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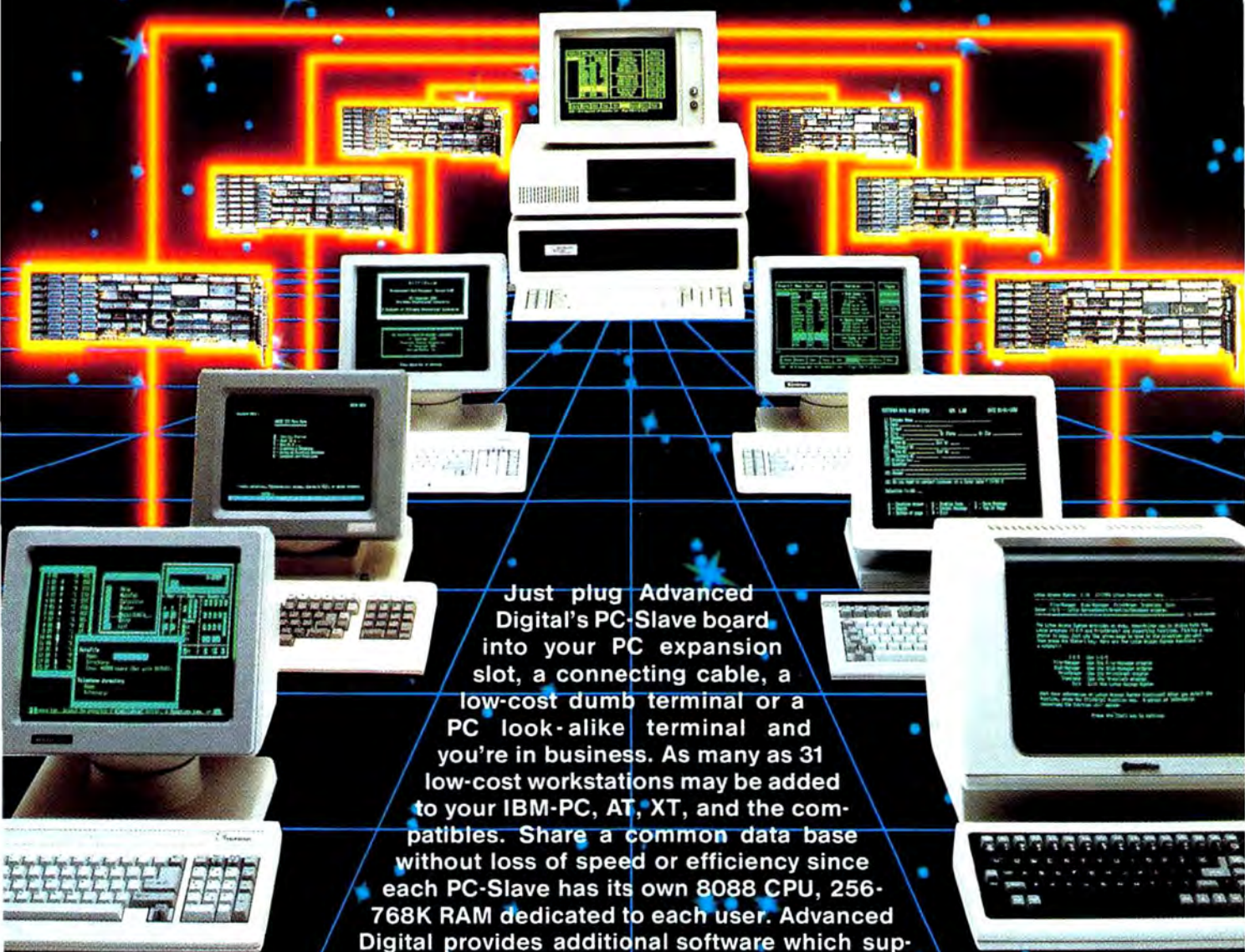
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PC WORLD

The Comprehensive Guide to IBM Personal Computers and Compatibles
February 1986



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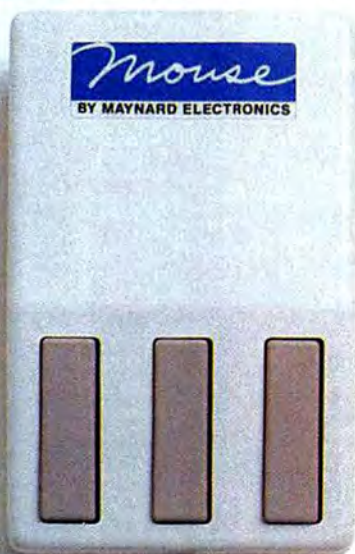
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Button Auto Repeat	Yes	No	No
Diagnostics	Yes	No	Yes
Dynamic Scaling	Yes	No	No
Cursor Overshoot Control	Yes	No	No
Adjustable Cursor Speed/Up, Dn (while running application)	Yes	No	No
Adjustable Cursor Speed/Rt, Lft (while running application)	Yes	No	No
Buttons-Definable (while running application)	Yes	No	No
Macro-Definable (while running application)	Yes	No	No
User-Definable Alternate Cursor Movement	Yes	No	No

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FEATURES	PREVIEW!	HERCULES
Replacement for IBM Mono-chrome Display/Printer adapter	Yes	Yes
Text and Graphics Modes available	Yes	Yes
Graphics capabilities	Two pages with 720 x 348 resolution	Two pages with 720 x 348 resolution
Text capabilities	80 characters x 25 lines 7 x 9 character matrix in a 9 x 14 cell	80 characters x 25 lines 7 x 9 character matrix in a 9 x 14 cell
Screen memory	64 KB	64 KB
Parallel port	Yes	Yes
Warranty	2 years	2 years
Suggested list price	\$399.00	\$499.00
Microsoft Flight Simulator Included	Yes	No

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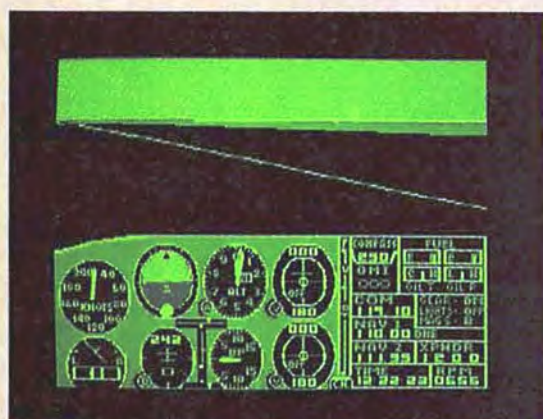
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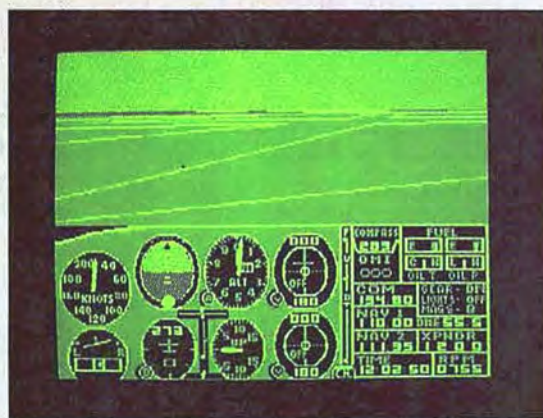
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Introducing Pc

Microsoft® Windows has arrived.

For anyone who uses a computer in earnest, that is extremely good news.

Windows gives you a practical way to integrate programs. It radically decreases the time it takes to move from one application to another. Dramatically simplifies the means of consolidating data from many different programs.

And as a graphical extension of the MS-DOS® operating system, it gives you a highly visual way to work and to organize your work.

In short, Windows brings efficiency to all those processes of personal computing which have till now been awkward, unwieldy, inconvenient.

The joys of job hopping.

With the advent of Windows, you can work with multiple applications. And switch from program to program with ease.

Start up with one application, then another, and another. Leap back and forth between applications as your work routine dictates. Then pick up right where you left off.

The ability of Windows to change quickly from program to program logically and naturally magnifies the utility and productivity of the personal computer. And is a recognition of the way people who exploit the power of PCs really do their jobs.

Breaking the 640K barrier.

Just like you, Microsoft Windows can handle several projects at the same time. Juggle assignments. Deal with frequent interruptions.

And Windows will ignore the 640K limit of the PC, especially if you have a hard disk, the Intel® Above™ Board, or expanded memory. It will execute the rather neat trick of working with more programs than

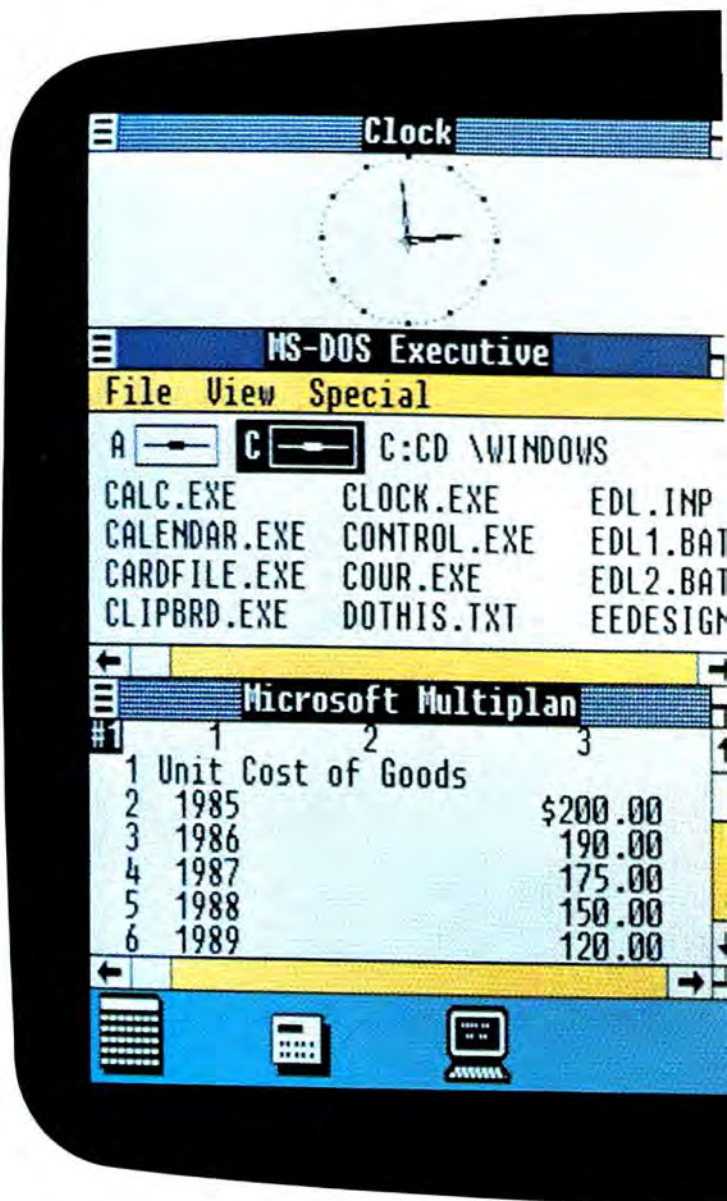
memory can hold at one time.

Spreading knowledge.

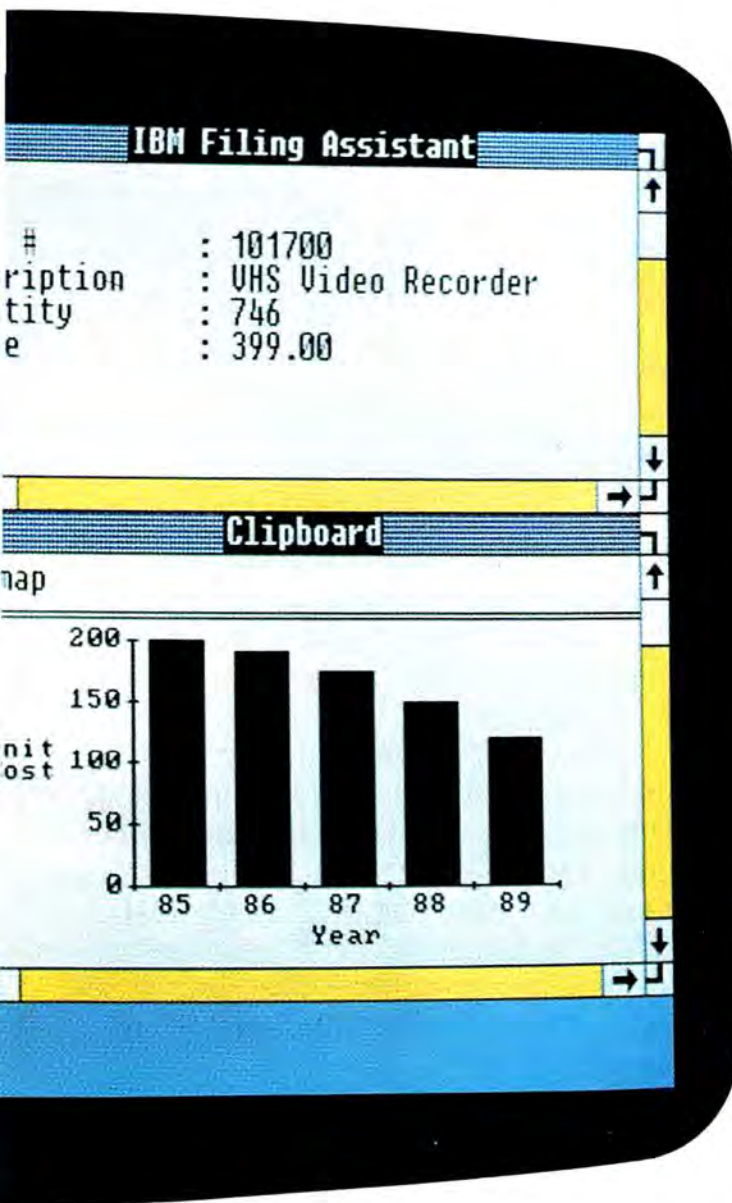
Another significant service Windows performs is accelerating the movement of information from one program to another.

Collecting and combining that information is as simple as taking a "snapshot" of data in one program. Editing it. Then consolidating it with data from other programs.

With Windows, you can enjoy the advantages of conventional integrated programs without their compromises. Because Windows lets you put together the applications that you know, and that get a job



Power Windows.



done for you.

Choose your best word processor, spreadsheet, database—you name it. They're all there for you at a keystroke.

Common ground.

Finally, Windows is not only an immensely powerful tool for today, it's also a solid base for a new generation of Windows Applications.

As an introductory offer, two of these—Microsoft Windows Write and Windows Paint—are included in the Windows package. Along with more than a dozen other Windows desktop applications. Including a DOS file management program, calendar,

cardfile, notepad, calculator, and a telecommunications program.

In Windows Applications you have a common interface which includes drop-down menus, dialog boxes, icons. Along with a richer environment that allows you to mix pictures and text. And to summon different type faces and styles at a keystroke.

Windows is a bridge between today's applications and the graphics based software now evolving. A way to work interchangeably with today's programs. And tomorrow's.

**Of course, all this is
going to cost you: \$99.**

A price that makes Windows the most startling value ever offered in software. A comparable collection of programs—a switching program, a graphic interface, desktop applications, a word processor, a drawing program—could easily cost hundreds of dollars more.

If you're someone who uses personal computing as a natural part of your work life, who capitalizes on the productive powers of sophisticated applications, look into Windows.

It offers a new vision of what a computer can do.

Microsoft® Windows

The High Performance Software™

For the name of your nearest Microsoft dealer, call (800) 426-9400. In Washington State and Alaska, (206) 828-8088. In Canada, call (800) 387-6616.

Note: Photo shows color and resolution obtained on an IBM® PC equipped with IBM Enhanced Graphics Adapter. Monochrome display is generated when an IBM Color Graphics Adapter or compatible graphics adapter card is used.

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System Requirements: IBM or COMPAQ Personal Computer (or 100% compatibles) 256K memory, two double-sided, double-density disk drives (512K and a hard disk recommended, when using multiple applications or DOS 3.0 or higher). Graphics adapter card (IBM Color Graphics Monitor Adapter, IBM Enhanced Graphics Adapter, Hercules Graphics Card, or compatible).

"Why we had a strong case for buying an Epson PC after owning an IBM."



"Way back in 1982, we were just two more young lawyers starting out. Our big advantage was, we were smart enough to get an IBM® PC. But today we can modestly claim to be even smarter. This time we bought the new Epson® Equity.™

Not only is it fully compatible with all the software and peripherals we use on our old PC, but the Equity I, II, and III models have more features and better performance than the corresponding IBM PC, XT, and AT.™ Things that IBM adds to your bill, like MS-DOS™ software plus serial and parallel ports, are standard on the Equity. And each Equity model uses the improved AT style keyboard.

All the evidence points to Epson's superior value.

In point of fact, the Equity II, which we selected, comes with 640 KB of memory and a dual speed CPU for higher performance and even

more productivity. Add in a very attractive price, and you end up with a motive for buying Epson that stands up under any cross examination.

What really swung the verdict in Epson's favor was their solid reputation. Even with our old PC, we had an Epson printer. And like the product, their service and support were terrific. Epson's dealer network and technical staff treat the little guy just like a member of the Fortune 500. And the Equity even comes with a one year warranty.

We waited a long time before buying a second computer. But in our professional opinion, the time to buy an Epson Equity is now. As far as we're concerned, it's an open and shut case."

For more facts about the Equity line of personal computers, call 800-421-5426, or (213) 539-9140 in California.



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David Bunnell

East meets West as Publisher David Bunnell travels to China to encounter the burgeoning information age.

The China Interface

For a long time I've been an observer of the impact of personal computers on American culture. Recently, I had the opportunity to visit China and see the effect of computer technology on a culture that is completely different from ours.

China is about the same size as the United States, but its population is about 15 times our own. It's a Third World culture that is still largely agrarian. The process of modernization began only recently—virtually leapfrogging over the industrial age right into the information age.

Yet China holds a very prominent place in the history of technology. It's a nation where not only gunpowder but also silk, paper, and movable type were first invented.

When I was in China, I found that the country is genuinely opening up to new ideas—and that it's becoming a socialist state with capitalist tendencies. For the first time since the Communist revolution in 1949, private street vendors are selling their wares. I saw many other dramatic examples of Chinese entrepreneurship—at a low

level compared to Silicon Valley perhaps, but still very much in evidence.

This new entrepreneurial initiative seems to be a factor even inside the Chinese government and in large organizations where individuals are now encouraged to develop new projects and take them to completion.

The Chinese people I met were really interested in the concept of entrepreneurship. In fact, there's even a magazine about entrepreneurs published by the same company that produces the *Chinese Economic Daily*, the *Wall Street Journal of China*. It's called *Chinese Entrepreneur*.

It was interesting to see that this old culture, which in so many ways is behind the technologically advanced culture I'm used to, has a chance to actually leap ahead of many industrialized countries.

However, in examining the state of the computer industry in China, I found that the country needs to face many problems and

(continues)

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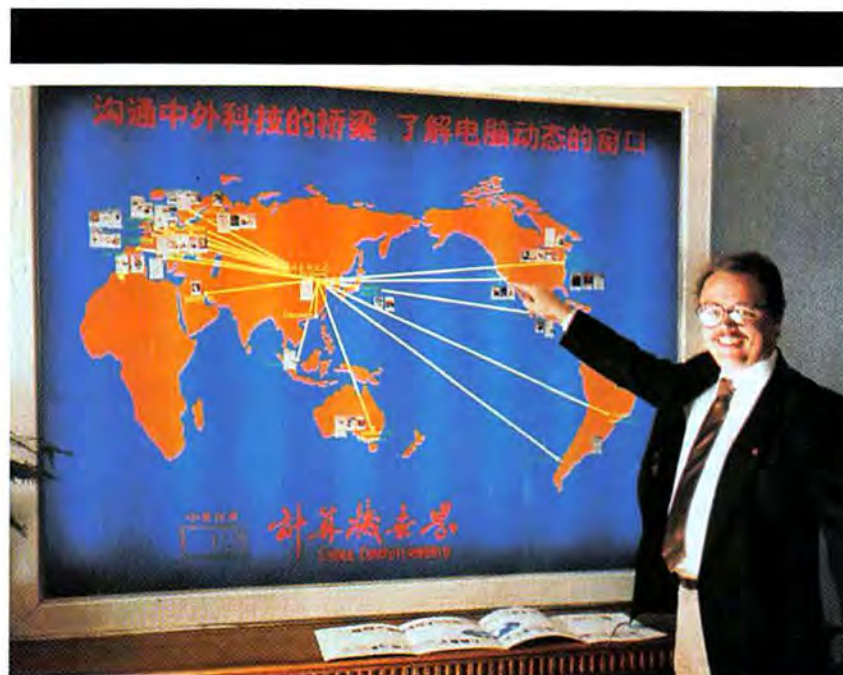
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A little bit of home. In the offices of China Computerworld, David Bunnell finds PC World on a map of our sister publications around the globe. Although it has only 60,000 subscribers, 18 people read each copy of China Computerworld, giving it a readership of over a million.

challenges before this high-tech dream can come true. One of the biggest problems, of course, is the general economic plight of the Chinese people.

In China the average worker makes \$500 to \$600 a year. So most people are hardly in a position to buy an Atari home computer or to purchase video games for educating their children. They're lucky if they have electricity, and most likely they live in a house that's not very well heated in the winter. All the buildings I went into in Beijing were cold, with temperatures ranging from about 45 to 50 degrees. The level

of heating was minimal compared to what Americans are used to.

I jokingly remarked to one of the Chinese people I met that there could be one computer on every bicycle. He thought for a moment, then suggested that it might be better to first put a generator on every bicycle to make it more like a motorcycle.

As part of their modernization drive, the Chinese began buying microcomputers from the West in 1976. First they bought about 500 Cromenco S-100s. Since then they have acquired more than 150 models of microcomputers, including 60,000 to 70,000 IBM XTs and XT compatibles.

Unfortunately, the Chinese were led to believe by unscrupulous dealers in Hong Kong and in other gray markets around the world that the key to using computers in

(continues)

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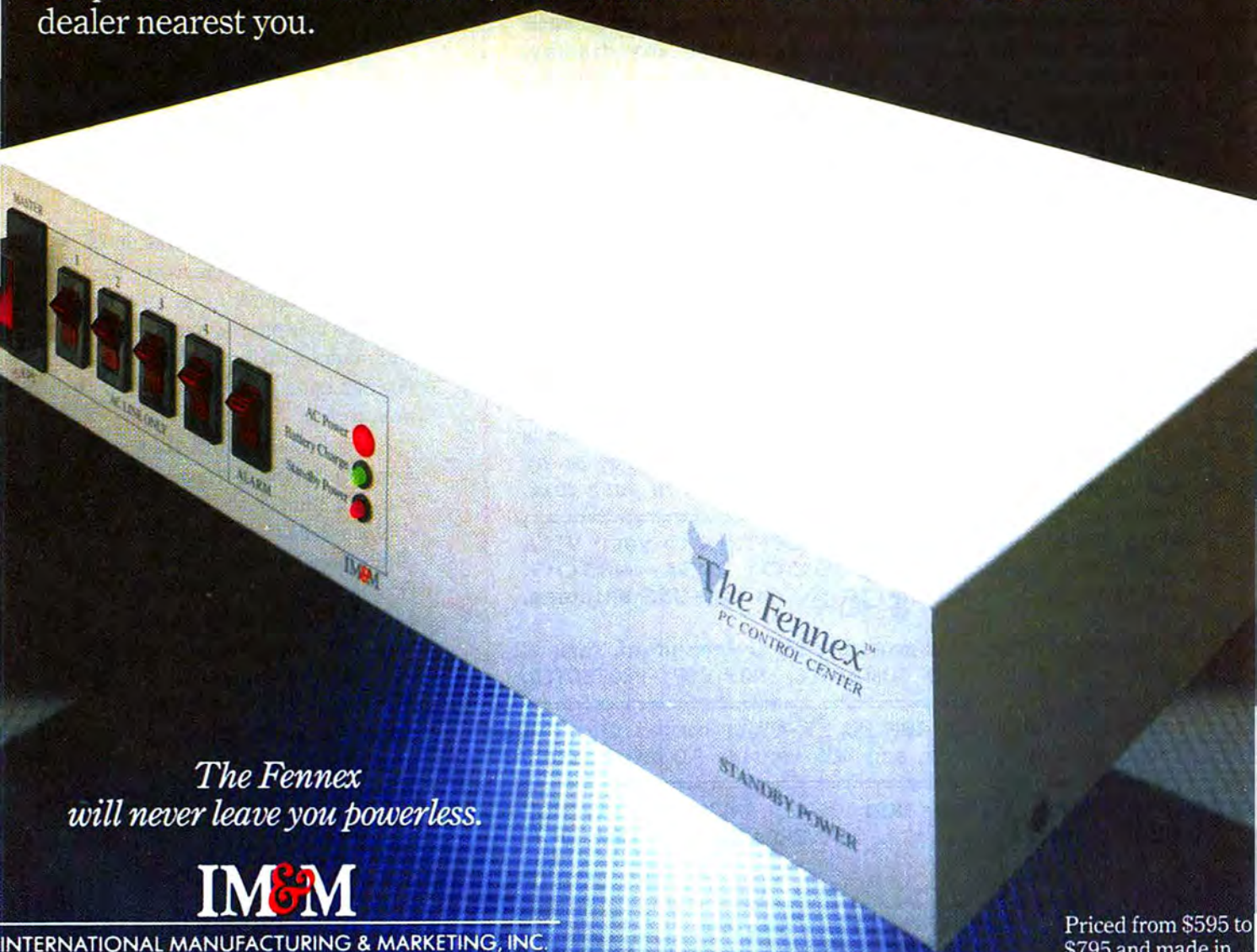
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a modern society is simply to buy them. So the Chinese bought lots of computers without really thinking about what they should be used for.

Consequently, many personal computers are still locked up in storage for the simple reason that the Chinese have no idea what to do with them.

However, I found that the Chinese are now learning how to cope with their problems, gradually making the necessary changes within their system. When I visited the Ministry of Electronics, I learned that they very much want to learn more about computer applications. The Chinese see that if they study how the personal computer is used in the West, they can learn how to use it in the East, even though there will no doubt be variations in its usage.

They have a lot of interest in office automation, in the use of the personal computer for graphic design and computer-aided design and manufacturing, as well as for managing projects and inventories.

I also discovered that IBM and Apple both have interesting problems in China.

One of IBM's problems is that China bought many of its IBM PCs on the gray market, so IBM will not support them. When these PCs break down, there's nowhere for the Chinese to turn for repairs. And they're not always able to fix the machines themselves.

(continues)

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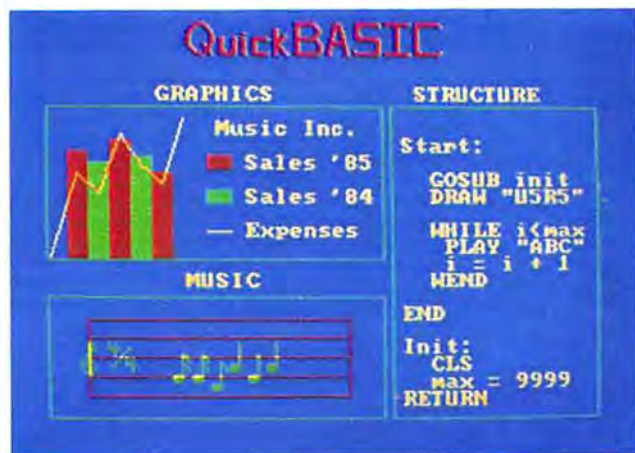
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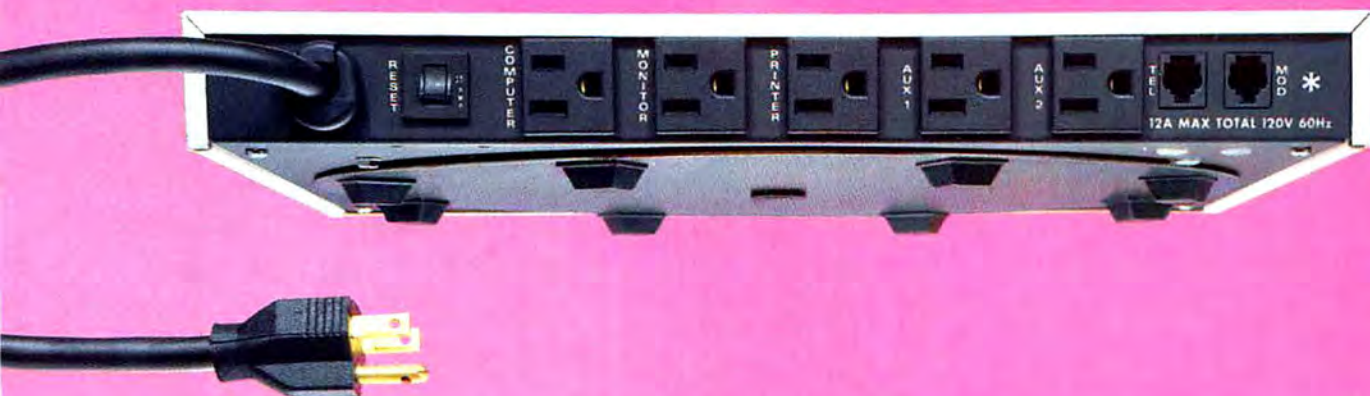


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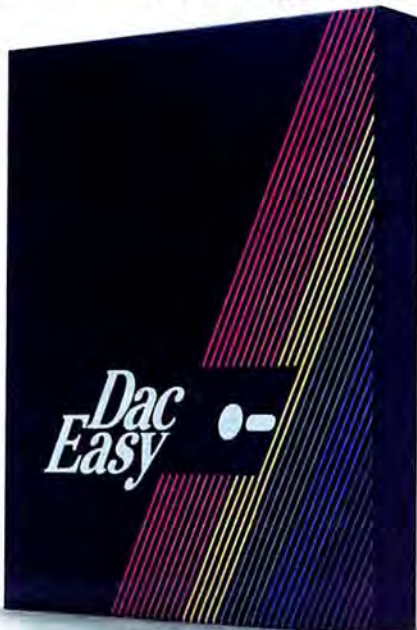
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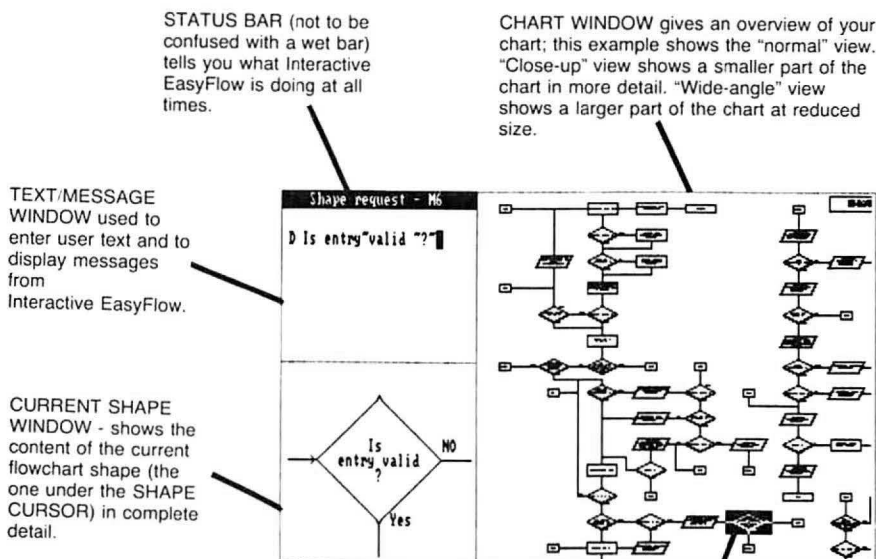
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This lack of support makes many people angry with IBM because they don't really understand what it means when computers come from the gray market. As far as the Chinese are concerned, IBM is IBM. Chinese institutions also bought many IBM XT compatibles of various stripes, and when those machines break down, the purchasers tend to place the blame on IBM. Because, to the Chinese, there is no difference between an IBM machine and an IBM look-alike.

IBM has made some inroads convincing people in the Chinese government and the Ministry of Electronics about the importance of watching where you purchase equipment and making sure that you've bought a proper application to make use of it. IBM has also arranged to get a bulk importer license from the U.S. Department of Commerce so China can import PCs almost at will, without having to license each machine individually.

These measures should help improve IBM's situation in China.

However, Big Blue realizes that the Chinese are making their own IBM compatibles—particularly the Great Wall 0520, an XT look-alike—and that the Chinese ultimately don't care whether they buy computers from IBM or some other source. What they want is to understand the technology and design so they can build their own machines.

(continues)

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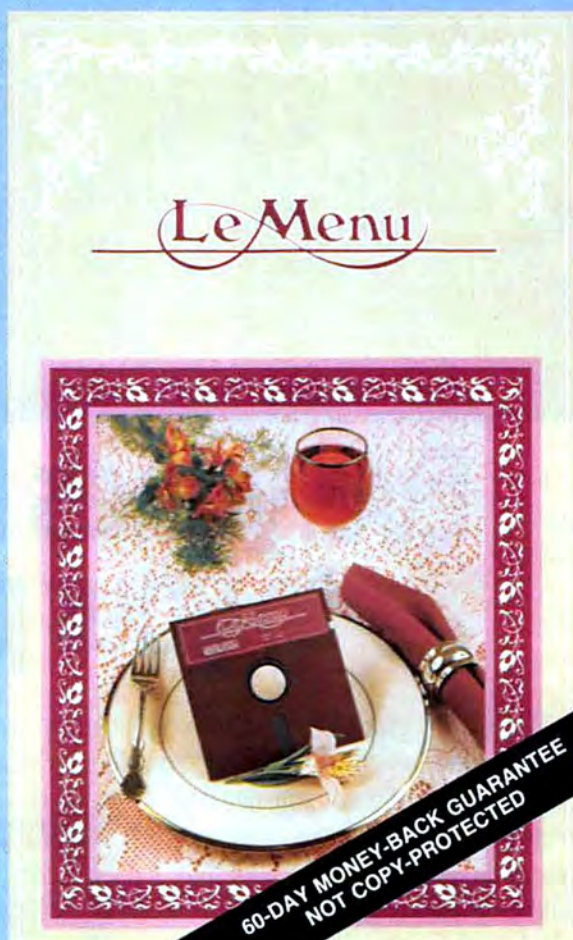
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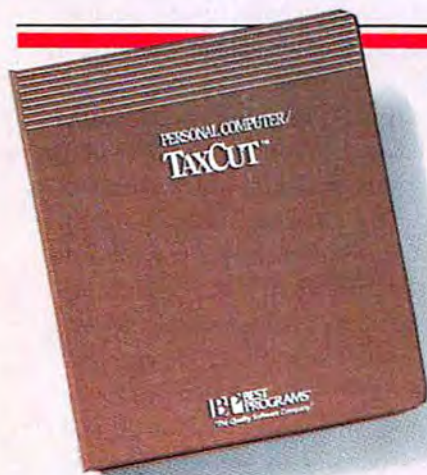
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David Bunnell

After all, in a cash-poor country, you want to make sure that you maximize the return on any import purchases—so you make as few as possible.

Apple Computer has had some success in China, too—particularly with its Apple II, which numbers about 50,000 in China. Actually, I'm not certain how many of those machines are in fact Apples and how many are look-alikes. Most so-called look-alikes are very blatant rip-offs, produced in Hong Kong, Singapore, or Taiwan, and clearly violate Apple's copyright.

One "Apple" I saw was green instead of cream-colored; otherwise, it looked just like the real thing.

As for the Macintosh, 1000 Macs have been sold in China so far. One problem facing the Mac is the lack of Chinese-character software. However, I was told that software for the Mac using Chinese characters would be available within the year.

Chinese character generation is perhaps one of the biggest problems facing the Chinese personal computer user. There are about 500 different ways to input and output Chinese characters with a personal computer. Already there is a Chinese language *WordStar*, and soon there will be a Chinese 1-2-3. I even visited a factory in Beijing where they were working on a Chinese version of the Wang operating system.

Over time, the Chinese will probably settle on a standard form

(continues)



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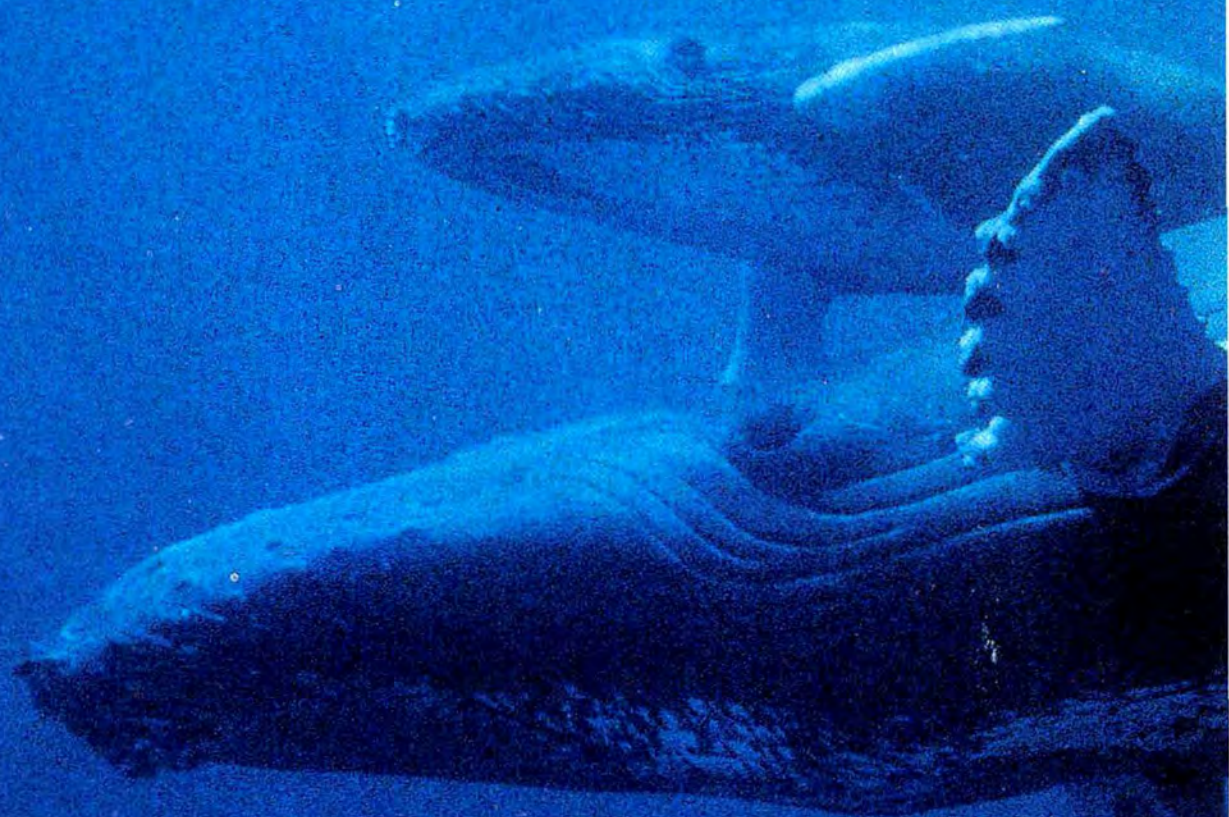
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of inputting and outputting Chinese characters, probably using laser printers because dot matrix printers cannot satisfactorily produce the intricate characters.

Another problem I found in China is that although it has a patent law covering inventions, there's no such thing as a copyright law protecting either software or written material. Yet the Chinese don't want to get a reputation for piracy like Hong Kong's or Taiwan's, so in many cases Chinese purchasers are willing to sign separate agreements not to make illicit copies of software. Nonetheless, some American software companies are nervous about doing business with China.

Officials in the Ministry of Electronics, and indeed members of the Chinese electronics industry in general, understand the piracy problem and are working to have their government pass a software-protection law.

We'll soon see more Chinese software and more absorption of personal computers into Chinese culture. 1985 was the year to figure out what to do with personal computers in China. 1986 will be the first year of really using them. And 1987 should be a boom year for the PC in the PRC; by then the Chinese will have established their own applications, which will rapidly be put to use in industries, schools, and many businesses and government agencies throughout the country.

(continues)

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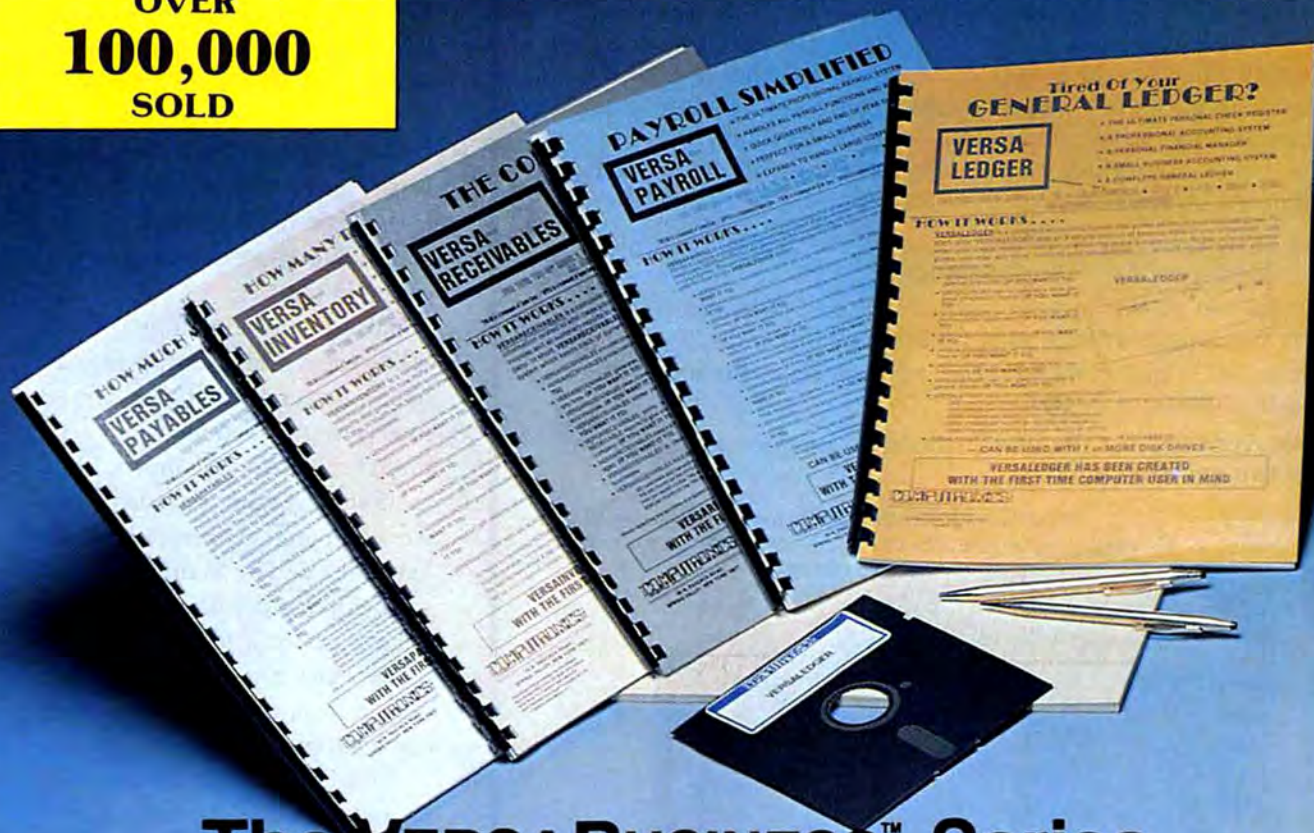
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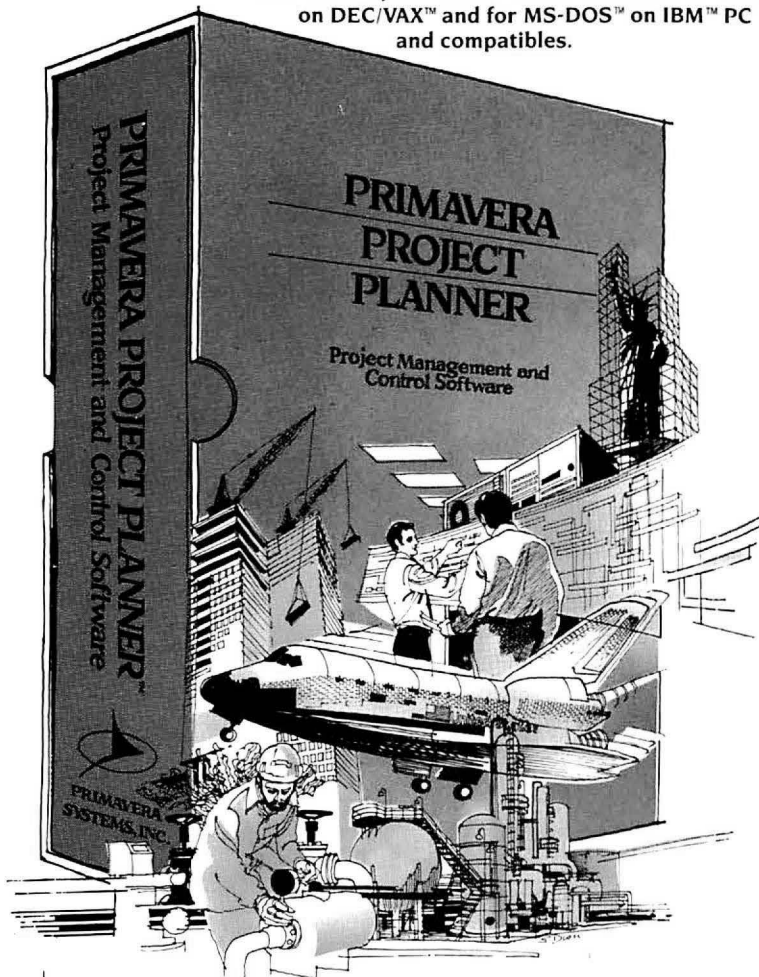
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In an interview with the *Chinese Economic Daily*, I predicted that China and the United States would lead the world in personal computers by the year 2000, with Japan coming in third. This idea was received with a great deal of enthusiasm in China, and I suspect it will also be warmly received in the U.S.

I also predicted that by the year 2000, every Chinese student will have a personal computer. The interviewers asked me why I thought this would happen. I told them that by then, affordable lap-size computers will be on the market. They will be so powerful and so cheap that it will make complete sense for students to have them. The Chinese found this idea very intriguing. I am convinced it can be implemented.

A line from an old Chinese poem reads, "Ghosts wailed at night when the ancients invented words." That was before the dawn of early Chinese civilization. Just think how those ghosts will wail when the Chinese develop their own word processing and communications technology.

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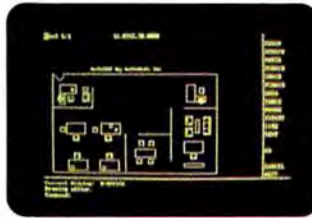
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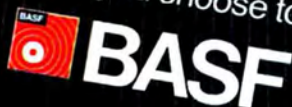
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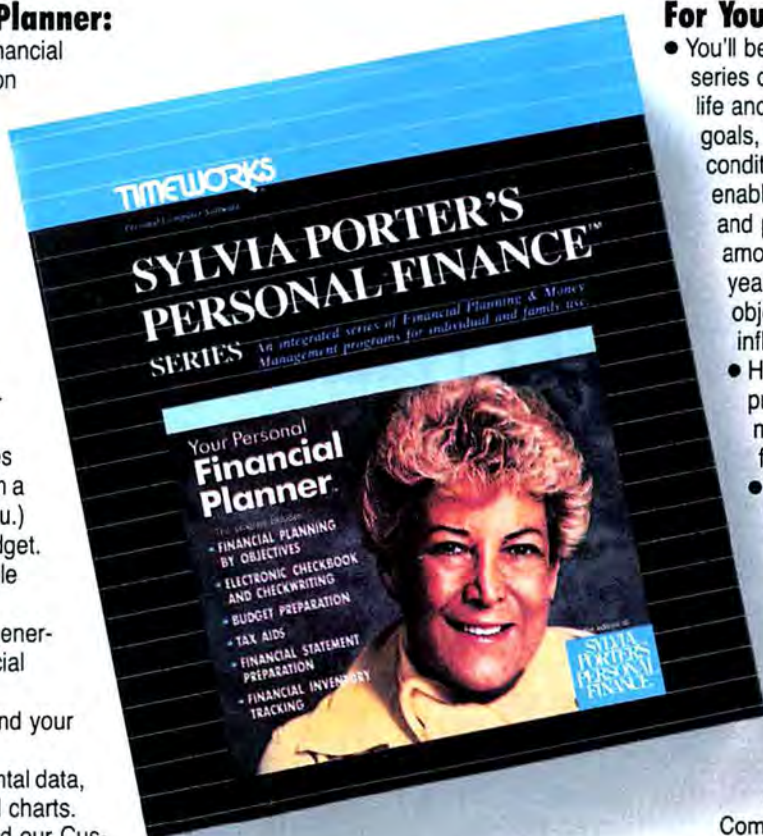
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Once in a while you see something that makes your skin crawl. It happened to me in Sausalito, California.

I was looking at a video image of a patio surrounded by shrubs, with two trees in the foreground. Grabbed by an AT&T Image Capture Board (ICB), the image was composed of a mere 256 by 200 pixels. Its 32,000 colors made it look much richer than most high-resolution images.

In fact, it looked as good as most images captured by a video cassette recorder (VCR). Video people will tell you that everything we computer types do with images is meaningless until we acknowledge that we need 16 million colors (dubbed "true color") more than we need a resolution of 1024 by 1024 pixels. I couldn't agree more.

Anyway, I saw the image in the offices of Island Graphics. The company is the brainchild of old-timer Steve Dompier. I remember Dompier from the days when he created a game called *Target* for the Sol 20 computer, a real-time shoot-'em-up using memory-mapped character graphics. It was

spectacular in 1977—there was nothing like it on a micro. Island Graphics is now doing elaborate paint programs for products like AT&T's stunning series of Image Capture Boards.

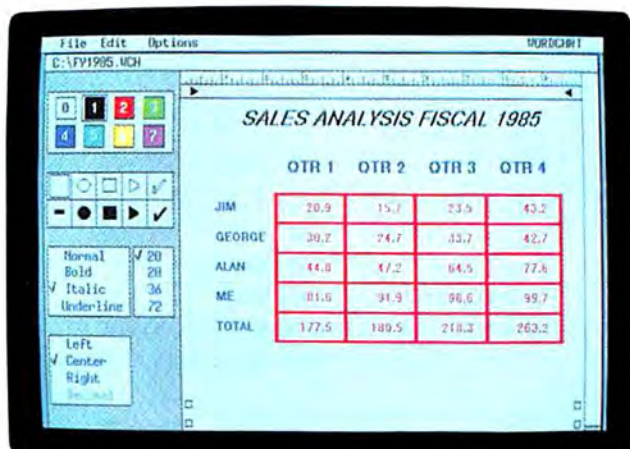
As I looked at the image of the patio, someone grabbed the mouse and clicked it on some icons that were superimposed over the image. She then placed the cursor over the tree trunk in the foreground. With a flick of the wrist she erased one of the foreground trees, revealing a bare tile patio and shrubs in the background.

It was almost eerie to see it happen so effortlessly. "Can you imagine what a nifty tool this will be for architects?" asked a programmer. "Or plastic surgeons," added another. The second tree was eliminated next, as if it had never existed.

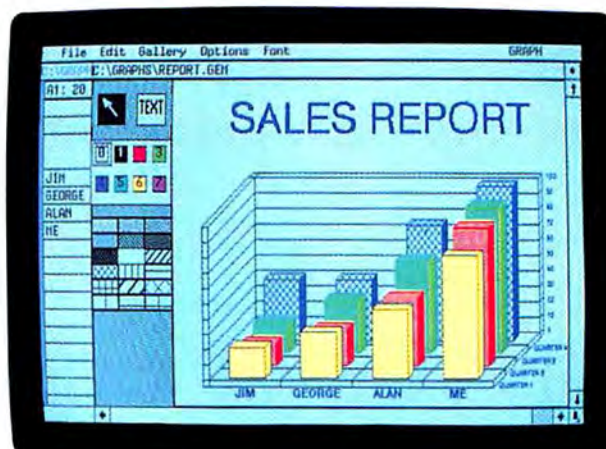
I've seen the future of digital images. The sophisticated Island Graphics software can blend various visual elements intelligently. As the tree is erased, the computer

(continues)

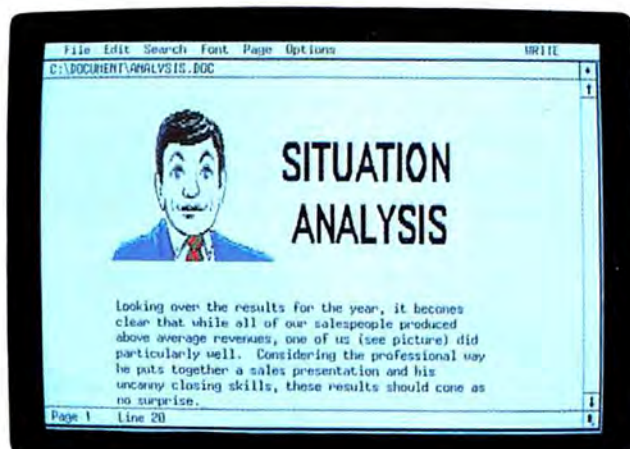
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looks around the landscape and reproduces the surrounding elements where the tree once stood.

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But even the short demonstration I saw set off some internal alarms. What happens when video images can be so easily altered, superimposed, and generally doctored? It certainly eliminates routine belief in anything you might see via a video device. The medium no longer assures reality.

This phenomenon may not seem like a big deal, but the reliance on video cameras for such activities as news gathering, police operations, and congressional proceedings makes image manipulation an issue that must be brought to public attention before someone pulls a fast one on the unsuspecting and the gullible.

Most of the attention paid to computer graphics has come from the CAD/CAM sector and artists who see the computer as a tool for creating new versions of reality. The same techniques developed for these purposes can be inverted (and subverted) to alter reality. People can be placed in locations where they weren't or removed from locations where they were. And this sleight of hand doesn't require an expert.

(continues)

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45	2,500	2,500	2,500	2,500	2,500
46	500	2,000	1,000	3,000	
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50	7,500	5,000	1,000	1,000	1,000
51	5,000	5,000	5,000	5,000	5,000
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44	2,100	6,600	6,600	6,600	6,600
45	2,500	2,500	2,500	2,500	2,500
46	500	2,000	1,000	3,000	
47	300	400	500	750	750
48	5,760	5,760	5,760	5,760	5,760
49	230	205	320	335	345
50	7,500	5,000	1,000	1,000	1,000
51	5,000	5,000	5,000	5,000	5,000
52		9,500			
53			2,500		2,500
54	1,500	750		1,000	750
55					

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Circle 258 on reader service card

John C. Dvorak

Crooked real estate agents, for example, could show you a "tape" of a fine mansion in another city after having the computer carefully patch cracks and turn a slab floor into a glossy veneer.

Forget about identifying a bank robber from the picture taken by the video camera on the wall. With ease, *your* face could be superimposed on the image of the real robber. Show the tape to a jury, and who's going to say it wasn't you? Guilty as charged. Of course this won't happen if experts can determine that the image is a fraud. But what expert would testify on your behalf if you're a poor hillbilly being railroaded onto a chain gang in southern Mississippi? Absurd? Perhaps—but there's less paranoia here than food for thought.

The new AT&T graphics boards are part of one of the "intrapreneur" projects that big companies like to brag about. Say a firm discovers that a couple of its hot engineers have an idea for a product and would like nothing better than to start their own company. The idea is that the big company finances the entire venture and keeps a percentage rather than lose the hotshots altogether.

These underpublicized video boards emerged from just such a project. AT&T markets them through various OEMs with little or no advertising. Everyone who has seen the boards is impressed. They mark a totally new direction for personal computers, one that may well dominate the scene in the next few years: a trend toward full-color-spectrum images. These

(continues)

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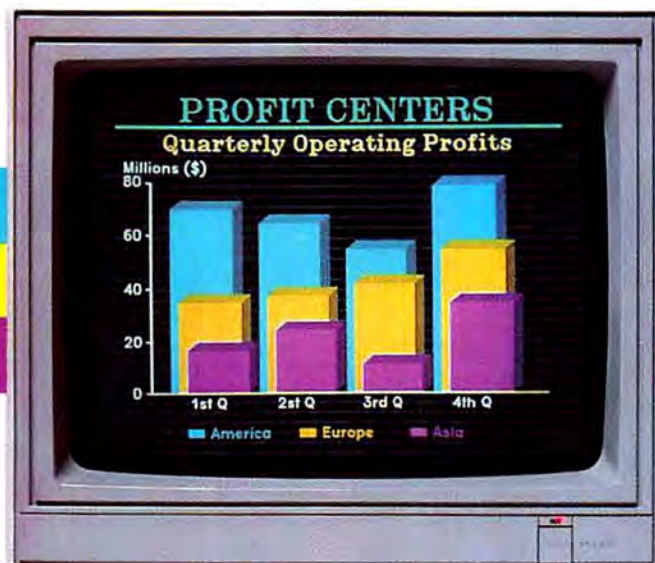
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boards will accelerate the turn toward CD ROMs and eventually read/write/erase laser disk technology with its potential to hold gigabytes of data.

When you see what a video capture board does, you have to laugh at the images produced by the Macintosh, the Amiga, and the Atari ST. You quickly see that those are mere stopgap machines—a perception that is, I think, shared by most industry observers who have declined to become cheerleaders for the new Amiga and Atari machines.

Now I hate to bring the Japanese into this scenario, but here they come. The movement toward lifelike video images created, manipulated, and stored digitally by

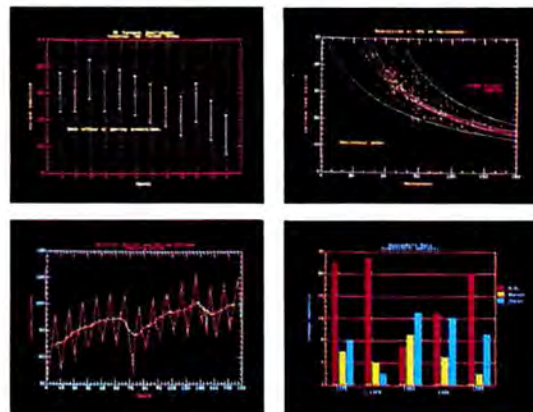
personal computers sets the stage for the Japanese takeover of the business. They already make most of the peripherals included in a personal computer system, and they'll soon own the chip business. Let's face it, they own the video business too. We don't even make VCRs in this country.

The Japanese will probably manufacture all the laser storage devices, all the RAM chips, and most of the video tubes used to display the images. If they ever decide to develop a video capture and display product like the AT&T device, you can be sure that theirs will be better and cheaper. What other parts are

needed for the computer of the future? Japanese-manufactured 3½-inch floppy disk drives?

The only American component will be the logo on the front of a metal box filled with Japanese parts. So as I said at the beginning of this roundabout rumination, in the future reality may not be what you think it is. Welcome to the next generation. ●

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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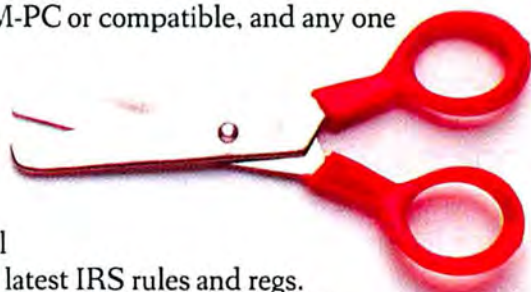


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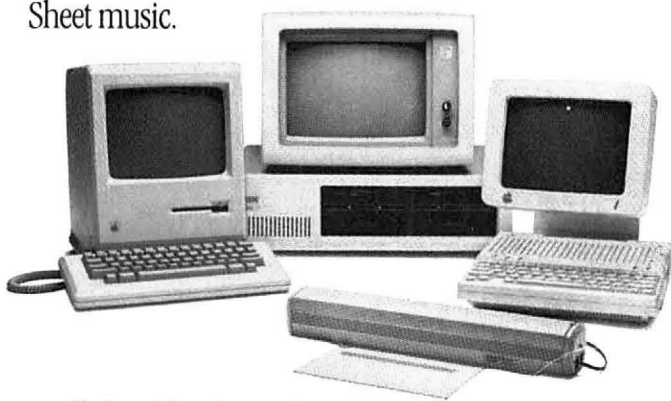
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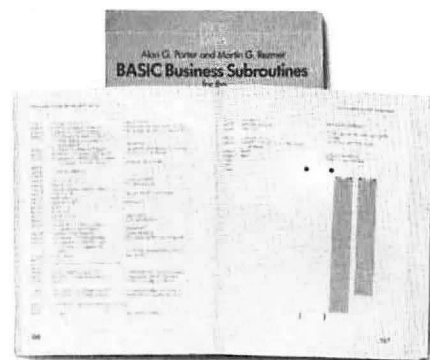
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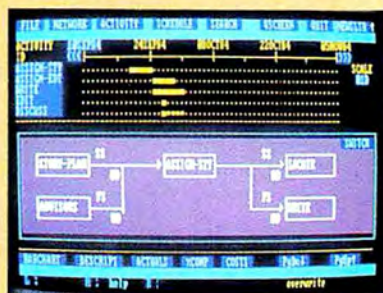
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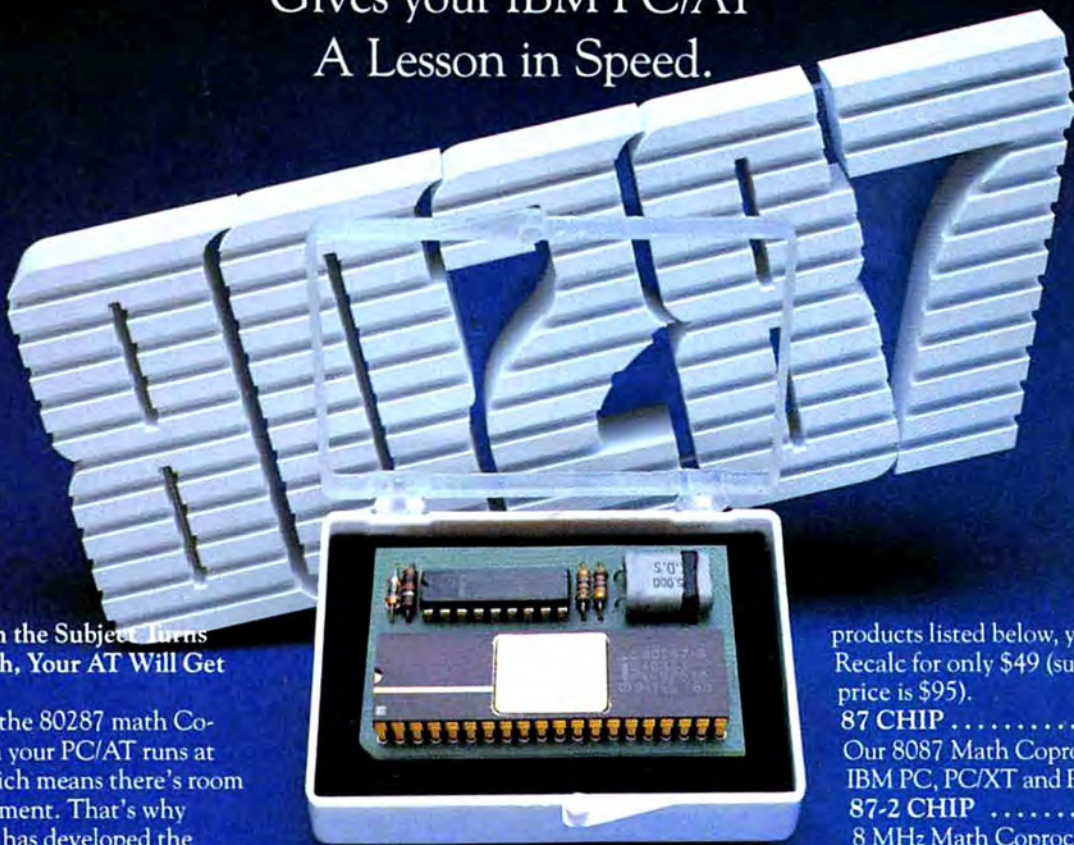
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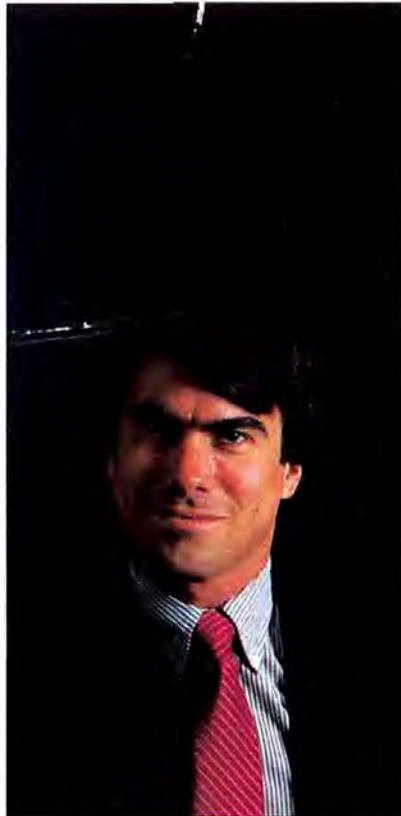
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Kevin Strehlo

The Video Game Syndrome

PC savvy is the ticket to wealth and fame? Guess again. It seems the more managers use computers, the less they earn.

A legend is growing at the Florida Institute of Technology about how Jack Gochenouer used to spend his vacations. Anchored in his sailboat near the mile-wide mouth of the Indian River—without the distractions of phones, television, or wife and three kids—he studied. When darkness fell, he would hook a wire connecting the light on a miner's hat to a generator he had installed on an exercise bike. Donning the hat, he would hop on the bike and pedal long into the night to light his books on organizational design and quantitative analysis. From the shore he appeared as a wavering glow in the middle of the still, starlit estuary.

There was no other way. If Jack Gochenouer was going to get his doctorate in management from the Florida Institute of Technology while continuing to work full-time as MIS director at the headquarters of the Harris Corporation, he had to be totally committed.

That's the kind of guy Gochenouer is. He has a compulsion for (and a curiosity about) whatever it takes to get the job done. This compulsion explains why he was

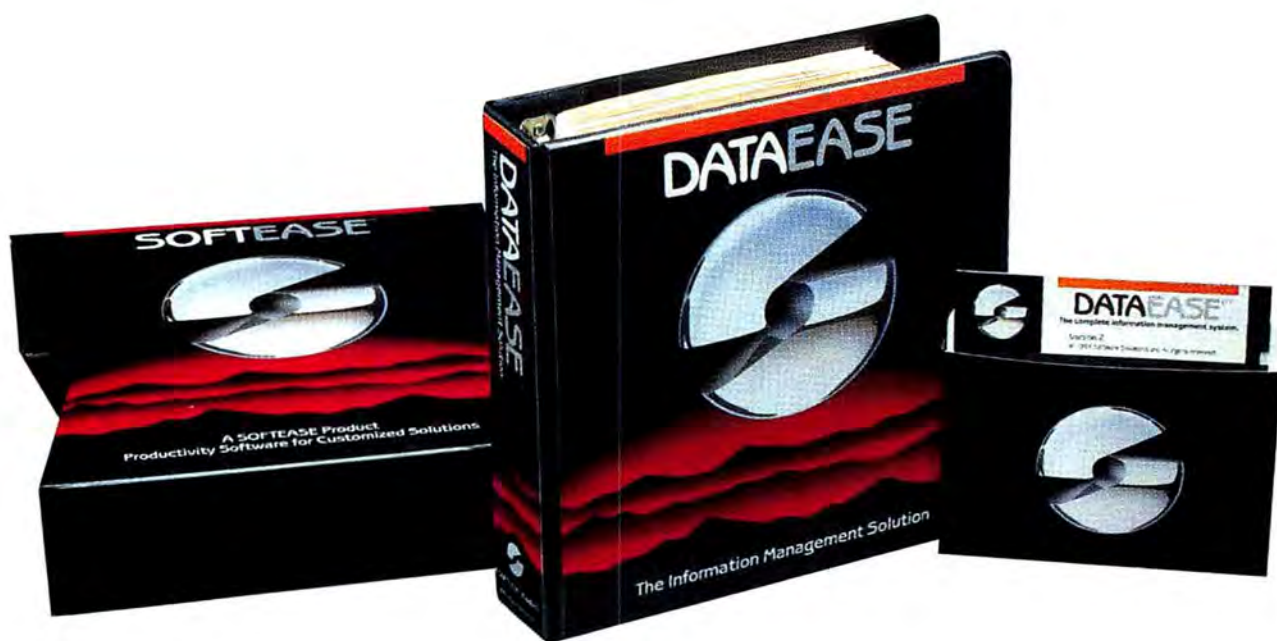
the only finisher among the management program's eight first-year doctoral students. The curiosity explains why he was in the program in the first place.

Something had long bothered Gochenouer. He had never proved that his work—helping other managers use computers—boosted his subjects' job performance. Quantifying the managers' productivity was tough, but tying it to their use of computers was a real challenge. Gochenouer wanted a number he could show to peers in other management areas and say, "This is it, no denying it—it's fact." When it came time to begin research for his doctoral dissertation, Gochenouer set out to prove that his 12 years as an MIS director had contributed to the bottom line.

Given the slippery nature of measuring managerial productivity directly, Gochenouer chose another measure of success: salary increases. His position as head of MIS at Harris gave him access to sensitive information that graduate

(continues)

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Kevin Strehlo

students in management rarely, if ever, see. He obtained historical data on managers' salaries as well as records of their use of IFPS, the mainframe financial analysis tool that was the rage at Harris, which builds and sells semiconductors and large computers.

Gochenouer matched people in the company on every factor he could think of—age, years with the company, position, function, education, and, of course, salary—and defined two groups: one group that used computers and one that didn't. Gochenouer was sure that correlating computer use with salary increases would confirm the positive impact of computer-based financial analysis on managers' performance.

Use It—And Lose It

Gochenouer came into the office holding a computer printout and looking worried. "You won't believe this, Roger," he told his doctoral adviser, Dr. Roger Manley. "The computer users are getting wiped out by the nonusers."

Gochenouer sounded shocked, but Manley was amused. Many researchers go through a denial phase when their findings contradict their expectations. In this case, the reaction was especially understandable. Gochenouer had devoted his life to MIS work; it had to be hard to accept a row of numbers that denied the value of those years of dedication. Manley knew he had to keep goading his

(continues)



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video display boards. And we provide "convenience" features not found in other terminal emulation packages like: "Branch to DOS" hot key, automatic installation, color support, multiple setups, "smart" softkeys, remappable keyboard layouts, and online help screens detailing PC and AT keyboard mappings. Our unique support for DEC's popular EDT editor includes convenient keyboard mapping of the "GOLD" and PF function keys, as well as an EDT specific on-line help screen, and keypad chart.

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popular XMODEM "error-free" protocol, we include our own PDIP protocol and supply you with free BASIC and FORTRAN programs which implement the protocol on VAX/VMS systems.

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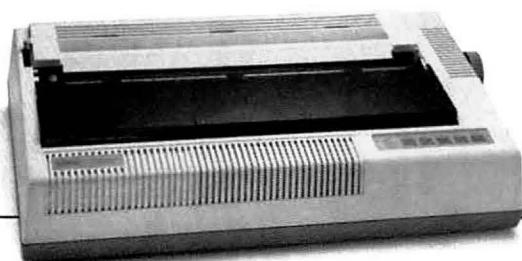
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student. "Don't tell us what it should be, Jack," Manley would say. "Just tell us what it is."

For two months Gochenouer double-checked his results, making sure that he hadn't generated any bad data and verifying the soundness of his statistical technique. He finally faced facts. The salary performance of the computer users didn't measure up to the control group's. One startling fact stood out: The more that managers used computers, the worse they did financially.

Manley called in colleague Chuck McNickle of Clemson University in South Carolina to help Gochenouer refine his population matching; the statistical significance of his findings increased. Questionnaires pinpointed how IFPS was used and correlated that to managers' salary increases.

The computer users who performed forward-looking analysis with IFPS—planning, budgeting, simulations—fared better than those who used it for report writing and historical analysis. That made intuitive sense, especially given that Harris competed in the fast-paced world of high technology. But Gochenouer had assumed that people who used computers in the most sophisticated way were more intelligent and would therefore perform better. Instead they did worse. Using sophisticated Monte Carlo techniques and sensitivity analysis was

(continues)

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just asking for a smaller raise, it seemed. The managers with the fattest salaries tapped only the basic capabilities of IFPS and used the computer no more than 4 hours a week. The most telling finding: No subset of managers who used computers performed better than those who didn't.

Searching for a culprit responsible for this dismaying trend, Gochenouer drew on observations from his 11 years of working with top management at Harris. "I call [the phenomenon] the video game syndrome," he said. "I remember seeing managers doing the same things as the kids in arcades. It was as if they became hypnotized by the computer. They'd get mad at it, laugh at it, but no matter what, they'd keep playing. Managers got hooked." As a result, their use of the computer was not efficient.

Gochenouer found corroboration in the work of researcher Paul Strassman, whose writings offered a similar explanation of why computer use is not always productive. Strassman dubbed it the Harvey syndrome, after the giant rabbit in the Jimmy Stewart movie, and theorized that the computer becomes the fantasy world into which managers escape.

Spreadsheet Salvation

Many managers at Harris have switched from IFPS on a mainframe to 1-2-3 on a PC, but Gochenouer expects that the

(continues)

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change may, if anything, make matters worse. 1-2-3 involves more training and—partially because of the necessary file management and backup—more of a manager's time. Besides, a PC user is even more prone to the video game syndrome.

There's a chance, however, that 1-2-3 users may outearn IFPS users, simply because the spreadsheet program lacks some of the sophisticated capabilities that led the managers in Gochenouer's study furthest astray. In any case, arguing over particular computer tools misses the point of Gochenouer's work. That point, says Roger Manley, is that managers are the ones who know what managing is all about. It is not productive to spend time with a computer when you should be communicating with staff; nor does it pay to keep your gaze fixed on the past.

"If you're sequestering yourself to hack away on your personal computer, you aren't doing the things that are rewarded," Manley says. "If you need a PC to perform your job, use it intelligently and in a forward-looking manner."

With the study behind him, Gochenouer says he feels he's starting life anew. But the break is even more profound than that. Gochenouer can hardly return to his previous role as an MIS director after demonstrating that companies with large investments in

(continues)

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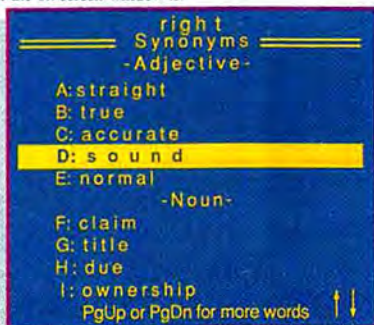
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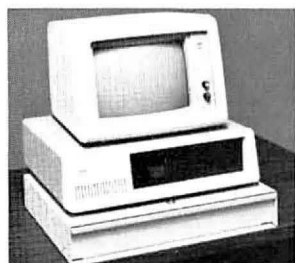
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Kevin Strehlo

information systems aren't necessarily getting their money's worth.

He still has a great deal of energy, however, and a certain amount of denial remains. Gochenouer wants to conduct the same kind of study at a different company and with a larger sample. Perhaps a certain bias was introduced because the company he studied—Harris—was a high-tech firm. Historical analysis, for example, should be more valuable in a mature industry than in a business too new to be cyclical. Understanding the impact of birth rates on life insurance policy sales might make a significant contribution to the bottom line of Metropolitan Life, for instance.

All Gochenouer needs is access to the kind of sensitive information that no company reveals casually. Until he gets it, managers doing financial analysis can only wonder about the universality of his findings and the pervasiveness of the video game syndrome. ●

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

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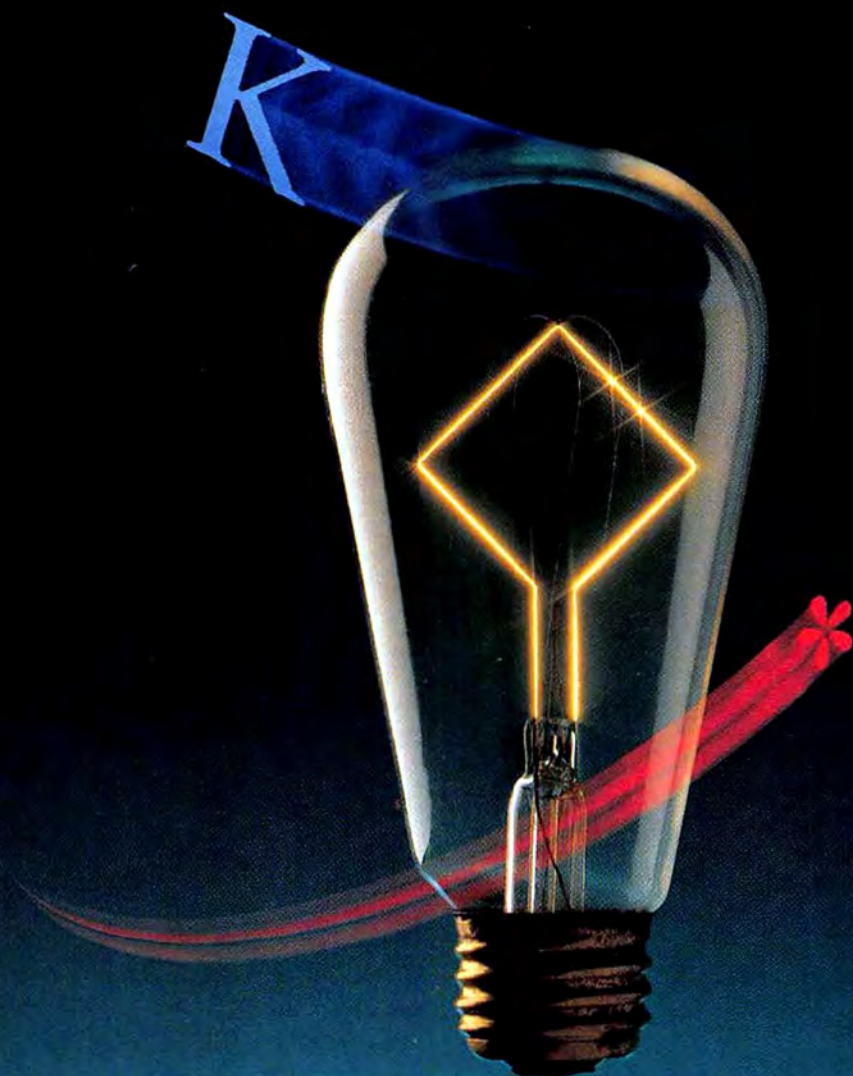
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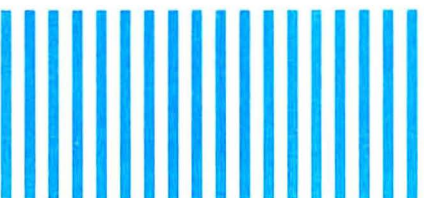
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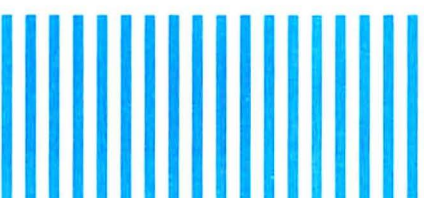
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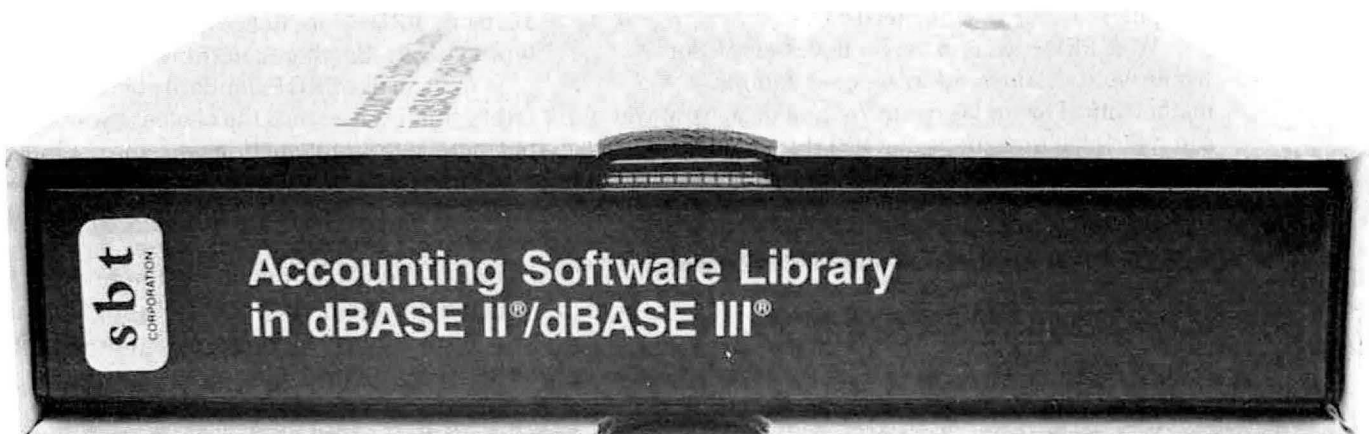
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Type **asap**. Press (Space Bar)

Result: **asap** is replaced on screen instantly with **as soon as possible**.

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PRD+ utilizes 64k of RAM and runs on IBM® PC, XT, AT and compatibles. © 1985. Productivity Software International, L.P. PRD+ is a registered trademark of Productivity Software International, L.P. patent pending. IBM is a registered trademark of International Business Machines Corporation.

Cuts disk access time in half Makes Your IBM PC **LIGHTNING** Fast! **\$49⁹⁵**

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LIGHTNING™ enables any program to approach the same rapid speed as a RAM Disk, but it does it without the disadvantages. With a RAM Disk there is a constant danger that you can lose your precious data if you forget to copy it back to the disk drive. With **LIGHTNING™** you just use your programs normally. You don't have to remember anything.

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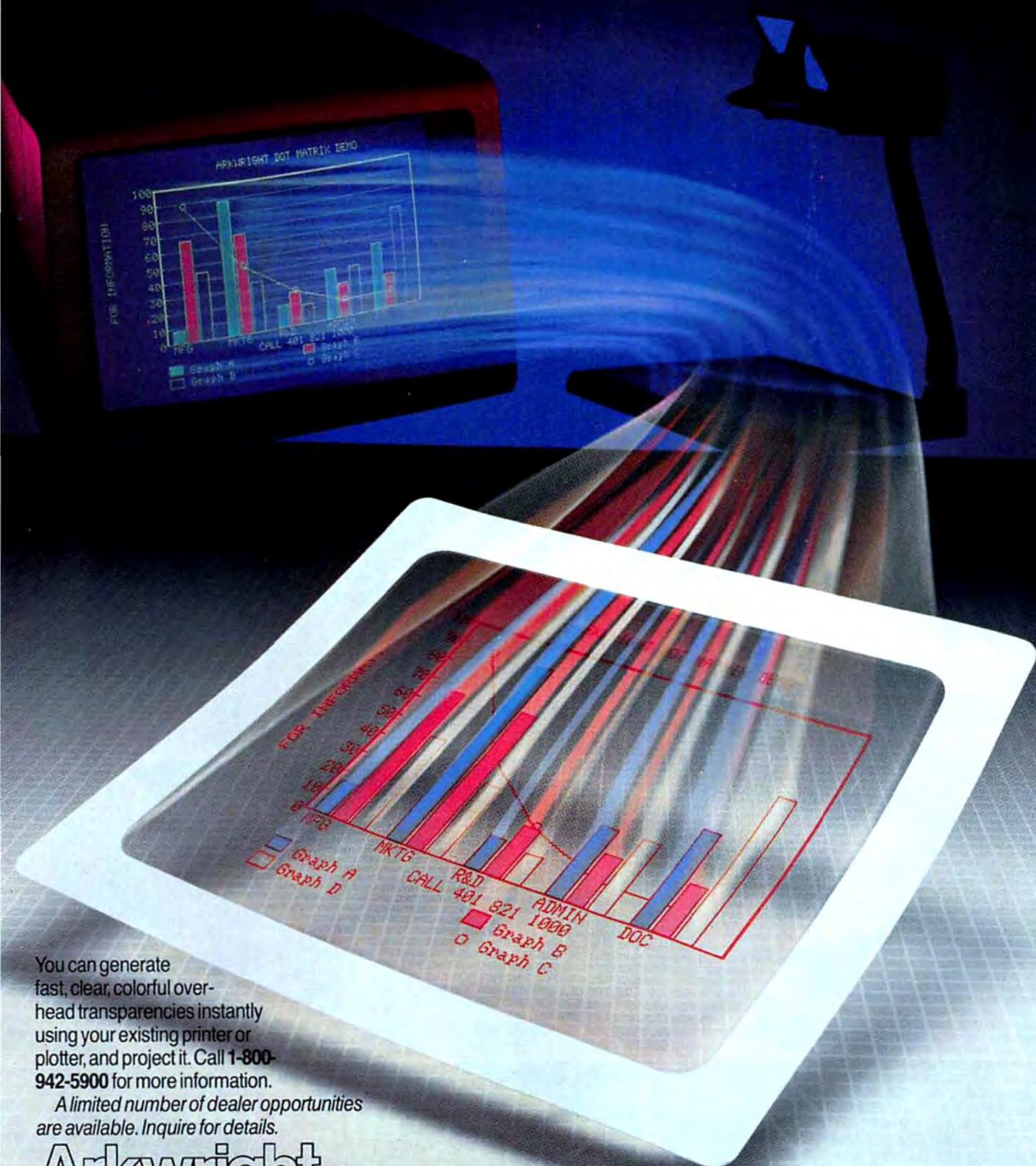
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Letters

Reactions and responses from the PC World community

R:base Bugs Me

I want to applaud Lotus Development Corporation for recalling *Symphony* after discovering bugs in the program. Unfortunately, other software companies are not so honest.

My employer recently purchased Microrim's *R:base 5000*. After many frustrating days trying to program with the Express applications generator, I called Microrim technical support for help. The Express package, they said, had a defect that erases parts of an application whenever it is changed. I asked for an updated version of the package and was told that I could probably buy one in a few months. Needless to say, I was outraged. Not only had Microrim's technical support staff neglected to tell me about the defect during previous discussions, but the company apparently failed to inform their dealers of the problem and are still selling a defective product.

Can computer companies sell software that they know is defective? Who can the consumer turn to?

Stuart C. Rosenberg
North Suburban, Illinois

Microrim's Version

Very few Microrim customers have encountered any of the bugs that we discovered in *R:base 5000* version 1.0 after it was released. In most cases our technical support staff was able to provide a work-around for the user until we could analyze and correct the problem. Version 1.01, which we've been shipping since the end of August, corrected every known bug in version 1.0 and added features that boosted efficiency and capacity as well.

Anyone who purchased and registered a copy of *R:base 5000* version 1.0 after August 15, 1985, will automatically receive a copy of version 1.01. Also, any registered user of version 1.0 who encountered a bug and reported it to us prior to the availability of version 1.01 is being sent an updated version at no cost. Subscribers to our Software Maintenance Plan receive all updates at no additional cost.

I've spoken with Mr. Rosenberg and Microrim will send him a free copy of *R:base 5000* version 1.01. This is not special treatment, but rather our standard policy of customer support.

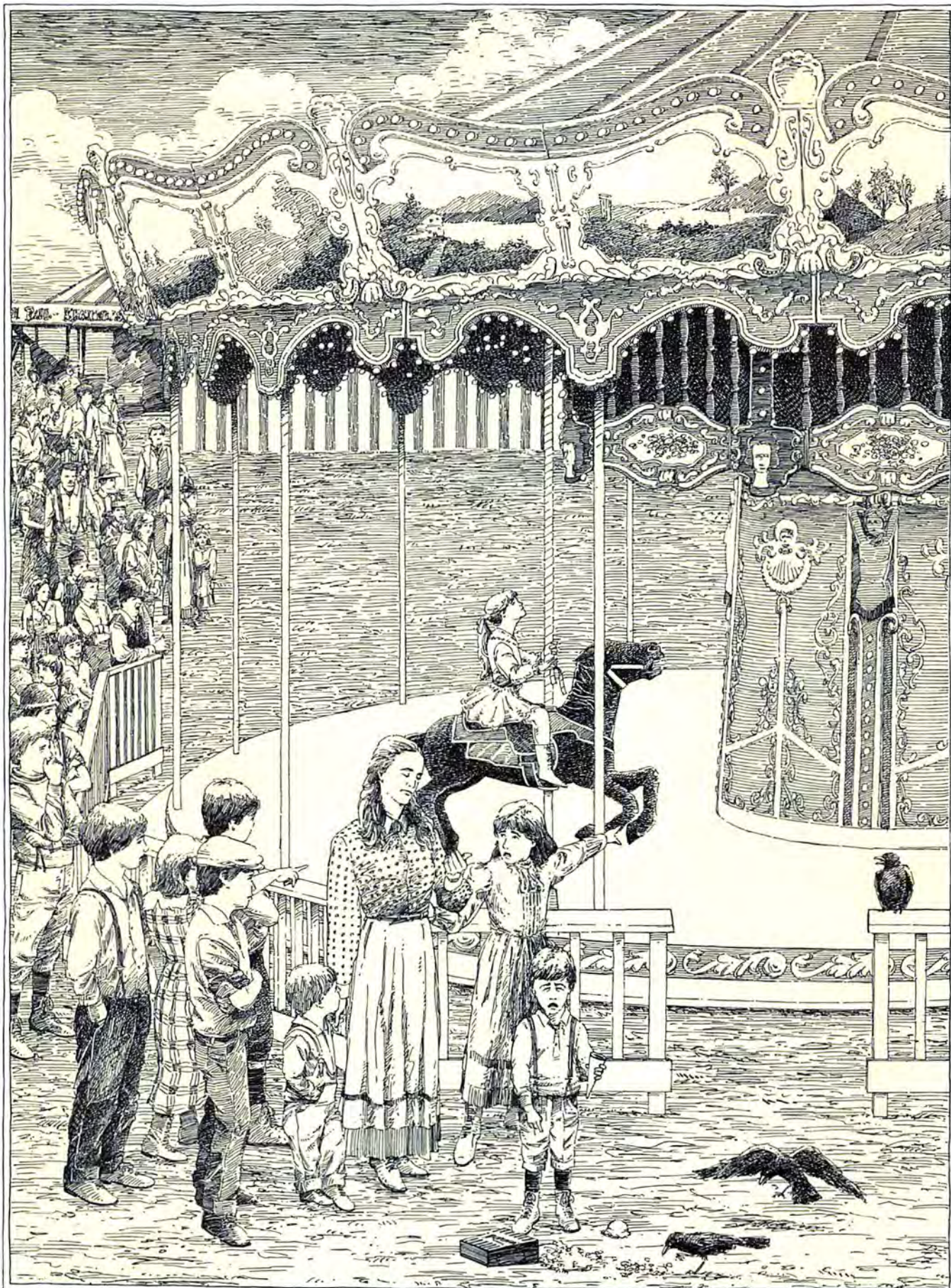
Wayne Erickson
Chairman and Chief Executive Officer
Microrim, Inc.

Turbocharged Hazard

As the number of turbo boards that upgrade the 8088-based PC to an 80286 machine increases, consumers should be aware of a lurking potential disaster. [See *From the Hardware Shelf*, PCW, October 1985 for a comparison of two PC turbo boards.]

Several accelerator boards such as Kamerman Labs' Super Flight, Micro-Way's Number Smasher, Univation's PC Turbocharger, Quadram's Quad-Sprint, and Seattle Telecomm and Data's PC-286 replace the PC's 8088 processor with a 40-pin adapter linked to the board by a ribbon cable. This adapter can be installed backward, consequently destroying the PC

(continues)



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.

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a result, multiple users will be able to work with the same database at the same time.

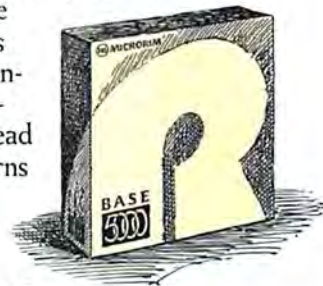
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R:BASE 5000 MULTI-USER FROM MICRORIM

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Circle 167 on reader service card

power supply, the motherboard, and the accelerator board when the system is turned on.

This problem is extremely acute in PC compatibles, as not all clones orient their 8088 CPU socket toward the back of the chassis, as is standard in the IBM PC. A user I know recently blasted \$2500 worth of equipment when he set up his turbo board backward in an ITT machine.

Univation, Micro-Way, Kameron Labs, and Seattle Telecomm include cautionary notes in their documentation. But I urge other companies who make these products to ensure that installation instructions are updated to provide this additional critical information.

*John Harnitchek
Lompoc, California*

Big Blue Is Watching

I have owned an IBM PC AT since September 1984. The machine operated flawlessly for about six months, at which point the hard disk totally failed. My dealer quickly diagnosed the problem as the drive itself. He told me he had been waiting for replacement drives from IBM for a number of weeks, but helped me find a warranty service center that had a drive in stock. I am grateful for his good service. I am less grateful to IBM.

I sent IBM a letter carefully documenting the circumstances surrounding the drive's failure and the steps I took to circumvent the problem. I noted that my dealer provided servicing and asked IBM to identify the source of this widely reported AT problem.

IBM didn't respond to my letter, but they did contact my dealer to ask why he was selling IBM equipment. It seems IBM didn't recognize him as an authorized dealer although I explained in my letter that his company was the parent of an authorized IBM dealer. While I understand their concern about possible "gray market" dealers, I'm perturbed that they ignored a request for assistance from an IBM owner and chose to harass a legitimate business.

*Larry Thiel
Littleton, Colorado*

The Deal of the Century

The personal computer industry is caught in a slump because retailers emphasize sales to first-time buyers of brand-new machines.

InfoWorld published a graph showing that the PC market is saturated and that by 1990 over 95 percent of the people in the personal computer target market will already own at least one machine. Computer retailers should take a page from the automobile industry, whose dealers quickly learned to accept trade-ins as a normal part of sales. Some ComputerLand stores are reportedly taking trade-ins. Disk drive manufacturer Core gives credit to AT owners who trade up to hard disks. Trade-ins should be normal practice. Computer companies may well find a resurgence in sales if PC owners can trade in their old machines for new Macintoshes, ATs, Compaq Portable 286s, and Amigas.

(continues)

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Get both — and really get it on. Using Stretch with its RAM disk software and SuperCharger as your calculations accelerator, you'll breeze through even your largest database sorts. And SuperCharger's triple-speed will ripple through your spreadsheets in a blur.

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Excellence in PC Enhancements.

In my experience, computer retailers are slow to innovate, so manufacturers can take the lead by offering rebates for used machines. The industry must open its eyes to the fact that the buying public isn't going to throw away its computers for nothing.

*Roleigh Martin
Edina, Minnesota*

Prehistorics Power Up

I just finished reading Jeremy Joan Hewes' article "Retrofit Your PC" [PCW, October 1985] about the installation of various peripherals

on a "Stone Age" PC. While it is a very desirable thing to endow the ordinary PC with the attributes of its higher priced cousins, as the article states, you must "make sure that everything is compatible before starting."

Although Hewes experienced some compatibility problems between the hard disk and Tall Tree Systems' JRAM board, it is more than likely that Tall Tree could fix the problem by altering the CONFIG.SYS file. It's not clear in the article whether or not Tall Tree provided technical assistance. In light of this, the evaluation of the JRAM board is somewhat misleading and may prompt the discriminating hard disk buyer

not to purchase a JRAM board based on an unwarranted fear of incompatibility.

You also refer to the JRAM as a "512K memory board from Tall Tree Systems." Tall Tree discontinued this product about two and a half years ago. The JRAM-2 holds 2MB, as do all our multi-function boards; the JRAM-3 does everything the JRAM-2 does and additionally supports the Lotus/Intel/Microsoft spec.

*Troy Stone
Technical Support
Tall Tree Systems
Palo Alto, California*

(continues)

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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.

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It's even easy to upgrade to new 1-2-3.

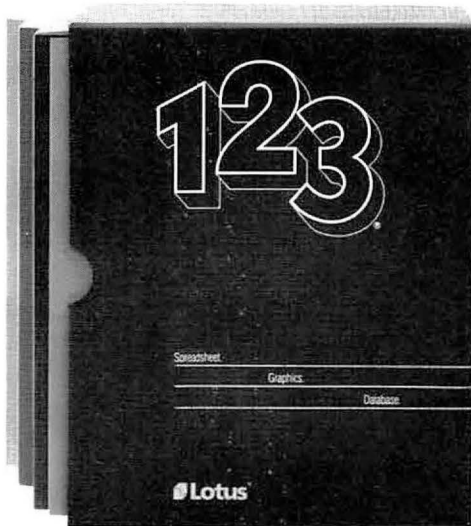
If you're a registered 1-2-3 user and want to upgrade to new 1-2-3, you'll find all the details in a mailing from Lotus. If you haven't registered yet, complete and send in your Warranty Registration Card or call 1-800-TRADEUP* so we can send you the mailing.

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.

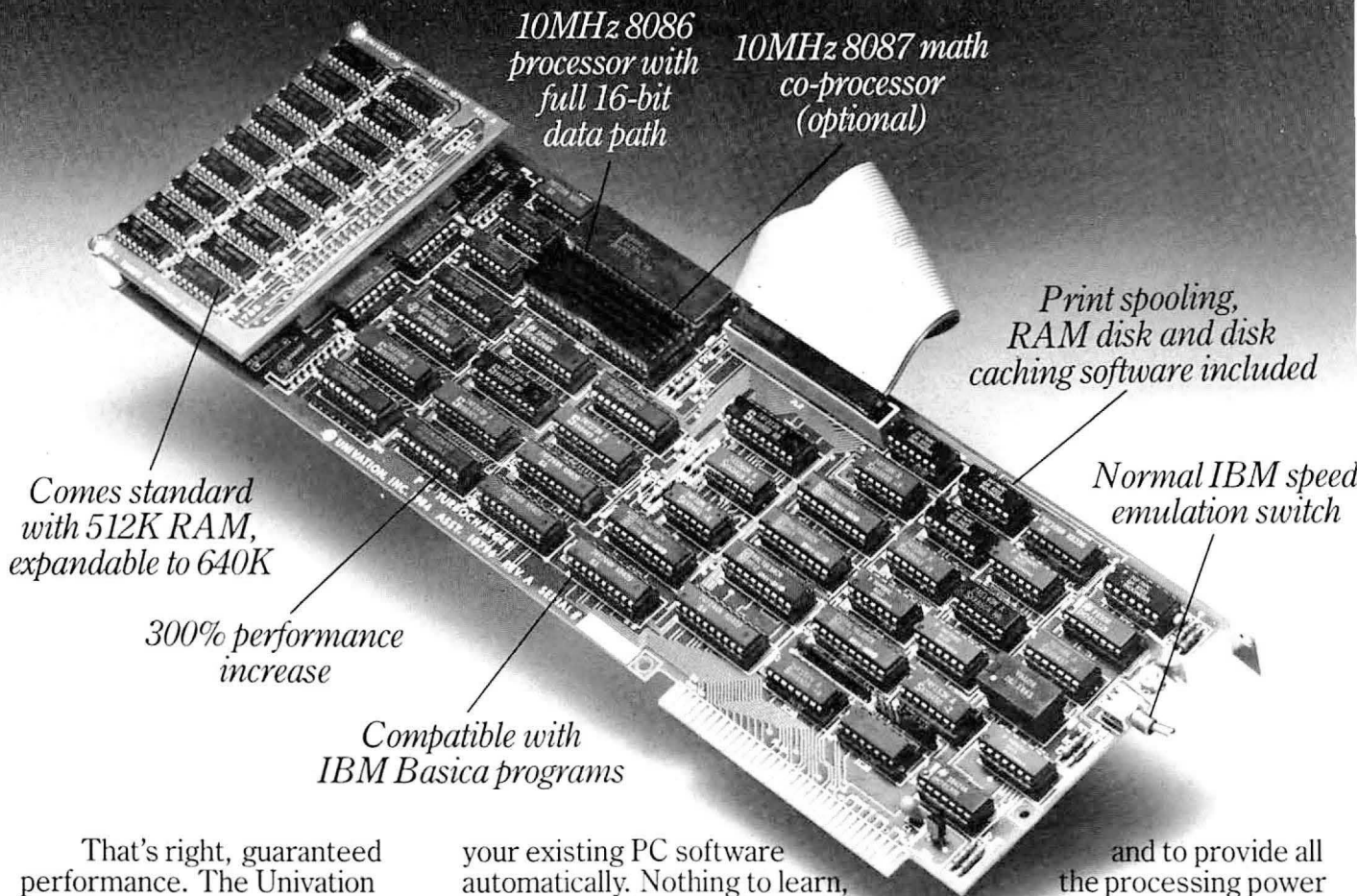
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29. KIMBLE	12215	Married	235	C	24.620	18 Apr 62	18 Apr 62
30. KIMBLE	12215	Married	235	C	24.620	18 Apr 62	18 Apr 62
31. KIMBLE	12215	Married	235	C	24.620	18 Apr 62	18 Apr 62
32. KIMBLE	12215	Married	235	C	24.620	18 Apr 62	18 Apr 62
33. KIMBLE	12215	Married	235	C	24.620	18 Apr 62	18 Apr 62
34. KIMBLE	12215	Married	235	C	24.620	18 Apr 62	18 Apr 62
35. KIMBLE	12215	Married	235	C	24.620	18 Apr 62	18 Apr 62
36. KIMBLE	12215	Married	235	C	24.620	18 Apr 62	18 Apr 62
37. KIMBLE	12215	Married	235	C	24.620	18 Apr 62	18 Apr 62
38. KIMBLE	12215	Married	235	C	24.620	18 Apr 62	18 Apr 62
39. KIMBLE	12215	Married	235	C	24.620	18 Apr 62	18 Apr 62
40. KIMBLE	12215	Married	235	C	24.620	18 Apr 62	18 Apr 62
41. KIMBLE	12215	Married	235	C	24.620	18 Apr 62	18 Apr 62
42. KIMBLE	12215	Married	235	C	24.620	18 Apr 62	18 Apr 62
43. KIMBLE	12215	Married	235	C	24.620	18 Apr 62	18 Apr 62
44. KIMBLE	12215	Married	235	C	24.620	18 Apr 62	18 Apr 62
45. KIMBLE	12215	Married	235	C	24.620	18 Apr 62	1

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123 Report Writer™
Lotus®

REGIONAL SALES REPORT

Sales Under Quota

Second Quarter

REGION SW

NAME & TITLE	DIST.	SALES \$2	CONTA \$3	SCOUTS
Carole Nelson Corporate Rep	A	\$6,400	\$17,000	518
Keith Smith Corporate Rep	A	\$1,640	\$4,000	418
Sharon Tucker Corporate Rep	A	\$1,290	\$9,550	148
John Decamp Retail Rep	A	\$14,500	\$19,000	978
Diane Johnson Retail Rep	A	\$7,450	\$7,800	998
Ann Lane Retail Rep	A	\$1,010	\$8,950	188
Brian Adler Corporate Rep	B	\$1,380	\$4,000	228
Kathy Jones Corporate Rep	B	\$1,100	\$3,000	268
Khonda Peters Corporate Rep	B	\$7,900	\$8,000	948
John Wiles Corporate Rep				
Mauri Green Retail Rep				

ANNUAL SALARY REVIEW

Route to: District Managers S. Rosen J. Hatfield	Department Finance	Name	Cont
		Tory, Christopher	64
		Lore, Jim	64
		Sergist, Carla	64
		Byrre, Nicholas	64
		Romario, David	64
		Rivers, Brenda	64
		Gabor, Margot	64

Marketing

Misson, Diane	32
Carlson, Onyad	32
Gallman, Jason	32
Bartley, Lily	32
Sandora, George	32
St. James, John	32

Operations

Malone, Fred	40
Washington, Lew	40
Rayson, Brian	40
Van Wyke, Allen	40
Fishman, Laurette	40
Petrone, Constance	40
Barley, Ariel	40

Sales

Lane, Bonnie	72
Shandley, Jennifer	72
Ertelsson, Rachel	72
Welfer, Mitchell	72

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Construction
101 Main Street
Hartford, CT 06101

STATEMENT DATE: 05/20/85
ACCOUNT NUMBER: 21866
INVOICE NO: 1

ACCOUNT NUMBER

www.bsc.com/builder

DATE	ITEMS	QTY	UNIT	PRICE	AMOUNT
05/15/85	Net 50	0.62			\$608.70
05/20/85	Net 50	0.00			\$206.00
04/10/85	Net 50	0.62			\$211.60
04/27/85	Net 50	0.12			\$402.70
05/15/85	Net 50	0.62			\$462.10
05/25/85	Net 50	0.62			\$321.00

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SHIP TO:
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Items: This is a confirmation of your order for hardware & supplies.

ITEM	QUANTITY	UNIT	PRICE
Hardware Components			
ACE Personal Computer System Unit	1		\$253.00
ACE Monochrome Display	1		\$145.00
ACE Graphics Printer	1		\$95.00
ACE Display/Printer Adapter	1		\$35.00
ACE Graphics Printer Cable	1		\$5.00
ACE Disk Operating System	1		\$60.00
Surface Mounting System	1		\$700.00
System Supplies			
ACE Diskettes (Set of 10)	1		\$5.00
Continuous Paper (Set of 3500)	1		\$40.00
Total Cost			\$4428.00

* 1-2-3 Report Writer reads files created by 1-2-3 Release 1A and Release 2, and Symphony® release 1.0 and release 1.1. Suggested retail price for 1-2-3 Report Writer is \$150.
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* 1-2-3 Report Writer reads files created by 1-2-3 Release 1A and Release 2, and Symphony® release 1.0 and release 1.1. Suggested retail price for 1-2-3 Report Writer is \$150.
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Circle 299 on reader service card

After speaking with Troy Stone, I learned I could indeed have solved the incompatibility problem between the JRAM-2 driver and the software for the hard disk I installed later. By not talking with the technical people at Tall Tree before I had my dealer swap memory boards for me, I learned two valuable lessons: that I should try harder to find a solution before giving up, and that Tall Tree is both willing and able to help users make its products operate compatibly with all varieties of hardware and software. —Jeremy Joan Hewes.

A Word About WordPerfect

We appreciate Terry Datz's suggestions in "Present WordPerfect" [PCW, October 1985]. The article states, however, that "if you save your document before printing it, WordPerfect... can print in the background while you edit another document." While this statement is accurate, it might give some readers the impression that simultaneous editing and printing cannot occur with a document that has not been saved to disk.

When a document is sent to the printer from the editing mode,

WordPerfect makes a temporary copy of the document on disk. This is used during printing and is deleted after printing is completed. You can continue editing the original document on screen or work on another document.

W. E. Pete Peterson
Executive Vice President
SSI Software
Orem, Utah

Software Anyone?

Darcy DiNucci's article "Copying Software: Who's Right?" [PCW, September 1985] was an informative treatise on copy protection.

(continues)

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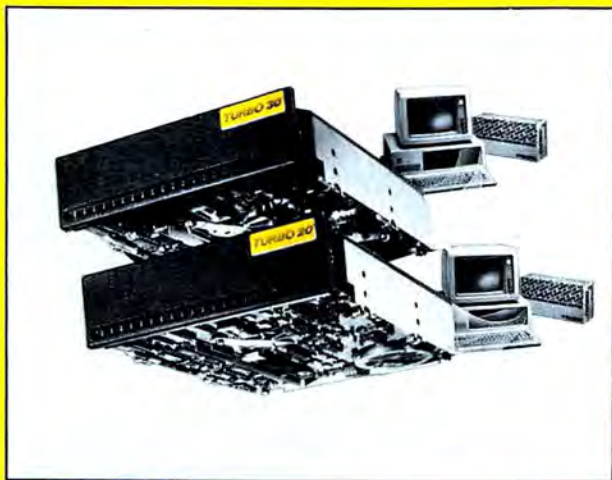
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PC WORLD, Aug. 1985, Vol. 3, No. 8

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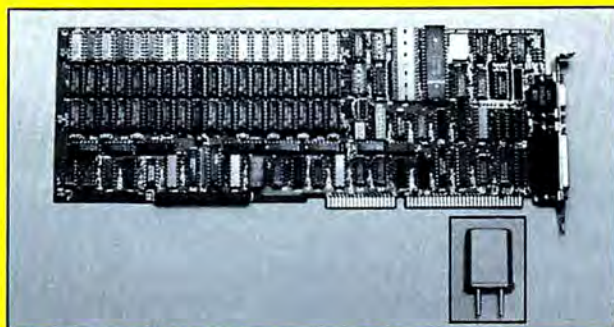


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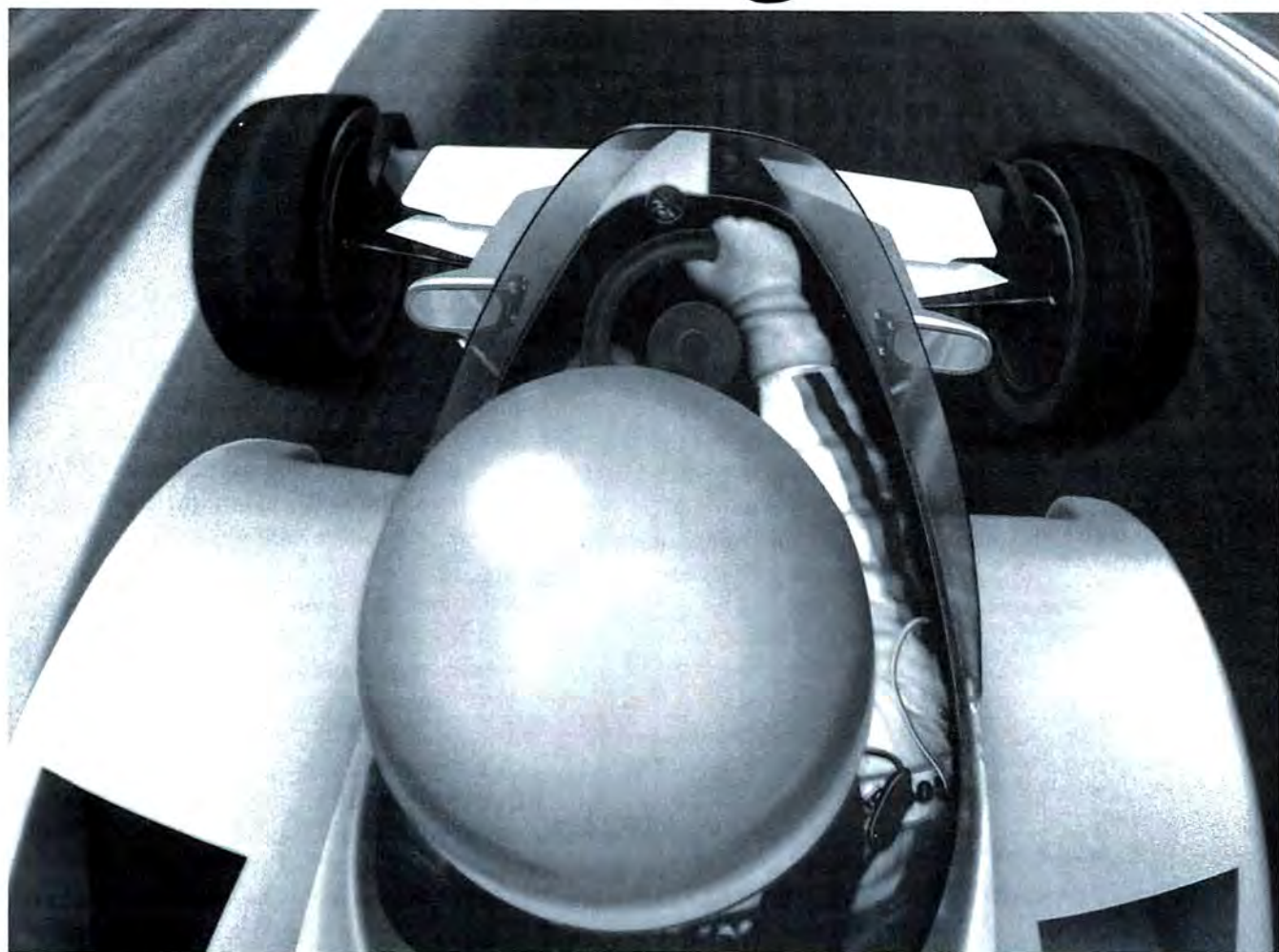
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I'm impressed that there are still some honest people in the PC community.

It was interesting to find that a significant number of people actually buy software after trying out pirated copies. I work for a large retail sporting goods chain in the United States, and here's how we approach a similar problem.

Many people buy tennis rackets on the advice of friends or outside sources, like magazines, without any real idea how the racket actually handles. These people are easy prey for a great salesperson's pitch. Our company has a special buying agreement with racket manufacturers that allows us to

lend potential customers a demo racket for a nominal rental fee and a refundable deposit equivalent to half the product's worth. In the retail business everything is marked up 50 to 100 percent, so if someone steals a racket, we've covered our costs.

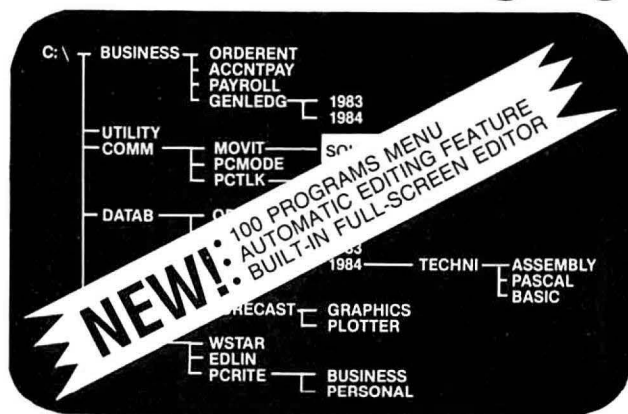
I think software giants like Ashton-Tate, Microsoft, and others can afford to try a similar approach. If they're worried about these demos being copied, Kristin Anundsen's sidebar "How You Gonna Stop Me?" [same article] describes existing preventive measures. Software companies do get

ripped off and deserve a break, but so does the consumer. After all, without us they wouldn't be in business.

Brian K. Miller
Maryville, Tennessee

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

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—Alan Hoenig, *PC World*, 8/85.

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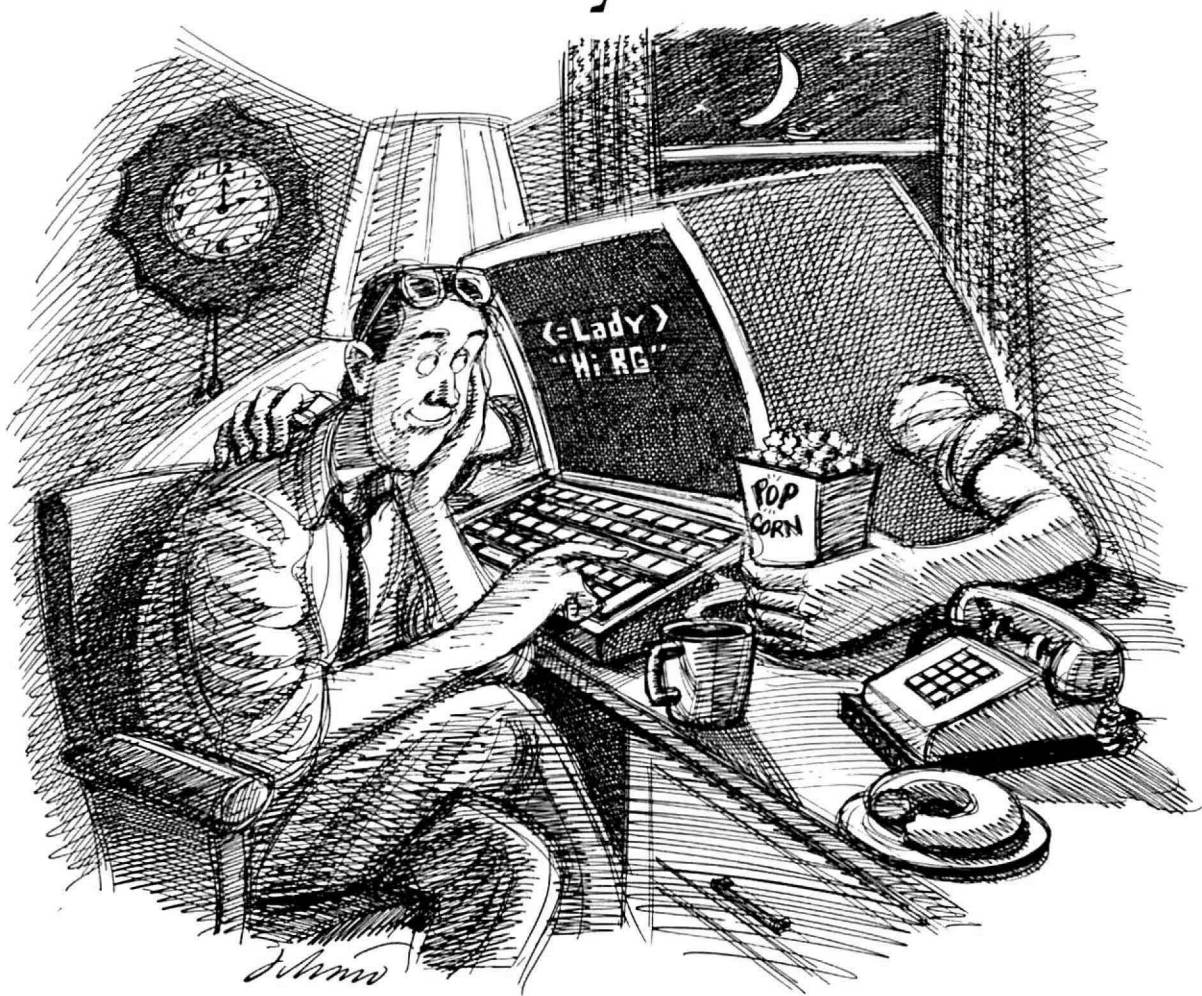
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Very observant, Watson. These cunningly designed baffles are the secret of its precise, smooth operation.

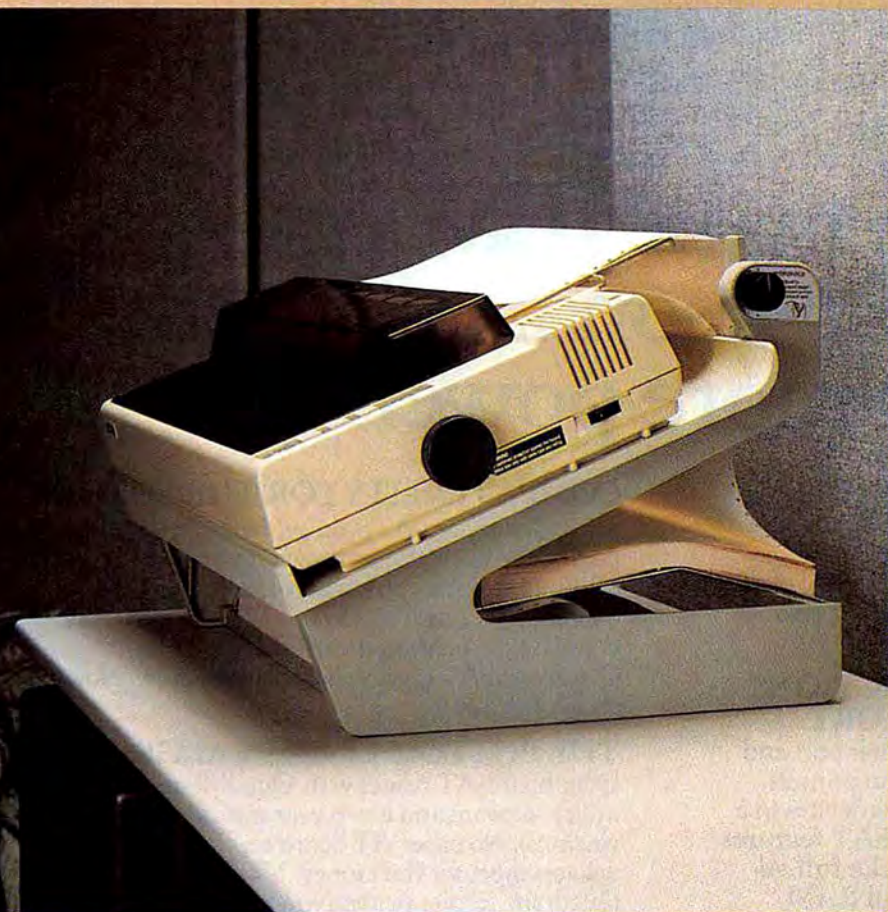
A smooth operator?

Even with its back to the wall, Watson!

Are we tracking the footprints of a smooth operator? Holmes, I haven't a clue...

It's no secret, Watson—all other printer stands are now obsolete. Meet the MicroFold!

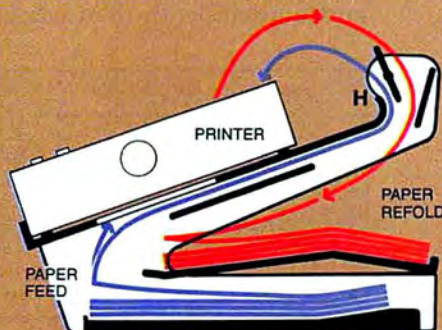
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PC WORLD

Solid-State Software

Corporate computing on pint-size personal computers is a sure sign that ROMs are popping in all over.

They're smaller, faster, tighter, safer, virtually uncopyable, and now, affordable. They're programs on a chip, and they're enjoying something of a renaissance; these venerable stalwarts of the video game era are back in a big way, this time for business applications. They're also managing to boost the power—and sales—of laptop computers.

ROM (read-only memory) chips, also known as firmware,

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

—Ken Greenberg



View

News and notes for the computing community

have been around awhile. The PC, of course, carries BASIC and its BIOS in ROM; other machines also bury some system software in silicon. Firmware essentially consists of programs in a frozen state; the computer can look at, but not touch, ROM.

ROM software has obvious appeal. It provides near-full functionality to laptop machines that lack disk drives and offers additional flexibility to more complete portables. Consider the advantages: Because code is already in memory, no time is spent reading the program from disk to RAM—software is instantly accessible. What's more, programs don't soak up valuable (and often very limited) RAM.

Alan Lefkof, marketing vice president for Grid Systems, puts it this way: "The kind of demand that we're seeing for firmware in portables resembles that for hard disks in desktop systems."

Until recently, the costs of "burning in" and distributing software on a chip, combined with the volatility of most software on the market, limited firmware's appeal. Software upgrades, indeed, remain a thorny matter.

Even so, ROM software is carving a literal niche in new hardware. The GridCase line of laptops includes four sockets for ROM packs—up to a heady 512K. Grid is distributing most of the

hits—*1-2-3*, *Symphony*, *Microsoft Word*, *Microsoft Chart*, *dBASE III*, and *Framework*—and for a fee, will commit a buyer's favorite vertical applications to ROM as well.

Hewlett-Packard's Portable Plus packs a wallop of ROM in its back pocket. The Plus contains two 12-socket drawers that can hold either ROM chips or extra RAM. Eschewing extra RAM, the Portable Plus has the capacity to pack 24 ROM-based programs—enough customization potential to satisfy even the most demanding user.

Two new diskless laptops—Tandy's Model 600 and Heath/Zenith's Z-150—come equipped with a pair of snap-in ROM cartridges containing all 224K of *Microsoft Works*, an abridged version of that company's basic software library. *Works* consists of a system shell, BASIC, *Multiplan*, a svelte *Word*, a file manager, a calendar, and a telecommunications program.

Traveling Software, a Seattle firm that specializes in developing laptop applications, recently introduced *The Ultimate ROM II*, which combines six programs on a single chip—Traveling Software's *Idea!*, a *ThinkTank*-compatible outline processor; *T-base* relational data manager; *T-Word* text processor; and a three-program set called *ROM-View 80*. The set

includes *Text-80*, a word processor; *Telecom-80*, a communications package; and *BASIC-80*, a BASIC interpreter—all of which display characters across a full 80 columns rather than the usual 40. ROMs are available for Tandy's Models 100 and 200 and NEC's PC-8201.

Programs in *The Ultimate ROM II* use system and application code already built into the Model 100's 32K of ROM. By not including those routines in its package, Traveling Software was able to cram three full-function programs into one 32K ROM. "In essence," says Traveling Software's Mark Eppley, "*The Ultimate ROM II* is a 64K application."

Firmware's biggest fans are corporate users interested in getting computing power into the field quickly and effortlessly. According to Grid's Lefkof, "ROM software is most successful for those building friendly, custom applications. And companies like to control software distribution."

Chrysler Corporation, proud owner of 600 GridCases, is providing district sales and service managers with firmware versions of DOS, *SuperCalc 3*, *MultiMate*, and a communications package. To disseminate custom programs, the automaker is even burning in its own ROMs.

Lee Iacocca apparently knows good things come in very small packages. —Clifford Guren

Between a Rock and a Fruity Place

*In which we ask:
When is a GEM a
mineral and when is
it like a fruit?*

Another riddle of the Sphinx? Thankfully not—but the query does highlight a murky but critical legal quandary concerning whether what you see on your screen has a legal life of its own. The answer thus far suggests only that litigation may now be the sincerest response to imitation.

Digital Research Incorporated (DRI) and Apple Computer crossed swords recently over

DRI's Graphic Environment Manager (GEM) series, which looks something like the interface for the Macintosh. Apple, claiming that DRI had infringed on its Mac copyrights, threatened the smaller, more vulnerable software house with a potentially costly lawsuit. DRI opted for an out-of-court settlement that found it coughing up a bit of cash and agreeing to make minor alterations to its GEM display.

Apple specifically questioned DRI's use of the desktop metaphor, certain icons and their locations, and some typefaces. Independently, these concepts are freely usable by others. But Apple claimed that their specific combination and screen layout constituted an expression that was its own.

(There's some irony in the outcome: DRI, which used the same third-party design team as Apple, reportedly took steps to reject icons deemed too Mac-like. And the Mac itself was scarcely conceived immaculately in Cupertino; Apple "borrowed," rather than licensed, many of the machine's distinguishing features from Xerox.)

Apple's claim turned on two basic questions under federal copyright law: Can a program screen be copyrighted? If so, does using a "substantially similar" but not identical screen constitute copyright infringement? Not in dispute was the fact that GEM and the Mac interface are written in decisively different code.

Because it never got to court, the Apple/DRI showdown provided no clear answer to either question, or to whether other hardware companies and software developers can assert rights to interface formats and designs. Lacking a precedent with the force of law, each new case turns on the specific facts of the situation, as applied under established but nebulous legal doctrines.

The fundamental premise of copyright protection is that the law protects only "expressions," not "ideas." A spreadsheet program is protected, but copyright does not extend to its underlying algorithms. That rule, in turn, is an extension of Atari's successful crackdown on *PacMan*'s "visual competitors." The game maker established that a story can be protected, but that its theme (the chase) and its character (the *Pac-Man*) cannot be. When does an idea become an expression? According to the courts, only when it's the subject of sufficient elaboration.

Even in the presence of an expression, however, protection will be denied if there is only one way to express the idea. Consequently, the use of a desktop with icons denoting choices, or of a screen with certain types of user options at the top, may not necessarily be protected ideas or protected expressions. The legal hang-up



remains the definition of "substantially similar."

Some legal analysts believe that similarity in the total "look and feel" of a work is sufficient, as Apple claims in its suit over GEM. Under this theory, GEM infringes because its entire assemblage is too much like the Macintosh's copyrighted display. The contrasting view argues in effect that what you see isn't the same as what you get. It maintains that the display is simply the functional result of the underlying copyrighted program. When the display is separately registered as an audiovisual work (as with the Macintosh), this argument carries less weight because the display itself is the protected entity.

This inconclusive denouement notwithstanding, the case looms as something more than another skirmish in the legal wars over software copyrights. As users hanker for standardization, application software is beginning to attain a certain cherished familiarity—which now just might be at risk, particularly if heavy-weight companies choose to lean on more vulnerable players. Consider: *VP-Planner* looks like *1-2-3*, whose metaphor is shared by *Paradox* and the *Enable* spreadsheet; *Q&A*, meanwhile, has a certain resemblance to *pfs:file*—but then, *Microsoft Windows* and *PC Paintbrush* could be mistaken for GEM...

Not surprisingly, *PC Paintbrush* publisher IMSI—apparently interpreting the icons on the wall—

recently withdrew its support for the product in favor of *Dr. Halo II*, a less Mac-like package.

For the time being, most developers are likely to avoid the issue by trying to remain compatible with and functionally similar to target programs without looking too much like them. Indeed, the changes in GEM that Apple "won" may ultimately be more of style than of substance to the operation of the program—or to users. —Marc D. Guren



The Feds Are Coming

While Fortune 500 firms are stocking up on PCs by the hundreds, Uncle Sam has begun acquiring personal computers by the thousands. One published report quotes a General Services Administration official as predicting a PC or terminal on every civil servant's desk by 1990—an astonishing idea, given the sprawl of the bureaucracy.

The Defense Department (DOD) has of course had a particularly gargantuan appetite for PCs. Just to ensure that next month's headlines don't scream about \$679 (blank) floppy disks or \$13,652 half-card modems, a software company in Reston,

Virginia, has concocted a program that ought to please defense contractors beset with budget overruns and bad press.

MIRRoR (*Material Inspection Receiving Report Preparer*), from the Federal Contractor Systems & Software Group, is billed as the first PC-based package designed to prepare DD Form 250. The form, which rides along with all deliveries under DOD contract, is the bread-and-butter paperwork for Pentagon suppliers. This is one very classy program: *MIRRoR* automatically generates reminder letters urging the DOD to sign and promptly return Form 250 (and presumably pay up).

You don't suppose the IRS knows about this, do you?

For Your Craze Only

Even in the information age, when the extraordinary has a habit of turning up in your in-box in the most unassuming guise, there are still those occasional advertising claims that grab you by the collar and send you lunging for the phone.

The latest bit of hyperbole comes from Grebar, a small Canadian software house, which maintains that *For Your Eyes Only*, its data encryption package for the PC, could withstand 4 billion years of code-breaking efforts without cracking under the stress and revealing your data.

What's more, according to the firm's promotional flier, it would take 4 billion years for 1000 Cray-1s, all working in collusion and generating a mind-numbing 60 trillion code combinations a second, to unscramble your encoded files.

Incredible, I thought, agog at the googols, starry-eyed at how many powers of ten were dancing across Grebar's flier: 1000 Cray-1s! The National Security Agency (NSA) has only 2. To learn a little more about this cryptographic wonder, I called Barry McClure of Grebar, author of the program and architect of the scheme. McClure confirmed the claim, then rattled off the mathematical gymnastics by which he arrived at these awesome figures.



What, I probed, makes *For Your Eyes Only* strong enough to thwart the Pentagon? At that query, McClure suddenly hushed up. "Trade secret," he proclaimed. Well, I reasoned, cryptographers are by nature a reticent lot. But my interest was piqued.

Calls to other cryptographers elicited responses that varied from a skeptical "uh-huh" to an outright guffaw. "People have been making claims like Grebar's since the days of Charles Babbage," said cryptographer Cipher Deavours of Kean College in Union, New Jersey, and scion of an NSA code-cracker. "McClure's refusal to release details of the code shows that he fears somebody will find a flaw in it."

The customary *modus operandi* in cryptography, according to Deavours, Israeli cryptographer Adi Shamir, and others, is to publish your secret code in scientific journals, then wait as the rest of the cryptographic community tries to prove mathematically that

it's a piece of junk. Most codes are effectively cast into oblivion via this procedure. "Grebar is not playing by the rules of the game," concluded Deavours.

One other problem remained. Seems that McClure has based his Cray-1 extrapolations on the slowest of all code-cracking techniques—a scheme that would, according to one cryptographer, reduce the *New York Times* crossword puzzle to insolubility by a like number of Cray-1s over a similarly galactic stretch of time. McClure denies that any other method would work with his cipher, but other cryptographers are dubious. They point out that codes are seldom broken by large-scale brute force alone but instead by a blend of computer time, chance, and human intuition.

McClure isn't surprised at the incredulity that greeted his handiwork, explaining that he's loath to publish for competitive reasons

and that his aversion to public scrutiny has nothing to do with the product's lack of security. He even offered to submit a copy of the algorithm to a *PC World*-designated cryptographer for review; as it happens, the magazine's Cray is in the shop. Anyway, he sounded sincere enough.

But so long as fate and the human element play a role, the true question is what, if any, real-life relevance one should ascribe to a mathematical estimate of a code's resistance to computer cracking. Meanwhile, *For Your Eyes Only* continues to rack up sales in the thousands. —Judy Getts

No Time to R.I.P.

Columbia Data Systems is but a memory, but the former management team of the defunct PC compatible manufacturer hasn't given up the ghost. Robert Cross, onetime Columbia president, now heads an outfit called Chesapeake Data Systems. Chesapeake is based in (you guessed it) Columbia, Maryland, and began shipping modular, Korean-made XT and AT compatibles a short while back. In a press release extolling its new product line, the firm made nary a mention of Columbia's existence—or its demise. And the body was still warm...

Follow That Story!

Unshrouding Turin's High-Tech
Second in a continuing series of updates of previously published PCW articles. See "Europe: Accent on Competition," October 1985.

What has half of all the high-powered lasers in the European Common Market, employs two-thirds of all the robots in Italy, and is shaped like a triangle? The answer is Tecnocity, the area in northwest Italy where the cities of Turin, Ivrea, and Novara define the three points of the triangle.

If you think of Italy and see only towers in Pisa and piles of pasta, think again. Tecnocity is a vivacious high technology area, the seat of European industrial giants Fiat and Olivetti (whose respective financial statements quickly show that they're hardly limited to producing cars and typewriters). These industrial titans, along with many smaller but important companies, form a geographic concentration of most of the major players in Italy's high technology industries.

Tecnocity's characteristics put the Italian triangle on a par with Silicon Valley and Boston's Route 128. Tecnocity boasts a sizable population with a large work force, numerous research centers, high-quality academic institutions, proximity to financial resources and systems of transport, the local government's predisposition to collaborate, and attractive amenities including quick access to the Alps, the French and Italian

Rivieras, and major cultural centers such as Paris, Venice, and Rome.

What may surprise those familiar with the characteristic individualism and chaotic organization attributed to and largely unadmitted by the Italians is the cooperation and skillful planning among the players. Such coalescence appears to be leading Tecnocity on an unwavering path toward competitive success in supplying world markets. The Tecnocity Association for Technological Progress, a consortium of area businesses, has devised an ambitious plan called the Tecnocity Project that it hopes will

(continues)



Follow That Story! (continued)

guide development in the coming decade.

The Tecnocity Project Plan sketches out four basic vehicles to guide research: the Agency for Technology Property, offering management expertise for new ventures; the Society of Technology Brokers, finding and disbursing research financing; Telescience Park, coordinating disparate research endeavors via a

vast data base; and Teleport, supplying state-of-the-art telecommunications.

While the Tecnocity Project plan is still only a concept, the stature and determination of the parties involved augurs swift implementation of the proposal. If the Italians are successful, the West may feel the effects of a new Italian Renaissance—this time in the fine art of high technology.

—Janette Martin

Dressing for Excess

For all those middle managers struggling through life with neckties that lack pizzazz, chartreuse shoes for that battleship gray double-breasted suit with the Nehru collar, and Nikes when the situation demands lace-up wing tips, help is at hand. The PC has gone GQ.

For the better part of two years, a PC dedicated to carefully considered pronouncements on men's fashion has been making the rounds of the nation's major department stores. The *Sense of Style Profile* package is the brainchild of Remy Martin, the cognac company, and travels with a national men's fashion promotion sponsored by *Gentlemen's Quarterly* magazine. It provides personalized advice on what to wear and when to don specific duds.

The 60-second fashion analysis begins with a touch-screen-activated self-appraisal (encompassing body type, life-style, fashion taste, and so on). Depending on your type, it might suggest something like, "Temper your adventurous impulses with subtlety to avoid adding extra bulk to your body."

The program is revised annually to reflect current fashion trends. GQ editor Tim Hawkins supplies the data, and Allen Spence, a systems consultant specializing in Fortune 500 companies, does the BASIC programming.

Although clothes horses and thrift shop habitués alike queue up to play with the computer, they're usually interested in more than whether to wear stripes, checks, or plaids. The machine itself, it seems, has become the very essence of chic. —Dorothy Kelly

Grapevine

Don't Call Us, We'll Call You

We're not ones to put much stock in tea leaves or to play LPs backward in quest of definitive recipes for cheese soufflé. Still, is it pure chance that Microsoft's sales and customer service number is 800/426-9400? Nothing odd there, you say? Look again; the prefix digits spell out "IBM" on your telephone dial. Microsoft has long had a thing about phones: Its headquarters number, after all, ends in "8080" (the name of a venerable Intel CPU, the granddaddy of the PC's 8088). Microsoft has IBM's number—and apparently, vice-versa.

Clifford Guren is a freelance technical writer based in San Francisco; Judy Getts writes on communications issues from Wisconsin; Marc D. Guren is a Los Angeles-based attorney; Janette Martin is a contributing editor to PC World; Dorothy Kelly is a freelancer based in Marin County, California. ●



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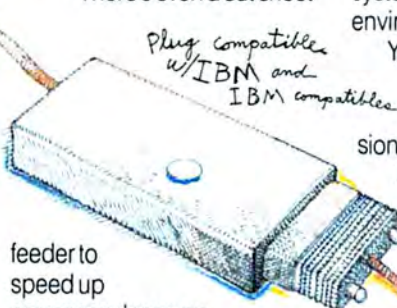
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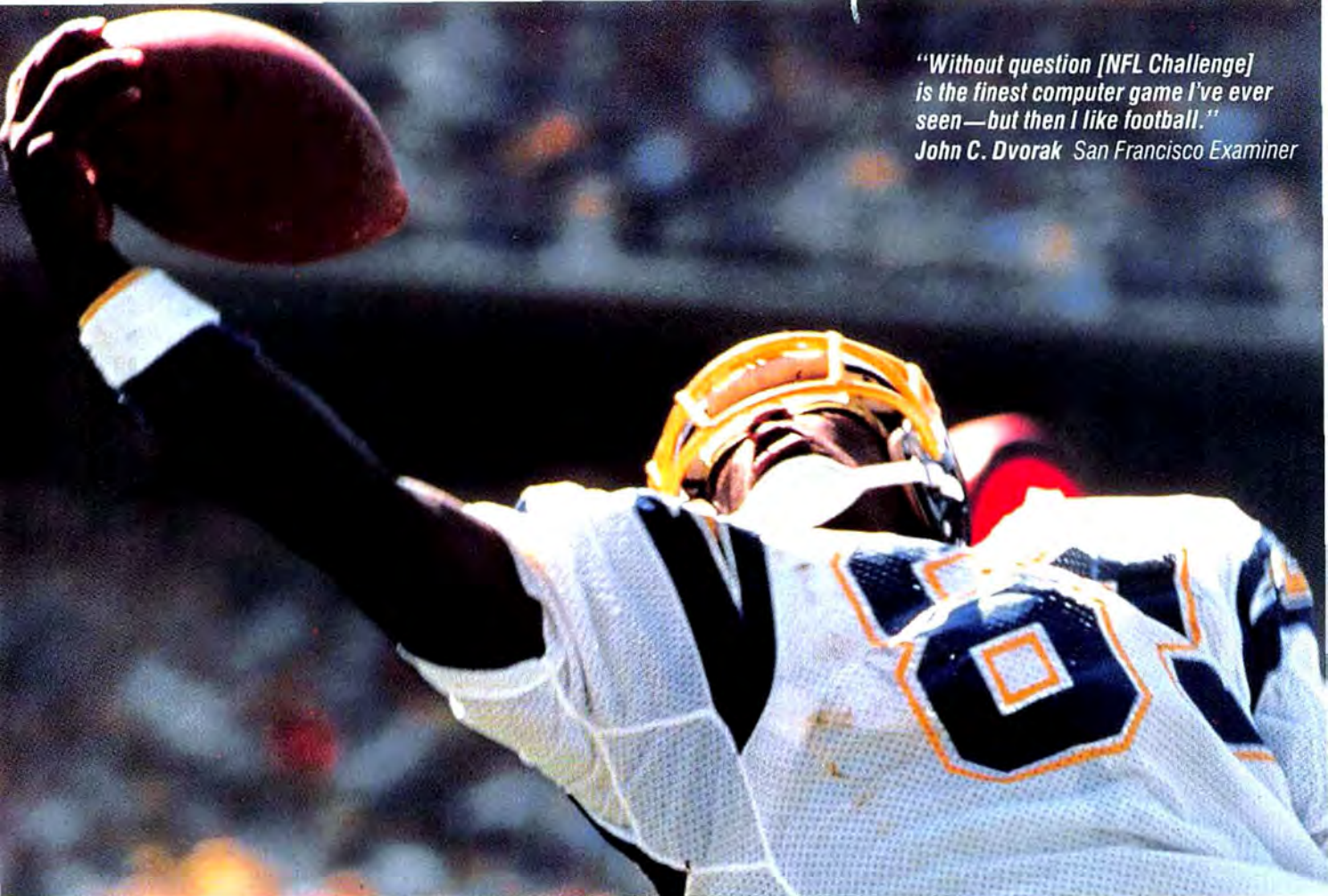
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Circle 764 on reader service card

The Help Screen

PC World offers answers and advice at every level

This month: The reason and the remedy for the squiggly lines that disrupt graphics printouts, printing the PC's extended character set, removing hidden files, and a DOS command to display BSAVED files without BASIC

Karl Koessel

Recurring Intruder

Q. Lately, I've been programming in BASICA on my PC AT. Attempts to use the Epson FX-100 printer's "bit image mode" to print graphics have failed. A small, twisted line appears at regular intervals within an image.

Upon investigation, I learned that the tiny squiggles are the result of the carriage return and line feed codes (ASCII 13 and 10) that BASIC sends to the printer after every 80 characters. [In bit image mode, a "character" is a vertical pattern one dot wide and up to eight dots high.] Although these printer control codes are necessary to print text properly in text mode, they are interpreted as graphics data when the printer is in bit image mode.

As you can see by the sample printout of a horizontal line [see Figure 1], these carriage return/line feed codes wreak havoc on printed graphics. How do I rid my printouts of them?

Jan Kortleven
Hasselt, Belgium

A. You may already be using the BASIC statements WIDTH "LPT1:", 80 and WIDTH "LPT1:", 132, thereby switching your printer's line width to accommodate 80- and 132-column paper. You can use any number from 0 to 254 to specify the number of characters on a line; BASIC will insert a carriage return/line feed sequence after the requisite number of characters has been sent to the printer. But using a value of 255 disables line folding (inserting the carriage return/line feed sequence). Before you send bit image mode data to the printer, add the statement WIDTH "LPT1:", 255 and remember to re-set the printer's line width before printing in text mode.

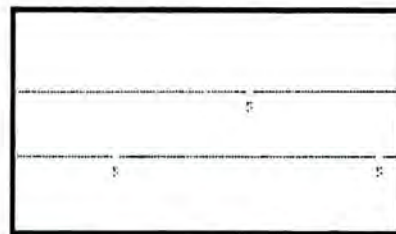


Figure 1: This horizontal line has been interrupted after each 80 dots by the insertion of a carriage return/linefeed that the printer interpreted as graphics data.

Printing the PC's Extended Character Set

Q. I appreciated the November 1985 Help Screen tip explaining that GRAPHICS.COM must be run from DOS before <Shift>-<PrtSc> can print subsequent graphics screens. Your advice did not, however, solve the problem of printing graphics characters, such as || and ¶, from the PC's extended character set.

These characters are commonly used as borders around text. But when I try to use <Shift>-<PrtSc> to dump a screen containing such characters, my Epson FX-80 prints italic capital letters in place of the graphics characters. I assumed that if the screen image was created in graphics mode instead of text mode, I could dump the graphics screen to my printer. Unfortunately (and much to my surprise), it seems that the PC does not support the extended character set in graphics mode.

What can I do to print screens that contain graphics characters from the PC's extended character set?

Susan Walker
Menlo Park, California

(continues)

DISPLAY ACCOUNTS & ATTRIBUTES

Choice Key & Category Name	Nickname	Reser voir	Dis burse ment
[A] Assets			
[C] Cash			
[P] Pocket Money	Pocket Money	Reser	Disbur
[C] Checking Account	Checking Account	Reser	Disbur
[M] Money Market Account	Money Market Acc	Reser	
[R] Receivables			
[L] Loan to Sarah	Loan to Sarah		
[C] Cable TV Deposit	Cable TV Deposit		
[M] Mortgage Escrow Account	Mortgage Escrow		
[L] Life Insurance Cash Value	Life Ins Value		
[I] IRA	IRA		
[A] Annuities Cash Value	Annuities Value		
[S] Securities			
[S] Stocks			
[G] General Motors	General Motors		
[I] IBM	IBM		
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A. One solution is to purchase a printer capable of reproducing the PC's full character set. The IBM Quietwriter, the Diablo 630 IBM ECS, and the Star Micronics SB and SR will do the job, and more such printers are appearing every day. I'm not recommending any specific printer or suggesting that getting another printer is your best solution—it's simply one option.

Another solution is to "teach" the PC to display the PC's extended character set in graphics mode. If you're not inclined to do the necessary programming yourself, you'll need a utility. Consult your local computer or printer store to locate an appropriate program, or consider using GRAFTABL.COM, a utility included with DOS 3.00 and 3.10.

With your newly capable PC, you could then use <Shift>-<PrtSc> to dump a graphics screen that includes graphics characters.

Your printer is also ripe for tutoring; thus a third option is available. Your printer can be "taught" to print new characters for the byte values it receives from the PC. You can "download" the PC's extended character set to the Epson and tell the Epson to use this alternate character set. Try your local computer shop, printer store, or Epson America to help locate an appropriate utility.

If you feel like doing it yourself, read "Character Construction" by J. G. Vaughan (PCW, Vol. 2, No.

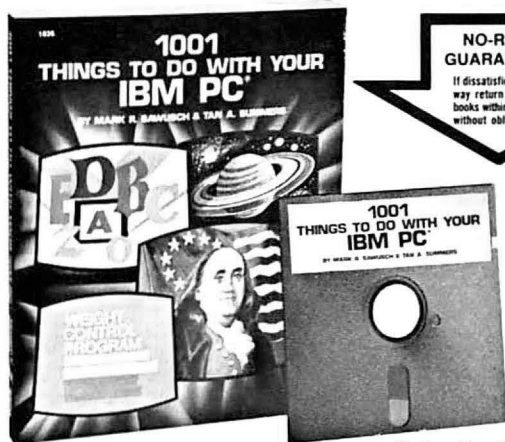
4) to learn how to create characters for and download them to your printer.

Removing Hidden Files

Q. Having heard what an improvement Microsoft Word [version 1.00] is over my old buddy WordStar, I loaded it, tried it, didn't like it, and attempted to erase it from my AT's hard disk. While doing so, I found a subdirectory named MSTOOLS that contains four hidden files, identified as MW.COD, MW.COM, MW.DAT, and MWA.

Because there seems to be no way to erase these hidden files, I can't get rid of the subdirectory. Is

(continues)



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PCW-286

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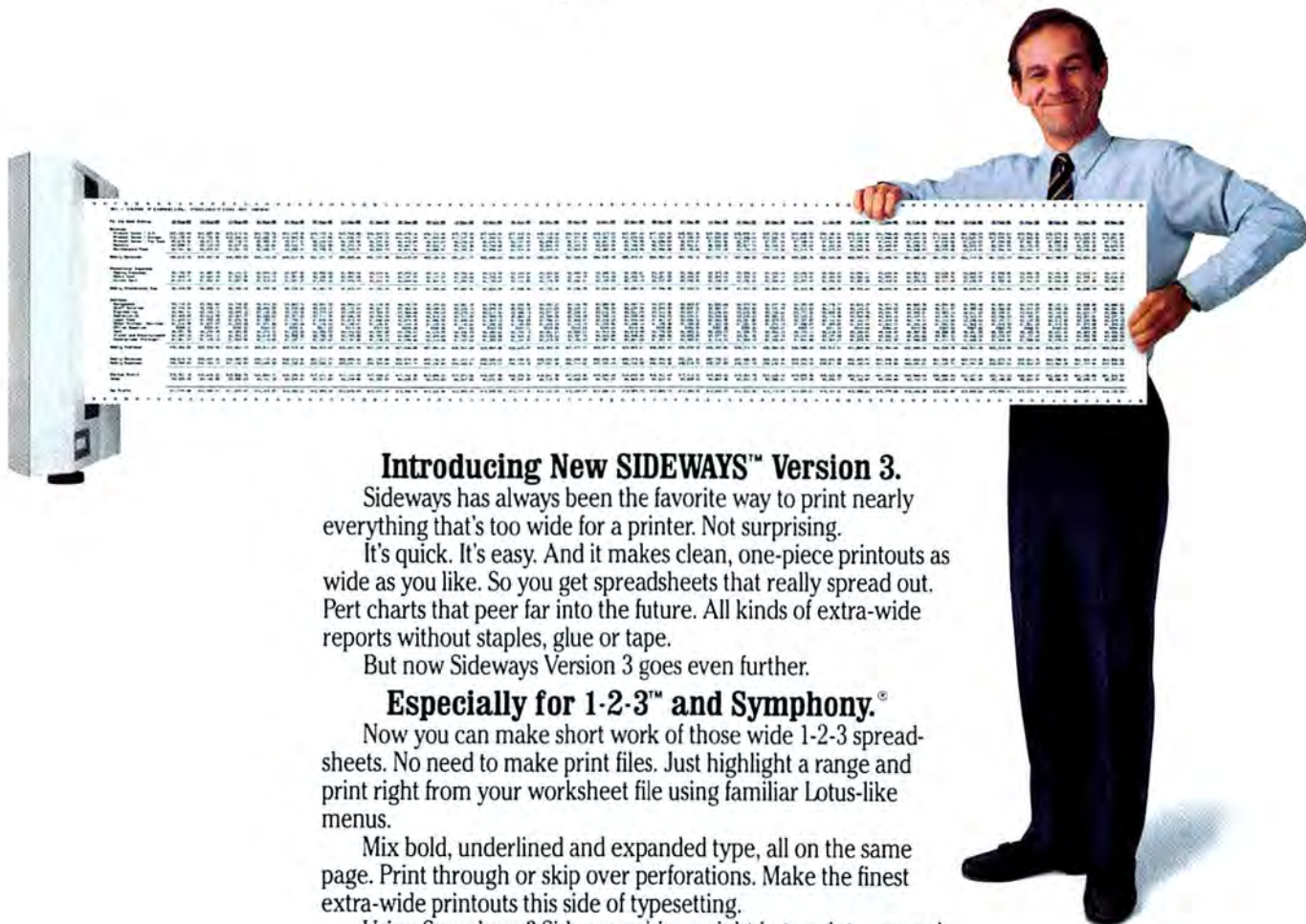
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1020 DATA 2,C3,81,30,FF,30,C0,88,07,BA,82,00,B8,00,3D,C0,21,-1,40
1030 DATA 3,89,C3,B9,07,00,BA,02,01,B8,00,3F,C0,21,8B,0E,07,-1,91
1040 DATA 4,01,8B,16,05,01,A1,03,01,8E,D8,B8,00,3F,C0,21,B8,-1,99
1050 DATA 5,00,3E,C0,21,BA,01,17,B7,00,B4,02,C0,10,C0,20,-1,5D,-1

```

Listing 1: DISPLAY.DAT. Add these lines to the BASIC program X-MAKER.BAS from this issue's *. * column to create DISPLAY.COM.

there a way to eliminate them short of reformatting the hard disk?

Albert Hayes
Yucca Valley, California

A. First flip to this issue's *. * column and the item "CHMOD Revisited," which presents a program capable of reading and changing a file's attribute byte. The value of that byte determines whether a file is hidden.

To remove the MSTOOLS subdirectory, follow the instructions in "CHMOD Revisited" to create CHMOD.COM. Use it to remove the mystery from each of the hidden files in the MSTOOLS subdirectory. Enter the command **CHMOD C:\MSTOOLS\filename /00**

Once the files are no longer hidden, they can be deleted and the MSTOOLS subdirectory removed. I suggest that you copy the files to a floppy disk before removing them from the hard disk. Although you may not like Microsoft Word, your friends might want a crack at it.

Displaying Menu Maker Screens

Q. PCW's November 1985 issue contains an article entitled "Designer Screens," which was excerpted from the book *The Fully Powered PC*. The editor's closing

note mentions that the PC World Utilities Disk (included with the book) contains the BASIC program Menu Maker which "makes creating designer screens even easier" than using EDLIN or the Professional Editor, the methods described in the article. Intending to create menu screens like the ones described, I bought the book.

The discussion of Menu Maker begins where the article ends. It explains that Menu Maker produces "binary screens" via the BASIC command BSAVE. Unlike the straight ASCII text files discussed in "Designer Screens"—which are displayed from DOS using the TYPE command—Menu Maker files must be loaded by the BASIC command BLOAD. Toward this end, a one-line BASIC program, DISPLAY.BAS, is included both in print and on the PC World Utilities Disk.

That program loads the specified menu file onto the screen, moves the cursor up to line 24 (to prevent the screen from scrolling as the program ends), and issues a SYSTEM command to leave BASIC and return to DOS. Unfortunately, my computer uses GW BASIC version 2.01.00, which clears the screen during execution

of the SYSTEM command. Do you know of a patch for that command that will keep the SYSTEM command from clearing the screen?

Marc Tolman
Boston, Massachusetts

A. Instead of patching your GW BASIC's SYSTEM command, try this replacement for DISPLAY.BAS, called DISPLAY.COM. It will work on any PC compatible running DOS 2.00 or a later version. Note, however, that the program does not perform error checking: It won't inform you if it cannot find the specified file and works properly only with BSAVED (Menu Maker) files. It doesn't check for the type of active monitor (graphics or monochrome); it attempts to display the BSAVED file on the type of monitor on which the file was created.

To create DISPLAY.COM, load BASIC, type in the *. * listing X-MAKER.BAS, and enter the lines shown in this column's Listing 1. Check your work, then type **RUN** and press <Enter>. To use DISPLAY.COM, create and save a menu screen with Menu Maker, then type the command

DISPLAY [d:][path]filename.ext where *d:* is the optional drive designator, *path* is the optional path, and *filename.ext* is the name and extension of the menu screen file.

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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Single copy	24.50.
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Software Group	
✓Enable 1.1	call

Software Publishing	
✓PFS:Proof B:00	59.
✓PFS:Report B:01	77.
✓PFS:Access A:00	84.

✓PFS:File B:01	\$84.
✓PFS:Graph B:01	84.
✓PFS:Plan A:01	84.
✓PFS:Write C:00 (w/PFS:Proof)	84.
✓First Success (Combo Pack includes PFS: Write, Proof, Plan, File)	229.

Sorcim/IUS	
✓SuperCalc 3 2.1 (w/Sideways)	199.

Spectrum Holobyte	
✓Art Studio	32.
✓Executive Picture Show	139.

Springboard	
✓Newsroom	35.
✓Clip Art Volume 1 (for Newsroom)	19.

Unison	
✓Art Gallery 1	22.
✓Printmaster 1.1	37.

United Software	
✓Einsteinwriter 7.2 (w/coupon for free Speller)	99.
✓In-House Accountant 2.05	109.
✓ASCII Pro 4.23	69.

Xanaro	
✓Ability 1.0A	call

TRAINING

ATI	
SKILL BUILDER PROGRAMS	

Intro and How To Use:			
Word Processing	MS-DOS		
Business Software	PC-DOS		
Data Bases	Typing Tutor		
Compaq	BASIC		
IBM-PC		each	38.

TRAINING POWER PROGRAMS	
How to Use:	

dBase II	dBaseIII	Lotus 1-2-3
MS Word	Supercalc 3	Multimate
Multiplan	Wordstar	Framework
Wordperfect	Symphony	Displaywrite 3
		each
		49.

Friendlysoft	
--------------	--

✓PC Intro Set	35.
---------------	-----

INDIVIDUAL SOFTWARE	
---------------------	--

✓The Instructor II	35.
✓Professor DOS	47.
✓Tutorial Set (both items above)	75.
✓Professor Pixel	47.
✓Typing Instructor	39.

✓Training for Lotus 1-2-3	\$49.
✓Training for dBase III	49.
✓Training for Project Management	49.

Scarborough Systems	
MasterType	26.

Simon & Schuster	
✓Typing Tutor III	33.

EDUCATIONAL

Barron's	
Computer SAT	59.

Designware	
Spellicopter (ages 6 to adult)	25.
Mission Algebra (ages 13 to adult)	27.
European Nations (ages 9 to adult)	27.
Grammar Examiner (ages 9 to adult)	27.
States and Traits (ages 9 to adult)	27.

Digital Research	
Diagnostic Test (PSAT)	14.
OwlCat SAT (15 hours)	63.
OwlCat SAT (60 hours)	169.

Eduware	
Algebra 1	22.
Algebra 2	22.
Algebra 3	22.

Harcourt Brace Jovanovich	
✓Computer SAT	49.
✓Computer GRE	57.

Scarborough Systems	
✓Build-a-Book (ages 2 to 12)	19.

Simon & Schuster	
Lovejoy's SAT	39.

Spinnaker	
All Spinnaker products now work with DOS 2.x and 3.x.	

Educational Games for Young Computer Users. (All require graphics board)	
✓Face Maker (ages 3 to 8)	18.
✓Kids on Keys (ages 3 to 9)	18.
✓Fraction Fever (ages 7 to adult)	18.
✓Kinder Comp (ages 3 to 8)	18.
✓Alphabet Zoo (ages 3 to 8)	20.
✓Kidwriter (ages 6 to 10)	20.
✓Trains (ages 3 to 8)	20.
✓Snooper Troops I (ages 10 to adult)	23.
✓Snooper Troops II (ages 10 to adult)	23.
✓In Search of the Most Amazing Thing (ages 10 to adult)	23.
✓Delta Drawing (ages 4 to adult)	27.
✓President's Choice (ages 13 to adult)	27.

Springboard	
✓Fraction Factory (ages 8 to 14)	19.
✓Make A Match Math (ages 2½ to 6)	19.
✓Piece of Cake Math (ages 7 to 13)	22.
✓Early Games for Young Children (ages 2½ to 6)	22.

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would be me."

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- Music Maestro (ages 4 to 10).....\$22.
- Easy As ABC (ages 3 to 6).....24.

Stone (requires graphics board)

- Across the U.S.A. (ages 5 and up).....22.
- My Letters, Numbers, Words (ages 1 to 5).....29.
- Kids Stuff (ages 3 to 8).....29.
- Memory Master (ages 3 to 8).....29.

The Learning Company

- Addition Magician (ages 6 to 10).....23.
- Magic Spells (ages 6 to 10).....23.
- Word Spinner (ages 6 to 10).....23.
- Reader Rabbit (ages 5 to 7).....26.
- Moptown Hotel (ages 8 to 13).....26.
- Number Stumper (ages 6 to 10).....26.
- Moptown Parade (ages 8 to 12).....26.
- Rocky's Boots (ages 9 and up).....32.

RECREATIONAL

Blue Chip

- High finance simulations.
- Baron.....32.
- Millionaire.....32.
- Squire.....32.
- Tycoon.....32.

Broderbund

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

CBS

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

Electronic Arts

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

Friendlysoft

- PC Arcade.....35.

Funtastic

- Among the finest arcade style games available.
- Cosmic Crusader.....27.
- Snack Attack II.....27.
- Big Top.....29.
- Master Miner.....29.

Hayden Software

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

Infocom Difficulty levels shown in italics

JUNIOR

- Seastalker.....25.

STANDARD

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

ADVANCED

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

EXPERT

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

Invisiclus (hint booklets) are available
for most Infocom games. Specify game... 6.

Microleague Sports

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

Microprose

- F-15 Strike Eagle.....22.

Microsoft

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

1Step Software

- Golf's Best (Pinehurst or St. Andrew's).....32.

Origin Systems

- Ultima III.....39.

Parlor Software

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

PCSoftware

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

SEGA

- Spy Hunter.....29.

Sierra On-Line

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

Sir-Tech

- Wizardry.....42.

Spectrum Holobyte

- GATO.....27.
- Tellstar (w/ Halley's Comet).....32.

Sublogic

- Night Mission Pinball.....29.
- Jet.....33.
- Six scenery (airport) disks are available for Jet.....each 15.

Telarium

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

XOR

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

HARDWARE

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- I/O Plus II with clock calendar and serial port (parallel, game, or second serial port optional).....125.
- Parallel, game, or second serial port for any AST board (specify board).....35.
- AST-5251-11.....579.
- AST-3780.....579.
- Reach Modem half card 300/1200 baud internal modem includes Crosstalk XVI.....349.
- Advantage 128k upgradeable to 1.5 Meg (or more with Piggyback Card), with serial, parallel ports, now includes Sidekick version 1.5 non-copy protected (game port and second serial port optional).....399.
- RAMpage! upgradeable to 2Mb, fully supports LOTUS/INTEL expanded memory specification (EMS).....call

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- Video 310A mono monitor (amber).....169.
- Color 600 - RGB monitor.....399.
- Color 710 - RGB monitor.....449.

Amdek

- Video 300G composite monitor (green).....129.
- Video 300A composite monitor (amber).....139.
- Video 310A mono monitor (amber).....169.
- Color 600 - RGB monitor.....399.
- Color 710 - RGB monitor.....449.

CompuCase

- Plastic Keyboard & Drive Cover Set.....17.
- IBM Mono Screen Enhancement.....17.

Cuesta

- Uninterruptable power backup units
- Datasaver 240 WATT.....call
- Datasaver 400 WATT.....call

Curtis

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- PC Pedestal (for IBM Mono or Color).....37.
- Portable Pedestal.....47.
- System Stand.....19.
- System Stand for IBM-AT.....37.
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- Crystal 300-watt (line conditioner).....159.



PC Persistence.

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Multimate each 12.

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All Toshiba printers listed are 24 pin dot matrix.
P1340 printer (80 column) 439.
P341 printer (136 column) 899.
P351 printer (136 column) w/serial and
parallel interfaces 1129.
WICO
Joystick 35.

DRIVES

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Tandon

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

TEAC

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Toshiba

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

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150 nanosecond (set of 9) 10.
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Install memory upgrades & run diagnostics
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DS/DD Disks for the PC & XT (40 TPI).
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Maxell MD-2 19.
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DS/High Density Disks for the AT (96 TPI).
10 disks per box.
Fuji 35.
Maxell 39.
Verbatim 45.
Flip Sort (holds 75 disks) 15.

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Compuserve Information Service
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Dow Jones

Membership Kit 19.

Source Telecomputing

The Source (subscription and manual).. 39.

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breaker) 123.

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050 color printer call
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K-85 call
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Light Pen 195.
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Smartmodem 1200 389.
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Smartmodem 1200B (no software) 289.
Smartmodem 2400 579.
Smartcom II 2.1 (software) 89.
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A multifunction board that can hold as
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Pinwriter P5 (IBM, 132 column) 899.

Spinwriter 3550 (letter quality 32 cps) 1099.

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PCnet Daughter Board piggybacks to

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Board expandable to 640k, increase the

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PC Magazine called it "a top performance bar-
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Princeton Graphics

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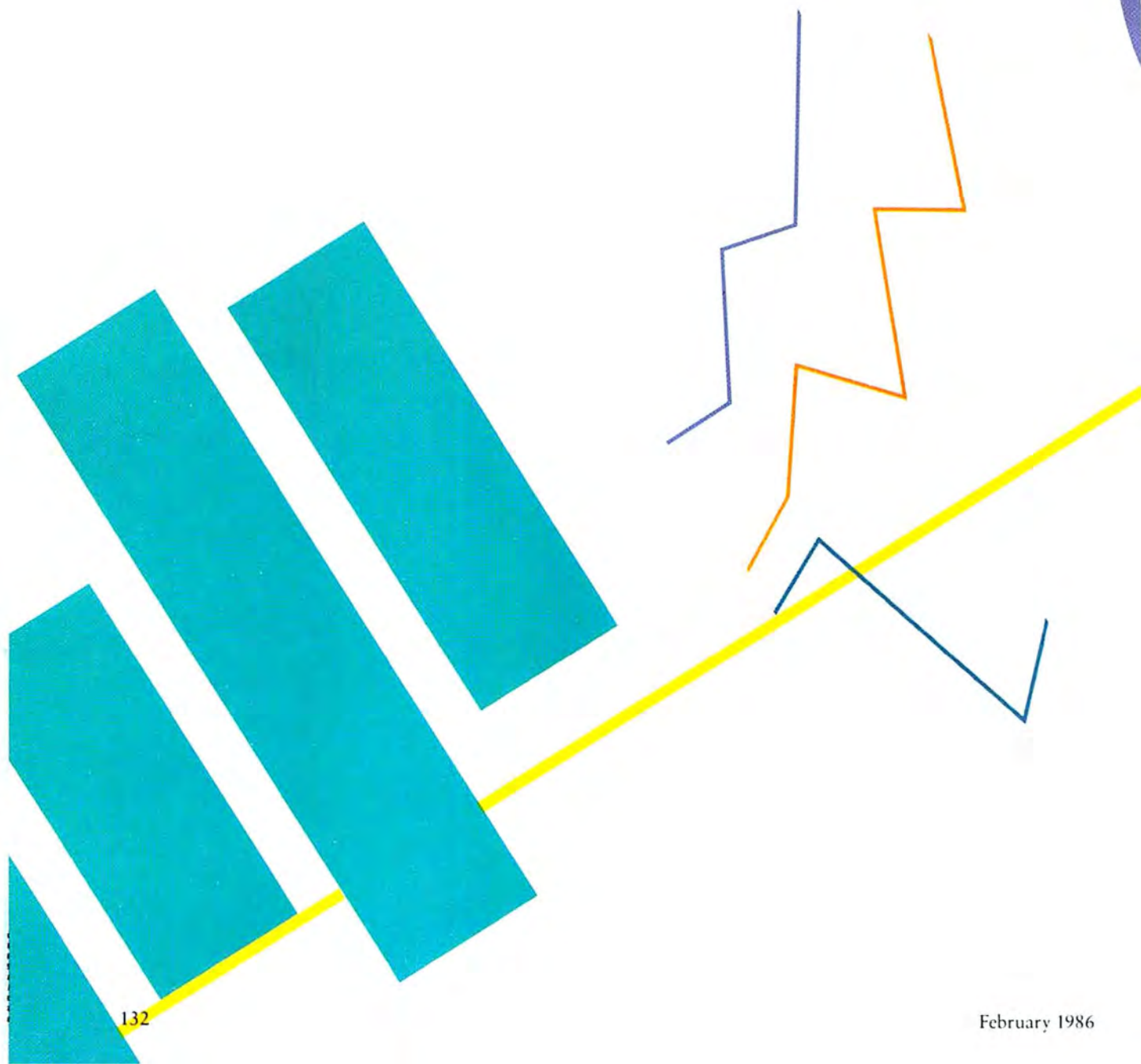
SR-12 RGB monitor (690 x 480) 597.

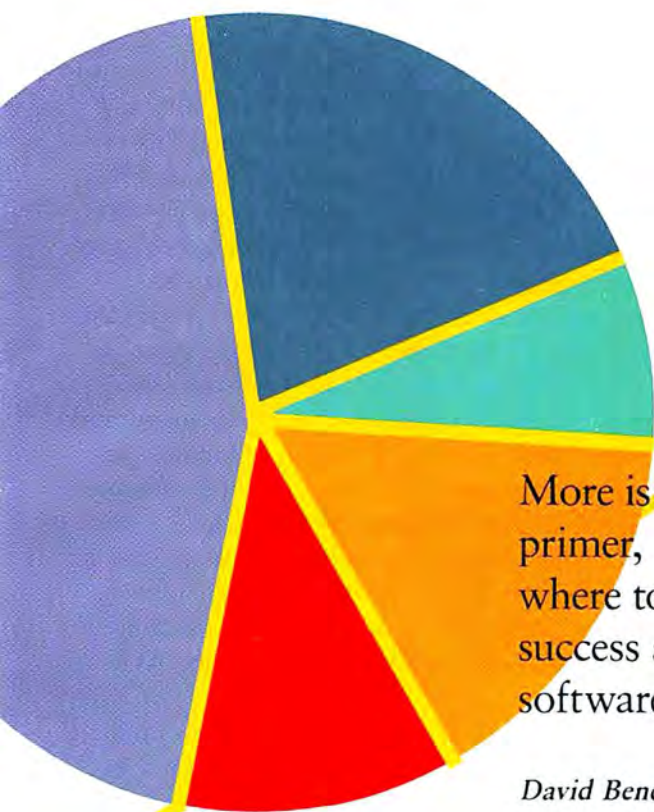
ISM Scan II Board for SR-12 149.

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Presentation Pointers





More is not always better. In this primer, a graphics pro shows you where to draw the line between success and failure with graphics software.

David Benchley

Presentation graphics call for prudence. The power of currently available graphics software can overwhelm a new user, especially when some packages offer 400 colors and color patterns, ten styles of charts and graphs, animation, clip art libraries, and a multitude of type styles and fonts.

The first thing to remember about such packages is that you shouldn't even consider using every feature. The key to good presentation graphics is simplicity. Effective visual presentations—overhead projections, 35mm transparencies, and live, computer-generated video shows—can make quite an impression on your audience.

Graphics can dress up a presentation by calling attention to important points that can't be explained clearly in words. They are a quick and attractive means of conveying numbers, trends, and relationships. Used successfully, presentation graphics promote your professional image and ensure the impact of your message. But violate the "dress for success" code of graphics and you risk boring your audience as well as obscuring your message. Follow these rules of the road for good graphics and your presentations will be more powerful and persuasive.

Figure 1: Bar, line, pie, and text charts are the four standard graphics used in business because they are the simplest ways to illustrate complex data.

The Default Option

Computers don't guarantee superior graphics. While the packages on the market today are excellent tools, they won't magically transform you into a Matisse. You still need to know some basic design principles to use the computer successfully. Not everyone can design by hand the graphics they need for good presentations. For those of us who can't draw a straight line, much less a pie chart, the PC can ease the process.

You might want to let the program do the designing until you learn more about the design process.

Most graphics software packages have a default function for times when you cannot decide what background color is appropriate, what type style to use for a label, or even what kind of graph or chart will best illustrate your point. Some programs automatically color bars in a bar chart blue or red, or set up a horizontal bar chart for data that compares changing quantities against lengths of time. These default options are based on standard design rules of thumb.

Bear in mind that the computer's default is a limited function. It isn't making a decision for you but is merely acting on a set of options put in place to help you. So while it won't make you an artist, a default option can supply some of the design basics you need for effective presentation graphics. You might want to let the program do the designing for a while until you learn more about the design process. You can override the defaults when you are ready to set off on your own.

Charting Your Course

Once your data is in hand, you must select the best chart format for your situation. Sounds easy, but which format is most appropriate? There are no absolutes in business graphics design. Bar, pie, line, and text charts are the formats used most frequently in business communication because they provide direct visual representations of complex data (see Figure 1).

Bar and line charts let you represent the changing nature of data over time. Bar charts can be oriented vertically or horizontally. One bar format gaining popularity is the Gantt chart, a variation on the standard bar chart commonly used in project management. Usually, a Gantt chart illustrates many tasks that occur simultaneously but lack a common starting point. Pie charts are almost always used for comparing values that represent parts of a whole. Line charts connect data points on a grid, allowing you to graph interpolated and extrapolated data and to describe trends. Text charts support your spoken message, emphasizing points in the same manner as a billboard.

The format you select depends entirely on the type of data and the message that you want to convey. Suppose you want to compile your corporation's yearly sales figures by region. You could display the data in a pie chart to stress the proportion of total sales contributed by each region. A clustered bar chart would be best if you wanted to compare yearly sales by region. A line chart would be suitable for tracing trends in sales growth for each region over a five-year period. Focus your ideas first, then figure out how to convey them.

Some software displays galleries of available chart types and shows how such charts may be used.

Graphics programs will let your reach exceed your grasp by tempting you with an amazing variety of design options. Don't indulge yourself—keep it simple.

Many packages also recommend, by default, the best format for a specific type of data and automatically set up the chart for you. Don't forget that most graphics programs will let your reach exceed your grasp by tempting you with an amazing variety of design options. Don't indulge yourself—keep it simple.

Better Bar Charts

When carefully designed, a bar (or column) chart is the easiest graphic image to understand. It's a tried-and-true business graphics standard. In its simplest form, a bar chart compares data using horizontal bars or vertical columns plotted on a grid. In either case, bars start from zero, or the origin of the appropriate axis.

Bar charts are best at illustrating multiple comparisons and complex relationships. Most software packages offer a variety of styles, from simple columns to double stacked bars.

To compare several distinct sets of data in one chart, use a clustered bar graph. Clustered bars are like an outline for a report: They group general subjects together, and then divide the information into specific categories. They are used for comparing different but related types of data within a group, and over a period of time. Ordering data in this manner clearly illustrates what all groups have in common, as well as salient differences.

It is very important to label a clustered chart clearly. Each cluster should have a label, and each bar within a cluster should be identified. Since there is usually insufficient room for all those labels, draw each bar in a different pattern or color and describe the bars in a legend under the graph. This not only saves space but simplifies the image.

Here's a straightforward example: To discuss quarterly operating profits for corporate subsidiaries in Europe, North America, and Asia, you could create separate graphs for each continent's subsidiaries. However, a cluster graph would make the comparison more powerful by displaying sets of data side by side. You might use a different color for each geographical area and indicate profits by four clusters of bars with each quarter's cluster labeled along the horizontal axis (see Figure 2). Limit both the number of clusters and the number of bars in each cluster to four.

If you've got the hang of it and want a tighter look—and if your program permits it—overlap the bars rather than displaying them adjacent to one another. This technique will give your chart dimension, adding to its visual impact.

Not all bar charts are intrinsically clear and concise. The stacked bar chart can sometimes be confusing. Like a pie chart, the stacked bar illustrates the relative parts of a whole. The advantage of a stacked bar chart is that it compares many whole quantities on one graph, while simultaneously illustrating the components of each quantity. The problem, however, is that the segments within the whole bars do not emanate from a common starting point, such as the axis in a standard bar chart. Stacked bar charts are complex, hard to understand at a glance, and may require extensive labeling or footnoting. If you have to explain a chart at length, it's time to rethink your graphics approach.

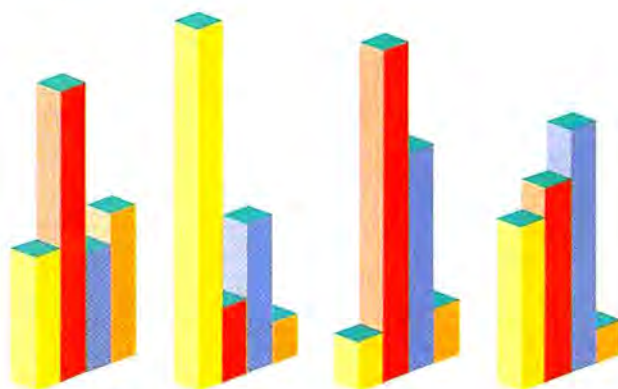


Figure 2: Cluster charts group general topics together and illustrate types of data within each group. For simplicity, cluster charts should be limited to four groups and four types of data within each group.

Figure 3: Since stacked bar charts are difficult to read, some data is better illustrated with another style of graph. This example works because the cluster graph provides a common base-line for comparison.

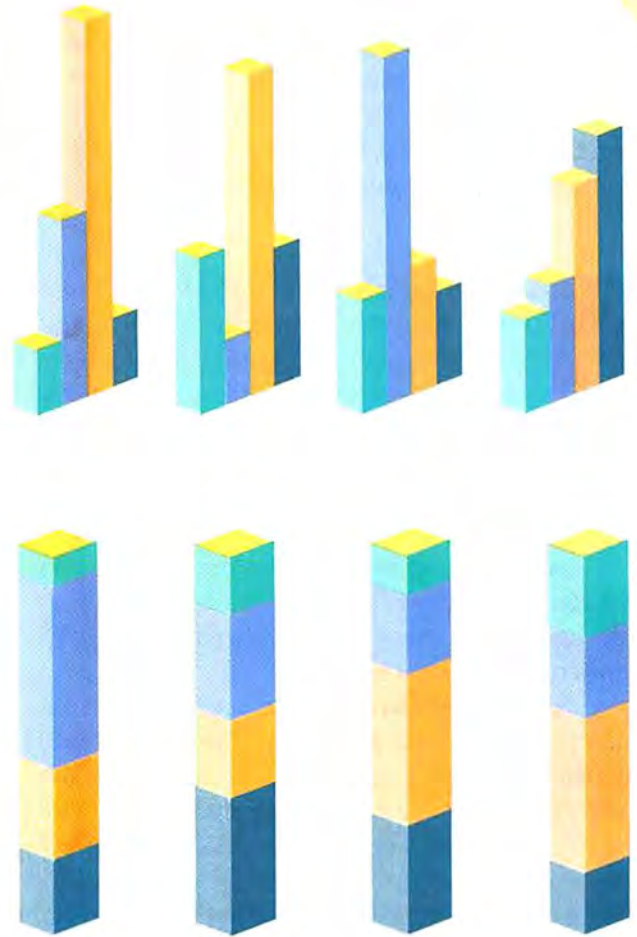


Figure 4: Exploding a segment of a pie chart attracts attention to the most important information in the chart. Color can also be used effectively to achieve the same effect.



Each bar in Figure 3 shows the proportional contribution of regional divisions to total corporate sales over the past four years. It's hard to tell that Region A had higher sales than Region B. In this situation, it might be better to use a clustered bar chart to show the data, using one cluster to represent each year. The bars within the clusters would represent regions, illustrating much more clearly the difference in activity between the regions.

Any Way You Slice It

Today's business graphics designer can't avoid the ubiquitous pie chart. A presentation favorite from Wall Street to Silicon Valley, the pie chart is one of the simplest and most effective ways to dramatize proportional relationships. The chart really looks like a pie: The whole amount is represented as a circle, with each part of the whole represented as a slice of the pie.

Any way you slice it, a pie chart is eye candy—a digestible visual snack that imparts contrasts. Be wary of the tendency to turn this essentially qualitative form into a quantitative one by packing excessive information into a single pie. Too many divisions of the pie will make the resulting portions too small to label. Stick to five or six segments, and group segments representing very small percentages (usually less than 5 percent) into a collective “other” category.

One dressy technique that has become de rigueur in business presentations is exploding, or separating, segments of the pie from the rest of the drawing (see Figure 4). This technique directs attention to the most important pieces of information but may make the chart more complicated for the viewer.

While no hard-and-fast rule dictates when to explode a pie or how many segments to separate, bear in mind that the more you use the technique, the more complicated the chart will become. Limit the number of segments you explode to one or two. Some software lets you separate as many as three segments from the pie chart proper. An alternative to using the exploded pie chart is to highlight the important segments with bright, solid colors.

Other trendy practices to use sparingly: “three-dimensional” pie charts and pie charts drawn in perspective so that they appear to be oval. These charts may look snazzier, but the data may actually be harder to absorb or too distorted to read accurately.

Pie charts do not lend themselves to illustrating the passage of time, nor do they allow you to compare more than one group of data within a single chart. Comparing multiple entities requires multiple pie charts. If you find yourself using more than four pies, you may want to consider a stacked bar chart instead, in which several groups of data can be compared in a relatively small amount of space.

If you decide to use multiple pie charts, be consistent: The pies should be identical in size and color—the only variation should be segment size. Explode the most important segment in each pie or give it a bright color, so the viewer can easily compare it from pie to pie.

Stream-Lined Charts

Line graphs effectively illustrate trends over a period of time. Such graphs use a continuous line to trace the relationship between data points, representing stock prices, gross national product, sales figures, and similar values. The data is plotted on a grid, with horizontal and vertical axes indicating time, amounts, percents, years, months, rates, descriptive categories, and the like. Each point on the grid through which the line passes is highlighted with a marker. Good marker symbols for line graphs include circles or dots, squares, and triangles. A solid-color symbol is more noticeable than an outlined symbol. Some software packages, notably *Energraphics* from Enertronix Research, plot solid, filled, and outlined marker symbols.

You can also use lines to define areas. An area chart plots data in the same manner, but it illustrates the entire range bounded by the line, instead of a set of defined points. An area chart is like a pie chart with the element of time introduced.

Line and area graphs are excellent ways to illustrate overall trends and cycles in the data. There's no need to limit the number of specific values in a set of data that comprises a line. However, you should limit the chart to four or five lines or areas so it won't look cluttered (see Figure 5). Most software can plot four to six lines on one chart.

The horizontal axis of a line chart typically indicates categories or time periods (such as months or years), while the vertical axis shows amounts. If space and the program permit, label both axes with horizontal titles. Unfortunately, not all packages provide that capability, but some let you create horizontal labels as well as tilt longer labels on a diagonal for legibility.

Bold Statements, Simple Terms

While an image is worth a thousand words, most presentations also rely on text charts. The text chart is similar to a billboard at the side of a freeway, conveying a simple but pointed message to an audience with limited viewing time. Freeway drivers passing a billboard at 55 miles an hour are bombarded with information from all directions, but their eyes are still drawn to the billboard, and amazingly, they're able to read and remember what they see. This kind of attention-getting device is exactly what you must strive to emulate with a text chart.

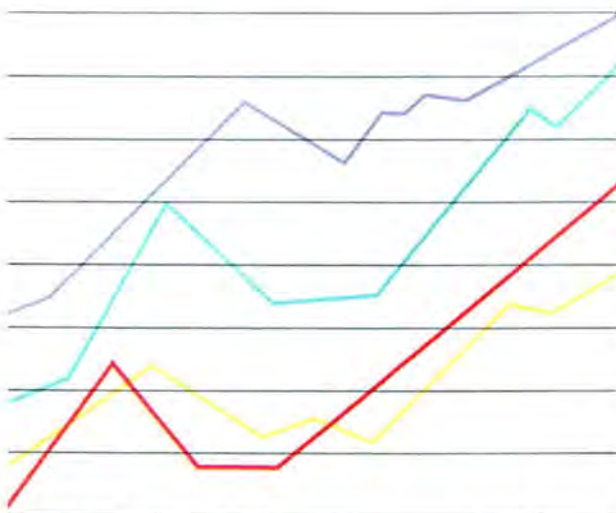


Figure 5: Line graphs use a continuous line to trace the relationship between data points. Limit the graph to four or five lines so it won't look cluttered.

Choose a bold statement to illustrate. If the company has doubled revenues from last quarter or garnered a 90 percent market share with its latest product, say it proudly in a text chart. But say it with brevity. Too much text can quickly overwhelm an audience. If you keep it short, simple, and impressive, the chart will support—but not overshadow—your message. It's best to limit text charts to one topic and a few words—a maximum of six lines of several words each. If you are listing items or want to make several points in one chart, title the text and accentuate the main points with bullets, asterisks, check marks or any other attention-getter.

Your next step is determining which type of font will best convey your message. Most graphics software packages provide an overwhelming number of type styles. Familiarize yourself with the characteristics of some of them. Do they have serifs? Do they look good in boldface as well as italic? Do they

The pie chart is one of the simplest and most effective ways to dramatize proportional relationships.

have a professional look, or are they too decorative? Use each style for what it does best. If you want to strike a professional tone in your presentation, choose a simple, legible type (see Figure 6).

Boldface fonts are a good way to emphasize words and phrases, but don't go overboard. Use type variations sparingly. If you can't resist the temptation to mix type styles, limit yourself to no more than three styles per chart—one for the title, one for the text, and one for the single most important word or phrase that you want to stress.

Form should match content. Match the style of text to the importance of the message. Highlight titles and important terms in bolder or larger type. You can also use italics sparingly for highlighting, though the type may be difficult to read in a projected image. At a distance capitalized text is generally easier to read than boldface. The main text should be displayed in plain type.

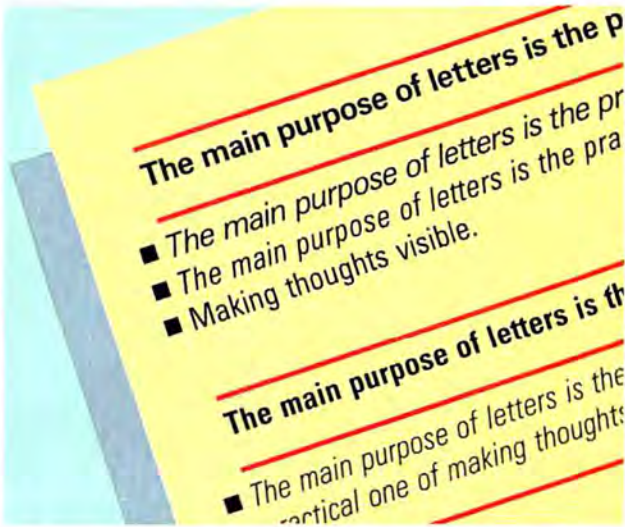


Figure 6: Use simple, legible type in a text chart to convey a professional tone. While italic and boldface type are excellent for highlighting key words, they are often more difficult to read in a projected image.

■ Convincing With Color

In business graphics, color serves to draw attention to important parts of a chart, to differentiate information, or to show similarities.

Where color is concerned, restraint should be your byword. Don't try to use your program's 40 colors in a single chart. Four or 5 should suffice for a complicated bar chart; 2 colors are fine for text charts. Vary color intensities to create contrast.

Some programs feature colored patterns such as hash marks and dots, which can heighten the contrast between a graph's elements. Use neutral colors for the background—or leave it white. Use black or a dark color for axes and outlines, and highlight important data in bright colors. Bright colors attract attention to smaller objects, such as very short bars in a bar graph, or thin axes. Note that black is also a good background for a chart that will be displayed live on a computer screen or converted to a 35mm slide for projection. A dark background provides excellent contrast for the PC's intense, luminescent color. Some 35mm slide processes soften contrast, so use brighter colors and greater contrasts for images that will be turned into slides.

Convey similarities and distinctions with color. Don't make the title the same color as part of the chart (such as a bar or pie segment) unless the two

have an important connection. Similarly, don't color objects differently unless the objects are different. Use a separate color for each segment in a pie chart, but the same color and shading pattern for each bar in a simple bar chart.

■ Graphics on the Move

Animation is a surefire attention-grabber. With packages such as *Execuvision* from Visual Communications Network, and *VideoShow* from General Parametrics, you can create animated presentations for screen display or projection to a large screen. Make your data come alive by "growing" bars and columns to dramatize increases, and use cinematic techniques such as wipes, dissolves, and fades to move from one graph to the next in a live presentation.

■ Finishing Touches

It's the little things that count. A few final touches can make a big difference in the impact of your graphics. A border can give a graph a finished, professional look.

With software libraries of "clip art," you can add compelling images to your charts without distorting the data. If your graphics software package includes a clip art library, choose illustrations that pertain to the subject of your chart. If you are relating domestic automobile sales to the average American household income, for example, put a picture of a car and a house at the bottom or top of the appropriate bars in the graph. Pictures take the place of labels; the viewer should be able to recognize immediately both what the object is and what it means.

As a finishing touch, attribute the source of your data. It helps buttress your point, and it can make the difference between persuasion and passive disregard.

Once your artwork is complete, how do you present it to your audience? Some software turns your PC into a slide projector. *VideoShow* with its *PictureIt* software allows you to generate the graphics on a PC as well as "edit" a presentation. You simply

tag one graphic after another and use a remote control to change "slides" or program the software to display each image for a certain length of time. One consideration: If you program a timed display, you must time the material in your speech to coincide exactly with the flow of the graphics.

Other packages allow images to be captured by slide generators that convert the screen display into a 35mm slide. It may be less expensive, however, to create the graphic, dump it to disk, and have a photographic reproduction company create the slide. With the appropriate hardware, some software can convert your graphics to overhead projection transparencies.

Though the road to more effective graphics is studded with potholes, bearing these basic rules in mind should keep you on the straight and narrow toward better presentations. Effective images help persuade others to accept your message—and to buy your product or service. Powerhouse graphics not only promote your ideas, they also promote you. ●

David Benchley is a San Francisco-based writer who specializes in business graphics.

Chart-Master

Decision Resources, Inc.

25 Sylvan Rd. S

Westport, CT 06880

203/222-1974

List price: \$375

Requirements: 192K (256K for printing graphics or for use with the Polaroid Palette), two disk drives, color graphics board with color monitor or Hercules board with monochrome monitor

Energraphics

Enertronix Research, Inc.

5 Station Plaza

1910 Pine St.

St. Louis, MO 63103

314/421-2771

List price: \$350, plotter option driver \$100

Requirements: 128K, color graphics board

Execuvision

Visual Communications

Network

238 Main St.

Cambridge, MA 02142

617/497-4000

List price: \$395

Requirements: 128K, two disk drives, color graphics board

Microsoft Chart

Microsoft Corp.

10700 Northrup Way

P.O. Box 97200

Bellevue, WA 98004

206/828-8080

List price: \$295

Requirements: 128K, one disk drive, DOS 1.10 or later version, color graphics board

PC Storyboard

IBM

P.O. Box 2328

Menlo Park, CA 94025

800/426-2266

List price: \$250

Requirements: 256K (320K recommended), two disk drives, DOS 2.00 or later version

Polaroid Palette

Polaroid Corp.

575 Technology Square

Cambridge, MA 02139

800/225-1618

List price: \$1999

Requirements: 128K, serial port, color graphics board with composite output

VideoShow 150

General Parametrics Corp.

1505 Solano Ave.

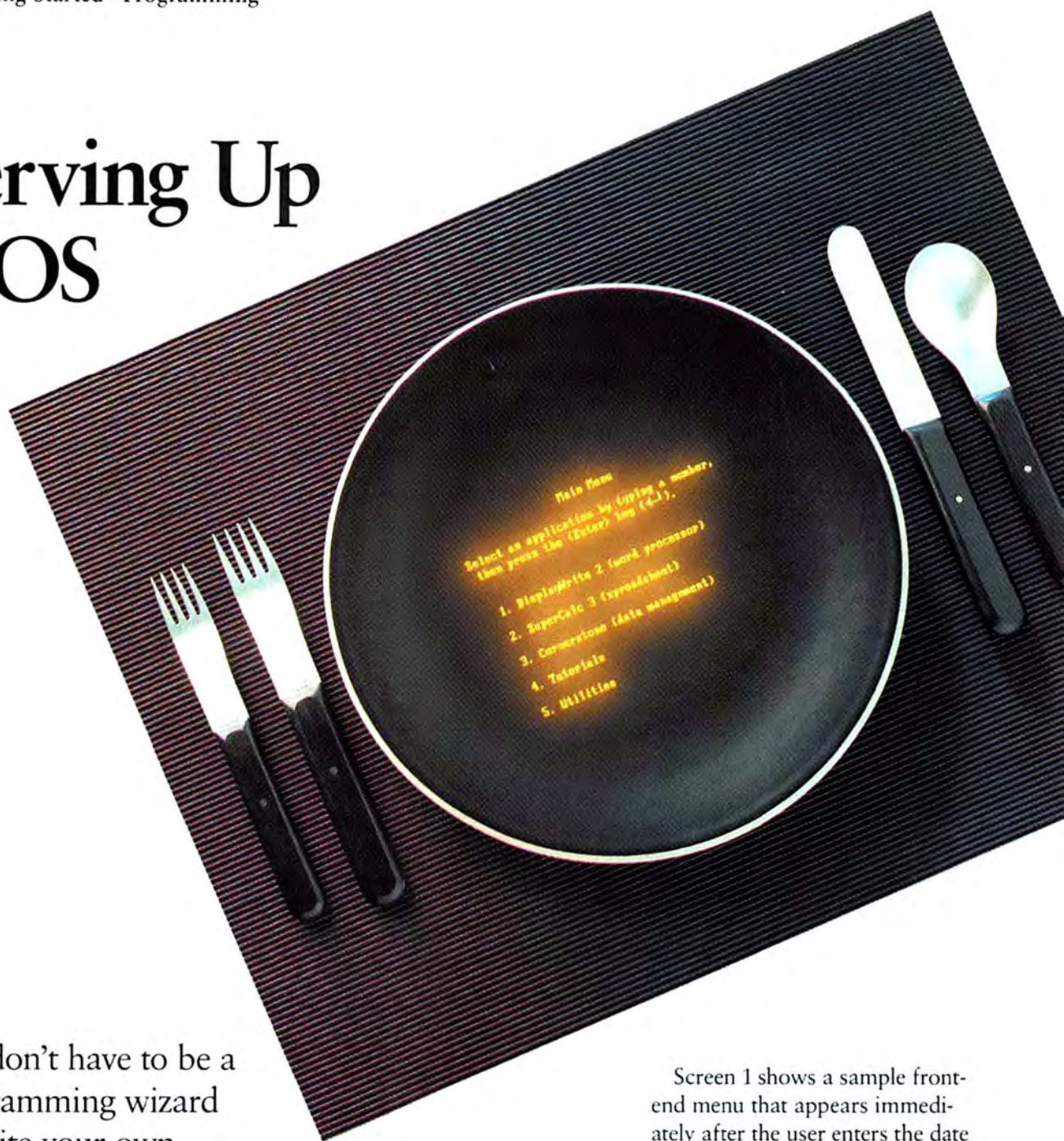
Berkeley, CA 94707

415/524-3950

List price: \$3150, PictureIt \$700

Requirements: 256K, two disk drives, DOS 2.00 or later version, color monitor

Serving Up DOS



You don't have to be a programming wizard to write your own front-end menu for a hard disk. All you need are a few friendly text and batch files.

Hal Nieburg

||||| A law office has a PC XT with five programs stored on a hard disk. Several secretaries use the system, and what little computer experience they have is limited to menu-driven programs. One way to spare them the complexities of DOS and subdirectories—and to protect the programs and data against errors—is to set up a front-end menu.

Screen 1 shows a sample front-end menu that appears immediately after the user enters the date and time. Entering the number of a menu selection loads the desired application and presents its familiar opening menu. When the user exits from a program, the front-end menu reappears, enabling the user to select the next application.

You don't need IBM's *TopView*, Microsoft's *Windows*, DRI's *GEM*, or any of the host of new desktop programs to organize work sessions and software.

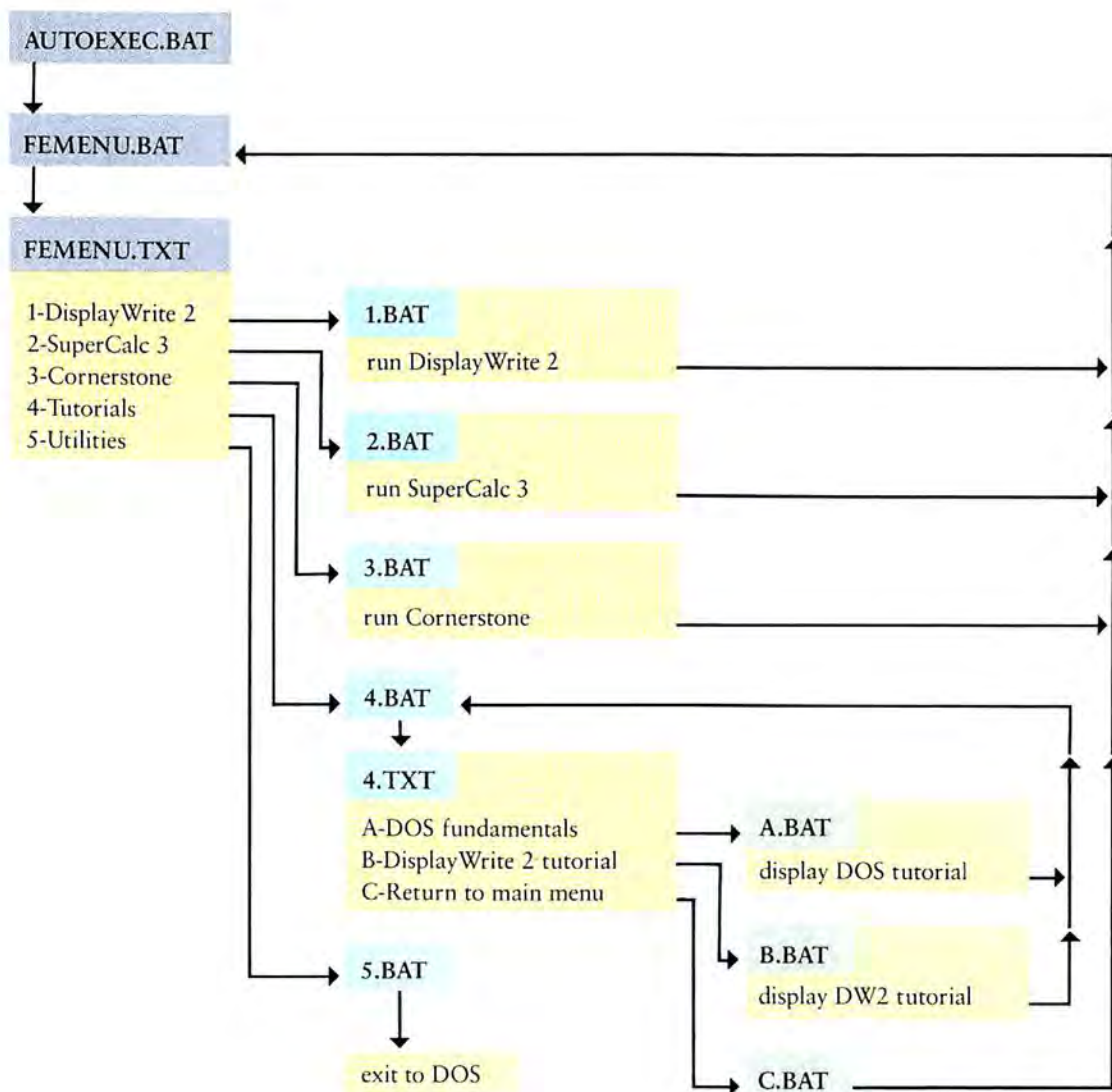
Figure 1: AUTOEXEC.BAT ends by running FEMENU.BAT, which displays FEMENU.TXT, the main menu. Entering 2 runs 2.BAT, which runs SuperCalc 3. When SuperCalc 3 is exited, 2.BAT resumes and runs FEMENU.BAT, and the main menu is redisplayed.

Those facilities are nice, but they cost money, take up lots of disk space and memory, and aren't really necessary for most users.

Every owner of a PC with a hard disk already has the means to write a front-end menu. The tools are provided by DOS 2.00 and later versions. Using simple DOS batch files and text (ASCII) files, you can tailor menus to specific programs and needs. All these files can be written with the DOS line

editor (EDLIN.COM), with the COPY CON command (copy from the console), or by using an ASCII text processor—that is, any word processor that produces ASCII files. For this article, you will use the COPY CON command (see "Cooking Up a Batch File," PCW, Vol. 2, No. 5).

Admittedly, the front-end system presented here is rather rudimentary. Unlike flashy integrated environments, it does not permit multitasking or windowing, but it has many advantages over the standard DOS interface.



Automatic Execution

To have the front-end system come up automatically when the computer is turned on, you must either create or edit the AUTOEXEC.BAT file in the root directory of drive C:, the hard disk. Make sure that drive C: is the default drive by typing **C: <Enter>** and that the root is the current directory by typing **CD\ <Enter>**. To check whether this file already exists, type **DIR \AUTOEXEC.BAT <Enter>**. If DOS returns the message 'File not found', type in the following lines, pressing **<Enter>** at the end of each line.

```
COPY CON \AUTOEXEC.BAT
DATE
TIME
PATH C:\FRONTEND;C:\DOS
CD \FRONTEND
FEMENU
```

When you've typed the lines, press function key **<F6>** (or **<Ctrl>-Z**) and then **<Enter>** to write the file to disk.

If the DIR command reveals an AUTOEXEC.BAT file, you must edit the file with EDLIN or an ASCII text processor. Remove from AUTOEXEC.BAT any existing call that transfers control to another batch file. Otherwise, the commands you append will not be executed. If no PATH command is present in the file, add the last three lines shown in the previous listing to the end of the AUTOEXEC.BAT file. If a PATH command already exists, simply prefix **C:\FRONTEND;C:\DOS;** to the list of directories in the current PATH command and add only the last

two lines of the preceding listing to the end of the file. In either case, the hard disk should contain a directory called DOS in which all DOS files are stored. (See "Directory Assistance," PCW, August 1985, for information about organizing hard disk directories.)

The Front-End Menu

This front-end system (see Figure 1) requires a main batch file (FEMENU.BAT), a main menu text file (FEMENU.TXT), five ancillary batch files (1.BAT through 5.BAT), and one submenu text file (4.TXT). These files should reside in a directory called FRONTEND.

To create the directory, type the command **MD C:\FRONTEND** and press **<Enter>**. To make FRONTEND the current directory, type in the command **CD C:\FRONTEND** (or to use a handy DOS shortcut, type **C** and press **<F3>** to have DOS type the command for you). Then press **<Enter>**. To verify that FRONTEND is the current directory, type **CD <Enter>**. DOS should respond by displaying 'C:\FRONTEND'.

To create the main batch file for the front-end system, type **COPY CON FEMENU.BAT** and press **<Enter>**. You will be prompted by a flashing cursor. Enter the following lines, pressing **<Enter>** at the end of each line. (The line with the question mark should be followed by a space before you press **<Enter>**.)

```
ECHO OFF
CLS
C:
CD \FRONTEND
PROMPT Your Choice?
TYPE %0.TXT
< F6 >
```

When FEMENU.BAT is run (don't try it yet), the first line, ECHO OFF, makes the remainder of the batch operation invisible to the user. CLS then clears the screen. (These two lines are used in all the front-end system batch files in this article.) The commands C: and CD \FRONTEND ensure that C: is the default drive and FRONTEND is the current directory. The command PROMPT Your choice? (with its trailing space) changes the DOS prompt from 'C>' to 'Your choice? '. (Because ECHO is off, the changed DOS prompt is not displayed immediately.) When the line TYPE %0.TXT is executed, the DOS replaceable parameter (%0) in that line is replaced by FEMENU, the first word of the command that called this batch file. DOS then displays FEMENU.TXT, the front-end main menu, on the screen. (For more on replaceable parameters, see "The Fully Powered PC," PCW, July 1985, and "Creating a Batch File With Replaceable Parameters" in your DOS manual.) At this point the new DOS prompt, 'Your choice? ', appears on screen.

Once you've created the main batch file, you're ready to write the front-end menu shown in Screen 1. Begin by typing **COPY CON FEMENU.TXT** (or press function key **<F2>**, press **B**, and finish the line with **TEXT**) and press **<Enter>**. Enter the lines in Screen 1, *excluding* the prompt 'Your choice? ', pressing **<Enter>** at the end of each line. Use spaces and the **<Enter>** key to arrange the text on the screen. You can design the screen any way you want and add or subtract any text; changing the

Main Menu

Select an application by typing a number,
then press the <Enter> key (↵).

1. DisplayWrite 2 (word processor)
2. SuperCalc 3 (spreadsheet)
3. Cornerstone (data management)
4. Tutorials
5. Utilities

Your choice? _

Screen 1: The main menu for a homemade DOS front-end system. Pressing a number brings you directly into an application.

text or its placement will not affect the operation of the batch files. Only the menu numbers must be consistent throughout.

The <Enter>-key symbol (↵) that ends the first paragraph is made from three graphics characters (ASCII characters 17, 196, and 217). To create it, first type <Ctrl>-Q to make the arrowhead. ('^Q' appears on the screen now but will be replaced by '◄' when FEMENU.BAT types the file to the screen.)

Next, while holding down the <Alt> key, quickly press and release 1 on the numeric keypad, then press and release 9, and finally, press and release 6. Now release the <Alt> key, and ASCII character 196, the shaft of the <Enter>-key symbol, appears. Hold down <Alt> again, enter 217 on the numeric keypad, and release the <Alt> key to produce character 217, the "tail" of the <Enter>-key symbol. When all

the lines above 'Your choice? _' have been entered, create two blank lines by pressing <Enter> twice, then press <F6> and <Enter>.

■ A Batch File for Every Program

Each choice in the main menu calls another batch file, and each batch file follows the same pattern. For example, to create the batch file that invokes *DisplayWrite 2* (choice 1), type the following lines, pressing <Enter> at the end of each line.

```
COPY CON 1.BAT
ECHO OFF
CLS
PROMPT SP$G
CD \DISPLAY
DW2
CD \FRONTEND
FEMENU
< F6 >
```

ECHO OFF and CLS work the same way as they do in FEMENU.BAT. The command PROMPT SP\$G changes the DOS prompt from 'Your Choice? ' to display the current path (default drive and directory) followed by

the greater-than symbol. The next line makes DISPLAY the current directory. This previously created directory contains all the files associated with *DisplayWrite 2*. The command DW2 loads the word processor, and the user is ready to begin the work session. When *DisplayWrite 2* is exited, the last two lines of 1.BAT make FRONT-END the current directory and call the main batch file, which displays the main menu. You can now choose the next work task.

Batch files 2.BAT and 3.BAT are identical to 1.BAT, except that each makes a particular directory current (with the fourth line after the COPY command) and issues the appropriate command (with the fifth line) to invoke the program chosen from the main menu. As with 1.BAT, the directories that 2.BAT and 3.BAT make current and that respectively hold the files for *SuperCalc 3* and *Cornerstone* must be created and installed with their respective program files before the front-end system is used.

■ Custom On-Line Help

Choice 4 of the main menu calls the file 4.BAT, which displays a submenu of software tutorials in a directory called C:\TUTOR. 4.BAT is identical to FEMENU.BAT, the main batch file. To create 4.BAT, type COPY FEMENU.BAT 4.BAT. To create the submenu text, type

```
COPY CON 4.TXT
Select the tutorial you wish to review:
```

- A. The fundamentals of DOS
- B. Learn to use DisplayWrite 2
- C. Return to the main menu

< F6 >

Use the <Enter> key to create the blank lines above and below the lettered choices.

The next step is to write the batch files for 4.BAT's three selections, A, B, and C. To create A.BAT type

```
COPY CON A.BAT
ECHO OFF
CLS
MORE < C:\TUTOR\DOS.LRN
PAUSE
4
< F6 >
```

The line MORE <C:\TUTOR\DOS.LRN causes the first 24 lines of the file DOS.LRN (which is stored in the TUTOR directory in drive C:) to appear, followed by the prompt '-- More --' on the bottom line of the screen. (This tutorial file is not presented in this article. It is a simple text file whose contents are left for you to write.) Pressing any key displays the next 24 lines of the file, followed again by the prompt '-- More --'. This process continues until all of DOS.LRN has been displayed (or until the user presses <Ctrl>-<Break>). Then the PAUSE command is executed so the user may finish reading the last lines of DOS.LRN before the last line of A.BAT calls 4.BAT, which clears the screen and re-displays the tutorial menu.

Create B.BAT along the same lines as A.BAT, but replace DOS.LRN with the name of the DisplayWrite 2 tutorial. This tutorial file is also left up to you to create.

C.BAT returns the user to the main menu. Type

```
COPY CON C.BAT
ECHO OFF
CLS
FEMENU
< F6 >
```

A Simple DOS Shell

The last selection of the main menu, which handles DOS utilities and file maintenance, can be simple or complex, depending on the users' level of familiarity with DOS. Formatting disks, backing up files, and performing other maintenance tasks could be simplified for the user by having choice 5 provide a menu item for each important utility and a separate batch file to automate each item. For example, to back up the hard disk to floppies, the user would just choose that selection, and the rest would be controlled by an appropriate batch file. Easily said, but not so easily accomplished and beyond the scope of this article. What is simple for the user to use is usually complex for the batch-file writer to create.

For the educated user, the batch file writer can take a simpler approach. Put the utilities in a separate directory (C:\UTILITY) and have 5.BAT clear the screen, generate a more informative DOS prompt, turn echo on, make UTILITY the current directory, list that directory (or display a text file listing the available utilities), and let the user take it from there. To do that, type

```
COPY CON 5.BAT
CLS
PROMPT SP$G
ECHO ON
CD \UTILITY
DIR
< F6 >
```

You can now test the front-end system by resetting the PC with <Ctrl> - <Alt> - .

Why Create a Front End?

Front-end menus are especially useful with hard disks, even for experienced users. They help keep massive amounts of data and software organized and accessible, providing not only convenience but also security against mistakes that might erase or overwrite critical files. Front-end menus are useful with floppy-based systems as well.

Front ends can provide appropriate instructions and access to multiple files and programs. By writing a front-end menu and a few batch files, you can accommodate differences in user ability, thus better integrating the PC into office procedures. The PC AT's 1.2MB high-density floppy drives make such facilities very attractive, with or without a hard disk.

Commercial front-end windowing programs are coming on strong. With the falling costs of RAM and disk storage, and with the onset of gigabyte optical devices, such facilities will no doubt earn a place for themselves. But for many applications, creating your own front-end system with ordinary batch files can do the job just as well. ●

Hal Nieburg is a professor of political science at the State University of New York at Binghamton. He is the author of seven books and is currently trying to peddle a historical novel.

The AT Animates the Airwaves

By offering low-cost computer animation to television studios, production houses, and advertisers, AT-based systems like those from Cubicomp and Aurora are quietly changing the face of TV.

Paul Meyers and Eric Knorr

||||| If you watch any television, especially sports, you've probably seen them. No, not another light beer ad or Japanese car commercial. Next time you watch locally produced sports or news, take a close look at the acrobatic logos and shimmering backgrounds that kick off the show. These sophisticated, computer-generated animations may have been produced with a PC AT.

Flipping show titles, flags melting into maps, sexy chrome robots, and an armada of spaceships have rippled the airwaves for years. But until recently, these flights of visual fancy could only be created on mainframe or minicomputer systems, often costing

A digitized photo
altered on the
Aurora 75 by artist
Richard Sloss



upward of \$250,000. With animation bills from specialty houses soaring as high as \$10,000 per second for a 30-second spot, animated computer graphics were limited to the major networks and a few high-rolling sponsors.

But the AT is changing all that. A number of systems designed around the AT and priced in the \$30,000 range are enabling smaller TV stations and production houses to produce spectacular images at reasonable prices. For small stations, advertisers, and corporate video users, that's important. In these days of image-numbered video viewers, a few seconds of high-caliber computer animation can make the difference between an audience that tunes in to a program and one that tunes out.

"There is an upgrading of visual imagery everywhere," says Damon Rarey, cofounder of Aurora Systems, developer of the AT-based Aurora 75. "We're entering a more visual age, in which people will become more dependent on high-quality images to express their ideas. And because there's been such an enthusiastic response to high-end graphics, people are looking to create their versions on lower-end, more affordable systems."



Like Apple's MacPaint, the Aurora 75 uses icons to denote program functions.

Effective Technology

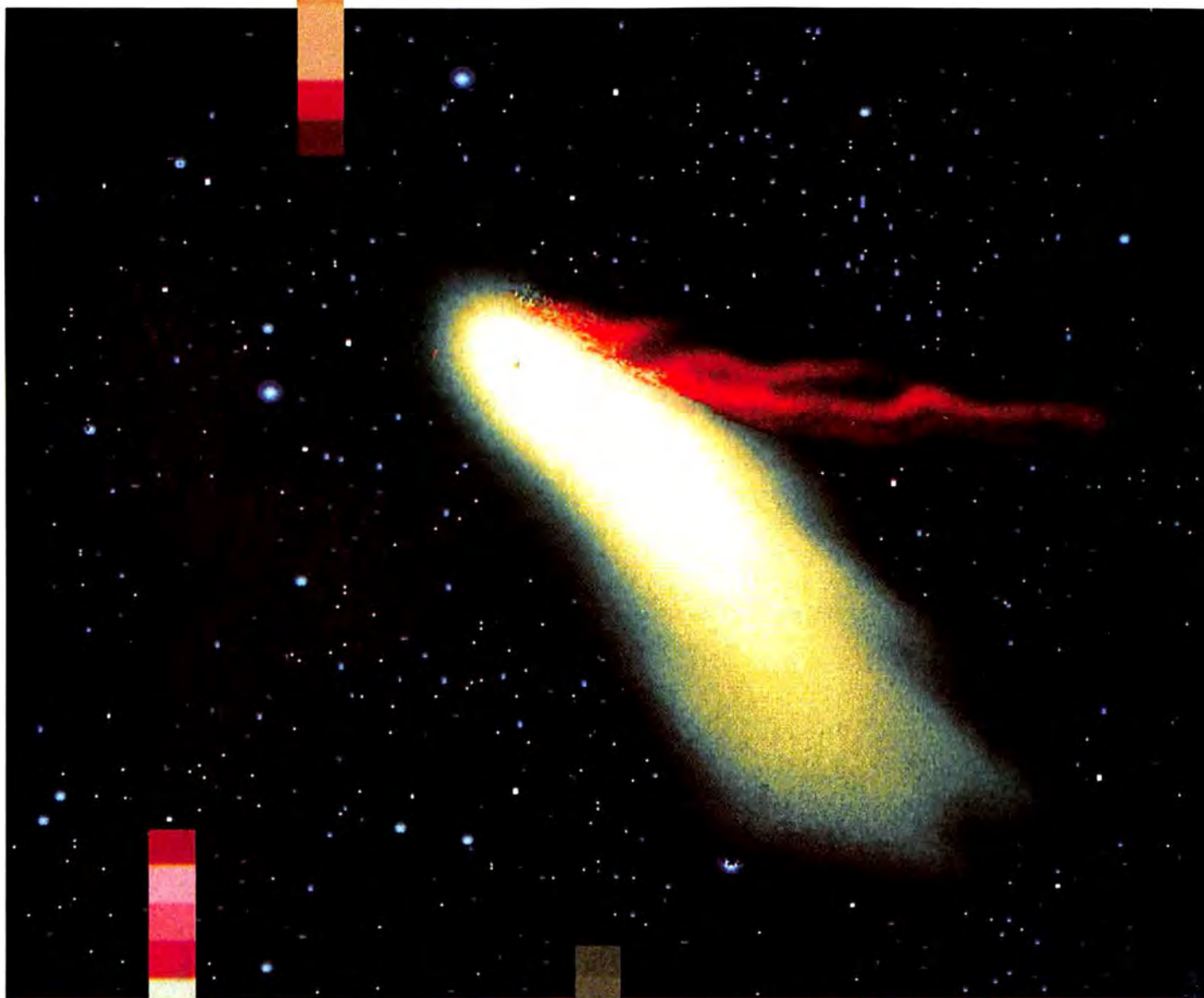
The Aurora 75 is a video graphics system, one of the first to be adapted to the AT. Like other AT-based video graphics setups, such as Artronics' System 8 and Time Arts' Lumena (see "The Lumena Effect" in this issue), the Aurora 75 uses a high-end paint program in conjunction with add-on hardware to store and manipulate images. Once you create an image with a digitizing pad or camera, you can animate it, add titles in a variety of fonts, and generate output compatible with broadcast requirements.

The PictureMaker system from Cubicomp exemplifies another type of technology invading the studio via the AT's low-cost processing power. Cubicomp, a company that develops both broadcast and computer-assisted design (CAD) modeling systems, has developed PictureMaker specifically for three-dimensional animation of fully shaded, realistic images. According to Ken Creasman of Yale Video Productions in Anaheim, California, "To be able to compose something in three dimensions and move through it or around it is a totally new capability for an AT-based system."

PictureMaker offers a low-cost way to give commercials, local programs, and industrial videos the slick "network" look expected by increasingly sophisticated viewers. "People are getting used to flashy computer graphics," asserts Cubicomp founder Edwin Berlin, Jr. "They've all seen *Star Wars* and other movies that use these effects, and they want to see more. It captures the attention of the audience."

Computer-generated animation is also enhancing the look of corporate video productions. Using an AT-based system, independent producers can offer corporations impressive graphics for both public relations and in-house communications videos without busting budgets. Three-dimensional animations are particularly effective for industrial training applications, because they can combine lifelike simulation with diagrammatic techniques such as exploded views.

In a television studio context, video graphics and solid-modeling systems usually take on different roles. The video graphics system's ability to do fast, simple, two-dimensional animation makes it ideal for time-sensitive news and weather applications. The



This frame from a flight simulation of Halley's comet was fashioned on the Aurora 75 for NASA by artist Richard Sloss.

fashionable three-dimensional look offered by solid-modeling programs takes more time and effort to animate, but it's a guaranteed attention-getter for program openings and commercials.

Judy Rosenfeld, art director for television station KRON in San Francisco, has experience with both types of systems. "With a video graphics system it's difficult to show multiple views of something as descriptively as you can three-dimensionally." However, because of the time required by solid-model animation, "I see three-dimensional systems being used for long-range animation projects and news documentaries," she says.

Designed With the Artist in Mind

Traditionally, creating animation has been redundant, expensive, and time-consuming—just the kind of process that begs for computerization. Using classic animation techniques, a 30-second sequence requires at least 360 drawings, each duplicated onto

an adjacent pair of film frames. Since the 1960s, innovators have used computers in an attempt to ease this repetitive labor, but with varying degrees of success.

One major breakthrough in computer animation was also a watershed for computer graphics as a whole. This benchmark was SuperPaint, a system developed in the mid-1970s that foreshadowed today's Macintosh-style, icon-driven graphics. Using a digitizing pad and offering ten simultaneous on-screen colors, SuperPaint enabled artists to draw directly into a frame buffer, a dynamic memory device that allowed real-time image manipulation.

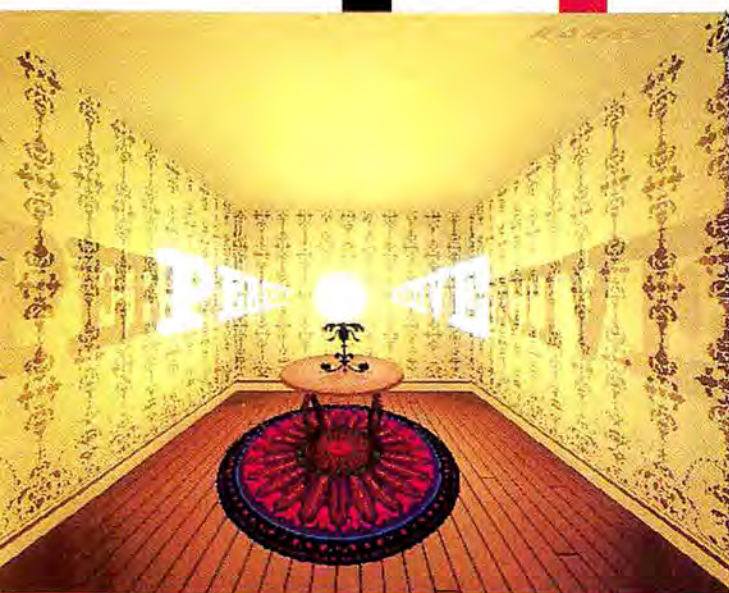
The similarity between SuperPaint and Macintosh graphics is not coincidental. The developer of SuperPaint, Dick Shoup, designed the system in the mid-1970s at the renowned Xerox Palo Alto Research Center (PARC), the birthplace of many features found on the Macintosh.

Damon Rarey, then a freelance graphic artist, met Shoup in 1976 and became instantly enamored of SuperPaint. Together Rarey and Shoup refined the machine's user interface, giving it a wide array of brushstroke and drawing functions. In 1978 and 1979, the two used SuperPaint's animation capability to create sequences for NASA illustrating the Pioneer space probe missions to Venus and Saturn. "Every

'The advent of AT-based graphics systems has made enhanced graphics capabilities affordable.'

night," recalls Rarey, "we saw our work on the evening news. This convinced us that computer graphics for television was the coming thing."

Shoup and Rarey started Aurora Systems in 1980 and together developed the minicomputer-based Aurora 150, an enhanced version of SuperPaint that sold successfully to broadcasters. This video graphics system was later upgraded to the Aurora 100, which boasted a \$100,000 price tag—not exorbitant by broadcast market standards. But when the PC AT came along in late 1984, Aurora "went for it," according to Rarey. The larger system's software was ported



Aurora Systems cofounder Damon Rarey created this image to demonstrate the Aurora 75's perspective capabilities.

to the AT in just under three months. Rarey and Schoup introduced their new model, the Aurora 75, in April 1985. Says Rarey, "After being accustomed to a large rack-mounted system with so many pieces, to see it all on a desktop was pretty amazing."

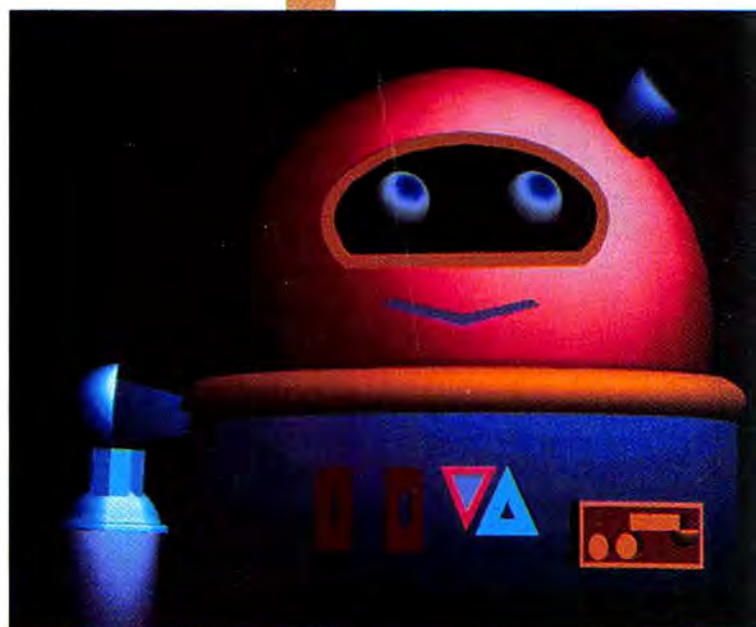
Affordable Configurations

KFTY in Santa Rosa, California, is a typical example of a small station that's taking advantage of Aurora's decision to make these capabilities available on the AT. "Normally in a market this size, stations don't have facilities like this," says Joe Perez, KFTY's vice president and director of engineering. "The advent of AT-based graphics systems has made enhanced graphics capabilities affordable."

The Aurora 75's standard configuration includes an enhanced AT with 512K of RAM, a 20MB hard disk, and a 1.2MB floppy drive. All of the system's graphics software is written in C. Although the usual input device is a digitizing pad, you can also use a mouse. Images can be entered through a black-and-white television camera or a "frame-grabber," a device that freezes a discrete frame of moving video. The system has two types of video output: an RGB signal for computer monitors and a broadcast-compatible composite signal for videotape recording.

The system uses two RGB monitors, one for artwork and one for the icon-driven menu system. A third monitor, a monochrome CRT, displays system functions such as picture recall and DOS commands. The palette lets you select and mix 128 on-screen colors out of a possible 16 million. A standard array of brush types is available, and you can customize brush shape and size.

A variety of functions enables you to manipulate previously drawn images. You can cut and paste a portion of an image, scale it to alter its size, and



Top: A frame from an animation created by Tony Caio of Data Motion Art for Nickelodeon Cable. Bottom: A solid model created on the Picture-Maker system by artist Mary Codd; this robot is one of the stars of a demo reel for Codd-Barrett & Associates.

quickly replicate it anywhere on the screen. Pictures can be zoomed in and out for detail work, and you can tilt images to feign a three-dimensional perspective.

The term "user-friendly" may be a cliché, but owners and operators of the Aurora 75 use the phrase with unblushing frequency. "It's truly designed for a graphic artist," says Jeff Van Pelt, vice president and general manager of Third Coast Video, an Austin, Texas, television production facility. Van Pelt bought an Aurora 75 in July 1985 after seeing it at the National Association of Broadcasters show in Las Vegas. "The Aurora system was really the only system designed for user-friendliness," says Van Pelt. "The artist doesn't need to be a computer programmer, because everything is laid out in such a friendly package."

The Aurora 75's key feature, however, is its ability to animate two-dimensional drawings using a process called color table animation. With this method, the Aurora cycles through a range of colors or pixel positions in an image to give the illusion of motion on screen. This function enables you to create and save up to 64 altered images to simulate separate frames.

Color table animation sequences produced by the Aurora 75 can be generated in real time. In other words, you can produce and view an animation immediately, rather than waiting for the computer to painstakingly create frames and transfer them one by one to videotape for later—sometimes much later—viewing. Quick results make color table animation ideal for creating last-minute sequences for news and weather reports.

KFTY got its Aurora 75 about a year ago, primarily for weather graphics. "We access a national data base called WSI," says Perez, "which provides us with compiled National Weather Service data via our 1200-bps modem." Graphics information from WSI includes an assortment of U.S. weather maps showing temperature ranges and frontal movements. "We download these into the AT with various gray level

information, and then we build a color palette on the Aurora so that each gray level will be represented by a discrete color. And the Aurora plugs in all the right colors for each level."

Local news and weather is one of the most competitive areas of television, and audience reaction is closely monitored by stations and advertisers. Apparently, KFTY's audience has taken notice. According to Perez, "We measure viewer response with phone calls, and we've had lots of favorable reactions."

■ An Added Dimension

"The difference between a two-dimensional system and a three-dimensional one is like the difference between an oil painting and a piece of sculpture," says Judy Rosenfeld of KRON. An artist using the Aurora 75 can draw in perspective or use the system's ability to tilt or angle an image to create the illusion of depth, but the image is still essentially two-dimensional.

"Realizing the difference between something that has perspective drawn into it and something that's actually a three-dimensional model—that's a major hurdle for people to get over," says Ken Creasman of Yale Video. Solid-modeling systems like Cubicomp's PictureMaker hold a three-dimensional description of an object in memory, even though you can view only one side of the object at a time. When Creasman first encountered the PictureMaker system at the Siggraph graphics trade show, he was captivated: "You mean this thing really knows there's depth?"



Cubicom founder Edwin Berlin, Jr., is used to this kind of reaction, even from experienced users of three-dimensional animation systems. Conceived as a PC-based system from the start, PictureMaker is one of the only solid-modeling systems for television animation that runs on anything less than a minicomputer.

PictureMaker has its foundation in flight simulation technology. After designing the hardware and software for a \$4 million flight simulator for the Grumman Aerospace Corporation, Berlin made a private wager: "I bet that the same design approach could be used to produce a solid-modeling system that ran on a microcomputer and ran faster than mainframes did at the time."

'The difference between a two-dimensional system and a three-dimensional one is like the difference between an oil painting and a piece of sculpture.'

In 1982, a few years later, Berlin started Cubicom with those same goals in mind. At first the applications Berlin envisioned had little to do with animation. "We started making a general-purpose product that we were going to sell to CAD users, people in research environments, package designers, and space planners. And then we found this tremendous demand from people in video animation."

The first product that Cubicom introduced, in June 1983, ran on the IBM PC. "When the AT came along," says Berlin, "we found that with very little additional work, we could run [our software] on the AT—and at about three times the speed." Cubicom's

own frame buffer lies at the heart of the PictureMaker system, storing two full 512- by 512-pixel frames at 16 bits per pixel. Output from the system provides the sync signals required for television recording.

One of the biggest annoyances in computer animation and modeling has been the moving, jagged edges that appear on lines not absolutely parallel to the vertical or horizontal axes. Known as aliasing, these saw-toothed edges are ugly and distracting. Some high-end graphics systems come close to eliminating aliasing, as does the newly enhanced Cubicom software.

"We want our machines to make pictures look as close to photographs as possible," says Stephen Crane, Cubicom's director of software development. "That's why we've put extra effort into developing our anti-aliasing software." Another sophisticated



Computer animation adds extra punch to logos and show openings, as this frame from an Aurora 75 sequence demonstrates.

Sculpting in the Video Void

When studios look for an artist to operate a solid-modeling animation system, they usually want someone with a background in industrial design or sculpture. Solid modeling requires a different conceptual outlook than two-dimensional artistry. Artists often need about six months to become comfortable with a three-dimensional modeling system.

Cubcomp's PictureMaker, which generated the artwork duplicated here, is one of the easiest solid-modeling systems to use. As shown in Figure A, a common configuration of the system includes an AT, Cubi-comp's CS/16 frame buffer, a digitizing pad, an RGB monitor for the artwork, and a monochrome monitor to display the various menus for drawing, modeling, and animating functions.

To create a three-dimensional animation sequence, you begin by doing a perspective line drawing with a digitizing pad and stylus. The system then

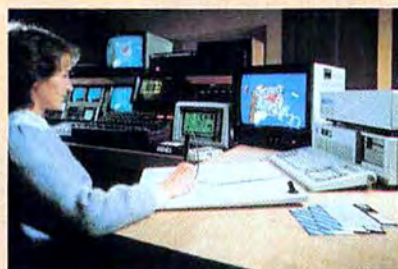
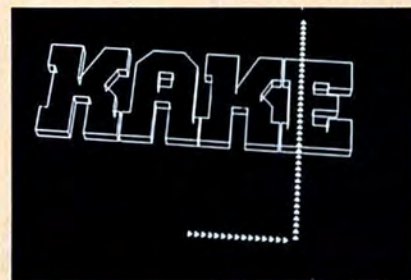


Figure A: Cubi-comp's PictureMaker solid-model animation system, shown here in its typical configuration. The large piece of hardware atop the AT is PictureMaker's frame buffer.

converts this drawing into a three-dimensional wire-frame model composed of transparent polygons (see Screen A). Once the wire-frame object is built, you can instruct PictureMaker to remove the "hidden" lines—those that would normally be concealed when you view a three-dimensional object from one angle.

Using the cursor controls, you can stretch, duplicate, scale, rotate, or even extrude other shapes from the wire frame. When satisfied with the basic design, you recreate the wire frame as a solid model (see Screen B). In effect, PictureMaker fills in all of



Screen A: A wire-frame model of Wichita station KAKE's logo



Screen B: Fully shaded, and combined with a second graphic element, the solid model is ready to be animated.

the object's constituent polygons, which can be smoothed with edging functions or remain hard-edged. You can then color the model with up to 4096 colors from a palette of over 16 million. To create realistic surfaces and reflections, you can position one or more light sources, choose surface textures, and select shading gradations.

The next step is planning the animation sequence. First, you design a map of the model's movement (see Screen C). Then you specify the "key frames"—the beginning and ending frames in a motion sequence—by positioning the model on screen and entering the appropriate command. A wide selection of motion control options tell the computer how the object will move through space on multiple axes and how it will accelerate or slow down during its trajectory. The animation program then creates the required number of in-between



Screen C: Establishing key frames, the first step in the animation process. Real-time previews of the action can only be done with a wire-frame model.

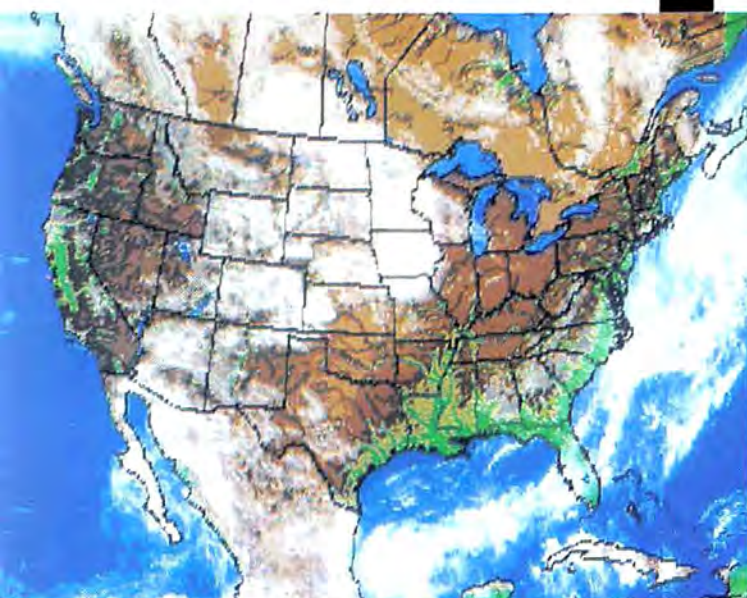
frames needed to make this movement occur on screen.

Two additional programs enhance PictureMaker's animation capacity. *Lumena*, a paint program developed by Time Arts and adapted by Cubicomp, enables you to generate two-dimensional backgrounds for animated sequences and enhance detail on the model before the action begins. PictureMaker's software module helps you create "scripts" for animated sequences containing multiple models, moves, and time sequences. Screen D shows a fully composed frame from a completed three-dimensional animation sequence.

You can preview animation sequences in real time, but only in the wire-frame mode, because it takes about 10 to 15 minutes for PictureMaker to create each fully modeled frame. During the actual recording of the animation sequence, hardware in the frame buffer controls a single-frame videotape editor, which instructs a video deck to record each individual frame—one at a time.



Screen D: A frame from the final animation, including a two-dimensional background created with Cubicomp's adaptation of the Lumena paint program



Top: Artist Robin Stelling produced this news graphic on the Aurora 75 for San Francisco station KPIX. Bottom: A weather map on the Aurora 75 displaying downloaded WSI information.

new software feature is texture mapping, the ability to "wrap" two-dimensional graphics, such as labels for soup cans or soap boxes, around modeled shapes.

For an artist faced with this panoply of functions, generating three-dimensional animation is more complex and far more time-consuming than producing animation with a video graphics system (see the sidebar "Sculpting in the Video Void"). Creating a model means making lots of decisions, such as choosing surface textures, positioning light sources, and selecting shading styles. You must then plot the path of motion and wait for the system to create the appropriate frames, which it then transfers to video individually. As Creasman puts it, "You leave it to cook overnight, come in in the morning, and see if you didn't screw it up."

And there's the rub. While modeling systems enable an artist to create precise, detailed, and often stunning pieces of animation, the cost in time is high. If it takes 15 minutes for PictureMaker to generate each frame, and a 5-second video animation requires 150 separate frames, it would take about a day and a half of nonstop computing just to record the sequence.

■ The Freedom to Create

The visual quality of a television program is often influenced by the amount of time spent creating it. News shows, for example, are extremely time sensitive. Stories must be shot, assembled, and broadcast quickly or their news value is lost. The "news look" is real, immediate, and perhaps a little rough around the edges. In this context, a two-dimensional animation generated by a video graphics system fits right in.

At WTVD-TV in Durham, North Carolina, artist Tom Westarp uses his Aurora 75 for just this purpose. "A lot of times in news you can't get video [footage of the story]," he says. "You need an animated sequence to show what happened. The Aurora's strength is that when you can't get video, you

can draw it. And you can do it in an animated and visually interesting way."

At the other end of the spectrum is the commercial, the 30-second result of months of collaborative planning, shooting, and editing. Some ads look as if they were hand-crafted by Renaissance masters. The strength of an AT-based solid-modeling

Generating three-dimensional animation is more complex and far more time-consuming than producing animation with a video graphics system.

system lies in its ability to supply that kind of world-class imaging at a tenth the price of larger systems. According to Judy Rosenfeld, "I chose the [PictureMaker] system because it did 3-D animation at a very reasonable price. And it did it very well."

For some studios, low-cost animation is the key to a whole new market. Artist Mary Codd, co-owner of CoddBarrett & Associates, an East Coast computer graphics house and systems design firm, says her company produced only slides and illustrations before acquiring an AT-based system. "We weren't doing any animation before. Now we're doing quite a bit. Clients like what we're doing, and they get excited about it."

Perhaps that's the real story here. Despite differences in how they work and what they do, these animation systems have two things in common: Because they are built around the AT, they have brought high-quality graphics and animation capabilities to users who could not previously afford them. And perhaps because of this accessibility, artists, producers, and clients are using these systems to create fresh images and present information from an innovative visual perspective.

"We've acquired new clients as a result of incorporating the Aurora," says Van Pelt of Third Coast Video. "The biggest problem we have now is

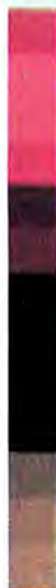
educating our clientele to the abilities of the system. They have to start thinking in another perspective about what they can accomplish."

What impact will these expanded capabilities have on the overall look of television? Cubicomp vice president Stephen Crane thinks the future effects are far-reaching. "As these systems move closer to simulating real visual experiences," he says, "the graphic images created on them will change. Think of it as the freedom to create whatever you want." ●

Paul Meyers is an independent San Francisco television producer who specializes in science and technology. Eric Knorr is an Assistant Editor for PC World.

*Aurora 75
Aurora Systems
185 Berry St. #444
San Francisco, CA 94107
415/777-2288
List price: \$30,000 (includes AT)*

*PictureMaker
Cubicomp Inc.
3165 Adeline St.
Berkeley, CA 94703
415/540-5773
List price: \$29,500*



Animal Trackers

Noah never had it so good. Modern-day zoos use ARKS, PC software that helps them play matchmaker and preserve endangered species.

Janet Goldenberg

||||| If you've ever had trouble keeping track of your relatives, consider the plight of the zoo animal. Born at one zoo, it may move on to several others during its reproductive life, building a roster of ex-spouses, offspring, and in-laws as convoluted as a chapter of Genesis or a season of *Dynasty*.

With tens of thousands of animals in zoos worldwide, keeping track of who begat whom is a prodigious—but ever more important—undertaking. As conservation-minded countries crack down





on the export of wild animals, increasing numbers of zoo denizens are born in captivity, creating a closed pool that must be monitored to safeguard the animals' genetic health. Too much inbreeding may have dire consequences, as European royalty can attest.

With such concerns in mind, a team at the Minnesota Zoo, sponsored by national zoo organizations and the U.S. Department of the Interior, developed a data base called ISIS (International Species Inventory System) to keep tabs on captive animals. Since 1974 the ISIS organization has compiled an inventory of nearly every zoo animal in North America and at 26 zoos in Europe and Asia—in all, more than 70,000 live animals and tens of thousands of their forebears.

ISIS membership is voluntary, with annual fees based on the number of resident animals. Data from participating zoos is fed into a central data base residing on a CDC Cyber mainframe. An annual listing from this data base reports the age, gender, parentage, and location of every zoo-bound creature, from shrews to elephants. When a zoo animal needs a mate, its keepers simply consult the ISIS printout for a suitable match.

More than just a dating service, ISIS is helping the cause of vanishing animals. As the world's wildlands shrink, most zoos no longer see themselves as biological stamp collections but as genetic arks whose mission is to preserve and replenish endangered species. Thanks to zoo-based breeding programs, Przewalski's horse, which had been extinct in its native Mongolia for generations, was recently reintroduced to the wild. The European bison, whose small surviving herds were nearly wiped out during World War II, has also made a comeback courtesy of zoo breeding efforts.



The European bison is now on the comeback trail, thanks in part to ISIS.



Przewalski's horse, shown here at the San Diego Zoo, has similarly been given a fighting chance to be fruitful and multiply.

■ An Animal's Best Friend

Whatever its rewards, maintaining the ISIS data base has until recently been a tedious, labor-intensive process. Each year, local zoo "registrars"—employees who keep track of animal statistics—have had to sift through their records manually and submit updates to ISIS on paper forms. Then, using antediluvian keypunch machines, ISIS entered these records into the mainframe data base.


But last August ISIS programmers took the first step toward automating data entry. The team

produced a package called ARKS (*Animal Records Keeping System*), which enables zoos to use an XT or AT to create local data bases that are also front ends for the ISIS network. Instead of filling out forms, registrars can now extract the necessary updates with a personal computer and upload them to the mainframe by disk or modem. Written with *dBASE III*, which is also required to run it,

animals all have the same sire [indicating the problem is hereditary]. Before, when I had to examine records by hand, this research could take up to half an hour."

Data Base Menagerie

For the present, ARKS's on-site output is limited to three reports: a species inventory, a listing of vital statistics (age, sex, and parentage), and a brief résumé of

 *While it can't stop the plundering of natural habitats, the ARKS-ISIS duo may help buy time for thousands of animals threatened by man.*

the ARKS program costs member zoos \$500. For an additional fee ISIS will download to a member zoo all data the zoo has ever submitted to it. In the case of New York's giant Bronx Zoo, which houses more than 3300 animals of some 600 species, this data consumes 14 floppy disks.

The first to go on line with the new PC-based system was Chicago's Brookfield Zoo, among the nation's ten largest and one of ARKS's original sponsors. With some 2000 animals of 400 species to keep tabs on, Brookfield registrar Rose Scola has found ARKS a godsend. "If a curator says, 'We're having trouble with animals X, Y, and Z—see what you can find out,' I can sit down at the PC and in about five minutes find out these

any animal's zoo career. When additional modules are complete, curators will also be able to generate zoowide profiles on fecundity, mortality, inbreeding, animal lending, and cage occupancy (useful for tracing communicable diseases). Even more valuable from a veterinary standpoint will be an ancillary data base, hooked into ISIS, containing health norms for every captive species. Currently, ailing animals sometimes go untreated because vets don't know they're sick.

In the meantime, aided by its new PC software, ISIS will be able to help zoos stave off worldwide gluts of prolific breeders such as lions and make sure that the breeding of hard-to-manage creatures like the rhinoceros isn't neglected. On a smaller scale, each zoo will be able to tell how many times an animal has been a parent and what happened to its offspring.

While it can't stop the plundering of natural habitats, the ARKS-ISIS duo may help buy time for thousands of animals threatened by man. "We haven't been around long enough to say we've saved any species from extinction," says ISIS research analyst Larry Grahn. "But what we have accomplished is to prompt a much-needed conservation effort among zoos. When ISIS first started, the conservation idea was too novel for some zoos to swallow. When they needed a new giraffe, they went directly to a dealer in Africa. It's taken a while for the old-school zoo boys to realize that those days are gone." ●

|| Janet Goldenberg is a freelance writer based in San Francisco.

ISIS

c/o Minnesota Zoological Garden

12101 Johnny Cake Ridge Rd.

Apple Valley, MN 55124

612/432-9010

List price: \$500

dBASE III

Ashton-Tate

10150 W. Jefferson Blvd.

Culver City, CA 90230

213/204-5570

List price: \$695

Requirements: 256K, two disk drives

The America's Cup AT

The San Francisco Bay Area's St. Francis Golden Gate Challenge hopes to bring the America's Cup back to these shores with a sailboat designed and monitored by PCs.

John Faulkner

When the *Freedom*, skippered by Dennis Conner of the San Diego Yacht Club, lost the America's Cup to the *Australia II*, Australia's innovative winglet-keel sloop, Conner's archrivals in San Francisco immediately began their attempt to beat the Aussies with some high-tech innovations of their own.

All 13 yachting organizations competing for the America's Cup (AC) in 1987 will be using computers in some capacity, but only the boat developed by St. Francis Golden Gate Challenge will be completely designed and lofted on computers. (Lofting involves drawing full-scale patterns from which the boat is then made.) IBM PC XTs, ATs, and a Tandy 2000 will be involved in the most prestigious sailing race in the world.

The St. Francis Golden Gate Challenge syndicate will be trying to bring the AC to the San Francisco Bay for the first time. The syndicate is spending \$10 million in an effort not unlike that of the first race in 1851, in which a single Yankee upstart schooner beat a fleet of British yachts around the Isle of Wight. The *America*, the victor in that contest, gave its name to a race won by superior sails and the most advanced hull design of its time.

The San Francisco-based team of sailboat racing experts intends to put a boat in the water that is a generation or two ahead of what is now considered state of the art. In preparation for the AC race in 1987 off Fremantle, near Perth, Australia, the Challenge team is designing its boat on PCs using CAD (computer-aided design) software. The team will also mount a PC on board to record and analyze pertinent boat and wind data.

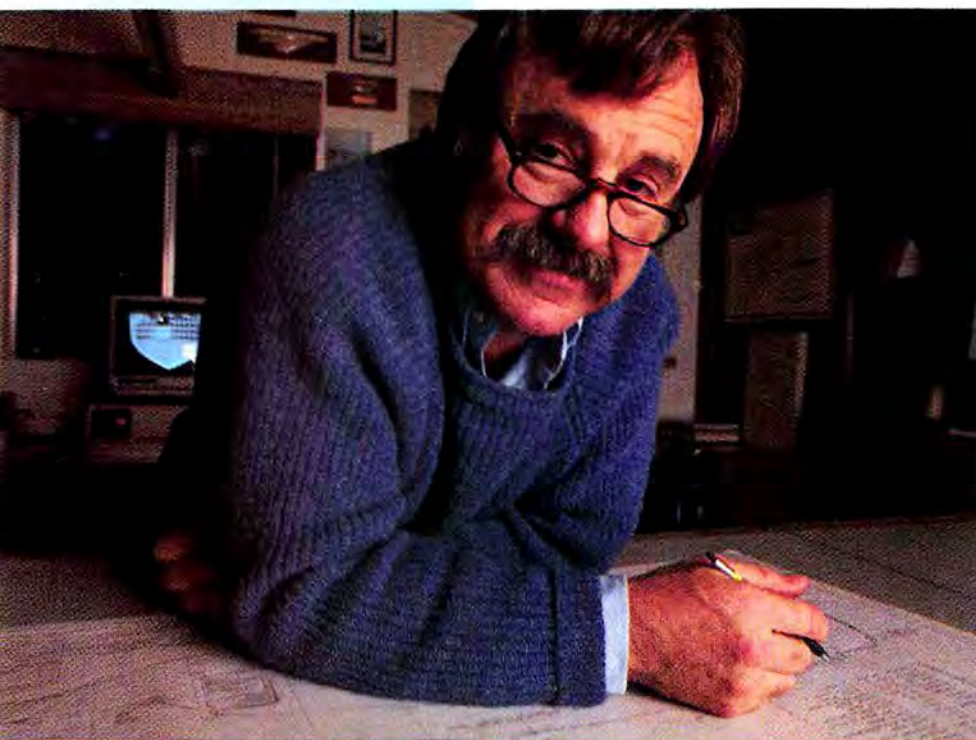
Secrecy is a difficult, but necessary, part of this extremely competitive endeavor. Plans are carefully locked away, employees must sign nondisclosure agreements, and teams have been known to check their offices weekly for bugging devices.

High-Tech Sailors

It would be hard to duplicate the expertise, skill, and experience of the brain trust designing the Challenge's boat: just a bunch of sailors who happen to include a world-class sailing master for more than two decades, an experienced naval architect, a Star Wars scientist, and an aerodynamics whiz. ▲



The Australia II, its spinnaker like a canvas balloon, leaves the Freedom in her wake during the final contest of the 1983 America's Cup race.



Naval architect Gary Mull: a pioneer whose designs—and pride—are on the line

Tom Blackaller, the Challenge's sailing coordinator and general manager of operations, has been sailing in world-class events all his adult life. He skippered the *Defender* in the 25th AC defense in 1983 but lost to San Diego's Conner, who, in turn, couldn't outperform the Aussies' unbeatable winglet keel (see the sidebar "On a Winglet and a Prayer").

Gary Mull is a pioneering naval architect who works out of his home in Oakland, California. In the last 25 years, he's been responsible for more than 180 innovations in yacht design. An avid sailor himself, Mull says, "I've got a huge ego, and it's on the line with this boat." It's his job to come up with a shape for the sloop, ensuring, among other things, that it floats and is rated according to the International Yacht Racing Union's stringent Twelve-Meter Rule (see the discussion under "Not a Meter More").

Designing on a Tandy 2000 and a souped-up XT, Mull is like a kid with a new sports car. "We use a super XT that has guts I can't talk about," he enthuses. Proprietary enhancements aside, much of Mull's hardware is off the shelf, including a Hercules graphics board and a Princeton monochrome monitor.

Dr. Heiner Meldner, a Soling Class sailor, is a computational physicist who works at the Lawrence Livermore Laboratory in Livermore, California. He coordinates Strategic Defense Initiative research and, on the side, employs a Cray mainframe—the XMP 48—to do fluid computational modeling (that is, simulating the movement of a hull through fluids). Meldner uses a PC AT as a dumb terminal to the Cray and a PC XT that is the sister machine to Mull's XT. Meldner and Mull telecommunicate with Hayes Smartmodems and *Smartcom*.

Alberto Calderon is an aerodynamic specialist and president of Advanced Aeromechanisms in La Jolla, California. Known internationally for his aerospace research, Calderon works on keel- and rudder-oriented lift and drag, and handles wind tunnel testing.

This high-tech design team divides the work load into three parts. Calderon studies aerodynamic forces on the foil, or keel, of the boat, while Meldner concentrates on fluid computations—what the keel encounters as it cuts through the water. Incorporating their findings into the shape of the boat is Mull's job, which he shares with his PC.

These days, anyone serious about winning the AC is using computers in some capacity. As Calderon explains, "The major teams—the English, the Italians,



and the San Diegans—are all using the physics and methodology of aerospace vehicle design”—and that’s where the PC comes in. Adds Calderon, “The difference [in reliance on computers] is simply one of degree.” Even in the last race, the teams used computers to check formulas and displacement calculations. The PC performs flotation analysis and generates water displacement codes, basic stability criteria, and “what-if” scenarios testing the structure under various wind and sea conditions.

Not a Meter More

All this high-tech madness pivots around the Twelve-Meter Rule, which is simply a metric system formula consisting of length plus sail area divided by 2.37. If the resulting number is 12 or less, you can play. Usually, if you change even one keel dimension,

you have to change other measurements as well. “If we want something long, we have to make something else short,” Meldner explains.

In addition to the rating rule, each syndicate must submit all its structural drawings to Lloyd’s Register of Shipping, a society that tells shipbuilders, owners, and insurers how ships should be built so the vessels don’t malfunction—and end up costing huge sums of money. Every week during construction of the Challenge sloop, Lloyd’s surveyor stops by with a micrometer to check the boat against submitted drawings.

Numerous specifications govern weight and building materials, most of which are aluminum alloys. No matter what kind of metal is used for the hull, the structure must weigh so many pounds per square foot. Another set of regulations governs the weight and dimensions of the mast.

A familiar face peering out from within a wall of high-tech nautical hardware, a PC monitor is a mainstay of the navigation station on the yacht Boomerang.

On a Winglet and a Prayer



The Australia II's break-through winglet keel delivered unbeatable speed—and issued a challenge to Cup contenders.

The decisive difference between the winner and the loser in the 1983 America's Cup race was under water. The Australians' winglet keel catapulted the contest out of the nineteenth century with an American idea that has made the race as much a test of technology as of sailing skill. Dr. Heiner Meldner puts the innovation into historical perspective: "The Aussies' boat was the *Sputnik* of yachting. They're one step ahead."

According to Naval architect Gary Mull, the Australians' secret was developed by Richard Whitcomb at NASA. The winglet keel built for the 1983 race was similar to the specifications that appeared in Whitcomb's 1976 NASA research paper.

Whitcomb's paper reads, in part: "Winglets, which are small, nearly vertical winglike surfaces, substantially reduce drag coefficients at lifting conditions." Although Whitcomb was writing about

airplanes, the principles he elucidated can be applied to any foil—in this case the keel of a racing sloop.

Meldner tried to convince the Americans of Whitcomb's idea shortly after the paper was published, but the U.S. contingent was concerned about possible violations of the exacting Twelve-Meter Rule. Meanwhile, the Aussies incorporated the innovation.

An Australian official did report the design peculiarity to his national sailing authority as prescribed by Section 28 of the rule, but the Australians did not come forward to the International Yacht Racing Union (IYRU), which administers race regulations. The New York Yacht Club, cup holder and defender for 132 years, lodged a formal protest to the IYRU but later withdrew the complaint.

Despite the Twelve-Meter Rule's strict limits, winglets are today regarded as acceptable. With PCs and other accoutrements of high-tech

now deeply involved in the sailboat design process, the big question is, what next?

Tom Blackaller, the St. Francis Golden Gate Challenge syndicate's sailing skipper and general manager, is delighted at the potential for innovation. "There's been a headlong rush by all the syndicates that build America's Cup boats into so-called high technology," he says. "The danger is that every crackpot in the world believes he can produce a faster sailboat. We're going to see a lot of funny boats floating around. But one of these wild ideas is going to succeed. The team that puts the whole thing together—that has the revolutionary idea that works and incorporates it into a system that can be operated by a crew that knows sailing well—is going to win."

■ Blueprints for Boating

Designing an AC boat involves tolerances similar to those used in designing an airplane for a specific flight envelope: altitude, speed limitations, and fuel range. Because an AC boat races on a specific course, its envelope is small. Mull can design a rudder, for example, that will give its peak performance under the exact conditions that the team will experience in Perth. The water in Perth is 4 to 5 degrees warmer than the Atlantic, the site of all previous races. Water characteristics, particularly fluid drag, vary considerably with temperature.

The basic design process begins by determining how big the boat should be. The Twelve-Meter Rule is extremely restricting: The boat can be long and the sail area small, or the reverse. The designer then attempts to choose a water line length for the conditions of the course at hand. Once the length is determined, the designer can work out the sail area. This in turn determines a certain draft (that is, the depth of the boat in the water) and stability. The architect can then choose a shape that conforms to the Twelve-Meter Rule and can handle the conditions of the ocean course.

Without a computer, a fast, experienced draftsman would need 80 to 100 hours to draw a set of lines that would define the boat's



World-class skipper Tom Blackaller: The race is now to the swift... and the computer literate.

shape. Those lines would then go to the builder, who would create a model in four to five weeks. Another week or so would be spent testing the model in a towing tank, where readings determine stability, trim and resistance, lift and drag, and other pertinent performance data. Nine or ten weeks after the first blueprints, a designer could learn how one proposed shape would work.

"In the America's Cup effort, you've got about 20 or 25 months in which to field a boat," says Mull. "If you spend three months on a shape, the most you can do is only about eight shapes. With a computer, you can develop a shape in a day."

The Challenge syndicate plans to build two boats; quickly transforming ideas into shapes makes such ambitions feasible. The first design approach will be evolutionary, or conservative, incorporating subtle changes to the hull and keel-rudder configuration. The second boat will be revolutionary. Major breakthroughs in design are expected to make it faster than any of its AC predecessors.

■ CAD Workhorses

Mull relies on two complementary CAD programs: *AutoCAD 2* and *Design Board 3D*. The latter can develop and draw intricate three-dimensional shapes that can then be read by *AutoCAD 2*, which is ideal for designing repetitive machine parts or dimensioning a complicated part. Using *AutoCAD 2* takes the guesswork out of building boat components. "We can have a specific foil built for a particular speed," Mull says. One *AutoCAD 2* feature permits sophisticated cut-and-paste, the integration of a complex set of lines into an existing figure—an essential capability in a job as massive as shaping a sailboat.

AutoCAD 2 also helps form the curves that define sailboat hulls. "It's sometimes necessary to draw a line tangent to a circle or a curve," Mull says. "Mathematically, you can come up with a perfect solution, but you could never do that by hand."

Mull also uses *Fairline-2B* and *Linefair*, both of which were written specifically for naval architecture. They are calculation-intensive programs that use the 8087 math coprocessor. Both programs

provide an on-screen graphic representation of the boat shape but store shape information numerically; that data can later be used when lofting the patterns to build

in BASIC and FORTRAN to solve specific problems. "We were developing software and using it at the same time," explains Mull. "This software isn't five lines of code in

'Computer simulation allows us to be much less conservative. We can get a wild idea, and if it doesn't work out, it only costs a day—not three months.'

the boat. The programs also provide subroutines that automatically calculate the vessel's displacement and stability.

"Neither AutoCAD 2 nor Design Board 3D is particularly good at the curvilinear shapes you find in a yacht," Mull says. "Both handle circles, arcs, and ellipses well, but Fairline-2B and Linefair truly do the job. When you're using either to draw a three-dimensional shape, you can draw a line in one and know it will be consistent and smooth in all three planes automatically.

"Computer simulation allows us to be much less conservative. We can get a wild idea, and if it doesn't work out, it only costs a day—not three months. With the PC, you can hit three or four buttons and go have lunch while it's figuring the problem out."

Finding the right software wasn't easy. Because relatively few ready-made programs exist, team members wrote custom software

BASIC. It's very intense. We've been right on the leading edge of this kind of development work."

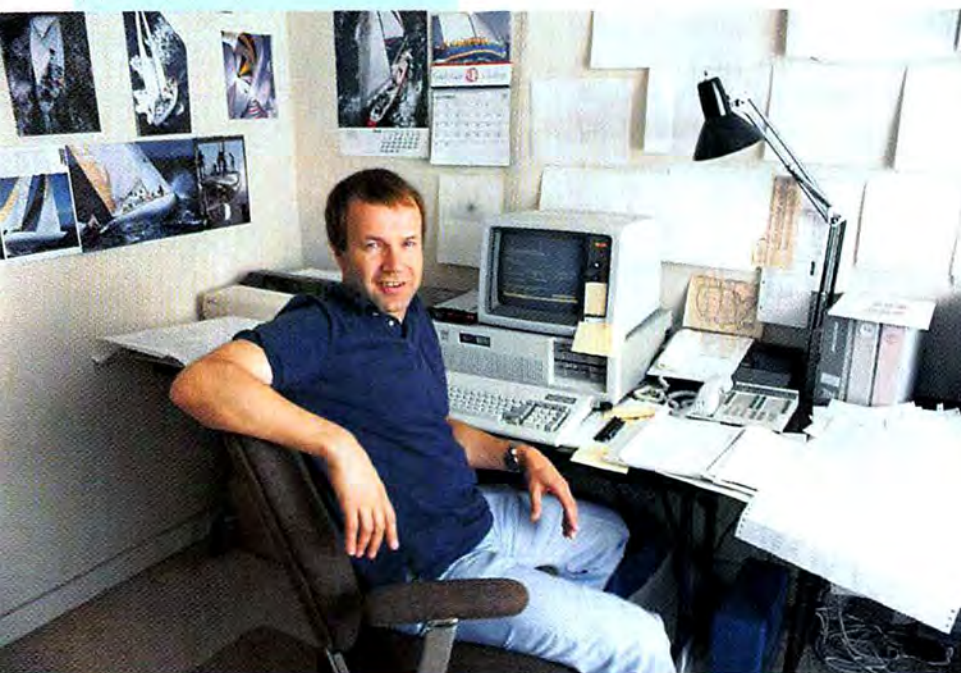
Computerized Construction

For the Challenge team, computer usage doesn't stop with design. Lofting—drawing the huge, full-scale patterns—is also a computer-based process. "To the best of my knowledge," says Meldner, "we are the only team that has full-scale, high-quality lofting on mylar—a 65-foot frame and gigantic hull are plotted by computer."

Lofting is done on an enormous Gerber plotter driven by a mainframe, which reads data from ½-inch magnetic tape. For reasons of convenience and security, Mull refrains from telecommunicating certain data from the XT to the mainframe. Instead, the information on the boat's shape is stored on a 5¼-inch floppy disk that Mull takes to a cooperative corporation where the data is transferred from the disk onto ½-inch tape. He then tucks the spool of tape under his arm and leaves it



PCs may contribute to a vessel's design, but actual boat construction remains a muscular task.



**Physicist and sailor
Heiner Meldner: using a
Cray and an AT to go
with the flow**

with his friends who have the Gerber plotter.

"In the old days, you had to have a guy crawling around on his hands and knees drawing these things full-size using battens and judgment," says Mull. "With the computer, instead of a loftsmen taking three or four weeks to loft the boat, we do the job on mylar patterns in a bit more than an hour."

■ PCs on Board

When the sloop is finally lowered into the water, PCs will be on board to gather performance data, analyzing that information while the boat is engaged in qualifying tests. The team commissioned the firm of Durgan-Wake & Associates to develop

specialized software for that task. The resulting *CompuSail* program will predict the boat's performance under every conceivable wind and sea condition, relying on an 8087 coprocessor to do the ambitious calculations. And because the PC is integrated into the boat's instrumentation by a single cable, the computer can easily be removed for other uses.

CompuSail will enable the Challenge team to track the boat's performance in various course positions, taking into account wind speed and direction and sea conditions. The software produces a polar diagram showing the angle of attack, the degree to which the boat heels (or tilts) in the water from 30 to 180 degrees, and its speed (from 2 to 30 knots). Displaying target information for the crew, *CompuSail* can suggest how to trim the sails given a specific boat speed and angle into the wind. The New York Yacht Club's *America II* will also be equipped with *CompuSail* when the trial races begin next year.

■ The Racing Salt

Tom Blackaller is optimistic. "The most valuable part of our system is Heiner Meldner's attempt to predict the speed of a complex, underwater hull/keel/rudder/appendage system of an AC sailboat," he says. But Blackaller questions the practicality of using PCs on board. He suggests the instrumentation remains prone to a margin of error too wide for accuracy in determining boat speed. (Boat speed is usually calculated by combining wind direction with wind speed, hull speed,

and the boat's course through the water.)

It's Blackaller's job to optimize that speed against his rivals. "A speed difference of $\frac{1}{100}$ of a knot is

board, he feels strongly about the computer's role in the design process. "I don't see the possibility of winning with an old design," he says. "There are only five or six

When the sloop is finally lowered into the water, PCs will be on board to gather performance data, analyzing that information while the boat is engaged in qualifying tests.

a relatively big difference," he says. "In a 4-hour race, if you were $\frac{1}{100}$ ahead, you'd have a reasonable lead—211 feet, or roughly three boat lengths—which is plenty to win. The things that are never brought into the equation are the condition of the sea and the character of the wind."

According to Durgan-Wake, such omissions have occurred in the past, but technology is now catching up. When the Challenge boat is rigged with the latest computer gear, the team will be able to adhere to very tight tolerances. That will certainly help, but only the sailor can sense what the wind is like 100 yards ahead. Subtle discrepancies become obvious once a boat is in the water.

Although Blackaller is not convinced that the PC can help on

teams in the world that can compete at this level. But competing with them, you'd better have the fastest boat." ●

John Faulkner is a freelance writer living in San Francisco.

AutoCAD 2
Autodesk, Inc.
2320 Marinship Way
Sausalito, CA 94965
415/332-2344

List price: Advanced Drafting Extension (ADE) 2 \$2200, ADE 3 \$2500
Requirements: PC 640K, two disk drives, DOS 2.10 or later version, Hercules graphics board (hard disk, AST SixPakPlus, 8087 math coprocessor recommended); XT 384K (640K recommended)

Compu-Sail
Durgan-Wake & Assoc.
881 W. 16th St.
Newport Beach, CA 92663
714/631-8835

List price: \$3500
Requirements: 256K, one disk drive, DOS 2.00 or later version, 8087 math coprocessor

Design Board 3D
MegaCADD
401 2nd Ave. S, 5th floor
Seattle, WA 98104
206/623-6245
List price: \$1750
Requirements: 512K, two disk drives or hard disk, DOS 2.00 or later version, 8087 math coprocessor, graphics board, mouse or digitizer; Houston Instruments DMP series plotter recommended

Fairline-2B
Letcher Offshore Design
P.O. Box 104
Southwest Harbor, ME 04679
207/244-7347
List price: \$495
Requirements: 128K, one disk drive, DOS 2.00 or later version, graphics board; Houston Instruments DMP series plotter recommended

Linefair
Coast Yacht Design
10073-136 A St.
Surrey, British Columbia
V3T 4G1 Canada
604/584-6118
List price: \$2000
Requirements: 128K, two disk drives or hard disk, DOS 2.00 or later version, graphics board; Houston Instruments DMP series plotter recommended

High-Tech Harvest



A wine industry brochure proclaims that “wine is made only by nature,” and man, “for all his scientific knowledge, is relegated to the role of helper.” The PC is also lending a hand.

Marina Hirsch

On spring and summer days, California’s Napa Valley is drowsy with heat. Grapes bask on the vine in row upon orderly row, as far as the eye can see. The California wine industry has its roots here in the fields of the valley.

This lush life draws new devotees every year. The number of wineries in the valley has more than doubled over the past decade, and California is now host to

more than 650. But in recent years the state's wine business has fallen on drier times. The strength of the dollar in Europe has reduced the export demand for California wines and has made European vintages more attractive to American consumers. In such times, help with forecasting changing patterns of demand, narrowing the margin for error, and cutting costs is invaluable. With spreadsheets and with specialized software written specifically for wineries, the PC is supplying that help—from the planting of grapes to their harvest, from the crush and the fermentation to the bottling, and, ultimately, the sale.

■ The Business End

As an industry steeped in centuries of tradition, wine making is especially resistant to change. According to Dr. Roger Boulton, an associate professor at the University of California at Davis' Department of Viticulture and Enology, "There is still a widespread conception of wine making as an ancient art that would be corrupted by automation." George Schofield, an independent financial consultant to wineries, notes, "Many wineries are small, family-owned businesses, and they just aren't familiar with PCs."

To spread the word, Schofield carts his Compaq and a printer along when he visits clients; he uses their own data to show them what the machine can do. And vintners are catching on. According to Derek Holstein, a winery software consultant, financial managers in the wine business are eager to integrate PCs into their

offices. No statistics are available on how many vintners have turned to PCs, but Harvey Steinman, managing editor of the *Wine Spectator*, an industry journal, claims that "virtually every winery is using a PC in some capacity," usually in the accounting, administrative, or marketing realm.

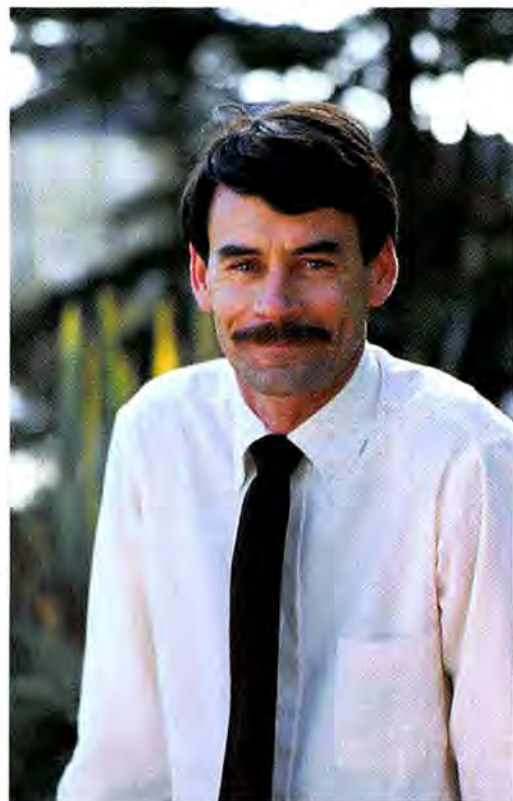
PCs are also appearing on the operating and production side of wineries. Its reputation as a genteel vocation notwithstanding, wine making is, after all, a business. And like any business, it has mailing lists, payroll and personnel records, and inventory files to maintain and information to telecommunicate.

Peter Mondavi, Jr., Charles Krug's vice president of processing and engineering, has a B.S. in mechanical engineering and an M.S. in engineering management from Stanford—and a vast interest in the possibilities of technology. Krug builds its data base "in the field." Each load of grapes is tested for sugar and acid level and weighed in at a test stand. That data, along with information on the grower, the grape variety, and the region the grapes came from, is entered into a minicomputer; Krug personnel also keep tabs on their data with HP portables. "There's an initial piece of paper, a source document you can give to the grower," explains Mondavi. "But from then on, it's all electronic."

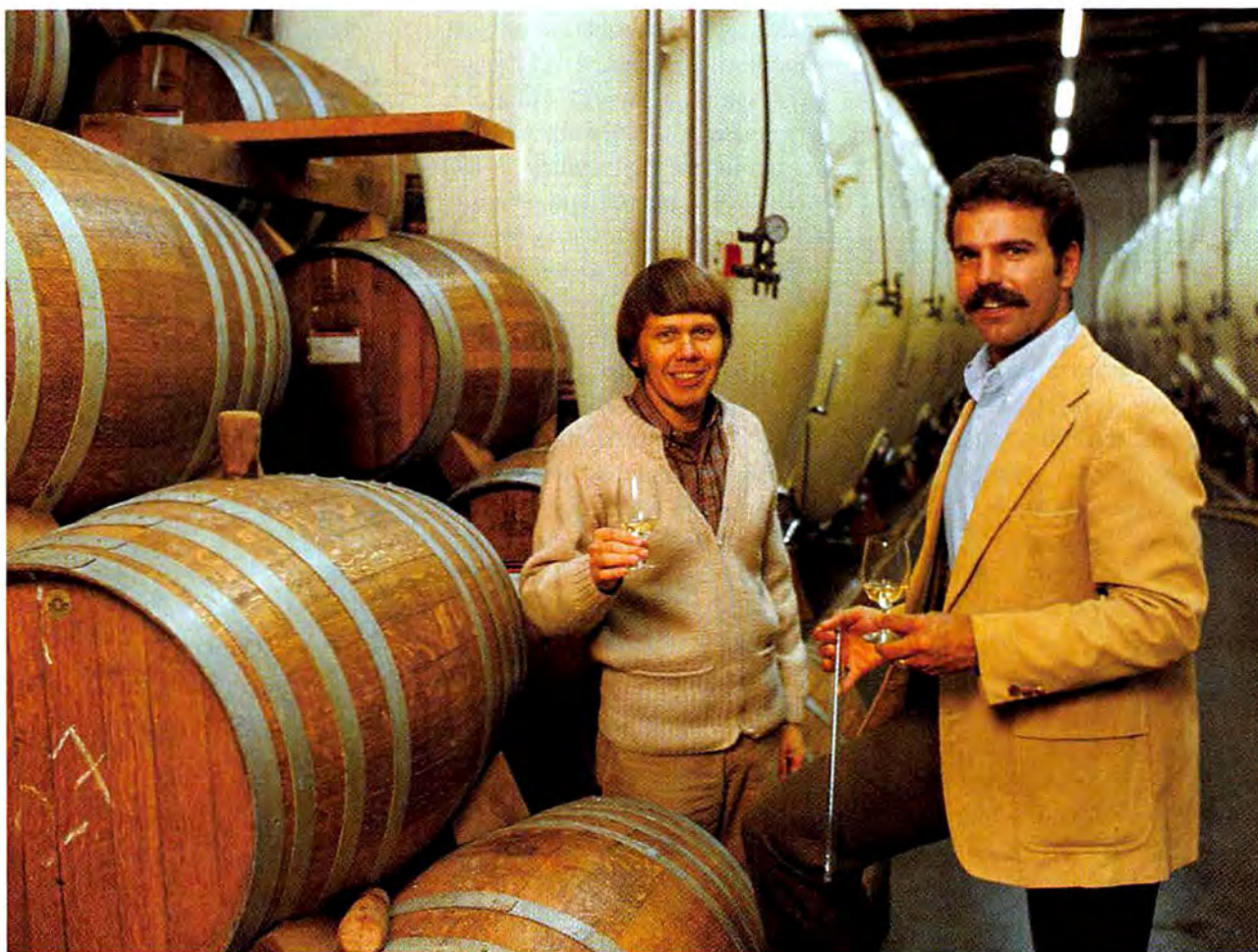
■ Planting Doubts

Grape growing and wine production call for endless calculations: How fast will different crops ripen? How many tons of grapes will be needed to make how many cases of wine to meet a market demand at what fluctuating level? How much will it cost—

To UC Davis's Dr. Roger Boulton, the automation of wine making is as natural as cork.



Vintner Peter Mondavi (right) and software consultant Jim Vahl sample the fruits of their labors.



in labor, time, and acreage—to plant and harvest those grapes? And what about optimum levels of fertilizer and water? Because many wines are slated for sale a good five years or more after they're bottled, long-range planning is essential.

Some wineries are engaging in crop planning and forecasting via models created with off-the-shelf spreadsheets. Holstein specializes

in developing custom 1-2-3 templates for client wineries, designing menu-driven systems for tasks from growing grapes to blending the wines (see Screen 1). Franciscan Vineyards president Agustin Huneus trusts 1-2-3 to calculate the amount of acreage needed to produce a given amount



of grapes and how much wine those grapes will yield. Armed with such information, he can schedule harvest dates and anticipate whether the company will need to sell or buy grapes for its crush.

Vintner's Helper

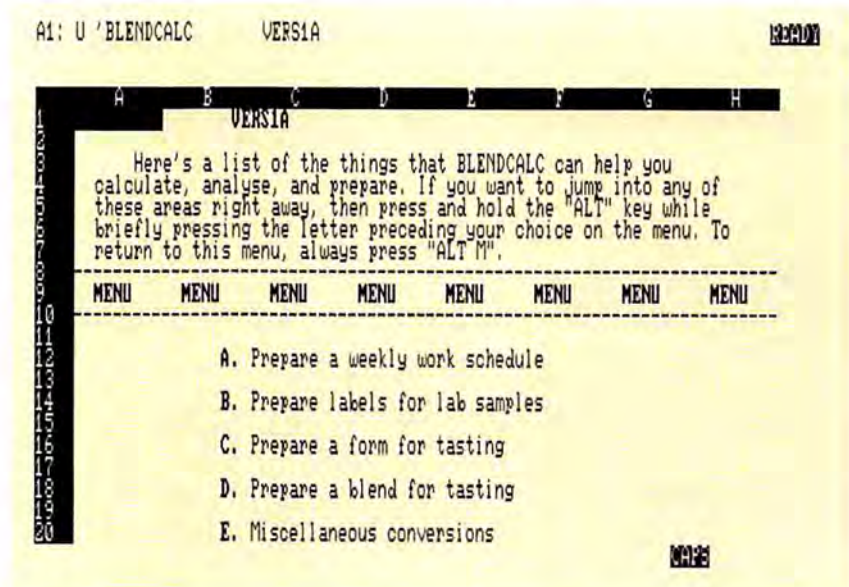
Full-blown software designed to handle tasks specific to the wine business is steadily becoming more abundant. Such software generally falls into two categories: programs that assist with wine production and packages that take care of a winery's inventory needs. Production programs track grapes, often from planting to the time they are harvested, brought to the winery, crushed into juice, blended, put in stainless steel tanks for fermentation, and bottled. Inventory programs handle such matters as case goods/inventory, order entry/invoicing, accounts receivable, sales analysis, accounts payable, and general ledger.

The inventory needs of wineries far exceed those of most businesses. For tax purposes, wineries must document all movement of their products for the Federal Bureau of Alcohol, Tobacco, and Firearms. Wineries must also pay an excise tax on a wine's alcoholic content and be able to confirm the region, the alcoholic content, and the grape claimed on a wine's label. Thus, if a label maintains that the roseate liquid inside the bottle is a 1974 Alexander Valley Cabernet Sauvignon that is 12 percent alcohol, the winery must have records to prove it.

Adding to the rigors of record keeping is the tourist trade. According to *Wine Country* magazine, the Napa Valley rivals Disneyland as California's largest tourist attraction. The impressive ceiling-high oak casks; the ubiquitous, deliciously dark fragrance of the wine; and the polished showmanship of the tour guides draw more than 1 million tourists to the valley each year. Visitors who come to taste often stay to buy, and tracking the varieties, vintages, and amounts they purchase calls for some sophisticated record keeping.

Data Consulting Associates of Occidental, California, markets the *Winery Information Management System (WIMS)* for tracking inventory, while the company's

Screen 1: The menu for Blendcalc, a 1-2-3 template designed by Derek Holstein, offers options to aid the vintner in testing and analyzing new blends.



Winery Production Management System (WPMS) monitors production. Both are intended for small wineries and run on XT's and AT's.

According to Richard Gulson, author of *WIMS*, the program is currently in use at 32 California wineries, including Cuvaision, Pine Ridge, Grgich Hills, and even Takara Sake USA, a sake production facility in Berkeley. *WPMS*, written by Data Consulting Associates, is the software of choice at 12 wineries, including Joseph Phelps, Conn Creek, Ehlers Lane, and champagne-maker Korbel. Both programs are also available in models for the IBM System/36 and System/36 PC—versions designed for larger wineries. The

Figure 1: A report from Price Waterhouse's WineBlend program. WineBlend calculates the least costly, most flavorful blend from a winery's cellars to meet labeling requirements.

WINEBLENDING MODEL: Sample Report Format Initialized 1/17/86					
FILE NUMBER: 9999					
RUNTIME: 1/17/86 2:20 p.m.					
BLEND MODULE					
TOTAL GALLONS: 1050					
Attribute	Tank Number				Blend Percent
	1	2	3	4	
	Percent	Percent	Percent	Percent	
Variety					
1 Cabernet	57.14	100.00	82.00	.00	69.69
1 Merlot	42.86	.00	.00	.00	20.41
1 Zinfandel	.00	.00	18.00	100.00	9.90
Vintage					
2 1979	100.00	.00	100.00	100.00	80.95
2 1980	.00	100.00	.00	.00	19.05
Type					
3 Varietal	.00	100.00	.00	.00	19.05
3 Premium	100.00	.00	100.00	100.00	80.95
Appellation					
4 Amador	42.86	.00	.00	.00	20.41
4 Napa	.00	.00	.00	100.00	4.76
4 San Joaquin	.00	100.00	18.00	.00	24.19
4 Sonoma	57.14	.00	82.00	.00	50.64
Producer					
5 CAJ	.00	100.00	100.00	100.00	52.38
5 JT	100.00	.00	.00	.00	47.62
Cost Per Gallon	5.20	4.00	5.15	5.80	4.99

the Stag's Leap and San Martin wineries. *The Winemaker's Data Base* tracks inventory, while *The Grape Grower's Data Base* manages production information, logging all relevant information from fertilizer to rainfall. Vahl also offers optional inventory and analysis modules.

Dhiren Rao of the accounting firm of Price Waterhouse developed *CrushPlan* and *WineBlend* so PCs could help cut costs for wine growers. *CrushPlan* uses "what-if" scenarios to help vintners calculate how many grapes to crush, according to projected ranges of case sales. Taking into account the costs of overproduction, the program finds the production level with the highest estimated return. *WineBlend* is designed to help vintners choose the most economical and desirable blends to meet labeling requirements. If a wine must contain 75 percent Pinot Noir grapes to merit labeling as a Pinot Noir, for instance, *WineBlend* can advise a wine maker what percentages of which tanks' contents will meet the requirements with the best flavor and color (see Figure 1).

Price Waterhouse also offers *WineLedger*, a general ledger and financial reporting system for smaller wineries; *WineSim*, a simulation program for financial forecasting to help wine makers develop production plans and marketing strategies by bottle size and wine type; and *WineMod*, a financial planning and forecasting system for wineries and vineyards. All the Price Waterhouse programs can be set up for PC or minicomputer systems.

company's *Bulk Wine Management System*, or BWMS, is used at several large wineries including Beringer, and the *Bulk Information Tracking System*, or BITS, is intended for multiplant wineries.

The Winemaker's Data Base and *The Grape Grower's Data Base*, created by Jim Vahl, a winery software consultant in St. Helena, are up and running on PCs at



In for the Crush

The last area ripe for automation is the making of the wine itself. The grape harvest runs only from August through October, and during those three months, called "crush," the pace is frantic. "The grapes come in," says Jim Vahl, "and you go to work—as much as 20 hours per day." As Derek Holstein explains, "During crush, grapes are very vulnerable to bacteria and yeast—we have to keep track of them and have as much control as possible." A miscalculation along the way, like the wrong temperature during fermentation, could doom an entire batch of wine. Some wineries are using PCs to reduce those risks.

'The enologists can just glance at the terminal now and know exactly what's going on in each tank.'

Fermentation—the conversion of sugar to alcohol—is a delicate process. The conversion builds heat, but too high a temperature can rush the process and rob the wine of flavor. The Charles Krug, Robert Mondavi, and Beringer wineries all oversee the fermentation process electronically to exert maximum control during this crucial time.

Krug uses an HP 1000 minicomputer to monitor and maintain fermentation temperatures. The winery's current system is five years old, however, and Krug planners are looking into converting to a PC system. According to Peter Mattei, director of production planning, "The new technology is smaller, easier, and cheaper to maintain." Mattei also

notes that a PC-based system could offer greater security. "If something goes wrong in the system we could have a parallel system ready to go," he explains. "In the old days, the hardware costs were so huge that you'd just have to take the risk."

Beringer uses a generic graphics monitoring system called *Dyna-Draw*, developed by Dialog R&D in Santa Rosa, California, to "watch" nearly 100 fermentation tanks. The system operates on an AT hooked up to a network of five controllers that register the tanks' temperatures and make adjustments if necessary. The system prints out readings in inks of various colors, issuing a warning if

men (who move wine from rack to rack, add ingredients, and do actual blending). "They can just glance at the terminal now and know exactly what's going on in each tank," explains a Beringer spokesperson.

Looking Ahead

According to Dr. Boulton, wineries have barely taken the first steps toward automating their operations. What Boulton has in mind is completely computerizing the production of wine.

Currently, wine makers control fermentation by maintaining a steady temperature. A more effective process, says Boulton, would be to influence the rate of fermentation by manipulating temperature. But, he explains, "You can't detect a problem with fermentation until the process is almost finished—and then it's too late."

Six years ago, Boulton designed a mathematical model that can monitor fermentation speed and thus evaluate the impact of temperature manipulation without endangering a harvest's worth of wine. The model is based on the fact that the sugar solution of grape juice is heavier than the alcohol solution of wine. The rate of fermentation can thus be established by determining the solution's weight.

In 1979, when Boulton published his model in technical and enology journals, PCs weren't a common sight in wineries (or anywhere else). Boulton's model was first tested at the Charles Krug winery during its 1984 harvest season. Probes connected directly to an HP 1000 minicomputer automatically sampled the density,

level, and temperature of the liquid once per hour. That information was stored in a data base. The vintners were then able to call up a model on the screen and see how it fit the measured parameters. Results of the test were promising, and according to Peter Mondavi, further tests are in the offing.

Harvey Steinman sees Boulton's model as "a quantum leap in complexity," while Mondavi claims that the model is "the first one of any consequence," and points out that "because it's the first, people may not recognize its consequence."

Brave New Wineries

PCs have found a secure and growing niche in the administration and production planning offices of California's wineries. The "what-if" planning made possible by spreadsheets and the more precise calculations and organized record keeping offered by specialized software can make wineries—like any other business—more efficient.

Will probes, plotters, and PCs find homes within the wine cellars of the future? Tight electronic

control over fermentation can reduce risks during that crucial phase. Applying technology to wine production, however, can initially be expensive. And even for a large winery like Krug, the investment can be a burden. "We found our automated system cost-effective," says Mondavi. "But estimates we got from consulting firms for implementation were phenomenally high." Mondavi cut costs in half by implementing the system himself, although he admits that if a winery doesn't have that kind of in-house knowledge, the price of such automation could get out of control.

Blend analysis software can give a mathematical edge to an educated palate, but as Jim Vahl says, "It's possible to make good wine without the technology. The payoff is in the little refinements and the control, the possibility for different characteristics and flavor." The day a human taster is replaced by a robot with bionic taste buds is fortunately far in the future, but for PCs in the offices and cellars of California's vintners, it's been a very good year. ●

Marina Hirsch is a marketing writer and editor for Autodesk in Sausalito, California.

Winery Information Management System (WIMS), Winery Production Management System (WPMS)
Data Consulting Assoc.
18000 Coleman Valley Rd.
Occidental, CA 95465
707/874-3067

List price: WIMS \$8550 (also available by module), WPMS \$5000

Requirements: 64K, hard disk, DOS 2.00 or later version

The Winemaker's Data Base, The Grape Grower's Data Base
Dr. Jim Vahl, winery consultant
1361 St. James Dr.
St. Helena, CA 94574
707/963-5423

List price: The Winemaker's Data Base \$7500 (single-user, customized), \$11,000 (multiuser, customized); The Grape Grower's Data Base \$1700, inventory and analysis modules \$500 each

Requirements: single-user system 128K, 10MB hard disk, DOS 2.00; multiuser system Novell Netware 86 network

CrushPlan, WineBlend, WineLedger, WineSim, WineMod

Price Waterhouse
555 California St.
San Francisco, CA 94104
415/393-8500

List price: varies with system

DynaDraw
Dialog R&D Inc.
880 Second St.
Santa Rosa, CA 95404
707/579-2776

List price: \$4200
Requirements: 512K, high-resolution (600-by-400 pixel) graphics board, monochrome board, serial port, mouse



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THE General Ledger:

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- Totals entries to check balances
- Supports multiple departments or profit centers
- Proofs input data onto paper for auditing
- Lets you specify recurring journal entries
- On-line inquiry for account status
- Reports include: Income Statement, Balance Sheet, Chart of Accounts, General Ledger Report, Accounts Distribution Report, Trial Balance
- Prints Financial Statement in flexible, user-defined format

THE Accounts Payable:

- 5 transaction types: Release, Hold, Void, Prepaid and Credit Memos
- Access invoices for payment or inquiry
- Priority status or projected payment date available for each voucher
- Maintains numeric control over checks
- Complete payment information on voucher stub checks
- Computes discounts
- Writes automatic payables schedule
- Automatic vouchers for recurring items
- Allows partial payments
- Reports include: Aged Trial Balance, Two Pre-check Reports, Aged Cash Requirements, Vendor History Report, Check Register, Checks, Summary of Accounts Distribution Vendor List, Account List

THE Accounts Receivable:

- Balance forward or open item billing
- Automatic computation of late charges or interest rates
- Handle cash, C.O.D. or credit customers
- Specify any 3 invoice aging periods
- Print statements at any interval
- THE A/R posts cash receipts or invoices to customer accounts, types customer statements and reminder notices, and organizes and prints management information reports
- Automatically records recurring charges
- Reports include: Aged Trial Balance, On-Line Enquiry, Batch Proof, Accounts Distribution Report, Customer Statements, Customer Lists, Invoice & Cash Batch Proof, General Ledger Update
- Optional dunning letters

THE Order Entry:

- Processes invoices singly or in batches
- Up to 99 lines items per order
- Held (unshipped) items are marked on the Order Report
- THE O/E system automatically shows customer credit rating
- Each invoice depletes THE Inventory automatically
- Sends accounting transactions to THE Accounts Receivable
- Assign separate line item amounts to independent sales and receivables accounts
- Checks stock quantities in THE Inventory and notifies you when back orders are required
- Stock depletions will be automatically reported in THE Inventory
- Detailed invoice information
- The Order Report provides urgent information on every order

THE Inventory:

- Perfectly suited to retail environment
- Simple transactions for: addition, deletion, alteration and examination
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- Activity statistics for current or to-date period
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- Optional hard copy record of all inventory transactions for auditing
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- 30 character description field
- Reports include: Activity Report, Valuation Report, Auditability Proof, Reorder Report, Item List, and Item File Print

THE Payroll:

- Handles any combination of weekly, biweekly, semimonthly & monthly pay schedules
- Define up to 20 earning or deduction categories for all employees
- Assign any 8 categories for each employee
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- System includes safeguards and verification procedures
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- Of course, THE Payroll calculates payroll including Federal & State taxes, prints checks, allows hand written checks, lets user maintain tax tables and keeps an extensive employee payroll history

THE Name & Address System:

- Create name & address files
- Print mailing labels
- Sort files by up to 4 items
- Search or sort by match or range
- Print a report of a NAD file
- Merge files
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- 10 number zip code

THE Spreadsheet:

- On-line tutorial
- Cut & paste multiple spreadsheets
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THE Wordprocessor:

- On-line help
- Powerful editing: Erase, Copy or Cut & Paste characters, words, sentences, lines, paragraphs, pages, or user-defined blocks of text
- Automatic word wrap-around (may be turned off)
- User-defined page breaks, soft hyphen, tab, indent and margin settings
- Proportional & justified printing
- Global Search & Replace, Automatic & Examine
- Optional command character viewing
- Superscript and subscript
- Phrase files for boilerplate
- Print bold, centered, underline
- Edit ASCII files
- Right or left justification
- Hyphenation

THE Mailmerge:

- Integrates THE Wordprocessor & THE Name & Address System
- Mass mailings
- Specialized mailings to select groups in your Name & Address System
- Can read A/R customer file, A/P vendor file and payroll employee file so you may send customized Wordprocessor letters

WindowMaster:

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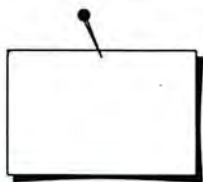
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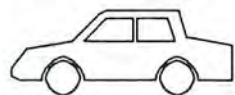
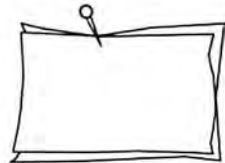


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Professional .PICs

Freelance and Sound Presentations are more than just drawing programs—they're designed to import Lotus .PIC files and make your business graphics shine.

Bill Crider

 If you've ever had to convince, sell, educate, or explain, you know that conveying a concept with pictures is easier than trying to do so with words alone. The better the picture, the better the expression of your idea. The more professional the picture, the more impressed your audience will be.

PC graphics software has done wonders for visual presentations. Instead of tediously drawing graphs and charts, you can plug numbers into a spreadsheet and quickly instruct the computer and printer to draw the graphs for you. Programs like Lotus Development Corporation's *1-2-3* and *Symphony* have become the mainstays of the business world for creating presentations. Rather than the dry lists of numbers prepared for business meetings in the past, vivid charts and diagrams have become the norm.

As valuable as these programs are for preparing charts, their output is still rudimentary when compared with the professional results of a graphic arts department. In many companies executives print Lotus graphs as rough drafts for the art department.

Now two programs allow those same executives to create finished graphics that rival those of a professional artist. *Freelance* from Graphic Communications, Inc. (GCI), and *Sound Presentations* from Communication Dynamics, Inc. (CDI), allow you to import Lotus .PIC files, spruce up the graphs, and then produce them using a wide variety of devices including cameras, printers, and plotters.

Freelance and *Sound Presentations* are drawing programs as opposed to painting programs. Thus, they lack capabilities such as area erase and spray-paint—rapidly filling an area with a color or pattern. Instead of manipulating a picture as a set of pixels on the screen, these programs manipulate graphics elements such as lines, arcs, rectangles, and circles. Since these elements are manipulated as objects rather than pixel by pixel, they can be moved or edited more easily than in a painting program. The major features shared by *Sound Presentations* and *Freelance* are resizing, rotating, and drawing. You can also add text in a number of fonts and choose symbols, maps, and chart templates from a library of designs.

Neither program automatically creates business graphics. In contrast with most graphics programs, you cannot plug in a series of numbers or percentages, choose a graph type, and watch the graphics appear on screen. You can, of course, draw in the graphs by hand, paying close attention to the x- and y-coordinates listed in the screen prompts, but this takes extra effort and skill. For example, creating the outline of a pie chart would be somewhat difficult with *Sound Presentations* and relatively easy with *Freelance*, but getting the percentages correct would be arduous with either program, since you would have to size the slices visually.



Also, neither program provides the real-time presentation features that can structure a PC slide show for maximum impact. You could, of course, bring screens up one at a time, but both programs lack the sophisticated timing and transition features found in IBM's *PC Storyboard* (see "Good Show, IBM" in this issue).

In short, these programs are specialized and should not be compared with stand-alone graphics packages such as GCI's popular business graphics program, *Graphwriter*, or Decision Resources' *ChartMaster*. However, the potential audience for *Freelance* and *Sound Presentations* is enormous—these programs represent a product niche that should prove immensely popular among the hundreds of thousands of Lotus users who want to brighten up their humdrum graphics.

■ A Bit of Device

Aside from their drawing expertise, *Sound Presentations* and *Freelance* stand out from the crowd because of the wide variety of output devices they support. Both programs come with a set of standardized device drivers, so your output device need only support a *virtual device interface*. This means that the program does not need to know a lot about the printer or plotter. It just sends out graphics information in a standardized way as if it were to be produced on a hypothetical, or virtual, device. The device driver translates the graphics information into the particular codes and commands needed by the printer or plotter.

This sort of standardization has long been discussed, but only recently has it shown signs of becoming a reality. Most popular programs—including *1-2-3* and *Symphony*—do not support the virtual device interface, and therefore support only a limited number of output devices.

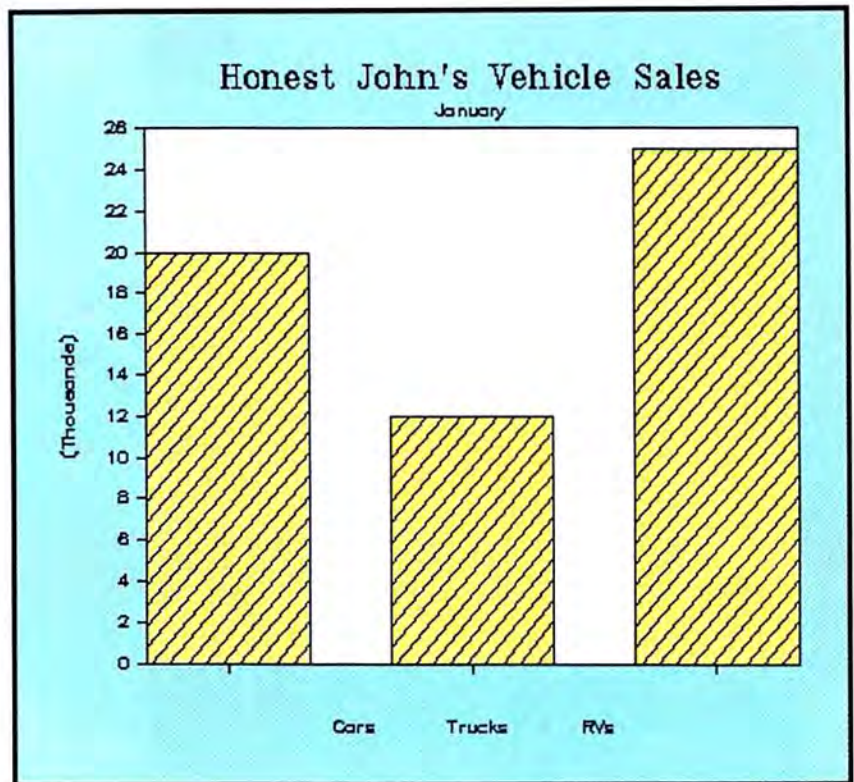


Figure 1: A company sales chart is a great improvement over a list of numbers, but embellishing it with *Freelance* or *Sound Presentations* could make it far more dramatic.

Bringing Up .PIC

Getting a Lotus .PIC file into these programs is handled in one of two ways. The first method, called *Raw .PIC* in *Freelance*, is to change every line, circle, and letter in the .PIC file into a line, circle, or letter in a file usable by *Freelance* or *Sound Presentations*. Every stroke a plotter would make in plotting the picture becomes an individual graphics item. With *Sound Presentations* you run a separate program that changes the .PIC file into a *Sound Presentations* format file. With *Freelance* you simply make a menu choice within the program to read the .PIC file directly into the worksheet you are editing.

The disadvantage of reading a file as a collection of plotter strokes is the amount of editing needed. For example, if you have a 1-2-3 bar chart, such as the one shown in Figure 1, each hatch mark in the vertical bars will be a unique line. The bars themselves will not be recognized as rectangles but rather as sets of four lines. Moving or resizing that many lines in a small area is tedious and time-consuming. Moreover, you can't change to a different fill pattern. Only a solid object like a rectangle, circle, or polygon can be filled, not a collection of four lines. Therefore,

with a Raw .PIC file you have to reconstruct each rectangle manually and delete the old bar and hatch marks. This defeats the purpose of being able to read in the .PIC file. The only way to resize the bar chart in its entirety would be to save it first as a symbol and then bring it back to the screen.

However, *Freelance* can read .PIC files a second way, converting the bars into rectangles. Then you can edit or change the fill pattern, alter the proportions, or move the bar easily. This method of reading files gives *Freelance* a distinct advantage over *Sound Presentations*.

Freelance allows you to import plain ASCII text files, a useful capability for adding text to graphics. *Freelance* can also read and enhance *Graphwriter* files, which use the same file format. *Sound Presentations*, on the other hand, can read in .PIC files only.

Sound Presentations

Installing *Sound Presentations* presented the only major hurdle in this easy-to-use program. The documentation is vague or misleading in a number of areas. For example, the manual describes a separate installation program for the supplementary disks that contain predesigned symbols and icons. I could not

find the alleged installation program and spent an hour and a half trying to create one. A subsequent phone call to CDI revealed that installing the disks simply requires copying them to the appropriate subdirectory.

Another confusing factor is introduced by the two installations required—one for the program and the second for the device drivers, *GSS-Drivers*. The device drivers are published separately by Graphic Software Systems (GSS) and come with their own documentation. Unfortunately, GSS disagrees with CDI about where you should store your device drivers. The *Sound Presentations* documentation instructs you to install the drivers on a floppy disk rather than your hard disk so they won't take up RAM each time the computer is reset. The device driver documentation tells you to install them on the hard disk so they will be more accessible and load faster.

For convenience' sake I decided to load the drivers on my hard disk, but then I noticed that they took up over 70K of RAM and that some of my 1-2-3 spreadsheets would no longer load. I decided to create two versions of CONFIG.SYS and store them in files called CONFIG.SAV and CONFIG.SP. I now boot with CONFIG.SAV most of the time, and if I am going to use *Sound Presentations*, I copy CONFIG.SP into CONFIG.SYS and then reboot to load the drivers into memory. It takes a little extra effort, but not as much as using floppy disks to run the program.


Once you've installed *Sound Presentations* your troubles are over. The program is completely menu-driven and presents you with elegant, well-designed screens. Pressing <F2> opens the main menu on the right side of the screen. You then use the cursor keys to move a check mark to the appropriate menu choice and press <F1> to select. A submenu appears beside the first, and once again you move the cursor to your choice and press <F1>.

Overall, *Sound Presentations* lacks the range of features provided by *Freelance*, but the program outshines its competitor in a few areas. First, *Sound Presentations* allows you to see the actual typefaces on the screen, a feature *Freelance* lacks. Typefaces and sizes are chosen from a visually oriented menu. Each change you make on the menu changes the typeface

sample on the screen, which enables you to see the results immediately without returning to the picture. If you don't like the choice, you can change it again. However, the program provides only five typefaces, each in four sizes, and you can't add new typefaces or sizes.

Sound Presentations also surpasses *Freelance* in the variety and quality of its maps. It includes maps of every continent and of the ten largest metropolitan areas in the United States. If you need graphics with detailed maps, *Sound Presentations* is your program.

Using *Sound Presentations* is a simple matter of pointing and selecting. For example, creating the composite picture shown in Screen 1 is a breeze. First, create a .PIC file with 1-2-3. Next, run SP Converter (*Sound Presentations*' 1-2-3 and *Symphony* conversion program), and then load *Sound Presentations*. To display the chart, choose File, Pic, and Get by pointing to those selections on the menu. Then save the graph as a symbol file so you can resize it and move it later as a single unit. Point to File, Symbol, and Save, and the file is stored to disk.



These programs represent a product niche that should prove immensely popular among the hundreds of thousands of Lotus users who want to brighten up their humdrum graphics.

Now you're ready to read in the map in the background. Choose File, Template, and Get and type the name of the map. Then read the chart in again, this time as a symbol (File, Symbol, Get). While the chart is still the active object, point at Edit and Movesize on the menu. Selecting a "scale" point on the chart and a second point as a size reference allows you to reduce the chart in size. Then select a point on the symbol and move it to its new location. Finally, save the whole creation as a .PIC file. Total keystrokes: about 25. Total time: 10 minutes.

After using this pointing system for a while, I began to wish that I could do things faster. For example, it would be quicker to press the first letter of a

menu choice than to have to move the cursor there. However, if you have a mouse, using the menu system will be more convenient. *Sound Presentations*' large, square menus resemble the user interface of the PC painting programs and seem to be designed with a mouse in mind.

Freelance

Freelance was easier to install than *Sound Presentations* but was more difficult to learn and use—not because of poor design, but because it is a more complex program with more options. Its Lotus-like menus and options make the program easy for 1-2-3 users to adapt to. *Freelance* also comes with a good printed tutorial supported by practice files on disk.

Screen 2 shows the *Freelance* graphics editing screen. The menus run across the top of the screen. When you make a selection, an explanation line appears below them. As with 1-2-3, you can either move the cursor to the menu choice or simply type the first letter of the choice, and you will get a new menu of subchoices. Like *Sound Presentations*, *Freelance* can be operated with a mouse.

At the right of the screen is a status bar that lists the vital statistics of the item you are editing, current x- and y-coordinates, file name, and memory available. Knowing the coordinates helps you quickly arrange graphics items in proper relation to each other.

The x- and y-coordinates become especially relevant when you take advantage of *Freelance*'s ability to zoom in and out on any area on the screen. For example, in Screen 2, suppose you want to zoom in on Arizona to locate some text. Simply put a box around the area you want to zoom in on, select 'In' from the View menu, and the names 'Tucson' and 'Phoenix' (previously mere smudges) become readily editable (see Screen 3). Not only can you select a smaller or larger area for editing, you can also choose to print only a portion of the picture.

Freelance gives you more ways to select objects for editing than *Sound Presentations* does. You can select one, several, or all objects at a time. The Like and Cycle commands are two unique ways of selecting objects you want to change. With the Like command you could choose, for example, a red rectangle, and *Freelance* would mark all red rectangles. Or you could pick out a particular typeface and size, and *Freelance* would select all other type of that same face

and size. This is very convenient for changing a number of similar objects at once.

At other times selecting one object out of a group of closely spaced objects may be difficult. In that case, you can Cycle through them. Each time you press an arrow key, another object is selected. You press the <Space> bar to make a selection "stick." When you have chosen all the objects you want, press <Enter> and then edit, rotate, size, or perform any other operation on them simultaneously.

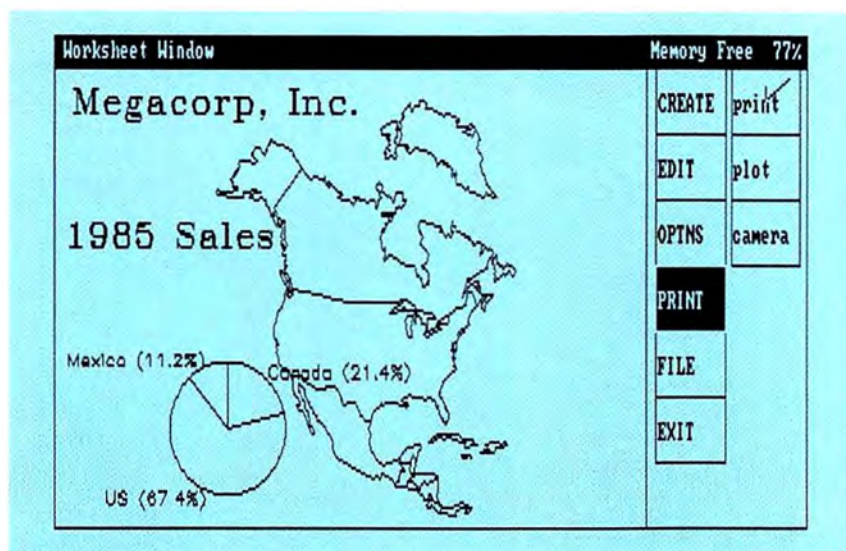
As you create objects, they receive priorities; that is, some objects will be "behind" others when they are plotted. If you wish, you can change those priorities so an object created later is drawn sooner. This is similar to changing the order of calculation in 1-2-3. Just as there are times you want to protect cells from editing in 1-2-3, there are times when you want to protect objects from editing in *Freelance*. You can simply lock them to protect them and unlock them if needed.

Freelance comes with over 200 prepared symbols for use on presentations. It also has maps, boxes, and two dozen typefaces (but only eight faces are available for any particular picture). Your charts can include text in any size you want.

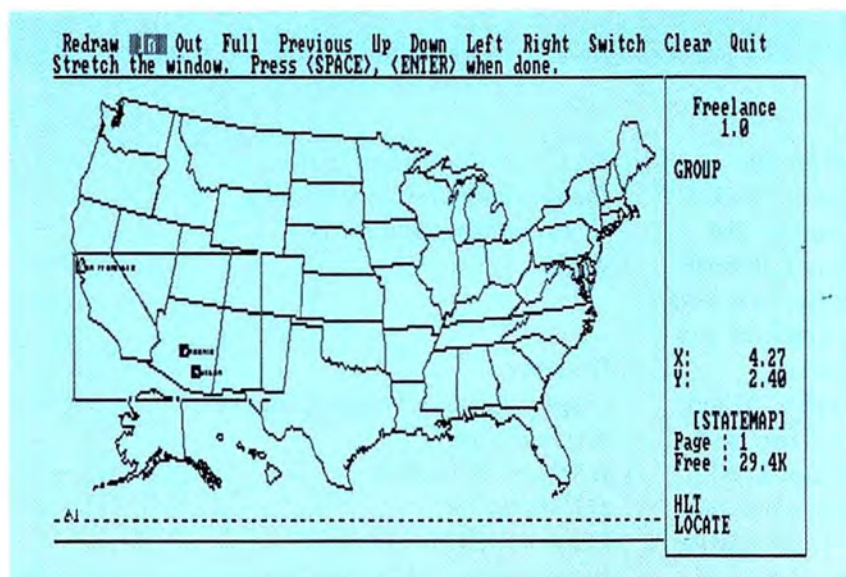
Adding predesigned symbols to a *Freelance* chart is easy. You load a file containing up to 20 symbols into the second page of your image (a temporary holding area). Each symbol has an associated <Alt>-function key or <Ctrl>-function key combination. Just press <Alt>-<F1>, for example, and the appropriate symbol will appear in your drawing at the cursor location. You can then move or size it as you please.

The only *Freelance* process that did not work as documented was changing the angle of text and rectangles. Although the documentation indicated you could turn them in 1-degree increments, I could only move them 90 degrees at a time. Other objects, such as lines and polygons, rotated with no problems.

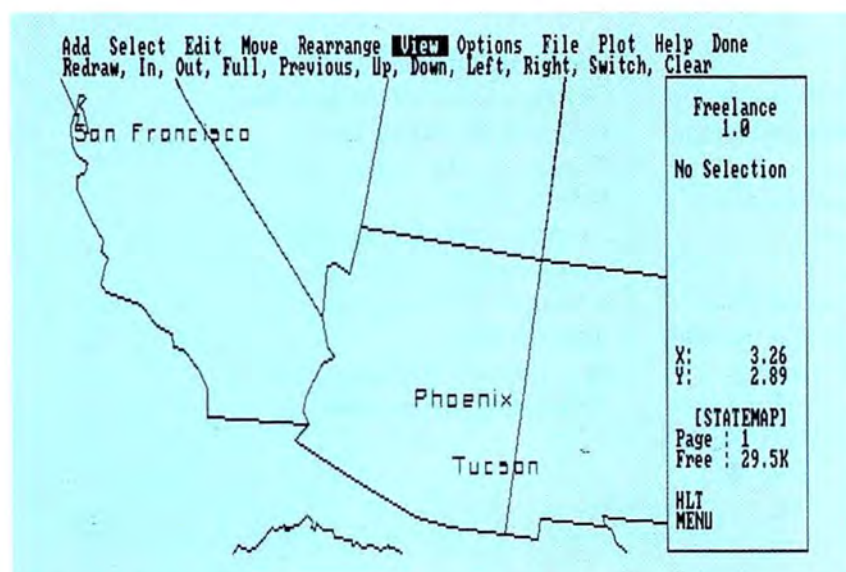
The lackluster 1-2-3 graph in Figure 1 is a great improvement over columns of numbers, but you can modify it with *Freelance* and create the much flashier chart in Screen 4. First, load *Freelance* from DOS. Then choose File, Import, and Pic from the menu. Select the correct .PIC file from the list presented, and



Screen 1: Sound Presentations graphics display. Both Sound Presentations and Freelance programs allow you to use maps and other visual elements as backdrops for your business graphics.

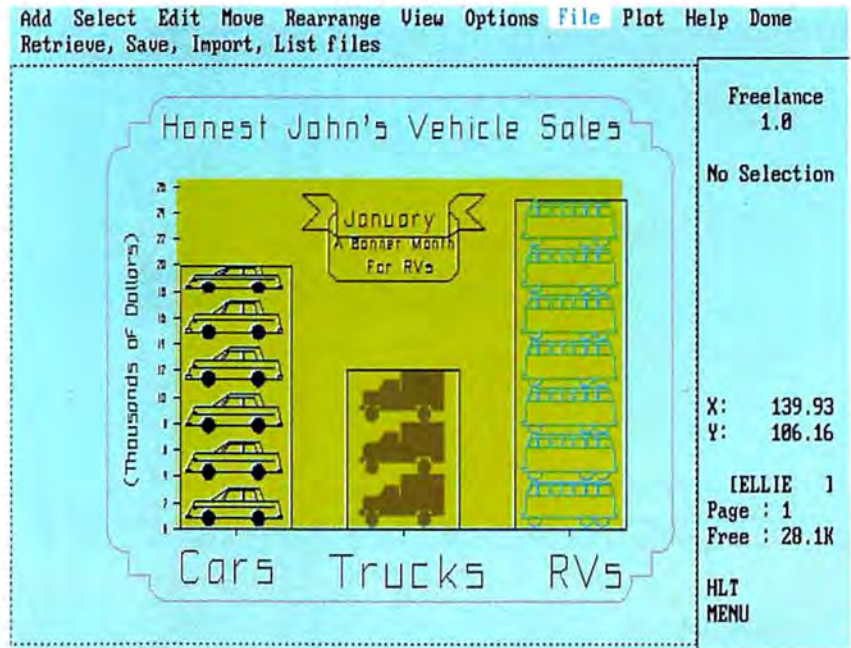


Screen 2: A map of the United States from Freelance's symbol library



Screen 3: Freelance allows you to zoom in on any part of the screen for detailed editing. Here we see a close-up of the section enclosed by a box in Screen 2.

Screen 4: With the help of pre-designed icons, Freelance allows you to add visual impact to the bar chart in Figure 1.



soon you'll be looking at the 1-2-3 chart on the screen. Change the fill pattern in the bars to 'No Pattern'. Then select the second page of the image and load a file that includes transportation icons. Returning to the first page, use <Alt> and the function keys to put an icon in each bar, then choose Replicate and copy the icons enough times to fill the bars.

A few more keystrokes are all you need to add the text and adjust the typeface and size. Then load another symbol file into page 2 of the image. Load the banner and frame icons onto the image, size and position them, and save the file to disk. Total time to edit: about 20 minutes. Total keystrokes: about 150.

You Oughta Be in Pictures

Spiffing up your Lotus art with *Freelance* or *Sound Presentations* is so easy it's worth investigating even if you only make a few presentations a year. If you are continually preparing reports or presentations, one of these programs may become indispensable.

If your primary objective is creating graphics simply and with a minimum of learning time, *Sound Presentations* is an excellent choice. But if you are a power user, you will likely benefit more from the extra features in *Freelance*. With either program, you'll find yourself creating presentations like a pro. ●

Bill Crider is president of the Tucson Computer Society and a Contributing Editor for PC World.

Freelance
Graphic Communications, Inc.
200 Fifth Ave.
Waltham, MA 02254
617/890-8778
List price: \$395
Requirements: 256K, two disk drives, graphics monitor

Sound Presentations
Communication Dynamics, Inc.
8532 S.W. St. Helens Dr.
Wilsonville, OR 97070
503/682-0651
List price: complete package \$340; program \$250, SP converter \$50, template libraries \$40
Requirements: 256K, two disk drives, graphics monitor

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Circle 994 on reader service card

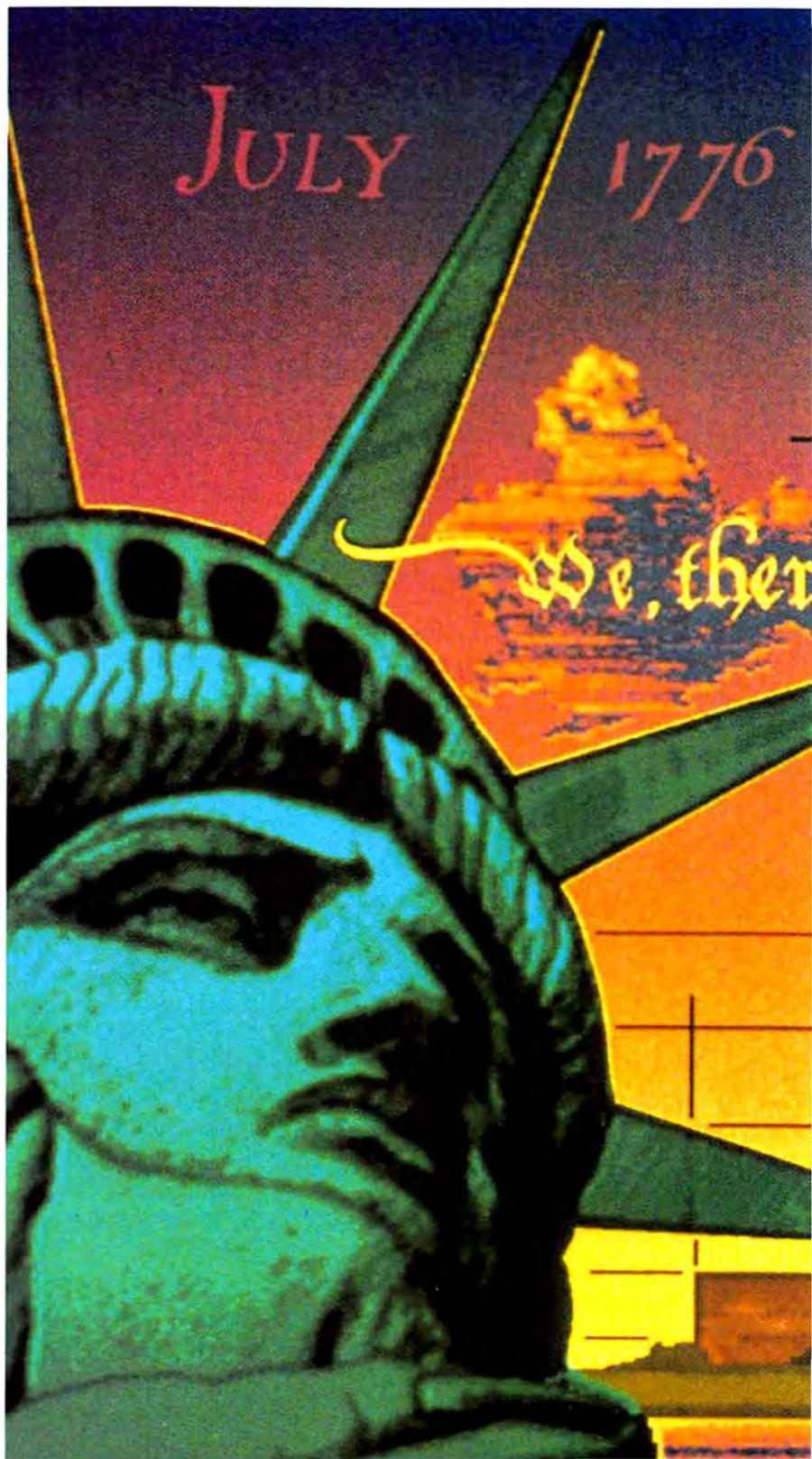
The Lumena Effect

If PC painting programs aren't enough and mainframe graphics stations are too much, Lumena may provide the answer for professional graphic arts on the PC.

Frederick Hannon

||||| Artists aren't really asking for much in a computer graphics system—just the power of a mainframe at the price of a PC. All they want is a magic paintbrush that can create in any medium, paint any color, produce any effect, and of course, a system so easy to use that they don't need to learn anything about programming or computers. Is that asking too much?

Time Arts doesn't think so. With the *Lumena* graphic arts package, the 3-year-old company



"The Return of the Grand
Lady," by Jim Hillman.
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Tynes & Co. Used with
permission.



is helping artists explore the new frontiers of computer-aided art and graphic design.

Lumena is a sophisticated graphics software package that gives artists a wide array of tools for presenting concepts and packaging data. The current version, 2.01, enhances the first version with optional modules for video and print applications. With these advanced *Lumena* programs,

the software to create color compositions for product and package design and to plan ads and brochures.

Architectural and interior design companies create computerized color renderings by capturing the image via photograph or video, digitizing the actual client site, and then adding layers of color and graphic alterations. Textile designers use *Lumena* to

In this standard configuration, the AT is equipped with three specialized boards: a Number Nine color graphics controller board that supports 256 colors and 512-by-512 high-resolution graphics, a video input controller board to receive and translate images from a video camera, and a memory board to store animation sequences and other special effects.

The *Lumena* graphics workstation also includes a digitizing pad, a stylus, and two monitors. The first monitor provides monochrome text for displaying on-line help documentation and reporting command or color status, while the second monitor—a 19-inch, long-persistence analog RGB unit—displays the color images as they are created.

The top-end *Lumena* workstation costs as much as \$50,000. The hardware includes an IBM AT outfitted with the necessary special boards and peripherals, plus a digitizing camera, a film recorder or ink jet printer, and all the optional software for specific audio-visual or print applications.

■ *Anyone needing first-rate, computer-generated graphics for presentation slides, video, or print media should consider Lumena.*

Time Arts has succeeded in its goal of matching the cosmetic and performance characteristics of mainframe graphics systems costing \$150,000 or more.

Lumena's graphic images are created with a digitizing pad and a stylus or by scanning with a video camera. The artist can then manipulate the image to the limits of his or her imagination. A skilled graphic artist at a *Lumena* workstation can produce the effects of pen and ink, pencil, chalk, charcoal, paint, airbrush, and texturing. With the high-end *Lumena* system, the artist can manipulate video images and create color animation.

Anyone needing first-rate, computer-generated graphics for presentation slides, video, or print media should consider *Lumena*. The program has been tailored for an eclectic mix of applications. Corporate audiovisual and graphics centers use *Lumena* to produce presentation and promotional materials. Advertising agencies use

create patterns and experiment with hundreds of color variations. Even if you never use an advanced computer graphics program, the tie you wear or the sheets you sleep between may have been designed on *Lumena*.

■ Graphics Power for a Price

All this power and versatility carries a stiff price tag, however. The basic software alone costs \$5000, and a complete *Lumena* system, including all the modular software, an IBM AT or compatible, and the necessary peripherals, runs about \$25,000. If you already have an AT, Time Arts charges \$14,500 for the basic graphics package and the necessary peripheral hardware. With this system you forgo the niceties of animation and video input, but you can draw and paint to your heart's content.

■ Software Options

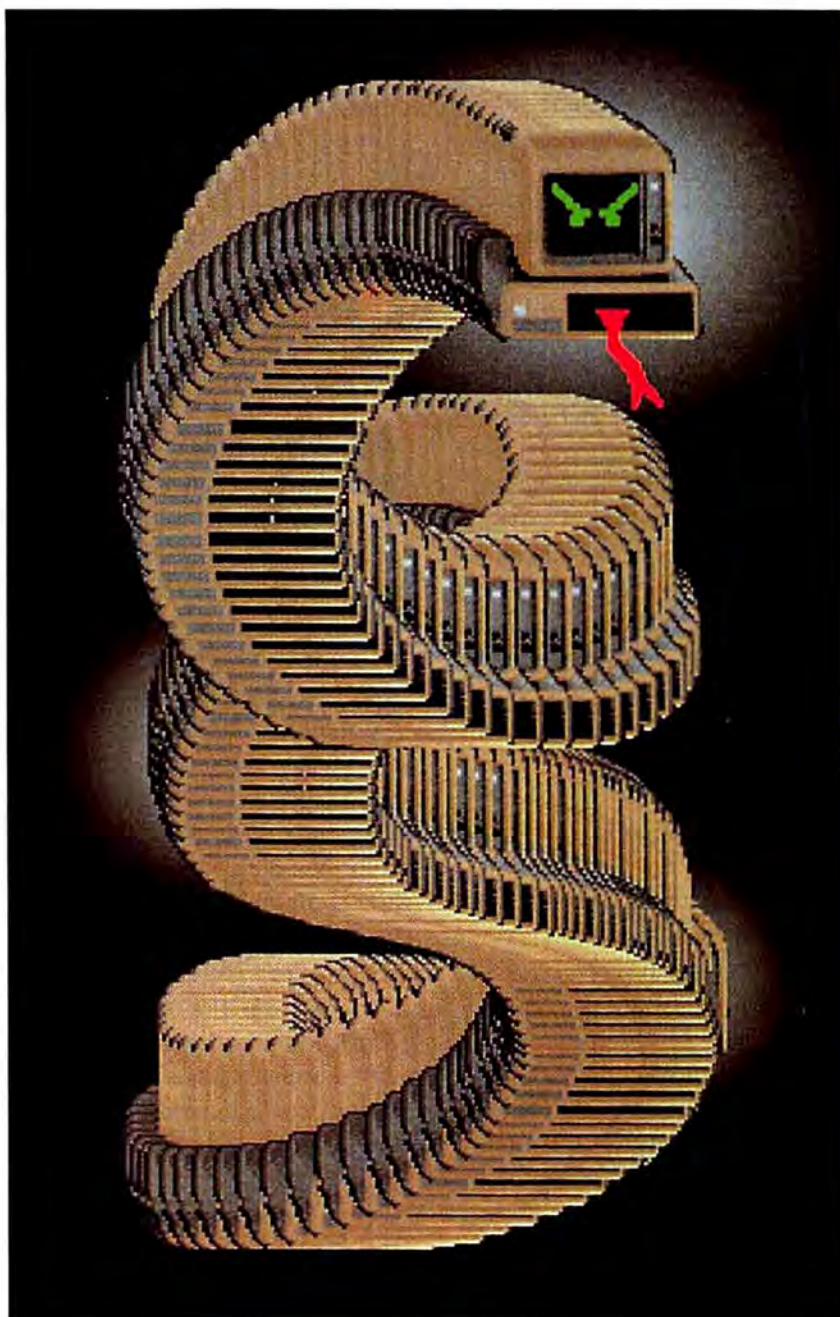
The potential for mixing software modules with various hardware configurations gives *Lumena* graphics workstations a range of prices. The *Lumena* system starts with one of two basic programs, enhanced with optional software modules. *Lumena Single Plane* is the rudimentary program, with no animation or cell buffer capability. A stripped-down version of *Lumena Single Plane* is available on the Tandy 2000 for \$299, but that version offers only

eight colors on screen (dithered to produce 28 shades) and is slow in execution.

The Time Arts versions of *Lumena—Single Plane* and the more advanced *Lumena Multi-Plane*—are lightning fast. *Multi-Plane* allows multiple images to be stored simultaneously in the memory buffer, like pages in an electronic book. Each image requires 256K of storage, so as many as eight cells (buffered images) can be saved on a 2MB memory board. An artist using *Multi-Plane* can create and store various images and mix some or all of them instantly.

A number of other options are available with the program. Image processing provides gray scale manipulation, the illusion of embossing, and an “anti-aliasing” feature that smooths image edges. Additional *Lumena* software options include video input (to allow camera digitizing input), enhanced resolution (for driving high-resolution film recorder output), and business graphics (for two- and three-dimensional pie charts, line graphs, and bar charts). The animation module offers special effects such as cycle brushes, cycle palettes, and in-betweening. The color separation options, used by photo-silk-screeners, separately produce cyan, magenta, yellow, and black on a film recorder. The font library program delivers 12 typefaces, including the popular Times Roman and Helvetica families.

“CompuSerpent,” by John Derry and Frederick Hannon. A single graphic image can be swept across the screen using Lumena’s custom paintbrush tool.



Learning Lumena

As with any complex graphics program, mastering *Lumena* requires practice time. Beginners should budget approximately 40 hours to survey the hundreds of commands, and another week to learn how to use the tools in concert. But learning *Lumena* without seeing it demonstrated is like trying to paint a sunset without ever witnessing one. Time Arts offers one- and two-day training seminars, and user groups are emerging in major metropolitan centers as *Lumena* artists explore new applications.

If you have a question about a command in any menu, you press the digitizing stylus on the digitizing pad at the point that corresponds to the on-screen 'D' (for "documentation"), then on the command in question. On-line help, ranging from full-screen explanations to one-liners, appears immediately on the monochrome monitor. If the help screen doesn't answer your question, you can turn to the well-written 400-page manual.

Using Lumena

Lumena's main menu includes the commands Draw, Palet(te), Tools, Fonts, Anim(ation), and Xform (for *transform*). Each menu contains second- and third-level submenus. The menus and submenus appear across the bottom of the high-resolution monitor in the same pop-up window as the key-color minipalettes. An ancillary pop-up menu at the top of the monitor shows the full 256-color palette.

When you choose a color for an application, it is statistically profiled on the monochrome monitor. This comprehensive status report

defines the active color as percentages of red/green/blue, cyan/magenta/yellow, and the Y-I-Q video color formulaic breakdown, as well as the Munsell color system for hue/saturation/value. You can request a color status report for any previously painted color to help match colors for touching up an image or creating an accent border.

Although the on-screen palette is limited to 256 colors at a time, you can select these colors from 16,777,216 shades, tints, and hues. But 256 colors should suffice for most artists—*Lumena's* palette is 64 times greater than the 4-color on-screen offering of the low-cost PC painting programs.

Grand Illusions

Lumena delivers a dazzling set of graphics tools, many of which are unique to this computerized medium. Part of the power of *Lumena* is that its effects and techniques can be combined in almost endless permutations. In manipulating a single image, for example, you can use automated image rotation, enlargement/reduction, rubber-stamp copying, color blending, image embossing, and computerized calculations of perspective. For example, an artist at a *Lumena* workstation can isolate a portion of a drawing or a digitized photograph and move it into another image. With this electronic "cut-glide-and-paste" technique, you could paint your company's logo across an electronic sky. By employing the anti-aliasing feature, you could smooth the edges of the logo into a cloudlike effect or blend the colors between

the logo and the sky by isolating a portion of an image and then letting the computer calculate and substitute alternate color gradations. In noncomputer terms, this is like using colored chalks, then smoothing the colors to form new blends.

Because *Lumena* is raster (pixel) based, the software is limited to two-dimensional image manipulation. Although *Lumena* doesn't let you rotate and manipulate a true three-dimensional object, it can produce an illusion of three-dimensionality. For example, with the image-embossing feature you can start with an image, say a company's logo type, then automatically add the appearance of depth. The letters are seemingly raised from their surface (embossed) or etched into a solid form (debossed). With *Lumena* you can position the light source to give the illusion of shadows on any side—shadows that consistently define the raised or lowered image.

Perspective calculations start with the artist identifying part or all of the image to be altered, then defining an imaginary horizon and a point on that horizon. That spot becomes the "vanishing point" where all otherwise parallel lines converge, giving the illusion of depth. The user simply tilts the image vertically or horizontally until he or she achieves the desired effect.

By using *Lumena's* enhanced resolution option, you can divide

an image into four 512-by-512 quarters, which are scanned and edited one at a time. You can also divide an image into sixteenths and scroll to view portions of the image, any of which can be sent to a film recorder capable of recording 2048-by-2048 pixels. This option helps you take full advantage of the existing high-resolution film recorder technology—with dazzling results.

■ Classy Business Graphics

Although *Lumena* was designed for professional graphic artists, unskilled amateurs can use it to create sophisticated bar and pie charts. *Lumena* adapts information extracted from 1-2-3 or other spreadsheet programs. With a little practice, a novice can capture a graphic image from a digitized photograph and use it as a backdrop for high-resolution business graphics.

To produce business graphics you first use the stylus to identify the number of elements and data groups to be represented. Then you select from a menu that offers two-dimensional and seemingly three-dimensional bar charts, stacked bar charts, pie charts, and line graphs. Data can be fed into *Lumena* from DIF files or manually inserted by using the stylus to raise each bar to the desired height.

ASCII text files can be imported for labels, and text can be generated with *Lumena's* font library. The font library contains standard symbols, and you can create and store special symbols of your own. With the easy-to-follow menus and on-screen instruction, modifying business graphics is as easy as creating them.

"Marilyn: A Tribute," by John Derry. *Lumena* helps artists capture, transform, and embellish photographic images.



■ Output Options

Lumena is currently configured to support four types of output devices. One is the high-resolution color monitor used to view the images directly. You can get printed output in minutes from ink jet printers, such as Advanced Color Technology's ACTII (\$6000), which supports up to 128 colors. Ink jet printers are currently the only printers driven by *Lumena*.

Lumena also supports film recorders for making slide transparencies. These range from the low-end analog recorders such as Lang's 35mm device (\$6000), which matches the software's 512-

by-512 resolution, to the high-resolution digital film recorders such as the Samurai by CalComp (\$12,000).

■ Video and Animation

The fourth means of output is the video recorder, used by video production and post-production companies that require animation and special effects. A video professional can transmit *Lumena's* images to a video recorder with an encoder that converts signals to the standard of the National Television Standards Committee. To accomplish this, the *Lumena* signal is converted from three separate signals (red, green, and blue) into a composite signal, which is then transmitted to the recorder.

Video and animation applications include color cycling, palette cycling, in-betweening, and frame-by-frame animation. Color cycling creates the illusion of a changing surface appearance, such as a logo that undulates and flashes. Palette cycling means transfusing one image into another, such as fading a human face into the face of a Cheshire cat. With the in-betweening feature, the producer designates a starting image, such as a scene at noon, and a desired final image (the same scene at night), and the computer calculates the transitional shades of lighting.

Lumena's animation capability includes the creation of up to 20 windows, each representing a different image. For example, these 20 images could be a bird in sequential positions of freeze-frame flight. Frame by frame, each image can be sent to an animation controller, which puts the sequence on tape. When the tape is played, the result is an animated illusion of a bird in flight.

Competition among computer-based graphics companies in the video/broadcast field makes the microcomputer war look like a Sunday school picnic. Over 50 established companies offer products in the \$6000 to \$150,000 range, with studios like Disney using multimillion-dollar Cray supercomputers. Competing systems include software by Dubner, 3M/Artronics, West End Films, MCI/Quantel, Autographix, Computer Graphics Labs, and Aurora (see

"The AT Animates the Airwaves" in this issue for a discussion of Aurora's *Aurora 75* animation system). *Lumena* stands alone, though, as a cost-effective tool that combines video, presentation slides, and print-media graphics.

■ Artists Are Never Satisfied

Lumena should be appreciated for its ease of use, powerful features, and versatility. But because the computer industry is driven by consumer demands for more, the areas of potential improvement are worth discussing. First, the color capabilities could tolerate enhancement. Although the 256-color on-screen palette is impressive, one can only wish for the unlimited color access of broadcast television.

Another limitation, albeit of interest only to users involved in commercial printing, is *Lumena's* lack of direct-to-scanner file conversion that would allow computerized images to be converted directly into four-color separations.

Another relative weakness, common to all paint systems, is the cumbersome nature of the file storage requirements. Because each image requires 256K regardless of its size on the screen, only one image fits on a 360K floppy disk, or four images on a 1.2MB disk. Even a hard disk fills up quickly.

In fairness to Time Arts, the elegant FORTH programs compile and crunch the image files with remarkable efficiency. The solution is larger mass storage, which is becoming progressively more affordable. Perhaps forthcoming optical-disk technologies will provide the answer.

Finally, *Lumena's* requirements for capturing color images with a video camera should be streamlined. Time-consuming manual adjustments to the gray scales are required for each RGB color in a color video camera. Time Arts is currently testing RGB cameras that allow the color video frame to be captured automatically.

Despite these minor shortcomings, *Lumena* is an outstanding graphics tool for print, presentation, and video enhancement. With *Lumena*, Time Arts is establishing a new standard of excellence for the computer graphics community. ●

Frederick Hannon is a writer and graphic designer with Hannon & Associates in Carlsbad, California.

*Lumena, version 2.01
Time Arts, Inc.
3436 Mendocino Ave.
Santa Rosa, CA 95401
707/576-5722*

*List price: basic software \$4995,
high-end hardware/software
system up to \$50,000
Requirements: IBM PC, XT, AT,
or compatible; 512K; two disk
drives (hard disk recommended); 512-by-512 analog RGB
monitor with long-persistence
and underscan; monochrome
monitor; digitizing tablet with
stylus; Number Nine high-
resolution board*

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ENERTRONICS

SEEING IS BELIEVING

Good Show, IBM

For on-screen or slide presentations, PC Storyboard provides an easy, economical way to put your best on display. The program lets you package your information with a little razzle-dazzle.

Gordon McComb

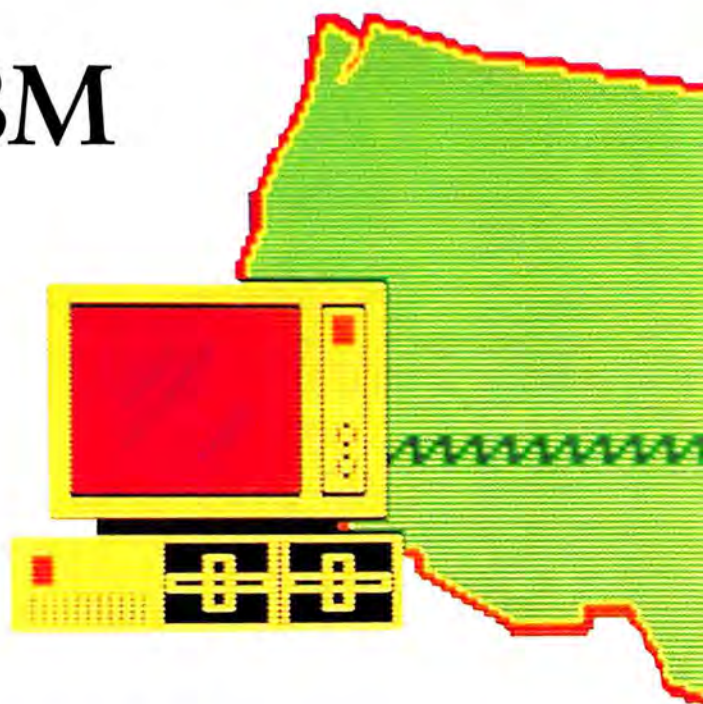
||||| Thursday, 10 a.m. The VP of marketing bursts through your office door. "The account executive's out sick," he pants, "and the creative director is in Trinidad. You've gotta do the Cuisine de la Canine presentation." It's the break you've been waiting for. Do a dynamite show for the million-dollar account and you'll never inhabit the doghouse again.

"No problem, I'll get right to it," you say. "By the by, when's the presentation? Week after next?"

The marketing veep smiles wanly. "No such luck, amigo—it's today. Five o'clock."

Get a flashy dog-and-pony show ready in just 7 hours? Sounds impossible. There's no time for creating the artwork, let alone shooting slides and having them developed. Using overhead transparencies might be an alternative, but they simply don't have what it takes for a professional presentation.

Out of luck? Not quite. With IBM's PC Storyboard you can fashion attractive, colorful graphics and build a PC-based slide show fit for final presentation. Images made with PC Storyboard can be linked together in an elaborate script and played back at your command. The program is a natural show-off, boasting a variety of special effects from animation to nifty dissolves. Word charts gain panache with shading and attractive oversize fonts.

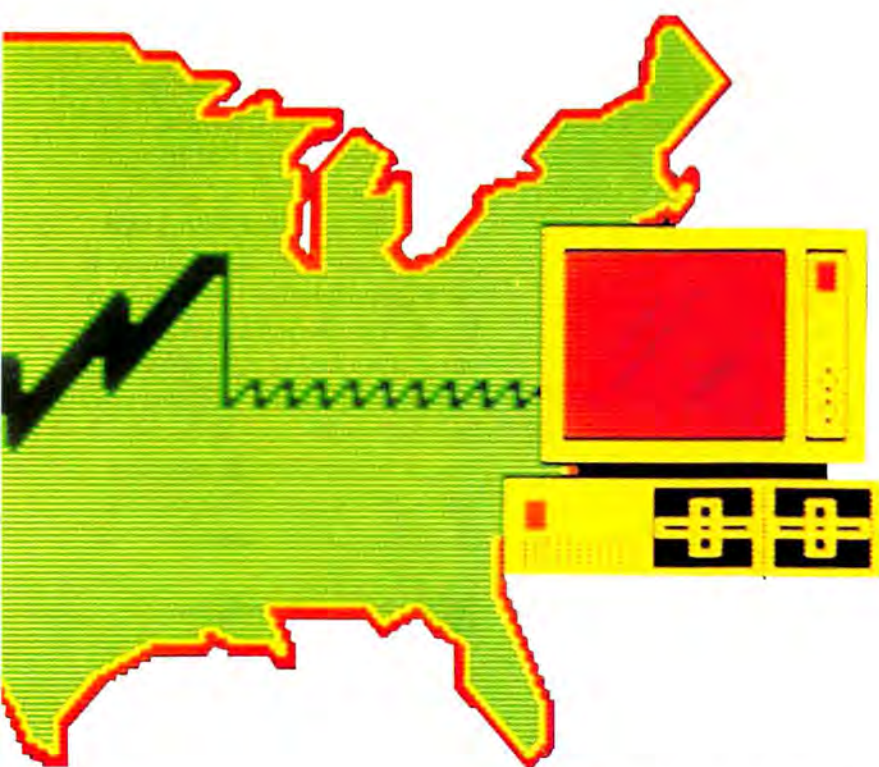


Better still, the presentations you make with PC Storyboard fit on disk and go where you go. You can even mail a complete presentation to a client or an associate.

■ Present at the Creation

Business presentations are the fruits of a two-stage process: creation and display. PC Storyboard is merely adequate at the first (although it generously lets you import images freely from other programs), but it excels at the latter. The package unites a quartet of closely related graphics programs, each with a distinct role in preparing a presentation: Picture Taker, Picture Maker, Story Editor, and Story Teller.

The first module, Picture Taker, snaps a shot of the PC's screen,



whether it's displaying text or graphics, and writes that image to disk. Picture Maker creates charts and freehand graphics and edits graphics screens, including those captured with Picture Taker. To connect the images made or imported with Picture Maker and Picture Taker, turn to Story Maker, which lets you choose among various types of transitions between images. Story Teller reads the script created with Story Editor and displays the pictures according to your instructions.

PC Storyboard supports IBM's Enhanced Graphics Adapter but only in the board's Color/Graphics Adapter-compatible mode. The package works with standard RGB monitors as well as with color and black-and-white composite monitors. When used with a color

composite monitor, *PC Storyboard* offers 16 foreground and background colors.

But enough shilly-shallying; now to put *PC Storyboard* through its paces and create that presentation. Time is short.

10:45: Do You Know Where Your Charts Are?

The Cuisine de la Canine presentation requires graphic representation of the company's financial statements, prepared with *1-2-3*. To capture screen images from *1-2-3* or virtually any other program, you load Picture Taker, a 5K memory-resident file.

You can specify the drive on which you want the pictures stored and whether you'd also like printed screen dumps. Just like

doing a screen dump, snapping a picture is a simple matter of pressing <Shift>-<PrtSc>. The image is saved in a compressed format.

Picture Taker can record images in all the usual screen modes: monochrome or color medium- and high-resolution graphics, as well as 40- and 80-column text. You can even digitize photographs, then use Picture Taker to include them in a show.

IBM endeavored to make *PC Storyboard* as tolerant as possible; just about anything you can see on the screen, Picture Taker can capture. You can import images from programs that bypass the PC's BIOS and write directly to the screen (as *1-2-3* does). IBM also includes a /G option that enables Picture Taker to record graphics screens. A typical *PC Storyboard* image claims 8K of disk space. A single disk can thus contain 45 pictures—enough to build a self-running 20-minute demo.

11:20: The Cutting Room Floor

With the appropriate images recorded on disk, you quit *1-2-3* and load Picture Maker, a hefty 222K file. Picture Maker enables you to view, edit, and embellish medium-resolution graphics images. You can use it to display—but not edit—text-mode and high-resolution screens. Character-based screens, along with high-resolution bit-mapped graphics, can't be edited or retouched with Picture Maker, but Story Editor can display them as full or partial pictures (see Screen 1).

Picture Maker begins with a virtually clean slate—just a cursor on a blank screen. The cursor, which can take several shapes, is

used for drawing and to select portions of images for editing or coloring.

PictureMaker is largely command-driven; its few menus display only such items as color palettes. The bulk of this component's four dozen commands use mnemonics like U for Undo and Z for Zoom (to edit on a pixel-by-pixel basis, much like the Macintosh's FatBits). Some

commands, unfortunately, are arcane rather than intuitive: O, for example, saves your picture Out to a disk, and K steps through the various cursor (Kursor?) settings. With its plethora of functions and options, Picture Maker is clearly the most difficult of the four modules to master. To IBM's credit, however, the <F9> and <F10> keys perform a helpful Rotate function, scrolling through *PC Storyboard's* options and defaults. Picture Maker's on-line help is not context-sensitive, but in flipping through its reasonably complete 14 pages, you'll probably find the information you're seeking.

You can recall captured images for editing by using the I(n) command, then specifying the name of the saved file. With the image displayed on the screen—say a 1-2-3 pie chart for your Canine presentation—you can begin putting Picture Maker's drawing and text-editing commands to work.

You'll probably want to replace 1-2-3 titles and data labels with text in one of the four *PC Storyboard* fonts. Each font—bold, thin, Roman, and PM (Picture Maker, the house dressing)—is available in five sizes (roughly 18 point to 72 point), with or without outlining, shadowing, and slanting. Entering text is a simple matter of positioning the cursor where you'd like the text to be, striking T, and typing away. You can use the cursor keys to add depth and emphasis to text entries. In theory, it's easy to create additional fonts via a separate utility, but tinkering with individual pixels tends to be a tedious business.

Want to put some meat on that gaunt 1-2-3 pie chart? Picture Maker lets you work with IBM's typical array of four-color palettes. You can choose any color

for any pixel from either of two palettes—green/red/yellow/*background* or cyan/magenta/white/*background*, depending on which palette is active. Select your background from any of 16 available colors.

Now fill each slice with a new color. Position the cursor within a pie slice and choose the F(ill) command. If you're not keen on the initial fill color, you can substitute another by pressing <F7> and selecting an alternative from the palette. You don't like the chart's position? Use the cursor keys to move it around the display.

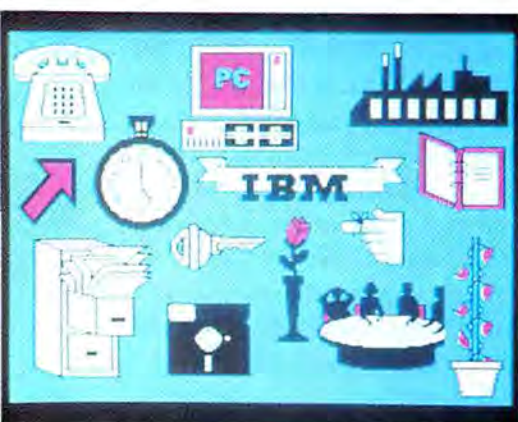
12:35: Charting on Your Own

Skipping lunch, you move to Picture Maker's modest charting component, which serves up a feast of horizontal and vertical bars, pies, and lines and enables you to manipulate and enhance your creations. For a package that doesn't purport to include full charting capabilities, *PC Storyboard* provides more than ample flexibility. You can vary the spacing of bars and the thickness of lines, and even explode an individual slice from a pie. To make a chart, you enter the values of the graph using the Graph Definition command. Values, entered as positive or negative numbers, can be changed at any time—and the graph will change accordingly.

Although Picture Maker makes short work of creating simple charts from scratch, you may well find it more productive to use a stand-alone graphing application and then import your handiwork



Screen 1: Picture Taker captures and Picture Maker embellishes medium-resolution graphs created with other programs.



Screen 2: Picture Maker's library of clip art enables you to dress up otherwise austere text charts.

with Picture Taker. Using *PC Storyboard* to create charts combining bars, lines, or pies is bothersome; the program supplies no overlap or 3-D option, so manipulation must be done by hand. In addition, *PC Storyboard* can't analyze data (to illustrate moving trends or averages, for instance) as can *Microsoft Chart* and *Chart-Master*.

1:25: Drawing Conclusions

To make your presentation a *pièce de résistance*, you'll need to create a few illustrations using Picture Maker's built-in drawing tools. The program's toolkit contains five: D(raw), for continuous sketching; E(rase), to delete parts of an image; L(ine), to generate straight lines; P(oint), to plot dots; and R(ound), for circles and ovals.

You can alter outlines and fill colors using the <F5> through <F10> keys. Errors can be wiped away with the U(ndo) command or by using the cursor to box an area and deleting its contents with the E(rase) command.

Suppose you want an introductory slide consisting of Cuisine de la Canine's logo framed by a border. You can use the P(oint), D(raw), and R(ound) commands to build the basic logo, relying on the Z(oom) command to move in close for cleanup work. Frame the logo with the L(ine) command, and then write the text with the T(ext) command.

You can recycle the company logo by drawing a box around it with the cursor keys and calling up Picture Maker's cut-and-paste feature to duplicate the image.

The cut-and-paste commands also enable you to copy an image

from one of the two picture libraries included with *PC Storyboard*. These libraries include the usual assortment of clip art, such as file cabinets, telephones, disks, notepads, and arrows (see Screen 2). (Marketing Graphics recently beefed up the *PC Storyboard* image storehouse with *PicturePak*, a trio of clip art libraries, each boasting 120 still frames—some with two or three pictures per frame and 15 to 20 animated sequences.)

PC Storyboard's reliance on cursor-key-based drawing tools precludes the kind of convenience offered by a mouse-based freehand graphics program like *PC Paintbrush* or *In*a*Vision* and by the light pens or digitizers common in CAD systems. The program does support the Mouse Systems mouse, but that input method can be used for freehand

drawing only, not charts or bars, which you create by entering numbers. If you need to do a great deal of drawing, the best course might be to use a mouse-based paint program, once again capturing finished images with Picture Taker and leaving the editing to Picture Maker.

3:05: Ready When You Are, PC

With the images completed and saved to disk, it's time to write a script stringing them together into a slide show. Quit Picture Maker and start Story Editor, which opens with a script template (see Screen 3). You enter the appropriate picture name with the <F9> and <F10> Rotate keys, scrolling through the files you've saved on disk. That done, <F9> and

PC STORYBOARD Story Editor									
Edit the Story									
Story Name Cuisine de la Canine									
Label	Picture Name or Command	Display picture using:				Then wait for	Set Color		Area
		Method	Dir	Line	Time		Pal	Back	
A	Arnold Airedale	CHECKER	UP	NONE	FAST	KEY	GRY	BLK	FULL
B	Bruce Bassett	CRUSH	DOWN	GRN	MED	0	CMW	BLU	PART
C	Colleen Collie	DIAGONAL	LEFT	RED	SLOW	.5	LGRY	GRN	FULL
D	Darrell Dachshund	EXPLODE	RIGHT	VEL	0	1	LCMW	CYN	PART
E	Edwardo Elkhound	FADE	OUT-U	CYN	.5	1.5	GRY	RED	FULL
F	Fernando Fox-Terrier	NONE	IN-U	MAG	1	2	CMW	MAG	PART
G	Gregory Greyhound	PUSH	OUT-H	WHT	2	4	LGRY	VEL	FULL
H	Hubert Husky	REPLACE	IN-H	BACK	3	7	LCMW	WHT	PART
I	Ivan Irish-Setter	SPLIT	UP	NONE	4	12	GRY	GRAY	FULL
J	Jan Japanese-Spaniel	STRIPES	DOWN	GRN	60	60	CMW	WHT	PART
<div> <div>EDITING KEYS</div> <div>F1 Help</div> <div>F2 Function Keys</div> </div> <div> <div>aB Mark Block</div> <div>aC Copy Block</div> <div>aD Delete Block</div> </div> <div> <div>aE Erase Line</div> <div>aI Insert Line</div> <div>aU Unmark Block</div> </div> <div> <div>F6 Save Story</div> <div>F7 Print Story</div> <div>F9/10 Rotate</div> </div>									

Screen 3: Story Editor's script template lets you specify desired effects and transitions using program defaults or your own input.



Screens 4-7: This bottom-up crush replaces a text chart with a digitized image; in this example, the effect includes pauses for keyboard entry.

<F10> will also generate the program options you need to complete the form.

If you'd like glitzy transitions between images, you can choose from a raft of special effects. Story Editor offers ten: checker, crush, diagonal, explode, fade, push, replace, split, stripes, and weave.

For most of the effects, you specify a direction of travel. The push, split, and diagonal wipes, for example, can start from the top, bottom, left, or right. Some effects, like the diagonal wipe, can include a border line, in a color of your choosing, separating incoming and outgoing frames. (Screens 4-7 illustrate a crush from the bottom up.)

Story Editor offers two time controls—one sets the time *PC Storyboard* takes to draw an image, the second the length of intervals between pictures. The speed of an effect and the duration of a display can be designated as slow, medium, or fast or set numerically in seconds or fractions of a second. Using "push-on" screen wipes of three or four images at $\frac{1}{10}$ of a second yields a semblance of animation (see Screen 8).

With Story Editor's time features, you can put scripts on automatic pilot. Advanced users are particularly apt to like Story Editor's capacity for interactive presentations. This capability enables you to create shows that branch to particular slide sequences, based on the viewer's keyboard input.

To build interactive presentations, you use Story Editor's BASIC-like command language, with keywords such as /GOTO, /GOSUB, and /IF. Because programming Story Editor requires exacting syntax, as does any language, many casual *PC Storyboard* users may forgo this powerful and useful capability.

4:29: Teller of Tales

With the deadline fast approaching, it's time to strive for continuity—and here is where Story Teller takes a bow. While writing the script, you can preview the show as you please. This enables you to easily modify the script without having to toggle between Story Editor and Story Teller. You can step through the show a frame at a time, run it in real time, or display a picture by itself.

When everything looks right, you can copy the pictures, the script file, and the Story Teller module to a new disk. None of the *PC Storyboard* modules is copy protected, and IBM permits duplication of Story Teller—a legal and efficient way to prepare a presentation in New York and show it in L.A. IBM asks only that you include a copyright notice on the disk.

Like Story Editor, Story Teller has a fine sense of time. At any point in the presentation, you can pause by pressing the slash (/) key, then resume by hitting the <F4> key. Tapping the minus key steps backward through the frames; <F3> steps through the frames one at a time. If you need to control the show remotely, you can attach a joystick to the PC's game adapter port or wire a Kodak EC-1 slide projector remote control for connection to the game port.

4:59: The Moment of Truth

You're now ready to shove one last bit of work *Storyboard*'s way. You're thinking hard about hard copy for the Canine audience. Picture Maker supports the IBM Graphics Printer and compatible printers; it also works with IBM's JetPrinter or its equivalent to generate color output of the frames you've created. It's a shame *PC Storyboard* doesn't support laser printers or plotters yet.

High-quality printed output isn't entirely elusive, however. *PC Storyboard* saves picture files in BASIC's BSAVE format, which some programs, like *PC Paint*, can read. Assuming you have a program that includes appropriate printer drivers and can read the file, you're probably in business. If you need higher quality output than any printer can provide, you can always hook up a film recorder, like the Polaroid Palette or the Celtic VFR-2000, to turn your frames into slides. Better still, come up with a soundtrack and turn it all over to a VCR.

Show and Tell

You've done it, you've really put on the dog this time—developed and produced a presentation certain to make the marketing gurus glow and place Cuisine de la Canine in supper dishes across America.

In its price class, *PC Storyboard* wins Best in Show. *Grafix Partner*, a slightly less expensive offering, lets you create a similar slide show but doesn't offer *PC Storyboard*'s range of effects. *Execuision* is also crammed with special effects—but at roughly double this program's price.

VideoShow 150, a combination of hardware and software, provides three times *PC Storyboard*'s resolution and oodles more colors. But at \$4000, VideoShow 150 is geared for presentation diehards; you've got to care intensely about differences in color and resolution to swallow the difference in price.

Although learning and using every last *PC Storyboard* feature can be cumbersome—and although it's neither a freehand drawing nor a full-function charting package—the program enables you to design and execute professional-quality presentations faster than most of its rivals, and for fewer nickels and dimes.

PC Storyboard is a coup for Big Blue, which has taken its knocks in PC software. The package includes the typical IBM binder, but the manual inside is refreshingly clear and, yes, crisply written—which almost makes up for its lack of an index. The documentation contains a particularly helpful tutorial.

Count on free support for the first three months, but on a by-mail basis only. Extra support can be had, but at a hefty price—a lamentable situation that applies to every entry in IBM's *Personal Decision* series. IBM offers a \$125 telephone support plan after the initial 90 days and tacks on \$40 for every call. So cherish that manual.

PC Storyboard achieves its objective as a stylish teller of tales—and then some. Its special effects and scripting capabilities make the program a potential job-saver. Once you master its commands, the package is a delight to use. You'll be creating snappy presentations in a few hours. And you won't be dog-tired. ●



Screen 8: *PC Storyboard* enables you to add animation to clip art. By quickly cycling through a series of pictures, you can make the factory smoke appear to move.

Gordon McComb is a freelance writer in Aptos, California, who specializes in graphics applications.

PC Storyboard IBM

P.O. Box 2328
Menlo Park, CA 94025
800/426-2266

List price: \$250

Requirements: 256K (320K recommended), two disk drives, DOS 2.00 or later version

PicturePak Marketing Graphics, Inc.

401 E. Main St.
Richmond, VA 23219
804/788-8844

List price: Eye Openers, Holidays, PC Family \$195 each
Requirements: 256K, PC
Storyboard

Son of LaserJet

Hewlett-Packard's LaserJet started the laser printer stampede. Now HP is bidding to maintain its position as the leader of the pack with a new printer, the LaserJet Plus.



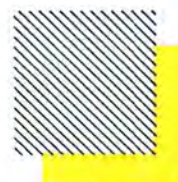
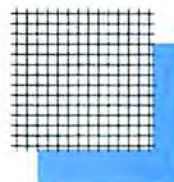
The LaserJet Plus offers a variety of patterns to enhance graphics.

Ted Nace

“I want the LaserJet to be the IBM PC of laser printers,” said Roger Archibald, Hewlett-Packard's printer mogul, recently. The comparison is apt. Like the PC, the LaserJet shot out of the starting blocks before the competition even had its shoes on. According to market researchers at Future Computing, it now outsells the next most popular laser printer, the Apple LaserWriter, six to one.

The LaserJet was designed as an Everyman's product, less technically sophisticated than some, but aimed quite accurately at the needs of most users. It is reliable and relatively simple to operate. And HP borrowed a page from IBM by catalyzing third-party software support for the LaserJet. Within a year of its introduction, a multitude of utilities and special application programs had materialized to help users tap the LaserJet's potential.

Now HP has taken the next logical step by introducing the more powerful LaserJet Plus and simultaneously dropping the price of the LaserJet by \$500. The move is timely. With nearly a score of the Japanese electronics giants pushing laser products into this lucrative market, the monopoly HP enjoyed in 1984 is but a memory.



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0123456789:;<=>?
@ABCDEFGHIJKLMNO
PQRSTUVWXYZ[\]^_
'abcdefghijklmno
pqrstuvwxyz{|}~

!"#\$%&'()*+,-./
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Ä å Æ æ Å å Ö Ü Ê Ì Ñ Ò
Ã Ä Å Æ ç È É Ê Ë Ì Í Î Ñ Ò
Þ þ — ¼ ½ ¾ « » ±



■ If the LaserJet is HP's PC, then the Plus is its XT, offering several significant performance enhancements while remaining completely compatible with the valuable library of LaserJet utilities and application software.

must be shut off to reset, the Plus resets at the touch of a button on its front panel yet preserves any fonts and macros residing in the printer's expanded memory (see Table 1).

The LaserJet shot out of the starting blocks before the competition even had its shoes on.



fonts from floppy disks and thus combine a greater assortment of typefaces and sizes than was possible with the LaserJet's plug-in cartridges. Finally, you can save long sequences of printer commands as macros. This allows you to store a letterhead or a form and

then print it out with a brief command.

LaserJet owners who need extra printing power can upgrade to a Plus by having an HP dealer replace the main board for \$1995.

This is 8-point Helv.

This is 10-point Helv.

This is the bold version.

This is the italic version.

This is 12-point Helv.

This is the bold version.

This is the italic version.

This is 18-point bold Helv.

**This is 24-point
bold Helv.**

This is 8-point Tms Rmn.

This is 10-point Tms Rmn.

This is the bold version.

This is the italic version.

This is 12-point Tms Rmn.

This is the bold version.

This is the italic version.

This is 18-point bold Tms Rmn.

**This is 24-point bold
Tms Rmn.**

Figure 2: HP's first package of floppy disk fonts provides nine versions of TMS RMN and nine versions of HELV. Each is available in portrait mode (shown here) and landscape (not shown).

■ Fonts à la Carte

The LaserJet has two built-in fonts and accepts ROM cartridges containing additional fonts. Cartridges go for \$225 to \$400 and typically hold about half a dozen fonts. While this sounds like more than enough, four permutations of a single font—medium-weight portrait, bold portrait, italic portrait, and medium-weight landscape—take up two-thirds of a cartridge. Moreover, cartridge fonts cannot be scaled or modified.

The Plus adds seven fonts to the two already "wired" into the machines: 12-point Courier in landscape and portrait modes for ASCII and Roman Extended character sets; and 8.5-point Line Printer in portrait mode for ASCII, Roman Extended, and Roman 8-character sets. But it's the fonts on disk that unleash the power of the Plus (see Figure 1).

■ Free at Last

Unshackled from its cartridge confines, the LaserJet Plus can turn to floppy disk fonts for a powerful printing punch. You can store the precise fonts you want in the Plus's capacious memory, mixing and matching up to 16 typefaces per page in fixed point sizes to create forms and letterheads to your exact specifications. HP font disks are priced at \$250 each, undoubtedly to avoid undermining sales of ROM cartridges.

These fonts can hold a greater variety of typefaces and sizes than the average font cartridge, but for the moment they promise more than they deliver. Hewlett-Packard currently offers only one pair of floppy disk fonts with two typefaces, TMS RMN and HELV

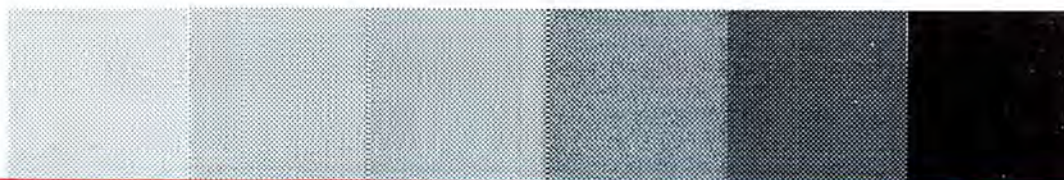


Figure 3: The Plus creates eight shades of gray (shown above) and provides a palette of six patterns (see pages 208 and 209) to embellish graphics.

(which closely resemble Times Roman and Helvetica, respectively). Both typefaces come in 8, 10, 12, 18, and 24 points at portrait and landscape orientations, and in bold and italic options for the 10-point and 12-point sizes (see Figure 2).

Additionally, the LaserJet Plus stores fonts as bit maps, an approach that has some inherent limitations. Fonts cannot be rotated or easily scaled to different sizes, so each point size must be stored as a separate font. By comparison, the Apple LaserWriter stores a compact description of a character and can easily modify it. Consequently, the Plus is initially less expensive than the LaserWriter, but users who need a variety of point sizes will end up spending a good deal more on floppy disk fonts.

Third-party software developers are already boosting the Plus with their own fonts. For example, LaserJet owners can scale and customize floppy disk fonts originally developed for the Corona Laser Printer with a new version of *Poems Font Editor*. Unfortunately, due to the LaserJet's bit-mapped

method for storing fonts, scaling can result in type with jagged edges or a slightly misshapen appearance.

■ A Tale of Two Utilities

Fonts from floppy disks can be sent to the Plus by using either the DOS COPY command; *PCLPak*, a special printer control language (PCL) interface utility provided by Hewlett-Packard; or one of the LaserJet utilities sold by third-party developers.

Utility software is the easiest way for the day-to-day user to wrest the power of floppy disk fonts from the Plus. *Printworks for Lasers* is a memory-resident utility that works in conjunction with any application program. <Shift>-<PrtSc> displays the *Printworks* pull-down menu; from there, you load or change fonts with one or two keystrokes. *PrintMerge 2.0* is a *WordStar*-specific utility that defines new dot commands and modifies existing ones to call appropriate fonts.

For example, to set a line in a *WordStar* document to Times Roman 24-point bold type, you would enter the special dot command .LF at the beginning of the document, then a single letter like D as an identifier, followed by a code representing the typeface, in this case TR24B#US.SFP. The

identifier is used in conjunction with the <Ctrl> key like a regular *WordStar* format command, to set off character strings to be printed in a specific typeface. Enter <Ctrl>-D anywhere in the document and the text that follows it is printed in Times Roman.

Although both these utilities are relatively simple to use, *Printworks* is the more versatile. Not only does it work with different programs, it lists fonts currently in memory and lets you set printer controls such as margins and page length.

These are but two of a rapidly growing stable of LaserJet utility programs that enable existing application programs to run with the LaserJet Plus (see *PC World View* in this issue). Some utilities, like *CTLLaser*, provide pull-down menus for easy access to LaserJet fonts. Others are designed for use with specific applications: *StarJet* with *WordStar*; *SetLaser* and *DW2/3 Em-U-Print* with *DisplayWrite 2* and *3*; and *Laser-Ease* with *1-2-3*. Still others, such as *Laser Control 100*, allow the LaserJet to emulate existing printer protocols, such as Epson and Diablo.

Table 1: How the Plus measures up

	HP LaserJet	Corona Laser Printer	HP LaserJet Plus	Apple LaserWriter
Price	\$2995	\$3395	\$3995	\$6995
Printer engine	Canon LBP-CX	Canon LBP-CX	Canon LBP-CX	Canon LBP-CX
Total RAM	64K	128K	512K	1.5MB
Maximum image size (square inches)				
75 dpi	85.9	91.2	full page	full page
150 dpi	21.5	22.8	full page	full page
300 dpi	5.4	5.7	30 to 32	full page
Downloadable fonts	No	Yes	Yes	Yes
Graphics	Rectangular shapes	Epson graphics	Rectangular shapes, six patterns, eight shades of gray	PostScript language supports unlimited graphics
Macros and downloadable overlay forms	No	Yes	Yes	Yes

Greater Graphics, Software Salvation

Not only can the Plus print a larger image at 300 dpi, it supports several new commands in its PCL to create patterns, shades of gray, and solid rectangular shapes (see Figure 3). You can store these PCL command sequences as macros, thanks to the printer's larger internal memory. A single macro can incorporate all the instructions necessary to construct a complex image such as a letterhead or a tax or personnel form, which can then be sent to

the printer. Up to 32 macros can be stored in the printer at once.

Though HP's manuals document PCL, the escape codes are too lengthy and complex to be practical for average users. For example, the following commands are part of a macro that draws a ½-inch-square black box 1 inch from the left margin. `< Esc > &a720.00H` locates the cursor 1 inch (720 decipoints) from the left margin. `< Esc > &a720.00V` locates the cursor 1 inch from the top.

`< Esc > *c360.0000H` draws the square ½-inch (360 decipoints) wide, and `< Esc > *c360.0000V` makes it ½-inch tall. `< Esc > *c100G` chooses black. `< Esc > *c2P` fills the box with black. As you can see, creating a graphic image directly in PCL is a bit like trying

to write your own word processor in BASIC: It's possible, but not advisable.

The answer to greater graphics lies in an emerging generation of software that lets you draw forms on screen and save them to the LaserJet. The first of this new breed—*LaserSoft* from Business Systems International and *Laser-Type* from SoftLab—create complex forms and letterheads without once forcing the user to invoke a PCL command.

A laser printer is only as effective as the software that runs it. So dust off the old rule for buying computers: Pick the software that does what you need, then buy the machine that supports that software. As the LaserJet family continues to build popularity among consumers, it's safe to assume that a wealth of third-party software will soon appear to support the advanced features of the Plus. In the critical area of current and future software support, HP is still miles ahead of the competition. ●

Ted Nace is a Contributing Editor for PC World and the coauthor of LaserJet Unlimited: How to Get the Most From Your Hewlett-Packard LaserJet and LaserJet Plus Printer (Peachpit Press, Berkeley, 1985).



CTL Laser
Rabar Systems
P.O. Box 306
Westport, CT 06881
203/227-4415
List price: \$65
Requirements: 64K, two disk drives

DW2/3 Em-U-Print
Koch Industries
11 W. College Dr., Bldg. G
Arlington Heights, IL 60004
312/398-5440
List price: \$149
Requirements: 256K, two disk drives, DOS 2.00 or later version, DisplayWrite 2 or 3

Laser-Ease
Ensemble Computer Services
P.O. Box 9083
Fountain Valley, CA 92647
714/848-2762
List price: \$49.95
Requirements: 256K, two disk drives, 1-2-3

LaserControl 100
Insight Development Corp.
2005 Vine St. #4
Berkeley, CA 94709
415/527-8646
List price: \$150
Requirements: 64K, two disk drives, 1-2-3

LaserJet, LaserJet Plus
Hewlett-Packard
Personal Computer Group
11000 Wolfe Rd.
Cupertino, CA 95014
800/367-4772
List price: LaserJet \$2995, LaserJet Plus \$3995; LaserJet Plus upgrade \$1995

Lasersoft
Business Systems International, Inc.
20942 Osborne St.
Canoga Park, CA 91304
List price: \$995
Requirements: 128K, two disk drives

LaserType
SoftLab
P.O. Box 879
St. George, UT 84770
801/628-4969
List price: \$500
Requirements: 512K, two disk drives, DOS 2.00 or later version, Hercules graphics board with monochrome monitor or IBM EGA board with color monitor, Microsoft-compatible mouse

PCLPak
Hewlett-Packard
Personal Computer Group
List price: \$79 (free with purchase of floppy disk fonts)
Requirements: 256K, two disk drives, DOS 2.00 or later version

Poems Font Editor
Poems
509 Marin St. #121
Thousand Oaks, CA 91360
805/373-1919
Price: \$400 including LaserJet/LaserJet Plus conversion module
Requirements: 192K; two disk drives; DOS 2.00 or later version; IBM, Tecmar, or Hercules graphics board

PrintMerge 2.0
Polaris Software
310 S. Via Vera Cruz #205
San Marcos, CA 92069
619/489-8243
List price: \$99
Requirements: 196K, two disk drives, DOS 2.00 or later version, WordStar

Printworks for Lasers
SoftStyle Inc.
7192 Kalaniana'ole Hwy. #205
Honolulu, HI 96825
800/367-5600
List price: \$125
Requirements: 256K, two disk drives, DOS 2.00 or later version

SetLaser
The Stovall Group
5180 Roswell Rd. N #202
Atlanta, GA 30342
404/252-9454
List price: \$250
Requirements: 128K, two disk drives, DOS 2.00 or later version

StarJet
Control-C Software, Inc.
6441 S.W. Canyon Ct.
Portland, OR 97221
503/292-8842
List price: \$150
Requirements: 64K, two disk drives, DOS 1.10 or later version, WordStar



Optical Disks: First Light

The era of gigabyte storage is almost upon us. But does bigger necessarily mean better? PC World examines the first step toward true mass storage—the ISI optical disk drive for the PC.

Ron Cleaver

Once my 10MB XT seemed like a bottomless pit. Today, there's an audible *thunk* whenever I toss yet another program or data file into that formerly yawning void. I find myself continually tamping down the rising pile; all too often I must dispassionately excise the old or redundant to make room for my latest project.

But wait. There's a new storage alternative peeking over the horizon that can gobble up every file in

sight with nary a hiccup—one that promises to revolutionize even the jaded PC market. Enter the optical disk.

Though optical disk drives for larger systems have been around for more than a year, the first optical drive for the PC—the Model 525 from Information Storage Incorporated (ISI)—has just made its debut. Backed by hard disk vendor Tallgrass Technologies, office automation giant CPT, and computer veteran Sperry, the 5¼-inch ISI drive offers rugged removable media, performance comparable to the XT's hard disk, and random access to mammoth amounts of storage (starting at 100MB). You cannot buy the Model 525 from ISI, but vendors such as Tallgrass expect to release units (probably paired with hard disk drives) early this year.

Using the ISI drive requires a certain amount of mental readjustment. For unlike floppy drives and hard disks, an optical disk drive stores data by physically burning pits with a laser into a specially coated disk. The result is secure but permanently unalterable data.

At \$1500 per system in very large quantities—which translates roughly into \$3000 to \$4000 per unit retail—this “write-once” device is the cheapest optical storage going. But chances are it won’t replace the hard disk. Until erasable optical disk drives arrive en masse, the ISI and its peers should be considered supplements to hard disk storage. Given the ISI’s expected retail price, it’s also likely that the drive will first find a home in large corporations and government agencies, where pockets are deep and archiving data is a priority.

However, the price may be acceptable to smaller companies in compelling situations. Designers and engineers using CAD software need to store huge image libraries. A company that wants to back up numerous hard disks may find the ISI drive superior to tape systems or the Iomega Bernoulli Box. Small regional insurance companies, banks, and similar institutions must store huge amounts of data and keep permanent audit trails. Firms that rely on several multimegabyte programs, such as the *Business Management*

Series, or on UNIX-based multi-user software may also find that the investment is worth the initial financial shock.

■ Making Light

The ISI drive tested was a preproduction unit with prerelease software, so some features may be enhanced or smoothed over when units are finally released. The drive is about the size of a full-height floppy disk drive and is installed in an Everex expansion chassis that includes a power supply for the drive and three PC-compatible expansion slots. The system comes with an interface board for the PC, cables, and most important, a DOS extension called ISIDOS that allows the drive to work, albeit clumsily, in the PC environment.

The drive uses a 5¼-inch single-sided removable disk that packs 122MB of formatted storage, of which 100MB is guaranteed usable by ISI. Future units will take advantage of double-sided platters. Shrouded in a tough plastic shell, the ISI disk consists of a clear plastic outer layer and an inner layer of tellurium. The laser records data on the disk by burning permanent pits in the tellurium; a pit represents binary 1, and its absence, 0. The disk is permanently formatted by ISI, and the drive will accept only ISI cartridges. You may flinch at the thought of spending \$250 for a single cartridge, but on a cost-per-byte-stored basis it beats all comers—



The ISI optical drive au naturel

and it’s removable (see Table 1). ISI predicts that a cartridge will cost only \$60 by the end of 1986, and the price of a drive should be neatly halved.

■ Using Light

As we shall see, using the ISI drive with the PC takes some doing. As David Allen, president of Tallgrass, once noted, “The people who designed DOS were disk bigots—they didn’t recognize the existence of optical or tape technologies.” The immediate impact? You cannot start a PC from the ISI drive. However, installing the drive couldn’t be easier. You merely slip the ISI interface board into the back of the PC and attach the cable to the board and the Everex chassis. Like most external devices attached to a PC, the drive must be turned on before the PC.

Getting the drive up and running was slightly problematic. The XT hooked up to the drive was also connected to a 3Com EtherSeries local area network. As network users of all stripes can attest, network controller boards conflict with almost everything in your PC. The 3Com board was no exception: It coveted the same I/O port address as the ISI controller board. Removing the 3Com board



Library on a disk? ISI’s 100MB optical disk

was the easiest solution, since the ISI board cannot be reconfigured. (Hardier souls can of course reconfigure the 3Com network—not a trivial task.) ISI has noted the problem and hopes to solve it soon, particularly since the ISI drive could act as a specialized network server.

A Different DOS

Since the optical disk drive is so radically different from other PC storage devices, most DOS commands won't work. Thus ISI has created ISIDOS, a DOS extension that consists of device drivers for the optical disk (ISBIOS.SYS and ISIDOS.SYS) and several DOS-like utilities. Among the latter are programs that copy files to the optical disk (ISCOPY), mount them (MOUNT), allow you to list the files on disk (ISDIR), and eject the disk cartridge (EJECT.) ISIDOS requires 16K of memory, used mostly for storing a special disk directory called a logical directory.

To install ISIDOS, you include the command `DEVICE=ISBIOS.SYS` and `DEVICE=ISIDOS.SYS` in your system's `CONFIG.SYS` file and the two .SYS files in the root directory. ISI recommends that you copy the ISIDOS files supplied on floppy disk to the ISI drive by using the command `ISCOPY A:*.*`. (ISCOPY knows the optical disk is designated drive D:; specifying the destination disk is not allowed.) In fact, ISCOPY is the only way you can write anything to the optical disk, unless you have the necessary programming skills for tapping ISBIOS disk write functions.

Using a program or opening a file means activating it with the `MOUNT` command. `MOUNT`

Table 1: Optical and hard disk drives face off

	ISI Model 525 Optical Disk	IBM XT Hard Disk
Cost*	\$4000	\$450
Formatted storage (megabytes)	100**	10
Cost per megabyte	\$40	\$45
Average access time (milliseconds)	200	85
Data transfer rate (megabits/second)	2.5	5.0
Power requirements (watts)	20	20
Factory low-level formatting	yes	yes
Interleave value	1:1	6:1
Changeable interleave	no	no
Warranty	1 year	3 months, parts/labor
Toll-free number	no	yes
Software included	ISIDOS	no

* Estimate of retail price

** 122MB possible, 100MB guaranteed by ISI

copies a file's directory information to a "logical" directory stored in memory and makes the requested file available to DOS. Any command or program requiring file information accesses the logical directory. Files are normally mounted one at a time; fortunately, you can copy the logical directory, which lists currently mounted files, to an optical disk file (for example, `FILEDIR`) with the command `ISCOPY FILEDIR/D`, then insert the command `MOUNT FILEDIR/D` in

your PC's `AUTOEXEC.BAT` file. Running `AUTOEXEC.BAT` or restarting the computer would automatically mount the files.

On the Trail of DOS

But why bother with ISIDOS, logical directories, or file mounting at all? Consider the write-once nature of the ISI drive. The physical file directory, like all data stored on the optical disk, cannot be erased; thus, updating the directory (when a file is changed or a new one is added to the disk) means finding virgin tellurium. The optical disk directory

continues to expand as files are added, unlike floppy or hard disk directories that are fixed in size by DOS. Not surprisingly, DOS cannot cope with the optical disk's oversized directory.

Remember too that when a file on the optical disk is changed—even just one byte—it is rewritten completely to another part of the disk and assigned a version number, which is recorded in the physical disk directory. (On a floppy or hard disk the old file in most cases is overwritten and the directory entry updated.) Here another DOS incompatibility occurs—and ISIDOS and the logical directory come into play. Since DOS does not recognize file version numbers, ISIDOS mounts the most recent version of a file (unless directed otherwise) and copies the relevant information (minus the version number) into the logical directory, which DOS can read and work on.

Other distinct traits and important differences should be taken into account when considering the ISI drive. As noted earlier, neither DOS nor any application can write files directly to the disk—this operation is reserved solely for ISCOPY. You can read mounted files from the disk or execute mounted programs using DOS commands such as DIR, TYPE, WS, and so on. Since DIR lists only files in the logical directory, ISDIR is provided to list both mounted and unmounted files stored on the disk. ISDIR also supports I/O redirection and pipes. For example, the command ISDIR DATA.FIL > PRN prints a listing of all versions of DATA.FIL; ISDIR + SORT displays a sorted disk directory.

Unfortunately DOS's functionality has not been fully captured by ISIDOS. Volumes are currently limited to 16MB and 63

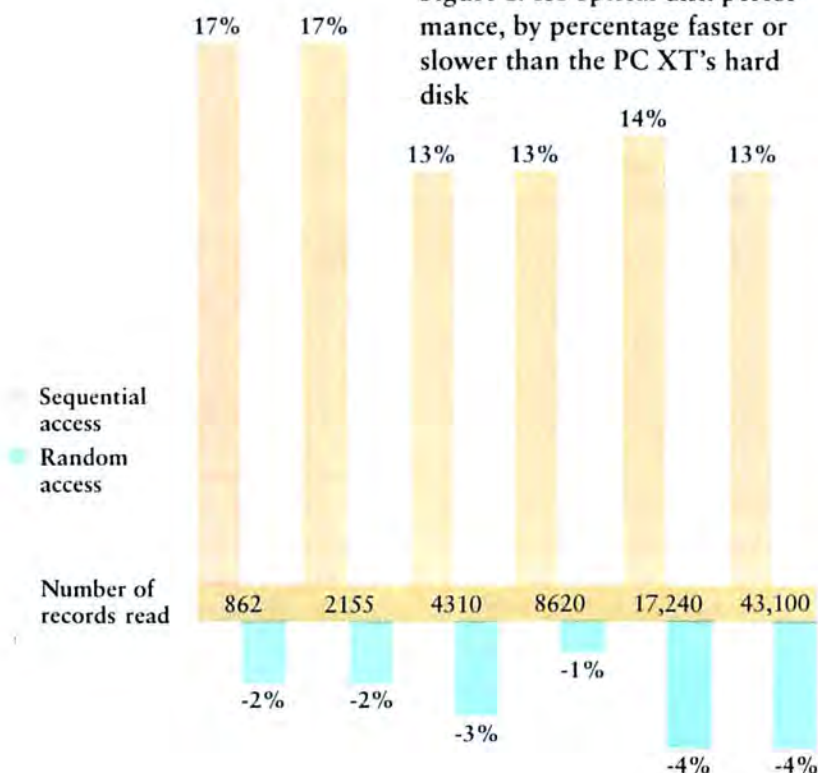
mounted files, half the amount of space and files normally allowed by DOS. More important, the ISI drive cannot support subdirectories or paths, making file organization a bit hair-raising. This problem is one of categorization. ISIDOS relegates physical directory entries to the outer edge of the disk, starting at the first sector of the first track and spiraling inward toward the center. Data files start at the last track and spiral outward. But a DOS subdirectory is essentially a file with a directory structure—and thus cannot be assigned a home by ISIDOS.

Given ISCOPY's central role in accessing the ISI drive, its limitations and quirks are indeed annoying. ISCOPY will terminate file copying if, during disk writing, it detects and skips over 100 bad sectors. File size poses problems too, since ISCOPY seems to have limits, in one instance around 880K. Unfortunately, some disk space is burned up in unsuccessful copying attempts. ISI claims both limitations will be eliminated with the next version of ISIDOS.

Real Life Optics

In determining the ISI drive's performance and handling, I copied files onto it, mounted and unmounted files, and installed and ran several programs. In theory, at least, you should be able to use any software package, copy protected or not, on the drive. I installed *Symphony* using ISCOPY and ran it with the key disk in the PC's drive A:. The program worked flawlessly until I absent-mindedly tried to write to the op-

Figure 1: ISI optical disk performance, by percentage faster or slower than the PC XT's hard disk



tical disk. Then *Symphony* informed me that the disk was write protected; I had to save the files to the hard disk and then transfer them to the ISI drive with IS-COPY. I also installed *WordStar* and *PC Paintbrush* and they ran perfectly—as long as I didn't try to save data files to the optical disk.

dBASE III was another matter. This program relies on its own file copy utilities for installation, and thus cannot be copied onto the ISI disk. However, I executed *dBASE III* from the hard disk and accessed my data base and index files on the ISI drive.

Through the Gamut

After poring over the manual, installing hardware and software, and shooting the ISIDOS rapids, I was itching to see how well the ISI drive would perform compared to my XT hard disk. I was admittedly skeptical, because the average access time for most optical drives, including this one, is typically 200 milliseconds—just a shade faster than a floppy disk drive.

ISI hikes performance by emphasizing critical components and using the drive's limitations to good effect. One big boost comes from storing the logical directory in memory, which measurably speeds operations. The drive's disk controller is fast enough to read one sector (or one track) after another as the disk spins. This provides an effective interleave factor of 1:1. (By comparison, the XT's hard disk's interleave is a slower 6:1.) The drive's data transfer rate is a respectable 2.5 megabits per second—about half that of the XT's hard disk.

Since ISCOPY is restricted to use on the ISI drive, a head-to-head write test with the XT was out of the question. I observed, however, that ISCOPY copies about 220K a minute; at this rate it would take nearly 9 hours of continuous copying to fill the entire optical disk. The XT and the ISI drive loaded *WordStar*, *Symphony*, and other programs with equal swiftness.

To quantitatively test performance, I set up a read test. I stored a *dBASE III* data file and its companion index file on both the XT and the ISI drive. I next wrote a *dBASE III* program that read the data base file sequentially and then according to its index. The latter approach forces the drive to retrieve records in a random fashion according to the value of the key. As Figure 1 illustrates, the ISI drive is significantly faster than the XT in sequential file access mode and only marginally slower in random access mode.

Light Reading

ISI's user manual is generally clear, concise, and logically organized. In 36 pages the manual encompasses everything from hardware and software installation to ISIDOS use and programming. Appendices focus on file and directory structure, programming tips, error handling, and other specifications. The manual is flawed in certain respects: It fails to mention that DOS cannot be booted off the optical disk and that the unit's controller board cannot be used in the XT's short slot. ISIDOS error messages are not documented, and an index is lacking. A discussion of which expansion boards conflict with the ISI board—and possible resolutions—would also be welcome.

End of the Tunnel

If your applications demand a bottomless storage pit, the ISI drive will be one good place to start—if ISI unties some knots in ISIDOS. The company claims that the next version of ISIDOS will bring the system more fully into the DOS fold: File and volume size will reach 32MB, and multiple volumes will be possible, with 511 mounted files per volume. On-line help for ISIDOS utilities will also be included. AT users can look forward to compatibility with the drive as well, since ISI will provide the necessary interface board and version of ISIDOS.

ISI's drive will no doubt be more appealing when the price of the system drops and the company releases double-sided "floppy" disks early this year. In the meantime, carefully consider your other mass storage options. Cost-per-byte-stored figures don't count for much when the price of internal 40MB hard disks hovers near \$1000. It may pay to wait both technologies out—and see over which bottomless pit the price pendulum comes to rest. ●

Ron Cleaver is a freelance writer and systems consultant based in Greenbelt, Maryland.

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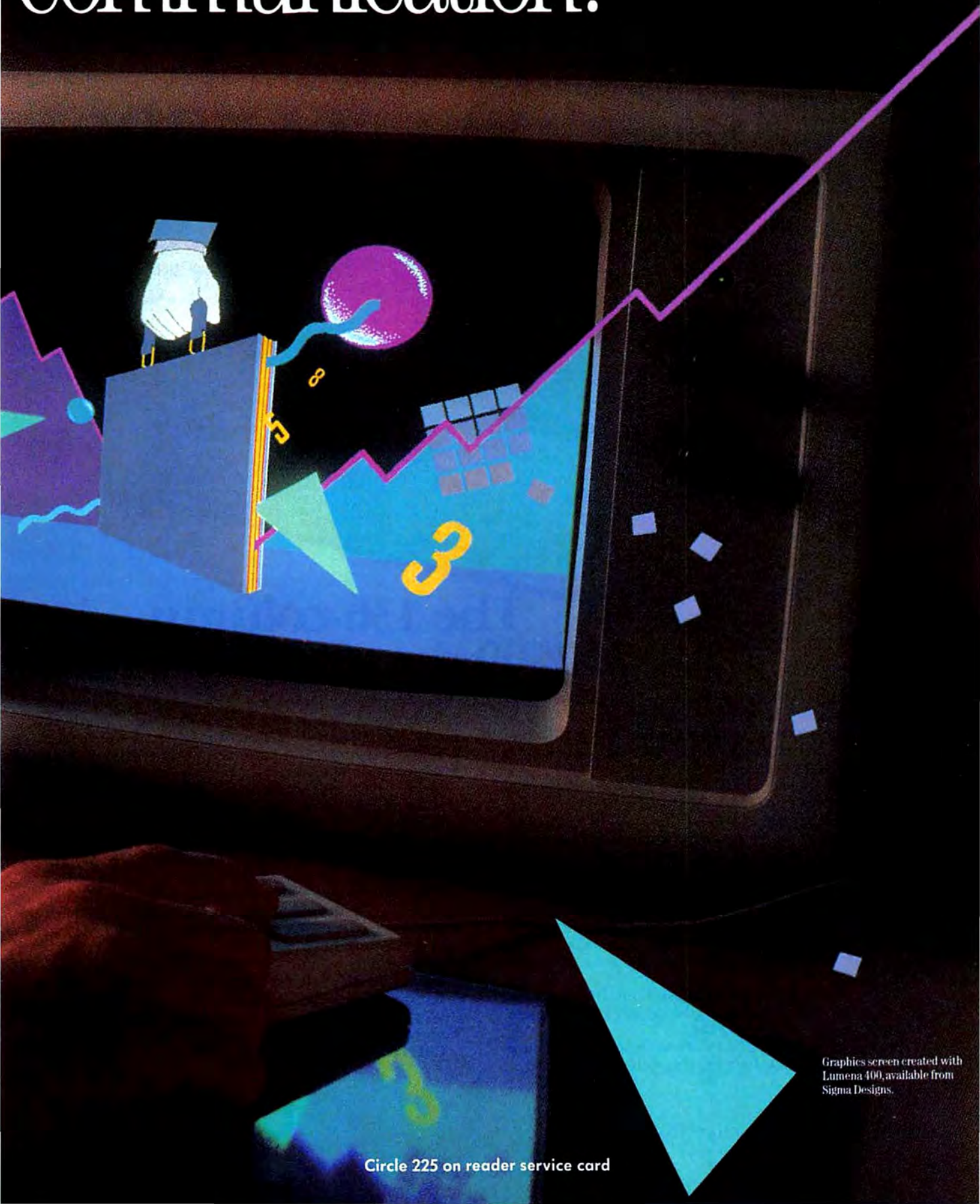
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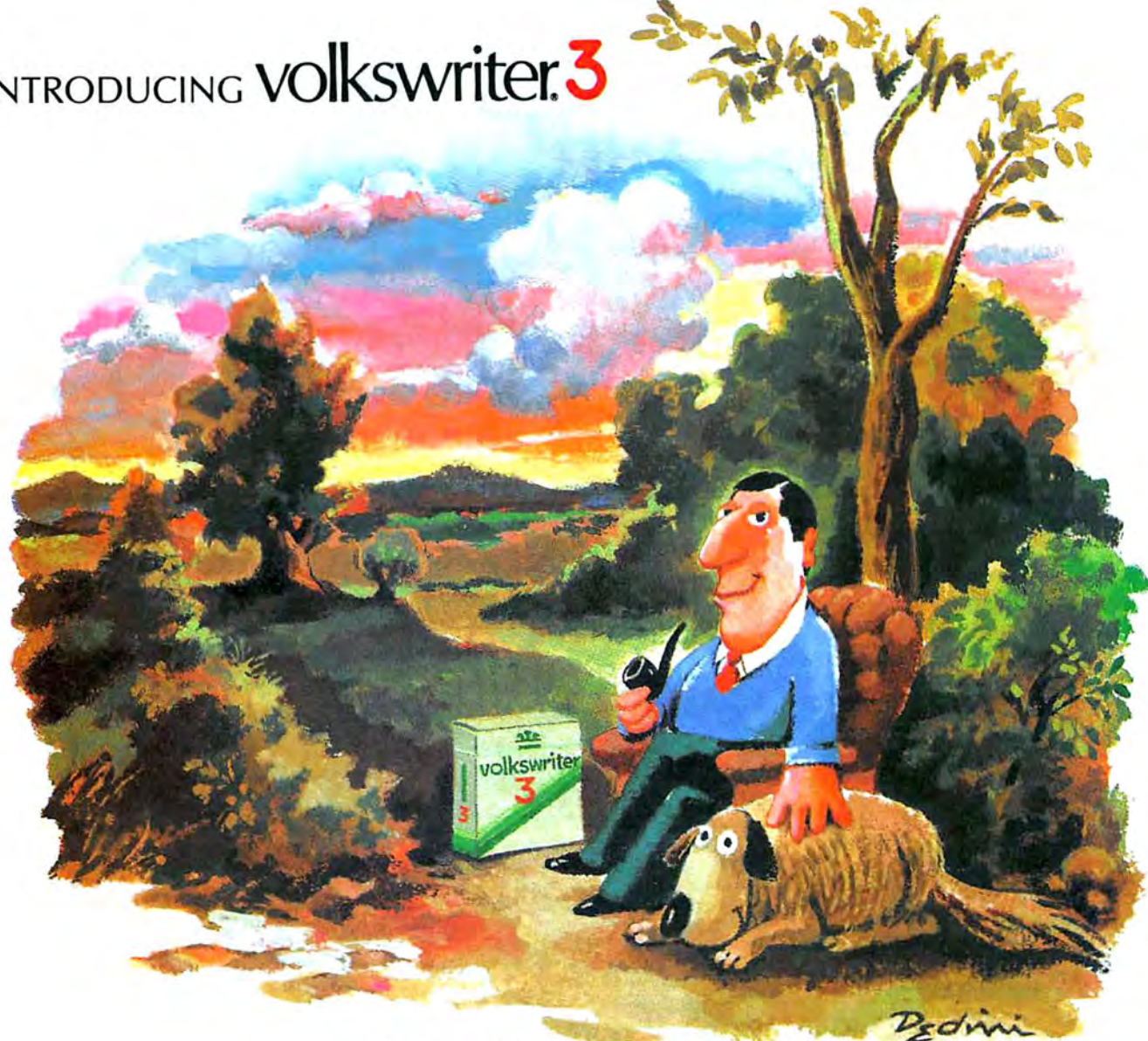
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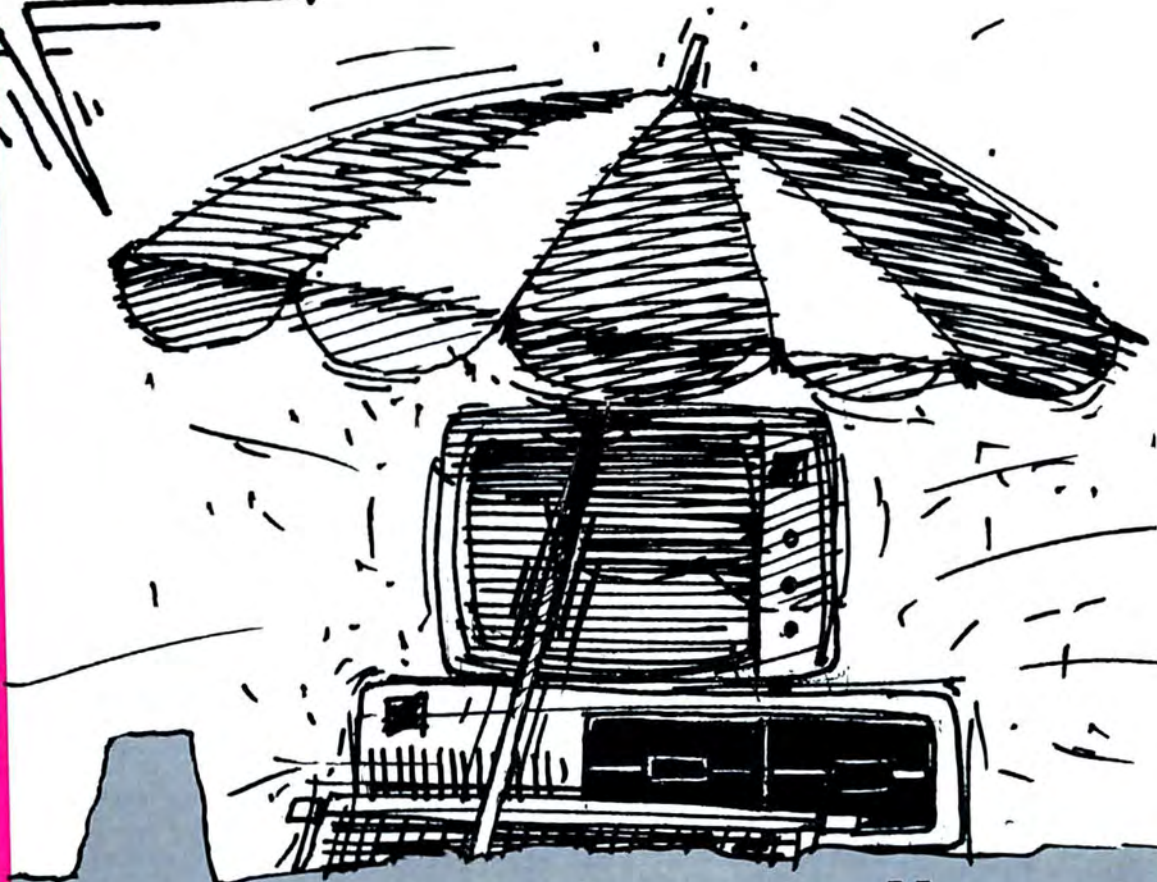


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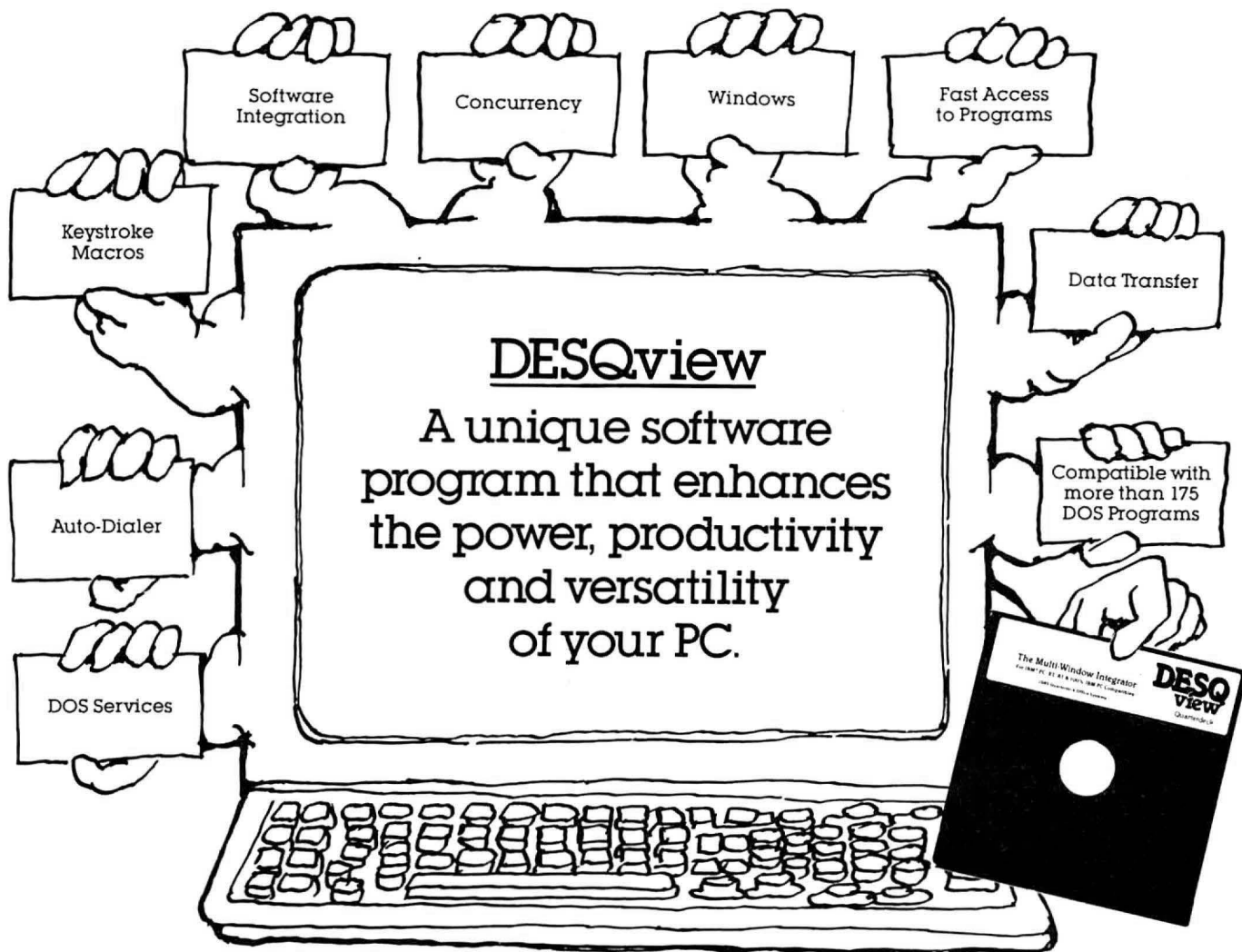
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Data on Your Dial

FM subcarrier broadcast technology beats the telephone as a cheap way to continuously download information to PCs. FM-based services already let your PC pull stock quotes out of thin air and trigger buy/sell recommendations—and more services are on the way.

Danny Goodman

There is scarcely a PC owner who hasn't encountered dial-up information services the likes of Dow Jones News/Retrieval, The Source, and CompuServe. Connecting to them requires little more than a PC, telecommunications software, a modem, and a telephone line. Once on line to a host computer's vast data warehouse, you can access anything from the current price of Aardvark Corporation common stock to encyclopedia entries on Zanzibar.

But for some applications—trying to make money in pork belly futures, for example—this kind of “query-driven” data flow is inadequate. Information needed for quick action is obsolete by the time you retrieve it from an on-line data base. Ideally, a PC would perpetually be on line, analyzing an incoming data stream.



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Brokerage firms do just that. Brokers maintain continuous links with several stock exchange computers, gaining instant access to data on trading in securities, commodities, and financial instruments. Computers monitor the data flow and alert staff to predefined conditions, such as a designated issue on a particular exchange reaching a specific price.

In this system, scofflaws can't get far: If a customer attempts use without payment, the LINC computer broadcasts a special code shutting off the receiver's data-gathering capability.

Trouble is, the cost of maintaining a similar link over which all this information could flow into your own PC is prohibitive. One component of that cost—the fee each exchange charges for the privilege of accessing its information—is beyond any individual user's control. And simply leaving your machine on line all day is certain to drain your capital more rapidly than prudent investing could augment it.

Moreover, a plain voice line can't transmit data fast enough to handle the enormous volume of trading information—you need a high-quality data line instead. Dedicated data lines do not come cheap; telecommunications typically ranks as a brokerage branch office's second biggest expense. For the individual investor, cost-benefit considerations rule out such an arrangement.

Fortunately, the cost of getting real-time information into your PC is being whittled down by several information packagers. Traditionally, the best you could do was receive financial market information on 15-minute delay. Today, continuous and up-to-the-minute trading information is being delivered to the PC via FM subcarrier (also called FM sideband) transmission.

Along for the Ride

FM stereo broadcast stations are assigned a range of 200 kilohertz (KHz) of the radio spectrum. That is, when a station operates on a frequency of 102 megahertz (MHz), it actually occupies a range between 101.9 and 102.1MHz. In practice, however, the broadcaster's main signal does not use the 25KHz at each outer edge of the range. These subcarriers, or sidebands, can carry completely different signals from the main broadcast signal; only specially equipped receivers can detect and decode the information such channels carry. The Federal Communications Commission sanction that permits FM transmissions on the subcarrier is known as Subsidiary Communications Authorization (SCA).

FM subcarriers have long been the primary means of delivering banal background music. The Muzak piped into an elevator or your dentist's office is broadcast via the sideband of a regular country, jazz, or classical music station. FM subcarriers have also delivered reading services for the blind and non-English-language programming.

In 1975 and again in a more clearly defined 1983 ruling, the FCC opened the way for FM stations to offer a wider array of subcarrier services, including data transmission. The FCC envisioned subcarriers as vehicles for financial information services, paging, electronic mail, and local information exchanges.

Modio Dough

The financial services industry was quick to treat FM SCA as a vehicle to transmit data. Dataspeed, a San Mateo, California, company, was first among those pioneers to bundle the broadcast of financial information with the hardware and software needed to pipe it into a PC.

Dataspeed contracted with FM broadcast stations in two dozen major U.S. cities to carry stock exchange data over the station's subcarriers. Dataspeed also developed a combination FM subcarrier receiver and modem (trademarked as Modio) that funneled data through the PC's serial port. Software written for the PC and compatibles displayed captured information on the screen and allowed a modicum of data storage. Last year Lotus Development purchased Dataspeed and renamed the company Lotus Information Network Corporation (LINC).

According to LINC's market research, at least 30 percent of *1-2-3* and *Symphony* users describe investment analysis as a primary application. To reach that market, the Lotus subsidiary is now offering an updated FM receiver with revised software that feeds incoming data into a *Symphony* or *1-2-3* spreadsheet. The product, called Signal, is the first FM SCA financial service to hit retail shelves.

A Long and Winding Road

Delivering financial quotations from the exchange floors to an FM SCA receiver like the LINC unit is no small technical feat. An intricate network of computers and satellite relays carries trading information to a satellite dish at participating FM stations, with a redundant telephone system as a backup in the event of network failure. From the earth station, data is fed to special broadcast equipment for transmission over the station's subcarrier (see Figure 1).

LINC obtains its stock quotations from several computer services that are themselves tied directly to the tickers of the New York and American stock exchanges, the NASDAQ (over-the-counter) market, the Chicago Board of Trade and the Chicago Mercantile Exchange, the Commodities Exchange Center, and the Options Price Reporting Authority (OPRA).

The exchanges generate a steady stream of data on prices paid and volume traded for each active issue. Two mainframe computers at LINC's Burlingame, California, facility maintain daily histories of raw trading data and supplement that information with a capsule analysis that includes the opening prices, price fluctuations, highs and lows, and total trading volume. LINC computers also detect errors in incoming data by checking the price of each transaction against the last trading price. If a drastic change is confirmed as an error by the originating computer, the transaction is intercepted before transmission to subscribers; typically, the exchange handles the correction itself.

A proprietary data-compression technique condenses the capsule analysis calculated at the Burlingame facility after each transaction; that information is then whisked to a ground station in nearby Palo Alto. The data is transmitted at 4800 bps to the Westar IV satellite hovering in its assigned parking spot 23,000 miles above the equator. The data bounces down to satellite receiving dishes in the 20 metropolitan areas LINC serves, where equipment

encodes the data for broadcast over the FM station's subcarrier frequency, also at 4800 bps.

A Signal FM receiver, which looks like nothing more than your garden variety modem, sits beside the PC. To capture the signal, an antenna resembling the wire dipole antenna supplied with FM stereo receivers is attached to the back of the unit. (In certain areas, use of a better antenna may be necessary.) The Signal hardware translates the FM frequencies it receives into digital data and passes the captured information on to Signal software running on the PC.

Despite what seems to be a lengthy and tortuous route, the elapsed time between the data leaving the exchange computer and its display on the PC's monitor is usually 2 to 3 seconds.

Before the Signal hardware can receive data, you must enter a 12-character password. That password contains encoded information about specific services for which you've signed up and the period for which the password is valid (usually one month). A new password accompanies each month's bill. In this system, scofflaws can't get far: If a customer attempts use without payment, the LINC computer broadcasts a special code shutting off the receiver's data-gathering capability (see the sidebar "A Wise Receiver").

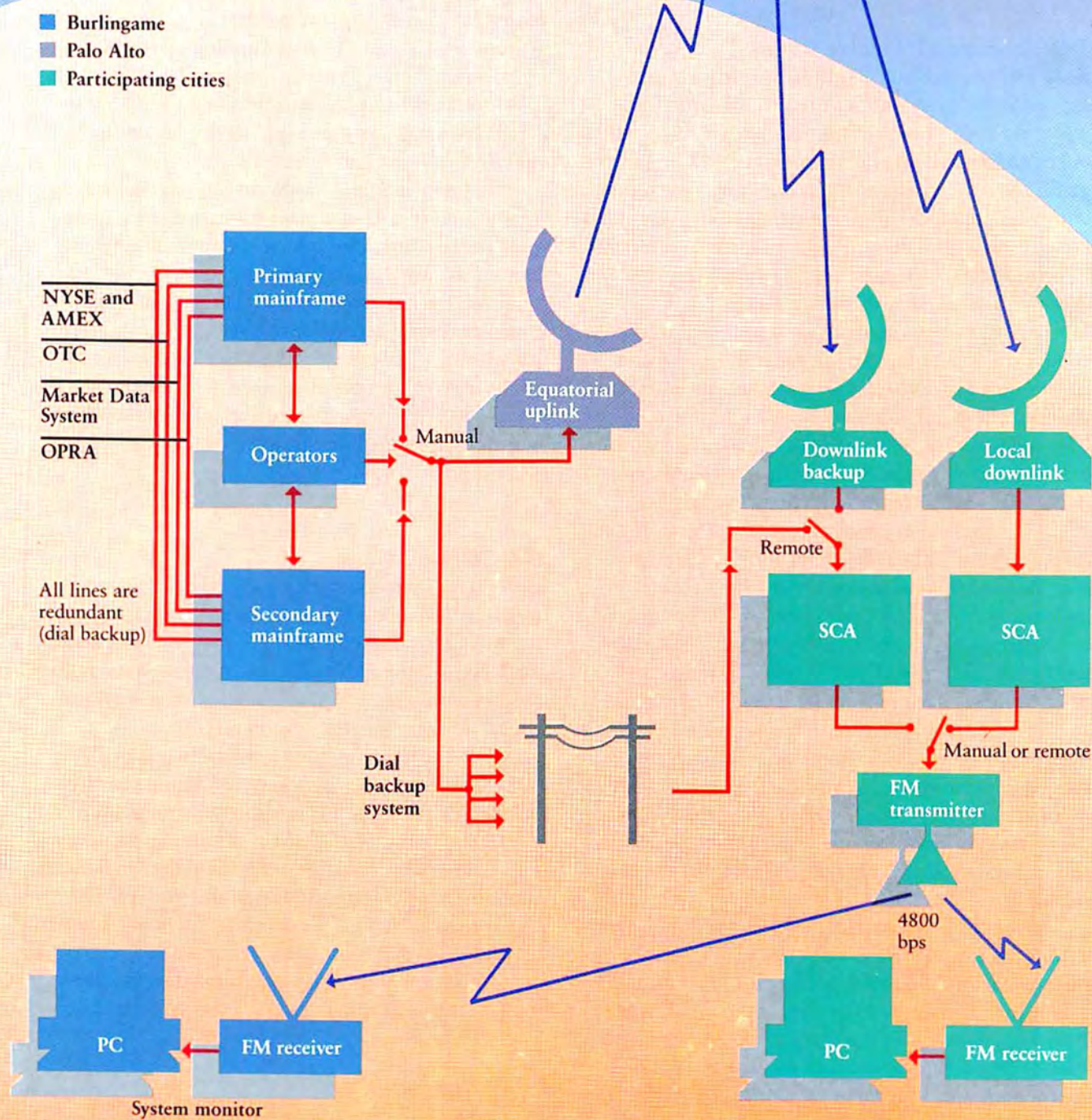
Software Signals

Signal software performs two basic functions. Initially, it tells the FM receiver what trading information to capture and pass along to the PC via its serial port. The program also formats incoming data and displays it on screen. When you leave the program, you can save the current session on disk.

Fortunately, you don't have to turn your PC into a dedicated desktop ticker. The Signal receiver includes a 64K buffer for stashing data on the program's maximum of 250 stock, commodity, and options issues. As transaction information on an issue comes in, the program stores it in the receiver. The next time you start the Signal software, it automatically retrieves data from the receiver's RAM.

LINC encourages users to leave their receivers on at all times. Turning the unit off erases data and

Figure 1: The Signal network moves data from a pair of mainframes to a satellite dish, to the Westar satellite itself, back down to receiving dishes and FM stations, and finally, to individual receivers.



setup information stored in RAM; a brief receiver re-initialization procedure is then required.

A typical Signal "page" (one screen) lists up to 18 investments by ticker symbol. You can organize investments in any order, and the software enables you to group them under headings of your own choosing. You can divide the 250 issues that Signal tracks among as many as 99 pages. Special summary pages list synopses (consisting of trading symbol, last trading price, and most recent trade direction) on up to 90 issues.

Because watching the PC's screen every minute the markets are open is impractical (to say nothing of unproductive), Signal allows you to set "alarms" (or "trigger values") for each issue you track. Alarms can be set to notify you of predefined high, low, or volume trading levels. If, for example, you're eager to sell Consolidated Tire Chains once it reaches \$2.50 a share, you can set the alarm to alert you to any trades coming across the ticker at that level or higher. A display window shows which alarm has gone off and when.

Alarm settings can also be assigned to the FM receiver. A switch on the receiver's front panel activates an internal alarm system that will audibly alert you to a noteworthy development, even if the PC is off. When you start the program, the time and nature of the alarm are displayed.

■ The Lotus LINC

The Signal package also includes a memory-resident program called *LINC*, which works in tandem with 1-2-3 releases 1A and 2, and *Symphony* releases 1.0 and 1.1. *LINC* transfers data on demand from the FM receiver into a Lotus worksheet, and its files bear the .WKS extension. This enables you to update portfolio valuations, perform custom analysis, graph selected market data, and calculate do-it-yourself indexes.

Predefined column headings for stocks, options, and commodities (such as high, low, bid, ask, and net change) indicate to *LINC* those spreadsheet cells designated to receive FM data on specified issues. Actual data retrieval is then just one program command away (see Screen 1).

Ed Happ, product marketing manager for LINC, says the company is evaluating other software products that may enhance or complement Signal. LINC is also encouraging third parties to develop software that will store and analyze data received via the FM SCA.

Although Signal is new on the market, a budding Signal aftermarket already exists. Bristol Financial Services is offering *Window on Wall Street*, a program it sells with the Signal receiver. The package

The Signal receiver includes a 65K buffer for stashing data on a maximum of 250 stock, commodity, and options issues.

records selected transactions during any period the receiver is left on. *Window on Wall Street* boasts a charting module that displays the trading range for any issue during the day—a handy way to spot trends. The program also features automatic portfolio valuation, which enables you to monitor the effect of each new transaction on your total portfolio.

Even using subcarrier transmission in lieu of a dedicated data line (and even without per-minute charges), keeping in constant touch with the market can be costly. In addition to the \$80 monthly Lotus subscription fee for data from any four exchanges, the individual investor must pay each of the exchanges separately (see Table 1). Although Lotus offers prepayment and credit card discounts, the fees for monitoring securities on the three major exchanges (NYSE, AMEX, and NASDAQ) total \$1700 annually.

■ Investing Economically

Does the benefit of instantaneous information justify this kind of expense? It's a question Dataspeed founder David Lockton has long pondered. Lockton, now a consultant on the broadcast delivery of time-sensitive information, classifies use according to type of investor. Prime candidates for Signal include PC owners who have investment portfolios valued at more than \$100,000 and perform at least 24 trades a

Table 1: Monthly fees for Signal use

Exchange	Lotus fee	Exchange fee
New York Stock Exchange (NYSE)	\$20.00	\$7.50
American Stock Exchange (AMEX)	\$20.00	\$5.00
NASDAQ-NMS/NASDAQ-Level 1	\$20.00	\$16.25
Chicago Board of Trade (CBT)	\$20.00	\$50.00
Chicago Mercantile Exchange (CME)	\$20.00	\$35.00
Commodities Exchange Center (CEC)	\$20.00	\$44.00
Options Price Reporting Authority (OPRA)	\$20.00	\$2.00

year. He suggests that such individuals will benefit even if it means a monthly outlay of \$100 to \$200 for real-time information.

An investor with a smaller portfolio who makes fewer trades probably doesn't need real-time quotations, according to Lockton. For that breed of investor, quotes on 15-minute delay should suffice, assuming such a service can be had for \$50 to \$100 per month. Lockton calls his final category "homebound computer users," who he says need no more than end-of-day quotes, plus selected news items relating to issues in their portfolios. For such a service, Lockton says, monthly fees should not exceed \$50.

Prices aren't even close to that point today, a situation that irks magazine publisher Jim Warren. Warren, founder of the West Coast Computer Faire, was among the first to propose FM SCA for mass use. In 1978 he even trademarked the term "Datacast" to describe this method of information transmission.

Warren believes that many companies plunging into digital FM SCA "start up on a shoestring, pursuing very narrow markets in search of quick profit. They know FM SCA is coming, but they don't know how to deal with it—they don't know how much to charge, so they charge too much."

Subcarriers for All

Jim Warren favors widespread use of FM SCAs but doesn't rule out applications geared to vertical markets. "Bombard the whole world," he says. "Go for the transmission of stock and commodity quotes, certainly, but also broadcast want ads, news, and special interest bulletin boards, appropriately edited. Interweave encrypted and free transmissions," he advises. "The lion's share of information that people want is local and time-sensitive. Have the information arrive, then let the computer scan it, sort it, and present it when you want it."

Although such a community FM SCA service is not yet a reality, an FM-based electronic mail system is already operating in several major markets. INDESYS, a joint venture of Epson America and ABC's Video Enterprises, broadcasts encoded messages over local ABC affiliate FM subcarriers to specially designed receivers that fit inside PCs and compatibles (or connect to Epson printers).

INDESYS has upped the throughput ante with its 38,400-bps rate, which translates to 1½ pages per second. A message uploaded to the system's main computer in Mountain View, California, via phone lines is relayed to a subscriber within an hour at a rate of 20 cents per page. Four-hour delivery drops to 15 cents a page, and overnight service is only 10 cents a page. The plug-in receiver board costs \$250 and includes 256K of RAM, which stores incoming messages when the PC is otherwise engaged. A monthly password scheme similar to LINC's controls system access.

Bonneville Telecommunications also offers FM-based electronic mail delivery. For Bonneville, offering electronic mail was a logical way to get more mileage from existing capabilities. Bonneville has for some time delivered commodity futures quotes to its dedicated Market Monitor terminals, and it sells a graphics-oriented FM SCA package for the Macintosh.

A Wise Receiver

The Lotus Information Network Corporation (LINC) FM Receiver is considered "addressable" because each working unit can be controlled remotely by the central computer at LINC's facility in Burlingame, California. This capability, in combination with Signal's password system, makes unauthorized use of the software so unlikely that LINC released its Signal program without copy protection—certainly a first for disks bearing the Lotus logo.

The Signal package consists of both the receiver and the software. You can immediately begin receiving data on the Dow Jones Industrial Index, but you can't get quotations on individual issues until you have a password (obtained by calling a toll-free number). The 12-character password is keyed to your receiver's internal ID number, the services you've signed up for, and the current month.

LINC occasionally transmits date signals along with quotation data. The receiver's ROM software compares the incoming date with the month coded in your password. If the last password entered was April's, for example, on May 1 the receiver will dutifully begin flashing the "grace" light on its front panel. This signifies a 15-day grace period during which

you can enter the new password, as conveyed on the monthly Signal invoice. When the grace period is up, the old password will no longer permit access to quotations.

Should you fall behind on your payments or discontinue service, LINC includes your receiver's ID number in a series of "kill" signals it broadcasts to all receivers. This signal disengages your receiver; you will be incapable of receiving additional quotes until a reactivation signal, sent from the central computer, "awakens" the unit.

B. Douglas Smith, LINC's vice president of engineering and manufacturing, tells the story of a customer who boasted of cracking the password scheme after only two months. The third month's password, however, wrecked the customer's theories about password patterns. Random guessing is even less fruitful than trying to break the code. "By the time someone could try all possible password combinations, another month would have rolled around," Smith says.

No wonder the program isn't copy protected.

LOTUS SIGNAL

F1 - Help F2 - Options tables F10 - Menu

Detail Page: 1

Blue Chip Securities

Collection: SAMPLE

SYMBOL	T	LAST /	BID	CHANGE	PR/AS	VOL	HIGH	LOW	TIME	X
#INDX										
\$COMP		305.85		+ 0.6	305.25				unkn	
\$INDU		+1436.9		- 2.3	1439.2	113M	1450.0	1427.0	12:07	
\$OEX		+191.45		- 0.6	192.05				12:07	
\$XMI		271.45		- 0.4	271.85				12:07	
#STOX										
AAPL		19' 6		- 0' 2	20' 0	310K	20' 2	19' 6	unkn	T
GE		64' 3		+ 0' 3	64' 0	780K	64' 5	63' 7	12:05	N
IMSX			1' 3		1' 4	2000	1' 3	1' 3	unkn	
GM		70' 6		+ 1' 3	69' 3	1.9M	72' 0	68' 7	12:05	N
IBM		137' 3		+ 0' 6	136' 5	1.7M	138' 3	136' 3	unkn	B
MCIC		10' 4		- 0' 1	10' 5	760K	10' 6	10' 4	12:06	T
MMM		80' 6		- 0' 7	81' 5	190K	82' 2	80' 4	unkn	M
RCA		48' 1		0' 0	48' 1	330K	48' 6	47' 7	unkn	N
T		21' 7		- 0' 3	22' 2	1.4M	22' 4	20' 7	unkn	N
WAN		19' 0		- 0' 2	19' 2	110K	19' 0	18' 7	12:07	A

Fri 15 Nov 12:07:34

ALERT(S)

ADJ 219

Screen 1: Signal captures data on selected issues and classifies that data according to criteria defined by the program.

Companies with branch offices in major cities upload electronic mail by telephone to Bonneville's central computer. From there the messages are sent via satellite to all stations in the Bonneville FM SCA network and then rebroadcast over FM subcarrier. Only the intended recipient need store the message; the rest ignore it. As with all broadcast data of this type, information is compressed and encrypted for security.

Plucked From the Sky

FM SCA is hardly the only means of delivering time-sensitive information to individuals. Equatorial Communications lets you skip the FM link in the chain and obtain information directly from a satellite. Equatorial's proprietary receiver consists of a 2-foot dish, which is relatively small, that catches data bounced off leased transponders on the Westar IV

satellite. Because Lotus already uses the Equatorial service to send its stock quotations to participating FM SCA stations, it's a simple proposition to use the Equatorial receiver to snare quotations in areas not served by FM SCA broadcasts.

The price for direct satellite reception is steep, however: The Equatorial unit will set you back approximately \$3000. Moreover, satellite reception is not always possible. You must be able to situate the dish so that it has an unobstructed view of the satellite perched above the equator—a difficult task in cities, where buildings may block that view. Additionally, local zoning often discourages installation of satellite dishes.

Also on the way are services that use yet another data delivery vehicle: the vertical blanking interval (VBI) of a television signal. The VBI consists of the unused scan lines of a television broadcast. (If you adjust the vertical hold of your TV so the picture

rolls, you can see the VBI lines as the black band between frames of the picture.) The VBI is currently idle aside from its occasional use for transmitting closed-caption text for the hearing impaired.

International MarketNet (IMNET), a joint venture of IBM and Merrill Lynch, is slated to begin sending VBI-based real-time financial quotes over 30 to 40 PBS television stations this year. PC software for the IMNET system runs concurrently with Innovative Software's *Smart Series* of integrated programs.

■ VBI Meets SCA

No unanimity exists, however, on VBI as a viable medium for data transmission. David Lockton is particularly skeptical. Noting that good television reception is essential to ensuring error-free VBI reception, Lockton muses, "Have you ever tried to get a good television picture in New York City?" Lockton is dubious about the ability of even cable systems to provide an adequate signal.

FM stations will prove to be the data carriers of choice, according to Dennis Waters, president of Waters Information Services and editor in chief of SCA: *Radio Subcarrier Report*. In radio's favor, he says, is its pervasiveness: An average market has four times as many FM stations as TV stations. Moreover, the potential income from data broadcasts is highly significant to FM stations, which are now forced to live with revenue sources far more limited than those open to TV stations. By contrast, VBI income would be marginal for most television stations.

■ Looking Ahead

One day, RAM-packed, pocket-size terminals will be as ubiquitous as the Sony Walkman. These little gems will be able to monitor several FM subcarriers at once. Whenever electronic mail or news of particular interest to you is broadcast over one of the many services, an alarm will sound. The instant it hits the airwaves, you'll know about a classified ad for that vintage Corvette you've been coveting.

Sound like science fiction? Consider this: A calculator-size FM SCA receiver is already in production. The only pieces missing are low price and the marketing prowess of a few imaginative entrepreneurs capable of giving the airwaves universal appeal. ●

Danny Goodman is a Contributing Editor to PC World and the author of *How to Buy an IBM PC or Compatible Computer* (1984, PC World Books/Simon & Schuster).

Signal

Lotus Information Network Corp.

1900 S. Norfolk St.

San Mateo, CA 94403

800/762-7538

List price: \$595

Requirements: 320K, serial port, 1-2-3 or Symphony

Window on Wall Street

Bristol Financial Services, Inc.

1010 Washington Blvd.

Stamford, CT 06901

203/356-9490

List price: \$595 to \$1595

Requirements: 256K, color graphics board or Hercules board, serial port, Signal FM Receiver; hard disk and 80-column printer recommended

Bonneville Telecommunications

19 W. South Temple

Salt Lake City, UT 84101-1503

801/532-3400

Equatorial Communications Co.

189 N. Bernardo

Mountain View, CA 94043

415/969-9500

INDESYS

2425 Garcia Ave.

Mountain View, CA 94043

415/940-6077

80386: The Megabyte Manager

Intel's new 80386 microprocessor could spawn a generation of super PCs with unparalleled power. But the right software will be needed to fulfill Intel's promise.

James E. Fawcette

■■■■ Three long years after its introduction, the Intel 80286 microprocessor is finally changing the performance standard for personal computing. Yet a successor to the 80286 is already waiting in the wings: the 80386, a 32-bit chip with the processing punch of a super minicomputer. Only months away from mass production, the 80386 may have a radical impact on the performance and design of future PCs.

If this new microprocessor comes into production as soon as Intel predicts, personal computers designed around the 80386 could

be commercially available by the end of this year or early 1987. Although 80386-based machines wouldn't necessarily make the AT obsolete, they would spur dramatic changes in operating systems, application software, and in particular, the IBM PC family.

■ Power Hungry

Since the dawn of Apple, hardware and software manufacturers have repeatedly underestimated the amount of power personal computer users need and lust after. The original IBM PC was configured with a paltry 16K of RAM and a port for attaching a cassette recorder. A 160K floppy disk drive cost an extra \$500. User demand quickly forced IBM and third-party vendors to substantially enhance the machine. IBM was similarly unprepared for the initial rush of enthusiasm for the PC AT.

With the advent of optical disk storage, high-speed networks and PBXs, expert systems, and voice recognition systems, the 80386's arrival could not be more opportune. But whether or not the computer industry is ready and willing to redefine the next generation of

desktop computers remains to be seen. The 80386's horsepower will surely be harnessed, but exploiting its more valuable functions requires breaking old design habits.

■ Family Ties

Though a lineal descendant of the PC's 8088, the 80386 is more closely related to the 80286 in function, design, and software compatibility. In a general sense, the 80386 is a stretched 32-bit version of the 16-bit 80286. Like its immediate predecessor, it has a protected memory mode that keeps multiple tasks that are running concurrently from writing over one another. But as we shall see, the 80386 is far more powerful in many ways. And next to the 8088? The 80386 is like an Arabian stallion, the 8088, a Shetland pony. The 32-bit chip is ten times faster, and, depending on clock rates, two to four times faster than the 80286. The 8088 is confined to manipulating, or "addressing," 1MB of memory; the 80386 can



Stretching Memory

In the days before memory was dirt cheap, computers commonly augmented their meager memory with disk and tape storage. Needed data and program code were swapped from storage to memory and back again under the direction of the operating system. Such "virtual" memory schemes were not particularly fast, but they effectively tricked large programs into thinking they had an ocean of memory when only a thimbleful was available.

Virtual memory techniques have not gone the way of tubes and transistors—though the glut of inexpensive RAM and the rise of totally memory-resident programs such as 1-2-3 would make one think so. A number of PC programs—particularly word processors and data bases—use the technique, since it allows them to handle larger documents, data bases, program modules, and so

on. As optical disk drives boasting 1 or 2 gigabytes of on-line storage enter the market, virtual memory systems will become increasingly attractive.

On a machine using an 8088 or 8086, virtual memory systems are sluggish at best, because the software must contain memory management instructions—and the rate at which data can be swapped is inhibited by 64K segments. 80286-based machines are faster, but that chip is still confined to 64K segments and the limits of 16-bit registers. On a 80386-based computer, software will still do the lion's share of work, but the chip's architecture makes a big difference in getting the job done quickly. Segments can be 4 gigabytes in size; better still, the 80386 speeds up the entire process by maintaining a list of where portions of program code and data are located. The list is kept in a readily accessible section of the chip's memory called a "translation look-aside

buffer." The 80386 also notifies the operating system when an instruction asks for program code that isn't present in memory. In many cases, a program using a virtual memory system on the 80386 can run almost as fast as a totally memory-resident program.

Some engineers claim that the 80386's virtual memory talents are a waste of silicon, given the declining price of memory and the expected introduction of the 1-megabit (or 128K) RAM chip. Although talk of an affordable 80386 machine with 4 gigabytes of memory abounds, storage devices will undoubtedly continue to beat all comers on a cost-per-byte-stored basis. With gigabyte disks likely to cost less than \$100 by 1989, it's a sure bet that virtual memory schemes will be with us for some time to come.

directly address 4096MB—256 times the potential address space within the 80286's grasp.

More staggering is the 80386's ability to manage 67 million megabytes of "virtual memory." This is a number that defies comprehension—and suggests possibilities that software developers and storage engineers have not yet come to grips with (see the sidebar "Stretching Memory").

■ The Great Leap Forward

These mind-boggling statistics are less significant to personal computer users than are the chip's unique software-handling features. When a microprocessor provides a quantum leap in performance, existing software is either left behind or shoehorned awkwardly into the new environment, with decidedly mixed results.

Consider the AT. Although its 80286 microprocessor offers access to 16MB of main memory and 1 gigabyte of virtual memory, plus other features that should favor large programs, such power is available only in the chip's protected mode. Efforts to tap this mode for DOS applications—such as Digital Research's Concurrent DOS 286—have met with minimal success, in part due to DOS's inherent limitations. At present, only software running under Xenix or UNIX can unleash the 80286's power. The only benefit programs such as *1-2-3* and *Word-Star* wrest from the chip is speed; they are still limited to 640K of memory. A version of PC-DOS that breaks that barrier has been promised by IBM, but the challenge is admittedly difficult for both Microsoft and IBM.

Enter the 80386. Intel's guiding philosophy was to build as many chores into the microprocessor as possible. With its complement of 275,000 transistors, the 80386 is designed to shoulder, or at least simplify, many chores normally handled by an operating system. Task switching—the ability to jump quickly between concurrently running applications—is extremely difficult to implement in an operating system, and system performance usually suffers from the overhead. With the 80386, sending a simple 1-bit signal to the chip directs it to switch tasks in 20 microseconds. As a result, the 80386 can run more than one operating system simultaneously or juggle separate programs designed specifically for the 8088, 80286, and 80386.

The 80386's most unusual feature is its ability to act like several 8086s running simultaneously. According to Intel, an appropriately crafted operating system could permit the 80386 to run several conventional DOS applications at the same time. Each program would "think" it was running on a dedicated system with 640K and a superfast 8086.

Perhaps more significant, these DOS applications could run within a different operating system capable of exploiting the chip's more powerful features. This operating system might be a version of UNIX that ran 80386-specific programs in one window and DOS applications in other windows.

■ The Shape of PCs to Come

The implications for personal computer designers are clear. No longer must they slavishly follow in the plodding steps of IBM, which traditionally has been slow to adopt new technology. With the 80386's dual nature, a manufacturer could develop an innovative computer with a new multitasking, multiuser operating system, yet still offer prospective buyers the ability to run most IBM PC software. Designers can step out of Big Blue's shadow, a move that in the past has been equated with corporate suicide. Some dreamers even believe that the 80386 could be the heart of a multitasking, graphics-oriented computer running both Apple Macintosh and IBM PC software.

Although IBM and Intel aren't divulging details about a future 80386 PC, a number of hardware and software designers expect 80386-based machines to evolve in three stages:

Super ATs. Because the 80386 can use existing AT peripherals and run DOS 3.10 without modification, the first 80386 machines will likely resemble the AT, offering perhaps 1MB or more of memory as a standard configuration, a 40MB hard disk, a mix of 16- and 32-bit expansion slots, support for an 80387 math coprocessor, and improved graphics generation. The immediate—and maybe the only—benefit of such a computer will be improved performance. This first 80386 machine will be a more effective network server, open the way for the development of 32-bit peripherals, and give graphics and artificial intelligence programs a much needed boost.

How big is the market for a vanilla 80386 PC? "It depends on the price," says Michael S. Swavely, director of marketing for Compaq. "If the product comes in at \$6500—the introductory price for the AT—then demand will be very heavy." If 80386 machines arrive by the end of this year, enhanced AT compatibles with the faster 12.5MHz 80286 may find the new kid on the block stealing customers. As Swavely adds, "The 80386 may shoot the 12.5MHz 80286 off at its knees."

Better DOS machines. A machine specifically designed around the 80386 that could support a number of users and make good use of virtual memory awaits the

development of a new operating system. It's expected that this new DOS (presumably from Microsoft) will be altered over time, with the first version merely taking advantage of the 80386's multiple emulation of the 8086 but not tapping the chip's full capabilities. Given the push behind *Microsoft Windows* and similar graphics-oriented operating environments, this better DOS machine will likely support task switching and access to more memory.

Imagination machines. Several years after the introduction of the first 80386 machine, new hardware and software will fully unlock the chip's potential. Operating systems will embrace 8088 applications but also accommodate programs that take advantage

of megabytes of RAM and gigabytes of optical storage. And unlike the AT, this PC will be able to support multiple workstations. Mainframe vendor Sperry expects to release an 80386-based multi-user system by the end of 1986.

The 80386's general-purpose nature will be used to good effect in specialized markets. Its speed will make fourth generation digital PBXs a reality for PC users; computer-aided design and engineering (CAD/CAE) applications will probably make the move from minicomputers en masse; machine vision and voice recognition systems will have at their disposal the necessary processing muscle and storage to link up successfully with expert systems (see Figure 1).

Short-Term Confusion

Assuming that Intel starts production of the 80386 in June, the first Super ATs should find their way to market by year's end. Whether or not these machines will compete directly with the AT and its estimated dozen compatibles is unknown. As Compaq's Swavely observes, manufacturers "will be going in all sorts of directions." Indeed, computer makers will have to face some complex trade-offs—and carefully consider the law of supply and demand.

When the first 80386-based computers become available, enhanced AT compatibles running at the same clock rate (12.5MHz) will also be in production. (Later versions of the 80386 will achieve 16MHz and 20MHz.) Speed, in short, will not be as big a selling point for an 80386-based PC.

Cost is another factor. By late 1986, the 80286 will probably

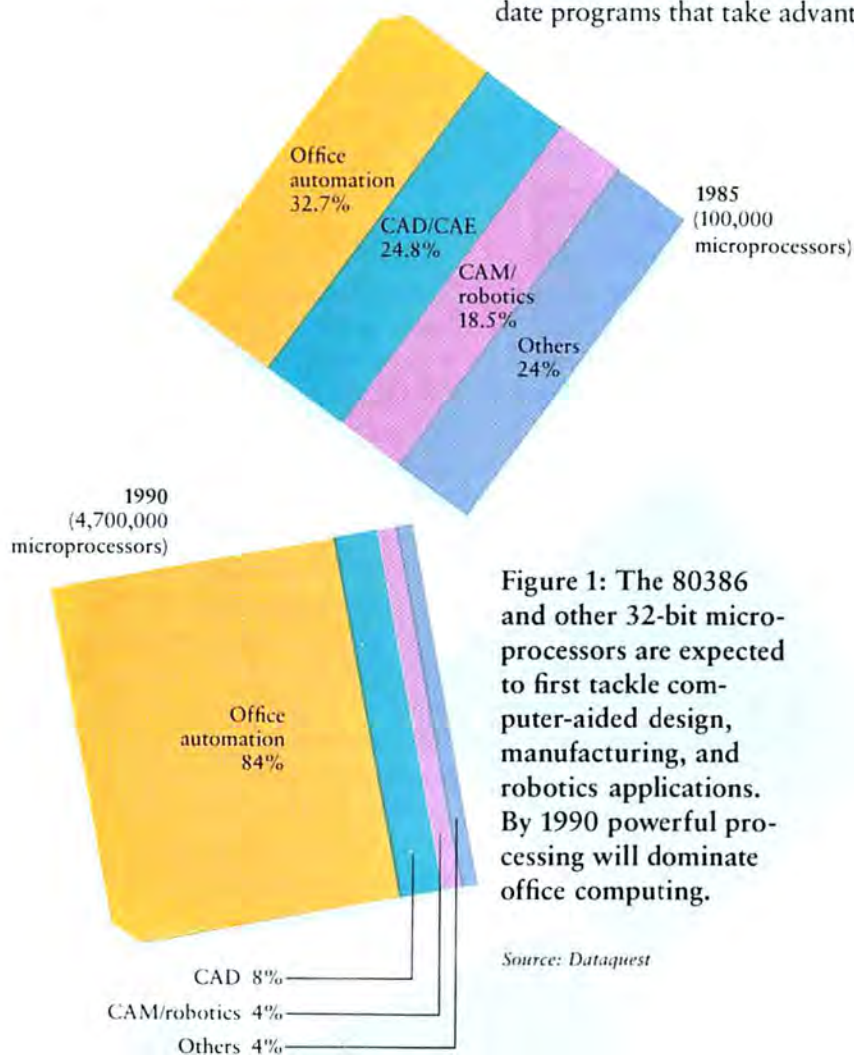


Figure 1: The 80386 and other 32-bit microprocessors are expected to first tackle computer-aided design, manufacturing, and robotics applications. By 1990 powerful processing will dominate office computing.

Source: Dataquest

cost between \$30 and \$50; the 80386, as low as \$195. The 80286 is also readily available not only from Intel but from second sources such as Advanced Micro Devices, Fujitsu, and Siemens. Like all new Intel products, the 80386 will be made in-house until demand rises and other companies can meet Intel's fabrication standards.

But there is more to the cost equation. A 12.5MHz 80286 must use faster (and much more expensive) 90-nanosecond RAM chips; contemporary 150-nanosecond RAM chips found in the current PC line won't suffice. In this case, the technological rub is in the 80386's favor. Because the 80386 can "pipeline" incoming signals, calculating a value or transmitting a message while waiting for the next task, it can use slower RAM and peripherals more efficiently. Yet a machine that simply substitutes the 80386 for the 80286 without using 32-bit peripherals, high-speed RAM, and cache memory would be perhaps 30 percent faster than a 12.5MHz AT.

If the past is any indication, inexpensive AT compatibles using the 6MHz or 8MHz 80286 will capture the bulk of the business market from the XT and its clones. Pricier 80286 computers, based on 10MHz and 12.5MHz microprocessors and sporting high-speed memory, will clash with the first 80386-based machines for control of the high-performance market.

Unlocking the Box

If you scan the technical specifications of the 80386, you see the soul of a mainframe. Within this humble slice of silicon lies the power to process 3 to 4 million instructions a second and

manage enormous amounts of memory and disk storage. Everything from artificial intelligence to true multitasking seems within reach. As always, unlocking this potential rests in the hands of software developers.

One software expert who is enthusiastic about the promise of the 80386 is Robert Carr, the principal author of *Framework*, an integrated package that accounts for nearly 20 percent of Ashton-Tate's revenues. Like several software developers interviewed for this article, he believes that the 80386 will lead to substantial improvements in personal computer software, but that development will take some time.

As programs grow larger and more complex, their development time increases exponentially. But Carr believes that one key feature of the 80386 will substantially simplify the programmer's task. Most Intel microprocessors address memory in fixed segments; in the case of the 8088 and 80286, segments are permanently set at 64K. This presents the programmer with a number of problems, because software must track which segment is active when managing code and data that exceed the 64K limit. Writing programs in small pieces and subsequently linking them accounts for almost 30 percent of development time, according to Carr. The 80386 gives developers the unique opportunity to use segments of up to 4 gigabytes. In effect, the problems associated with segmentation simply go away.

Carr also notes that the 80386's multitasking capability and sheer

speed will aid single-purpose programs such as word processors and spreadsheets—and not just fancy windowing or artificial intelligence software. For example, a word processor could be modified to format pages in the background while a document was being edited; a spreadsheet could likewise redraw a graph while source data was recalculated. Both would appear to run with blinding speed.

Carr expects the 80386 to play its biggest role in impelling the development of the next major evolution in personal computing—"component software." Under the aegis of the 80386 and a sophisticated operating system, users will be able to mix and match stand-alone programs (and modules from integrated packages) and have them work together like a single integrated package.

In the Chips?


Developers look to the 80386 to fulfill their dreams—from component software to graphics-oriented operating systems. Ultimately, the 80386 will supplant the 80286 as the engine for the most powerful desktop computers, just as the 80286 is now supplanting the 8088. But 8088- and 80286-based machines are not likely to vanish; the 80386's compatibility with its predecessors should extend the life of the entire family. If nothing else, the 80386 will tighten the hammerlock the Intel-Microsoft-IBM triumvirate has on office computing—for better or worse. ●

James E. Fawcette is a freelance writer, former editor of InfoWorld, and former executive editor of Personal Computing.

Lotus by Laser


Hewlett-Packard's LaserJet puts professional quality into 1-2-3 presentations. Among other tricks, the fast and stealthy LaserJet can switch type sizes and styles within a worksheet, produce high-quality graphs and charts on paper or clear acetate, and print wide worksheets sideways on a single sheet of paper.

Michael Gardner and Ted Nace

 Because 1-2-3 was developed before the introduction of the top-selling LaserJet, it does not include the commands you need to control laser printer functions, such as changing fonts or improving a graph's resolution. But with some work, you can build 1-2-3 macros that make these features dance to your tune.

By following the steps outlined in this article, you'll be able to select a font quickly and use it to print a worksheet, direct the printer to produce the worksheet in portrait (upright) or landscape (sideways) mode, switch paper sizes between letter (8½ by 11 inches) and legal (8½ by 14), and compress the type to squeeze more worksheet columns on a single





```
/ppoous1~s{esc}  
\027*t150R  
~qpq/qy
```

page. When you are generating graphs and charts with the 1-2-3 utility *PrintGraph*, you can use the following procedure to set the resolution to 75, 100, 150, or the full 300 dots per inch (dpi) available on the LaserJet.

■ Configuring 1-2-3 for the LaserJet

Unlike most printers, which communicate with the computer through a parallel port, the LaserJet uses a serial port. To make sure that the serial connection is established, first copy the MODE.COM file from the DOS distribution disk onto the floppy disk that you use to start up the computer, or to a hard disk directory included in the PATH command of the AUTOEXEC.BAT file (see the sidebar "Hard Disk Batch Up" in the article "Directory Assistance,"

```
/ppoous1  
\027*t1  
~qpq/q
```


■ Courier 1

```
'/ppoos1~s{esc}\027&f10\027(8U\027(s0p10h12v0s0b3T~q
omr102~ml4~p45~qq
```

Internal Font

COURIER - landscape, 12 points, 10 cpi, medium weight, upright style

Letter paper, 98 columns, 45 rows

■ Courier 2

```
'/ppoos1~s{esc}\027&f10\027(8U\027(s0p10h12v0s0b3T~q
omr132~ml4~p45~qq
```

Internal Font

COURIER - landscape, 12 points, 10 cpi, medium weight, upright style

Legal paper, 128 columns, 45 rows

■ Courier 3

```
'/ppoos1~s{esc}\027&f10\027(8U\027(s0p10h12v0s0b3T~q
omr76~ml4~p60~qq
```

Internal Font

COURIER - portrait, 12 points, 10 cpi, medium weight, upright style

Letter paper, 72 columns, 60 rows

■ Courier 4

```
'/ppoos1~s{esc}\027&f10\027(8U\027(s0p10h12v0s0b3T~q
omr76~ml4~p78~qq
```

Internal Font

COURIER - portrait, 12 points, 10 cpi, medium weight, upright style

Legal paper, 72 columns, 78 rows

■ Line printer 1

```
'/ppoos1~s{esc}\027&f0e8D\027(s0p16.66h8.5v0s0b0T~q
omr134~ml7~p104~qq
```

Internal Font (LaserJet Plus), Cartridges C,F,L

LINE PRINTER - portrait, 8.5 points, 16.6 cpi, medium weight, upright style, 8 lines per inch

Letter paper, 124 columns, 104 rows

■ Line printer 2

```
'/ppoos1~s{esc}\027&f0e8D\027(s0p16.66h8.5v0s0b0T~q
omr134~ml7~p128~qq
```

Internal Font (LaserJet Plus), Cartridges C,F,L

LINE PRINTER - portrait, 8.5 points, 16.6 cpi, medium weight, upright style, 8 lines per inch

Legal paper, 124 columns, 128 rows

■ Line printer 3

```
'/ppoos1~s{esc}\027&f0e6D\027(s0p16.66h8.5v0s0b0T~q
omr134~ml7~p80~qq
```

Internal Font (LaserJet Plus), Cartridges C,F,L

LINE PRINTER - portrait, 8.5 points, 16.6 cpi, medium weight, upright style, 6 lines per inch

Letter paper, 124 columns, 80 rows

■ Line printer 4

```
'/ppoos1~s{esc}\027&f0e6D\027(s0p16.66h8.5v0s0b0T~q
omr134~ml7~p98~qq
```

Internal Font (LaserJet Plus), Cartridges C,F,L

LINE PRINTER - portrait, 8.5 points, 16.6 cpi, medium weight, upright style, 6 lines per inch

Legal paper, 124 columns, 98 rows

Figure 1: 1-2-3 macros for the LaserJet. Each macro consists of two strings and is followed by a description of the particular font, typeface, and page characteristics effected by the macro.

PCW, August 1985). You also need to add two commands to your AUTOEXEC.BAT file:

MODE COM1:9600,N,8,1,P

MODE LPT1: = COM1

For detailed information on configuring your printer, see Chapter 2 of the LaserJet manual.

Next, install the HP driver. If you have 1-2-3 release 2, you install the driver as a routine part of installing 1-2-3 by selecting the HP 2686 as your text

and graphics printer. At the end of the installation, you will be prompted to name this new driver set. Call it **LaserJet**. A new file called LASERJET.SET will be created on your 1-2-3 system disk. Copy this file onto your *PrintGraph* disk also. Henceforth, every time you want to start either program for use with the LaserJet, type **123 LASERJET** or **PGRAPH LASERJET**.

1-2-3 versions prior to release 2 do not come with a LaserJet driver, but you can obtain one from an HP dealer. Without a driver, you can print worksheets but not graphs on the LaserJet. If you are using 1-2-3 without a driver, select */Worksheet Global Default Printer Interface 2.8* when you start a new worksheet. This sets 1-2-3 up for serial printing at 9600 bps. Skip this step if you have the driver, which automatically prepares the printer interface.

■ Courier 5

'ppous1~s{esc}\027&100\027(8U\027(s0p10h12v0s3b3T~q
omr76~ml4~p60~qq

Cartridges A,C,H,L,Q

COURIER - portrait, 12 points, 10 cpi, bold weight,
upright style

Letter paper, 72 columns, 60 rows

■ Courier 6

'ppous1~s{esc}\027&100\027(8U\027(s0p10h12v0s3b3T~q
omr76~ml4~p78~qq

Cartridges A,C,H,L,Q

COURIER - portrait, 12 points, 10 cpi, bold weight,
upright style

Legal paper, 72 columns, 78 rows

■ Courier 7

'ppous1~s{esc}\027&110\027(8U\027(s0p10h12v0s3b3T~q
omr102~ml4~p45~qq

Cartridges L,Q

COURIER - landscape, 12 points, 10 cpi, bold weight,
upright style

Letter paper, 98 columns, 45 rows

■ Courier 8

'ppous1~s{esc}\027&110\027(8U\027(s0p10h12v0s3b3T~q
omr132~ml4~p45~qq

Cartridges L,Q

COURIER - landscape, 12 points, 10 cpi, bold weight,
upright style

Legal paper, 128 columns, 45 rows

■ Line printer 5

'ppous1~s{esc}\027&1008D\027(s0p16.66h8.5v0s0b0T~q
omr178~ml7~p60~qq

Cartridges A,B,C,L

LINE PRINTER - landscape, 8.5 points, 16.6 cpi, medium
weight, upright style, 8 lines per inch

Letter paper, 165 columns, 60 rows

■ Line printer 6

'ppous1~s{esc}\027&1008D\027(s0p16.66h8.5v0s0b0T~q
omr221~ml7~p60~qq

Cartridges A,B,C,L

LINE PRINTER - landscape, 8.5 points, 16.6 cpi, medium
weight, upright style, 8 lines per inch

Legal paper, 214 columns, 60 rows

■ Line printer 7

'ppous1~s{esc}\027&1006D\027(s0p16.66h8.5v0s0b0T~q
omr178~ml7~p45~qq

Cartridges A,B,C,L

LINE PRINTER - landscape, 8.5 points, 16.6 cpi, medium
weight, upright style, 6 lines per inch

Letter paper, 165 columns, 45 rows

■ Line printer 8

'ppous1~s{esc}\027&1006D\027(s0p16.66h8.5v0s0b0T~q
omr221~ml7~p45~qq

Cartridges A,B,C,L

LINE PRINTER - landscape, 8.5 points, 16.6 cpi, medium
weight, upright style, 6 lines per inch

Legal paper, 214 columns, 45 rows

■ The Setup Worksheet

Once you have properly configured 1-2-3 for the LaserJet, create a worksheet file to hold macros that implement setup strings for different fonts, paper sizes, orientations, margins, and page lengths. Figure 1 lists 16 representative macros using various combinations of LaserJet fonts and page setups. They don't exhaust the available combinations but provide the most commonly used formats. You can change each macro's margin and page length settings to suit your purposes.

To illustrate the setup process, we will walk through Figure 1's first macro, which we have named Courier 1. Starting with a blank worksheet, type the

following entries in the cells noted (be careful to distinguish between the numeral 0 and the letter O, the numeral 1 and the letter l, and uppercase and lowercase letters):

C3: **Courier 1**

C4: 'ppous1~s{esc}\027&110\027(8U
\027(s0p10h12v0s0b3T~q

C5: omr102~ml4~p45~qq

C6: **Internal Font**

C7: **COURIER - Landscape, 12 points, 10 cpi, medium weight,
upright style**

C8: **Letter paper, 98 columns, 45 rows**

Courier 1. A label to identify the macro.

'ppous1~s{esc}. The macro for the commands /Print Printer Options Other Unformatted Setup 1 <Enter> Setup <Esc>. The initial apostrophe ensures that the command string will be entered as text

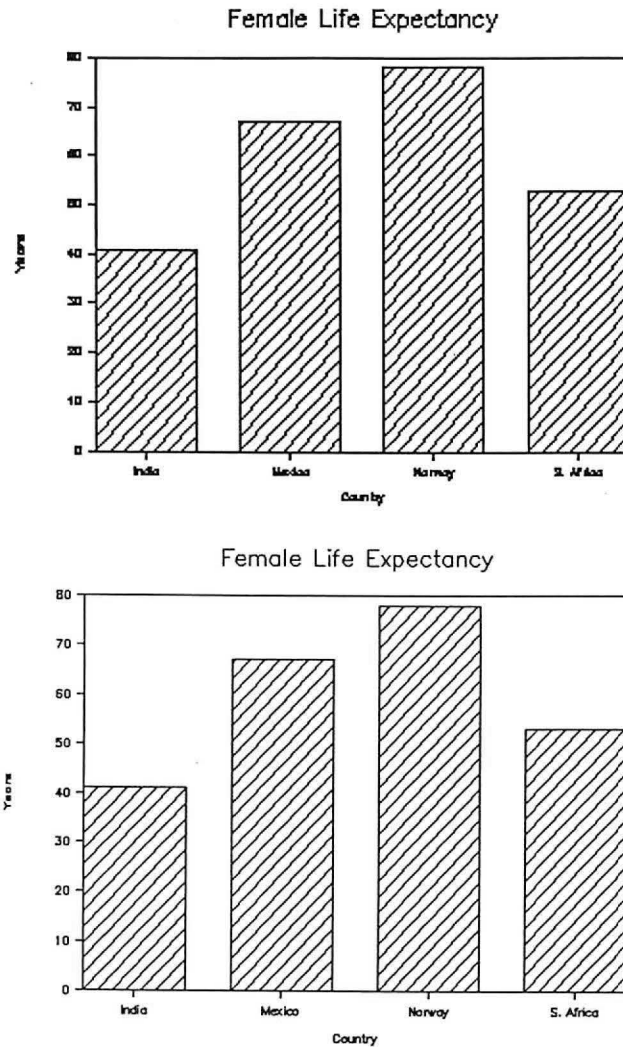


Figure 2: Graphs produced at 75 dpi (top) and 150 dpi (bottom)

rather than executed immediately. This macro clears any default or existing setup string so that you can add your own. Although it may seem circular to add the numeral 1 to the setup string just before clearing the string, it prevents the <Esc> command from forcing you back to the menu if it encounters a blank string. The tilde (~) is the 1-2-3 macro abbreviation for the <Enter> key; {esc} stands for the <Esc> key.

\027&l1O. The backslash character (\) tells 1-2-3 that the next three characters represent the decimal value of an ASCII character, in this case ASCII 27 (Escape). LaserJet fonts or features are always selected with a string of characters that begins with the Escape character. In this example, the feature selected is landscape mode [&l1O], meaning the spreadsheet will be printed across the length of the paper, which is essential for printing wide worksheets. (Be careful here: The lowercase l precedes the numeral 1, which is followed by the uppercase letter O in this character string.)

\027(8U. Selects the Roman-8 character set used by the Courier font.

\027(s0p10h12v0s0b3T~q. Sets the following parameters: fixed character spacing [(s0p], 10 pitch (characters per inch) [10h], 12 point size [12v], upright style [0s], medium stroke weight [0b], and Courier typeface [3T]. The tilde is the 1-2-3 macro abbreviation for <Enter> and causes the setup string to be sent to the printer. The q causes 1-2-3 to back up one menu level.

omr102~m14~p45~qq. Sets the right margin at column 102, the left margin at column 14, and the page length at 45 lines. The two q's return you to the spreadsheet.

Cells C6, C7, and C8 are descriptions of the font, the typeface, and the page setup of the macro in cells C4 and C5.

As you can see, it would take a lot of painstaking typing to send the preceding characters to the printer each time you wanted to print a spreadsheet. You can avoid that chore by storing each macro so that it can easily be copied to other worksheets.

Select */Range Name Create*. When 1-2-3 prompts for the name of the range, type **Courier 1** and press **<Enter>**. At the prompt for the range, type **C3..C5** **<Enter>**. The range containing the label Courier 1 and its macro are now assigned the name Courier 1. Now you can complete your setup worksheet by copying the macros from Figure 1 that pertain to the desired font cartridges and print characteristics.

For most documents proportional type has a more polished appearance, but in spreadsheets a proportional font causes the columns to print unevenly on the page.

You can also create a sample worksheet and test the Courier 1 command string. First, save the worksheet with the name LJMACROS and then call up a new worksheet. Move to cell C2 and select the command */File Combine Copy Named/Specified-Range*. 1-2-3 will prompt for the range name. Enter **Courier 1**. 1-2-3 will prompt for the name of the file where the range is stored. Enter **LJMACROS**.

Now the Courier 1 macro will appear on the worksheet. The next step is to assign the macro to an **<Alt>**-key combination so that it can be invoked. Use the command */Range Name Create*. When prompted for the name, enter **\p**, and when prompted for the range, enter **C3..C4**. Next, move to cell B2 and type **\p** to provide a record of the key combination that you have just assigned to the macro.

Now set up a sample worksheet to test the macro. Issue the command */Data Fill*. Choose the range C8..K52, and specify 1 as the first number and 1 as the step. The worksheet will fill with numbers.

To send the appropriate setup string to the printer, type **<Alt> -P**. To print the worksheet, select */Print Printer Range* and cells C8..K52. Now use *Go* to direct 1-2-3 to send the page to the LaserJet. The

page will not be ejected until you select *Page* or press the printer's "on line" button (toggling it off line) and then press the form feed button.

If this test fails, double-check your setup string to make sure that the characters are correct.

If you have not already done so, return to the LJMACROS worksheet and fill in the remaining macros from Figure 1. Note that all these macros cause the LaserJet to use fixed-space fonts. LaserJet fonts are of two species: proportional and fixed space. With proportional fonts, such as the one used in setting the text you are reading, the widths allotted to characters vary according to the shape of the individual character. With fixed-space fonts, each character has the same width. For most documents proportional type has a more polished appearance, but in spreadsheets a proportional font causes the columns to print unevenly on the page.

If you want to use a proportional font, such as Hewlett-Packard's Tms Rmn, there is a way to align the columns and get rid of the wobbles. Although a complete discussion of the method is beyond the scope of this article, the idea is to print your spreadsheet to a file (*/Print File*) and use a word processor that supports proportional spacing to insert tabs between columns.

Changing Fonts

So far, you have learned how to print an entire worksheet range in a single font of your choice. But if you want to print a particular line in another font, emphasizing the bottom line of a financial worksheet with boldface, for example, you can do that too.

Because the LaserJet does not automatically eject a page until it receives a form feed character or the */Print Printer Page* command, you can print a section of a worksheet using one font and the rest using another font. To do so, invoke the first macro to send the first setup string to the printer, select */Print Printer Range*, then specify the range that you want

Laser Utilities

If setup strings and macros aren't your cup of tea, try four utilities that enhance your ability to use the LaserJet with 1-2-3.

Laser-Ease from Ensemble Computer Services is a 1-2-3 worksheet that holds macros similar to those described in the accompanying article. When you invoke the main macro, the *Laser-Ease* menu is displayed, enabling you to quickly select the desired font cartridge, font, and page parameters. The utility also enables you to set the printer to produce up to ten copies, wrap lines that go beyond the right margin, and underline printing.

LaserControl from Insight Development Corporation complements 1-2-3 with several useful functions. It emulates an Epson FX or MX graphics printer and enables you to produce 150 dpi resolution from *PrintGraph*, doubling the 75 dpi provided by Lotus's LaserJet driver. It also corrects for a problem with the density 3 option of the Lotus Epson MX-80 printer driver, which causes graphs to be artificially elongated. *LaserControl* provides a menu from which you can select LaserJet fonts and page parameters, including margins and lines per inch.

Inset from American Programmers Guild is a memory-resident utility with which you can merge 1-2-3 charts and graphs with text and print them on the LaserJet. While you are viewing a 1-2-3 graph, pressing <Alt>-<PrtSc> will invoke *Inset*. Using the cursor keys, you can specify the borders of the graph you wish to clip, then save the clipped image in a file. Later, you can paste the image in a text document by inserting its name within square brackets.

If you use *WordStar*, you can enhance your worksheets with Polaris's *PrintMerge*. Instead of printing a worksheet directly on the LaserJet, you can print it to a file, exit 1-2-3, and load *WordStar*. Using *WordStar* dot commands and the additional *PrintMerge* commands, you can select the desired fonts and page parameters and print the worksheet.

Inset

American Programmers Guild, Ltd.
12 Mill Plain Rd.

Danbury, CT 06811
203/794-0396

List price: \$149

Requirements: 75K, one disk drive,
DOS 2.00 or later version, color/
graphics board recommended

Not copy protected

LaserControl 100
Insight Development Corp.
1024 Country Club Dr. #140
Moraga, CA 94556
415/376-9451

List price: \$150
Requirements: 9K, one disk drive,
DOS 2.00 or later version, color/
graphics board recommended
Not copy protected

Laser-Ease
Ensemble Computer Services
P.O. Box 9083
Fountain Valley, CA 92728
714/848-2762

List price: \$49.95
Requirements: 256K, one disk drive,
DOS 2.00 or later version
Not copy protected

PrintMerge
Polaris Software
310 Via Vera Cruz #205
San Marcos, CA 92069
619/471-0922
List price: \$99 copy protected, \$124
not copy protected
Requirements: 196K, one disk drive,
DOS 2.00 or later version

printed with the first font, and choose *Go* to send the output to the printer. Don't eject the page from the printer. Instead, invoke the macro to send the second font setup string to the printer, and again select */Print Printer Range*, specifying the second part of the worksheet as the range. Select *Go* and then issue the *Page* command. The printer will now eject the page, which will contain both fonts. Note, however, that the LaserJet cannot print fonts from different font cartridges on the same sheet of paper.

To change to a new font with 1-2-3 release 2, you can use a simpler method, called *imbedding*. Just put the setup string in a cell preceded by two vertical bars.

Laser PrintGraph

With LASERJET.SET on your 1-2-3 release 2 *PrintGraph* disk or in the hard disk directory that contains 1-2-3, enter **PGRAPH LASERJET** to run *PrintGraph*. Select the HP 2686A printer with the Settings Hardware sequence, and then *Specify Interface Parallel*. You do not have to specify a serial interface; the LaserJet driver takes care of that.

To use *PrintGraph* from 1-2-3 versions prior to release 2 with the LaserJet, you must have a LaserJet driver, which you can obtain from an HP dealer. Follow the accompanying instructions to install the driver.

An unmodified *PrintGraph* works well with the LaserJet; with it you can print graphs of various orientations and sizes. But this approach has one major drawback: Graphs print at 75 dpi, a far cry from the higher resolutions that are possible with the LaserJet. As Figure 2 shows, graphs and charts produced at 75 dpi resolution are coarse. Because the LaserJet prints at 300 dpi, each dot you see at 75 dpi is actually a box 4 dots long and 4 dots wide. To get better results, you have to send the LaserJet the appropriate commands to change the resolution to 100, 150, or 300 dpi. Although these commands are short, you cannot send them to the LaserJet directly from *PrintGraph*. You must send them from 1-2-3, exit 1-2-3, and then enter *PrintGraph*.

Just as you set up a special worksheet containing font selection macros, you can set up a worksheet (see Table 1) containing the macros needed to change the LaserJet's graphics resolution.

Table 1: Macros for changing resolution

<Alt>-key assignment	Macro command string	Resolution (dpi)
\a	/ppoous1~s{esc}\027*t300R~qpq/qy	300
\b	/ppoous1~s{esc}\027*t150R~qpq/qy	150
\c	/ppoous1~s{esc}\027*t100R~qpq/qy	100
\d	/ppoous1~s{esc}\027*t75R~qpq/qy	75

Exit *PrintGraph* and enter 1-2-3. In cell B2, type '300 dpi resolution. In cell B3 type '/ppoous1~ s{esc} \027*t300R~qpq/qy. Select /Range Name Create, enter \a to name the range, and choose B3 as the range. In cell A3, enter '\a to record the name of the macro.

Using Table 1, repeat the procedure for 75, 100, and 150 dpi, then save the file as GRAPHRES. Henceforth, whenever you want to change the LaserJet's resolution, exit *PrintGraph*, enter 1-2-3, call up GRAPHRES, and type the <Alt>-key combination that invokes the desired resolution macro. Each macro will automatically configure the printer for the appropriate resolution and exit 1-2-3. You can then restart *PrintGraph* and produce your graph or chart at the selected resolution.

As you experiment with printing at different resolutions, you'll notice that graphs become smaller at higher resolutions. For example, a graph printed at 150 dpi will be half as wide and half as tall as one printed at 75 dpi. If you want the graph to be bigger, double its dimensions. However, *PrintGraph* will not print graphs wider than 6⅜, 4¼, or 2⅞ inches at 100, 150, or 300 dpi, respectively.

A second limitation is the LaserJet's 59K printing buffer, which limits you to a printing area of 5.4 square inches at 300 dpi, 21.5 square inches at 150 dpi, and 48.3 square inches at 100 dpi. The LaserJet Plus's printing buffer is 395K, enabling you to print up to 32 square inches at 300 dpi and a full page at lower resolution.

Integrated Printing

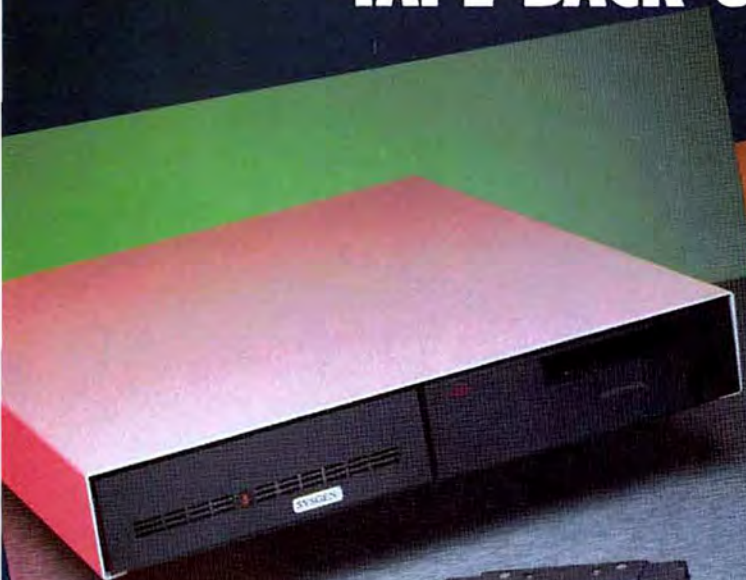
The marriage of 1-2-3 and the LaserJet is a natural. Just as 1-2-3 broke new ground for the PC by combining powerful spreadsheet and graphics capabilities, the LaserJet's ability to handle high-quality text and graphics with ease is unprecedented. By taking the time to learn how to guide the LaserJet through its paces, you can dramatically improve the quality of your 1-2-3 reports. ●

Michael Gardner is the director of development at WordTech Systems. Ted Nace is a Contributing Editor for PC World.

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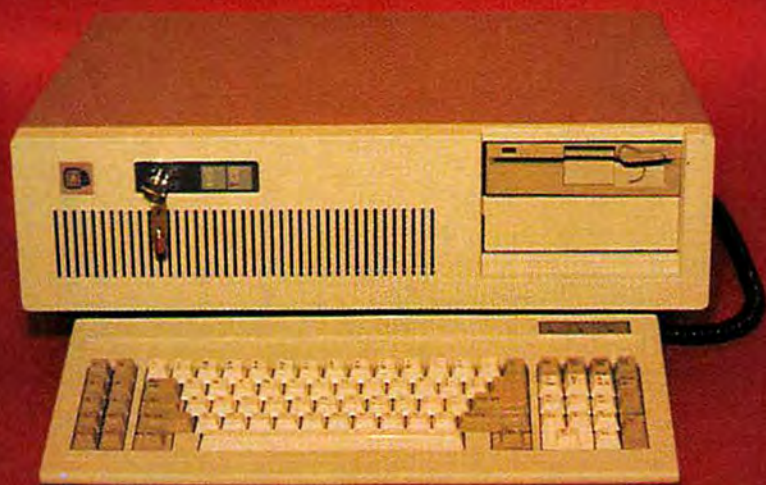
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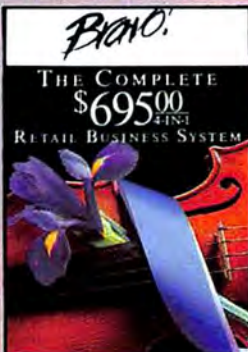
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From the Hardware Shelf

PC World offers first impressions of recent hardware releases

This month's 20/20 hindsight reveals the secret of 8-foot spreadsheets, an OCR in need of bifocals, and the cheapest turbo board yet.

Edited by Robert Luhn



Limelight

The monitor attached to your PC is more than a window into its silicon soul—it's an electronic slate that can display your novel, a sagging bottom line, or that gangbuster pie chart. For the most part, such displays of information are intimate, the small screen being what it is. But what if you want to shout your numbers, words, and images to the world?

Getting your message to the masses via PC takes some doing. But one thing is certain: Whether you are making a boardroom presentation on manufacturing efficiency, training employees in data entry, or demonstrating your hottest software at a convention, everyone must be able to see the resulting output clearly. In these situations, the size and quality of your images can mean making a big sale or conveying a subtle concept.

Until recently the challenge of turning little pictures into big ones had two solutions: You could either capture screen images on slides with the aid of special software and hardware, or anchor a \$30,000 video projector to the ceiling of a room. Neither solution is particu-

larly flexible. The former makes showing the computer in action difficult, since the images are static; the latter raises engineering problems associated with transporting a room (or at least a ceiling) when making presentations in the field.

As you may have guessed, someone has come along with a better idea. Vivid Systems has created Limelight, a portable projection system that can give your spreadsheets or *Flight Simulator* crash landings dramatic impact. Limelight consists of an extremely bright monochrome monitor and lens system capable of producing sharp images as large as 8 feet by 8 feet. The entire unit is about the size and weight of a 16mm movie projector.

Limelight is painless to hook up and use. Disconnect the PC's monitor and plug the projector's cable into the composite video output. Most color graphics boards include a composite jack, but many monochrome boards don't, so be prepared to lay out \$350 for a Vivid Systems adapter. Turn on the Limelight and the PC, point the projector at a screen, and you are greeted by a green glob.

Turning that glob into a meaningful image involves more than fiddling with the unit's brightness, contrast, and focusing controls. Although Limelight's monitor is bright and requires a liquid cooling system, the resulting projection is dimmer than a slide projector's. Fluorescent lights and diffused lighting can easily wash out Limelight's image. For the best results, use a highly reflective screen (such as the one sold by Vivid), keep the projected image under 4 by 3 feet, and either totally darken the room or dim the lighting for the proper balance.

The secret of 8-foot spreadsheets: the Limelight projector

For a presentation on the road, you might darken the room and place incandescent lights behind the screen. For presentations on your home turf, install shaded incandescent lights and dimmers. After you've used Limelight a few times, you'll need about 10 minutes for screen setup, adjusting, and focusing. In case you misplace the user manual, setup instructions are summarized on the lens cap.

Once you've mastered lighting and Limelight, have no fear of obscure presentations: projected 80-column display is readable from a distance of 25 feet. Your audience will be able to inspect documents, spreadsheets, and graphs with equal facility; better still, you'll do more than communicate—you'll impress. After all, it's easier to keep an audience riveted when they can see what you're talking about.

—Jay Alperson

Limelight

Vivid Systems

41752 Christy St.

Fremont, CA 94538

415/656-9965

List price: \$3950, composite adapter \$350, portable screen \$195

Requirements: composite output



Spreadsheet projection with the human touch

printed so that it could be electronically stored, searched, and edited.

The optical character reader, or OCR, can remove this bothersome bottleneck. Kin to the bar code reader found at the supermarket checkout stand, an OCR converts characters on paper into the bytes word processors love to edit and occasionally lose. But OCRs are pricey peripherals, costing anywhere from \$6000 to \$35,000.

In an attempt to bring the technology down to earth, Oberon International has introduced the \$699 Omni-Reader for the PC. Unfortunately, it's a price trailblazer that gets lost coming through the rye. For the Omni-Reader is slow and error-prone, and it recognizes only four typewriter faces: Courier 10, Courier 12, Letter Gothic 12, and Prestige Elite 12. Though these typefaces are common in most offices, I discovered that many of the documents I wanted to scan were typed in different faces. A further

disappointment—the Omni-Reader's inability to read typeset text.

The Omni-Reader is directly connected to the PC via an RS-232C serial port. To "read" text, you lay a page of the document on the Omni-Reader's 10-inch by 16-inch plastic tablet, position a plastic guide underneath a line of text, and then slide the scanning head across the line in either direction. It takes 2 or 3 seconds to scan a line and another 2 seconds for the Omni-Reader to process it and send it to the computer.

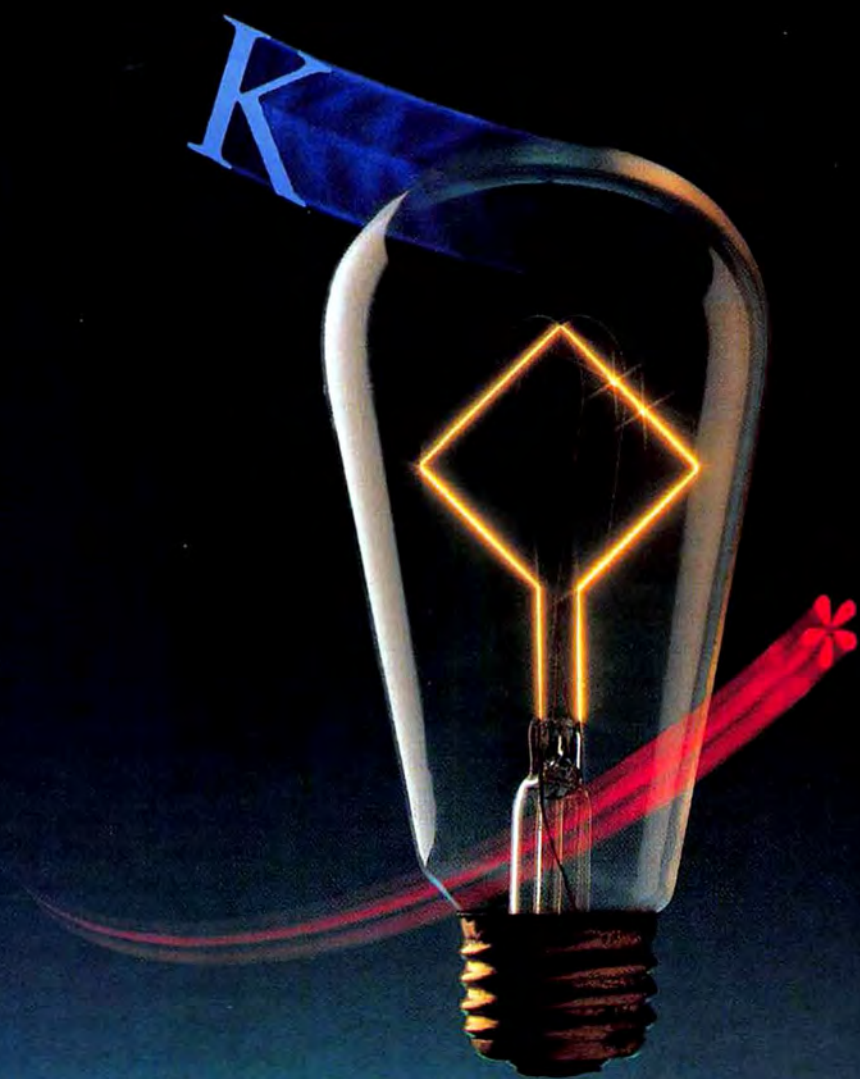
Since scanned text is sent via a communications port, most communications programs can capture it. I successfully used *PC-Talk III* to save typewritten text to a disk file. For an extra \$100 Oberon also provides drivers that permit *WordStar*, *WordPerfect*, *1-2-3*, *dBASE II*, and several other applications to capture Omni-Reader text directly. With *WordStar*, for example, I merely opened a file and began scanning; each processed line of text was automatically inserted in the file.

(continues)

Omni-Reader

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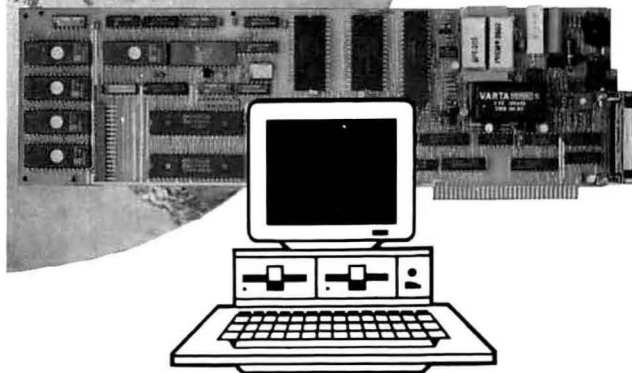
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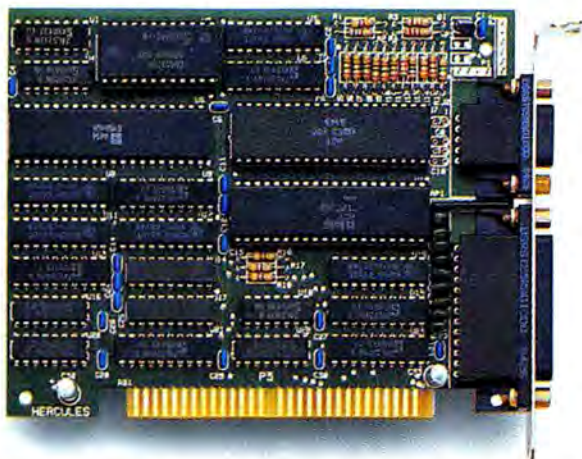
Circle 248 on reader service card

Being able to edit captured text is essential, since the Omni-Reader makes at least one error per scanned line. In fact, the only text it scanned with an acceptable number of errors was the test page included with the product. Even clearly typed original documents produced an error every two lines—an *r* is often translated as a *z*, *t* becomes *c*, and lowercase letters inexplicably change to uppercase. The error rate varies with the typeface being scanned and the paper used. Prestige Elite type seems to be the hardest to scan, while Letter Gothic is the easiest; documents printed on beige paper can't be scanned at all.

Omni-Reader provides a "poor-copy" mode that supposedly lowers the error rate for fuzzy or poorly photocopied documents, but I noticed scant difference when I switched to this mode. Taking Oberon's free training course improved my technique. I learned to increase speed and decrease errors by scanning lines with a smooth back-and-forth motion, pressing down firmly on the scanner (which flattens the page), and carefully aligning text along the scanning guide. But in spite of my hours of careful practice, I was never able to scan my own documents without eliciting at least one error every two lines.

Even if errors didn't creep in, it takes 4 or 5 seconds to scan a line of text. As it is, you must take additional time to catch and correct these wayward characters. Potential

(continues)



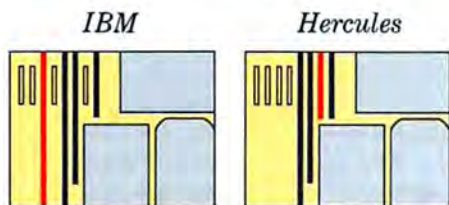
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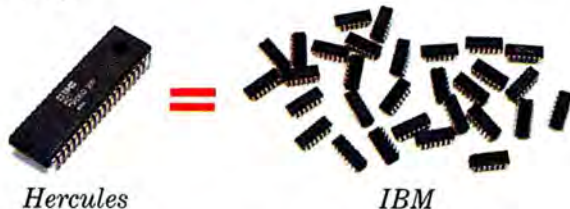


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buyers should weigh this factor carefully—a moderately fast and accurate typist will probably outperform the Omni-Reader. —David McCune

Omni-Reader
Oberon International Inc.
MacArthur Plaza
Suite 630, LB48
5525 MacArthur Blvd.
Irving, TX 75038
214/869-9310
List price: \$699, with interface software and cable \$799
Requirements: DOS 2.10 or later version, RS-232C port

faster?" Virtually overnight, thousands of partially depreciated PCs were viewed as plodding, antiquated piles of silicon and sheet metal.

But the PC is a trouper, performing on demand, dutifully grinding out spreadsheet numbers, untangling data bases, and processing words. Though AT performance would be welcome on occasion, it's hard to justify when budget time rolls around. A phosphor Karl Malden taunts you from the other side of your glowing green screen: "What will you do? What will you do?"

Reach for your traveler's checks. For \$595 you can turn your tortoise-like PC into a track star with the SpeedDemon accelerator board from Micro Computer Technologies (McT). The SpeedDemon is a full-size expansion board equipped with a 10MHz 8086 microprocessor, an 8087 math coprocessor, and an 8K memory cache. The back of the board features a switch for

(continues)

SpeedDemon

When IBM released the PC AT, high-tech junkies weren't the only ones to sit up and take notice. PC users across the land who were reformatting paragraphs and sorting data bases raised their weary voices and bleated, "You mean, it can go

Table 1: The SpeedDemon versus the PC and the AT

	IBM PC	PC AT	IBM PC and SpeedDemon
Processor(s)	8088	80286	8088, 8086, and 8087
Calculate primes from 0 to 1000	14:20	5:35	8:01
Evaluate, display, and increment dBASE III macro 1000 loops	1:11	0:26	0:50



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- Data Classes: auto, extern, static, register
- Typedef, Struct, Union, Bit Fields, Enumerations
- Structure Assignment, Passing/Returning Structures

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asm
asmx
atan
atoi
atol
bdos
bdosx
bios
biosx
calloc
ceil
cfree
chain
character
chdir
chmod
clearerr
close
clrcrn
cmpstr
conbuf
conc
cos
cpyst
creat
curblk
curlin
curcol
currow
curloff
curson
delete
drand
exec
execl
execv
exit
exitmsg
exp
fabs
fclose
fdopen
feof
ferror
flush
fgetc
findex
filetrap
find
floor
fopen
fprintf
fputs
fread
free
freopen
fscanf
fseek
fstell
fwrite
getc
getch
getch
getchar
getcseg
getdseg
getd
putd
getdate
gettime
geti
puti
getkey
getmode
setmode
gets
getw
heapsiz
heaptrap
hypot
index
inp
insert
iofilter
isalnum
isalpha

Functions

isascii
isctrl
isdigit
islower
isprint
ispunct
isspace
isupper
itoa
keypress
left
len
log
log10
longjmp
lseek
malloc
alloc
mathtrap
mid
mkdir
modf
movmem
open
outp
peek
perror
poke
poscurs
pow
printf
putc
putchar
puts
putw
rand
read
readatr
reach
writech
readdot
writedot
realloc
rename
replace
repmem
rewind
right
rindex
rmdir
scanf
setbuf
setbufsiz
setcolor
setdate
setjmp
setmem
sin
sound
sprintf
sqrt
strand
sscanf
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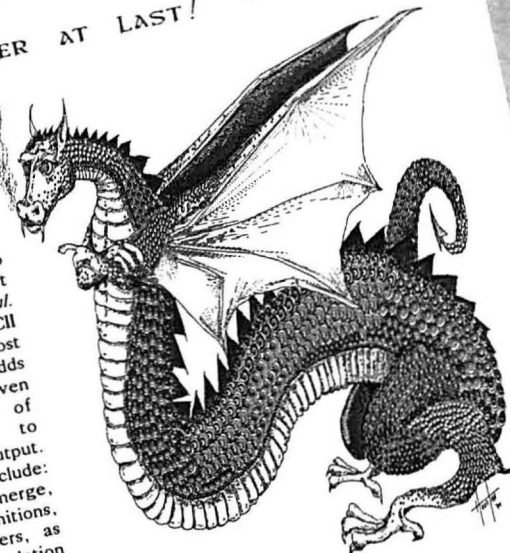
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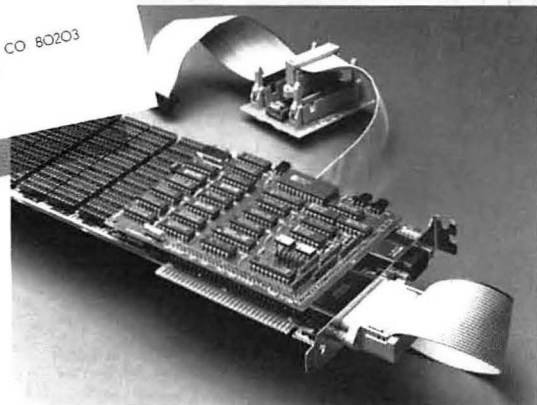
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From the Hardware Shelf



changing from 8086 mode to 8088 mode, a reset button, and a light showing when the 8086 is in use.

The dual high-speed microprocessors and memory cache boost the PC's processing speed while maintaining complete software compatibility—a claim the AT can't make. A SpeedDemon-equipped system won't beat an AT or a PC paired with certain accelerator boards; at best, performance is almost doubled. But when you remember that most accelerator boards start at \$1000, the SpeedDemon becomes more attractive.

There is one catch: Before your PC can slip on its Nikes, you must remove its 8088 and plug it into the installed SpeedDemon board. The motherboard socket is filled by a 40-pin connector wired to the SpeedDemon board. Though McT provides a chip puller, beware. The 8088 is firmly planted in its socket; yanking up on one end may bend or break pins.

Relocating the old 8088 chip onto the accelerator board is an interesting design twist. Unlike other accelerator boards that emulate the 8088 they are intended to replace, McT keeps the 8088 available when absolute compatibility is necessary. More important, the SpeedDemon uses all of the PC's installed system memory—other accelerator boards, notably Univation's PC Turbocharger, can use only their own complement of RAM.

A potential headache is the modest power supply of older PCs and compatibles. If your machine is packing several expansion boards or a hard disk, you may need to add a heftier power supply to use

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the SpeedDemon. This is a design limitation of the computer, not the SpeedDemon board—you may encounter the same problem if you install an internal modem board.

Just how quick is the SpeedDemon? I conducted several benchmark tests, pitting a SpeedDemon-equipped PC against a standard PC and an AT (see Table 1). While not the fastest accelerator board on the market, its price/performance ratio makes this a very affordable alternative.

Ever since IBM started the CPU speed war with the AT, peripherals vendors have been toeing the starting blocks. This recent entrant offers reasonable performance, complete IBM compatibility, and a price that is easy to live with.

—Robert Nusbaum

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Jay Alperson is a clinical psychologist and director of computer-assisted instruction at Palomar College in San Marcos, California. David McCune is president of the Proteus Group, a consulting firm in Brooklyn, New York. Robert Nusbaum is a freelance writer and programmer based in Grand Rapids, Michigan. ●

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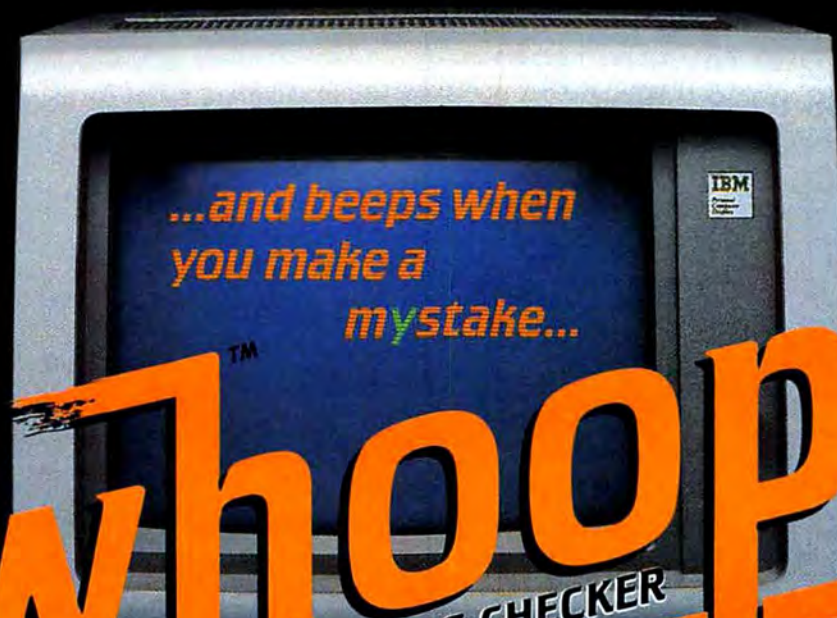
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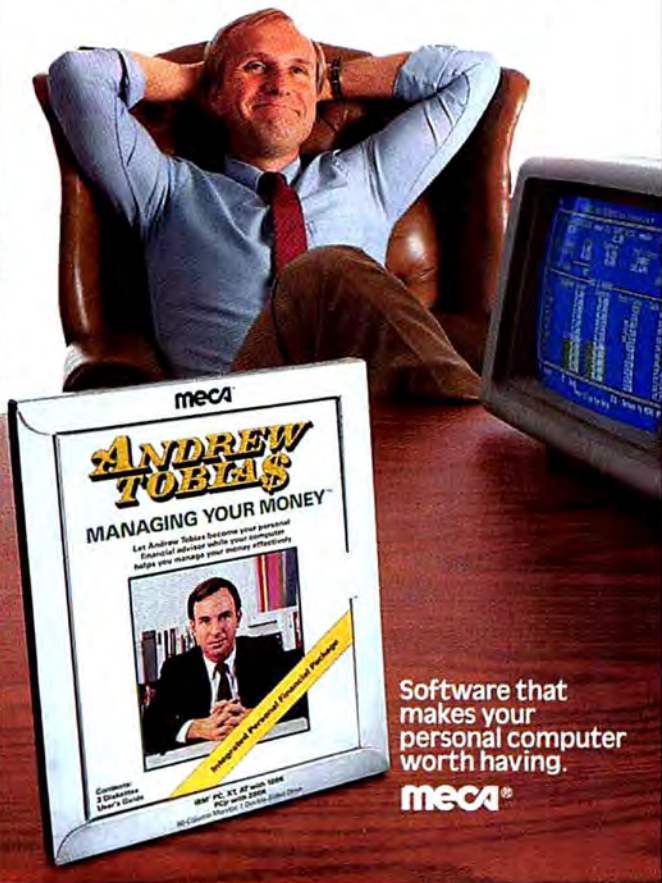
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Edited by Robert Luhn

WordFinder, Version 2.0

Some years after the death of Dylan Thomas, a stash of the poet's hitherto unseen manuscripts came to light behind a file cabinet. Along the margins of their pages, written unmistakably in Thomas's hand, ran a series of cryptic numbers. Literary historians were stymied in their search for the key to this baffling and seductive riddle, but eventually the code yielded its secret. The Rosetta stone: *Roget's Thesaurus*! Thomasologists were shocked. That wild, native genius had resorted to a thesaurus? Unthinkable—but the explanation held.

Were Thomas writing today he could avail himself of one of the current crop of on-line thesauri, which leave no telltale numbers in the margin. These programs sit poised on the wings of RAM or disk, ready to contribute their synonymic suggestions whenever summoned from within your word processor.

But what of us lesser poets? Might we too profit from an on-line lexicon? As a creature of habit long addicted to *Roget's*, I gingerly installed Writing Consultants' *WordFinder* on my *WordStar* disk. I wondered: Could I make tolerable linguistic music with such an electronic instrument?

Currently one of the more comprehensive RAM-based thesauri, *WordFinder* draws on a burly 90,000-word dictionary to provide synonyms for some 9000 keywords, whose selection was based on frequency of use in contemporary



business communications. The program works with *WordStar*, *WordStar 2000*, *Microsoft Word*, *MultiMate*, *WordPerfect*, *pfs:write*, *IBM Writing Assistant*, and *EasyWriter II*, with versions expected for *Volkswriter*, *Palantir*, *Symphony*, and *Framework*. *WordFinder* comes with a "generic" installation routine that accommodates word processors not listed. Version 2.2 can be used with different word processors, whereas version 2.0 requires irrevocable commitment to one program at the time of installation.

Once installed, *WordFinder's* lexicographical talents are only a few keystrokes away. Place the cursor under the word in question, type a two-key command, and a windowful of synonyms opens on screen. If you spot an acceptable synonym, press <Enter> and the boring old word is replaced with

(continues)

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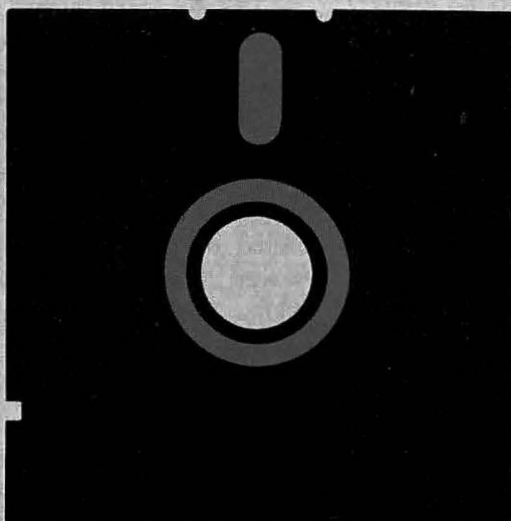
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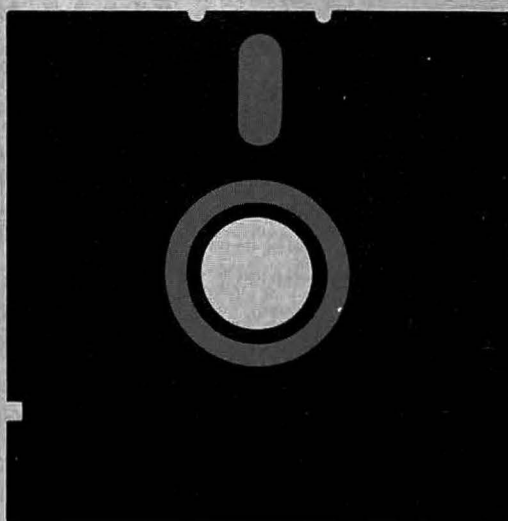
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an elegant new one before you can say Claus von Bulow. If *WordFinder* can't produce a suitable replacement, the program displays the 30 alphabetically closest words from its dictionary. If you spot a likely contender, you can request its synonyms.

That situation arises not infrequently—the program is generally ignorant about past tense and plural forms. For example, *WordFinder* does not recognize *cows*, though *cow* elicits *bossy*, *bull*, *calf*, *critter*, *heifer*, *ox*, and *steer*. If it's bovines you're chasing, you don't have far to look. But if you're after alternates for less bucolic words, such as *allege*, *incorporate*, or *inspiration*, be prepared to hoist your off-line lexicon. In light of *WordFinder*'s stated aim to offer "a dictionary of synonyms with practical meaning," the abundance of cows and the absence of allegations is puzzling. But these seemingly capricious gaps are more than compensated for by the program's effortless operation and usually helpful suggestions.

Installation is simple, though getting up and running with the program takes some doing, since the user manual's instructions are somewhat elliptical. But with a little experience, using *WordFinder* is a breeze, a lark, a piece of cake, child's play, duck soup, a cinch—in a word, a snap.

According to Writing Consultants' president Mike Weiner, version 2.2 of *WordFinder* will feature more lucid documentation. Also in the works: a utility that lets users add keywords and synonyms to the dictionary; support of DOS paths and an expanded 15,000-keyword

data base; and eventually, a "vernacular converter" that translates the rough-hewn terms of street speech into their more refined counterparts.

Writers tend to be quirky characters. Algernon Swinburne is rumored to have kept an armadillo in his sock drawer for inspiration. Dylan Thomas and I resort to *Roget's*. Though I'm not prepared to relegate that rich, familiar storehouse to my closet, neither am I about to remove *WordFinder* from my *WordStar* disk. *WordFinder* is swift and efficient, takes up a scant 26K of memory, and usually delivers what I'm looking for. If you normally write or edit on a computer and are pressed for time and shelf space, give serious consideration to making *WordFinder* a permanent resident in your electronic reference library. —Barbara Lewis

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SeekEasy

Before I bought my first computer, I had a mystical view of the beast. I imagined that you simply fed it information, and with the touch of a key the computer magically transformed the data into any shape desired.

A quick turn at the keyboard soon dispelled this notion. I discovered that the computer is at best a sorcerer's apprentice. It must be told how to do everything, and it's very fussy about the instructions it receives. Most first-time users spend more time figuring out how to phrase instructions than actually accomplishing the task at hand.

When you try to manage data, for example, you suddenly confront the issues of field and record definition, indexing terms or descriptors, data types, and a variety of other arcane details. And if you don't get the details just right, the fruit of your labors may be skewed. Some anonymous programmer coined the acronym GIGO—Garbage In, Garbage Out—to describe this state of affairs.

But now you can elude the spectre of GIGO with *SeekEasy*, a special-purpose data management program geared toward quickly storing and retrieving information with little muss or fuss. Although it can't replace a full-featured data manager, particularly in report generation, you can master *SeekEasy* in 15 minutes or less. In fact, on-line help is so complete that you can practically ignore the user manual.

From the program's six-function main menu you can store and search for data, list all records, check file size and available space, and "compress" the data file, where all records reside, for faster searching. Four keyboard commands complete *SeekEasy*'s control structure; you can return to the menu,

(continues)



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edit or delete items, exit to DOS, or print a report.

What's the secret to *SeekEasy*'s simplicity? All data is kept in a single file without regard to its nature. You don't have to worry about field length, field type, or other special descriptors. I've used the program for appointments, addresses and phone numbers, BBS record keeping, bibliographic citations, and any thought that I'd normally jot down on a Post-it. When I need to retrieve an entry, I type in any word that might be part of the record; *SeekEasy* zips through the file (as fast as 10K per second) and displays the closest match. For example, entering BROW might retrieve all references to articles by Eric Brown. The program will also perform search, list, and check file size operations on files not in the *SeekEasy* format; it will even locate ASCII text in binary files.

Free-form data management has its price, though. Each record is limited to two lines in length, and there is no flexibility in generating reports. In the former case, you can get around the size limit by creating a second record with the same name; in the latter, you're stuck with a single report format that lists record names and contents in the manner of *dBASE II*'s LIST command.

These restrictions are more than acceptable, given *SeekEasy*'s amiable nature and reasonable price. Correlation Systems is confident enough about its product to offer a

usable demo disk for \$15, and the price can be applied toward purchasing the real thing.

SeekEasy may not have eliminated GIGO, but it has changed its meaning. With *SeekEasy* GIGO means Garbage In, Gospel Out. —Burton L. Alperson

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dBIII Compiler and Clipper

dBASE III's command language has attracted a large following among programmers, systems consultants, and value-added resellers who create serious business applications. However, the language is interpreted, much like the BASIC built into the PC. Programs execute slowly, and the source code you write can easily be read—and copied. Furthermore, a user must have and be able to use *dBASE III* to run an application written in the command language. These serious handicaps have rightly caused some developers to shy away from this otherwise powerful language. No longer! *dBIII Compiler* from Word-Tech Systems and *Clipper* from Nantucket, Incorporated, have finally set *dBASE III* applications free.

Both programs are *dBASE III* compilers. They transform applications written in the *dBASE III* command language into programs that can be directly executed by the PC without the presence of *dBASE III*. Compiled programs are faster and, in this machine language form, virtually indecipherable to all but the most skilled copycats. This represents substantial savings to the user, an incentive to the programmer, and a boost to the entire software marketplace, since thousands of existing applications can be sold to people who don't own or use *dBASE III*.

Although speed, independence from *dBASE III*, and source code security are reasons enough to buy a compiler, there are other attractions. Compiled applications generate standard *dBASE III* data files that can be manipulated outside of the compiled application by *dBASE III* owners. Compiled applications also take up less disk space than *dBASE III*. For example, *dBASE III* and an application might take up 313K; once compiled by *Clipper* and *dBIII Compiler*, the application shrinks to 118K and 106K respectively.

Though compiled applications run faster, manufacturer speed claims are overly optimistic. A test application compiled by *Clipper* and *dBIII Compiler* ran two and six times faster, respectively, than it would under *dBASE III*. The speed gain depends on the application compiled. Calculation-intensive applications run much faster when

(continues)



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Table 1: dBASE III applications time test

	dBASE III	Clipper	dBIII Compiler
Index 1000 records on one field	2:19	0:33	1:07
Index 1000 records on two fields	2:52	0:53	1:50
Repeat a loop with six replacements, 1000 times	6:52	3:16	3:00

compiled; those that are mostly read/write oriented show little improvement (see Table 1).

Having used BASIC compilers in the past, I assumed that these dBASE III compilers would be slow, hard to use, and persnickety about the source code being compiled. Most of my prejudices die slowly, but *Clipper* and *dBIII Compiler* quickly convinced me that compiling could almost be fun. One application was compiled and linked in just over a minute by *dBIII Compiler*; *Clipper* required a little more than four minutes. I've sat at stoplights longer.

The compilers are also surprisingly tolerant and swallow conscientiously written dBASE III applications with barely a hiccup. There are a few exceptions. Both compilers expect some data items to be separated by spaces instead of commas. Neither compiler supports the EDIT or BROWSE commands or interactive commands such as the MODIFY COMMAND.

Since dBASE III offers an interactive testing and debugging environment, it makes sense to iron out problems first and then compile the application. Keep in mind that both compilers offer enhancements

to the dBASE III language. If you use the enhancements, the application will not run under dBASE III. Neither company offers a debugger yet, but the enhancements are so enticing that you might be tempted to try them anyway. You can, for example, increase the number of fields per record and the number of open files, use macro substitution in DO... WHILE loops, and even create context-sensitive help screens triggered by a function key.

Which compiler is better? To use the old cliché, it depends. *Clipper* creates faster running programs, accepts scientific notation, supports an 8087 math coprocessor, and allows you to create your own functions. But it cannot deal with report, label, or standard index files. The linking process is rather complicated, and the compiler requires 256K.

Compiling and linking are faster and easier with *dBIII Compiler*, and smaller programs are generated. The compiler recognizes report, label, and index files and requires a mere 128K. But you face perhaps the ultimate sacrifice:

With only 128K, compiled applications run slower.

Both companies promise that future versions will be faster and easier to use. But if you're developing dBASE III applications, don't wait—both compilers do an outstanding job. —Bill Crider

dBIII Compiler
WordTech Systems, Inc.
21 Altarinda Rd.

P.O. Box 1747
Orinda, CA 94563
415/254-0900

List price: \$750
Requirements: 128K, two disk drives, DOS 1.10 or later version
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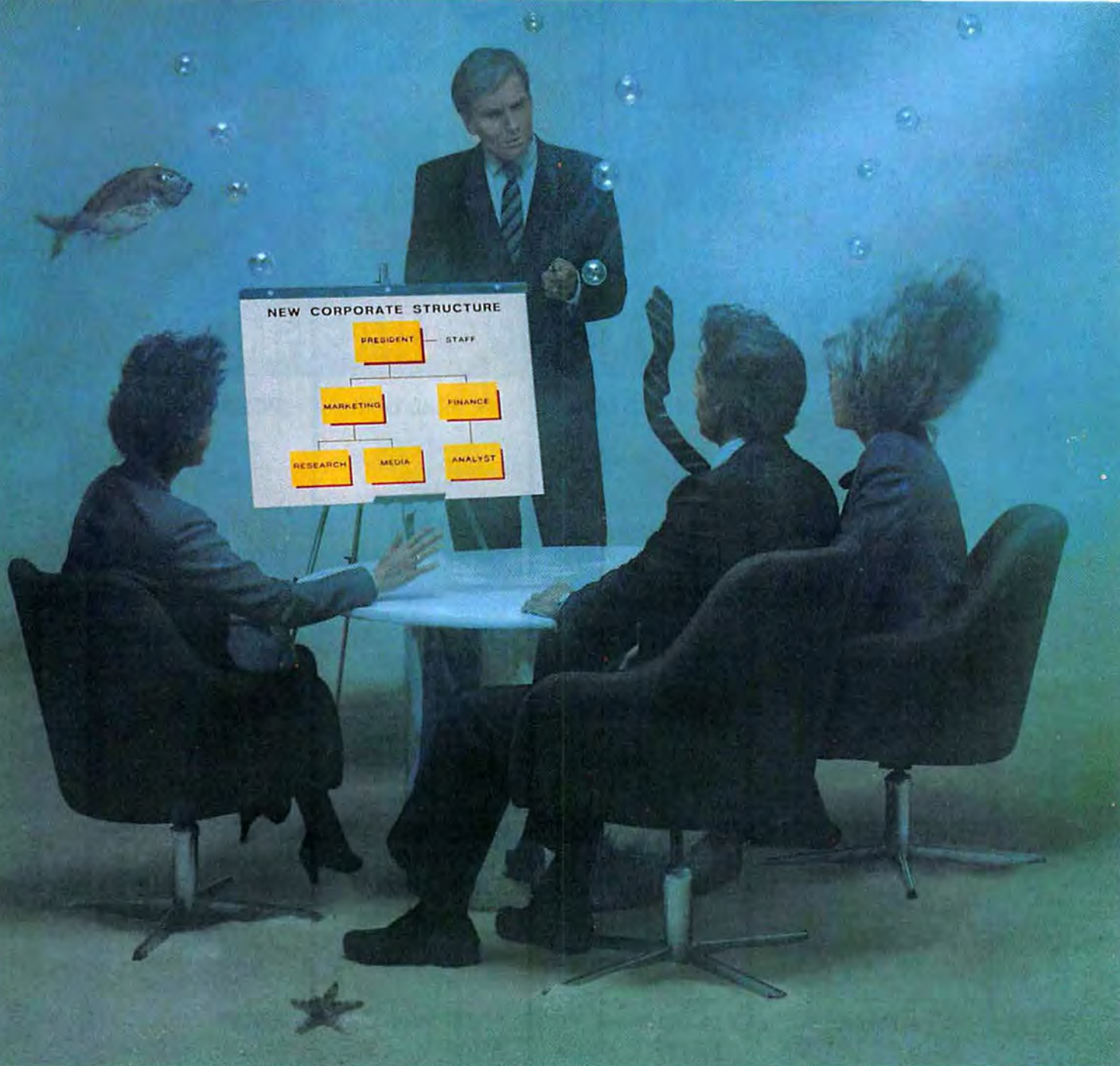
Clipper
Nantucket, Inc.
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Culver City, CA 90230
800/441-2345

List price: \$695
Requirements: 256K, two disk drives, DOS 2.00 or later version
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FANSI-Console

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(continues)



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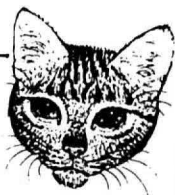
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Running DOS on a standard IBM PC is a bit like driving a four-cylinder Chevy with a stick shift. You can rev up the engine and even spin the tires, but you'll get laughed out of the high-tech parking lot by those with muscle machines such as the AT and the Compaq 286.

You don't need to overhaul your PC's engine with an expensive coprocessor board to boost its speed. One inexpensive way to put some zip in the box is with FANSI-Console, a \$25 utility program from Hersey Micro Consulting. FANSI-Console (derived from "Fast ANSI") is a souped-up replacement for the ANSI.SYS device driver, which aids DOS in controlling keyboard and screen input and output. When FANSI-Console is loaded, any program that goes through DOS or the BIOS ROM for screen display will do so noticeably faster. A DIR listing will scroll more quickly; *dBASE II* screen display will also scroll more quickly.

The company calls this program an "integrated console utility." In addition to speed, you get a whole dashboard of DOS-level functions: the power to recall and edit lines that have scrolled off the screen and to pause scrolling with a single key (the equivalent of <Ctrl>-<NumLock>), DOS keyboard macros, the ability to save and recall screen images, screen blanking, 50-line display (with a graphics board), and generally flicker-free scrolling.

Once FANSI-Console is in memory, you can access the advanced features (scroll recall, macros,

screen snapshot) by pressing <ScrollLock>. FANSI-Console displays a status line at the top of the screen listing installed functions. To take a screen snapshot at this point, press <Ins>. To use scroll recall, press <CursorUp>, and the information you thought was lost forever reappears.

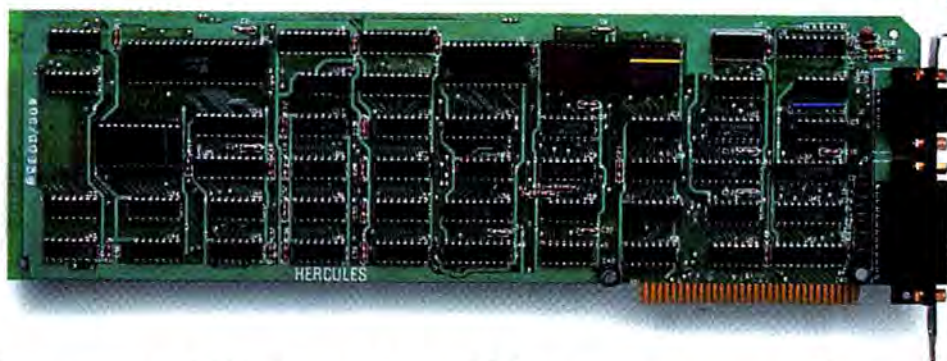
The user manual is clearly written, laying out step-by-step instructions for setting up the program. Along with replacing ANSI.SYS, you must create or edit the CONFIG.SYS file to indicate which FANSI-Console features to install. This is particularly useful if your PC is short on memory. Though FANSI-Console soaks up only 24K, you could forgo some functions (the keyboard macro facility) or allocate less memory to the scroll recall buffer.

FANSI-Console runs on the PC, the AT, and most compatibles, though it won't work on machines that stray too far from the IBM path, such as the TI Professional and the Tandy 2000. The program is also incompatible with some display adapters, such as the Everex Ace, the Sigma Design Graphics Dazzler I & II, and the IBM Enhanced Graphics Adapter in any mode other than 80-column by 25-line text. Hersey Micro Consulting plans to provide EGA compatibility in the near future.

Most applications work harmoniously with FANSI-Console. The program measurably speeds screen display for *dBASE II*, *Friday*, *PC-File*, *SuperCalc*, *WordPerfect*, *Word Proof*, and *Samna Word*, among others. However, programs that

(continues)

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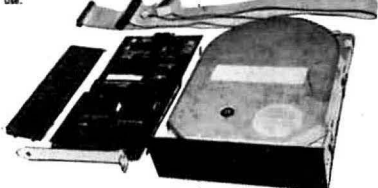
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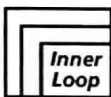
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PC World copy editor Barbara Lewis is an incurable word junkie. Burton L. Alperson is a professor of psychology at California State University at Los Angeles and a Contributing Editor for PC World. Bill Crider is also a PC World Contributing Editor and president of the Tucson Computer Society. Robert Nusbaum is a freelance writer and programmer based in Grand Rapids, Michigan. ●



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Password: Communicate

Insights and information on the PC communications marketplace

This month: PC-Talk moves up to the big leagues, Moneylink gives a boost to home banking, and lawyers fear possible malpractice suits for not using a modem

Edited by Eric Brown

ACK/NAK

PC-Talk Grows Up

Long before Adam Osborne raised his ruckus about inexpensive, quality software, a small Tiburon, California, company by the name of Headlands Press (now Headlands Communications) was quietly shipping copies of a low-cost communications program called *PC-Talk*. One of the first communications programs for the IBM PC, *PC-Talk* was written in BASIC by the late Andrew Fluegelman. True to its mellow Marin trappings, the program (which included on-disk documentation) was free for the price of a blank disk and return postage. If you wanted to contribute to the cause—\$35 was the suggested honorarium—you were welcome to do so. Thousands of grateful users ponied up the money and spread the word. *PC-Talk* and the “Freeware” concept were launched, and

with them, a successful underground industry that delighted users and caused commercial software developers to gnash their teeth in frustration.

In response to user suggestions, a significant upgrade of the program, *PC-Talk III*, hit the mails in early 1983. In the space of a year the program outsold every other PC communications package save *Crosstalk XVI* and *Smartcom II* and was licensed by Digital Research for inclusion in Concurrent DOS 3.2. As the checks continued to flow into Headlands Press, Freeware became greenware.

Times change, and *PC-Talk* is about to shed its tie-dyed threads for a pin-striped suit. Gone are the Roman numerals, the documentation-on-a-disk, and the unbeatable price. In their place is *PC-Talk 4*, a totally new program written in Pascal (with swatches of C and assembly language) that reflects not

(continues)



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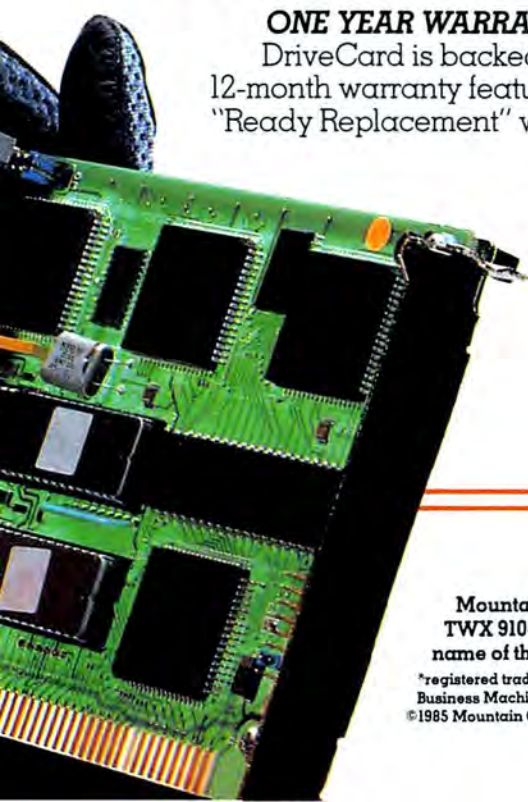
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only oft-requested improvements but also the realities of the software marketplace.

PC-Talk III devotees will be able to upgrade to *PC-Talk 4* for a low price, and the retail price for new users will be kept under \$100. The program will be sold via direct mail and will also be licensed to corporations. The latter method, said Fluegelman, who continued to work on the new program until his death last July, "is a very effective approach—and one that lets us offer better support."

PC-Talk 4's copious features and chameleon-like flexibility are bound to please both beginning and advanced communications users. Some highlights:

Macros. The program offers a system for editing and assigning characters or commands to keystrokes. The macros can receive information interactively, pause for a period of time, or wait for specific responses from a remote system. Like a number of contemporary programs, *PC-Talk 4* can record sequences automatically during a session and store them for later use as automatic logon procedures and script files. Macros can also be linked to other macros, permitting the creation of automated systems.

File manipulation. All files on any drive or subdirectory can be

viewed, renamed, or deleted during a session. For writing and editing electronic mail you can use Quick Edit, a single-screen editor that supports word wrap and variable margins. A split-screen feature enables you to edit text before sending it. For bigger jobs, you can fetch your favorite word processor at the touch of a key—without leaving *PC-Talk 4*.

Dialing directory. Directory entries are limited solely by disk space. Each entry can be customized to include dialing commands, modem controls, parameters, protocols, macro key definitions, printer controls, and more. Several entries can be dialed in sequence

(continues)

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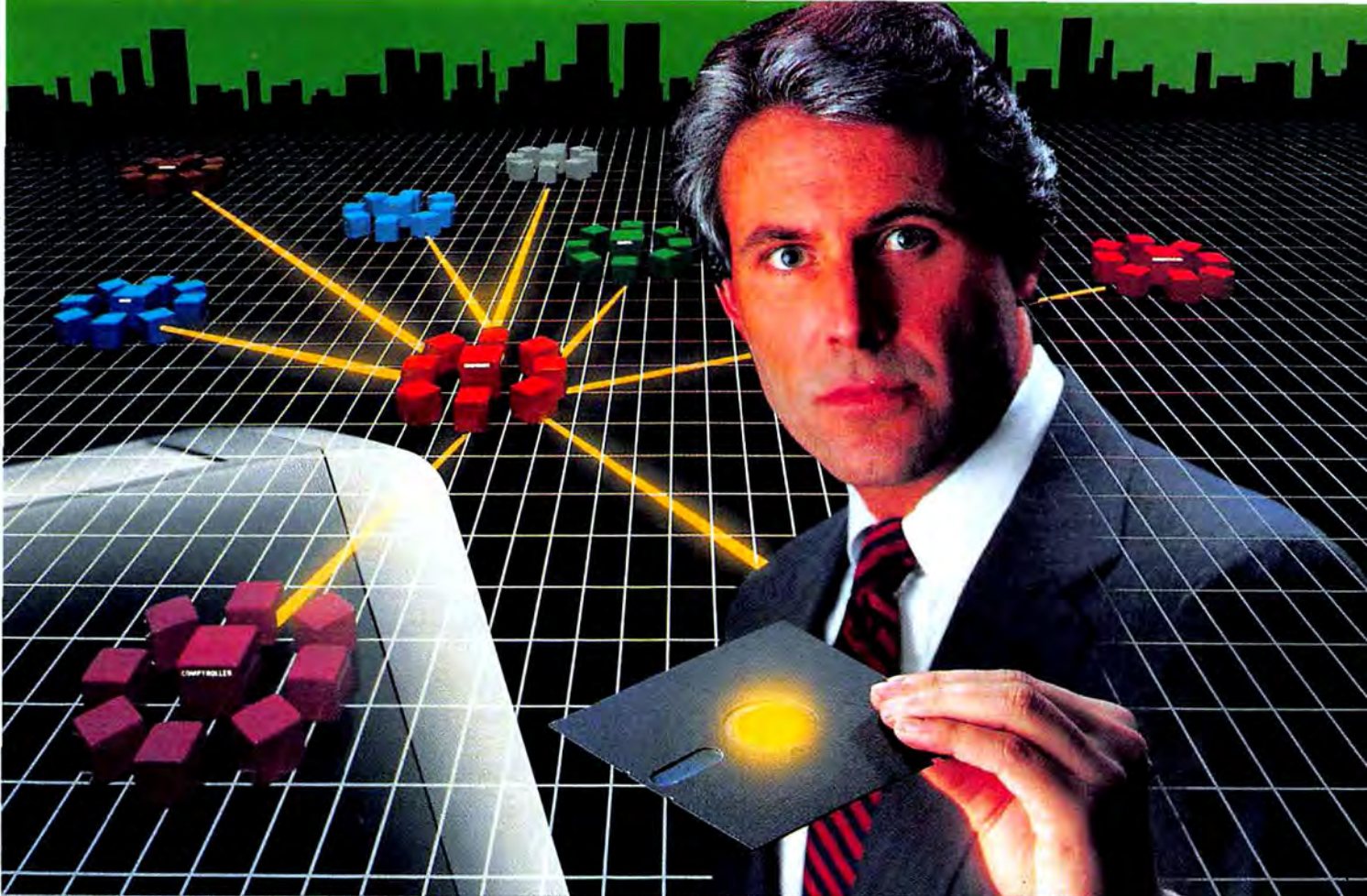
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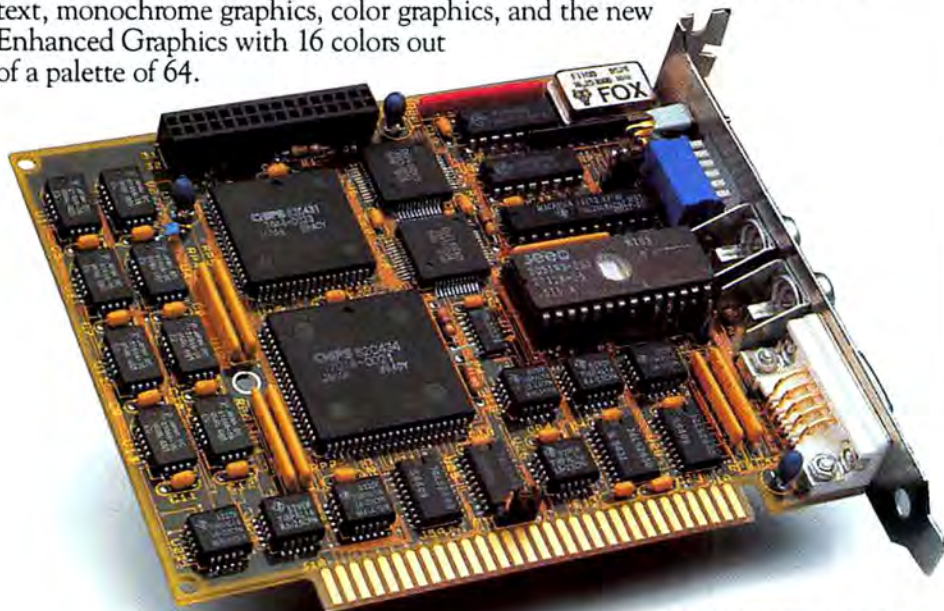
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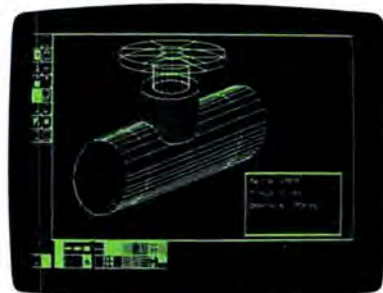
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File transmission. *PC-Talk 4* enables you to transfer files and chat with a remote system simultaneously. Files can be sent in ASCII text mode or by using the XMODEM, Polite, and Kermit error-checking protocols. The program can also filter out high-bit and control characters (*WordStar* users, take note). *PC-Talk 4* emulates popular terminals such as the VT 100 and the Data General Dasher.

History. With a single keystroke, *PC-Talk 4* displays a 32K history of your last communica-

tions session. All or part of the history can be printed or saved to disk, reused, or edited.

Splice. With new protocols, terminals, and modems popping up like daisies after a spring shower, the program's adaptability is particularly welcome. *PC-Talk 4* is not modem-specific; with its Splice utility, you can write independent communications modules in Pascal, C, or assembly language and easily plug them into *PC-Talk 4*, linking them to any directory entry. Possible Splice applications might accommodate character conversion, custom protocols,

terminal emulation, encryption, compressed or packed data, sound, and graphics. Headlands Communications also plans to publish a Splice tool kit to aid programmers in developing modules.

Although *PC-Talk III* will continue to be supported as Freeware, most current users will no doubt take advantage of the attractive upgrade offer and follow Headlands into the commercial world of *PC-Talk 4*. Still, *PC-Talk 4*'s open-ended design and modest price seem to be in keeping with the original spirit of Freeware, and the company's past successes point to a promising future.

—Robert Lubn

(continues)

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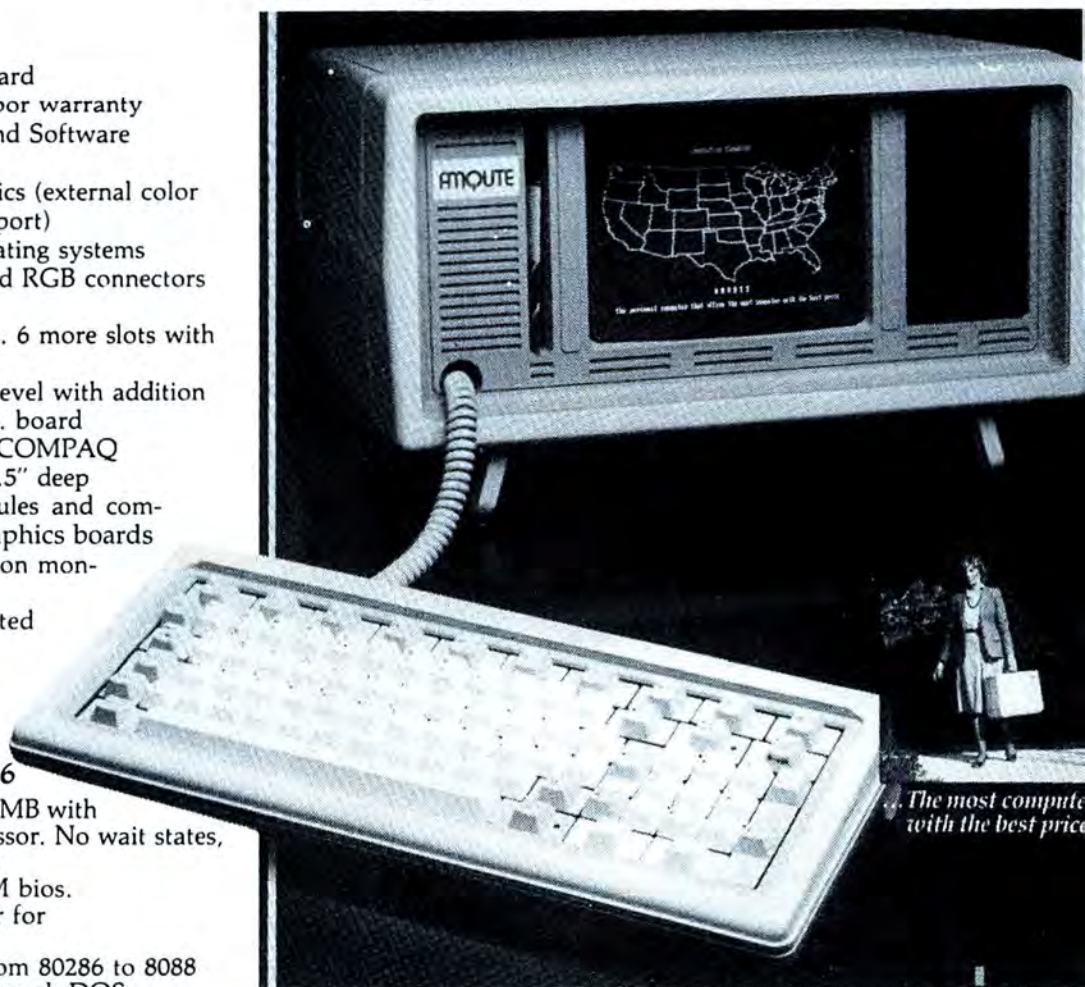
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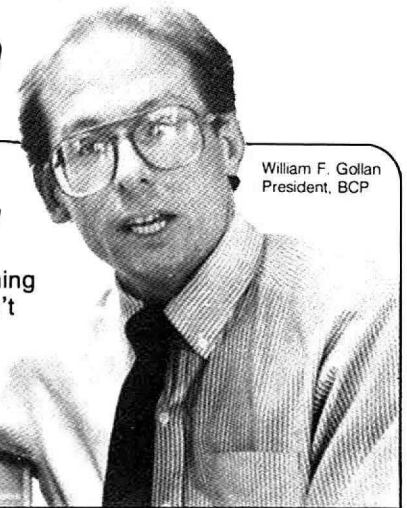
Moneylink—the Home Banking Connection

New communications software just hitting the market may finally help home banking via personal computers reach its potential. The first such program out of the starting gate was Monogram's *Moneylink*, a communications bridge between the company's *Dollars and Sense* personal financial management program and a bank's existing PC banking service. Subsequently, Chase Manhattan Bank and software publisher MECA announced a communications link that will provide a similar service between Chase's Spectrum home banking service and MECA's *Managing Your Money* financial management software. In addition to handling banking transactions, the MECA system will allow customers to download on-line security quotes.

The software comes none too soon as far as bank officials are concerned. Despite plenty of optimism, banking by modem is off to a sputtering start. By the end of 1985, only about 60,000 computer owners around the country had signed up for electronic banking services, a fraction of those that experts estimated would sign up. For example, when Bank of America started its HomeBanking service in November 1983, a top official boldly predicted the San Francisco-based bank would sign up 25,000 customers in its first 12

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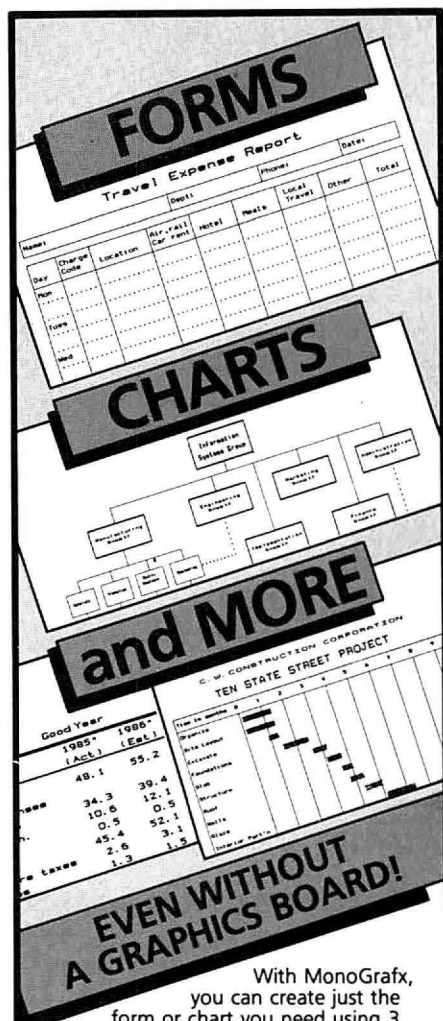
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months of operation. More than two years later fewer than 21,000 intrepid consumers subscribe to HomeBanking. Meanwhile, only 17,000 customers have signed up for Chemical Bank's Pronto, and 10,000 is the current subscribership at Citibank's Direct Access.

"I'm still fundamentally convinced that PC banking has the same opportunity for explosive growth as automated teller machines did just a decade ago," insists John Reese, president of Monogram, an Inglewood, California, software company. Despite the slow start, Reese predicts there will be "at least several million" PC banking customers by 1990.

Reese bases his optimism largely on several software products under development, including the *Moneylink* program that his company brought to market in October. "*Moneylink* is critical to the acceptance of PC banking," Reese says. "Most of the first-generation PC systems will soon hit a wall, if they haven't already, unless they take advantage of the features in *Moneylink* or something like it. A great part of the reason home banking hasn't taken off is that it hasn't taken advantage of the functionality of the PC."

Moneylink enables home banking customers to combine information in their checking and savings accounts and bill-paying records with their home, business, and tax records stored in *Dollars and Sense*. For example, as a customer of Bank of America's HomeBanking service, you could load *Moneylink* and, while off line, arrange to pay several bills from your personal checking account. *Moneylink*'s batch feature

lets you prepare a number of transactions while off line, thereby saving time and money while on line.

Once you log on to the electronic banking service, *Moneylink* provides a user-friendly front-end interface to the system. Here you can send the payment requests to the bank, pick up information on all bills paid and deposits received since your last on-line session, and quickly sign off.

Then you can use *Moneylink* to transfer the new data to your *Dollars and Sense* records. Your tax record will now add your dental bill to a listing under medical payments and enter the other payments into their proper categories. Prior to using *Moneylink* you would have had to retype the data into the financial management program to stay up-to-date. The *Dollars and Sense* records can also be transferred into 1-2-3 or 80-column ASCII text files.

"*Moneylink* makes the process easier by eliminating a lot of data entry," says Kevin Randolph, the Bank of America vice president in charge of HomeBanking. "We think we'll save 15 minutes of a *Dollars and Sense* user's time and 6 minutes of our customer's on-line time." Randolph and Reese look to each other for new customers. They estimate that fewer than 3000 of the bank's HomeBanking users are among the 150,000 owners of *Dollars and Sense*. (Sales of the program are

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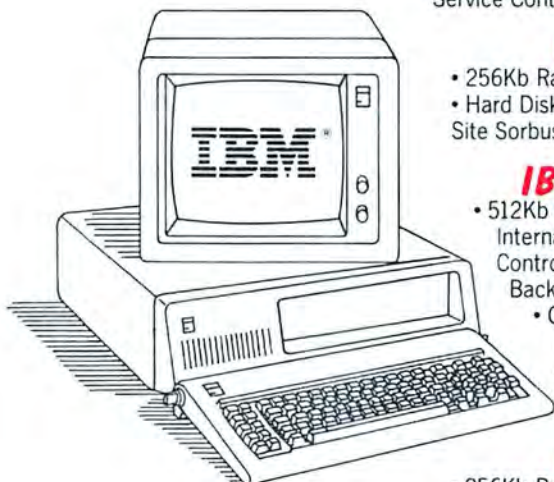
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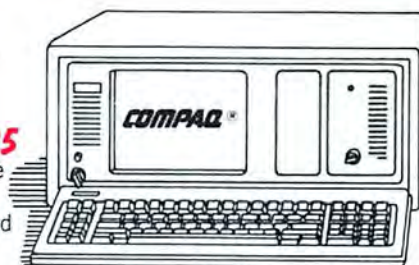
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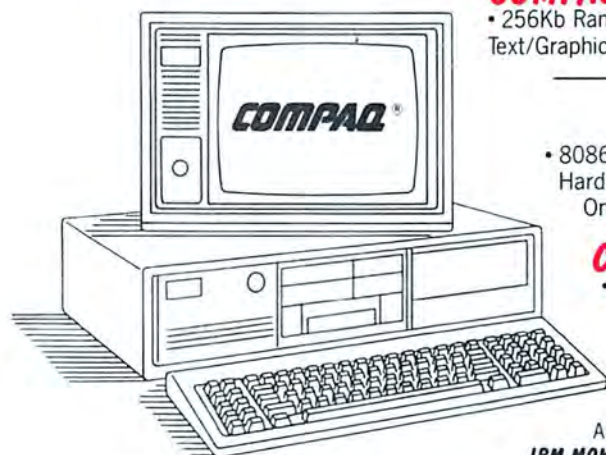


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divided almost equally between owners of IBM PC, Apple II, and Macintosh computers.)

Moneylink is also available for Citibank's Direct Access users, but the program has been customized differently for the two banks. Meanwhile, Bank of America sees *Moneylink* as just the first of many programs it plans to link to its HomeBanking service.

"I hope to make *Moneylink* a standard," Reese says. A standard will become necessary, he continues, once large consortiums of banks and financial institutions join together. Reese points to Video Financial Services, a Dallas-based group of seven banks including Security Pacific, Banc One, and First National Bank of Chicago; Covidea, a joint venture of Bank of America, Chemical Bank, Time, and AT&T; and Trintex, composed of IBM, Sears, and CBS.

"These three consortia have initial funding of hundreds of millions of dollars each," explains Reese, "and each one will have PC banking as a cornerstone to let you talk to hundreds of banks for whom they serve as a systems provider."

So far, it is not clear whether these services will provide scrolling-ASCII videotex, frame-by-frame graphics videotex, or both. Reese and Randolph agree that the joint ventures will attract more PC banking customers if

they focus on scrolling-ASCII services instead of full graphics videotex.

"The PC banking customer is looking for speed of entry and access," Randolph says. "Our experience is that graphics get in the way. People don't want to wait while the screen paints a pretty picture of the bank." —John Eckhouse

Trends

Malpractice for Modem-Shy Lawyers?

It's only a matter of time, say some legal authorities, before the innovation-shy legal profession confronts a new type of malpractice suit—failure to use computers in researching a case.

"We're in a period of transition to major computer use over the next five years," says Russell Burris of the University of Minnesota's Center for Computer Assisted Legal Instruction. "But that may not be fast enough. We're all waiting for the first malpractice suit for failure to access the most up-to-date information."

Others feel that such suits are many years away because of the difficulty in proving that failure to use a computer caused the injury. However, legal administrators who take the threat seriously are trying to diminish the impact of what they believe is inevitable. Their primary focus thus far has

(continues)

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been on students at law schools. Almost all law schools already teach future lawyers to use West-law or Lexis, the two major on-line legal libraries (see "Lawyers On Line," PCW, October 1985). During the last decade an increasing number of law school graduates have had some hands-on experience with the two systems. However, the more difficult—and perhaps equally important—subject-specific lay data bases and the emerging network of public and private computer bulletin boards are being ignored.

"The problem is that law schools are conservative and slow to change," says Burris, "so there's an across-the-board low utilization of data bases. But an awareness will start to grow rapidly in the next five years."

Legal administrators hope that will be enough time to forestall a rash of negligence charges. Says Roger Crampton, president of the Association of American Law Schools and a professor at Cornell University School of Law, "Mostly students use computers for word processing now, but there's an increasing use of the modem. In a few years," he predicts, "there will be universal familiarity with computers among law school student bodies. Papers will be submitted on disks, and data bases will be accessed regularly. Soon," he says, "you won't recognize the old law school."

However, while law schools are beginning to push for computer education, they are receiving little incentive from established law firms. An informal survey of large law firms in California, a state

with 86,000 active lawyers, one-seventh of the nation's attorney population, shows that computer literacy is a low priority in recruiting law school graduates.

"It [computer literacy] is not even a consideration," says Robert Vanderet, chair of the employment committee at O'Melveny & Meyers in Los Angeles. "It's more important that lawyers know how to analyze legal issues and are versed in the law."

Law firms recognize the importance of electronic legal research, but they believe that their own in-house computer training and research staffs will provide the necessary buffer against possible malpractice suits. More important, they believe, than actually knowing how to use computers is knowing what is accessible through the computer.

"The real problem," notes Peter Pfister, in charge of recruiting at the Morrison & Foerster law firm in San Francisco, "is a generation gap with attorneys who began practicing before electronic research was available. The need is to educate these older lawyers."

—James Evans

Robert Luhn is an Associate Editor for PC World. John Eckhouse is a business correspondent for the San Francisco Chronicle. James Evans is a freelance writer and an associate editor at the State Bar of California. ●

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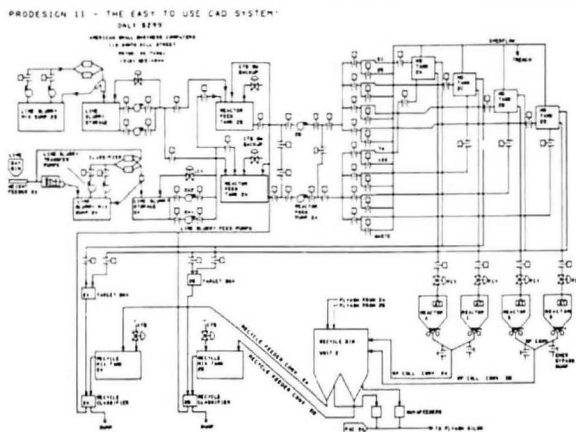
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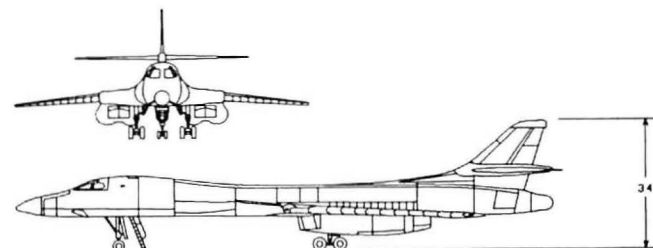
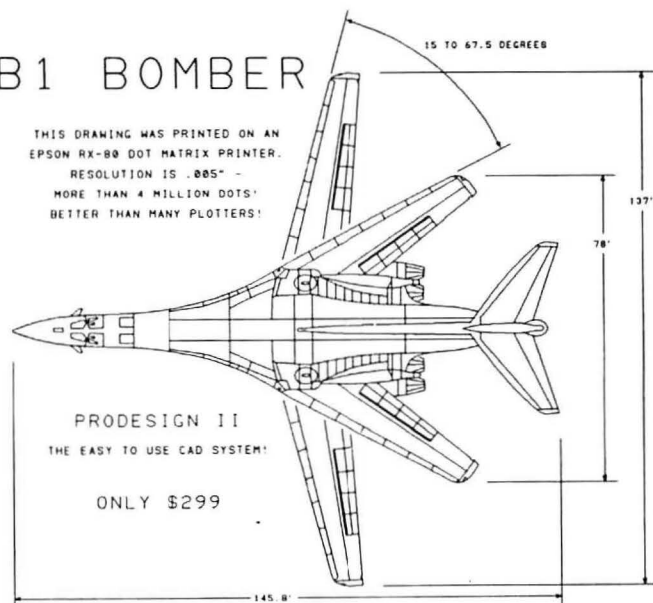
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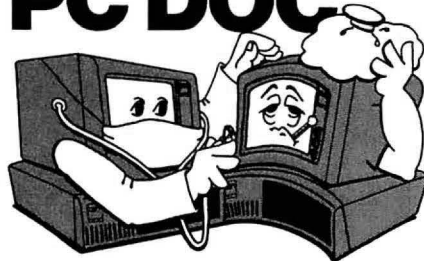
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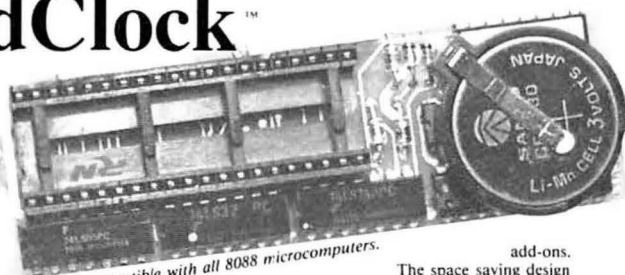
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BEFORE

AFTER

Circle 137 on reader service card



Star-Dot-Star

A global exchange of personal computer discoveries

This month: Tips for using function keys in DOS and dBASE III, 1-2-3 macros and graphics, and several useful utility programs

Edited by Steven Cook

Get a Move On

Browsing through Appendix D of the DOS 2.00 manual ("DOS Interrupts and Function Calls"), I noticed that DOS function 56 hexadecimal (rename a file) not only renames a file but can also move a file from one directory to another. Because the DOS command RENAME can only rename a file, I wrote a rename program that can also move files.

I call my program MOVE.COM. To create it, load BASIC, type in the program shown in X-MAKER.BAS and the lines shown in MOVE.DAT. Then type **RUN** and press **<Enter>**.

To use the MOVE command, type **MOVE** followed by a space, the drive, the path, and the name of the file you want to move; then type a space, the new path, and a file name, new or old. Note that you cannot MOVE a file from one disk drive to another. Also note that MOVE.COM requires DOS 2.00 or a later version.

*Troy Armstrong
Bartlesville, Oklahoma*

Editor's note: Because MOVE.COM simply changes the directory information, it is much faster than using the COPY command and then deleting the original. MOVE works even when a disk is too full to hold an additional copy of a file.

1-2-3 Macro Menus

In his item "Two More on 1-2-3" [**.**, PCW, October 1985], Patrick McMahon noted the potential for trouble when the **<Esc>** key is pressed during a macro menu. The problem he identifies will occur only if the /XM statement is stored

in the cell directly above the first menu item. As Mr. McMahon said, placing a blank cell between the /XM statement and the menu will prevent trouble.

Here's the source of the problem: When **<Esc>** is pressed, 1-2-3 continues macro execution at the cell directly below the /XM statement, which in Mr. McMahon's situation was the macro menu itself.

However, there's no need to put the macro menu directly below the /XM statement, or even anywhere near it. You can make use of this fact by placing several /XM statements in inverse sequence, one below the other, to create a multiple-menu structure like 1-2-3's. Macros called by menu items can move execution up one level to the next /XM statement. Whenever you press **<Esc>**, the execution will revert to the preceding menu. Pressing **<Esc>** at the first menu can cause execution to drop to an empty cell and return to READY mode.

*Steven Huelskoetter
Collinsville, Illinois*

Graph Notes

My work calls for a variety of graphs that 1-2-3's documentation does not clearly describe. Accordingly, I've developed a few techniques of my own:

Scatter plots. You can create a scatter plot by using the /Graph Options Format Graph Symbols command.

Crowded x-axis labels. Yearly data can be unreadable when the number of years exceeds 15. Use

(continues)

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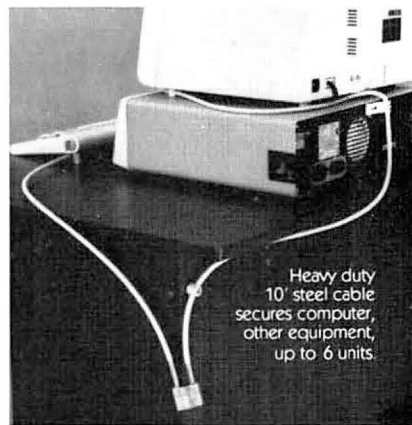
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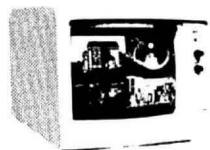
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```
10 DEFINT A-Z:CLS:KEY OFF:DEF FNHEX(X$)=VAL("&h"+X$)
20 LOCATE 3,1:PRINT "X-Maker":READ F$
30 LOCATE 5,1,1:PRINT "Now testing for data errors...please wait";
40 SUM=0:READ LN:IF LN<0 THEN 80
50 READ H$:IF VAL(H$)<0 THEN 70
60 SUM=(SUM+FNHEX(H$))*2:SUM=(SUM\256)+(SUM MOD 256):GOTO 50
70 READ CKSUM$: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$;": ";
100 AS=INPUT$(1):PRINT:IF AS=CHR$(27) THEN END
110 LOCATE 6,1:PRINT "Working...";
120 OPEN F$ AS #1 LEN=1 : FIELD #1,1 AS BX$
130 READ LN:IF LN<0 THEN 160
140 READ H$:IF VAL(H$)<0 THEN READ CKSUM$:GOTO 130
150 LSET BX$=CHR$(FNHEX(H$)):PUT #1:GOTO 140
160 CLOSE:PRINT:PRINT F$;" has now been created.":END
170 PRINT:PRINT "Error in DATA Line";STR$(LN);". ";
180 PRINT "Check your work.":BEEP:END
```

X-MAKER.BAS: Star-Dot-Star's program-creating program

```
1000 DATA "a:move.com"
1010 DATA 1,b4,30,cd,21,3c,02,bd,00,00,7c,18,bb,81,00,8a,4f,-1,b7
1020 DATA 2,ff,b5,00,e8,37,00,8b,d7,e8,32,00,b4,56,cd,21,72,-1,f1
1030 DATA 3,02,cd,20,3d,00,00,75,04,8d,16,6b,01,3d,03,00,75,-1,e0
1040 DATA 4,04,8d,16,99,01,3d,05,00,75,04,8d,16,aa,01,3d,11,-1,f8
1050 DATA 5,00,75,04,8d,16,ba,01,b4,09,cd,21,cd,20,8b,fb,e3,-1,1a
1060 DATA 6,10,b0,20,fc,f3,ae,8d,5d,ff,e3,06,f2,ae,e3,02,4f,-1,38
1070 DATA 7,41,c6,05,00,47,e3,01,49,87,df,c3,49,6e,76,61,6c,-1,9a
1080 DATA 8,69,64,20,44,4f,53,20,76,65,72,73,69,6f,6e,20,28,-1,0d
1090 DATA 9,6d,75,73,74,20,62,65,20,32,2e,30,30,20,6f,72,20,-1,61
1100 DATA 10,6c,61,74,65,72,29,0d,0a,24,50,61,74,68,20,6e,6f,-1,f2
1110 DATA 11,74,20,66,6f,75,6e,64,0d,0a,24,41,63,63,65,73,73,-1,71
1120 DATA 12,20,64,65,6e,69,65,64,0d,0a,24,4e,6f,74,20,73,61,-1,5d
1130 DATA 13,6d,65,20,64,65,76,69,63,65,0d,0a,24,-1,e1,-1
```

MOVE.DAT: Add these lines to X-MAKER.BAS to create MOVE.COM.

the /Graph Options Scale Skip command to indicate the data labels to omit.

Crossbar. To produce a solid crossbar at horizontal zero, include a positive and a negative value in any data range. To place a crossbar at a nonzero position, include a data range with all values equal to the desired crossbar height.

Vertical bars. You can place a vertical bar at the zero position of an x-y graph by including a

positive and a negative value in the x-range.

Cartesian coordinate graphs. To create an x-y graph with coordinates that cross in the center, such as a graph from -1 to 1, include -1 and 1 in the x-range and in any data range.

Jeffrey Kahn
Setauket, New York

(continues)

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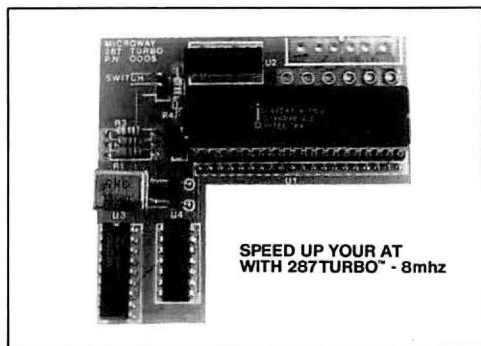
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```

100 DEFINT A-Z : KEY OFF : CLS
110 ESC$=CHR$(27) : Q$=CHR$(34) : SEM$=CHR$(59) : P$=CHR$(112)
120 PRINT "This program creates a .COM file to redefine DOS function keys"
130 LOCATE 4,1
140 INPUT "Enter a name for the new .COM file: ",FS
150 IF FS="" THEN END
160 NAMS=FS+".com"
170 '
180 LOCATE 6,1
190 PRINT "Enter the characters for each key (press END when done):"
200 FOR K=1 TO 10
210 LOCATE 7+K,1
220 PRINT "F" + MID$(STR$(K),2) + ": ";
230 GOSUB 440 : FKEY$(K)=X$
240 NEXT
250 '
260 OPEN NAMS FOR OUTPUT AS #1
270 FOR I=1 TO 19:READ Z:PRINT #1,CHR$(Z);:NEXT
280 DATA 190,19,1,180,2,138,20,128,250,0
290 DATA 116,5,205,33,70,235,244,205,32
300 '
310 FOR K=1 TO 10
320 DF$="" + SEM$ + MID$(STR$(58+K),2)
330 PRINT #1,ESC$ + "[" + DF$;
340 IF FKEY$(K) > "" THEN 370 'if no definition,
350 PRINT #1,SEM$ + DF$ + P$; 'reset key to normal
360 GOTO 380
370 PRINT #1,SEM$ + Q$ + FKEY$(K) + Q$ + P$; 'output a definition
380 NEXT
390 PRINT #1,CHR$(0); 'this marks the end of the definitions
400 CLOSE
410 LOCATE 22,1:PRINT "File ";NAMS;" now contains those key definitions."
420 END
430 '
440 X$="" : X2$="" : R=CSRLIN : C=POS(0)
450 LOCATE R,C,1 : PRINT X2$;
460 Z$=INKEY$ : IF Z$="" THEN 460
470 Z2$=Z$
480 IF LEN(Z2$)=1 THEN 520
490 IF ASC(MID$(Z2$,2))=79 THEN RETURN 'test for END key
500 BEEP : GOTO 450
510 '
520 IF Z$=CHR$(8) THEN 600 'backspace
530 IF Z$=CHR$(10) THEN Z2$=CHR$(25)
540 IF Z$=CHR$(13) THEN Z2$=CHR$(127)
550 '
560 X$=X$+Z$ 'add a character to a definition
570 X2$=X2$+Z2$
580 GOTO 450
590 '
600 IF X$="" THEN 450 'remove last char. if backspace pressed
610 X$=LEFT$(X$,LEN(X$)-1)
620 X2$=LEFT$(X2$,LEN(X2$)-1)
630 LOCATE R,POS(0)-1 : PRINT " ";
640 GOTO 450

```

DEFKEY.BAS: BASIC program to create key redefinition programs

(continues)

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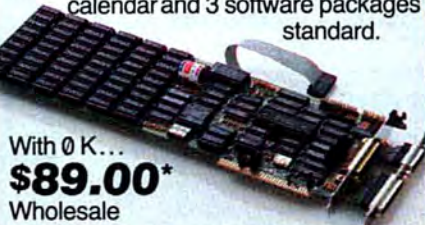
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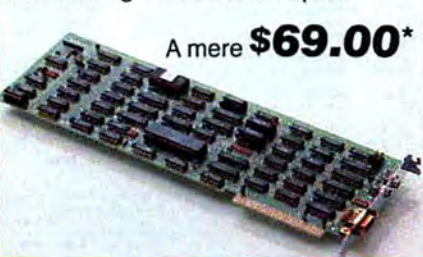
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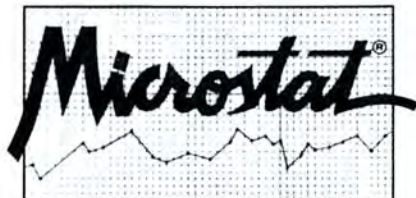
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Circle 493 on reader service card

A Key Program

While looking through back issues of *PC World*, I came across two items about redefining function keys in DOS: "ANSI.SYS Key Reassignment" [*,*, *PCW*, June 1984] and "Key Reassignments With DEBUG" [*,*, *PCW*, Vol. 2, No. 13]. I found the techniques so useful that I wrote the program DEFKEY.BAS to create my own key redefinition programs.

Use BASIC to load and run the program. At the first prompt, enter a file name for the key redefinition program you want to create. Enter only the first 8 characters; DEFKEY will automatically add the .COM extension. Next, you will be prompted to type the characters you wish to assign to each key. Most keys, including <Enter>, will become part of the definition. If you make a mistake, press the <Backspace> key. If you don't type anything, the key will assume its default status.

When you have finished a definition, press the <End> key. After you've entered definitions for all ten function keys, DEFKEY will create a program using the name you specified. Type that name at the DOS prompt to install your definitions.

Thomas Poff
Campbellsville, Kentucky

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The extra money might be going toward flashier advertising, snazzier packaging or simply higher profits.

But the extra money in a higher price isn't buying better quality.

All of the good manufacturers put out a good diskette. Period.

How to cut diskette prices ...without cutting quality.

Now this discovery posed a dilemma: how to cut the price of diskettes without lowering the quality.

There are about 85 companies claiming to be "diskette" manufacturers.

Trouble is, most of them aren't manufacturers.

Rather they are fabricators or marketers, taking other company's components, possibly doing one or more steps of the processing themselves and pasting their labels on the finished product.

The new IBM diskettes, for example, are one of these. So are IBM 5 1/4" diskettes. Same for DYSAN, Polaroid and many, many other familiar diskette brand names. Each of these diskettes is manufactured in whole or in part by another company!

So, we decided to act just like the big guys. That's how we would cut diskette prices...without lowering the quality.

We would go out and find smaller companies to manufacture a diskette to our specifications...specifications which are higher than most...and simply create our own "name brand" diskette.

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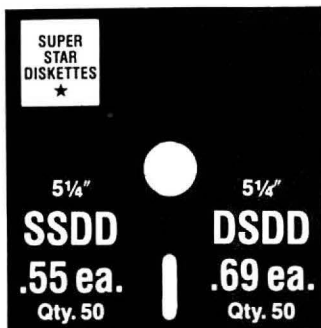
In other words, they're garbage...stuff that six months ago, no self-respecting manufacturer would have sold.

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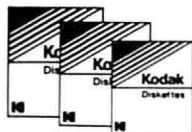
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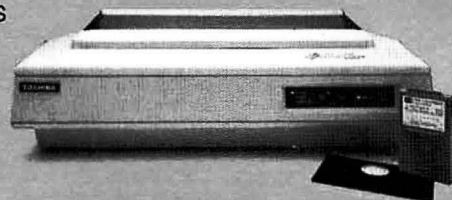
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TOSHIBA AMERICA, INC., Information Systems Division

Circle 285 on reader service card



- * This menu uses function keys without changing their definitions
- * When the WAIT TO statement is active the function keys return
- * ASCII values from 246 to 255. Since 255 is a null character
- * it must be handled differently than the others, as shown by
- * the last item in the CASE statement below

```
DO WHILE 1=1
  CLEAR
  * (Use @SAY statements to display a menu more quickly)
  TEXT
      **** SAMPLE MENU ****

      [F1]    Whatever

      [F2]    Etc.

  ENDTXT
  WAIT '      Press a Function Key:  ' TO action
  DO CASE
    CASE ASC(action) = 254
      ? "F2"
    CASE ASC(action) = 253
      ? "F3"
    CASE ASC(action) = 252
      ? "F4"
    CASE ASC(action) = 251
      ? "F5"
    CASE ASC(action) = 250
      ? "F6"
    CASE ASC(action) = 249
      ? "F7"
    CASE ASC(action) = 248
      ? "F8"
    CASE ASC(action) = 247
      ? "F9"
    CASE ASC(action) = 246
      ? "F10"
    CASE action = ''
      ? "F1"
  ENDCASE
  WAIT
ENDDO
```

DKEYDEMO.PRG: Demonstration of dBASE III function keys

a \$3.99 Joystick Extension Cable from Radio Shack, part number 276-1978.

*Keith Thibodeaux
Baton Rouge, Louisiana*

More on dBASE III Function Keys

I agree with Lyle Rich regarding the usefulness of setting function keys in *dBASE III* as he described in "dBASE III Function Keys"

[*.*, PCW, September 1985]. I use a shortcut that does not require changing the key definitions. When the WAIT TO statement is active, the function keys will return ASCII values 246 through 255.

The program DKEYDEMO.PRG demonstrates how those key codes can be handled by a *dBASE III* application. The demonstration merely displays the name of the function key you press. An actual application would most likely execute a DO statement instead.

(continues)

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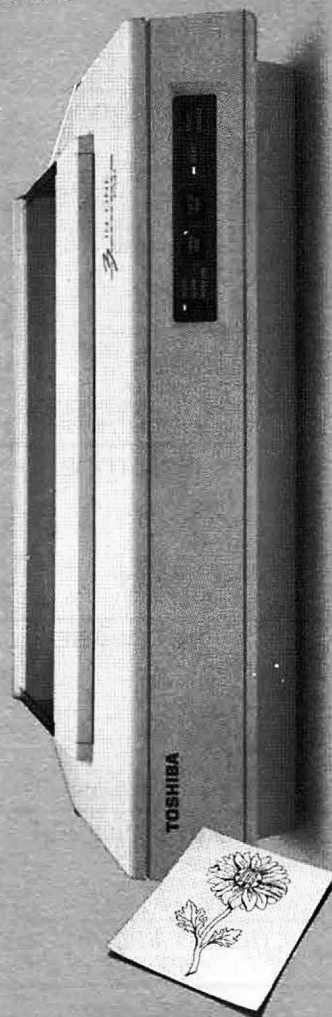
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Interchangeability: Our parallel and serial interfaces make the 3-in-One series compatible with all micros. Today — and tomorrow.



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Circle 285 on reader service card

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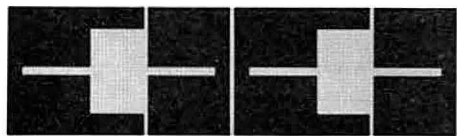
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1010 DATA 1,EB,51,43,75,72,72,65,6E,74,20,61,74,74,72,69,62,-1,F1
1020 DATA 2,75,74,65,20,69,73,3A,20,20,20,0D,0A,24,55,6E,61,-1,86
1030 DATA 3,62,6C,65,20,74,6F,20,72,65,61,64,20,6F,72,20,63,-1,23
1040 DATA 4,68,61,6E,67,65,20,61,74,74,72,69,62,75,74,65,0D,-1,66
1050 DATA 5,0A,24,00,30,31,32,33,34,35,36,37,38,39,41,42,43,-1,4E
1060 DATA 6,44,45,46,1E,29,C9,51,BF,82,00,8A,4D,FE,FE,C9,78,-1,80
1070 DATA 7,70,80,2F,F2,AE,75,2C,83,F9,02,75,65,C6,45,FF,00,-1,DC
1080 DATA 8,E8,68,00,72,5C,88,DF,47,E8,60,00,72,54,B1,04,D2,-1,73
1090 DATA 9,E7,00,FB,28,ED,88,D9,B8,01,43,BA,82,00,CD,21,72,-1,61
1100 DATA 10,40,C3,41,BF,82,00,29,C9,8A,4D,FE,01,CF,C6,45,FF,-1,24
1110 DATA 11,00,29,C9,B8,00,43,BA,82,00,CD,21,72,24,88,0E,42,-1,E8
1120 DATA 12,01,B1,04,B4,00,A0,42,01,D3,E8,BB,43,01,D7,A2,18,-1,AA
1130 DATA 13,01,A0,42,01,D3,E0,D2,E8,D7,A2,19,01,BA,02,01,EB,-1,8A
1140 DATA 14,03,BA,1D,01,0E,1F,B4,09,CD,21,C3,8A,1D,80,EB,30,-1,0D
1150 DATA 15,7C,0F,80,FB,09,7E,08,80,EB,07,80,FB,0F,7F,02,F8,-1,3F
1160 DATA 16,C3,F9,C3,-1,8D,-1

```

CHMOD.DAT: Add these lines to X-MAKER.BAS to create CHMOD.COM.

A second, unrelated technique involves eliminating the CASE statement entirely; instead, use the SET FUNCTION statement to define each key with "DO program-name;" (the semicolon will appear as the <Enter> key when the statement executes). Your menu program can ACCEPT the user's response to a variable, then execute that variable using the dBASE III & variable name macro feature.

John Schroeder
Midland, Michigan

CHMOD Revisited

I've written an enhanced version of the program CHMOD.COM by William Burlingame [*, PCW, Vol. 2, No. 6]. My version enables you to read (as well as change) the current value of a file's attribute byte.

Add the lines in CHMOD.DAT to the X-MAKER.BAS program to create CHMOD.COM. To use

it, type **CHMOD filename [/mode]**. If you omit the /mode parameter, the program will display the current value of the file's attribute byte. If you do specify a valid hexadecimal /mode parameter, CHMOD will set the file's attribute byte to that value. A list of hexadecimal

Table 1: File attribute values

Hexadecimal value	File attribute
01	Read only
02	Hidden
04	System
08	Volume label
10	Subdirectory
20	Archive bit

(continues)



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file attribute values is shown in Table 1. Note that you can add values to create a combined effect; for example, an attribute byte of 07 indicates a file is Read Only, Hidden, and System.

David Drosselmeyer

Oklahoma City, Oklahoma

Editor's note: CHMOD accepts only a two-digit attribute parameter—for example, /07, not /7. Be careful not to change the attributes of subdirectories; DOS may not let you set them back to their original values.

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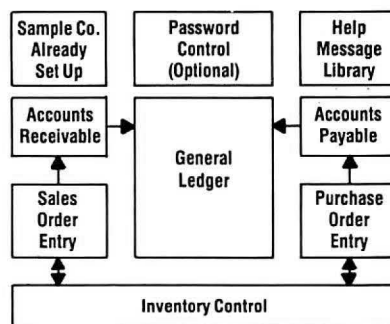
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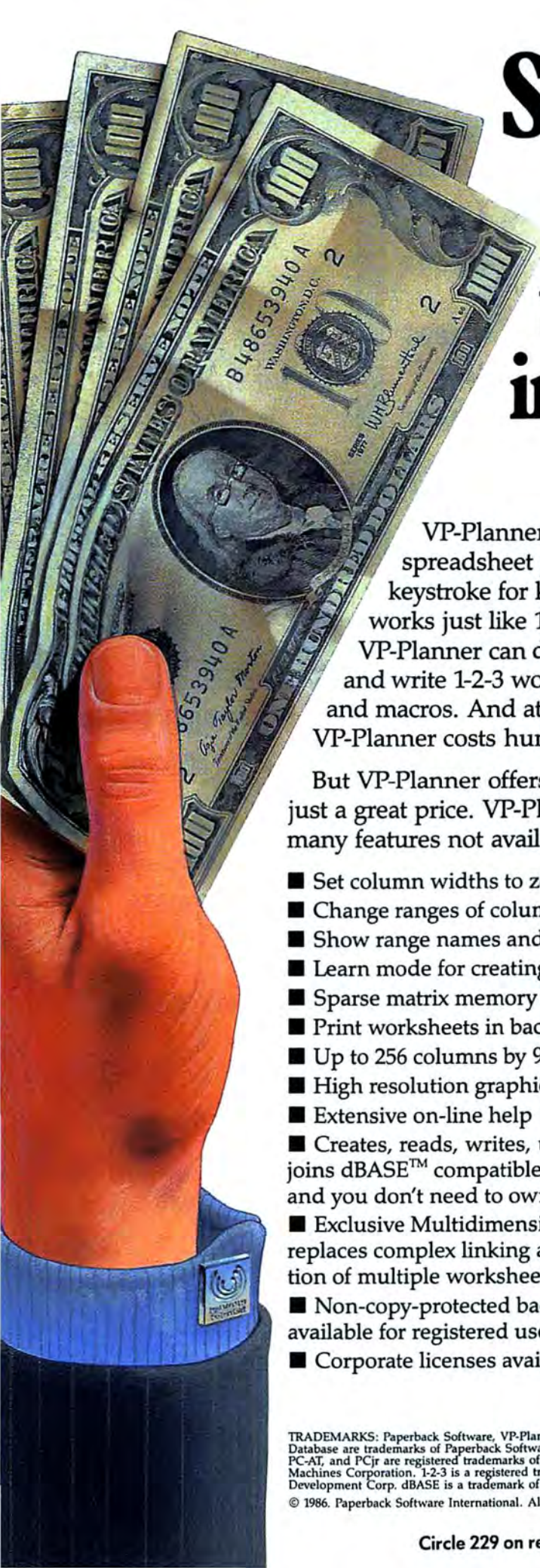
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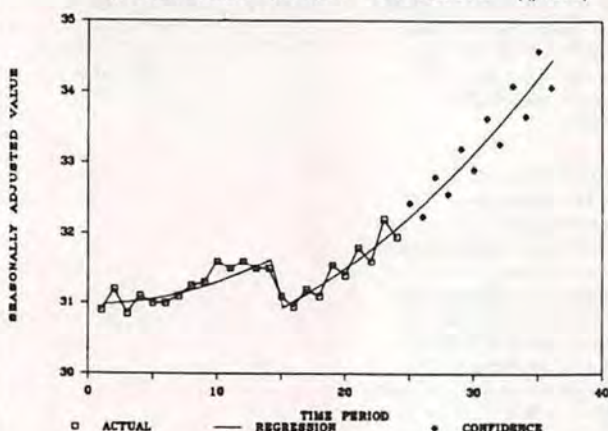
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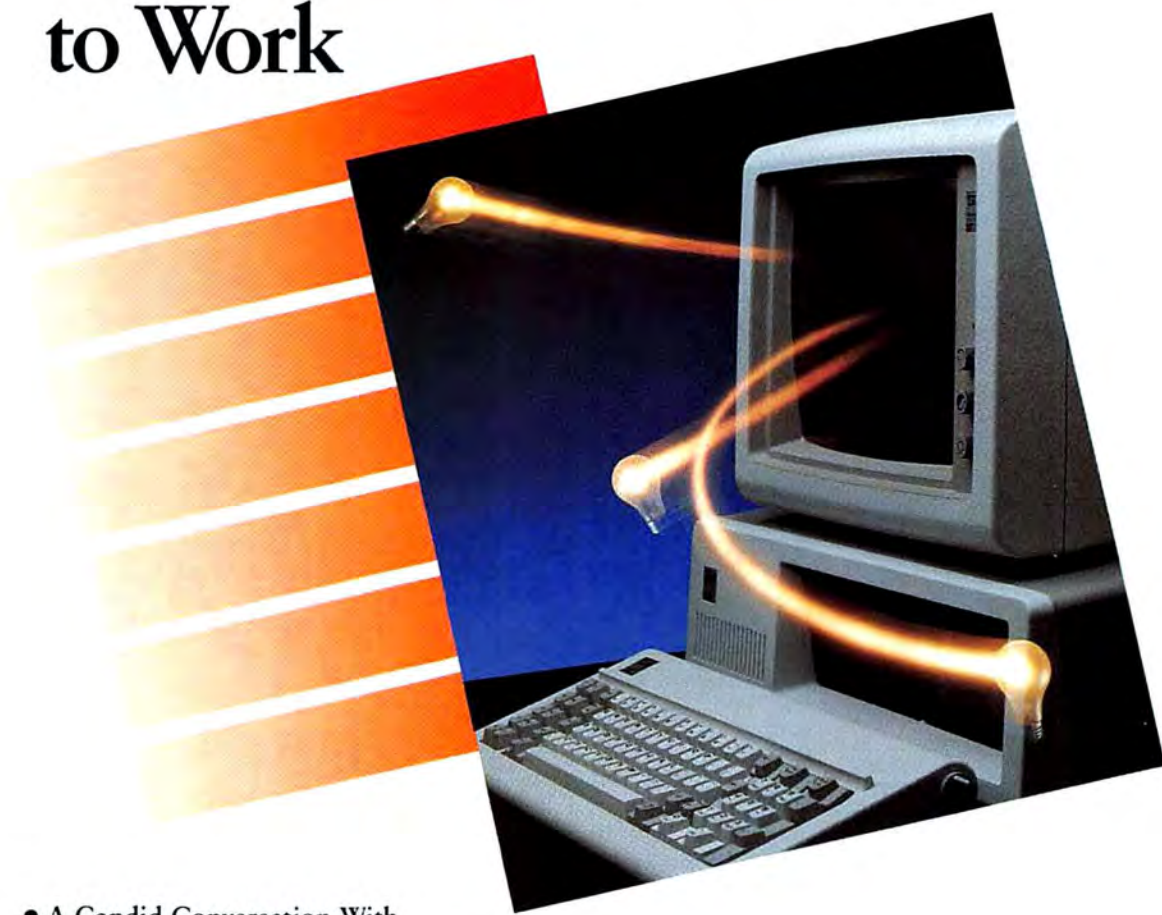
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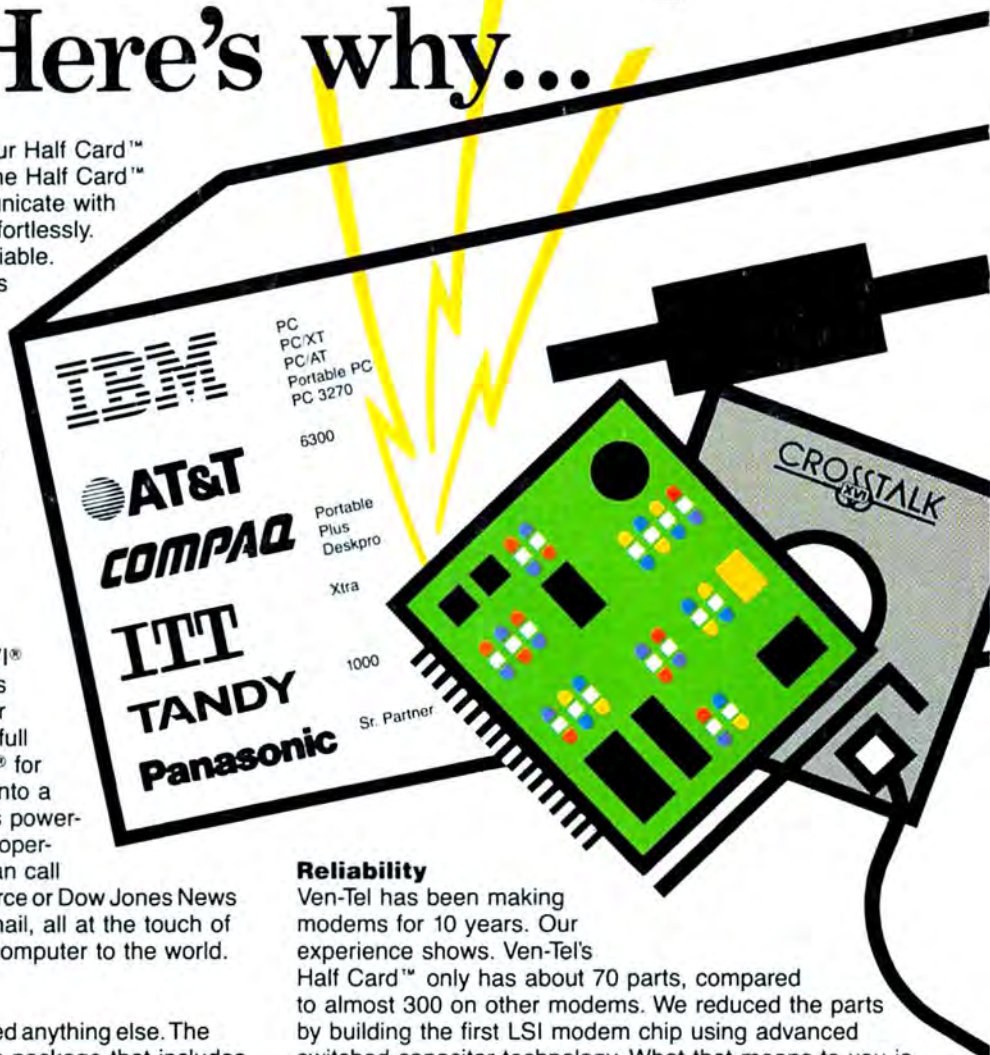
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