems able to find the spelling you wanted. Some of the              │
│ suggestions can be humorous. For the misspelling "nmemonic" it       │
│ suggested "mnemonic," "gnomonic," "nominate," "pneumonia,"           │
│ "nominee," and "Mennonite" as possible spellings.                    │
│                                                                      │
│ Being able to easily check my spelling on single words as I write    │
│ has improved my spelling already. Just being able to see the         │
│ correct spelling of the word reinforces it in my mind. It has,       │
│ however, made me begin thinking about how nice it would be to        │
│ have such an on-line thesaurus. I am adding it to my wish-list.      │
│                                                                      │
└═══════════════ ord Processing Enhancements  Char:     51/105 ════════┘
Word: nmemonic                    Choose correction or ESC to previous menu
 mnemonic  gnomonic   mnemonics   Mennonite   nominate   pneumonia   nominee
```

Screen 3: The spelling checker flags a word in context while simultaneously displaying alternatives at the bottom of the screen.

flagged, the spelling checker asks if you want to ignore it, edit it, add it to the dictionary, or have the program suggest a possible replacement. Even when the first letter is wrong (which totally befuddles most spelling checkers), *Framework II* can generally suggest a plausible alternative. As an added bonus, spell-checking is not limited to word processing—you can also check spreadsheet labels and data base records.

**■ Building a Better Matrix**
Many users found the old *Framework* spreadsheet slow and severely limited in size. *Framework II*'s spreadsheet is about twice as fast as its predecessor, and worksheets can be from two to five times larger in the same memory configuration. These improvements are largely due to a
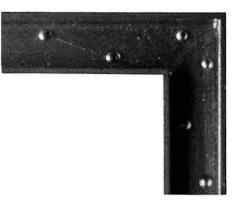
new "sparse matrix" algorithm recently adopted by the lastest versions of *Framework, 1-2-3,* and *Symphony.* In the old version, a formula in the lower right cell of an otherwise empty spreadsheet would consume a hefty chunk of RAM. Thanks to the sparse matrix algorithm, the same spreadsheet occupies only as much RAM as the one cell requires, no matter where that cell is located.

At 32,000 rows by 32,000 columns, *Framework* theoretically has always had one of the largest spreadsheets, but inefficient memory management made the actual limit a tiny fraction of the purported one. *Framework II's* thrifty use of RAM and support of the two major expanded memory standards (see "The RAM Revolution," *PCW,* January 1986) permits spreadsheets of a size much closer to the program's outrageous potential.

More good news: You can now use the sort and the search and replace functions within spreadsheet files. Cell range selection is also augmented. Rather than having to start at the top left corner, you can now mark off a range beginning at the bottom.

One remaining annoyance is the program's inability to lock more than one row or column as a title on a spreadsheet. Yet another failing (especially in the eyes of *1-2-3* habitués) is the spreadsheet's de-

pendence on the <Enter> key. Without pressing <Enter> to signal the end of a cell edit, you can't move to an adjacent cell using the cursor keys. As a partial concession, pressing <Enter> twice takes you to the adjacent cell in the next row.

### ◼ Mite Gets the Boot

If any portion of *Framework II* were to receive an award for Most Improved, it would have to be telecommunications. The first release of *Framework* tacked Mycroft Labs' *Mite* onto the program as an external facility. This meant you had to learn a command set distinct from standard *Framework* conventions, and *Mite's* rather obscure menus did little to expedite the learning process. To use *Mite* without having to exit the rest of the program, you needed an additional 128K of RAM.

The new telecommunications module, although based on *Mite,* is a tightly integrated, menu-driven *Framework II* module. It's easily accessible from the desktop, provides a full range of features, and offers extensive on-line help. The module's integration enables you to access any and all *Framework II* commands and functions while engaged in a telecommunications session. You can now move text into the telecommunications frame from another module, and move or copy information from telecommunications into another frame.

Formerly, you had to set up a separate data file for each frequently called remote system. The current version enables you to list up to nine remote systems on a single menu for automatic logon,

and store an unlimited number of additional configuration files on disk.
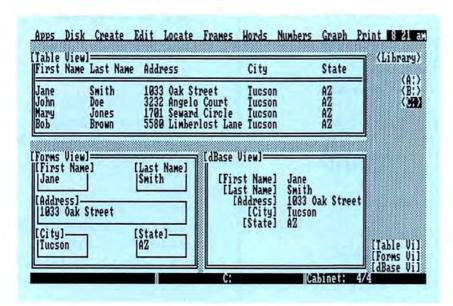
While *Mite's* top data-transfer speed was 1200 bits per second (bps), the new facility also supports 2400-, 4800-, and 9600-bps modes. Unlike its precursor, *Framework II's* telecommunications component can emulate many popular terminals, including the DEC VT 100, the Televideo 920, the IBM 3101, the LSI ADM 3A, and the ADDS Viewpoint.

If you need to access your computer from a remote site, you'll appreciate *Framework II's* new password-protected remote access mode. Go through a simple auto-answer setup procedure, and you're ready to call in from a remote computer. You can use remote commands to turn capture on and off, change the active drive and directory, view a directory or a file, upload and download files, and alter the file transfer protocol. However, multiple password levels are not supported—one password allows access to the whole system.

### ◼ Small Change

Some aspects of the original *Framework* have undergone little alteration. The data base is the least changed of *Framework II's* modules, although general enhancements like speedier performance and improved macros make it more powerful. The inclusion of *dBASE III* on the Apps menu is a good indication of the rationale here: Why enhance the data base to the point that it competes with another well-established Ashton-Tate product?

Screen 4: You can now view data base records in dBASE format.



Screen 5: A new outlining feature offers both Arabic and Roman numerals.



The only specific change in the data base is a choice of three ways to view data. Previously, you could view records in one of two formats: as a table or in forms view. *Framework II* adds the *dBASE* viewing format shown in Screen 4.

The one new outlining feature is the ability to toggle between Arabic and Roman numerals (see Screen 5) and even mix the two outline types within a containing outline. Added graphics capabilities include high-low-close charting and the capacity to print or plot graphs in multiple colors. *Framework II* also supports more hardware than the previous version, including the IBM Enhanced Graphics Adapter and over 100 printers and plotters.

Many of the capabilities built into *Framework II* could only be attained in the old version using the FRED programming language. But FRED has had a facelift too,

| | |
|---|---|
| @bop | Establishes beginning-of-paragraph parameters, such as indent, justification, left margin, and right margin |
| @exact | Determines whether two strings match exactly |
| @frametype | Returns the type of a frame, such as word, data base, graph, or spreadsheet |
| @frameview | Returns the view type of a frame, such as contents view, outline view, dBASE view, forms view, or table view |
| @isbop | Tests for a beginning-of-paragraph character |
| @iscapslock | Tests for <CapsLock> on |
| @isdocument | Tests whether a frame is a document (resides on the desktop instead of inside another frame) |
| @isnumlock | Tests for <NumLock> on |
| @isalpha | Identifies an alphabetic expression (as opposed to numeric) |
| @max | Returns the maximum value in a list or frame |
| @panel1 | Returns the left value of the status panel display |
| @panel2 | Returns the right value of the status panel display |
| @scan | Reports the starting position of one string within another one (similar to BASIC's INSTR) |
| @sense | Used to determine whether a menu or submenu selection is toggled on or off |
| @wordcount | Returns the number of words in a frame |
| @writeframe | Writes a frame to disk in Framework II format |

**Figure 1: FRED's 16 newly acquired functions**

have the two weakest modules been completely renovated, the program's overall performance, integration, and memory management have been significantly improved.

*Framework II*'s extensive import and export facilities make the program especially attractive to new users. Although the updated version still takes a substantial investment of time to master, the revised documentation should help shorten the learning curve. *Framework* veterans, on the other hand, are likely to agree that Ashton-Tate has taken a good program and turned it into an excellent one. ⊜

*Bill Crider is a writer and computer training consultant living in Tucson, Arizona. He is a Contributing Editor for* PC World.

albeit a minor one. As illustrated in Figure 1, 16 functions have been added, 12 of which help you evaluate and manipulate the program environment. Three of them (@exact, @scan, and @isalpha) are for string handling, and one (@max) is numeric. Programmers will be glad to know that FRED's documentation is much better organized, offering numerous sample files and printed examples.

**■ The Pick of the Crop**
It's unusual for a software company to be as responsive to criticism as Ashton-Tate. Many companies are reluctant to admit to their program's failings, and release upgrades with band-aid revisions that fall short of the mark. *Framework II*, however, represents a major overhaul. Not only

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— Exasperated 1:16

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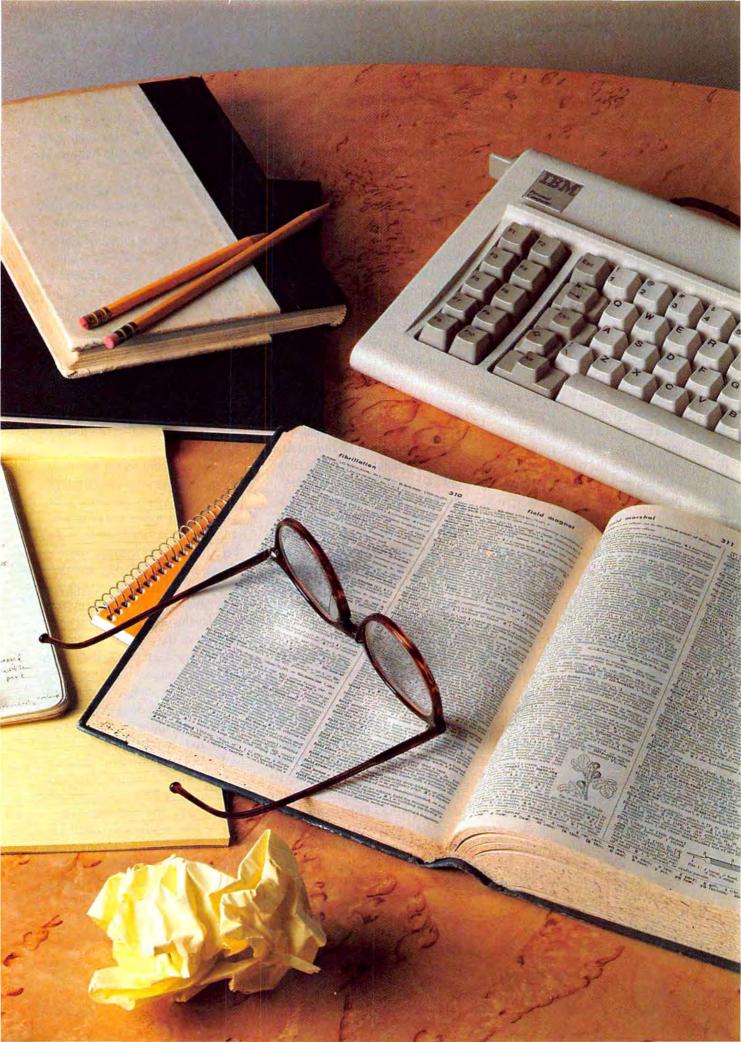
# Notable
# Nota Bene

Its Latin name,
its multilingual
capabilities, and its
bookish footnoting
features might suggest
that Nota Bene is
too academic for
business use. But this
program has the
power, speed, and frills
to match any word
processor for the PC.

*Elizabeth Wallace*

In an era of easy-to-use,
menu-driven software, it
takes courage to come out with a
command-driven word processing
program that is unabashedly com-
plex and difficult to learn. Yet
judging from *Nota Bene*'s enthusi-
astic reception among experienced
word processors and its unprece-
dented endorsement from the
Modern Language Association,
users won't mind a little struggle
if the program delivers. Initially
developed from the *XyWrite* word
processing program, Dragonfly
Software's ambitious new word
processor is worthy of its Latin
name—literally "mark well," or
take note.

The program is almost com-
pletely command-driven and of-
fers editing and formatting fea-
tures to rival the top word

processors. Other capabilities handle the fine points of preparing a long, complicated manuscript: footnotes, bibliography, index, and table of contents. *Nota Bene* also includes mail merge, list sorting, and limited mathematical operations. The program is so saturated with features (the manual covers 110 command line codes) that most users won't even notice its two major omissions, automatic hyphenation and spell checking.

However, what differentiates *Nota Bene* from the competition is its free-form text data management system. The text base is ideal for taking notes of any length and later locating and compiling them into a complete document. Never before has a PC word processor of such range and power been coupled with these kinds of searching skills. The following account of two fictional users, Ursula and Winslow, should reveal some of the diverse applications possible with *Nota Bene*.

Ursula finally won the contract for her consulting firm—six months in Quebec City analyzing the office automation needs of one of the largest departments in the provincial government. And if the ministry was satisfied with her report (of which two copies were needed, one in English, one in French), she would be hired for an additional two years to implement and oversee her own recommendations.

Ursula had written into her proposal the cost of purchasing and learning *Nota Bene*—a necessity for a bilingual project of such

scope. She would enter all her interview notes on her PC, and several months later she would be able to sort through them easily, locating and compiling whatever terms or topics she might need.

Once Ursula wrote the report in English, *Nota Bene*'s ability to display two files at once, in either horizontal or vertical windows, would make the translation into French much easier. And of course, all French accents and characters could be displayed on the screen as well as on the printed copy.

That same month, but many miles away, Winslow's partners asked him to handle a euthanasia case. He specialized in health law in law school and had summaries of all the major euthanasia case law in his PC XT. His old files were in *WordStar* format, but a *Nota Bene* utility converted the files to the format of his new program. On his hard disk system, *Nota Bene* could keep track of a text base of up to 50,000 pages of notes, a limit he was not likely to exceed in his career. Using the Boolean search capability, Winslow could quickly find and collate relevant notes and citations.

■ **A Lot to Learn**
Winslow, who hadn't attempted to learn a new software program since *WordStar*, found *Nota Bene*'s documentation rather daunting—the 731-page manual, clear and well written though it was, measured two inches thick, not including the 80-page tutorial. He would have appreciated a "quick start" tutorial for the textbase alone, one that presented only the barest essentials and reassured him that he could enter copious notes into the computer be-

fore worrying about how to prepare them for indexing. Oh well, he had made it through *Torts* in law school—he could handle this bear of a manual, too.

Winslow liked the way *Nota Bene* helped him organize his hard disk; in addition to policing the subdirectory that contained the program files, *Nota Bene* could create and keep track of seven other subdirectories, each of which could in turn contain five sub-subdirectories. He set up one subdirectory for personal correspondence, another for his journal entries, a third for contracts, another for research on current cases, and one more to hold boilerplate text for letters and other legal documents.

Ursula, an old pro at learning programs, quickly sailed through the tutorial's two exercises. Soon she was able to use the program with only occasional peeks at the help screens, the manual, the Quick Reference Guide, and the keyboard reference sheet. She appreciated the command summary page at the beginning of each chapter of the manual, not to mention the detailed index, the master lists of commands and error messages, and the charts of additional keyboards. The documentation for each command was consistently clear and complete.

Later, Ursula read the chapters on customizing the program and studied *Nota Bene*'s programming capabilities. She made extensive use of both features to install a nonstandard printer and to create customized on-screen tutorials and additional help screens and demos for the staff in Quebec.

**A Banquet of Operations**

*Nota Bene* incorporates a remarkably full range of logical cursor movement commands, assigning various command keys to extend cursor movements. For instance, the <Ctrl> key acts on whole words: <Ctrl>-<Del> deletes the word to the right, and <Ctrl>-<Backspace> deletes the word to the left. Similarly, the <Alt> key, combined with the cursor or <Del> key, operates on paragraphs; the <Shift> key controls sentences; <Ctrl>-<Shift> works on phrases (between punctuation marks); and <Shift>-<Alt> operates on lines.

The ability to mark text by these increments makes editing quick work. Defining, moving, copying, saving, merging, deleting, and undeleting blocks are all accomplished with remarkable ease and speed. You can also jump to a particular page, set place markers in text, transpose characters, and move columns.

For print formatting, *Nota Bene* uses triangular-shaped *deltas* that can store long format commands and can be placed anywhere in the text without breaking up the visual flow of the document. Deltas can be deleted, edited, moved, copied, and saved. *Nota Bene* also comes with five predefined style sheets, which can be chosen from one of the program's few menus, the Document Format menu. You can also create your own style sheets and store them on the menu. *Nota Bene* supports a wide variety of printers and contains extensive print mode commands for underlining, boldface, bold underlining, inverse, bold inverse, superscript, subscript, and overstrike. (All but the last three display on screen.)

The program furnishes an ambitious supply of extras, such as four-function math, wild-card and case-sensitive search and replace, widow and orphan control, alternating headers and footers, and four types of tabs (flush left, flush right, decimal, and centered).

---

**Nota Bene** *incorporates tools for generating up to three multilevel indexes at a time, a table of contents, and three additional lists of illustrations.*

---

*Nota Bene*'s macro function should more than suffice for most writers. You can store up to 35 macros (containing text, deltas, or commands) in each phrase library, and libraries can be overlaid so that a keystroke combination not assigned by the first library can be defined by the second.

*Nota Bene* incorporates tools for generating up to three multilevel indexes at a time, a table of contents, and three additional lists of tables, graphs, or illustrations. You can also create one or two bibliographies per document—one for original and one for secondary sources, or one for works cited and one for recommended reading. All these tools can be used over multiple linked files, although at present the files must all fit on two floppy disks or on a hard disk and a floppy. Thus, creating consecutive indexes and tables of contents for manuscripts longer than 300 double-spaced pages requires a hard disk. However, even on a

hard disk the maximum size of a bibliography or an index is approximately 50K.

The program's footnoting capabilities are comprehensive; footnotes of any length can easily be entered, edited, and rearranged. Changing them to endnotes (at the end of text) or back to footnotes again is simple. You can choose footnote formats from any one of five established styles, or you can define your own.

**Ingratiating Extras**

As a lawyer, Winslow appreciated the legal, math, and Greek symbols available to him on *Nota Bene*'s extended keyboards, and he came to depend on the automatic date and time functions, which added the current date and time to his file whenever he edited or printed it.
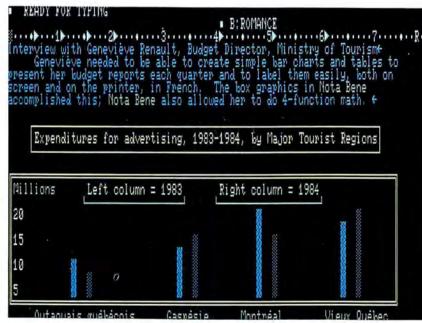
Winslow was pleasantly surprised that the program automatically handled two things he had always hated to bother about: capitalizing the first word of every sentence and indenting every paragraph. Once he gave the command, he never had to touch the <Shift> or <Tab> keys unless he was using proper names or creating a chart.

Ursula appreciated the way *Nota Bene*'s deltas kept the screen uncluttered while indicating any

Screen 1: Nota Bene's straightforward mail merge function allows the creation and simple sorting of English and foreign language mailing lists with variable line addresses. Here, Nota Bene treats each address as a separate entry because a blank line comes between them.



Screen 2: To add impact to documents, simple bar charts, boxes, and graphs can be created.

of an unlimited number of different margin settings, tab settings, and other formats within a document. To determine what command a particular delta designated, she simply placed the cursor on it and the contents of the delta appeared in the command line at the top of the screen.

The government secretaries Ursula interviewed were impressed with *Nota Bene*'s ability to create documents up to 255 columns wide (with horizontal scrolling) and the program's simple mail merge function (see Screen 1). In addition, they were pleased with the program's smooth handling of preprinted forms. You can create a copy of the form on screen, displaying all the preprinted text in a nonprinting bold/inverse template, and then fill in the blanks.

Time and again Ursula discovered an obscure feature she felt she would never bother with and ended up using regularly. For example, the program's box graphics characters came in handy for memos and reports (see Screen 2).

**Taking On the Text Base**
*Nota Bene*'s text base manager provides a number of different searching options. You can create a text base with every word in each entry assigned as a keyword for full text searching (although this limits each entry to about four pages in length) or you can search on up to 500 designated keywords per entry (although this prohibits you from making a full text search).

A text base can be reindexed with different keywords (including full text) at any time. If all words are indexed as keywords, *Nota Bene* can gather data from four or

five full disks into one text base on a floppy-based system. If a more limited group of keywords is defined, the number of indexable floppies is much greater.

*Nota Bene*'s searching speed is especially appealing. The program is designed so that the time-consuming indexing of a text base can be done separately and automatically. Once the index is built for a text base, the program requires only a few seconds to report which disks hold matching text and to designate which disk to insert first for retrieval. New entries can be added to an existing text base at any time without reindexing previous entries.

## ■ AND OR NOT

Ursula and Winslow had different tasks but a similar need: They wanted a word processor that could help them gather their thoughts and follow a complicated range of ideas over a long period of time. Ursula used *Nota Bene*'s all-words-as-keywords option for her consulting job in Quebec, creating one long text file for each group of related interviews within a department. She separated interviews with blank lines and restricted each entry to four pages or less (see Screen 3). Various searches combining keywords with the Boolean operators AND, OR, and NOT would scan the index of the text base, identifying and then displaying passages that met the search criteria (see Screen 4).

In contrast, Winslow developed a list of 750 keywords with which to identify and sort his notes. This



Screen 3: Free-form text entries in Nota Bene's text base can fill up to four screen pages.



Screen 4: A text file summarizing the results of four different searches based on a short text base comprising the material shown in Screens 1 through 3. Nota Bene will display each matching entry or a designated part of each matching entry on the screen.

way his individual entries could be of any length, not restricted to four on-screen pages like Ursula's. *Nota Bene* made it easy for him to search for particular notes by keywords and then to transfer them directly into his text.

### ■ Nobody's Perfect

Winslow, who had been conditioned by *WordStar,* found the most to dislike about *Nota Bene.* He especially missed the on-screen display of page breaks; turning on the page-line counter to locate page breaks was a nuisance and slowed down certain editing functions. Winslow also found cursor movement speed unpredictable; deleting by word was particularly slow.

Ursula's chief complaint concerned the underlining function. Typing in underline mode automatically underlined spaces unless she typed <Ctrl>-¯ to enter a nonunderlined space. Ursula felt that the <Space> bar would have been a more logical choice for entering the nonunderlined space.

### ■ An Ecumenical Word Processor

*Nota Bene* was tolerant of, even receptive to, the products of other programs. Ursula found the staff in the government office particularly pleased with the program's ability to read *WordStar, Final Word,* and *Perfect Writer* files and to both create and read ASCII files. Furthermore, they could exit quickly to DOS to run other programs, like spelling checkers, without clearing *Nota Bene* from memory.

Ursula also liked the demonstration she had seen of *Nota Bene 2.0,* an upgrade scheduled to be released soon. With appropriate printers, it could handle proportional spacing with right justification and allow up to 255 different fonts per document. You could even mix fonts on a single line, without losing right justification. The upgrade featured context-sensitive help screens, up to nine simultaneous windows, a function for comparing two files, a multiple-file search command, hyphen help, and automatic numbering for outlines. Most impressive was a new column format that permitted independent side-by-side columns on screen with automatic word wrap and separate format controls for each column.

### ■ Notez Bien, Tout le Monde!

The day Winslow won the case, he and his partners met to share a bottle of champagne. After the obligatory toasts, Winslow raised his glass to *Nota Bene,* which was humming away on his XT in the corner. No, it hadn't been easy to learn, and certainly software alone couldn't have won the case for him, but *Nota Bene* had allowed him to pull together the case in a minimal amount of time and with a minimal amount of anxiety. As he downed his Dom Perignon, *WordStar*'s commands became a foggy memory.

Late one snowy night in Quebec, Ursula put the finishing touches on her two reports. Her eyes strained from long hours in front of the screen, she granted the program a final glance of approval before exiting to the operating system. She appreciated *Nota Bene*'s design as a musician might

admire startling new strands of sound or a writer might recognize a major new literary voice. Ursula knew enough of the design of other word processors to value *Nota Bene*'s structure; what it occasionally lost in display speed during deletions, it compensated for in the swift performance and sheer power of its commands. She perceived endless possibilities for expansion and development within *Nota Bene* and saw that its essential workings could be taught to anyone in a few minutes, while its depths and ranges could seldom be mastered or outgrown.

"Notez bien, tout le monde," she murmured. "*Nota Bene* has arrived." ●

*Elizabeth Wallace, director of the KayPro Writing Project in the Baltimore County Public Schools, is a freelance writer and computer consultant living in Salem, Oregon.*

# A
# SIGHT
# FOR
# SORE
# EYES
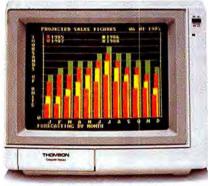
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# A Calculated RISC

Still considered avant-garde among tried-and-true chip technologies, RISC promises to give personal computers tremendous processing speed. The trade-offs, however, may take some of the sheen off the benefits.

*James E. Fawcette*

‖‖‖ Amid an ongoing rush to put hundreds of thousands of transistors on a single sliver of silicon, a radically different approach to computer hardware is gaining support among semiconductor and computer manufacturers. RISC (Reduced Instruction Set Computer) architecture is becoming a popular but controversial topic, not only because it goes against the grain of established chip technologies but because very little is certain about the advantages RISC may bring personal computers.

RISC's principal demonstrated improvement over conventional microprocessors has been the tremendous processing speeds attained in controlled university research. This much, apparently, is proof enough for several major players in the personal computer industry. Hewlett-Packard has said publicly that it plans to introduce RISC-based machines. IBM recently introduced a RISC machine, and other makers will reportedly follow suit.

While RISC emerged from the computer labs at the University of California at Berkeley and Stanford University, most sources credit IBM with developing the approach in the mid-seventies after extensive experimentation. Computer historians with longer memories point out that Seymour Cray, father of the Cray supercomputer, long espoused the basic approach that led to RISC. His phenomenally swift Cray mainframes use a reduced instruction set.

RISC disciples believe that the last 20 years of computer design have taken the industry in exactly the wrong direction. From the DEC VAX minicomputer to Intel's emerging 80386 microprocessor, they claim, CPUs have crowded more and more functions into the circuitry, resulting in over-designed machines that are much slower than they should be.

### Less Is More

Simply put, the RISC approach to computer architecture dictates that the less the computer hardware does, the better. Advocates favor RISC because the chips execute only a few basic instructions; they perform those functions with impressive speed and shift much of the processing burden to the operating system and the application software.

Instructions direct computer operation. For example, Move directs the computer to move a value from a register to memory or vice versa, or from register to register; Add instructs the computer to combine register values to achieve a new value. (A register is a memory cell on the CPU itself.) To ease the task of programming, the set of instructions for most modern processors includes complex single instructions, each of which could be handled by a string of

simpler instructions. By eliminating the complex instructions, RISC processors have smaller instruction sets than conventional CPUs; RISC advocates say that the simpler instruction sets enable the computer to run faster.

In microprocessors like the PC's 8088 and the AT's 80286, microcode resides in a portion of the chip. When software issues an instruction to the chip, it is actually calling for the execution of microcode, which can trigger a number of operations to be performed simultaneously or in parallel. RISC chips contain 30 to 50 microcode instructions; conventional microprocessors include 100 or more.

The greater the number—and complexity—of a processor's instructions, the more microcode must be stored within the chip. Tests reveal two problems with large instruction sets: Many of the elaborate instructions are seldom used; and it is often more efficient to execute many simple steps instead of one complex instruction. Accordingly, RISC trims the instruction set to a bare minimum.

*Hewlett-Packard is staking the future of its entire computer line, which totals 52 percent of the company's sales, on RISC.*

This simplified instruction set leaves more room on the chip. Here, RISC has a second opportunity to boost speed. The free space can contain extra registers. With more unused registers, RISC chips can leave values in registers rather than shuttling them between separate memory chips. The time saved is dramatic. In fact, RISC's critics say that the speed advantage of the reduced instruction set is an illusion created solely by effective use of more registers. They claim that the conventional microprocessor will soon have more registers on-chip, as well as a larger prefetch instruction queue (for caching instructions), thus mitigating the primary advantage of RISC.

In any case, such simplicity and speed come at a cost. Much more of a RISC computer's work must be handled by software, specifically by the compiler.

A compiler is a program that translates an application written in a high-level language into machine code instructions. Software is compiled in the development process before the product hits the shelves. In a RISC machine, the compiler in essence generates microcode.

On one hand, this is an advantage because the compiler can finely tailor the code for a particular application, rather than making do with instructions permanently etched on the chip. However, this strategy also means that the compiler is responsible for allocating memory, ensuring system integrity, preventing one subprogram from writing on top of another, and performing many more housekeeping duties. This is roughly comparable to writing a multitasking operating system to run on the 8088, an undertaking not suited to that CPU.

## ■ Fledglings and Heavyweights

More intrigued by speed than intimidated by the uncertainties, RISC's advocates include some stellar companies that are investing millions in the technology. In addition to Hewlett-Packard and IBM, RISC-based machines are also expected during the next two years from AT&T, DEC, and possibly Data General. These heavyweights will be joining such fledglings as Ridge, Pyramid, and MIPS Computer Systems, three hardware companies whose hopes are pinned on RISC designs. Ridge has a RISC-based supermicrocomputer competing directly with conventional supermicros from Sun Microsystems and Apollo. Pyramid has released a RISC minicomputer, while newcomer MIPS is working on RISC-based CPUs.

If the major players actually release such machines, RISC may have a significant impact on the way personal computers are designed and used. Most of the upcoming RISC machines occupy one of two niches: high-speed "mini-supercomputers," that sell for about $1 million; and engineering workstations, favored among researchers and designers for high-speed processing, high-resolution graphics, and suitability for UNIX.

Some of the more interesting products in the rumor mill include the following.

*AT&T's C Machine, a RISC-based workstation.* AT&T is developing both the microprocessor and a workstation built around the CPU. Although the so-called fifth generation microprocessor has not yet been announced, Allan Hoffman, AT&T's manager of microprocessor planning, recently said that the C machine would provide a "quantum jump in performance. We have had a sizable research group working on the [next generation] product for some time." The "C" designation is believed to be a reference to the C language. AT&T's UNIX operating system is written in C, as are most UNIX applications. Both the microprocessor and the workstations based on it are expected to emerge in 1987.

*HP's Spectrum project.* Hewlett-Packard is staking the future of its entire computer line, which totals 52 percent of the company's sales, on RISC. The Spectrum machines will replace the company's 9000, 3000, and 1000 series machines with RISC counterparts. The 9000 microcomputer is Hewlett-Packard's recent entry into the computer-aided engineering marketplace. Hewlett-Packard is counting on Spectrum to unify its product line and reverse a recent decline in earnings.

*DEC's Nautilus and Titan.* Digital Equipment is believed to have two RISC projects underway at its Los Altos, California, facility. Nautilus is said to be a high-performance minicomputer effort, while Titan is an engineering workstation.

*MIPS' chips.* This Silicon Valley start-up promises to ship RISC microprocessors and boards this year, primarily for use in engineering workstations. Prototypes reportedly ran Pascal programs five times faster than the Motorola 68000, the CPU used in Apple Computer's Macintosh.

## ■ Simple Hardware, Complex Software

RISC is specifically designed to run high-level languages. Such programming languages, including Ada, C, LISP, and Pascal, are removed from the assembly language-generated machine code instructions that computer circuits interpret. Programs that use these languages are easier to write, debug, and move from one type of machine to another. Increasingly, computer industry watchers believe programming must progress to higher-level languages if there is any hope of meeting the demand for portable software.

Critics, however, say that RISC does not simplify the inner workings of a computer system but

merely transfers much of the burden from the hardware back to the software. Thus, the availability of a compiler is crucial. The realization of RISC's potential may depend on high-level-language compilers that will run on RISC chips.

High-level, 8088-based code becomes complex and bulky when compiled. RISC-based code will only amplify that problem, because software running on RISC machines will carry more of the processing instruction load. Personal computers that use RISC will probably require a minimum of 1 megabyte of memory to handle the overhead.

The memory requirement barrier, however, is hardly insurmountable. The price of memory chips is plummeting, and 1-megabit RAMs are emerging, just in time to make RISC's memory gluttony palatable.

### The Jury Is Out

Manufacturers of conventional microprocessors generally dismiss the upstart technology. Says Claude Leglise, product marketing manager for the Intel 80386, "RISC hasn't yet shown any performance advantage in real applications."

Thus far, laboratory benchmarks validate Leglise's contention. Tests using RISC in several university research labs have yet to provide complete answers to questions about RISC's potential. Tests have conspicuously lacked definitive measurements: results of floating-point operations, critical to mathematical applications; provisions for on-chip memory management; or control of input and output. In effect, some critics say that the conditions under which RISC technology has been tested have little to do with the actual workload a computer must handle. Still, MIPS founder and Stanford University RISC pioneer John Hennessee maintains that RISC is well suited for both floating-point operations and memory management. The major computer manufacturers and venture capitalists backing MIPS, Ridge, and Pyramid are also unfazed by these criticisms and continue their RISC exploration for one very attractive reason: speed.

Where other test results fall short or are simply nonexistent, speed tests show extraordinary results. Early RISC experiments at Stanford have already

yielded performance of 2 million instructions per second (mips). To give a very rough sense of scale, a typical IBM PC is capable of about .5 mip and the AT 1 mip, while Intel claims sustained performance of 4 mips for its latest wonder chip, the 80386. RISC CPUs are expected to attain 8 mips soon, and by decade's end may reach 30 to 40 mips.

The trade-off with shortened instruction sets, according to Skip Stritter, vice president of development programs at MIPS, is a 10 to 20 percent increase in machine code to be processed. But, adds Stritter, RISC chips also process instructions at five times the rate of some conventional microprocessors. RISC microprocessors execute one instruction at each clock cycle; in comparison, Motorola's 68000 executes one instruction every five clock cycles. Thus RISC improves processing speed considerably, regardless of the increase in machine code. Additionally, the clock speed of a RISC microprocessor can run as high as 24MHz; MIPS's chips run at 16MHz. The PC AT's 80286 runs at a sleepy 6MHz.

These tantalizing speeds are enticing hardware manufacturers to endure the uncertainties. The thirst for performance has even spawned some remarkable research projects that could revolutionize personal computing—if they ever come to fruition. For now, these are largely exotic, blue-sky endeavors.

*Critics say that the conditions under which RISC technology has been tested have little to do with the actual workload a computer must handle.*

Perhaps the most far-reaching venture, funded by the Department of Defense's Defense Advanced Research Projects Agency, is aimed at producing a RISC-based 32-bit gallium arsenide microprocessor; the goal is a 40- to 50-mip CPU.

This objective may be realistic, given the properties of gallium arsenide. Used primarily in manufacturing transistors, the electron mobility of the material is estimated to be seven times that of silicon. To date, gallium arsenide has been limited to transistors because it is much harder than silicon to fabricate in adequate quantities for chip manufacturing, while maintaining an acceptable rate of purity.

Gallium arsenide also accommodates far fewer gates—the basic elements of a chip's transistors and other discrete components—per chip. Although it's not practical for standard chip technology, gallium arsenide may provide impressive speed in RISC hardware.

## Risky Ventures

The impact of such RISC-based ventures could be broad in scope. At one extreme, RISC could bring the high performance of engineering workstations to personal computing. Multiuser systems, bit-mapped graphics, and UNIX could become the rule. RISC may even foster increased use of vector graphics—a more flexible, memory-efficient but calculation-intensive graphics technique.

UNIX has become the de facto operating system for RISC efforts for two reasons: UNIX is written in C, a highly portable language, and it is the operating system of choice in the academic and engineering arenas. To AT&T's delight, RISC could give UNIX some needed momentum.

Much as race cars are testing grounds for designs that later find their way into automobile showrooms, development of a cost effective, high-speed processor might quicken the migration of these technologies to the business market. Such a scenario casts engineering workstations as pioneers of technologies that later migrate into office computers. Design considerations that the PC industry is struggling to cope with (such as high-resolution bit-mapped graphics, networking, multitasking, and high-speed cache memories) are already standard equipment for engineering workstations.

Arguing against these alternatives is the familiar anchor of compatability with existing software. RISC could address compatibility in several ways: As in the IBM RISC project, RISC and 80286 chips could be used as coprocessors with either chip as the CPU. An 80286 would handle input and output when the RISC chip is running the system. When a PC-DOS application is run, the 80286 would take over and the RISC chip would be relegated to coprocessing functions. A similar approach has been used, with minimal success, in existing machines such as the DEC Rainbow PC and the Seequa Chameleon.

Another option calls for a software emulator. Software running under UNIX on the RISC chip would imitate the 8088, essentially fooling the software into thinking it is running on a garden-variety PC. This has already been implemented on the Commodore Amiga using the Motorola 68000. Locus Computing's *Multisystem Merge* does virtually the same thing.

Scenarios aside, skepticism about the applicability of RISC to business computing persists. Several software developers point out that performance per dollar is the ultimate arbiter and that RISC is unlikely to beat out standard, mass market components.

Typical among skeptics is Robert Frankston of Lotus, codeveloper of the original *VisiCalc*. "The academic side of me finds RISC exciting and fascinating," he says, "but the pragmatic side doesn't see enough benefit at this point."

Frankston cites the availability of economical, high-power chips such as the Intel 80386 as better choices for development. "RISC machines are interesting, but not magic," Frankston says. "I wouldn't bet too much on RISC."

The most important consequence of RISC may be the impression it leaves. Some experts believe that while RISC microprocessors themselves will not achieve substantial commercial success, the exploration of the technology will prompt major changes in conventional microprocessors. Efficient use of on-chip registers and compact instruction sets may well be incorporated into future chips. Thus, more powerful personal computers are likely to be one legacy of RISC—even if a pure RISC machine never ends up on your desktop. ●

*James E. Fawcette is a freelance writer, former editor of* InfoWorld, *and former executive editor of* Personal Computing.
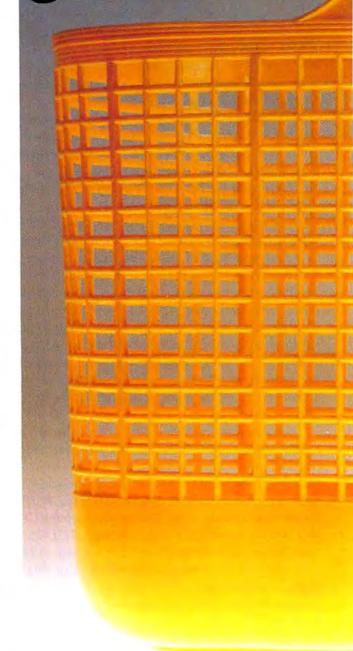
# Let Your Modem Do the Shopping

On-line shopping can yield substantial bargains if you know where to look. A Nader's Raider takes you along for a shopping spree on CompuServe and The Source.

*Harvey Rosenfield*

▉▉▉ *You need a new car, but you've been put off by the prospect of visiting a dozen car dealers. You slide into the front seat of your PC, flip on the switch, and hit the electronic highways. In a few seconds you're there: the shopping center of the future, thousands of stores selling millions of products, every byte yours for the asking. You check out a few models, engage in some stiff on-line negotiating, take a couple of minutes to access your bank account, and finally make a purchase. While you wait for your Mercedes to be delivered to your door, you leave an electronic message with your insurance agent asking her to upgrade your policies.*

A few years ago, when the personal computer took America by storm, PCs were heralded as the gateway to a social revolution. Consumer services like electronic banking and on-line shopping were going to transform daily life itself. America is not a "network nation" quite yet—you still can't buy a new car while sitting in front of your computer—but the transformation is well underway.
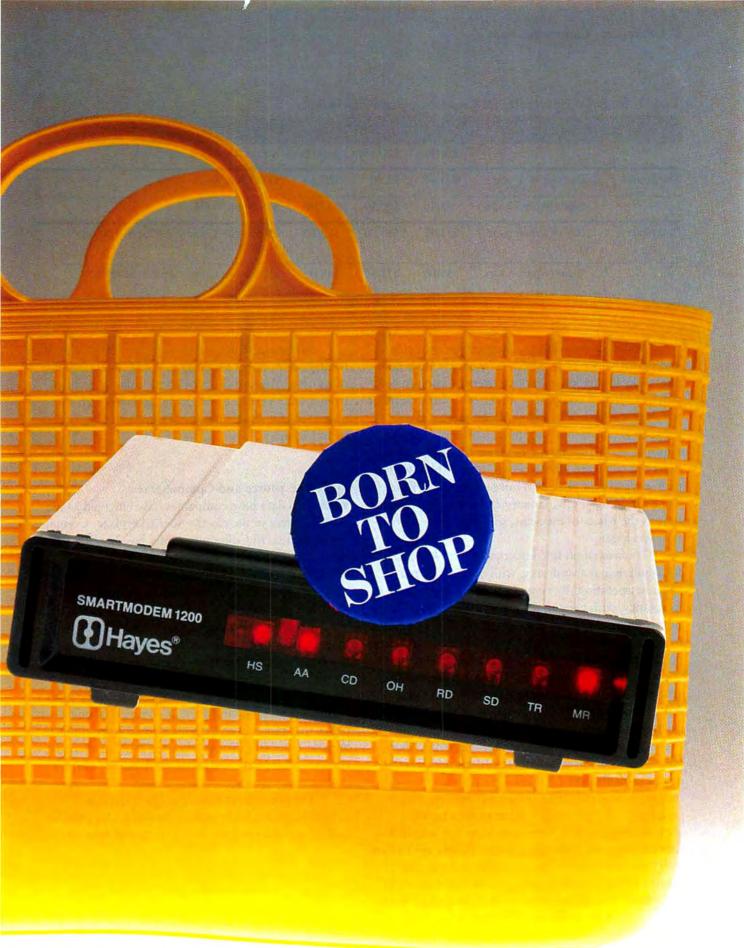
Table 1: Hourly connect rates for CompuServe and The Source

| | | 300 bps | 1200 bps | 2400 bps | Access line surcharges |
|---|---|---|---|---|---|
| The Source | Day (7 a.m.-6 p.m.) | $21.60 | 25.80 | $27.60 | $15.00 on WATS |
| | Night (6 p.m.-7 a.m.) | $8.40 | $10.80 | $12.00 | $15.00 on WATS |
| CompuServe | Day (8 a.m.-6 p.m.) | $12.50 | $15.00 | $22.50 | 25 cents on CompuServe or $10.00 on Tymnet/Telenet |
| | Night (6 p.m.-5 a.m.) | $6.00 | $12.50 | $19.00 | 25 cents on CompuServe or $2.00 on Tymnet/Telenet |

Today, teleconsumers can compare the price and performance of hundreds of products from compact disks to crockery; bargain over the latest in computer or kitchen equipment; order tools from Sears or jewels from Tiffany's; and, with the money saved through savvy on-line shopping, plan a vacation to Tahiti. The only requirements are a modem, communications software, and access to one of the information services that provide retail outlets. (See "First Time On Line," *PCW*, January 1986, for an introduction to the basics of modems, software, and information services.)

Traditional on-line information services are a $3.2-billion-a-year industry, with over 2500 data bases in operation. By contrast, on-line shopping is in its infancy, with sales in the mere millions of dollars. But this may change; some experts predict shopping by computer will become a $5 to $10 billion industry by the end of the decade. This figure takes into account the sales of a projected 50,000 shopping kiosks across the country, combining computer and videodisk technologies to allow instant shopping from an electronic catalog.

For all its high-tech plumage, electronic shopping is really a throwback to an old-fashioned retail medium—mail-order catalogs. This early form of direct marketing originally flourished because a high percentage of consumers lived in remote farming areas. Although most Americans now live within a short distance of a shopping center, people are finding they have less and less time to shop, and various forms of direct marketing are on the move again. In 1984 mail- and phone-order sales generated $170 million for retailers, double the amount of five years earlier.

While electronic shopping rides the wave of this resurgence in direct marketing, it adds a few benefits of its own. You can shop 24 hours a day and choose from a wide variety of products, and although shipping takes the usual amount of time, ordering occurs in an instant.

■ The Source and CompuServe
Two data base companies have emerged as the leading forces in the electronic marketplace. CompuServe, located in Columbus, Ohio, has 225,000 members. The Source, based in McLean, Virginia, has 62,000 subscribers. Both are relatively inexpensive to join and are accessible from almost anywhere with a local call (see Table 1).

Each company offers four basic kinds of shopping services: data bases for researching products; bulletin boards and user groups for person-to-person "want ad" transactions; manufacturer-sponsored "showrooms" that offer product support along with on-line advertising; and various commercial enterprises that range from high-class retail emporiums to bargain-basement discount houses. Not surprisingly, computer hardware and software dominate current on-line retail offerings.

The procedures to access The Source or CompuServe are fairly straightforward. Once you've logged on, you navigate on line in one of two ways:

You can step through a series of menus to see what's available, or, if you know in advance where you want to go, you can issue a command to proceed there directly.

### On-Line Research

If you're seriously considering making a purchase, say, a memory expansion board for your PC, you should do some on-line research before you plunk down your credit card number in one of the electronic stores. This will help you avoid binges of impulse buying—a particular threat when shopping electronically, since no cash or credit cards actually change hands.
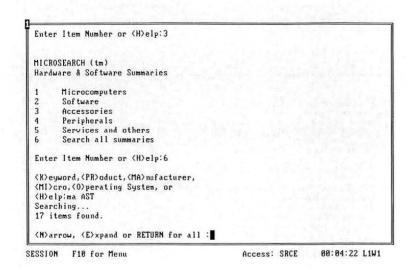
On The Source, check Microsearch for independent information on computer hardware and software. Located in the Personal Computing section (type **PC** at the command prompt), Microsearch contains thousands of brief summaries of magazine articles and manufacturers' data on various computer products (see Screen 1).

In a search for articles on memory boards, a list of 74 references appears, including a number of reviews. A quick check in the manufacturers index yields a detailed description of the units. Other hardware and software reviews can be found in various on-line publications within The Source's Member Publishing subsection (type **MEMBER 1**).

### The Special Interest Groups

If you're shopping for computer equipment, why not tap the collective wisdom of fellow enthusiasts? CompuServe's user-run "special interest groups," or SIGs, contain a host of tips and general advice from other members.

CompuServe's IBM PRO SIG, which acts as a meeting place for PC users, is divided into three sections: the Message area, Conferences, and the Data Libraries department. The Data Libraries are an excellent resource for shoppers (see Screen 2). First, they offer public domain software and patches that can be downloaded to your computer. You may find a free program that meets your needs entirely or a fix that significantly improves the performance of purchased software. Second, the Data Libraries often contain information files covering hardware and software topics.

The Source has only recently begun to encourage the formation of SIGs, but SIG-like functions are available elsewhere within the system. The Source has an extensive conferencing system called Parti. Each conference is ongoing, so you can read or add to it at any time. A list of conferences is readily available from Parti's main menu; discussions of computer hardware are common.

Screen 1: Microsearch main menu on The Source. Microsearch contains thousands of summaries of computer magazine articles and other data on computer products.

```
Enter Item Number or <H>elp:3


MICROSEARCH (tm)
Hardware & Software Summaries

1       Microcomputers
2       Software
3       Accessories
4       Peripherals
5       Services and others
6       Search all summaries

Enter Item Number or <H>elp:6

<K>eyword,<PR>oduct,<MA>nufacturer,
<MI>cro,<O>perating System, or
<H>elp:ma AST
Searching...
17 items found.

<N>arrow, <E>xpand or RETURN for all :█

SESSION   F10 for Menu              Access: SRCE      00:04:22 L1W1
```

Screen 2: IBM SIG Data Library menu. From the IBM Special Interest Group on CompuServe, you can download public domain software and research hardware and software products.

```
Data Library Sub-topics

0    General Information
1    Utilities
2    Products/Fixes
3    PC-AT
4    Programming
5    Communication
6    Software Library
7
8    Ask SysOps
9    IBM Compatibles
10

Enter choice : █


Retrieve information directly
COMPUSV    F10 for Menu                      Access: COMPUSV  00:39:17 L1W1
```

Screen 3: Sometimes the best bargains can be found on bulletin boards. In the Post subsection of The Source, users can leave "for sale" and "wanted" notices. Here is a partial listing of IBM-related classified ads.

```
  1    10 OCT TCB358 IBM AT(IBM)
  2     9 OCT BDG835 NEED HELP ON GAMES???(IBM)
  3     9 OCT ST3899 DOWNLOAD FREE PROGRAM - IBM(IBM)
  4     9 OCT BBV357 HELP TAX PACKAGES(IBM)
  5     9 OCT TCT591 *** MODEM SURGE PROTECTION ***(IBM)
  6     9 OCT TCT591 ** LOW-COST SOFTWARE **(IBM)
  7     9 OCT BDD401 BEST HARDDISTK DRIVE?(IBM)
  8     9 OCT STP857 USED PC WANTED(IBM)
  9     9 OCT CL1774 PANASONIC SENIOR PARTNER(IBM)
 10     8 OCT ST9622 INTEL ABOVE BOARD-$400(IBM)
 11     8 OCT AAG760 IBM 3340(IBM)
 12     8 OCT NAM105 KAYPRO 16 (XT COMP.) FOR SALE(IBM)
 13     8 OCT BBT951 FOR SALE: PROKEY(IBM)
 14     8 OCT BBT951 FOR SALE: OKIDATA 92(IBM)
 15     7 OCT BBM408 WANT DATA SEARCH PROGRAM(IBM)
 16     7 OCT BDN278 IBM COMPATIBLE PRINTER WANTED(IBM)
 17     7 OCT BDD643 THE LOVABLE TEACHING ROBOT(IBM)
 18     7 OCT TCP092 VISIT 'MICRO-CITY' [ON-LINE](IBM)
 19     7 OCT BCK124 (IBM)
 20     7 OCT NAM279 76,800 BAUD IBM DIRECT CONNECT X(IBM)

Enter item(s),<H>elp or RETURN for more: █

SESSION    F10 for Menu                      Access: SRCE  01:07:10 L1W1
```

Screen 4: The World of Lotus main menu on CompuServe. Software manufacturers are increasingly hosting "manufacturers' showrooms" that provide patches, templates, fixes, and interactive electronic mail.

```
Request Recorded,
One Moment, Please
Thank you for Waiting

The World of Lotus          LOTUS

        *Welcome to the World of Lotus*

 1 Introduction--What to Find & Where to Find It
 2 Additions for October
 3 October News & Feature Stories--Past and Present
 4 Listings--Complementary Software/Books/Periodicals
 5 Technical Product Information/Supported Peripherals
 6 Electronic Distribution--Drivers and Lotus Add-Ins
 7 1-2-3 User Forum
 8 Symphony User Forum
 9 Jazz User Forum

Enter choice !█

SESSION    F10 for Menu                      Access: COMPUSV  00:13:09 L1W1
```

The Source also offers a message system, known as Post. Like the message areas of CompuServe's SIGs, it facilitates the exchange of information among members. But it's especially valuable for person-to-person transactions.

### The Electronic Swap Meet

If you don't mind taking a chance, you're likely to find the best bargains on the bulletin board exchanges operated by The Source and CompuServe. The bulletin boards are a cross between a national swap meet and a newspaper's classified section. They contain numerous "for sale" messages; a few are ads by retailers, but the majority are from individual members selling new and used items.

On The Source, head for the Post subsection within the Communications section; in Post you'll be prompted with a list of categories, or you can issue a direct address command. For example, typing **Post R IBM** gathers all the messages indexed by that topic (see Screen 3). CompuServe's National Bulletin Board

> *If you don't mind taking a chance, you're likely to find the best bargains on the bulletin board exchanges operated by The Source and CompuServe.*

(type **GO BULLETIN**) works roughly the same way, though it contains fewer "for sale" messages.

You can find some astonishing deals on bulletin boards. At the time of this writing, an Intel AboveBoard memory board for the PC was listed at half off, and 256K RAM chips were going for $2.10 each, about a third of the current list price. After you read each message, you're given an opportunity to post a reply, using either CompuServe's or The Source's internal communications system. If you want to negotiate on line, you can compose an elaborate counteroffer and forward it to the member's mailbox.

Even if you can't find what you're looking for, don't give up. Some people don't realize that they have something to sell until they find someone who

wants to buy it. Posting a "wanted" message on the bulletin boards will almost always elicit some response.

While you can strike a deal and arrange shipping and payment on line, concluding the transaction by phone is probably easier. Also be aware that, as with any type of mail-order business, shopping the electronic classifieds entails some risk. Amidst the "for sale" notices, you will sometimes find a few complaints from people who have been burned (word travels fast in the electronic marketplace). Their message: caveat emptor.

### Manufacturers' Showrooms

Consumers are rarely in contact with the manufacturer of a product; when they are, it usually means bad news: Something went wrong with the product, and the place of purchase can't or won't help. However, in the on-line world, a number of manufacturers are making themselves available directly to consumers by mean of electronic showrooms.

There are still only a couple of dozen manufacturers on CompuServe and even fewer on The Source. They're not there to make sales; in fact, you generally can't buy products through the showrooms. Rather, the showrooms offer a phenomenal degree of product information and support simply unheard of in the off-line world.

For example, The World of Lotus, operated by Lotus Development on CompuServe, offers an extensive interactive support facility and hundreds of downloadable patches, templates, and fixes to supplement its famous spreadsheet products (see Screen 4). Other software manufacturers with showrooms include MicroPro, Digital Research, Borland, and Microsoft. Most of the showrooms can be found within the Personal Computing sections of The Source and CompuServe.

Only a few hardware companies are on line; Commodore and Epson operate on CompuServe, and NEC supports one of its microcomputers through The Source, but Apple and IBM are nowhere to be seen. And virtually no noncomputer showrooms are on line.

From the consumer's perspective, the after-purchase support available on line adds considerable value to the purchase itself. Access to end-users benefits the manufacturers as well by providing a ready means of judging consumer preferences and an excellent way to obtain product feedback.

### Retail Shopping

Once you have completed your research, a raft of on-line retail outlets offers a wide variety of both computer and noncomputer merchandise. Typing GO SHOPPING on CompuServe brings you to the main shopping section, the Electronic Mall (see Screen 5). The Electronic Mall, introduced in February of 1985, has grown from 23 merchants to more than 65. Here, you can order fine china from Lenox (GO LNX); shop at Bloomingdale's (GO BL); book hotel and airplane reservations (GO ATZ for hotel accommodations; GO TWA for airline ticketing), or, if you can't afford a winter vacation, at least ship yourself some fresh Florida oranges ($34.95 a bushel, GO FFS).

The Source offers fewer retailers, but the situation is changing for the better; new stores are coming on line all the time. To shop on The Source, type **SHOP** at the command prompt. Then enter the Compu-Mall (within the Comp-u-store complex) and check the Mall Index for new arrivals (see Screen 6).

Ordering from any of these stores is as simple as shopping by catalog. For example, on CompuServe, once you select an item from a menu, you're given a full description of the product, including credit terms. If you wish to add the item to your shopping basket, just type **0** to order. Nothing's final until you say so, and you can return your selections to the shelves simply by deleting them once you're at the electronic checkout stand. Purchases are billed to your major credit card, but some stores also accept checks.

### A Shopping Spree at Comp-U-Store

For those who prefer to do all their shopping in one place, both The Source and CompuServe offer their customers access to Comp-u-store, a 60,000-product department store run by CompuCard, a Stamford, Connecticut, company. While there are a number of other stores within the Shopping section

of both services, Comp-u-store is the largest. Anyone can browse in Comp-u-store, but only those who sign up in advance and pay a $25 annual fee can actually buy. You can join instantly on CompuServe, merely by adding the membership fee to a purchase; on The Source, you'll have to wait a few days until your passport to shopping paradise arrives in the regular mail.

Comp-u-store "leases" space to other shops, so when you arrive at the introductory menu you must decide whether to visit one of the peripheral establishments or enter the main store (see Screen 7). If you get lost, type **HELP** at any prompt for a list of Comp-u-store's commands. Once you're inside Comp-u-store, the commands are the same whether you're on CompuServe or The Source.

Resuming the search for a memory board, ignore the other merchants for now, and enter the main
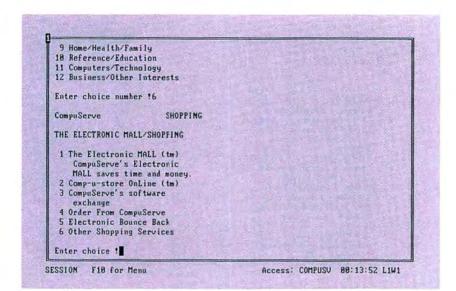
### *Once you select an item from a menu on CompuServe, you're given a full description of the product, including credit terms.*

store by choosing the first item on the menu, Comp-u-store & Best Buys. Once you enter the main shopping area, finding what you want is relatively easy. Once again, you're prompted to choose Shopping or Best Buys. When you select Shopping, you have the option of specifying a particular product by category, brand name, model number, function, or price range.

As in the real world, the emphasis is buy, buy, buy. Comp-u-store members are encouraged to order everything they want; you're not committed until the very end, when you finalize your purchases and delete your capricious whims.

To check out the store's selection of memory expansion boards, first choose the Personal Computing department from Comp-u-store's category list (see Screen 8). Choose menu choice 11, which brings up Screen 9, and then select the product type,

```
9 Home/Health/Family
10 Reference/Education
11 Computers/Technology
12 Business/Other Interests

Enter choice number !6

CompuServe            SHOPPING

THE ELECTRONIC MALL/SHOPPING

1 The Electronic MALL (tm)
   CompuServe's Electronic
   MALL saves time and money.
2 Comp-u-store OnLine (tm)
3 CompuServe's software
   exchange
4 Order From CompuServe
5 Electronic Bounce Back
6 Other Shopping Services

Enter choice !█

SESSION   F10 for Menu            Access: COMPUSV   00:13:52 L1W1
```

Screen 5: CompuServe's Electronic Mall features 65 on-line merchants that sell everything from fine china to Florida oranges.

```
SHOPPING, GAMES AND EDUCATION <HOME>

1  Focus on Education <LEARN>
2  Shopping At Home <SHOP>
3  Game Arcade <GAMES>
4  2,000+ Movie Reviews <MOVIES>
5  Horoscopes, Soaps and More <BYLINES>
6  Games Bulletin Board

Enter item number, <H>elp or <Q>uit: 2

SHOPPING AT HOME <SHOP>

1  Comp-U-Store <CSTORE>
2  MusicSource Records and Tapes <MUSIC>
3  Books <BOOKS>
4  Member Bulletin Boards
5  Member Publishing Catalogs <PUBLIC 1>

Enter item number, <H>elp or <Q>uit: 2
█

SESSION   F10 for Menu            Access: SRCE   00:01:22 L1W1
```

Screen 6: The Source provides electronic shopping through its Compu-Mall service.

```
Enter Selection # >2

        *** Shopping ***

1) Comp-u-store & Best Buys
2) Comp-u-mall - Specialty Shops
3) The Drugstore
4) Home Furnishing Store
5) Discount Travel
6) Warehouse Outlet
7) Return to Main Directory

Enter Selection # >1
        ** Comp-u-store **
1) Shopping & Ordering
2) Best Buys (Databasement)
3) Process a stored order
4) Return to Shopping Directory
Enter Selection # >█

SESSION   F10 for Menu            Access: COMPUSV   01:12:23 L1W1
```

Screen 7: Comp-u-store, featured on both The Source and CompuServe, boasts 60,000 products available electronically, and also leases its electronic floor space to other merchants.

Screen 8: Comp-u-store's main
category list

```
Product Type
(LISt) for Product Listing
>list
 #          Categories
---     -------------------------
  1     Appliances
  2     Cameras & optical equip.
  3     Cars, car stereo & tires
  4     China, crystal and gifts
  5     Silverware and cutlery
  6     Luggage
  7     Sports, exercise & health
  8     Stereo & audio equipment
  9     Tv & video equipment
 10     Phones & communications
 11     Computers & accessories
 12     Home & office furnishing
 13     Tools & lawn equipment
 14     Watches
 15     Musical instruments
 16     Warranty/service contract
Enter A Category # >█

SESSION              Cpt              Access: COMPUSU  00:00:11 L1W1
```

Screen 9: Computer products
found in Comp-u-store's per-
sonal computing department

```
 16    Warranty/service contract
Enter A Category # >11
Code        Product
----    -------------------------
APAB Apple business software
APAG Apple game/educ. software
APUS Apple utility software
ATAB Atari business software
ATAG Atari game/educ. software
ATUS Atari utility software
COAB Commodore business software
COAG Commodore game/ed. software
COUS Commodore utility software
CPAC Computer accessories
CPMD Computer modems
CPMM Memory expansion & storage
CPPR Computer printers
CPRS Radio shack computers
CPUT Computers
CPVM Computer video monitors
Press Return/Enter to continue
or enter selection >█

SESSION              Cpt              Access: COMPUSU  00:00:27 L1W1
```

Screen 10: A partial list of
Comp-u-store's memory boards

```
>1
Ship-to State
(necessary for quote)
>ca
CALIFORNIA (Y or N) >y
What's the most you will spend?
>$1200
Memory expansion & Page  1 Of  2
 #  Mfg    Model       FDC
 1 AMDK  MAIBOARD    347.89
 2 CASI  RC4          38.54
 3 DIGR  128KEXPANS  173.88
 4 DIGR  GLDCD64KBD  205.92
 5 EAGL  64KBKIT      37.95
 6 MCSF  64KRAMCARD  194.44
 7 MCSF  RAMCARD192  449.48
 8 MCSF  RAMCARD256  354.24
 9 MCSF  RAMCHIPS    114.13
10 MCSF  SYSTEMCARD  401.86

Enter Selection #, or
p# for that page >█

SESSION   F10 for Menu            Access: COMPUSU  01:17:25 L1W1
```

CPMM, which advertises memory expansion and storage devices. You'll then be asked for a preference in brand names or price range. Specify None so that you can compare all available units.

In a few seconds, a directory of products appears (see Screen 10). Comp-u-store carries more than a dozen RAM boards, but prices are pretty high; a Microsoft Systemcard with 256K was going for $401.86–30 percent off list, but still no bargain.

Type **TO MAIN** to exit the computing department and check out the Best Buys section (also known as the Databasement). The selection here is limited, however, so exit the main store altogether and proceed to the Warehouse Store. Prices for warehouse merchandise are excellent, but you may find that most of the items are tagged "sold."

### The Discount Houses

Don't despair if Comp-u-store doesn't have what you need or, more likely, can't deliver it at the right price. There are a number of discounters on line. Consumers who relish bargains and who don't mind shopping in less than elegant surroundings will find themselves completely (and literally) at home.

Be forewarned: You'll have to do some trekking around to find the discount houses. Inexplicably, The Source hides a few discount outlets under Member Publishing in the Personal Computing section, rather than under Shopping where they should be.

On The Source, the first stop in Member Publishing is Digital Decisions, a New Jersey outfit. Their catalog is updated once a month, and they'll quote a price on any computer product. A brief visit to the Monthly Specials department reveals an AST Six-PakPlus, fully loaded with 384K, for $249. Clearly, this is the best price of the day, as good as if not better than what you'll get from most mail-order houses.

While on The Source, you'll also want to stroll over to Elephant Walk, a rock-bottom discount heaven. Here, you can choose computer products from among nine categories, then add 7 percent to the dealer cost to get your price. Although Elephant Walk's prices are often the best to be found any-

where, on or off line, their shelves are pretty bare; it's a good place to go once you know exactly what you want.

Unlike The Source's potpourri of discount stores, CompuServe has less to offer in the way of independent discounters. However, Software Discounters of America (type **GO SDA**) usually has good deals on major programs.

### Rating Electronic Shopping

Has the age of teleconsumption arrived? As a resource for consumer information and product support, the results so far are remarkable, at least in the area of computer hardware and software. The bulletin boards, SIGs, and manufacturers' showrooms may ultimately redefine the concept of marketing.

Missing, however, are the independent consumer resources that would enable puchasers to shop more effectively. The information services could better serve their customers—and themselves—by providing safety studies, product recall information, price

> *The electronic marketplace offers a veritable cornucopia of products and services, at prices that rival—and sometimes beat—those of its shopping-center counterparts.*

surveys, and other types of information published by consumer groups and other nonprofit organizations.

The electronic marketplace offers a veritable cornucopia of products and services, at prices that rival—and sometimes beat—those of its shopping-center counterparts. However, it's important to remember that subscribers currently pay to shop on line, sometimes, as in Comp-u-store, a healthy premium just to get in the door. But when you add the cost and hassle of driving to a mall, parking the car, and fighting the weekend crowds, electronic shopping just might make more sense.

### The New Catalog

Full-function electronic shopping still awaits some major changes. First, more vendors have to go on line, and the marketplace must broaden beyond computer merchandise. Applying the economics of supply and demand, that means more customers have to come on line.

A second requirement is software and modems that can easily contact, capture, and compare data from a variety of sources simultaneously. The latest generation of fast modems and sophisticated communications software is a step in this direction. The new 2400-bps modems increase the efficiency and lower

> *When you add the cost and hassle of driving to a mall, parking the car, and fighting the Saturday crowds, electronic shopping just might make more sense.*

the transmission costs of telecomputing, and software packages like Microsoft's *Access* promise multiple, simultaneous, fully automated communications sessions that will give new meaning to the term *window shopping.*

Another problem lies in the services themselves. The scrolling ASCII videotex of CompuServe and The Source may prove too drab for successful marketing. For most people, the joy of shopping depends at the very least on sight, if not touch or sound. Even print catalogs provide color photo- graphs to advertise most of their products.

Menu-driven graphics videotex, such as the frame-by-frame, NAPLPS-based Viewtron data bases in southern Florida, may act as the bait that will lure advertisers and consumers into electronic shopping. As yet, however, graphics videotex has failed to catch on as expected. NAPLPS information services are slower than the more popular ASCII services, and even with a PC equipped with a NAPLPS decoder and a high- resolution color display, the images are rather crude and fall far short of matching the resolution of print media.

However, in the next few years some major corporations may be testing the graphics videotex marketplace. Later this year, AT&T, Bank of America, Chemical Bank, and Time, Inc., will be setting up a videotex joint venture called Covidea; and Trintex, a joint venture involving IBM, Sears, and CBS, is expected to offer videotex in 1987. Although it's not yet established whether these consortia will offer graphics videotex or stay with traditional scrolling-ASCII services, both groups plan to provide home shopping along with banking and financial services.

As remarkable as these advances are, it's unlikely that computer telecommunications will become a pervasive force within our society until a fourth or fifth generation of technology arrives. Doing the shopping and other daily chores via computer will then be as easy as dialing 411 is today. ◉

*Harvey Rosenfield is an associate of consumer advocate Ralph Nader and is the director of The Network Project, a California-based consumer protection organization.*

*CompuServe Information Service
5000 Arlington Centre Blvd.
P.O. Box 20212
Columbus, OH 43220
800/848-8199, 614/457-8600
Cost: $39.95 plus hourly usage
 fees (see Table 1)*

*The Source Information
 Network
1616 Anderson Rd.
McLean, VA 22102
800/336-3366
Cost: $49.95 plus hourly usage
 fees (see Table 1)*

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# From the Hardware Shelf

*PC World offers first impressions of recent hardware releases*

Just when you thought it was safe to buy a PC AT, a slew of compatibles arrived to snatch the bread from Big Blue's mouth. This month's Hardware Shelf spotlights the first entrants in The Great Compatibles Derby of 1986.

*Edited by Robert Luhn*

The IBM PC AT is no longer on the cutting edge of personal computing. Once a trailblazer in that no-man's-land between the PC and the minicomputer, today the AT is just another 80286 machine surrounded by equally capable and usually cheaper peers. At one time pundits from *PC World* to the *Wall Street Journal* pooh-poohed the possibility of an AT compatibles flood, pointing to the Great Compatibles Shakeout of 1984 that humbled Columbia, Xerox, Victor, Mindset, Otrona, and a clutch of other companies. The same oracles also predicted big things–the smashing of the 640K barrier, the corresponding emergence of multitasking software, the AT as hub of a 16-workstation network, and so on.

Alas, reality soon intruded. Users discovered that many AT 20MB hard disk drives had the rude habit of randomly creating bad sectors; new incarnations of DOS failed to truly crack the 640K barrier–ensuring the success of a hardware patch called the AboveBoard and its clones; and sadder-but-wiser companies such as Digital Research discovered that tapping the 80286's "protected" mode memory management capabilities for DOS– essential for multitasking software and multiuser setups–was not so easy.
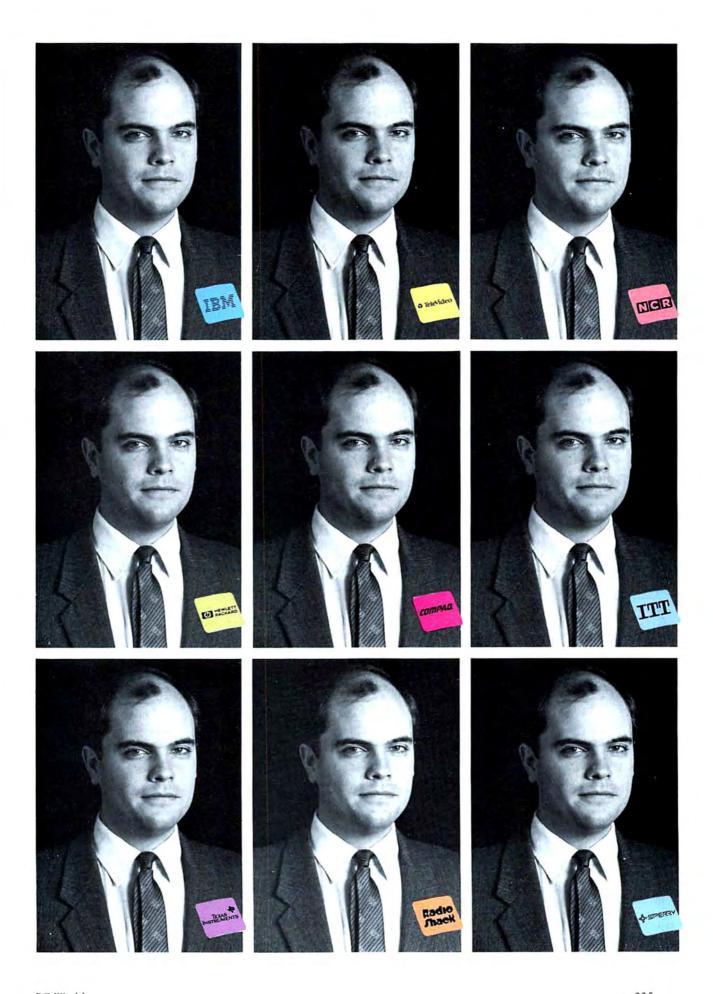
As a result, the AT's sales and its impact on the shape of the market have been rather modest. Industry analysts estimate that over 4 million PCs and compatible machines–and fewer than 200,000 ATs–are purring away on desktops across the nation. As one analyst noted, "There's no software. [The AT] is just a big fat PC." If the AT

engendered any new "standard" in the last year, it was *speed*. Performance-conscious users turned not only to the AT and 8086 machines like the Deskpro; many upgraded their PCs by dusting off 8087 sockets or by adding turbo boards with faster 8086, 80186, and 80286 microprocessors (see "Retrofit Your PC" and *From the Hardware Shelf*, PCW, October 1985). Whether this first wave of AT compatibles will open wallets is uncertain, but if nothing else, the competition will lower the admission fee to high-performance computing.

## Getting Serious

The first compatibles deluge involved small and large manufacturers alike; this time around the players are mostly well-established companies that have weathered the capricious PC market and IBM's legal department. Their products burst with "added value," beating the PC AT in terms of price, performance, or features. Every system brags of something extra: more function keys (which makes managing a passel of desktop utilities easier), a faster 80286 microprocessor and hard disk drive, more memory for the money, crisper color display, a larger power supply, or room for extra storage–be it floppy, hard, or tape. That's added value IBM hasn't matched.

Making their debut in *From the Hardware Shelf* are compatibles that may give IBM a serious tussle in the marketplace: The Xtra XP from telecommunications giant

*(continues)*

ITT (which pointedly promotes the machine as an XT compatible); the PC8 from archrival NCR, which has battled IBM for the business dollar since the days of the adding machine; the TeleVideo AT from terminal-maker Tele-Video; the Deskpro 286 from Compaq, the original clone maker; and the Vectra and Business-Pro from scientific minicomputer vendors HP and TI, whose previous PC compatibles did not fare well in an already glutted market. Before this issue hits the stands, AT compatibles from

Sperry, AT&T, Epson, Tandy, and a number of Japanese and European manufacturers will also be vying for shelf space. *From the Hardware Shelf* will duly note their talents and deficits in forthcoming issues.

## We're All ATs on This Bus

Few users are willing to trade a trusted and familiar PC program for speed. Accordingly, our informal compatibility test was slanted toward PC compatibility—though we take a passing peek at strictly AT-related issues (see Table 1). Testing PC compatibility is admittedly an inexact science. But if a

so-called AT clone chokes on PC-DOS 3.00 and can't run a healthy sampling of PC software, its claims to compatibility are suspect. Happily, the manufacturers represented here have not taken compatibility lightly. With few exceptions, their machines stray very little from IBM's path, yet manage to improve upon the original concept.

*PC World*'s compatibility tests included running a smattering of popular but finicky software (*Framework 1.1, 1-2-3 release 2,*

## Table 1: An informal compatibility test

| Program | NCR PC8 | TeleVideo AT | ITT Xtra | Compaq Deskpro | TI Business-Pro | HP Vectra | IBM AT |
|---|---|---|---|---|---|---|---|
| Jet | ● [1] | ● [1] | ● [1] | ● | ● | ● | ● |
| 1-2-3 release 1A | ● | ● | ● | ● | ● | ● | ● |
| 1-2-3 release 2 | ● | ● | ● | ● | ● | ● | ● |
| SuperKey | ● [1] | | ● | ● | ● [1] | ● | ● [1] |
| Framework | ● | ● | | ● | ● | ● | ● |
| PC-DOS 2.00 | ● | ● | ● | ● | ● | ● | ● |
| PC-DOS 3.00 | ● | ● | ● | ● | ● | ● | ● |
| PC-DOS 3.10 | ● | ● | ● | ● | ● | ● | ● |
| PopDos | ● | ● | ● | ● | ● | ● | ● |
| VDISK | ● | ● [2] | ● | ● | ● | ● | ● |
| TenKey 1.0 | | | | | ● | | ● |
| WordStar 3.3 | ● | ● [2] | ● | ● | ● | ● | ● |
| IBM AT Diagnostics | | | | ● | ● | ● [3] | ● |

[1] Failed to generate application's sound prompts
[2] Required native version of MS-DOS
[3] Ran to second menu

and *WordStar 3.3*); the PC-DOS family from 2.00 to 3.10; VDISK.SYS, a RAM-disk program supplied by IBM with the AT; *Jet*, a graphics and sound-intensive game in the tradition of *Flight Simulator*; *IBM AT Diagnostics*, which above all else expects to find itself running on a true-Blue AT; and a handful of equally picky memory-resident programs from old-timer *TenKey* to relative upstart *SuperKey*.

The test results aren't startling, but they are heartening. Almost every machine hit the compatibility bull's-eye—a claim most PC compatibles in 1983 and 1984 could not have made. The Compaq Deskpro 286 was closest to the center—but this is hardly surprising given its lineage. What is surprising is how close Hewlett-Packard's and Texas Instruments' machines came. Both compatibles match the Deskpro 286 program for program—and were the only other two machines to even boot *IBM AT Diagnostics*. The NCR PC8 was just a shade off center; slightly further out were the Tele-Video AT and the Xtra XP, which either failed to run a popular program (such as *SuperKey*) or required a native version of MS-DOS for certain applications.

### Pedal to the Metal

But how well do these AT compatibles measure up to the speed standard? To find the answer, each machine was subjected to a series of tests that measured hard disk, memory, and processing performance using typical PC applications. A sizable *WordStar* document was reformatted; a massive *1-2-3* worksheet saved and recalculated; a *dBASE III* file sorted; calculation-intensive graphics drawn; and for traditionalists,

**Figure 1: AT compatibles timing tests (in minutes and seconds)[1]**



Legend:
- NCR PC8
- TeleVideo AT
- ITT Xtra XP
- Compaq Deskpro 286
- TI Business-Pro
- TI Business-Pro (Turbo mode)
- HP Vectra
- IBM AT

Reformat a 150K WordStar document

Copy a 243K 1-2-3 release 2 worksheet

Recalculate a 243K 1-2-3 release 2 worksheet

Sort a 76K 712-record dBASE III file

[1] All AT compatibles tested with PC-DOS 3.10; the Xtra XP was tested with ITT MS-DOS 2.11
[2] Tested with each compatible's native version of BASIC
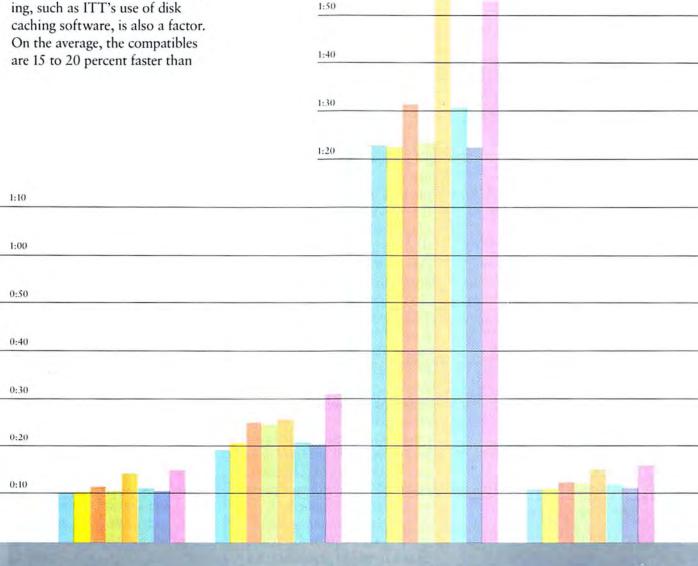
each compatible was forced to find and list the prime numbers between 1 and 1000 in interpretive BASIC and 1 and 10,000 in compiled BASIC (see Figure 1).

By all accounts, the compatibles easily beat the AT speed standard. Swifter processors (running at 8MHz versus the AT's 6MHz) and hard disk drives largely account for the difference. Clever engineering, such as ITT's use of disk caching software, is also a factor. On the average, the compatibles are 15 to 20 percent faster than the AT; within this breakneck group are performance variations as great as 62 percent.

Whatever your yardstick, the PC AT is in a run for its money—and its market. The careful compatible buyer can rest assured that companies such as HP, TI, NCR, and ITT aren't going to disappear overnight. Though we're hesitant to note whether this year's compatibles gold rush will leave mostly fools behind, it's clear that this time the prospectors in IBM's minefield are deadly serious.

*(continues)*
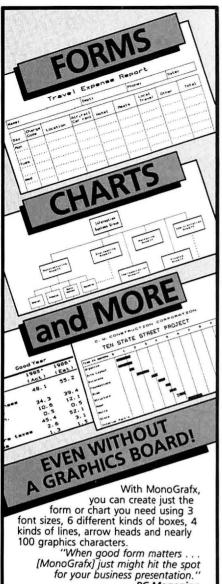


Find all prime numbers less than 1000 in interpreted BASIC[2]

Find all prime numbers less than 1000 in compiled BASIC

Run GLOBE (a graphics intensive program) in interpreted BASIC

Run GLOBE in compiled BASIC

# NCR PC8

When I see NCR's red logo, I think back to my childhood. My family owned a chain of toy stores, and one of my first toys was a battered NCR cash register, complete with hand crank, cash drawer, and paper tape. As my voice grew deeper and I traded in short pants for floods, I found myself selling toys—an experience akin to dishing out gruel in a Kamchatkan gulag. But I did learn to "make change," to assemble tricycles and doll carriages, and to trust our sturdy if ungainly NCR cash registers.

Now that I'm approaching my golden years, I find myself gazing upon the NCR logo once more—this time in the welcome form of the AT-compatible PC8. The story of the rivalry between NCR and IBM is a long one; suffice it to say that Big Red has kept pace with Big Blue in the PC market after its own plodding fashion. With the PC8, NCR has taken a tiny leap in the direction of—dare I say—style, without sacrificing value. Though the PC8's footprint is as elephantine as the AT's, the machine is pleasingly ergonomic and delivers the required compatibility, plus some worthy extras—a faster 80286 microprocessor, a fleet 20MB hard disk drive; and a rock-solid and ably modified keyboard—for a price on a par with a comparably configured AT.

With the exception of the Deskpro 286, the NCR probably sticks closest to the AT standard. Like the AT Model 99, the Enhanced PC8 comes with 512K (expandable to 640K on the motherboard), a half-height 1.2MB floppy disk drive, a full-size 20MB hard disk drive, a combination parallel and serial board, a bidirectional keyboard, plus MS-DOS, BASIC, and diagnostics software. Monochrome, monochrome graphics, and color monitors are additional and cost $520, $849, and $1260, respectively, including display boards. The chassis features an 80287 socket, six AT-like 8/16 bit expansion slots, two 8-bit slots, and enough space and power to accommodate a total of five half-height (or two full-height and one half-height) drives and 4MB of extended memory. Although NCR offers memory boards and storage devices for the PC8, most third-party devices—tape backup units, the AboveBoard AT, and so on—work just as well.

You might conclude the PC8 is nothing but a silicon copy of the AT, but 'taint so. The PC8 steps out of Big Blue's shadow in several important areas. The first is the PC8's enlarged keyboard. Boasting a doubly long cord and the snappy response that speed typists love and Compaq owners long for, the keyboard sports a separate cursor pad and duplicate <Ins>, <Ctrl>, <Del>, and <Enter> keys for the spreadsheet sophisticate. If you manage a handful of memory resident utilities or wrangle with programs such as *WordStar 2000* that frequently use <Shift>-, <Alt>-, and <Ctrl>-*key* combinations, the 20 extra programmable function keys lining the top of the keyboard

*(continues)*

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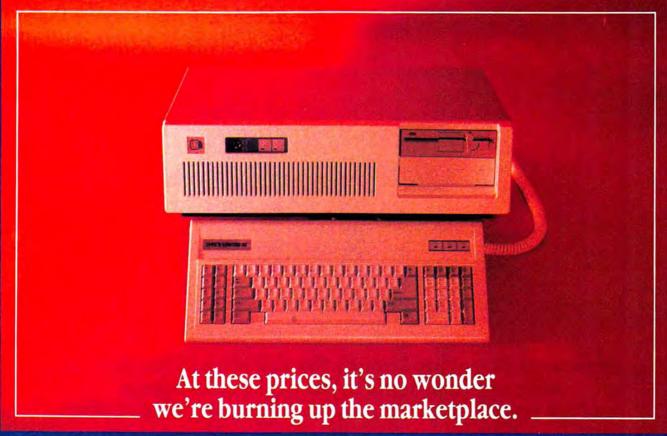
Then you can begin to send data regardless of where you're perched.

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**The AT&T Model 4000 Modem**

**AT&T**
The right choice.

will be especially welcome. <F11> through <F20> initially represent <Shift>-<F1> through <F10>; <F21> through <F30>, <Ctrl>-<F1> through <F10>. After some experimentation, I set aside <F1> through <F10> for my main application, the next ten function keys for DOS-level macros defined by *SuperKey,* and the last ten for triggering *SideKick* and *Turbo Lightning*'s spelling checker and thesaurus.

Like the AT, NCR makes things easier once you get inside. To install a full or half-height drive, merely pop off the cover, slide the drive into a compartment at the front of the system, and slip on one of five power supply connectors. Informing your machine of new tenants (drives, memory boards, or ports) doesn't involve flipping DIP switches or moving jumpers as with the AT and its compatibles–NCR has done away with such impedimenta, replacing them with a simple menu-driven configuration program.

Other niceties that round out the package: a built-in clock, an international power supply with a variable-speed fan, a combination keyboard/cabinet lock, and a volume knob for the system speaker. As Table 1 and Figure 1 show, the PC8 can keep pace with the compatibles rat pack and embrace the spectrum of PC software.

Of course, this solid compatible does have flaws. NCR's 15-inch color monitor won't win any prizes for text display in either monochrome or color graphics mode. In

*(continues)*

the former, characters are unreadable; in the latter, character spacing is erratic.

Worse still is the PC8's wildly inaccurate owner manual. It erroneously states, for example, that you must remove the motherboard to install an 80287 and you must set jumpers to signify the presence of a memory board or disk drive. When I queried NCR's technical point man on this, he chuckled nervously and said, "Oh, you must have read the manual—we're fixing that." And no small wonder. Consider the manual's cogent advice on moving the gargantuan PC8: "You may want to have another person help you lift the heavier units. Have an extra person available to open doors, or to call the elevator." Thankfully, this helpful guide is included in the system price.

Though the PC8's documentation verges on parody, the system is no joke. This is one of the fastest AT compatibles around—a competitive workhorse backed by a company you can trust. —*Robert Luhn*

*PC8*
*NCR*
*1700 S. Patterson Blvd.*
*PCD/1*
*Dayton, OH 45479*
*513/445-7478*
*List price: basic system $3795, enhanced system $5505, monochrome monitor with display board $520, monochrome graphics monitor with graphics board $849, color graphics monitor with 64K graphics board $1260*

*(continues)*

## TeleVideo AT

I put in my requisition for a Compaq Deskpro long before 80286 machines began sprouting like Santas in December. The Deskpro was Compaq's top dog at the time and was nipping at the AT's heels. Of course, razzing the AT wasn't tremendously taxing, given the scarcity of IBM's product and rumors of a faulty hard disk drive. My request came to naught anyway, for the *PC World* quartermaster apparently routed my order via Bogotá. I continued to hobble along with my 1948 Underwood, issuing memos, cursing the fates, and generally acting inconsolable.

And then, like Halley's comet, the AT compatibles materialized. By the time the UPS jock finally uncrated my 8086 Deskpro with its measly 10MB hard disk, I had already grabbed an incoming TeleVideo AT.

What, you say? Pass up a Compaq Deskpro for a TeleVideo? Just for blitzkrieg word processing and a little spreadsheet doodling now and again? You'd better believe it, for the TeleVideo AT is faster than a hungry barracuda.

You have to admire TeleVideo's spunk in borrowing the AT moniker. But TeleVideo has paid careful attention to compatibility this time, while offering performance that is startling from a company that's had financial ups and downs. TeleVideo's good but not great PC compatibles ate up capital and nearly devoured the

*(continues)*

company, along with the ASCII workstations that are the firm's cash cows. This season, TeleVideo can celebrate its resurrection with a machine that makes up in power what it lacks in panache.

Indeed, there's nothing imposing about the TeleVideo AT other than its girth. It is sensible and unpretentious and suggests nothing so much as an outrageously smart, fast terminal. But there's the rub: TeleVideo's humble marketing department may condemn the Korean-made unit to the role of perpetual underachiever.

The TeleVideo AT is clearly more than a terminal with a thyroid condition. But TeleVideo, wary of the "clone" appellation, has apparently positioned its AT as a loss leader (or at best, as a file server) for its Personal Mini network, a Novell derivative that won't win any World Class awards. Terminals, of course, remain TeleVideo's bread and butter, but *workstation* is as apt a label for this intelligent system as *schmata* is for Nancy Reagan's Sunday best.

The company has kept system options to a minimum by building goodies and essentials directly into the unit. Model I—which, except for the Tandy 3000, may be the best value in an AT work-alike—lists for $3395 and includes an 8MHz 80286 CPU, 256K of RAM, a keyboard, a single 5¼-inch 1.2MB floppy disk drive, a clock/calendar/alarm, a 220-watt power supply, serial and parallel ports built into the motherboard, and six AT-style 8/16 bit and two 8-bit expansion slots. You can populate the motherboard with 640K of RAM,

*(continues)*

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**Circle 152 on reader service card**

From the Hardware Shelf



More than a smart terminal: the TeleVideo AT

top the system out at 15MB with expansion boards, and plug in an 80287 if you're facing some heavy math homework. The unit's power supply is more than enough to support two floppy disk drives and two hard disks.

The Model II boosts memory to 512K and adds a shock-mounted, full-height 44.5MB Rodime hard disk drive. The hard disk is much more rapid than its unremarkable 55-millisecond access time would indicate. The hard disk controller relies on a technique known as *double-buffering*—the controller holds an entire track of data in its own RAM, boosting overall performance markedly. Adding further punch is the hard drive's 1:1 interleave factor, which enables it to read or write an entire track in a single disk revolution, unlike the three orbits that the AT's drive requires.

As I've unsubtly hinted, the TeleVideo AT is a substantial companion; it measures 21 inches wide by 16 inches deep by 6 inches high. If you value desk space, you can park the unit on its side (as you can with all true AT compatibles) on a custom floor stand. Under the hood, the design is functional rather than flashy. Removing the unit's steel casing (which in itself inspires a certain confidence) reveals a 32K video board capable of text and graphics, the disk controller, and six free slots. The system can house up to four storage devices: one full-height and three half-height, or one half-height and two full-height units.

Prominent "extras" include a monochrome graphics monitor, a 360K floppy drive, and an integrated 20MB Teac tape backup unit. Mindful that Xenix and some networks can't abide its proprietary disk controller, TeleVideo offers a genuine PC AT Western Digital controller as an option. Just be prepared to wait a bit longer when retrieving or stashing data.

TeleVideo earned its spurs for being ergonomically correct, and its AT doesn't disappoint. The company's nonglare, 14-inch tilt-and-swivel monochrome graphics display offers text mode resolution

*(continues)*

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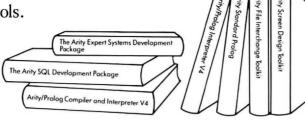
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that goes beyond the merely legible–its sans serif characters composed in an 8- by 16-pixel character cell are crisp and attractive. Both the display board and the monitor support IBM medium- and high-resolution graphics modes and can stretch to four-shade 320 by 400 graphics and 640 by 400 monochrome graphics modes. The board will drive TeleVideo's color monitor at 320 by 400 in four colors and 640 by 400 in two colors. Of course, there's always a trade-off: The TeleVideo's system ROM does not include support for IBM's Enhanced Graphics Adapter.

TeleVideo has faithfully built a bidirectional, AT-style keyboard that clicks. The layout is identical to IBM's, although LED indicators reside on the <NumLock>, <ScrollLock>, and <CapsLock> keys. The keyboard isn't flimsy–but keycaps have been known to pop off in the course of vigorous rewrites.

Unlike the PC AT, TeleVideo's AT sports a bank of DIP switches, good for tweaking monitor and port settings–and for braking the 80286 to the PC AT's 6MHz clock speed. But even this minor touch illustrates compatibility lessons taken to heart. The TeleVideo AT's serial port uses the same 9-pin connector as IBM's unit; ditto for the 25-pin parallel printer connector. TeleVideo supplies its own versions of MS-DOS and GW BASIC, which may come in handy with certain PC applications.

TeleVideo has fortunately staved off corporate calamity and blessed the market with a dark-horse AT compatible that could capture most

*(continues)*

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races. Now, if the company would only saw a few inches off the chassis and realize that it has a stellar stand-alone system on its hands, other would-be Compaq owners might skip taking delivery altogether. –*Ken Greenberg*

*TeleVideo AT
TeleVideo Systems
550 E. Brokaw Rd.
San Jose, CA 95150-6602
408/971-0255
List price: Model I $3395, Model
  II $4795, monochrome monitor
  $295*

# ITT Xtra XP
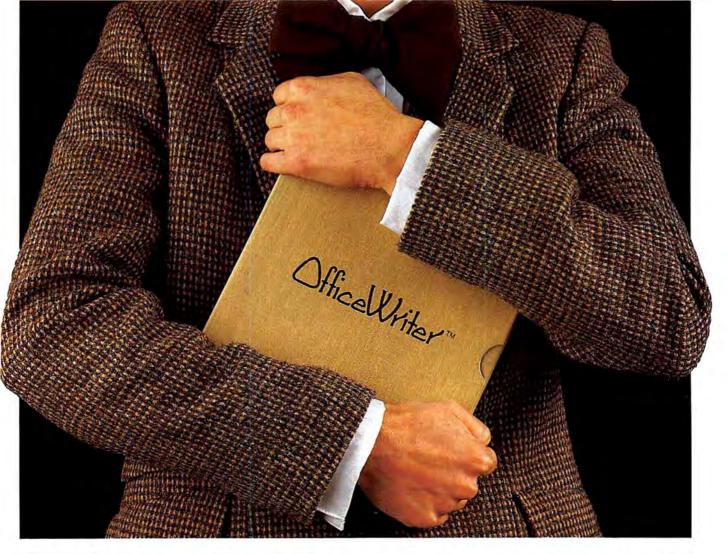
Let's face it–the IBM PC AT never really lived up to expectations. No one has managed to fully exploit the multitasking, multiuser power of the 80286's hidden side, and so most people buy the AT solely for its speed. But at $5000 a shot, the AT is overkill in most situations. As a result, board manufacturers have become the purveyors of performance, selling "turbo" boards that impart the AT's computational prowess to a PC at one-fifth the price.

On the system level, ITT's Xtra XP provides a similar solution with fewer compromises. Priced below most AT compatibles and above the XT, the Xtra XP draws features from both worlds. Because the XP's 80286 processes data in 16-bit chunks and uses fast, no-wait-state memory chips, it's often 10 to 20 percent faster than the PC AT (see

*(continues)*

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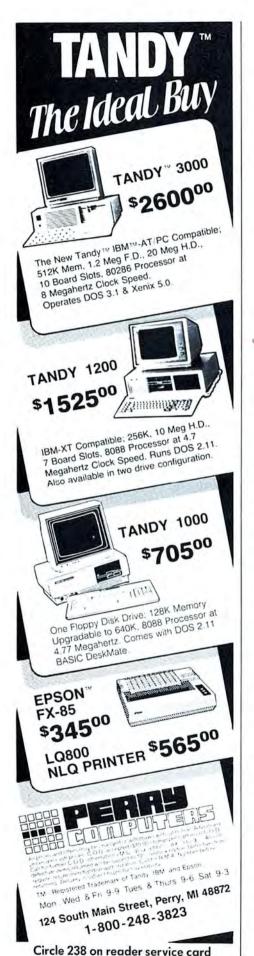
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From the Hardware Shelf



Half AT, half XT: Is the Xtra XP going in circles?

Figure 1). At the same time, the system shuttles data to and from peripherals in 8-bit dollops à la PC. Thanks to this atavistic bus behavior, XP users can plug in existing PC-compatible expansion boards. However, accessing a disk drive or performing intensive read-and-write operations slows performance. What you get, in effect, is a souped-up XT.

However, if you purchase a 512K or 1MB memory board from ITT and install the bundled FXP disk-caching software, hard disk access improves significantly. For example, the XP completes the *dBASE III* sort test in 1:14; with FXP, the time is hatcheted to 16 seconds. FXP further speeds transactions by keeping the disk directory in memory and going to disk according to the rules of "elevator seeking" logic. When the buffer is full, FXP drops data back onto disk just as an elevator discharges passengers at consecutive floors. Instead of randomly skidding across the disk, FXP is smart enough to let the right data off at the right cluster. Read/write head movement is minimized, hastening disk access.

Aside from its hybrid inner workings, the XP offers few surprises. Because the XP relies on an

8-bit bus, it's an unlikely candidate for network server. The XP features a 360K floppy drive, either a 10MB or a 20MB hard disk drive, 512K RAM, and 32K ROM that includes diagnostic routines. RAM chips and memory boards from ITT can raise the system to 1.64MB. The XP also accepts Intel's 80287 coprocessor for number crunching.

The XP includes built-in serial and parallel ports and five full-length 8-bit (PC-compatible) expansion slots. Though the XP's wide slot spacing may reduce claustrophobia and heat, most users would probably prefer an extra slot. Incidentally, you should park the hard disk head before adding expansion boards; it's difficult to slide the XP's cover back without knocking the unit around in the process.

Of course, limited expansion means more desk space: The XP is only 14 inches wide by 15½ inches deep. Another ergonomic boon: peace and quiet. The XP's hefty 155-watt power supply is amply cooled by a remarkably quiet fan.

*(continues)*

The XP's keyboard remains true to the XT standard, with minor exceptions. An additional <Enter> key is squeezed below the <GrayPlus>, and the <NumLock> and <CapsLock> keys have status indicator lights. ITT has also switched the left <Shift> and backslash keys, an improvement unless you've grown accustomed to the PC's whimsical placement. The feel of the keyboard strikes a happy medium between the quiet mushiness of the Compaq and the marshal clickity-clack of the IBM XT. The XP's keyboard is available in eight languages.

You can equip the XP with an ITT monochrome, color, or dual mode monitor. Like the Compaq's, the dual mode monitor displays graphics and text with equal aplomb; the integrated graphics board that drives it supports all three monitors and permits switching between two monitors. The board also includes a second serial and parallel port. On the color monitor reviewed, graphics and text resolution equaled images from the IBM Color/Graphics Adapter—which isn't saying much.

The Xtra XP is bundled with ITT versions of MS-DOS 3.10 and GW BASIC. In its several months atop my desk, the XP successfully ran more than 100 software programs without a hitch. The only exception was the ludicrously slow performance of Xor's football simulation game, *NFL Challenge*. If you need to run timing-sensitive programs, you can downshift the XP's 80286 to a PC-compatible 4.77MHz.

Since the XP is neither fish nor fowl, it's the perfect choice for those who can't decide whether to get an XT or AT. If computational speed is what you're after and the AT solution is too pricey, the XP may be your best bet. After all, an 80386 PC may only be a marketing move away. *–Eric Brown*

*ITT Xtra XP*
*ITT Information Systems*
*2350 Qume Dr.*
*San Jose, CA 95131*
*800/528-1400, 408/945-8950*

*(continues)*

*List price: Model III with 10MB hard disk $3995, Model V with 20MB hard disk $4595; 512K chip set $295, 512K board $395, 1MB board $700*

■

## Compaq Deskpro 286

I'm a sucker for power and speed, so when the AT came out I was naturally anxious to lay my hands on one. However, the AT did not turn out to be the baddest machine on the block—and some of us won't pay big bucks to own the *second* baddest anything.
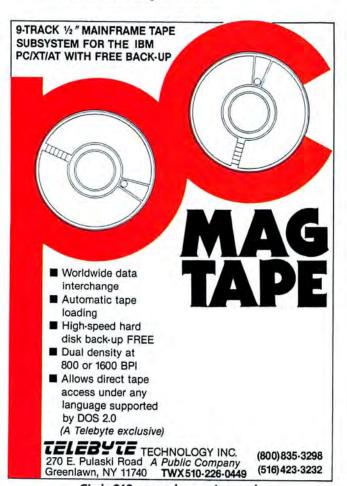
My quest ended when Compaq ushered in the Deskpro 286. In keeping with Compaq tradition, the Deskpro 286 toes the line on IBM compatibility but bastes the AT on price/performance. With its faster processor, more flexible memory expansion system, versatile floppy disk drive, fast 30MB hard disk, 10MB tape backup, and Compaq's typical quality control, the Deskpro 286 is definitely King of the Mountain.
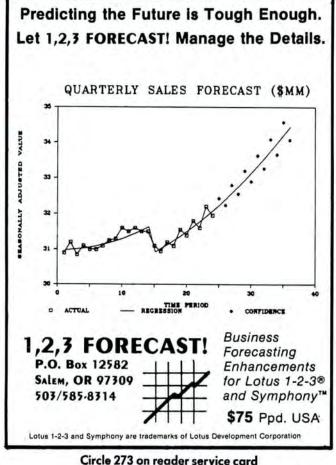
The Deskpro 286 chassis extends Compaq's reputation for sturdily built computers. The frame is reinforced with steel, and a sheet metal box encases each disk drive. I'm not sure what Compaq expects users to do to these computers, but they're built to last. The only weakness in an otherwise exemplary design is the arrangement of the disk and tape controller cables, which tend to snag on the cover when you slide it on or off.
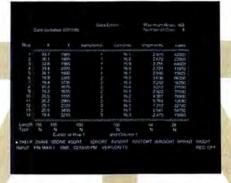
Compaq provides eight slots: two 8-bit (short and long) and six 8/16-bit AT-type slots. The floppy disk controller and tape backup controller take up one slot; the hard disk controller and a display board grab two more, leaving five slots open. However, memory requires at least one more slot, because the Deskpro 286 motherboard contains no RAM at all. When 1-megabit RAM chips are plentiful and cheap, upgrading your

*(continues)*

system will be a simple matter of swapping boards.

The hard disk is sturdy and quick. The 1.2MB floppy disk drive operates much like the AT's, but 360K disks written in the drive can be read reliably by 360K drives. The drive's indicator light flashes red for 360K operations and green when reading or writing on a 1.2MB disk. Compaq's tape backup is reasonably fast and very reliable; though not state-of-the-art by any means, it can back up or restore selected files or directories.

Keyboards have never been Compaq's forte, and this one is no exception. While the Deskpro 286's keyboard is an improvement over past efforts, Compaq has much work to do in this area. On the other hand, the Deskpro 286 will hospitably accept an IBM PC, AT, or any Deskpro keyboard.

Compaq's display technology hasn't changed with this new generation of Deskpros. While the system's amber screen is decidedly more readable, it is less aesthetically pleasing than the standard-issue green screen that came with older Deskpros. Although the new screen certainly matches the resolution of an IBM Monochrome Display, I substituted an IBM Enhanced Graphics Adapter (EGA) and Enhanced Color Display. I can report that the Deskpro and EGA coexist quite amiably.

Figure 1 tells the speed story in graphic terms, but I can confirm that on a day-to-day basis the Deskpro 286 is a screamer. Two extra MHz, no waiting.

I don't drink, smoke, get the caffeine shakes, or eat sweets, but I am

Tower of power: The TI Business-Pro packs networking muscle.

addicted to supercharged computing. With the Deskpro 286 I'll admit I've been corrupted absolutely. I state this not only to cleanse my conscience but to warn others of the risks involved.

Obviously, not everyone needs Deskpro 286 power. Unless you manipulate volumes of data, take advantage of concurrent processing (via *Windows* or *Desqview*), or are involved in system development or evaluation, feeding your addiction may prove costly.

But the Deskpro 286's elegant and effective design, superb craftsmanship, and powerhouse performance make it easy. More to the point: After I'd used an evaluation unit I paid the Deskpro 286 the highest compliment a slightly jaded editor can–I bought one. –Harry Miller

*Compaq Deskpro 286
Compaq Computer Corp.
20555 FM 149
Houston, TX 77070
713/370-0670
List price: Model 1 $4244, Model 2 $5999, Model 3 $6699, monochrome monitor $255*
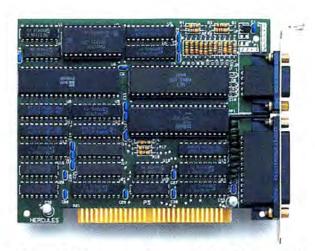
## Texas Instruments Business-Pro

Texas Instruments is known for its high-tech chip fabrication, communications products, and PC compatibles that aren't. Like so many AT clonists, TI has finally swallowed its corporate pride and is offering the Business-Pro, a truly IBM-compatible machine with formidable power and an equally formidable price tag.

At first glance the Business-Pro looks like a dumb terminal–until you peek under the desk. There you'll find a hulking, upright system unit doing a convincing impersonation of a small minicomputer. Inside this gray edifice is near-minicomputer memory, storage, and processing. Like TI's last PC, the Business-Pro is somewhat schizoid, offering compatibility with both the AT and the TI Professional line. Toggling between TI and AT modes is a matter of entering the proper command at the DOS prompt. If you plan on using the machine in both modes, you'll need to buy two different display boards.

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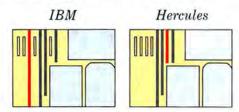
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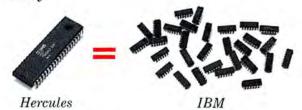
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Like the Compaq Deskpro, the Business-Pro works at an AT-like 6.0MHz and, in high-speed turbo mode, clocks in at 7.1MHz.

Inside TI's big box is room enough for the multitudes. It accommodates no less than eleven 8/16-bit and three 8-bit expansion boards (six are short slots). With two small 64K units that snap onto the motherboard, plus up to six 512K modules that fit in a special memory expansion drawer, you can add as much as 3.128MB to the system's standard 512K RAM without filling any expansion slots. (Parallel and serial ports built into the motherboard also help keep slots

free.) With memory expansion boards you can push total memory to over 15MB.

The Business-Pro's front panel alone accommodates four half-height storage devices; you can mount two more half-heights inside the chassis. TI offers a half-height 21MB hard disk, plus full-size 40MB and 72MB hard disks.

As you might imagine, the Business-Pro is for those who feel money is no object. For $3995 you get 512K RAM and a 1.2MB floppy drive, minus the monitor and display board. The system reviewed here includes an additional 1MB of RAM, a 360K floppy drive, a color monitor and two display boards, a 40MB hard disk, a 60MB streaming tape backup, and

MS-DOS—effectively tripling the price to a whopping $12,070.

Who can use this much computer? According to TI, anyone involved with "AI-based software that includes integrated windowing environments and large expert systems" might need such computing clout. Of course, the Business-Pro is ideal for such applications, but the machine is clearly targeted for local area network and multiuser environments. In the former configuration, a Business-Pro with 144MB of mass storage can serve 50 PCs using EtherLink hardware and *Advanced NetWare/E-TI* software. (Using TI's 931 emulator

*(continues)*

package, the Business-Pro can serve as the gateway between a LAN and mainframe storage and processing.) As the hub of a multiuser setup, it runs the Xenix V operating system and supports as many as eight terminals.

The Business-Pro's pedestal-mounted monitor is designed to minimize neck craning and switch searching. On/off, brightness, and volume controls reside beneath the screen; the keyboard and a mouse are easily plugged into the display stand. TI's AT-compatible controller matches the output of the IBM Color/Graphics Adapter, that friend of opticians everywhere. If color is a necessity and money no object,

invest in an IBM Enhanced Graphics Adapter and Enhanced Color Display, which are fully compatible with the Business-Pro.

The Business-Pro's duality is immediately apparent when you heft the unit's surfboard-sized keyboard. TI has added 16 keys to the AT's standard layout, including a TI-style cursor keypad that may confuse PC users at first. But you can adjust in short order, and you may appreciate the keyboard's quiet, responsive action. The surface surrounding the keys is tiled with plastic snap-on caps that cover switches for additional keys. When TI releases the appropriate utility, you'll be able to use this modular design to reconfigure the layout to your own specifications.

The Business-Pro's documentation is methodical and particularly considerate of beginning users, explaining the differences between AT and TI modes and providing enough general information to comprise a modest primer on computer concepts. With the help of the installation manual, an average user should be able to get the system up and running within an hour or so. A complete set of diagnostics programs, plus instruction booklets for each unit of add-on hardware, is also supplied.

The Business-Pro's dual compatibility and mammoth memory and storage make it unique among

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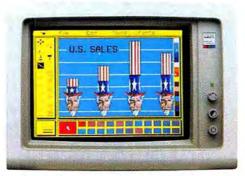
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Circle 678 on reader service card

From the Hardware Shelf

AT compatibles. Although the machine's networking and multiuser capabilities were not tested for this review, the Business-Pro seems uniquely suited for such applications, especially when both TI and IBM equipment are involved. Solidly built and well designed, the Business-Pro should cull a significant share of the high-end market. —Eric Knorr

> Business-Pro
> Texas Instruments, Inc.
> Data Systems Group
> P.O. Box 809063, H-819
> Dallas, TX 75380
> 800/527-3500
> List price: 512K, first additional 128K $350, 512K plug-in modules $1250; 1.2MB disk drive $3995, 360K disk drive $400, 21MB hard disk $1595, 40MB hard disk $3495, 72MB hard disk $5495; monochrome graphics monitor $450, color monitor $795; IBM or TI color/ monochrome graphics board $495; MS-DOS 3.00 $95, MS-BASIC $100

# Hewlett-Packard Vectra
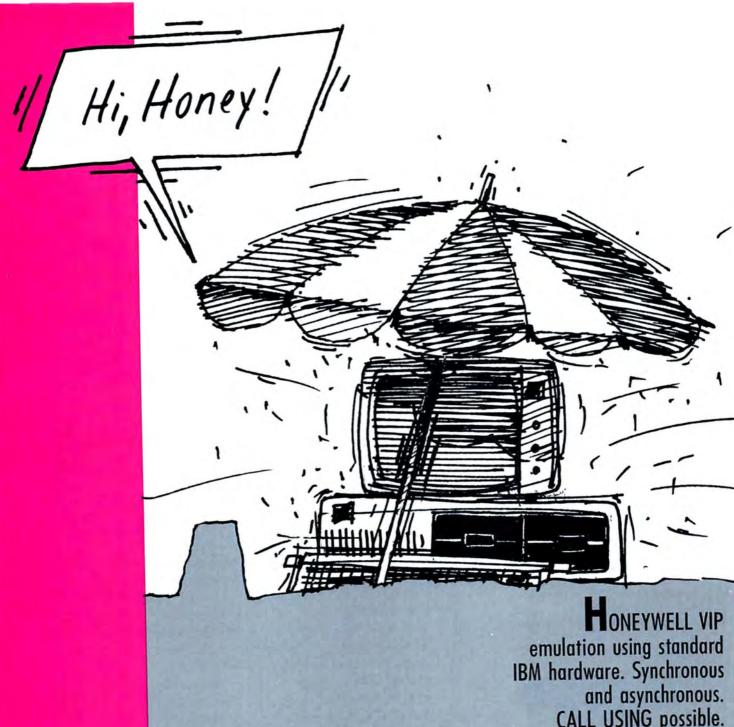
The company that made slide rules obsolete has now turned its talents to the AT arena. The HP Vectra is, not surprisingly, equipped with faster and better everything, outshining IBM and forgoing the cute (but essentially incompatible) 3½-inch floppy disk drives featured in the company's HP-150 touch-screen PC.

Based on looks alone, the Vectra is a standout amidst other AT clones, whose stylings range from stark Big Brother (the TI Business-Pro) to Weight Watchers chic (the TeleVideo). The Vectra's creamy 16.5-inch by 12.5-inch, 26-pound box is sleek, sculpted, and fits easily onto a cramped desktop. Even the Vectra's back plane is handsome, indicating peripheral connections with raised letters and icons.

HP has also thrown in some nice ergonomic touches. On/off switches and monitor controls are up front, and a built-in tilt-and-swivel pedestal makes it easy to cut glare and share displayed information. The Vectra purrs lightly along, producing unique, albeit faint, sound effects when first turned on. If you listen carefully, you can hear the sound track to Is Paris Burning?— an air-raid siren, honking car horns, the clinking of champagne glasses, and the flutter of doves, in that order. But this quickly fades to the machine's usual burble.

Compatibility is likewise unobtrusive. With its Phoenix BIOS ROM, the Vectra unhesitatingly runs everything off the shelf, from 1-2-3 to Gato. HP has also bent over backward when it comes to system configuration. The basic Vectra comes in three versions: the Model 25 with keyboard, 256K RAM, and one 360K disk drive; the Model 35, which adds a 1.2MB floppy disk drive; and the Model 45, which boosts memory to 640K. Monitor, hard disk controller, multimode display board, and 20MB

(continues)

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Seat of your keyboard flying: The HP Vectra takes Jet for a spin.

or 40MB hard disks are extra. Our review unit with multimode board, color monitor, 360K and 1.2MB floppy disk drives, and 20MB hard disk totaled out to $6640—not a sum to sneeze at.

Like its clone compadres, the Vectra houses an 8MHz 80286 and a speedy hard disk drive. With an optional HP multimode display board, the Vectra's color monitor produces sharp 640 by 400 text and graphics in both monochrome and color. Part of HP's secret is using an 8- by 16-pixel character cell versus 8 by 14 produced by an EGA setup. The board also emulates the IBM Color/Graphics Adapter (CGA) for programs attuned to the CGA. Even with a monochrome monitor, the results are impressive: 16 shades of gray in text mode and 4 in graphics mode. An optional RGB analog color monitor, which requires a piggyback card that plugs onto the adapter, produces startlingly clear graphics and text.

The feel of any keyboard is purely a matter of personal preference. The Vectra's has a velvety touch and is quiet bordering on silent. Those who prefer the resounding tap of the AT keyboard or the push-button click of a Selectric, however, may find it too soft. HP has added a separate numeric keypad for spreadsheet hotshots and eight extra programmable function keys along the top of the keyboard. Under HP's Personal Applications Manager (PAM), a disk management program bundled with the Vectra, these keys assume predefined roles.

While a variety of expansion boards and peripherals works with the Vectra, HP would like to keep it all in the family. The Vectra's keyboard, monitor, and system unit

*(continues)*

## From the Hardware Shelf

all incorporate special phone jacks
that allow you to use HP mice, bar
code readers, graphics tablets, and
other HP Interface Loop (HPIL)
compatible devices without hog-
ging expansion slots. The Vectra is
also designed to connect with the
HP 1000 manufacturing computer,
the HP 3000 general purpose busi-
ness system, and the HP 9000 en-
gineering workstation, in hopes
that the Vectra will solidify HP's
standing in the manufacturing, en-
gineering, and scientific markets,
where it has traditionally been a
strong presence. It's a machine that
supplies the basics and is strong on
graphics. But how the Vectra will
fare in the increasingly aggressive
AT-compatibles market is still open
to debate. —*Wes Nihei*

*Vectra
Hewlett-Packard
1020 N.E. Circle Blvd.
Corvallis, OR 97330
800/367-4772
List price: Model 25 $3199,
Model 35 $3395, Model 45
$3595; 20MB hard disk drive
$1625, 40MB hard disk drive
$2395; 3½-inch external floppy
disk drive $1390 (dual), $1090
(single); monochrome monitor
$325, color monitor $995;
multimode video board $425;
128K memory upgrade $125,
512K memory upgrade $595,
1MB memory upgrade $995*

*Robert Luhn and Eric Brown are
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programs you've already written. It supports all BASIC sound and graphic statements including PLAY, SOUND, LOCATE, DRAW, GET, PUT, LINE,

CIRCLE, PSET, and COLOR.

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# From the Software Shelf

## PC World offers first impressions of recent software releases

The ultimate thinking tool goes RAM, the ultimate dictionary goes on line, the ultimate spreadsheet gets a notepad, the ultimate word processor gets fancy fonts, and a humble real estate package does its job–quietly.

*Edited by Robert Luhn*
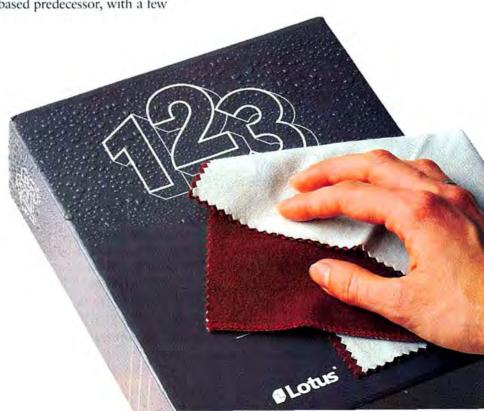
## Ready!

Before *ThinkTank* burst upon the scene and unleashed all the outlines and agendas locked within our organizational souls, most of us made do with word processors. Though not particularly elegant tools for marshalling thoughts–the <Tab> key being their primary instrument–word processors more or less did the job. With *ThinkTank*, Living Videotext demonstrated that you could go beyond simply indenting ideas. Following the lead of *1-2-3* devotees, *ThinkTank* enthusiasts have used their program for everything from appointment scheduling to project management. In many ways, outlining is the least of this program's formidable talents.

In an attempt to capture a new audience–and increase performance and convenience–Living Videotext has spawned *Ready!*, a memory-resident variation of *ThinkTank. Ready!* looks, feels, and generally acts like its disk-based predecessor, with a few important differences. Because *Ready!* resides totally in memory, it can be instantly summoned at the touch of a key. More important, the outline you generate can be neatly inserted into the main application. However, being quick, convenient, and full featured has its price: *Ready!* soaks up 128K and limits files to 32K.

The company's effusive literature is surprisingly accurate. Users new to the concept of outline processing can be up and running with the program in 10 or 15 minutes; *ThinkTank* users will feel right at home, because *Ready!* generally follows its precursor's command conventions and mimics its interface. As with *ThinkTank*, you can create an outline with many sublevels. These layers can be collapsed, leaving just the major headings for a "big picture," or expanded to reveal your thoughts in minute detail. <GrayPlus>, <GrayMinus>, <Ctrl>,

*(continues)*

<Home>, <End>, and the cursor keys are primarily used for manipulating and maneuvering through an outline.

Since few first drafts are perfect, *Ready!* permits you to move text around and edit individual entries. But don't be fooled by these word processing features—*Ready!* restricts an outline entry to a single line. This may not be a serious limitation, for like *ThinkTank*, *Ready!*'s potential lies beyond outlining.

In some ways *Ready!* is like a very fast notepad with some data management functions. For example, if you want to order a list—telephone numbers, addresses, city and area codes, appointments, and so on—merely enter each item on a separate line below the master (home) outline heading and select the Alpha command. In addition, *Ready!*'s keyword search and replace feature finds any entry in a hurry, while the ability to insert the system date and time easily makes the program a natural time and billing scratchpad. It's relatively simple to flip between a *Ready!*-created phone directory, an appointment calendar, and an outline because you can assign up to four files to the PC's function keypad. Any part of a *Ready!* file can be printed.

No matter how you apply *Ready!* to your daily grind, the resulting text can be copied and pasted into most application programs quite effortlessly. *Ready!* comes with a library of transfer setups for *WordStar, dBASE II* and *III, Framework, 1-2-3, SuperCalc,*

*ThinkTank*, and other popular applications. A setup not only makes the necessary data format conversion but translates *Ready!*'s commands (such as those for indentation) into the equivalent codes used by the target application. If your favorite program isn't listed in the library, you can create a custom transfer setup.

Other clever design touches: highlighted display of *Ready!* files in the current hard disk subdirectory and the ability to squeeze memory use down to 112K (leaving 16K for data files). *Ready!* also supports Intel's AboveBoard, automatically relocating most program code to this "higher" memory and freeing an extra 125K for other programs.

If you're a *ThinkTank* owner, *Ready!* probably won't tempt you, especially if you use the former's cloning, mark, and gather functions—noticeably absent in *Ready!*. If you own an original PC with a 64K motherboard, I wouldn't recommend the program—transfer operations frequently abort, and *Ready!* often freezes up the machine. But if you have a newer PC, need an outline processor or versatile pseudo-notepad, and don't run applications that take over the keyboard (such as *Samna Word* and *XyWrite I* or *II*), *Ready!* is a solid solution. *—Danny Goodman*

| *Ready!*
| *Living Videotext, Inc.*
| *2432 Charleston Rd.*
| *Mountain View, CA 94043*
| *415/964-6300*
| *List price: $99.95*
| *Requirements: 128K, one disk*
|   *drive, DOS 2.00 or later version*
| *Not copy protected*

## Webster's New World Spelling Checker
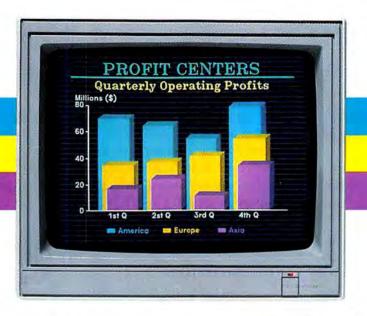
Like most copy editors, I tend to be smug about my spelling. I gloat whenever I spot *supercede* or *stupify*. But my typing, unfortunately, is subject to the whims of my not-so-deft digits. I wondered: Could a spelling checker compensate for my deficient motor skills? I decided to put *Webster's New World Spelling Checker* from Simon & Schuster to the test.

*Webster's* sits roughly between *CorrectStar* and *Turbo Lightning* in the spelling checker pantheon. It's not memory resident and won't correct spelling flaws on the fly, but it's reasonably swift, usually offers the right alternative, and is adroit at deciphering a variety of spelling and typing miscalculations. The program relies on an enormous 114,000-word main dictionary for thorough spelling checks, and on an 1100-word auxiliary dictionary (expandable to 2000 words) for quick "preview" checks.

In the preview mode, *Webster's* strolled through a 12K document in less than 2 minutes. Thanks to its finely honed lexicon, the program didn't flag some proper nouns, such as *Paris* and *New York*, that most spelling checkers choke on. It found 54 suspect words: 17 proper nouns and abbreviations (including such posers as

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**Circle 877 on reader service card**

IBM), two uncommon words (*honcho* and *bloviator*), and 35 genuine culprits in need of correction.

In a full-scale spelling check using the main dictionary, four scanning levels are possible. The first level is designed for those skilled spellers who simply need proofreading—the program highlights errors but will not recommend alternatives. Subsequent scanning levels suggest spelling alternatives; for particularly obscure words, the higher levels may be necessary. You can switch scan levels in middocument.

*Webster's* displays a suspect word in context in one window, by itself in a second, lists alternative spellings in a third, and shows program commands in a fourth. Move the cursor to the correct choice in the third window, press <Enter> twice, and the miscreant is replaced. At this point, a misspelling can be corrected globally; *Webster's* will preserve existing lowercase and uppercase. Given its competition, it's surprising that *Webster's* checks a document only from top to bottom; you can't check in the opposite direction or start a check in middocument.

In most instances, the program's first recommendation is usually on the nose—even on tricky manglings like *idiotorial*. (Most spelling checkers falter at an incorrect first letter.) The company claims the program even recognizes and corrects phonetic spellings. Being from Brooklyn, where woids is woids, I expected *Webster's* to perform erratically on this score. It managed

to properly decrypt *maygur* and *eether* as *major* and *either*, but struck out on *bizness* and *terablee*. If the mot juste eludes the program, you can browse through any portion of *Webster's* dictionary; the user manual includes a helpful section on phonetic constructions and their properly spelled equivalents.

Unlike many of its peers, *Webster's* flags repeated words such as *the the*, offers correct spellings for words that you inadvertently run together, and recognizes plural forms for words ending in *y*. Of course, *Webster's* is no replacement for a literate human with a keen eye and a sharp blue pencil. The program ignores context, so it will not peg an inappropriate but correctly spelled word. Note too that numbers and special characters are ignored. If you type *con\*rolled*, *Webster's* will blithely pass it by.

*Webster's* is a handy aid for average spellers and even for very good ones who need some proofreading assistance. The program works with *WordStar, pfs:write, Volkswriter, Volkswriter Deluxe, HomeWord, Perfect Writer, Textra, XyWrite II*, and all ASCII text files. One word of advice to Simon & Schuster: Give your public relations agency a copy of the program. The press release accompanying the program had a typo. —*Bonnie Monte*

■

## Note-It, Version 2

Someone once asked Daniel Boone if he'd ever been lost, and he said no, but sometimes he didn't know where he was. That's the feeling I get when I go roaming through someone else's complex *1-2-3* worksheets—or even my own, if they're more than a few weeks old. One solution is to document like crazy, but large blocks of explanatory text get in the way and may not fit if memory is tight.

The solution is *Note-It*, a memory-resident utility that lets you attach the electronic equivalent of a 3-by-5 index card to any cell in a *1-2-3* worksheet or to a file name, with as many as 100 note cards of 500 characters each per worksheet. The clever part is that each note is dynamically tied to a specific cell; it stays attached even when you move the contents of the cell or insert and delete columns.

Using the program is hardly complicated. Load *Note-It* (which occupies about 72K), any version of *1-2-3*, and your worksheet. Before you create a note, you must File Combine a special four-cell worksheet called PAD.WKS that keeps

*(continues)*

track of each documented cell. PAD.WKS can be put in an unobtrusive corner of your worksheet and forgotten.

To create a note, place the cursor on the cell you want to annotate, press <Alt> and the right <Shift> key, and a note card pops up over your worksheet (see Screen 1). Select the edit mode, enter your comments, press <F6>, and the card disappears. All cards are stored when the worksheet is saved. Cards can be viewed at any time, and you can highlight every documented cell in a worksheet by pressing the <Alt> key and both <Shift> keys simultaneously.

*WordStar* users will feel at home when editing a card. *Note-It* uses *WordStar*'s cursor control diamond, word and sentence delete command sequences, and even the paragraph reformat command. Tabs and word wrap are also standard. In the edit mode, a pull-down menu offers four options. You can list every cell that has an attached card, search through the entire deck for a specific string of up to 31 characters, delete unwanted cards, and print. With the print option you can request a single card, all the cards, a snapshot of the worksheet with the card printed at the bottom, or a list of documented cells. *Note-It* even features a DOS commander utility that can list a disk directory and rename and erase files without leaving *Note-It* or *1-2-3*.

*Note-It* seems to be bug free and works amiably with RAM drives, print spoolers, and memory resident programs such as *SideKick*



Screen 1: Document your spreadsheet. Note-It can suture an electronic 3-by-5 card to any cell.

and *ProKey*. (Interestingly enough, it conflicts with Lotus-owned *Spotlight*.) There are only two ways to lose notes. One is to move a cell onto a documented cell, in effect wiping out the reference the same way moving a cell into a named range wipes out range names; the other is to fiddle with PAD.WKS. The four PAD.WKS cells can be moved as a block without damage, but if they're erased or split up, the note references are destroyed. I purposely tried to crash *Note-It* by removing the work disk with an active worksheet in memory, but the program didn't bite. I was calmly told the note file was absent; when I reinserted the disk, *Note-It* picked up where it left off. Another cute trick: *Note-It* removes itself from memory when you exit *1-2-3*.

I have little patience for gimmicks, and I almost never adopt the utilities that come my way, but in the last two months I've found *Note-It* indispensable for preparing financial statements and writing macros. *Note-It* even fits on my *1-2-3* program disk. Now when I'm lost, at least I know where I am.
—*William Urschel*

*(continues)*

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## Fancy Word

Suppose you're a small software company selling a useful program, when suddenly a big company (let's say Microsoft) comes out with a program that does what yours does, only better. Do you (a) invest what's left of your venture capital in crocus futures; (b) move to Arizona and search for Judge Crater; or (c) start a networking club on the Lower East Side?

If you're smart and resourceful like the people at SoftCraft, the answer is (d) none of the above. Instead, you mutter, "If you can't beat 'em, join 'em," and go back to the drawing board.

Before the age of laser printers, SoftCraft sold a font generation and text formatting program called *Fancy Font* for dot matrix printers. To justify text, create headers and footers, or switch fonts in mid-document, you embedded *Fancy Font* commands within your text file and printed the file with *Fancy Font*. The program also came with an assortment of standard and esoteric fonts that you could modify.

When laser printers arrived on the scene, *Fancy Font* proved well suited to 300-dot-per-inch printing. Unfortunately, *Microsoft Word* sported formatting features that matched *Fancy Font*'s, though it lacked the latter's extensive font library and font-editing capabilities. So SoftCraft, making a virtue of necessity, created *Fancy Word*, an adaptation that gives *Microsoft*

*(continues)*

# 3 Section Three
## Typographic Requirements

For our user's manuals we need a variety of font sizes for chapter, section and paragraph headings. Also, the company logo should appear prominently. The top of this page indicates some of the features required. Typesetting features such as kerning and automatic ligature formation (fi, ffl, etc.) would be nice, but may be too much to ask of PC software.

The research department needs to produce technical documents containing scientific notation and mathematical formulas such as the following:

$$\pi(n) = \sum_{k=2}^{n} \left\lfloor \frac{\phi(k)}{k-1} \right\rfloor$$

For presentations and overhead transparencies we need

## Large Bold Fonts

that can be seen from a distance. For employee certificates we should be able to use decorative fonts such as 𝕺𝖑𝖉 𝕰𝖓𝖌𝖑𝖎𝖘𝖍 and *Script*.

Our international division must have access to foreign language accent marks and fonts, especially these:
á é à â ñ ç Ç ā ǎ ã å ø Ø ß ¿ ¡ œ æ Œ Æ

Figure 1: Fancy Word gives Microsoft Word a typographic boost on the LaserJet.

*Word* access to *Fancy Font* typefaces on dot matrix printers and the HP LaserJet.

Running *Fancy Word* is a two-step process. Print a *Microsoft Word* document to a file instead of to the printer, then print the file with *Fancy Word*. The enhancements available with *Fancy Word* are anything but modest: several

hundred fonts as large as 72-point Times Roman; ornate fonts like Old English; mathematical symbols; foreign alphabets such as Greek, Hebrew, and Cyrillic; graphics characters; and even an inverse video function that prints white characters on a black background (see Figure 1).

Getting fancy documents out of *Microsoft Word* means building a

*(continues)*

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**A lot more than just pretty pictures.**

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Next, you'll notice a higher resolution in both text and graphics modes.

The real fun comes in putting the board to work. You'll see soft scrolling, panning and windowing that was never before possible on a PC. And the flicker-free display will allow you to regulate these movements at any speed, or in any direction.

There are 512 characters carried in Spectra's memory that can all be displayed at once. Which is twice as many as previously possible on a PC.

And if you wish to use other characters, or even create your own alternate character set, Spectra will support those, too.

**More colorful features.**

Each Spectra EGA comes fully equipped with a parallel printer port, light pen interface and 256K RAM on the single board. This is especially good news because a full 256K RAM is needed to run most popular graphics software effectively.

**One thrilling price.**

Perhaps the best news is Spectra's price.

Upon first glance you may find that the Spectra EGA and the IBM EGA seem to be very closely priced. But look again. Because the standard IBM EGA only comes with 64K RAM, whereas Spectra EGA comes with a full 256K.

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**Circle 994 on reader service card**

printer driver with a special *Fancy Word* utility. The construction process may be a bit unnerving, since you decide which fonts to use and specify other typographical details. But if you follow the steps laid out in the user manual, you can create the driver in half an hour. Once the driver is installed, using a *Fancy Word* font is a matter of highlighting the text and selecting the desired typeface and size with *Microsoft Word*'s Format Character command.

You can further sharpen text with *Kern*, a separate SoftCraft utility. *Kerning* is the typographic term for tightening up the space between specific pairs of letters, such as *A* and *W*. *Kern* also includes

ligatures, such as fl, fi, and æ, for that ersatz typeset look.

One *Fancy Word* drawback: It uses the graphics mode, which slows the LaserJet's usually brisk output of several pages per minute to several minutes per page. Soft-Craft claims that a future utility will download *Fancy Word* fonts to the LaserJet Plus so that documents can be printed in the speedier text mode.

What? You say you don't care for *Microsoft Word?* You're going to stick with *WordPerfect* or *Word-Star* no matter what? Don't fret: SoftCraft has something for everybody. Just as *Fancy Word* grafts a

slew of fonts onto *Microsoft Word*, SoftCraft's *WPfont* and *WSfont* utilities do the same thing for *WordPerfect* and *WordStar*. Soft-Craft has done its homework, and the products show it. Ted Bob says check it out. —*Ted Nace*

*Fancy Word*
*SoftCraft, Inc.*
*222 State St. #400*
*Madison, WI 53703*
*800/351-0500, 608/257-3300*
*List price: $140, WSfont $15,*
  *WPfont $15, Kern $30, font*
  *disks (one to ten fonts each) $15*
*Requirements: 128K, two disk*
  *drives*
*Not copy protected*

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# Real Estate Analyzer

The ante keeps going up in the real estate investment game, not only because property values keep escalating, but because the rules are getting more complex. The prospect of speculating with my own hard-earned cash is indeed daunting. I'm afraid I won't have the experience and knowledge to accurately judge the quality of an investment. Is it wise to buy an upscale condo with a local 13 percent property tax rate? Will a certain four-unit apartment generate enough income to cover my loan payment plus fixed and variable costs?

*Real Estate Analyzer* from HowardSoft is dedicated to painlessly allaying such preinvestment fears. The program gathers the relevant data and extrapolates current and potential profitability from residential, commercial, syndicated, or private real estate. This third incarnation of HowardSoft's popular program not only caters to the aspiring real estate investor but boosts a professional's productivity.

Novices will appreciate the program's easily understood menu and fill-in-the-blanks approach to gathering data. The documentation is clear and thorough on the principles and methods used by the program to reach its conclusions. Professionals will find *Real Estate Analyzer* a powerful and complete package for tackling small to medium-size properties. You can attach up to ten different loans, ten

depreciation schedules, and 50 different income sources to a single property. Loans can be amortized, interest only, adjustable rate, and manual. And you can calculate depreciation along several lines: regular ACRS, optional ACRS, straight line, sum of the year's digits, declining balance, and manual.

The program's menu-driven operation is straightforward. From the main menu (and one submenu) you can store data, review and edit it, print or display results, and restart a session. Investment data is grouped into six subject modules: general information, loans, depreciation/capital expenses, monthly income, scheduled expenses, and assumptions for analysis. As you select each category in turn, the program displays an on-screen data entry form; you merely fill in the blanks.

Once the essential data and your assumptions are captured, *Real Estate Analyzer* issues a thorough and professional financial report. Typically running to four pages, this spreadsheet-style report recaps the salient data from date of purchase to current property value, delineates your financial assumptions, and analyzes cash flow and return on investment (ROI). The cash flow analysis encompasses factors like operating expenses and income, taxes, and debt service; the ROI brief figures proceeds from sales, commissions, closing costs, cash returns, and other factors in the total equation. Even the novice can quickly conclude if a property is going to earn its keep or turn a profit.

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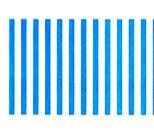
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*Real Estate Analyzer* is written in interpreted BASIC, which may cause speed-conscious users to drum their fingers in impatience. Since most time is spent entering data, processing speed isn't that critical. Delays occur primarily when a new module is loaded or a report is printed. More vital is how accurately and intuitively the program performs. I gave *Real Estate Analyzer* to a real estate investor who makes his very comfortable living selling and managing commercial and residential properties. He quickly generated three reports on the same property based on different financial assumptions. His reaction? "I could take any of these reports to the bank and get a loan this afternoon."

Two improvements I'd like to see in future versions of the program: automatic calculation and easier entry of balloon payments for amortized loans, and an interactive way to play out scenarios. As the program stands, you must print out a report to view the effects of different assumptions.

But "what if" flexibility is not a paramount concern. Dedicated packages such as *Real Estate Analyzer* offer a multitude of advantages over spreadsheets and accompanying template programs: validated data entry, ease of use, on-line help, and professionally formatted reports. *Real Estate Analyzer* could save you thousands of dollars—or at least help you keep an eye on whoever is investing your money. *—Ken Milburn*

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*HowardSoft*
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*La Jolla, CA 92037*
*619/454-0121*
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*Requirements: 128K (160K for compatibles), one disk drive*
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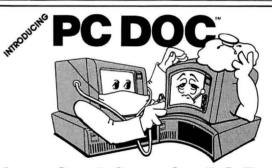
*Danny Goodman and Ted Nace are Contributing Editors for* PC World. *Bonnie Monte is a Copy Editor for* PC World. *William Urschel is a freelance writer and the author of* 1-2-3 *application software. Ken Milburn is a Marin County freelance writer and a consultant on PC topics.* ◓

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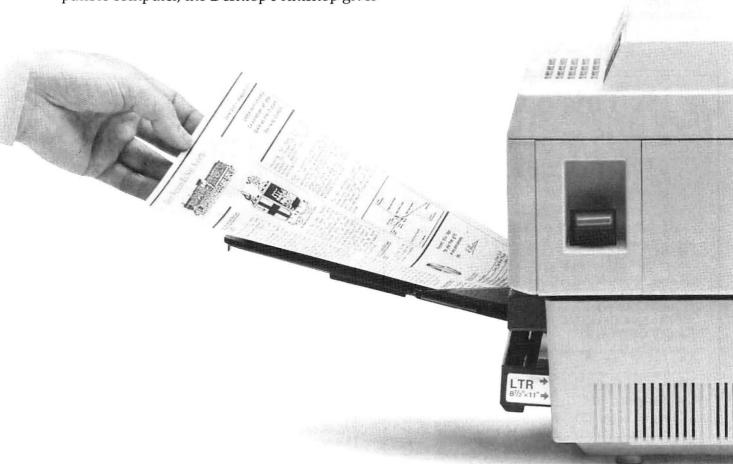
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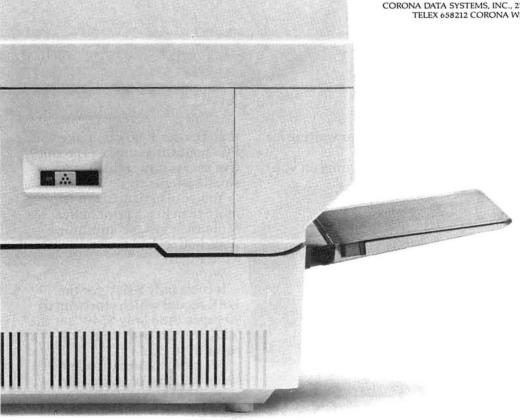
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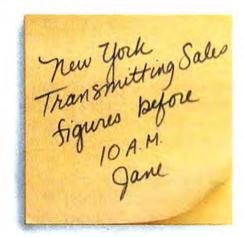
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# Password: Communicate

*Information and insights on the PC communications marketplace*

This month: 9600 bps blossoms, Viewtron goes nationwide, Telenet's PC Pursuit, and a guide to bulletin boards

*Edited by Eric Brown*

## Start Bit

### Shoot-Out at 9600 bps

Following last year's joint introduction of the 9600-bps Fastlink modem by Digital Communications Associates (DCA) and the identical Trailblazer modem by Telebit Corporation, a number of other modem manufacturers have jumped on the high-speed bandwagon. Since then, 9600-bps modems have been introduced by Microcom, Racal-Vadic, Telenetics, and Penril.

Unfortunately, the complexity of error checking and modulation schemes necessary for such supersonic asynchronous transmissions makes the modems incompatible with one another. Despite the risks of entering a marketplace that lacks firm standards, most modem companies don't want to be left out. According to market analyst Dataquest, modems operating at 9600 bps or faster will be the most rapidly growing segment of the modem industry in the next few years, with an annual growth rate of 73 percent through 1989.

While competitors were announcing their products at last fall's COMDEX, DCA and Telebit attempted to hold their joint venture up as an early standard with their announcement that 12 communications software companies were developing special software to support the Fastlink/Trailblazer. The list of "Fastlane Software Developers Program" participants includes such notables as VM Personal Computing (*Relay Gold*), Microstuf (*Crosstalk-Fast*), Mycroft Labs (*Mite*), and Communications Research (*Blast*). These and other companies are writing new programs or adapting old ones to take advantage of the Fastlink's special capabilities for high-density and micro-to-mainframe communications.

To qualify for the program, software must support large buffers and block sizes, perform flow control, and use the Hayes command set. Because the Fastlink/Trailblazer contains built-in error correction, software companies need not develop error checking of their own.

Participant Norton Lambert Corporation, maker of the *Lync* program, has developed its new remote access program, *Close-Up*, to take advantage of the Fastlink's special features.

"We could always run at 9600, but now we can optimize our software to run with the Fastlink," says Richard de Mornay, vice president of marketing.

One of the main reasons Norton Lambert supported the Fastlink was that the modem happened to complement one of *Close-Up's* key features—the real-time creation of graphics on both sides of a communications link. Although graphics can be coproduced at lower speeds, the Fastlink's speedy throughput helps expedite the transmission of the large amounts of data required for graphics.

Despite the announcements of high-speed modems from other reputable companies, de Mornay thinks the Fastlink has the edge. "It's a different technology than the others," he says, speaking of the Fastlink's unique DAM-QAM modulation scheme (see "Fastlink at 10,000 Bits per Second," *Password Communicate, PCW*, November 1985). "It should allow the Fastlink to move data much faster in the future."

*(continues)*

Philippe Kahn, president of Borland, agrees that the Fastlink is a significant product. "Hayes better come up with a similar technology or they're going to find themselves in deep trouble," warns Kahn. Borland, which uses Fastlinks throughout the company, plans to support the Fastlink with the telecommunications module of *Side-Kick-Plus*.

Kahn says he has been able to achieve speeds of 14,000 bps using *Crosstalk-Fast* with the Fastlink over clean phone lines and has been able to communicate at 8000 bps between California and Denmark.

While DCA/Telebit made its Fastlane announcement at COMDEX, Racal-Vadic was showing off its new 9600 modem. The company also announced that Tymnet's X.PC multisession protocol would be implemented in hardware on their 1200PA and 2400PA modems, which already contain built-in MNP (Microcom Networking Protocol) error checking. Karl Zorzi, manager of data communications products for Racal-Vadic, says the company isn't sure whether it will implement X.PC in its 9600-bps model.

"We already have built-in multilevel error checking in our 9600 modem," says Zorzi. "We could conceivably use X.PC, but it wouldn't be active in correcting errors because errors would already be corrected by the modem."

Steve Kim, product manager for X.PC at Tymnet, admits that X.PC isn't necessary for error checking at high speeds but believes it may well be desirable. "There is definitely a need for internal multilevel error correction at higher speeds because the effect of a spike at a higher speed is more devastating," says Kim. "But you still need a protocol, and I don't see why X.PC can't be that protocol. Given the low overhead of X.PC, using it wouldn't be a problem."

Although Zorzi believes that X.PC has certain advantages over MNP, which is being implemented in Microcom's new 9600-bps modem, he says that the adoption of a standard error-checking protocol would not solve the compatibility problem. "The reason that our modem won't talk to a Fastlink is that Telebit uses an entirely different modulation scheme," explains Zorzi. "It would be like a modem that uses the Bell 212A standard talking to one that uses Bell 202— you just can't do it."

Ironically, a standard does exist—last year, the Comité Consultatif International Téléphonique et Télégraphique (CCITT) adopted the v.32 standard to govern 9600-bps communications. Yet the free marketplace often has a tendency to outpace the slow standardization process. Before v.32 had been finalized, several producers had already begun work on high-speed modems. Therefore, most manufacturers, including Telenetics and Penril, have adopted variations of the more tried-and-true v.29 specifications. v.29 has been a four-wire, half-duplex synchronous modem standard for quite a few years and has only recently been adapted for asynchronous communications.

However, even if two different modems adopt v.29 modulation schemes, they inevitably have different error-correction methods that keep them from being compatible.

Telebit Corporation, the inventor of the Fastlink/Trailblazer, has eschewed both standards to create its own technique, which modulates over multiple channels. "v.29 and v.32 are single-carrier modulation schemes," says Mary Schaller, vice president of marketing for Telebit. "If you don't have a good line and you're using only the center part of the bandwidth, you have much less ability to adapt."

According to Schaller, the main problem with v.32 is that if line noise prevents you from communicating at 9600 bps, you automatically fall all the way back to 4800 bps. The Fastlink, on the other hand, allows you to fall back in shorter increments. Schaller points out that v.32 was designed for data terminal applications in a mainframe environment, not for PCs. "v.32 is still in its infancy," says Schaller. "The complexity of the technology is such that the modem has to be large, and you have about 60 switch settings. It's not designed for the personal computer marketplace."

As chaos continues in the high-speed modem sweepstakes, the DCA/Telebit venture is pushing hard to stay on top. In addition to the Fastlane support program, the two companies have formally submitted their modulation technique

*(continues)*

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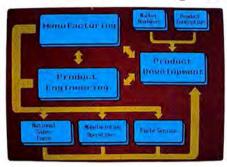
PC Paintbrush also has a beautiful way with words. The text icon lets you write in any of eleven fonts, in nine sizes, with italics, outline, shadow and boldface variations.
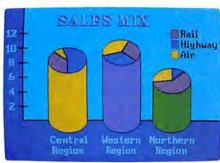
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to the CCITT for consideration as a future standard. However, a new standard could be as long as four years in coming.

"You saw the same thing happen several years ago in the 1200-bps market before the 212 standard really came about," explains Tymnet's Kim. "Everybody was making different modems with different protocols."

"The incompatibility is likely to stand for several years," says Racal-Vadic's Zorzi. "Racal-Vadic spent years developing its 9600 modem. Whoever gets there first and does the best job will come out on top."

## ■ On Line

### Here Comes Viewtron—NAPLPS or Not
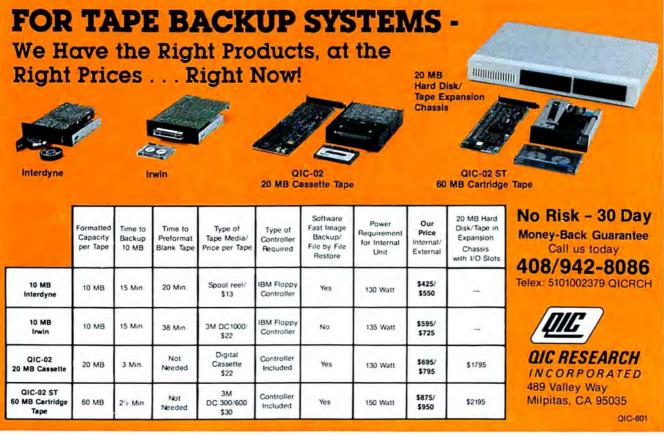
Watch out—Viewtron has escaped from the swamps of Florida to take on the giants.

No, it's not the latest Japanese robot, but an on-line interactive videotex service by Viewdata Corporation, a subsidiary of Knight-Ridder Newspapers. Viewtron has been offering on-line services from Miami for several years, and is now seeking to penetrate the national on-line consumer services market

dominated by CompuServe. Viewtron not only promises "something for everyone," it also gives you a choice of how to view it. Depending on your system's graphics capabilities, you can access Viewtron in enhanced ASCII format or view colorful frames of NAPLPS (North American Presentation Level Protocol Syntax) videotex.

Viewtron's major services include electronic mail, stock and commodity quotes, and electronic banking and shopping. News features include current international, regional, and local news and weather and business, sports, and financial coverage. Viewtron also

*(continues)*

# Technical Bulletin
## No. 2 in a series.

CPNX™

# SUBJECT: Engineering a LAN for Maximum Flexibility.

Quantum Software Systems Ltd. proudly announces QNX 2.0 — the Ultimate Distributed Network Operating System. QNX 2.0 is now available for the IBM-PC, IBM-AT, PC compatibles, DEC Rainbow and TANDY 2000. If you have been waiting for a Real-time Multi-tasking Multi-user Operating system with fourth generation LAN support, then QNX 2.0 can offer you today what the competition can't even begin to promise for the future.

QNX 2.0 integrates the Local Area Network architecture right into the heart of the operating system, at the fundamental level of intertask communication allowing tasks to communicate transparently with other tasks across the whole network. This means that any task (program/application) may access ANY serial port, ANY printer or ANY disk on the network. There are no artificial restricitons. Every PC with a disk is a potential file server. PCs without disks will automatically BOOT over the network.

## QNX on the IBM-PC AT:

QNX is the first Multi-tasking Multi-user Operating system available for the AT. It is available in both networked and single machine configurations. At about 2.5 times faster than the QNX 8088 PC based systems, and 10 times faster than other multi-tasking operating systems on the same processor, QNX is the ideal program development environment.
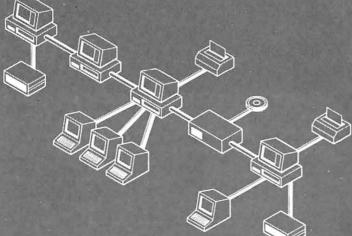
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|-----|----------|-----------|---------------|
| QNX ™ | IBM-PC AT | 80286 | 480 usec |
| XENIX ™ | Intel-286 | 80286 | 4,930 usec |

## File Security:

Designed with extensive file security features, QNX 2.0 provides login protection with network wide file permission checking based on 255 groups of 255 users. In addition, each PC user may control network access to devices attached locally to their machine.

## Distributed Processing:

The QNX LAN supports distributed processing as well as distributed devices. Tasks may be executed on remote stations as easily as they may be executed on the local work station. This allows pure processing elements (PCs without keyboards or displays) to be plugged into the network to be used as an un-committed processing resource. This is ideal for real-time, process control, data acquisition and data communication applications.

## Global Communications:

QNX supports a full implementation of X.25 allowing connection to public networks such as Telenet and Datapac. This allows you to link geographically separate LANs together providing true global area networking.

## Cost Effective Growth and Flexible Solutions:

QNX is affordable, and will work with the PCs you use today and those you will use tomorrow. You may mix and match different brand PCs on the same QNX network with absolute ease. Multi-user expansion may be accomplished by adding terminals to PCs or PCs to the network. You can start your multi-user application on a single PC with 1 to 10 attached terminals. Once your single processor starts to show signs of degradation, add another PC and connect terminals to the new processor. If the disk becomes the major bottleneck, you may add hard disks to other attached PCs to distribute the processing. Applications which are very CPU intensive may wish to limit a single user to each processor and expand the system with low cost diskless PCs used as work stations. QNX does offer a truly cost effective and flexible solution to your applications needs.

## Portability:

QNX 2.0 is portable. The operating system is independant of the physical local area network. It is available in a form suitable for porting to other 8088/8086/80186/80286 computers in the consumer, educational and industrial market place. QNX is ROMable and can operate in as little as 128Kb RAM.

## DOS Compatibility:

PC-DOS version 2.1 can run as a task under the QNX 1.2 or 2.0 operating systems. QNX will also allow transparent access to the DOS file system partition and floppies.

## QNX Products:

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| Basic Compiler | Isam File Utility |
| Qbol (dibol) Compiler | Networking Board |
| Text Processor | OEM Customization Kit |
| Real Time Spelling Checker | (to port QNX) |

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provides access to various business data bases and offers entertainment features such as real-time CB simulation.

A $9.95 starter kit enables anyone with a modem to use Viewtron. Viewdata includes its own non-copy-protected communications software with the starter kit, but you can log on with any communications program that has VT 100 emulation (such as *PC-Talk*, *Crosstalk*, or *Smartcom*) through any of three packet switching networks: Uninet, GTE Telenet, or Tymnet.

The main feature that sets Viewtron apart from the competition is the system's plain English keyword

interface. Looking for the latest market news? Type **MARKET NEWS** at any prompt. Want the latest information on your favorite sports team? Just type **CUBS**, **LAKERS**, or **49ERS**.

According to Reid Ashe, Viewdata chairman and CEO, Viewtron recognizes "thousands of keywords." The system even tracks unsuccessful keyword attempts and periodically adds frequently used words to the system. The slim user guide is as easy to read as a comic book but contains all the necessary information.

Viewtron began service for the PC in October 1985. But that relatively recent starting date belies the extensive research and development begun by Viewdata in 1976. In

1983 Viewtron was offered to owners of AT&T Sceptre terminals (stand-alone NAPLPS terminals) in South Florida. But when Sceptre sales failed to take off as expected, Viewdata expanded the service to personal computers equipped with NAPLPS decoder software (see "Toward a Graphics Standard," *PCW*, Vol. 2, No. 12).

An early proponent of the NAPLPS presentation standard, Viewtron found that a market for the standard was slow to develop. Viewtron now transmits in both NAPLPS graphics and enhanced ASCII code. Using the enhanced

*(continues)*

Password: Communicate





Viewtron offers two viewing modes, enhanced ASCII and NAPLPS videotex. On the top is Viewtron's main menu in enhanced ASCII mode, which can be displayed on any system. On the bottom is the same menu in color videotex, which requires a NAPLPS decoder package and a color display.

mode, which can transmit characters in the upper ASCII set, Viewtron displays graphics such as simple bar charts. Also, Viewtron differs from other services in that information is presented screen by screen, as opposed to the "scrolling-ASCII" presentation used by CompuServe. Consequently, the ability to decode NAPLPS isn't essential for effective use of Viewtron. Only the education sections require a NAPLPS decoder.

Dan Smigrod, Viewdata public relations manager, points out that a PC equipped with a standard color board, a color monitor, and NAPLPS decoder software (such as IBM's *PC Videotext*) can display Viewtron in color with graphics. However, he adds, "Even without NAPLPS graphics, a few Viewtron services give you 60 out of 61 pieces of information. Color makes for a nicer visual presentation, but it's like the difference between regular and stereo TV. We're playing to the technology that's in place. Right now that's ASCII and enhanced ASCII. If NAPLPS catches on we're already there."

While waiting for NAPLPS to warm up, Viewtron plays to the strengths of its parent corporation. Knight-Ridder publishes 29 daily newspapers and owns and operates five television stations, a cable television company, and an electronic commodity and financial news service. An on-line videotex service like Viewtron was a natural outgrowth of Knight-Ridder's experience at combining technology with information gathering.

"We originally thought videotex would provide serious competition for newspapers," says Ashe, "so we designed Viewtron to be an electronic newspaper."

Drawing upon its print media roots, Viewdata has an editorial staff of 28 to edit wire service stories for Viewtron. Stories carried by the Associated Press, the *Washington Post*, the *Los Angeles Times*, Weather Services Inc., Sports Ticker, and of course Knight-Ridder feed the Viewtron news service. In the financial realm alone, Viewtron offers the top ten daily business news stories, stock

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Muscling in on existing services like CompuServe and The Source doesn't faze Ashe: "There'll be 2 million modems sold in 1985 alone. We're ready to capture our share of that market."

Viewtron may soon have more than CompuServe to worry about—during the next several years, two well-heeled group ventures are expected to compete in the consumer on-line services arena: IBM, CBS, and Sears will constitute the Trintex service; AT&T, Bank of America, Chemical Bank, and Time will form the Covidea venture. Both services may also provide NAPLPS videotex. —*Wes Nihei*

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## PC Pursuit

Telecommunicating across the country can make the world seem smaller, but the costs involved can be astronomical. Fortunately, help has arrived for the home-based modem addict—GTE Telenet, a major packet switching network for businesses, now offers an affordable data communications service for the home. Telenet's *PC Pursuit* provides a convenient network for long distance telecommunicators calling to and from 12 major metropolitan areas. For a flat monthly fee of $25 (and a start-up fee of $25), you can call a local phone number to access bulletin boards, on-line data bases, electronic catalogs, and other communicating PCs in Atlanta, Boston, Chicago, Dallas, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, San Francisco, and Washington, D.C. If you find yourself logging on nightly, *PC Pursuit* can save you as much as 75 percent on long distance modem calls.

*(continues)*

As a subscriber to *PC Pursuit,* you dial one of two local access numbers in your metropolitan area and are prompted to enter your phone number. *PC Pursuit* then requests the city and phone number you want to call and asks you to hang up and set your modem to auto-answer mode. If you are an authorized subscriber, *PC Pursuit* calls you back immediately, switches you to Telenet's public data network, and connects you with your remote destination.

Unfortunately, if the line is busy, as bulletin boards often are, you are forced to disconnect and start over from scratch, calling *PC Pursuit* and waiting for them to call you back for the security check. Also, since Telenet is making the call, you are prevented from using the fancy redialing features your communications software may provide. Once on line, you're on your own up to the 1-hour limit, at which point you'll have to hang up and call again.

You can call in with a 300-, 1200-, or 2400-bps modem. *PC Pursuit* is available from 6 p.m. to 7 a.m. on weekdays, weekends from 6 p.m. Friday to 7 a.m. Monday, and 24 hours on major holidays.

*PC Pursuit* can be a real bargain for experienced telecommunicators who are tired of facing enormous long distance charges.

Now you can explore bulletin boards, shopping catalogs, and data bases without fearing phone bills that would set you back as much as a trip to see Halley's comet from the South Seas.
—*May Sui*

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## *Viva BBS!*

Incidentally, the world of electronic bulletin board systems (BBSs) is alive and well. At last count, about 2000 public electronic messaging systems were available in North America, not including the growing number of in-house BBSs used as electronic mail centers by corporations.

BBSs range from Commodore 64s running public domain bulletin board programs to larger systems running sophisticated messaging software on IBM PC ATs. Some provide large, searchable data bases and accept more than a half dozen callers at once. Sharing public domain software is still the main reason why people log on to a BBS, but lately a profusion of special interest boards have addressed topics ranging from politics to beekeeping, genealogy to

architecture, literature to football betting.

How do you find these bulletin boards? Quite a few numbers are on the BBSs themselves, and several publications print listings. One valuable reference is the *National Directory of Bulletin Board Systems*, available from Meckler Publishing. The directory supplies 48 pages chock full of BBSs, identified by type of software available and special interest. Meckler Publishing recently bought *Plumb* magazine, which has covered BBS activities for three years, and renamed it *Bulletin Board Systems*. Published eight times a year, the magazine will continue to cover new BBSs, bulletin board software, tips for SYSOPs (system operators), and other news from the fast-growing world of bulletin boards.

*National Directory of Bulletin*
  *Board Systems, 1985*
*Meckler Publishing*
*520 Riverside Ave.*
*Westport, CT 06880*
*203/226-6967*
*List price: $9.95*

*Wes Nihei is Editorial Assistant and May Sui is Editorial Secretary at* PC World. ●

# ✳•✳
# Star-Dot-Star

*A global exchange of personal computer discoveries*

This month: new insights on multicolor graphics, plus a handy program to send any characters to any device, a few tips for BASIC programmers, and a note about error checking in 1-2-3

*Edited by Steven Cook*

## Turbo Color

The PC graphics community owes a debt of gratitude to Larry McMillin for his revelation concerning low-resolution graphics ["130-Color Graphics," *PCW*, ✳.✳, November 1985]. I have incorporated Mr. McMillin's ideas in the Turbo Pascal program LORES.PAS. (Listing appears at the end of this column.)

LORES.PAS provides the basic tools needed to implement an extensive low-resolution graphics library for Turbo Pascal: Set_Lo_Res, which performs the necessary "tweaking" of the 6845 CRT controller chip to turn on the low-resolution mode; Clear_Screen, which clears the screen by setting all attributes to 0; Point($x,y,c$), which turns on a pixel at coordinates $x,y$ with color $c$, where $0 \leq x \leq 79$, $0 \leq y \leq 99$, and $0 \leq c \leq 135$ (variables $x$, $y$, and $c$ are integers); and Set_Text_Mode, which "untweaks" the controller chip, restoring the display to text mode.

LORES.PAS contains two demonstration routines. Set_Colors replicates the color table of foreground and background color values according to Mr. McMillin's program; and Display_All_Colors does exactly what its name indicates, in an 8 by 17 array.

The procedure Display_Palette demonstrates one useful feature I've added. To predefine a selection of 64 of the 136 possible colors, I declared the arrays blue, green, cyan, and so on at the beginning of the program. I selected them in an effort to enable you to specify an intensity level for a particular color. Thus, the pixel drawn by Point($x,y$,blue[3]) would be a darker blue than that drawn by Point($x,y$,blue[6]). This scheme is only partially successful, because the colors are not pure. You can easily modify these choices by changing the color arrays.
*Richard Chandler*
*Raleigh, North Carolina*

*Editor's note: Mr. McMillin's November item described generating 130-color low-resolution images using the standard IBM Color/Graphics Adapter and an RGB display. Read on to discover how another reader obtains even more colors.*

## Upping the Ante

I read with interest Mr. McMillin's item on color generation because I rely on a variation of that technique in *PC Color Spectrum*, a program I wrote and now market. In addition to using character 177 to produce a 50-50 mix of foreground and background colors, I also work with characters 176 and 178, increasing the total number of colors and shades to 178. In addition, my program takes advantage of several other tricks to produce a real-time kaleidoscopic display, which changes at the rate of ten frames per second.
*Bob Matheson*
*Drexel Hill, Pennsylvania*

*Editor's note: Whether you intend to write your own programs or simply want to see mesmerizing graphics, I heartily recommend Mr. Matheson's program. You can order a copy-protected version by sending $35 ($44 non-copy-protected) to Affirmware, P.O. Box 586, Drexel Hill, PA 19026, or by calling 215/449-6875.*

*(continues)*

*∗•∗*

## Data to Go

When I attempted to send control characters to my printer I discovered that DOS lacks an adequate way to send such codes to output devices. All DOS methods add a carriage return and a linefeed to the end of a data string. To solve this problem, I wrote OUTPUT.COM, a program that can send any sequence of characters to a standard output device. Because DOS redirection capabilities permit the output to be sent to any device, OUTPUT.COM is a handy way to control printers as well as the DOS extended screen and keyboard device driver.

OUTPUT.COM regards numbers between square brackets as decimal values of characters; everything between colons is considered literal text, so any character can be represented, including those that cannot be typed directly from the keyboard. For example, the command OUTPUT [27,13,10] sends Escape, carriage return, and linefeed to the screen. The command OUTPUT :Files are:[58] likewise sends the text 'Files are:' to the screen (58 is the decimal ASCII value for the colon). To send characters to the printer, simply add >prn to the end of the data; for example, OUTPUT [27,16] >prn sends Escape and Control P to the printer.

*Gary E. Nichols*
*Las Cruces, New Mexico*

*Editor's note: To create OUT-PUT.COM, load BASIC, type in the lines shown in X-MAKER.BAS followed by the lines in OUT-PUT.DAT, and then type* **RUN** *and*

*(continues)*

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```
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

```
1000 DATA "a:output.com"
1010 DATA 1,BE,81,00,8B,FE,B6,0A,AC,3C,20,74,FB,3C,5B,74,26,-1,BD
1020 DATA 2,3C,3A,74,16,3C,0D,75,47,B4,02,BE,81,00,EB,05,AC,-1,2C
1030 DATA 3,8A,D0,CD,21,3B,F7,75,F7,CD,20,AC,3C,3A,74,D8,3C,-1,77
1040 DATA 4,0D,74,E5,AA,EB,F4,33,DB,33,C9,EB,06,41,93,F6,E6,-1,2F
1050 DATA 5,02,D8,AC,2C,30,3C,09,76,F3,E3,02,93,AA,4E,AC,3C,-1,36
1060 DATA 6,2C,74,E3,3C,20,74,DF,3C,5D,74,AC,3C,0D,74,B9,BE,-1,A7
1070 DATA 7,74,01,BF,7A,01,B4,0F,CD,10,B4,0E,AC,CD,10,3B,F7,-1,7F
1080 DATA 8,75,F7,CD,20,45,72,72,6F,72,07,-1,BD,-1
```

OUTPUT.DAT: Add these lines to X-MAKER.BAS to create OUTPUT.COM

press < Enter > . *When using OUTPUT.COM, remember that the length of the DOS command line—and thus the number of characters that OUTPUT.COM can send at one time—is limited.*

### Rounding Right

Paul Cunningham's suggestion for error-checking in *1-2-3* [*.*, PCW, November 1985] works great—as long as you don't use multiplication or division in any cell of a row or column to be totaled. *1-2-3* keeps track of numbers to 15 decimal places, so values that appear identical on the display will not necessarily be considered equal when compared by a worksheet formula.
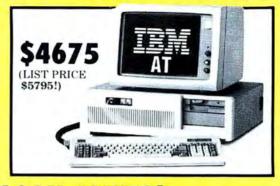
To ensure that the results of numeric comparisons match the results on screen, use the @ROUND function to trim away superfluous fractional amounts. The following formula compares dollar amounts in the same way as Mr. Cunningham's:

@IF(@ROUND(@SUM
(*rows*),2) = @ROUND
(@SUM (*columns*),2),
@SUM(*columns*),@ERR)

(*Rows* is the range of rows to be

*(continues)*

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```
100 DIM GRAPHARRAY%(8004)
110 SCRNFLAG% = 0 : ON KEY(1) GOSUB 25000 : KEY(1) ON
    .
    .
    .
25000 IF SCRNFLAG%<>1 THEN 25050
25010 GET (0,0)-(319,199),GRAPHARRAY%
25020 SCREEN 0,1,0,0 : WIDTH 80 : CLS : SHELL
25030 CLS : SCREEN 1,0 : PUT (0,0),GRAPHARRAY%,PSET
25040 RETURN
25050 IF SCRNFLAG%<>2 THEN 25100
25060 GET (0,0)-(639,199),GRAPHARRAY%
25070 SCREEN 0,1,0,0 : CLS : SHELL
25080 CLS : SCREEN 1,0 : PUT (0,0),GRAPHARRAY%,PSET
25090 RETURN
25100 SCRNY%=CSRLIN : SCRNX%=POS(0)
25110 SCREEN 0,1,1,1 : CLS : SHELL
25120 CLS : SCREEN 0,1,0,0 : LOCATE SCRNY%,SCRNX%
25130 RETURN
```

**POP2DOS.BAS: BASIC routine to save screens and load DOS temporarily**

summed, and *columns* is the range of columns.)

Notice that the @ROUND function has two parameters—the value to be rounded and the desired number of digits to the right of the decimal point. Be sure to change the second value to match the format of the values your worksheet displays.

*Don Osborne
Costa Mesa, California*

**Popping to DOS**

I use the routine shown in POP2DOS.BAS to let users interrupt my BASIC programs at any time and execute DOS commands.

This technique works with BASICA version 2.00 and version 2.0 of the IBM BASIC Compiler. When you press <F1> the routine saves and clears the screen and then loads DOS. You can execute any DOS command and even run other programs such as DISK-COPY and FORMAT. When

you're done, type EXIT and press <Enter> to return to the program, restoring the screen and putting you back where you began.

Because there is no easy way for the routine to determine the current screen mode, your program must set the variable SCRNFLAG% to note the current mode. Setting SCRNFLAG% to 0 indicates an 80-column text mode; set SCRNFLAG% to 1 just before working with medium-resolution graphics, and set it to 2 before any high-resolution graphics. Be sure to reset SCRNFLAG% to 0 when you reset the screen to text mode.

*I. N. Botnick
Los Angeles, California*

*Editor's note: When exiting to DOS, be sure that your programs have not left open any partially written files, lest the user decide to engage in disk operations that adversely affect the open files (for example, changing disks or deleting files).*

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**Window Wonder**

The program UPDOWN.BAS shows how easily BASICA version 2.00 can be made to print upside down. Line 140 of the program uses the GET statement to capture a part of the screen, line 150 uses the WINDOW statement to reverse the direction of the screen's $y$ coordinate, and line 160 PUTs the captured image back onto the screen. Because the $y$ coordinate has been transposed, the resulting image appears upside down.

> *Michael Trombetta*
> *Manhasset, New York*

*Editor's note: The WINDOW statement is a powerful graphics tool which, in addition to inverting images, can easily perform a variety of otherwise difficult tasks, including scaling, zooming, panning, and substituting programmer-defined coordinates in place of the screen's default (physical) coordinates.*

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*(Continue for listings.)*

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```
100 REM **** Upside down graphics ****
110 DIM IMAGE(100)
120 SCREEN 1,0 : CLS : KEY OFF
130 LOCATE 12,15 : PRINT "BASIC EXPERT"
140 GET (112,80)-(207,95),IMAGE
150 WINDOW (0,0)-(319,199)
160 PUT (112,96),IMAGE
170 A$ = INPUT$(1)
180 END
```
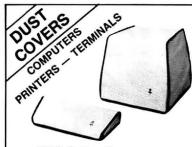
UPDOWN.BAS: Demonstration of BASICA version 2.00 WINDOW statement

```
Program Lo_Res_Graphics;
type
    scr             = array[1..16000] of byte;
    color           = array[0..7] of byte;
const
    blue            : color = (1,16,9,24,18,51,26,110);
    green           : color = (2,37,31,10,39,102,85,115);
    cyan            : color = (17,32,25,52,94,86,116,125);
    red             : color = (4,58,62,12,66,126,131,132);
    magenta         : color = (5,19,73,59,71,27,78,130);
    brown           : color = (6,81,83,41,87,68,128,133);
    gray            : color = (0,8,100,7,92,107,90,135);

var
    i,j,k,l         : byte;
    stop            : char;
    screen          : scr absolute $B800:$0000;
    color_table     : array[0..135,0..1] of byte;

{-------- SET GRAPHICS CONTROLLER CHIP FOR LO-RES ---------}

Procedure Set_Lo_Res;
type
    reg             = array[0..11] of byte;
const
    modereg         = $03D8;
    colorreg        = $03D9;
    crtreg          = $03D4;
    crtdata         = $03D5;
    regdata         : reg = (113,80,90,10,127,6,100,112,2,1,32,0);
var
    i               : byte;
    j               : integer;
    modesave        : byte absolute $0000:$0465;
    colorsave       : byte absolute $0000:$0466;
begin
    modesave := 0;
    port[modereg] := 0;
    colorsave := 0;
    port[colorreg] := 0;

continues
```

LORES.PAS: Turbo Pascal program to generate 130-color images

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```
    for i := 0 to 11 do
    begin
       port[crtreg]  := i;
       port[crtdata] := regdata[i];
    end;
    for j := 1 to 16000 do
    begin
       screen[j] := 177;
       j := j+1;
       screen[j] := 0;
    end;
    modesave := 9;
    port[modereg] := 9;
    end;

{------- RESTORE TEXT SCREEN ----------------------------}

Procedure Set_Text_Mode;
type
    reg         =   array[0..11] of byte;
const
    crtreg      =   $03D4;
    crtdata     =   $03D5;
    regdata     :   reg = (113,80,90,10,31,6,25,28,2,7,6,7);
var
    i           :   byte;
begin
    for i := 0 to 11 do
    begin
       port[crtreg]  := i;
       port[crtdata] := regdata[i];
    end;
    textmode(3);
    ClrScr;
end;

{------- CLEARS SCREEN -----------------------------------}

Procedure Clear_Screen;
var
    i   :   integer;
begin
    for i := 1 to 16000 do
    begin
       i := i+1;
       screen[i] := 0;
    end;
end;

{------- SET COLOR TABLE --------------------------------}

Procedure Set_Colors;
var
    i,c,fg,bg  :  byte;
begin
    c := 0;
    for i := 0 to 255 do
    begin
       bg := i div 16;
       fg := i mod 16;
       if bg <= fg then
       begin
```

*continues*

LORES.PAS *(continued)*

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```
            color_table[c,0] := bg;
            color_table[c,1] := fg;
            c := c+1;
        end;
    end;
end;

{-------- PLOTS POINT(X,Y) IN COLOR BG/FG -----------------}

Procedure Point(x,y,c:integer);
var
    bg,fg  : integer;
begin
    bg := color_table[c,0];
    fg := color_table[c,1];
    screen[2*(x+1)+160*y] := fg + bg*16;
end;

{-------- DISPLAY COLORS IN SEQUENCE ---------------------}

Procedure Display_All_Colors;
var
    i,j,k,l  : integer;
begin
    for i := 0 to 16 do
        for j := 0 to 7 do
            for k := 0 to 3 do
                for l := 0 to 11 do
                    Point(i*4+k,j*12+l,8*i+j);
end;

{-------- DISPLAY SELECTED PALETTE ------------------------}

Procedure Display_Palette;
var
    i,j,k  : integer;
begin
    for i := 0 to 7 do
        for j := 0 to 3 do
            for k := 0 to 11 do
            begin
                Point(4*i+j,k,blue[i]);
                Point(4*i+j,k+12,green[i]);
                Point(4*i+j,k+24,cyan[i]);
                Point(4*i+j,k+36,red[i]);
                Point(4*i+j,k+48,magenta[i]);
                Point(4*i+j,k+60,brown[i]);
                Point(4*i+j,k+72,gray[i]);
            end;
end;

{-------- MAIN PROGRAM BEGINS ----------------------------}

begin
    Set_Lo_Res;
    Set_Colors;
    Display_All_Colors;
    read(Kbd,stop);
    Clear_Screen;
    Display_Palette;
    read(Kbd,stop);
    Set_Text_Mode;
end.
```

LORES.PAS *(continued)*

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- ☐ (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 mor

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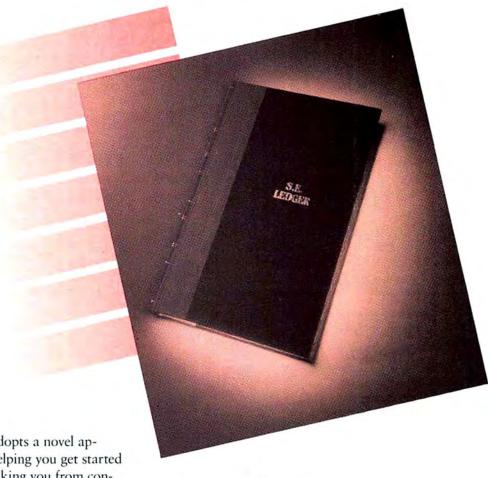
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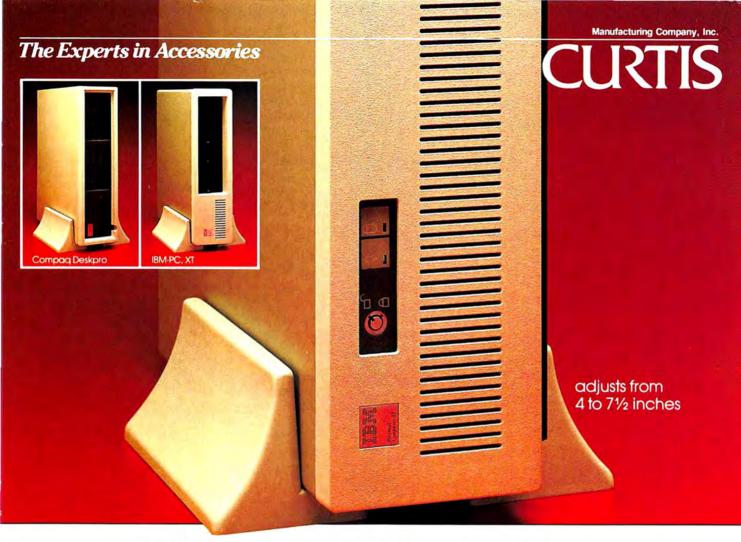
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