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PC WORLD

September 1984
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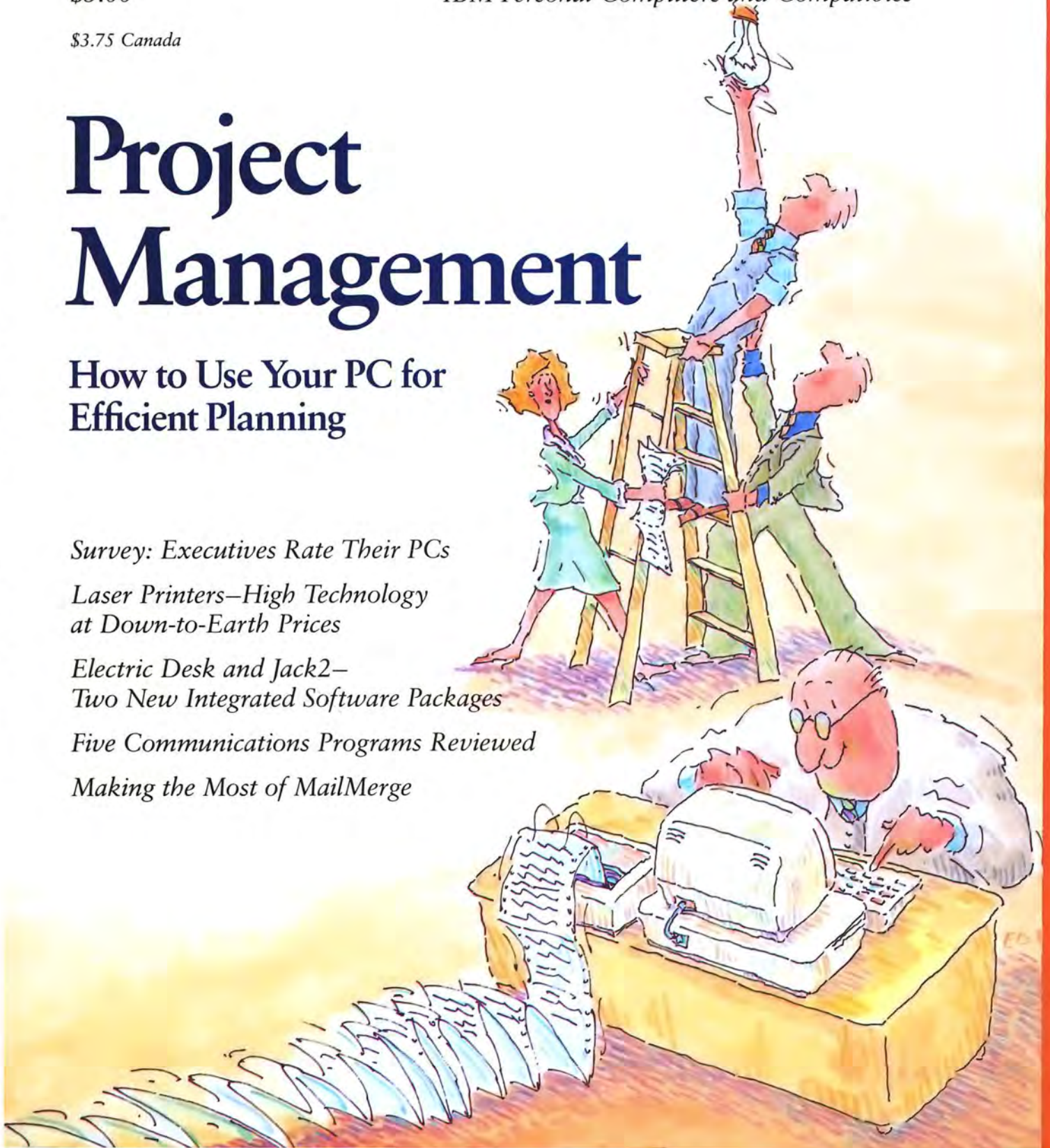
The Comprehensive Guide to IBM Personal Computers and Compatibles

Project Management

How to Use Your PC for Efficient Planning



Survey: Executives Rate Their PCs

Laser Printers–High Technology at Down-to-Earth Prices

Electric Desk and Jack2– Two New Integrated Software Packages

Five Communications Programs Reviewed

Making the Most of MailMerge

PC WORLD

Volume 2, Number 10

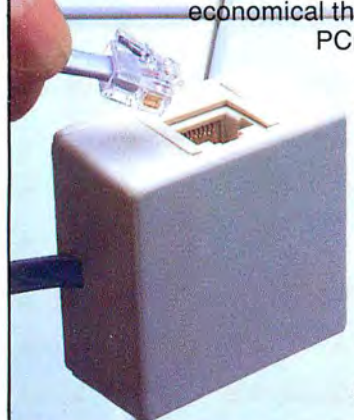
Project Management

Introducing AST-PCnet II.

Now PC networking is as easy as plugging-in your phone.

The advantages of Local Area Networks (LANs) are well known. Existing personal computers can be tied together to share information and expensive peripherals such as disks and printers.

Now AST makes networking easier and more economical than ever before. With AST-PCnet II, you simply insert the PCnet II board into an I/O slot in your IBM PC or XT. Then connect the PCnet II "twisted-pair" cable to the main network cable using a standard modular "telephone jack."



The same kind of jack that's used on your telephone. To move your PC from one point to another on the network, simply plug in at the desired location. It's that easy.

With AST-PCnet II, anywhere from 2 to 160 PCs can be interconnected. Standard PC-DOS commands are used to access remote drives and printers. And dedicated file and print servers are not required, because shared PCs also function as standard workstations.

We're AST, the world's leader in communications and enhancement products for the IBM PC. To find out how AST-PCnet II can expand your IBM PCs and XTs into a reliable, versatile LAN, call or write AST Research, 2121 Alton Avenue, Irvine, California 92714. (714) 863-1333. TWX: 753699ASTR UR

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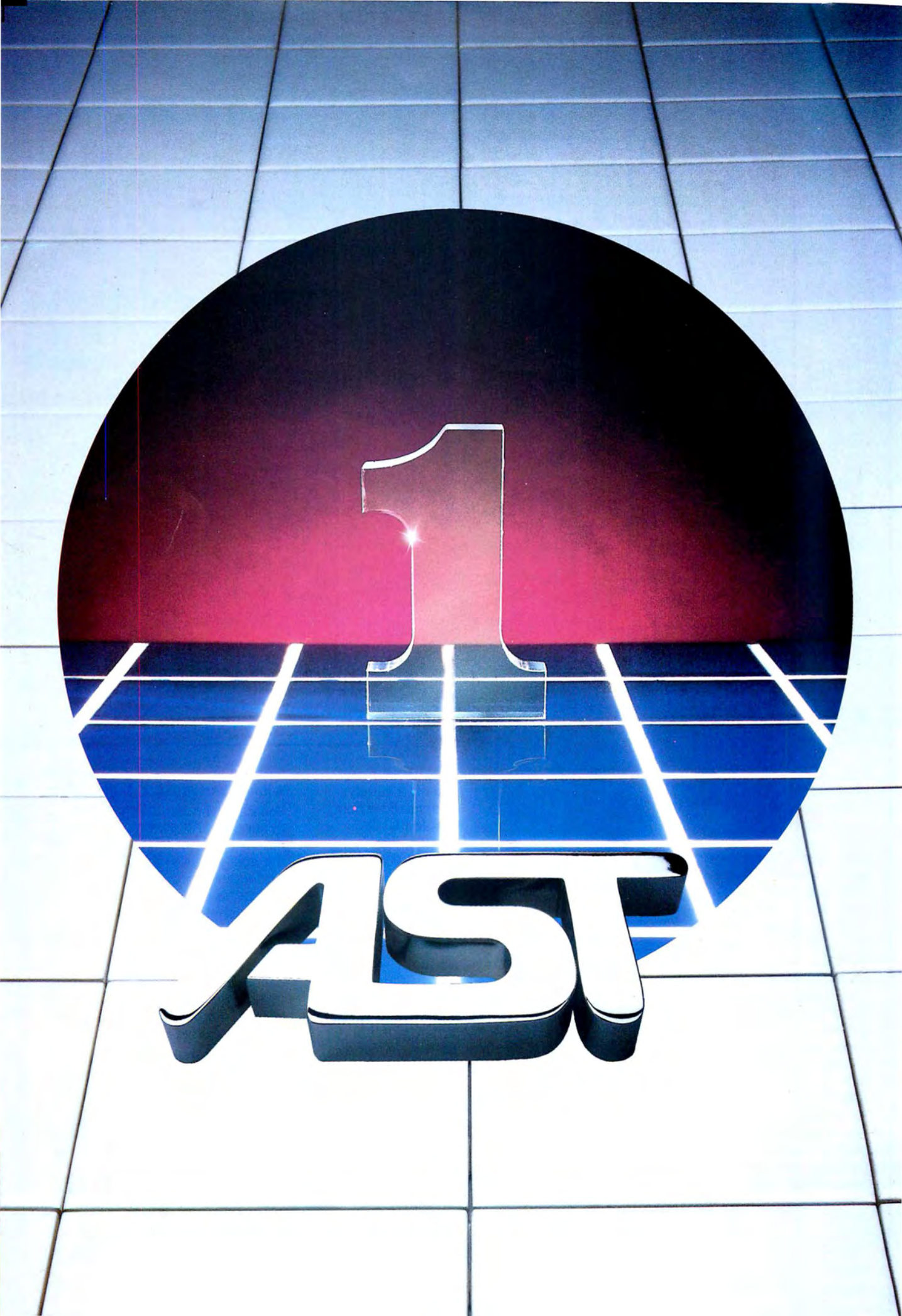
AST-PCnet II Local Area Network


1
AST

Now You Can Use Your IBM PCs as Smarter Smart Terminals in the IBM3270 World.

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What's more, our AST-BSC package lets you work in a 3270 BSC environment and still migrate to 3270 SNA/SDLC without hardware upgrades. Another way to save money and aggravation.

Still, there's more. For example, if you have an IBM 3274/3276 Cluster Controller, our coaxial connection hardware is your answer. Once installed (via coax-A), it lets your PC retain its stand-alone processing capabilities and emulate a 3278/9 terminal. With no performance degradation!

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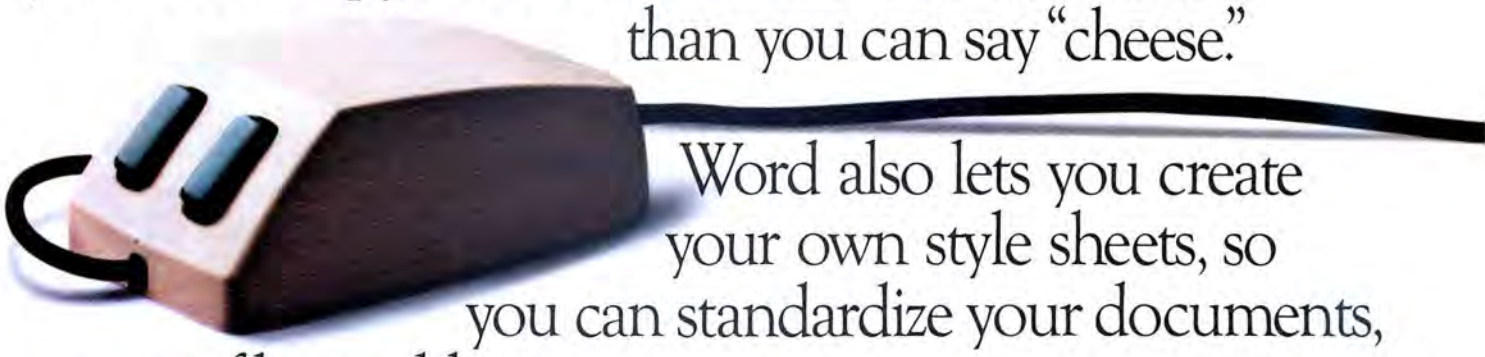

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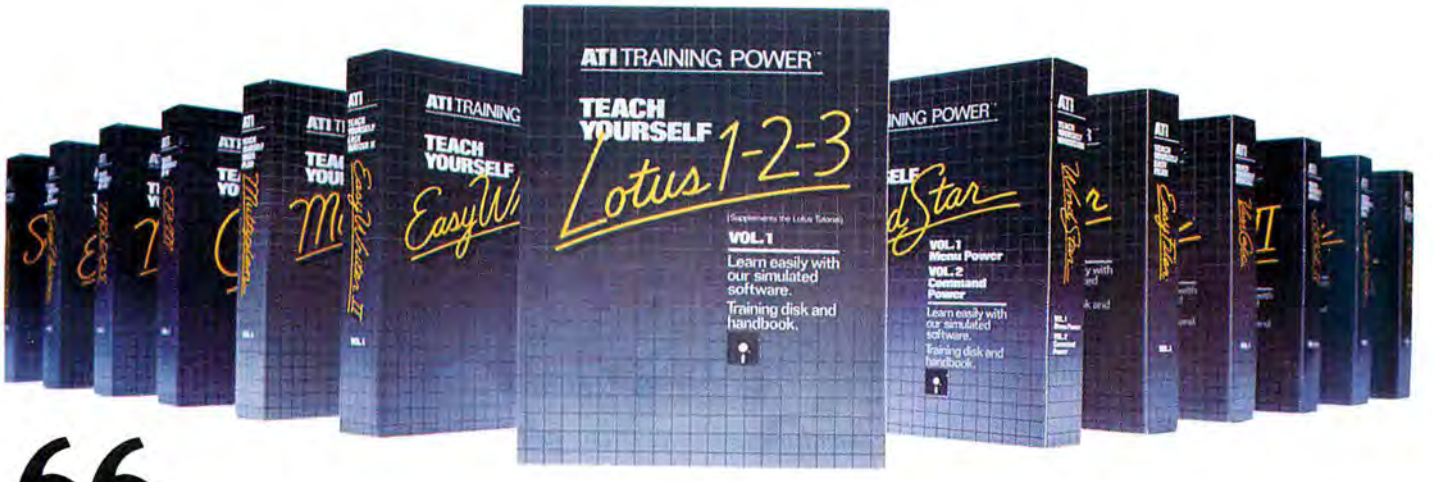

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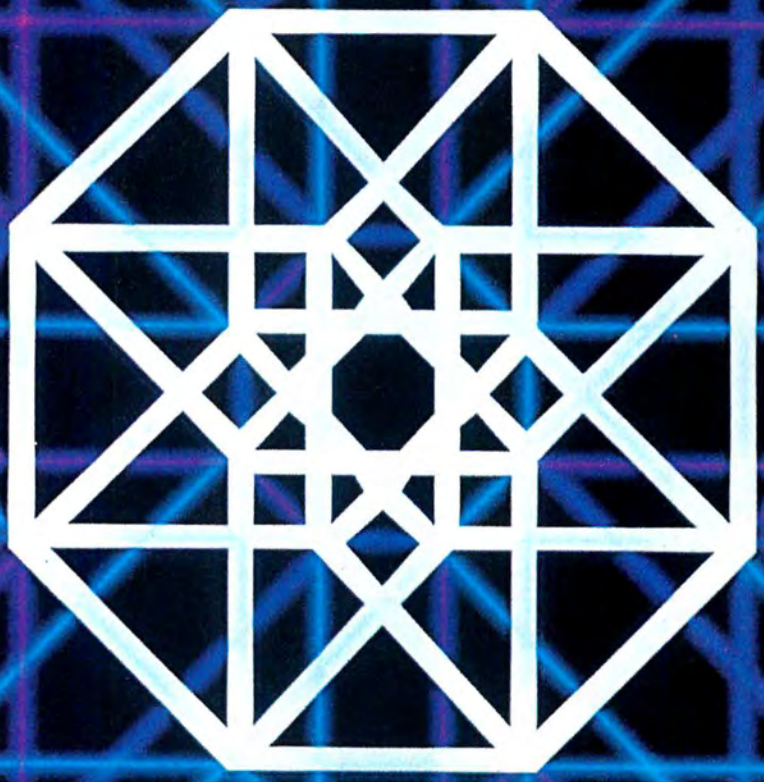

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Circle 6 on reader service card

David Bunnell

Can the Jr Be Saved?

Remember when they said that the PCjr would do for home computers what the PC did for personal computers? They don't say that kind of thing about the Jr anymore. And unless it is rescued soon, the PCjr could become the thorn in the side of IBM's personal computer strategy.

A year ago IBM had the rest of the personal computer industry running scared. Rumors and speculative articles about IBM's impending new home computer—code named "Peanut"—were rampant and so awe-inspiring that other home computer manufacturers lowered their prices and cut back on their production plans.

But it's apparent that the PCjr doesn't live up to the industry's expectations for IBM's entry into home computer manufacturing. Industry analysts who were once saying IBM would deliver up to 500,000 PCjrs in 1984 have revised their figures to as low as 100,000 units this year. Once the talk of the town, the PCjr has now become the butt of industry jokes, and in the process IBM has lost some esteem as well as a few points on Wall Street. One quip going around a recent personal computer trade show was that "the company that brought you the PC and

the PC XT has now brought you the PCjr." Could it be that in the lightning pace of the personal computer industry Big Blue has stubbed its toe and is going into a permanent decline? I wouldn't bet on it, but the damage has been serious.

I am certain that publishers who rushed to get PCjr books and magazines on the market have taken a bath. Many publishers spent millions of dollars in order to ensure their participation in what was certain to be a runaway success. The bottom of this early PCjr market was signaled when B. Dalton Booksellers and Waldenbooks simply stopped carrying PCjr books—an effective turn of the screw against the Jr. Perhaps never again will the publishing industry gear up to initially support an IBM personal computer with books and magazines like it did for the Jr. And the same can surely be said for the software industry.

Clearly, it's now or never. If IBM hasn't changed the Jr by the time this column appears in print, then it had better be hustling to do so. The recent price reduction and promises of enhancements show that IBM is aware of the shortcomings, but the time element is still crucial. What is at stake is the momentum IBM established in the personal computer marketplace with its PC. Big Blue must show that it listens to the marketplace and that it cares about what it hears. Without the public perception that IBM personal computers are innovative and easy to use, the three magic letters will tarnish. This is particularly true in the consumer market, dominated as it is by familiar brand names like Sony, RCA, and Panasonic.

When IBM recently lowered the price of the PCjr, they redressed one of the major obstacles to the Jr's success, but in my estimation there are still two equally important obstacles remaining. The first involves the product itself, which needs signifi-

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David Bunnell

cant enhancements. The other involves marketing and deals with a tactic for selling the product called "positioning."

From my personal computing friends I have received a variety of wish lists for the PCjr, all of which start off with the same thing—a new keyboard. If IBM plans to polish up the Jr's keyboard, hopefully the Chiclets-style keys will be relegated forever to the trash can of personal computer history.

Beyond that, additional memory and a second disk drive are desirable. Adding an optional mouse to the Jr would also be good, if for no other reason than to standardize these little critters. (Microsoft, VisiCorp, and Mouse Systems each offer a mouse for the PC.)

If you could get a PCjr with one drive (expandable to two), 128K of memory (expandable to 512K), and a PC-style keyboard for under $1000, you'd see a Jr comeback that would once again make IBM the darling of personal computer aficionados. To be truly successful a mass-market computer must offer real utility for under $1000. A computer without a disk drive, such as the basic Jr, cannot offer that utility and should be sold at a greatly reduced price—under $400.

Assuming we can get a PCjr with all those features at an aggressive price, we move on to the last and most difficult challenge: proper positioning in the market. The idea of a home computer is out of sync with IBM's image. IBM means office. The IBM PC means business computing. And the IBM PCjr is not just a home computer and should never have been positioned as such. Rather, it is an extension of a business computer.

The PCjr is a personal computer. A home computer is something like an Atari or a Commodore. That is, for the most part home computers are computer literacy tools with little true utility. Like its big brother, however, the PCjr can do lots of productive things, including telecommunications, word processing, and filing.

The PCjr should be aimed at the millions of people who need a personal computer for business applications but can't really afford a full-blown PC or XT. According to the U.S. Chamber of Commerce, there are 16 million businesses in the United States with 20 or fewer employees. Many of these businesses are in homes, and many are in small offices with one to five people. Most of the people in these businesses need personal computers, and an enhanced PCjr could hit that market right in the bull's-eye.

The other big market for the PCjr should be education. As in business applications, computers can be used in schools to improve productivity and the quality of work as well as to allow students to explore new tasks.

Some software publishers have come out with really good programs for the PCjr that they hope will generate a burst of PCjr sales. One example is Chang Laboratories, with its *Rags to Riches* accounting software for the Jr. The program so simplifies the process of "keeping the books" that this activity might even become fun. To point out the Jr's potential, the company held a "Save the Junior" breakfast at a recent computer trade show.

Properly resurrected, the PCjr could still be one of the most significant personal computers in PC history. And if any company can pull off such a coup, it's IBM.

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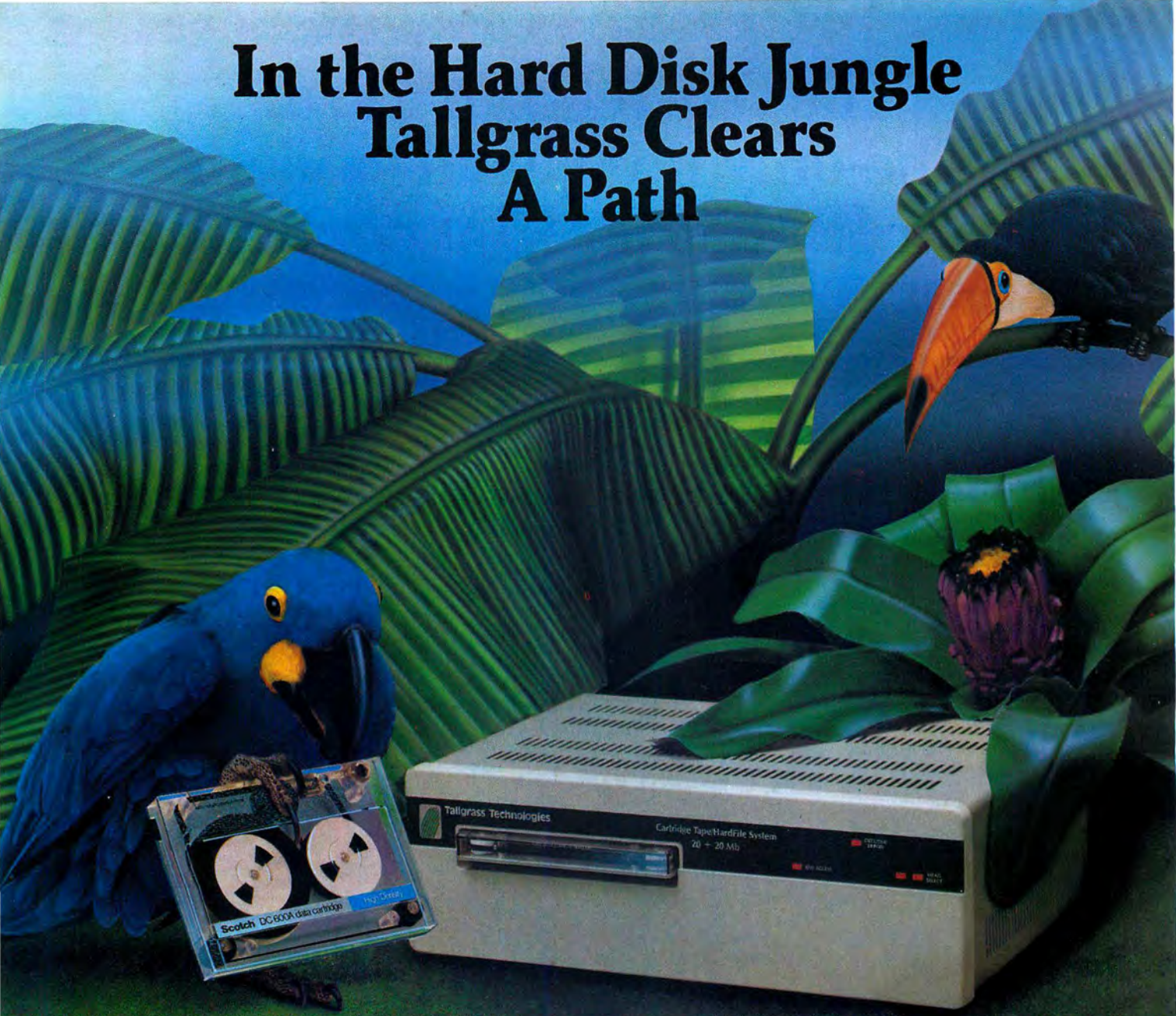

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Letters

More Tax Tips

I would like to thank you and Ralph Soucie for his very enlightening article on personal computers and the IRS ["Can Your PC Survive a Tax Audit?" *PCW,* Vol. 2, No. 6]. The "daily usage log" is certainly a revelation, but on reflection it seems to be a prerequisite of any properly run business. After all, how else would one determine billings and profits?

I have a suggestion, however: Mr. Soucie recommends keeping this log on disk, but I would suggest keeping a handwritten log in an accounting journal as the primary document and periodically updating a disk-based copy (ideally integrated into the user's accounting data base system). The handwritten log accomplishes two things: first, it protects you from data loss, and second, it is unquestionably a "contemporaneous" log. One can always print out a nice clean copy from disk, but if ever there is doubt, or should all copies of the disk log be wiped out, the original, handwritten log is there for all to see.

An additional cautionary note: Mr. Soucie mentions proper homeowner's insurance to cover a system; be aware that most homeowner's insurance policies do not cover equipment used to conduct business, in the home or elsewhere, whether one is self-employed or otherwise. The information one so carefully maintains to prove to the IRS that a computer is used for business purposes may also prove to the insurance company that the computer is not eligible for coverage.

There are special policies designed to cover such equipment, and these days there are even some companies that do nothing but insure personal computers used for business. Such insurance can be another point to help provide credibility when it comes time to prove to the IRS that the computer is a business machine.

Steve Branam
Dallas, Texas

Not Buying It

B. L. Olmstead's *REMark* about the inevitable proliferation of electronic communications [*PCW,* Vol. 2, No. 5] reminds me of the supersonic blimp. The SSB is an idea that will provide the ultimate in low-cost, high-speed transportation—once a few minor technical problems are solved.

My vision of the future still includes creative personal interactions that cannot be quantified in a digital data stream.

Paul S. Schmitt
Corning, New York

The Other Side of Piracy

For over a year I have been fascinated with the discussion that has been raging over software piracy. My fascination centers on the fact that most people who address the issue seldom, if ever, reflect upon the reasons why people pirate software.

As a clergyman and former systems analyst/programmer, I have a different view of the problem and its possible resolution than most people. Being in the people business has taught me that most people respond to the way they are treated. For the most part those who buy software today are being victimized by the inadequate documentation, poor performance, misleading claims, and inflated prices of the software manufacturers and vendors. Coupled with ludicrous licensing agreements in which software companies protect their rights while absolving themselves of all responsibility, is it any wonder that people respond with dishonesty?

Having served as a consultant for the past couple of years, I have firsthand knowledge of the difficulties that end users have in using the software they were assured was "so simple and easy to use." Indeed, I make very nice spending money getting end users up and running. (I want to pause here and thank Ashton-Tate's *dBASE II* for my new living room furniture.)

Perhaps the biggest gripe users have against software companies is the prices they charge. Three to five hundred dollars for a word processing program that some people get free with their computer? Come on; you and I both know that a junior programmer let loose for a couple of months could write a word processing program. I'm not buying that hooey about support costs either. Have you ever tried to get really detailed support from a software manufacturer? Don't.

There is a solution to the software piracy problem. Companies should recognize that some people will always be dishonest but that the vast majority are honest and would never consider misusing a trust if they were treated with respect and dignity. The way to succeed in the software business is to provide the user with a solid product at a reasonable price and with adequate documentation.

Roland M. Brown III
Baltimore, Maryland

Letters

A Vote for Personal Software Ownership

In David Bunnell's editorial "Innocent Victims of the War Against Software Piracy" [*PCW*, Vol. 2, No. 6] he discussed some of the problems inherent in the "war" against software piracy and asked for a solution. It occurred to me that separate keys for each software program would be the best next step in copy protection.

One method for protecting software, as outlined in the editorial, involves linking a disk to a machine serial number. This method is entrenched in the business world. It is apparently entrenched in the minds of many software publishers as well. It stinks.

I want to own my software tools. What if I buy a new machine, or have a machine at home and at the office, or visit a friend and want to use his or her computer? I'll make every effort to be able to use the tool I bought, wherever I am.

One solution is simple. Use a device similar to a credit card, which would be linked to the original disk by the software manufacturer. The disk would be copyable, but wouldn't work unless its "key" were located in a "lock," which might be built into a machine or added as a peripheral. This lock could be broken (as any code can be broken) by copying the key, but this could be a more flagrant violation of the law and would require new, specialized equipment.

I couldn't believe this idea hadn't occurred to many others, and of course it turns out I was right. One of the recent weeklies reports that Lotus, Microsoft, and some other companies are working to standardize a similar concept.

I want to put my vote in for personal ownership of software tools, including the right to loan or sell the tool to someone else. Any method that compromises this right will soon have to be replaced, in my opinion. (Imagine a computer company trying to restrict the use or resale of its computers.) A unique key for each customer could make the idea of owning software viable.

Brad Schrick
Yorktown, Virginia

Microcom Disagreement

I expected "The Microcom Agreement" [*PCW*, Vol. 2, No. 5] to be an unbiased presentation of the Microcom Networking Protocol (MNP). I also expected your usual fair comparisons with other similar techniques or products. What I found was an article written by a Microcom employee who was touting his company's protocol as a communications standard for the industry.

The article leads the reader to believe that the MNP has been adopted by IBM just because IBM markets Microcom's *Personal Communications Manager*. This is like saying IBM has adopted the accounting methods incorporated in the BPI accounting package.

In contrast, look at Larry Jordan's communications software comparison, "The Communicators" [*PCW*, Vol. 1, No. 5]. This article contains an excellent combination of information and product review.

Jordan's article more correctly identifies the Xmodem protocol as the default standard for error-free PC file transfer. Xmodem is in the public domain and is readily available. It provides all the features of the MNP. The MNP must be licensed for a "nominal fee," while Xmodem is free. What program uses the MNP other than Microcom's *Personal Communications Manager*?

Please, no more slanted articles. I can get product brochures from your advertisers.

Roger S. Danke
Orlando, Florida

Larry Jordan's piece struck you as a better review than "The Microcom Agreement" because the latter isn't a review at all. The "State of the Art" section, in which "The Microcom Agreement" appeared, is where we examine technological developments that look like they will be significant to the PC user community. Often, as with the MNP, a product or technology is so new that it is not available for evaluation by PC World *staff. Rather than waiting months for a full review, we think we serve our readers well by giving them a timely description by the people most familiar with the subject—even if their opinion is admittedly less than objective. Gregory Pearson's connection with Microcom was clearly stated.*

The MNP offers many features unavailable with other PC telecommunications protocols, including Xmodem. As for your question about who uses the MNP besides Microcom, as the article states, the MNP has been adopted by GTE Telenet, MCI, British Telecom, Uninet, Apple, Victor, Tandy, VisiCorp, Lotus, and Dow Jones for starters.—Ed.

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Circle 77 on reader service card

Letters

Disgusted

After reading "The War of the Words" [*PCW*, Vol. 1, No. 8], I purchased *Microsoft Word* with the mouse. I am thoroughly disgusted with the program and especially with its so-called documentation. The manual is an attempt to address two situations (with mouse and without) in one book. In addition, the manual simply ignores many—and I mean many—basic needs of any user.

I am a 50-year-old businessman and have used *WordStar*, *EasyWriter II*, and *Word Perfect* without one-millionth the trouble I am having with *Microsoft Word*. I feel that you should write an addendum to your article explaining to the unwary that this program is supplied with a manual that is nonexistent as far as utility is concerned.

Anthony V. Pace, Jr.
Boca Raton, Florida

We have received a number of letters pointing out what seem to be deficiencies in Burton Alperson's "review" of Microsoft Word. *The fact is that "War of the Words" was not a review of any program, but a comparison of the ease of use of* Microsoft Word, WordStar, *and* VisiWord. *This is why the article did not address the problems in the* Microsoft Word *documentation.*

Obviously, there's more to a good program than the ability to perform basic functions with a minimal number of actions. Efficient operation is important, however, and the reader response to the keystroke-counting test used in "War of the Words" indicates that it was a revealing and worthwhile experiment.

Apparently because Microsoft Word *scored so well on the keystroke tests, many readers saw the article as an endorsement of the program. We apologize for any confusion.—Ed.*

Corona's Complaint

I am writing to take issue with the somewhat misleading format and findings of "The Compatibles Line Up" [*PCW*, Vol. 2, No. 4].

According to the article, some of the machines tested ran all of the software tested except for *Xenocopy*; the Corona ran neither *Xenocopy* nor *Keynote*. I believe that it is misleading for your publication to classify the Corona PC in the 66 percent category on the basis of its having run one less package than those classified as 99.4 percent compatible. The percentages are misleading and do not truly reflect the overall compatibility of our products. At Corona, we are continually testing software packages, and we know that virtually all communications packages that run on the IBM PC will run without modification on the Corona. With the installation of a graphics board (required on both the IBM PC and the Corona) and the proper monitor, we have not found one package that will not run on Corona PCs. We recommend more than 225 packages for our PCs.

Your compatibility test was based on the ability to run certain selected software for the IBM PC. While there was no testing of machines' ability to accept PC expansion boards, the article states that systems in the 66 percent category may have difficulty accepting some boards. The casual reader, who may not remember the criteria for your "informal" test listed ten pages earlier, is left with the impression that this was part of the test and that Corona PCs may have this difficulty.

I'd like to point out that *PC World*'s in-depth review of Corona's desktop and portable PCs ["Corona: For Here or to Go," *PCW*, Vol. 1, No. 7] indicated that the machines come close to attaining your publication's highest level of compatibility and that in order to achieve such a rating they were able to use plug-in circuit boards designed for the IBM PC.

Kenn G. Morris
Director of Corporate Communications, Corona Data Systems
Thousand Oaks, California

Know Your Basic

I like Microsoft MBASIC (on my Kaypro) and BASICA (on my Columbia VP) and have written a number of engineering programs on both, which my company sells. I have successfully used Microsoft's MBASIC Compiler on my Kaypro. I decided to purchase Microsoft's MS-DOS BASIC Compiler for my Columbia VP. Much to my chagrin and ultimate disgust, it is not compatible with the BASIC that was supplied with my Columbia in several crucial areas. It's unusable.

I hope you publish this letter as a warning to other BASIC programmers not to jump on the Microsoft MS-DOS BASIC Compiler bandwagon casually. If you don't know exactly what you are buying, down to the very fine print, the odds are high

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that it will not be compatible with your BASIC Interpreter, in spite of Microsoft's brag about compiler/interpreter compatibility. And you won't get your money back.

Royal Dossett
Excelsior, Minnesota

Microsoft Responds

The BASICA distributed by Columbia Data for the Columbia VP is a version of the Microsoft GW-BASIC Interpreter. This version is a superset of our standard BASIC Interpreter and includes original equipment manufacturer (OEM) specific features such as graphics, sound, communications support, and event trapping support. By purchasing the GW-BASIC Interpreter, Columbia chose to include features not found in our standard Microsoft BASIC Interpreter for MS-DOS.

The BASIC Compiler for MS-DOS Mr. Dossett purchased is the compiler designed to be compatible with the standard Microsoft BASIC Interpreter (often referred to as MBASIC), not the GW-BASIC Interpreter. Since the standard interpreter/compiler must be compatible with all MS-DOS machines, hardware-specific features cannot be implemented. If they were, there would be no way to maintain compatibility across all MS-DOS machines.

The standard Microsoft BASIC Compiler for MS-DOS is compatible with the standard BASIC Interpreter for MS-DOS. Likewise, the GW-BASIC Compiler is compatible with the GW-BASIC Interpreter.

Because BASIC is a vital product that grows and evolves with programmers' needs, we have given the manufacturers the capability of shaping the language around their hardware and their customers' needs. Columbia chose to provide the advanced features of Microsoft's GW-BASIC (BASICA) but chose not to purchase the compatible compiler.

While we are sympathetic with Mr. Dossett, Microsoft makes no claims concerning compatibility between the retail Microsoft BASIC Interpreter/Compiler for MS-DOS and the OEM GW-BASIC Interpreter/Compiler. Our best suggestion in this case is to write the applications in standard Microsoft BASIC for MS-DOS and use the compatible compiler, realizing that some features (e.g., graphics) may have to be sacrificed.

Gregory E. Lobdell
Program Manager-Business Languages, Microsoft Corporation
Bellevue, Washington

Prime Point

Michael Ham's article "Four FORTHs" [*PCW*, Vol. 2, No. 5] is very informative and helpful to someone like me who is considering programming in that language. However, I must take issue with one important aspect of the timing test results of Table 1.

The execution time for the program PRIMES is listed as 25.2 seconds for PC/FORTH compared to 551 seconds for BASIC. Although it is not stated anywhere in the article, it can be inferred from both the timing and the extension .BAS that the BASIC program was run with the BASIC Interpreter.

However, FORTH is run as a compiled program, and a true comparison should be made between FORTH and Compiled BASIC. On my IBM PC the run time for PRIMES decreased from 539 seconds under the BASIC Interpreter to 11 seconds with a module generated by the IBM BASIC Compiler. That's a decrease in time of close to a factor of 50 between the two versions of BASIC and results in a BASIC program that runs more than twice as fast as the program in PC/FORTH, the fastest of the FORTH programs listed.

I realize that there are many considerations in the choice of a programming language, and speed in program execution is only one of them. Nevertheless, execution time is a prime (please excuse the pun) consideration, and in this instance Compiled BASIC appears to have the advantage over FORTH.

Martin E. Knebel
New Milford, New Jersey

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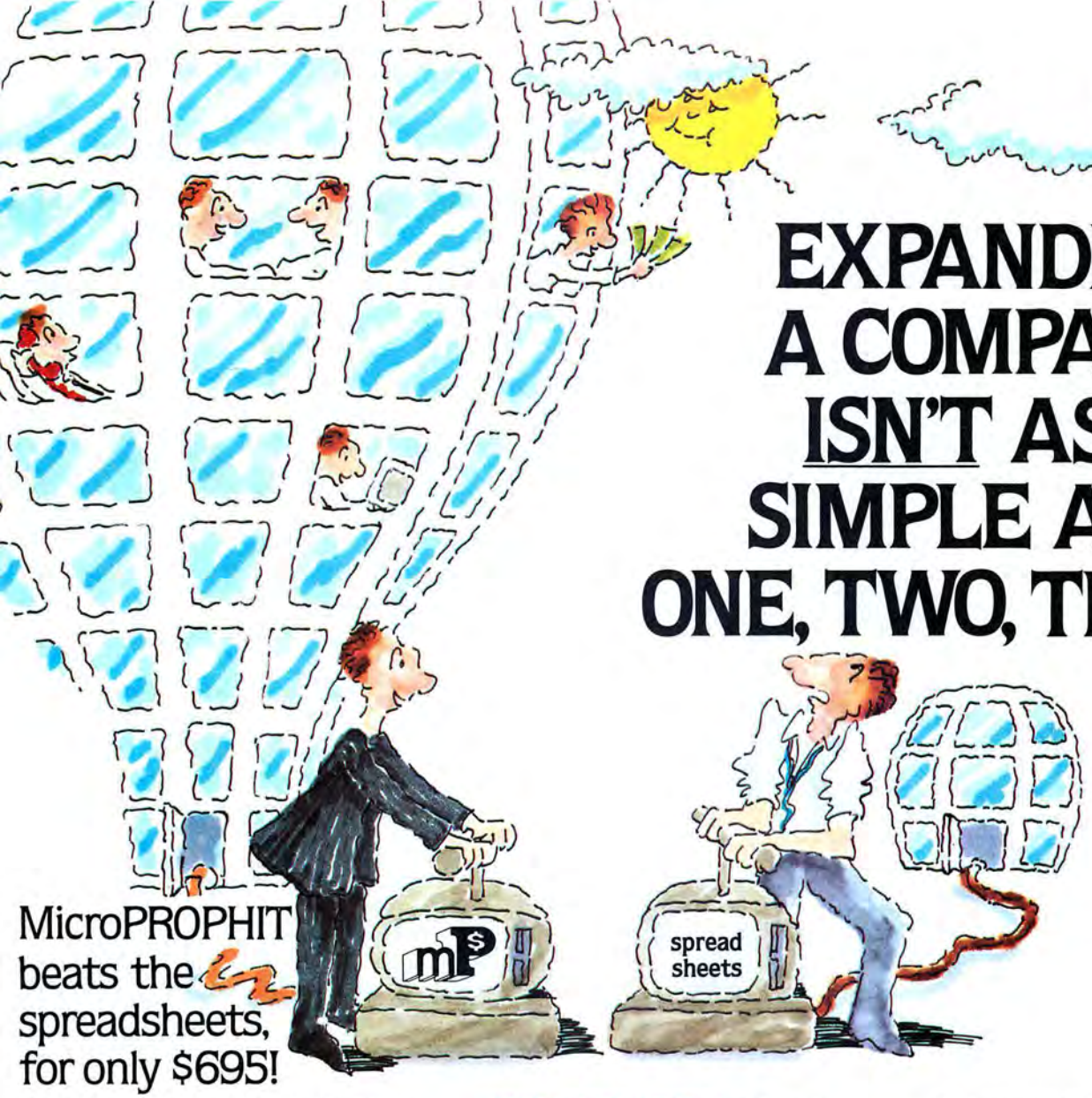

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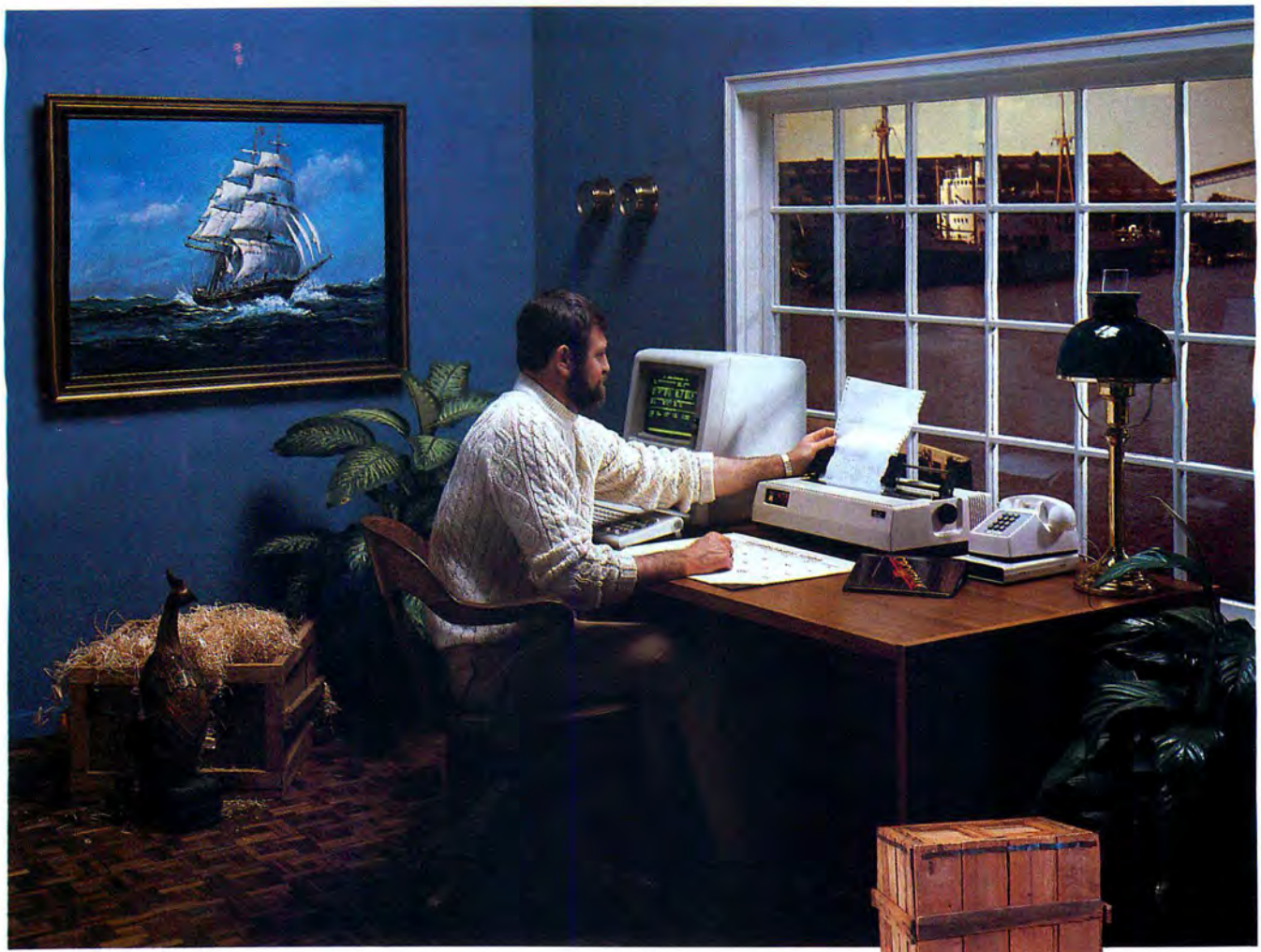

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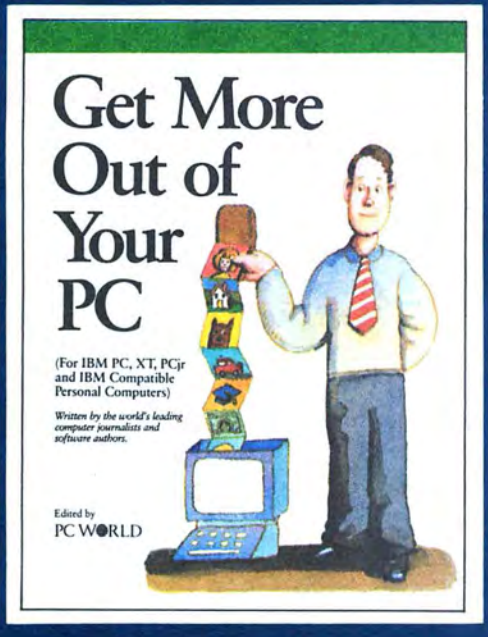

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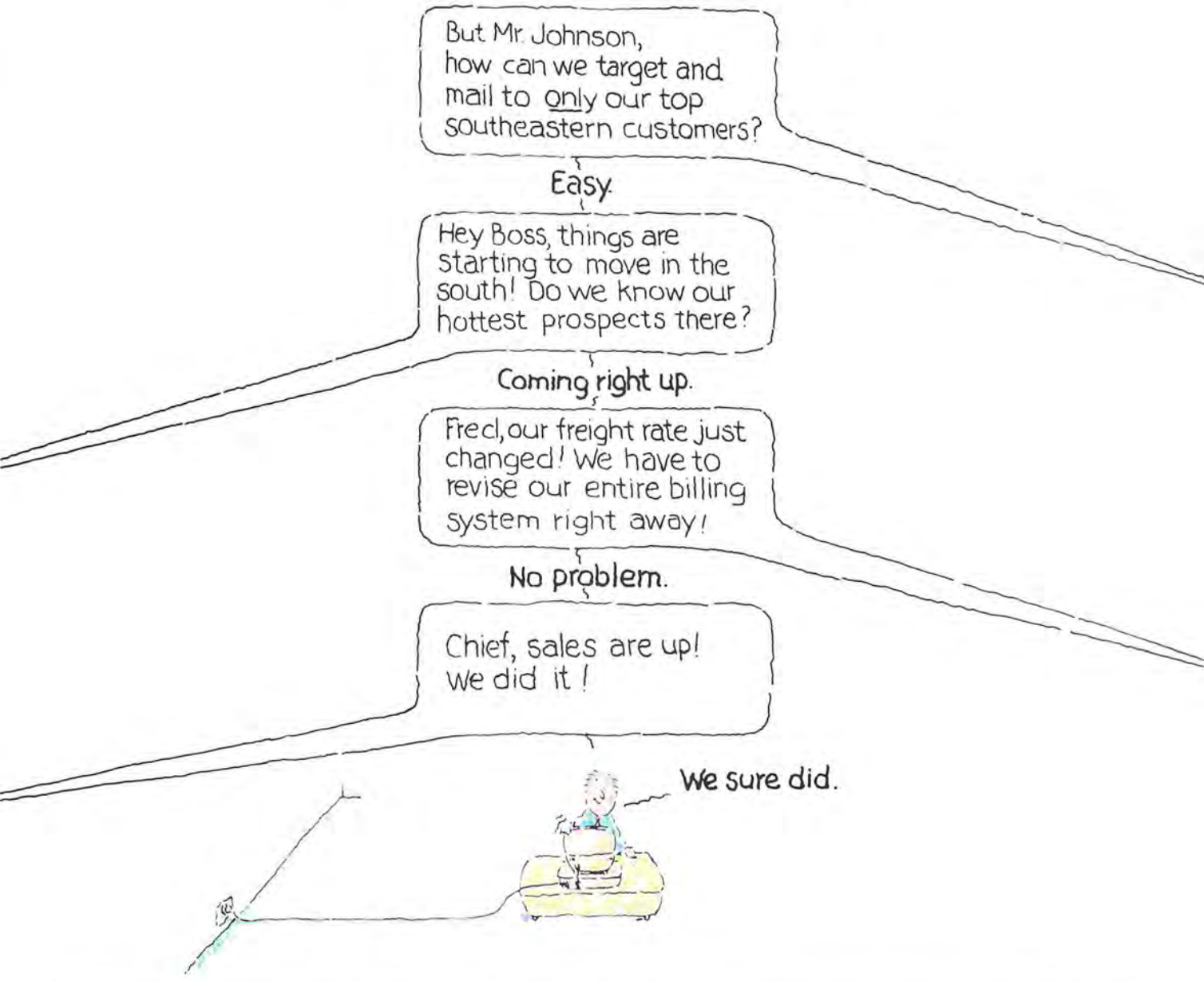

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Circle 382 on reader service card

PC WORLD

Baseball Stats

As baseball managers begin to feel the nip of fall in the air, they turn their attention to the statistics that will make or break their teams come World Series time. According to *Datamation*, a publication for the data processing and information services industry, this year's baseball season found more computers in major league dugouts than ever before. The Chicago White Sox, last year's American League West champions, are the most successful computer owners, *Datamation* claims. The team developed several coaching strategies from printouts. Other *Datamation* findings: San Francisco Giants Manager Frank Robinson relies on computer-generated stats, as does Tommy Lasorda's Dodgers coaching staff in Los Angeles. The Kansas City Royals and the New York Yankees both use computers for scouting activities.

Major league managers aren't the only ones consulting their computers. Another group of managers across the country is also consulting personal computers and the *Sporting News* in their race for the pennant.

These people participate in a new game called statistical baseball. Statistical baseball recognizes no team loyalty; it is a game played completely by the numbers. At the beginning of each season, managers draft or bid for team members from every league team to complete their rosters. The team standings are determined by the players' weekly statistics; for example, a hit is one point and a double is two points; RBIs add extra points, and errors delete points from the totals. A personal computer with a custom-designed program usually keeps the elaborate scoring formulas straight and the game honest. That's probably just as well—it is doubtful that newly elected Baseball Commissioner Peter Ueberroth could make a well-founded ruling for the league.

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

Loose Lips

People in the computer industry say some provocative and illuminating things. We'll print a selection of these statements each month, and we welcome contributions to this gallery of gab.

"It's a great challenge to be part of a group that becomes a successful business starting from zero. I find that in the first meeting or two, or the first couple of hours, you generally hear what they want you to hear. Yet most people like to talk, so you just wait them out. Sooner or later they'll start talking about what they really want to do, what their real philosophy is and how they approach it." *—William Hambrecht, president and cofounder of a San Francisco venture capital and investment banking firm, on working with entrepreneurs and high-tech companies.*

"The information processing industry, which is destined to be the world's largest industry by the year 2000, exists to serve human information processing needs. But very few of those needs involve calculating numbers or storing and retrieving data. Most human work involves knowledge, reasoning, and thought. The market for products and services of this type will be enormously greater than the market for traditional number processing and data processing. Knowledge is power, and the computer is an amplifier of that power. Those nations that master the new knowledge technology will have a cultural and political ascendancy."*—Edward A. Feigenbaum, Stanford professor and author, on the future of computers in society.*

View

News and notes for the computing community

Can 1-2-3 Save the PCjr?

Sputtering sales of the PCjr have led to some drastic measures—and a free 1-2-3 seems to be one of them.

Sales of the PCjr have been underwhelming, as numerous industry pundits have pointed out. IBM is taking measures to remedy this woeful situation, and various software makers are trying to help. Among them is Lotus Development Corporation, which has released a PCjr version of its top-selling *1-2-3*.

Because Lotus is offering the Jr version of *1-2-3* free to owners of the PC version of the program, this newly available software may actually succeed in selling some PCjrs for IBM. Many PC and XT owners may buy the relatively inexpensive Jr as their second machine. The question is, will they be content to use the Chiclet keyboard?

Microsoft is doing its part to help the PCjr as well. That firm recently announced that its new version of *Flight Simulator* operates on all PCs, including the PCjr. The upgrade of *Flight Simulator* features enhanced graphics and RGB monitor support; previously the program displayed color on a composite monitor or television set only.

Computer Supermarkets Are Fizzling

Entrepreneurs in several major cities have established computer supermarkets, anticipating that business buyers and just plain folks would flock to a center where all the major hardware and software could be tested and compared. But manufacturers have been slow to move into the computer marts. Boston's Boscom, the fist high-tech shopping center, is only one-third full two years after its announcement, and it won't open for business until next spring.

New York's Computer Center has filled less than 20 percent of its space, San Francisco's Datamart has leased a mere 5 percent of its space, and the Infomart in Dallas is about half full. Several other proposed marts have been canceled.

Like any other shopping center, a computer mart must be created, and the time and costs involved have dis-

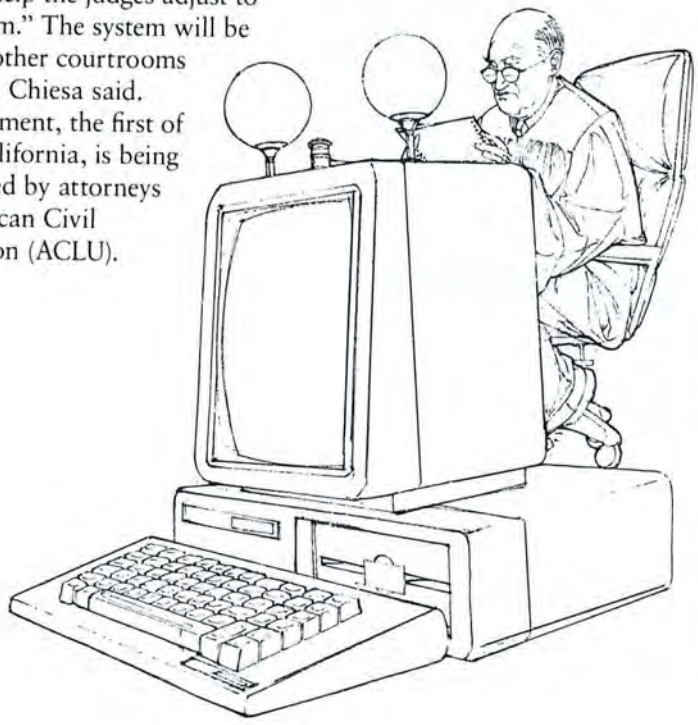
(continues on page 38)

Courting the New Technologies

Perry Mason might feel out of place in some courtrooms in Contra Costa County, California. The judges in these municipal courtrooms have computers on their benches. Four of the county's judges began using ITT terminals this spring to retrieve municipal court records and records from the state Department of Motor Vehicles. Plans call for a link with the state Department of Justice computers by spring of 1985. In addition to data retrieval, the judges use the terminals to run a scheduling program to plan the court calendar.

Court Administrator Roy Chiesa said that the judges have readily adapted to the terminals. "We [court employees] have been using computers in our offices for a while, so we were able to help the judges adjust to the new system." The system will be expanded to other courtrooms in the county, Chiesa said.

This experiment, the first of its kind in California, is being closely watched by attorneys for the American Civil Liberties Union (ACLU). "We will be exploring if there is any abuse of the system," said Dorothy Ehrlich, executive director of the San Francisco ACLU office. Both the defending and the prosecuting attorneys in a case have the right to examine all the evidence, Ehrlich explained; since the terminals can be used only by the judges, attorneys might not have access to the same information that the judge has. Other potential legal problems may arise from the maintenance of the records, because inaccurate or incomplete records may influence the decision of a case. State officials acknowledge that there is a backlog of cases to be added to the computers. The ACLU plans no legal action at present.



Big Blue's News

What's in a Name

The usually uncompromising IBM did a quick turnaround recently. In April the company's legal department, which is based in Armonk, New York, sent letters to most user group leaders telling them that their groups were infringing on the IBM trademark. The letters advised leaders to take the IBM initials out of or separate them from their club names. In other words, names such as "Anywhere USA IBM PC User Group" were illegal, but names like "Anywhere USA User Group for the IBM PC" were perfectly acceptable.

This minor distinction must have caused a major uproar among club members, because by early May IBM's legal department mailed out another letter to user group leaders saying, in effect, "Never mind." According to an IBM spokesperson, the company "reexamined the nature of the user groups and decided that the name changes were not needed."

This name dispute may have been a case of IBM's left hand not knowing what its right hand was doing. While the Armonk office was immersed in legal saber rattling, the Boca Raton office was opening The IBM PC User Group Support Department, the newest addition to the Entry Systems division. At present, department personnel operate a phone line and a bulletin board and publish a monthly newsletter for registered user groups.

An IBM spokesperson stressed that the phone line is not a technical hot line, but IBM personnel will answer group start-up questions. Registered groups are sent information packets that include the phone number and access code of the bulletin board and are put on the newsletter mailing list. The newsletter is a compilation of stories from user group newsletters and IBM stories and product announcements.

Future plans call for the User Group Support Department to disseminate material such as tapes and slides and information on public domain software. Members of this new department will also help schedule IBM guest speakers for group meetings. The spokesperson could not say when the department will begin these services.

User group leaders can register their groups by calling 305/998-7284 or writing to E. Gene Barlow, IBM PC User Group Support, Dept. 2L9-218, P.O. Box 3022, Boca Raton, FL 33432.

* ——— *

Chipping Away

This spring IBM became the first American company to produce an experimental, 1-megabit random access memory (RAM) chip. The memory chips most widely used in PCs today are 64-kilobit chips. A group of eight such chips can store 64 kilobytes of data. Eight of the new IBM chips will store 1 megabyte of data, making for a very high storage capacity in a very small space.

IBM spokespersons would not comment on when the chip, which was produced at IBM's research laboratory in Essex Junction, Vermont, would be commercially available, but industry observers estimate that the chips will be in regular production within two years.

Howard Dicken, president of DM Data, a Scottsdale, Arizona, consulting firm that specializes in semiconductors, computers, and artificial intelligence, said, "We should start to see samples in 1986, and by the end of the decade a 1-megabit chip will cost less than $10." (A 64-kilobit RAM chip now sells for about $4.)

The announcement was not a surprise. "Any company—American or Japanese—that now makes a 256-kilobit chip is working to bring out a 1-megabit chip," Dicken said. Dicken thinks that IBM, which developed an experimental 512-kilobit chip last September, will abandon the 512-kilobit chip and direct its manufacturing energy to the 1-megabit chip.

The new chips do not fit in the PC's memory sockets, which are designed to accept 64-kilobit chips, and would conflict with the PC's memory assignments. It is possible, however, that an expansion board will be designed that overcomes the memory allocation obstacle and allows PC owners to add several of these new chips to their computers.

On-Line Investing Update

* ——— *

Bullish on the PC

The joint venture between IBM and Merrill Lynch and Company (see *PC World View, PCW,* Vol. 2, No. 7) is beginning to take shape. The two firms have named the venture International Marketnet; the operation's president is Joseph P. Castellano, who previously served as director of Merrill Lynch's Corporate Systems Division. Two other Merrill Lynch executives and four IBM executives were also assigned to direct International Marketnet. The project will have test systems in operation by early 1985.

International Marketnet will use the 3270 PC. Its initial users will be brokers and financial institutions; individual investors will be added to the system at a later time.

Computer Supermarkets Are Fizzling *(continued)*

suaded many potential tenants. At the same time, the number of computer shows and expositions has increased rapidly, and both hardware and software makers now find that they must limit their spending for exhibits. Because local fairs provide wide exposure for relatively little investment when compared with a permanent exhibit in a computer mart, many firms have chosen exhibiting at the short-term fairs over renting space in a mart.

Boscom will probably provide the test for these high-tech supermarkets, and that mart's organizers have enlisted IBM as a major exhibitor (to the tune of 28,000 square feet). But Lotus Development Corporation, which originally reserved space at Boscom and other marts, intends to withdraw from such exhibits. Perhaps the computer industry is just too changeable—and the public too fickle—for anything as permanent as a shopping center.

A model of Infomart in Dallas, the computer supermarket that is scheduled to open in November. Infomart is modeled after London's Crystal Palace.

San Francisco's Datamart will accommodate up to 200 company showrooms and will provide rooftop parking for customers.

PC World View welcomes contributions from readers, and we'll pay up to $50 for the items we use. Please include your name, address, and phone number with your contributions; send them to *PC World View, PC World,* 555 De Haro St., San Francisco, CA 94107.

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Circle 727 on reader service card

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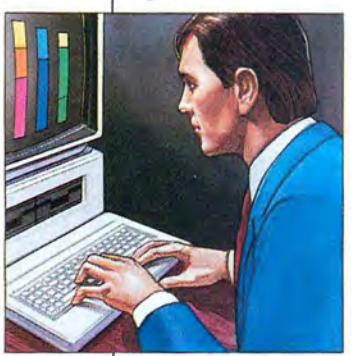

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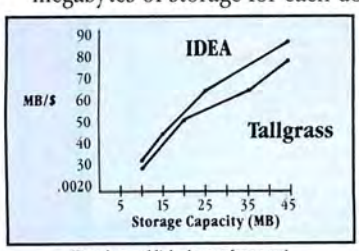

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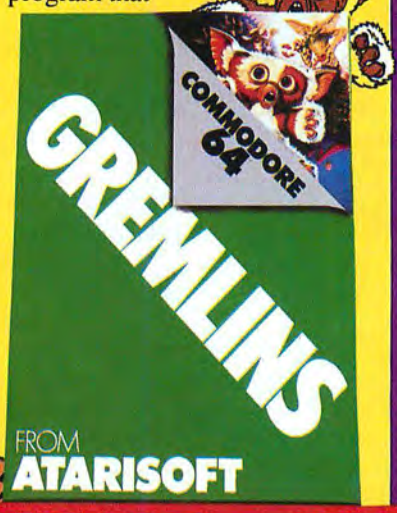

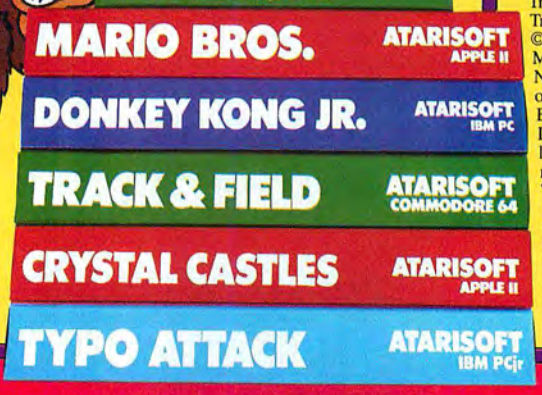

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*Titles available on IBM PC jr. are Ms. Pac-Man, Centipede, Donkey Kong, Moon Patrol[7] and Typo Attack. Available on the VIC 20 is Typo Attack.

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ATARISOFT

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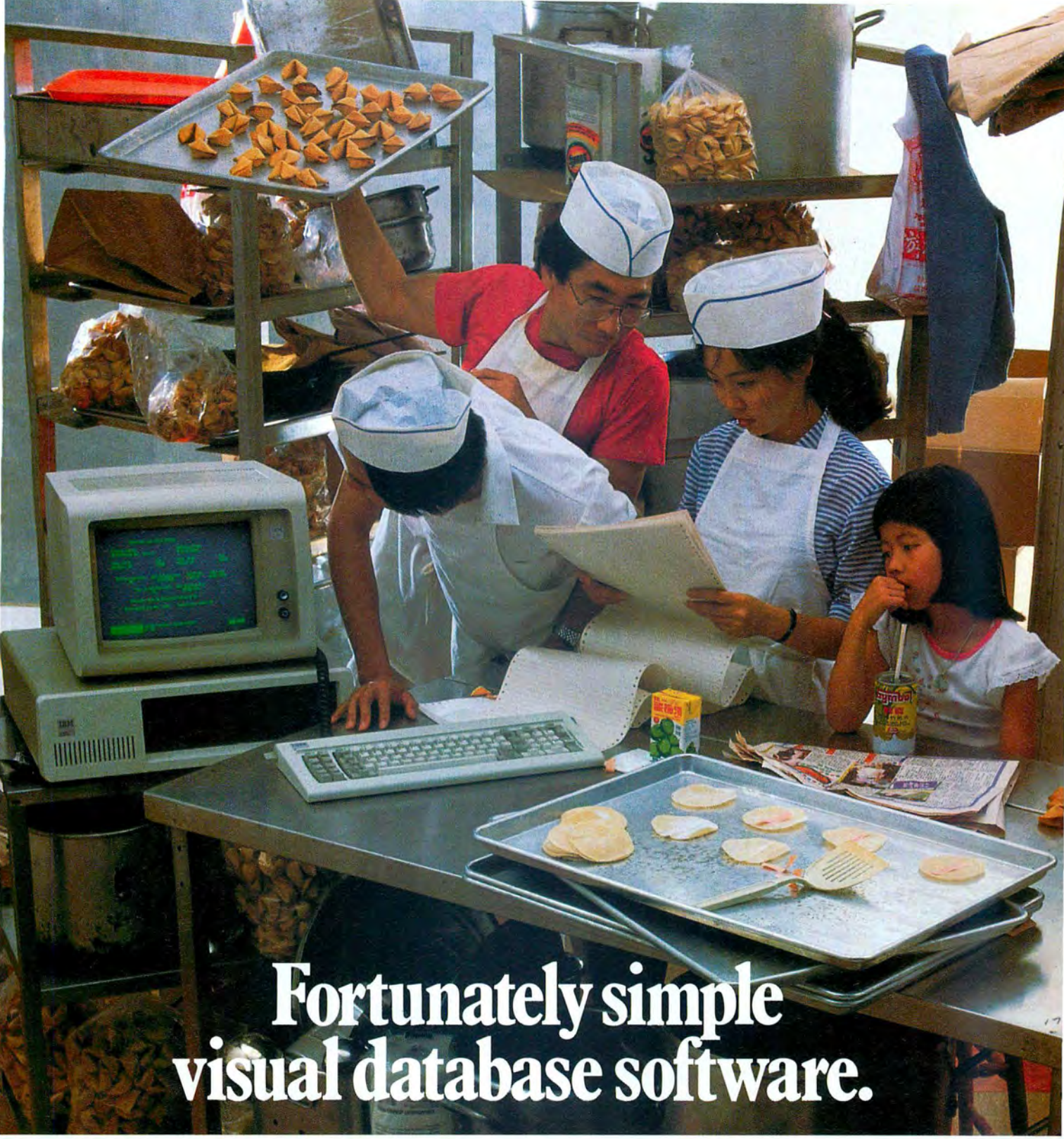

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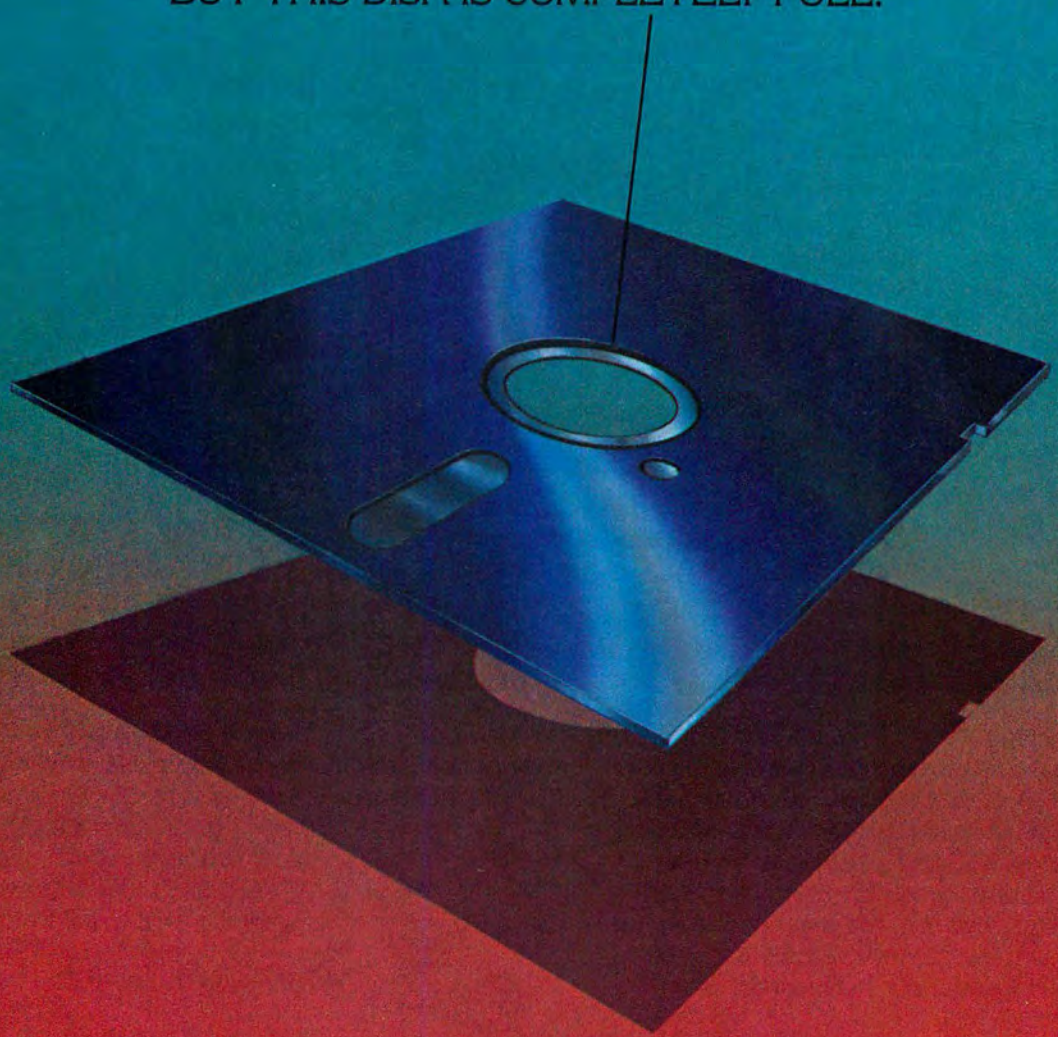

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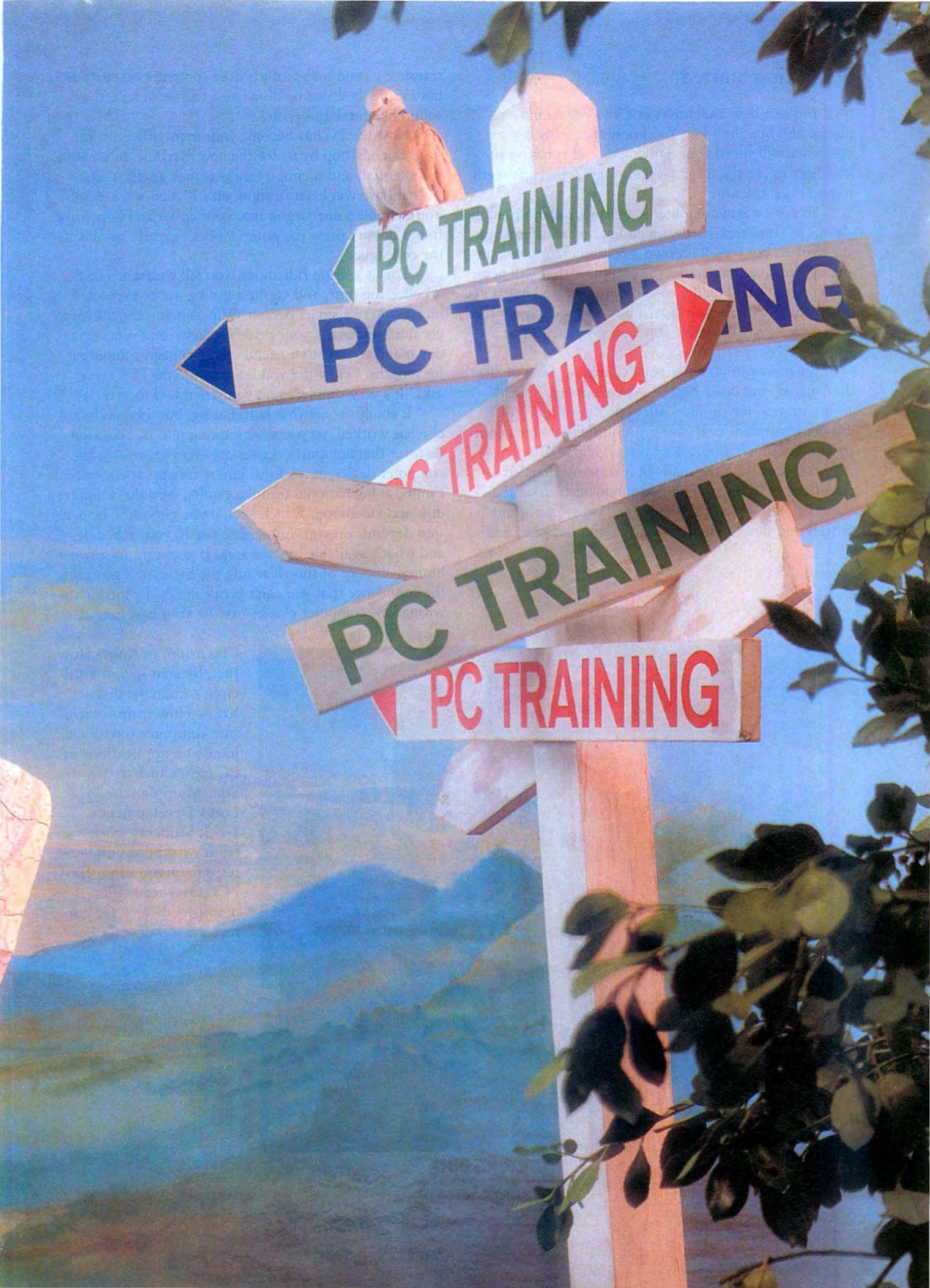
Circle 149 on reader service card

PC Training: Which Way to Go?

N. Steidtmann

What do you do when the PC arrives? Books, magazines, tutorial disks, and videotapes all claim to be able to teach computer basics, but many novices find hands-on classes the most effective way to learn about the PC. Computer training centers are opening up around the country to meet the needs of millions of new computer users.


PC TRAINING
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PC TRAINING

Getting Started

You're a busy executive, and you've taken the plunge and bought a PC. You know that in theory a computer will speed your daily tasks, but you have no idea how to use the thing. What's more, you can't seem to find time to learn.

You're an avid computer magazine reader, up on the details of every new hardware and software offering on the market, but you don't own a computer. You're waiting for the dream machine, the computer that will never become obsolete. Finally, you compromise and buy a PC, but cutting open the cardboard box and pulling out the new computer, you realize you have no idea how to use it.

What do you do when the PC arrives? First of all don't panic, and don't expect to be running a spreadsheet program ten minutes after you "boot up." You'll just get frustrated. Everything you initially do on a computer takes much longer than you anticipated.

You start with the manual. It contains detailed instructions on where the plugs go, how to turn on the machine, how to load software, and other important procedures. But you have to read it, and reread it, and translate it, and interpret it. Most computer manuals are not exactly bedtime reading. As a matter of fact, they sound like total gibberish.

Now the PC has become your main office attraction. Friends stop by to see the new machine, talk about its potential, and mention fantastic new applications. "What have you been running on it?" a co-worker asks. You mumble some jargon into your collar and hope your friend doesn't press the point. "That's great!" comments the colleague.

This is getting ridiculous, you tell yourself. The PC is collecting dust, and you're running out of excuses. I mean, you're a smart person. Why is it you can't seem to get started? Finally your pride weakens, and you break down and confess to a friend who has been computing for months. "How did you learn to use the PC?" you ask. "It's very simple," says your friend. "I took a class."

It sounds somewhat humiliating, but then nothing else has worked, so you start looking into it. You soon discover that computer classes are everywhere—at the computer dealer, at the local junior college, at computer camps, at big national training outfits, even on computer disk and videotape. Which should you choose? The decision depends on your immediate needs, your schedule, and what's available in your area. If you want to spend a limited amount of time learning the basics and acquiring the confidence that you can't break the PC by hitting the wrong key, computer classes may be your best bet.

Classroom in Know How Inc., located in San Francisco's financial district. Know How trains corporate computer novices in hands-on applications of PC basics such as WordStar, Multiplan, and Lotus Development's 1-2-3. Students work from workbooks and enter information into IBM PCs. Overhead color monitors display the correct answers.

The Warm and Fuzzy Factor

The Know How training center looks like a corporate kindergarten in a plush suite high above San Francisco. Color monitors overhead display a spreadsheet prepared on Lotus Development Corporation's *1-2-3* as a dozen well-dressed men and women from Pacific Bell sit in ergonomically designed chairs and stare fixedly into IBM PCs. A teacher stands in front, lecturing on formats and files, and a second teacher roams the room, zeroing in on an older executive who seems to be having trouble with his template.

"The warm and fuzzy factor" is the term used by Lawrence Magid, vice president of Know How, to describe the secret of his training philosophy. Know How trains a dozen corporate computer novices every day with hands-on training in PC basics like *WordStar, Multiplan,* and *1-2-3*. Corporations pay a premium for Know How's know-how. Class fees are $105 for a half-day session on the basics of a PC, $195 to $225 for a one-day introductory or intermediate course, and $395 for a two-day *1-2-3* session.

Bankrolled by Prentice-Hall Publishing Company and Pacific Technology Venture, Know How plans to go national later this year. "The need for training is fantastic, and no one has solved the problem," says Donald A. Schaefer, president of Prentice-Hall. Schaefer plans to learn how to use a PC when Prentice-Hall's corporate headquarters installs its information center. For the largest international publisher of college textbooks, the diversification into hands-on training was a natural move. Prentice-Hall's corporate development office was also looking for an investment in what appears to be a high-growth service industry for the eighties.

Bundled Training

Know How is only one example of the bets being placed on the need for computer training in the extremely lucrative corporate market. Down the street at Businessland, a computer retail chain, a group of real estate salespeople, contractors, and administrative assistants sits behind a row of Compaqs as the teacher fires questions at them about *1-2-3* formulas. An overhead projection of the computer screen dominates the room. One of the students gives a correct answer, and another question is raised. Writing on a large visual-aid board with a red felt pen, the teacher answers the question and then tells the students to perform the exercise in their workbooks. As they enter the proper data into the sales commission report, the students help each other out, exchanging comments about the program as the teacher moves around answering specific questions.

Top: Larry Magid, vice president of Know How Inc. Bottom: Students compare an overhead color monitor with their own PC monitor.

Getting Started

"I'm here to get away from the phones and have time to play with the computer," says one woman. "Our company bought the software here, and the training was included in the package," says another woman. Bundled training is the current trend in computer sales to corporations. Many companies buy software and training along with their computers. Both Businessland and ComputerLand offer package training deals.

Corporations are finding that training, expensive as it may seem, is more cost-effective than losing productive labor hours by letting employees teach themselves. "Even at $1000 a day it's cheaper to hire an outside consultant to teach classes," says training specialist and former piano teacher Larry M. Oliver. Oliver says companies often send one employee to attend a class at Businessland before contracting for a training package from the company. Individuals can also get deals on training. If you buy either an IBM PC or a retail-priced software pack-

Training Resources

PC Classes
Listed below are several organizations that offer instruction in computer basics. These companies will also give you advice on how to computerize your business and train your personnel. Universities and community colleges are also good resources for computer classes in your area.

Computer Resource Center
Meridian Mall #2A
216 N. Meridian Rd.
Newton, KS 67114
316/283-3818

Know How Inc.
Four Embarcadero Center #1970
San Francisco, CA 94111
415/986-8600

Management Systems Unlimited
201 15th Ave. SW, Ste. D
Puyallup, WA 98371
206/848-9276

National Training Systems, Inc. (NTS)
1111 Broadway
Santa Monica, CA 90401
213/394-7685

PCC Inc.
2682 Bishop Dr. #107
San Ramon, CA 94583
415/833-8604

Personal Computer Learning Centers of America, Inc.
1120 Avenue of the Americas
New York, NY 10036
212/840-6873
1820 Jefferson Pl. NW
Washington, D.C. 20036
202/293-0690

Instructional Video
The companies listed below offer instructional video cassettes for beginners and advanced PC users.

Anderson Soft-Teach
2161 Blossom Valley Dr.
San Jose, CA 95124
408/356-3552

Lynn Computer Service
6831 W. 157th St.
Tinley Park, IL 60477
312/429-1915

Micro Instructional, Inc.
3453 N.W. 55th St.
Fort Lauderdale, FL 33309
305/485-6880

Multimedia Interactive Training Systems
15392 Assembly Ln.
Huntington Beach, CA 92649
714/898-0840

Powersharing, Martha Stuart Communications
P.O. Box 246
Hillsdale, NY 12529
518/325-3900

age from Businessland, a 4-hour introductory course (normally priced at $75) is included free.

Oliver says that student needs are changing as more people learn computer basics. More and more students will be interested in going beyond the introductory classes and broad-based spreadsheet courses to study specific packages.

Ron Posner, president of National Training Systems, Inc., (NTS) in Los Angeles, is also concerned about future student needs and demands. NTS offers two-day PC seminars for corporate executives. Trainers go on-site to corporations to teach employees how to use their computers. Posner says that NTS tries to apply computer training to real-life corporate situations by simulating the negotiations of a high-powered movie deal.

"There needs to be education oriented at different levels and needs," says Posner, whose brochure teases, "A personal computer can be a valuable tool. Or the world's most expensive paperweight." He points out that retailers are often reluctant to mention training because it may make the product appear difficult to use. "No single approach solves the education problem today," says Posner. "If you take a few courses, it's not enough. It takes ongoing reinforcement and study to keep up on your computer skills."

Disks and Video

NTS is currently promoting a tutorial computer disk. "Putting *1-2-3* to Work" is a hands-on, self-study course that provides menu overlays for *1-2-3* and directs students through a set of exercises that teaches them how to use the program. A number of other companies also sell tutorial disks for major software programs (see "Learning by Disk" in this issue). Many software manufacturers also include a tutorial disk with their programs.

If you own a video cassette recorder (VCR), you might consider buying or borrowing an instructional video cassette. Some computer dealers offer videotaped courses that you can buy or view in the store. The advantage of videotapes is that they allow you to see a demonstration at your leisure and in the privacy of your office or home and then follow it yourself. If you can't get it the first time around, you can rewind and see it again. You needn't embarrass yourself in public if you've forgotten how to reset the PC.

Interactive videodisk technology is a new development in training that may revolutionize the use of video equipment as a teaching tool. Digital Interactive Strategies Corp. (DISC) of San Mateo, California, has developed interactive videodisk programs that integrate with the program you are trying to learn, affording you greater control over the program's user interface. The picture on the video screen is an exact duplicate of that on the PC screen, but the program pauses to allow you to type data and will repeat instructions if you thrice fail to execute a given task (see "Scene One, Take One" in this issue).

DISC President Walt Robson says a survey by his company indicated that interactive videodisk training would be most cost-effective for companies with ten or more PCs. DISC offers 18 learning packages, ranging in price from $250 for a demo to $1000 for the complete tutorial.

Training on the Rise

Computer training has become a big business. At computer camps, workshops, seminars, and specialized executive courses, everyone is jumping on the bandwagon. The Association of Data Processing Service Organizations (ADAPSO) estimates that the multimillion-dollar training market will double every year over the next several years. Already, brochures, ads, and other "come-ons" regularly beckon from the pages of computer magazines and from computer store displays, and you can expect that bombardment to increase.

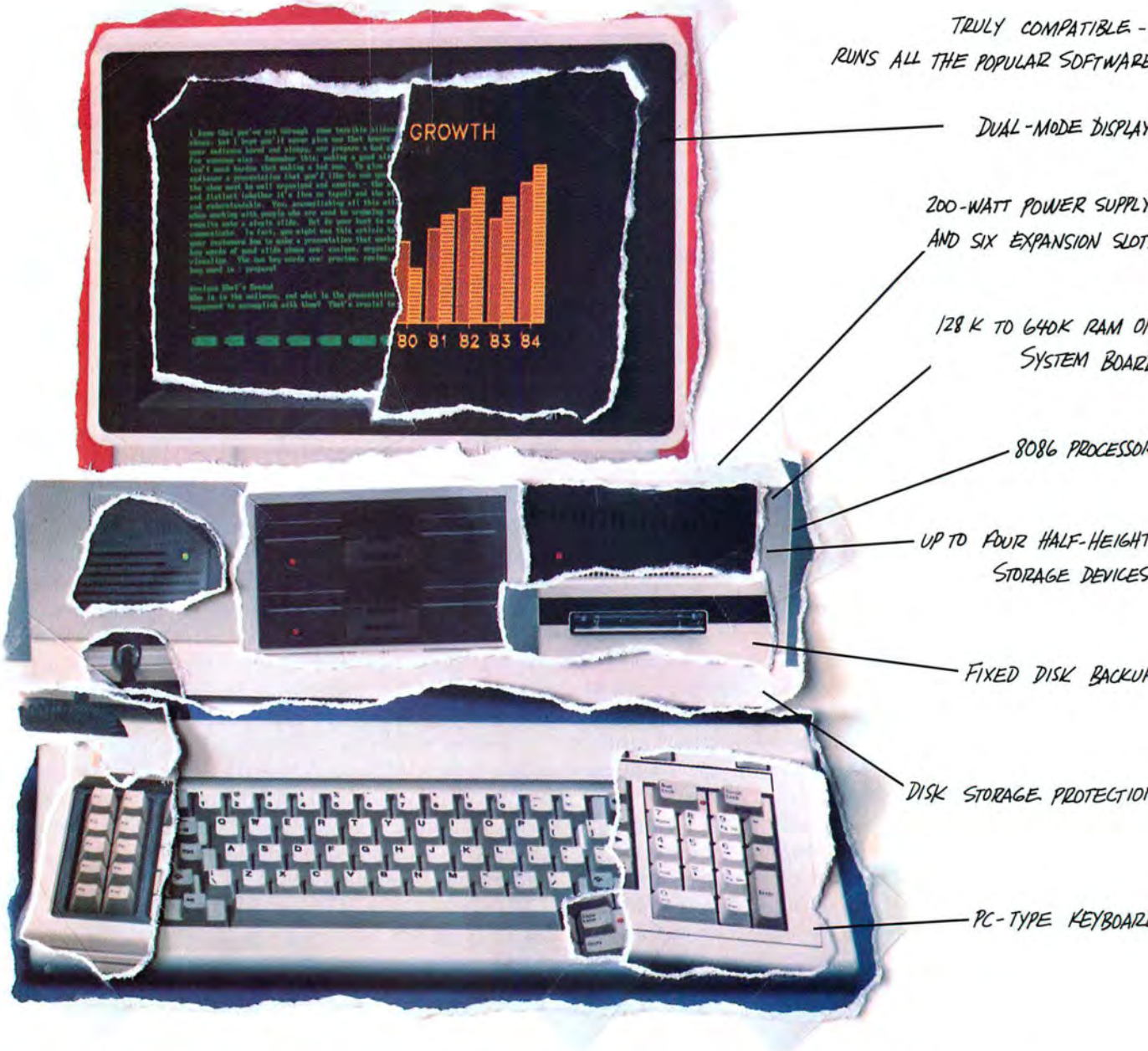
If you decide to take a computer class, ADAPSO recommends that you talk to previous students for their opinions about the courses they have taken and that you make certain that the class meets your expected computing needs. Ask the following questions: Is the training interesting? How many students are in the class? Will I get reference material to keep? Will I be learning on my own computer? Training can be expensive, so shop around.

Another good source of computer information is local user groups. Most areas have regular user group meetings that can help you with tips on how to use your system. In many cases computer experts belong to these associations, and they are often willing to help with problems and share information.

So don't despair. When your PC arrives, there are a number of options available to bridge the computer gap, and there are millions of other people out there with the same questions and problems.

N. Steidtmann is a freelance writer living in the San Francisco Bay Area.

Computer dreams.



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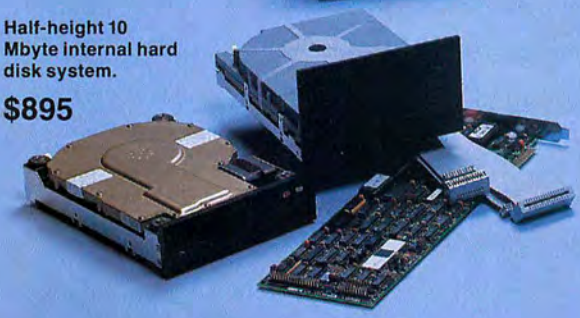

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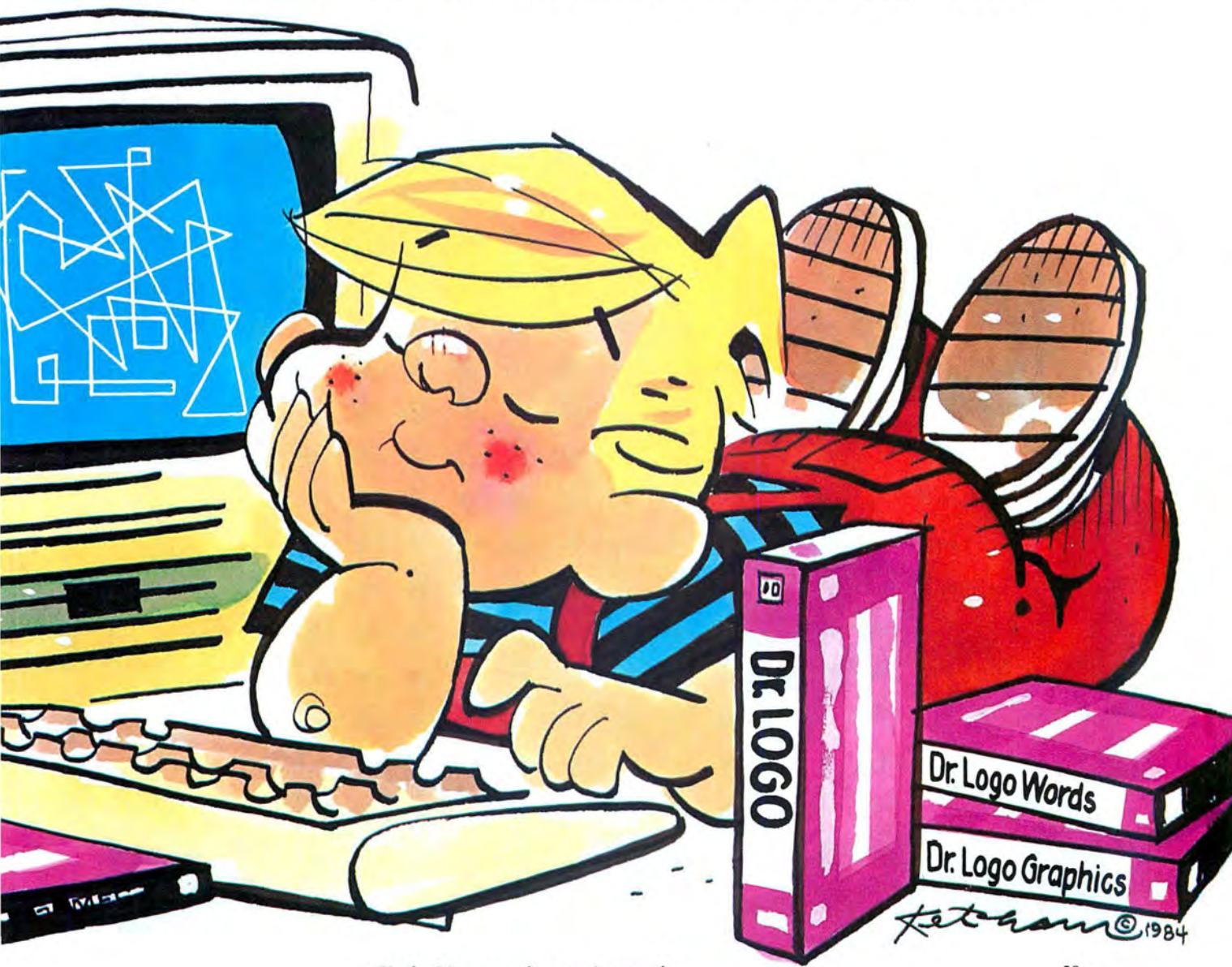

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Super BASIC

The IBM PC BASIC Compiler can turn mild-mannered BASIC into a language that is faster than a speeding bullet.

Glenn I. Ouchi

In its normal form BASIC is an easy-to-write, easy-to-execute programming language. For programs of fewer than 200 lines BASIC has no rival. But when an application requires considerably more code, many programmers find BASIC to be ridiculously slow and miss the speed and programming structures found in other compiled languages like Pascal and C.

The very nature of BASIC prohibits it from executing rapidly. Because BASIC is an interpretive language, the computer must perform a number of operations on each line of code before the line is executed. Each line must be read, checked for errors, interpreted into code that can be executed by the computer (machine code), and finally executed. Even lines within a FOR . . . NEXT loop are reread, rechecked, reinterpreted, and reexecuted each time they are used. Each step takes time, and the larger your program, the more time it takes to run.

Running a BASIC program is like reading an article sent via Morse code. If the article is short, you can interpret the Morse code, write down the results in English, and read the article in a short time. However, if you wish to receive and read a novel, you will no doubt fall behind in the translation. The entire process will be extremely slow and frustrating. To speed up the process, you could learn to translate Morse code faster or you could learn shorthand, but these methods would only increase the speed by a small amount.

The BASIC Compiler can increase program execution speed by a factor of 20 to 30.

However, if you step into the nearest telephone booth and run the BASIC program through a compiler, most of these problems disappear. The IBM PC BASIC Compiler, otherwise known as BASCOM, is available in slightly different forms from Microsoft and IBM. It performs the first three steps — reading, checking for errors, and interpreting — for the entire program before the program is executed. When the program is run, the computer simply performs the computations. To continue the Morse code analogy, running the program through the compiler is like having the entire novel sent to you ready to read.

The BASIC Compiler can increase program execution speed by a factor of 20 to 30. An application that normally takes 10 minutes to execute can be done in just 30 seconds. Graphics-oriented applications and game programs that would otherwise run prohibitively slowly in BASIC can be compiled to operate at interactive speeds. For tips on speeding up Compiled BASIC programs, see "Optimizing for BASCOM" (*PCW*, Vol. 1, No. 4).

In addition to increasing speed, the BASIC Compiler provides additional program development tools that aid in writing structured code. With the BASIC Compiler you can harness up to 128K of memory for program code and data and protect your source code at the same time. Interpreted BASIC, on the other hand, provides only 64K for both program and data.

Approaching the Telephone Booth

Before you use the BASIC Compiler, you should make sure your program is in the proper physical and logical form. First you must save your program in the form of an ASCII file. While in the BASIC Interpreter, type SAVE *"filename"*,A <Enter>. The compiler reads the ASCII file and translates the lines of code into machine code. This code is usually stored in a

```
CLS
B:
PAUSE . . Insert SOURCE DISK with BASIC .ASC program in A:, WORK DISK in B:
COPY A:%1.ASC
PAUSE . . Replace A: (SOURCE DISK)  with  BASCOM COMPILER DISK
A:BASCOM %1.ASC,,NUL,%2;
PAUSE . . Press (Ctrl)-(Break) to exit and fix errors, or
A:LINK %1.OBJ;
PAUSE . . Replace A: (BASCOM DISK) with DESTINATION DISK for .EXE program
COPY %1.EXE A:
ERASE %1.*
A:
PAUSE . . Press (Ctrl)-(Break) to exit or, to copy BASRUN.EXE,
COPY B:BASRUN.EXE
```

Listing 1: COMPILE.BAT

file with the extension .OBJ (for "object code"). The .OBJ file is then linked with other pieces of object code using DOS's LINK utility. LINK loads the .OBJ file into memory and then saves a snapshot of memory on the disk in a file with the extension .EXE (for "executable code"). If you have other routines to run with the program, such as device drivers for a specific printer or plotter, LINK will load these modules into memory at the same time. When you want to run the program, you simply enter the name of the executable file at the DOS A> prompt. The file is loaded into memory and executed.

Before attempting to compile a program, you should check the program for errors and be aware that there are some differences between the interpreter and the compiler. Refer to pages 77-114 of the IBM PC BASIC Compiler manual (or pages 61-80 of the Microsoft BASIC Compiler manual) for a listing of the differences. Some of the major factors you should consider when changing over to the compiler are outlined in "Before You Compile." Even if your program is not completely bug-free, you can still compile it. The compiler will flag your errors and print the offending lines on the screen with ^ symbols pointing to the errors.

Into the Telephone Booth

A typical session with the compiler is simplified by using a batch command file (see "Cooking Up a Batch File," *PCW*, Vol. 2, No. 5). Load DOS in drive A: by simultaneously pressing <Ctrl>-<Alt>-<Del>. Then place a blank disk in drive B: and format the disk by typing FORMAT B: /S at the A> prompt. After formatting is complete, remove the DOS disk and place the formatted disk in drive A:. At the A> prompt enter the command

COPY CON: COMPILE.BAT <Enter>

Now type in Listing 1. After entering the last line, close the batch file with <Ctrl>-Z <Enter>.

The batch file you have created, COMPILE.BAT, performs all of the steps required to compile and link a program (see Figure 1). It prompts you for each step, allowing you to bail out after any major step if you need to correct errors. Since it works from a copy of your program, it ensures you will not accidentally lose the program while you compile it.

This batch job requires a dual, double-sided drive system. Prepare two disks: one referred to here as the work disk, containing COMPILE .BAT and BASRUN.EXE (from the BASIC Compiler's Library disk), and the other, referred to here as the BASCOM disk, containing BASCOM .LIB, BASRUN.EXE, BASRUN.LIB,

> There is no limit to the number or length of comments in Compiled BASIC.

and IBMCOM.OBJ (all from the BASIC Compiler's Library Disk), and BASCOM.COM and LINK.EXE (from the BASIC Compiler's BASIC disk).

You can practice using COMPILE.BAT by compiling the DEMO program that comes with the BASIC Compiler. To create an ASCII file of the program (with the extension .ASC), load BASICA from your DOS disk by typing

BASICA <Enter>

at the A> prompt. Then insert the BASIC Compiler's BASIC disk in drive A:, and load the DEMO pro-

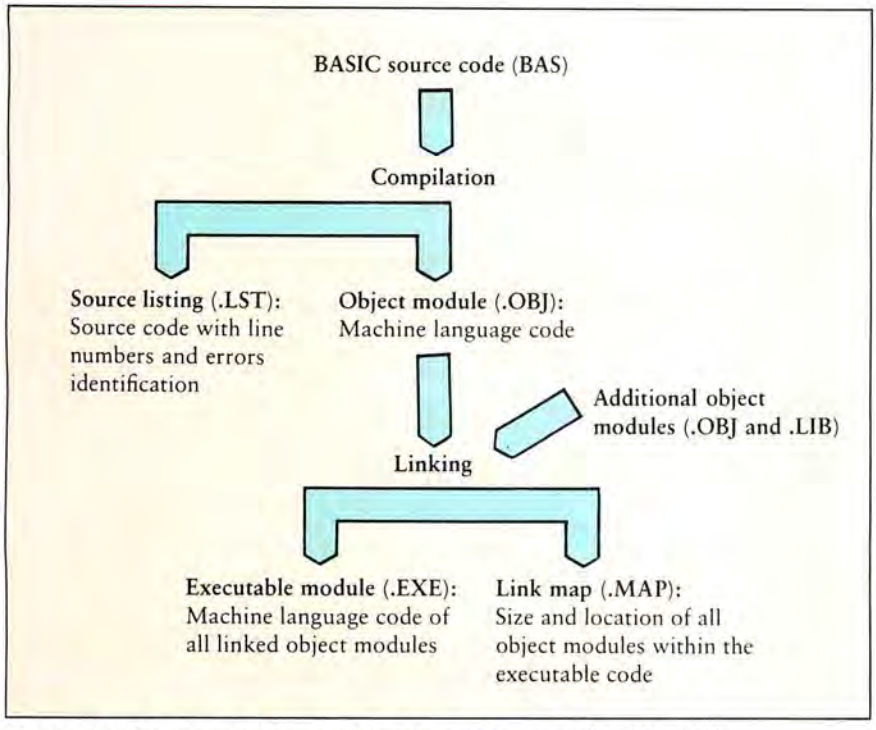

Figure 1: The compilation and linking process of the IBM PC BASIC Compiler

gram by typing

```
LOAD "DEMO" <Enter>
```

at the A> prompt. Now place the BASCOM disk in drive A:, and save DEMO as an ASCII file and exit back to the operating system by typing

```
SAVE "DEMO.ASC",A <Enter>
SYSTEM <Enter>
```

Place the work disk in drive B: and type

```
B:COMPILE DEMO /E <Enter>
```

at the A> prompt. The /E is required because the DEMO program contains an ON ERROR statement. On the screen you will see the prompts found in Listing 2. All you need to do is follow them. (You don't have to replace the source disk with the BASCOM disk since, for DEMO, they are the same disk.)

Exiting the Telephone Booth

You now have a compiled program on the destination disk named DEMO.EXE that shows an animated rocket taking off. This program can be executed by entering DEMO at the A> prompt. To compare program execution speeds, run the DEMO program using the BASICA Interpreter. Then run the compiled version. The rocket takes about 30 seconds in Interpreted BASIC but only 1 or 2 seconds in the compiled version.

The increase in speed alone will satisfy most BASIC programmers, but in addition the BASIC Compiler provides a number of features that can aid you in writing and supporting your programs. Unlike Interpreted BASIC, there is no limit to the number or length of comments in Compiled BASIC, and comments do not take up program memory space. This enables you to comment on the code liberally without affecting the program's performance.

In Interpreted BASIC, a line of BASIC cannot be longer than 256 characters. With the BASIC Compiler there is no limit to the length of a single line, nor does a carriage return terminate a line. Thus, an IF . . . THEN . . . ELSE command can be

Before You Compile

A number of differences exist between the BASIC Interpreter and the BASIC Compiler. Before you compile a program, examine it to make sure it complies with the compiler's rules. The following are the major points to consider when sending your program to BASCOM:

- All syntax must be correct.
- Nesting of FOR . . . NEXT and WHILE . . . WEND loops must be logical. For each FOR you must have a NEXT, and for each WHILE you must have a WEND.
- DEF FN and DEF commands must physically, not just logically, precede any lines in which they are called.
- DRAW and PLAY statements must use the VARPTR$ function to locate the strings used for these commands. Or you can substitute the statements LINE and SOUND in your code and not have to make any changes between Interpreted and Compiled BASIC.
- USR or CALL statements (for calling machine code routines) become CALL ABSOLUTE statements when you use the Compiler.
- If you use the ON KEY or ON ERROR statements, you must compile programs with the proper compiler parameters. The parameter /V or /W must be used if you use an ON KEY statement, and /E or /X must be used if you use an ON ERROR statement. (See the DEMO.BAS example in the accompanying article.)

```
A>CLS

A>B:

B>PAUSE . . Insert SOURCE DISK with BASIC .ASC program in A:, WORK DISK in B:
Strike a key when ready . . .
B>COPY A:DEMO.ASC
        1 File(s) copied
B>PAUSE . . Replace A: (SOURCE DISK) with BASCOM COMPILER DISK
Strike a key when ready . . .
B>A:BASCOM DEMO.ASC,,NUL,/E;

IBM Personal Computer BASIC Compiler
(C)Copyright IBM Corp 1982 Version 1.00
(C)Copyright Microsoft, Inc. 1982

22151 Bytes Available
17360 Bytes Free

     0 Warning Error(s)
     0 Severe  Error(s)

B>PAUSE . . Press (Ctrl)-(Break) to exit and fix errors, or
Strike a key when ready . . .
B>A:LINK DEMO.OBJ;

IBM Personal Computer Linker
Version 1.10 (C) Copyright IBM Corp 1982

B>PAUSE . . Replace A: (BASCOM DISK) with DESTINATION DISK for .EXE program
Strike a key when ready
B>COPY DEMO.EXE A:
        1 File(s) copied
B>ERASE DEMO.*

B>A:

A>PAUSE . . Press (Ctrl)-(Break) to exit or, to copy BASRUN.EXE,
Strike a key when ready
```

Listing 2: Interactive prompts that result from running the COMPILE.BAT batch file (see Listing 1).

written as shown in Figure 2. Furthermore, line numbers are required only for GOTO and GOSUB statements.

Metacommands are another BASCOM tool that can be used to save development time. The $INCLUDE: '*filename*' metacommand reads a file from the disk and includes the code contained in that file in the program at that point. This feature is particularly helpful if you have sections of code that are shared by a number of programs (for example, COMMON statements). These sections of code need only be updated in one place.

These features do not come without penalty. If you choose to use the Compiler, a program will take longer to debug, since it is not easy to insert a BREAK command in the program in order to view the current value of parameters. Each time you edit the source code, you must recompile the program before you can execute it again. Also, if you choose to leave out line numbers, you will not be able to use the program with the BASIC Interpreter. The lack of line numbers will bring forth the fatal 'Direct statement in file' error if you try to load the program into BASICA.

BASIC on the IBM PC is a complete language because it can control all aspects of the PC's color, graphics, screen display, and cursor control. No other language provides these tools without modification, and

```
IF condition THEN
    command 1
    command 2
    command 3

ELSE
    alternate command 1
    alternate command 2
```

Figure 2: IF . . . THEN . . . ELSE command in BASCOM

only assembly language can consistently produce faster code. BASIC's only fault is that it is slow. With the BASIC Compiler you can have the best of both worlds—speed and flexibility. So get your programs into the nearest telephone booth and turn your BASIC into Super BASIC.

Glenn I. Ouchi is a programmer and a chemist living in San Jose, California. He is also a consultant in using the IBM PC for scientific and small-business applications and is the author of a book on scientific applications for the IBM PC, to be published by Addison-Wesley.

IBM PC BASIC Compiler
IBM
Systems Products Division
P.O. Box 1328-W
Boca Raton, FL 33432
800/447-4700, 800/447-0890 Alaska and Hawaii, 800/322-4400 Illinois
List price: $300
Requirements: 64K, one disk drive

Microsoft BASIC Compiler
Microsoft
10700 Northup Way
Bellevue, WA 98004
206/828-8088
List price: $395
Requirements: 64K, one disk drive

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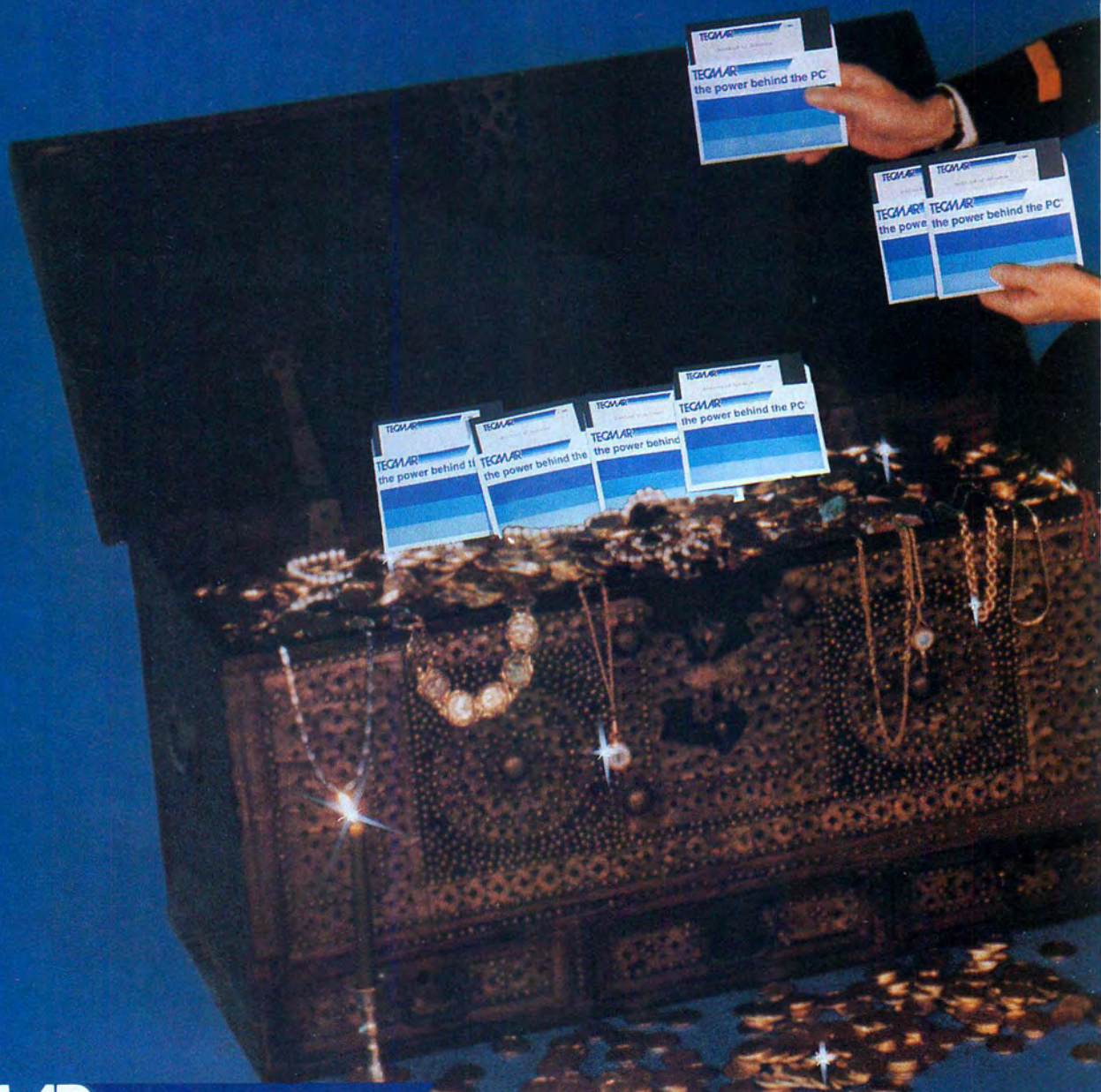

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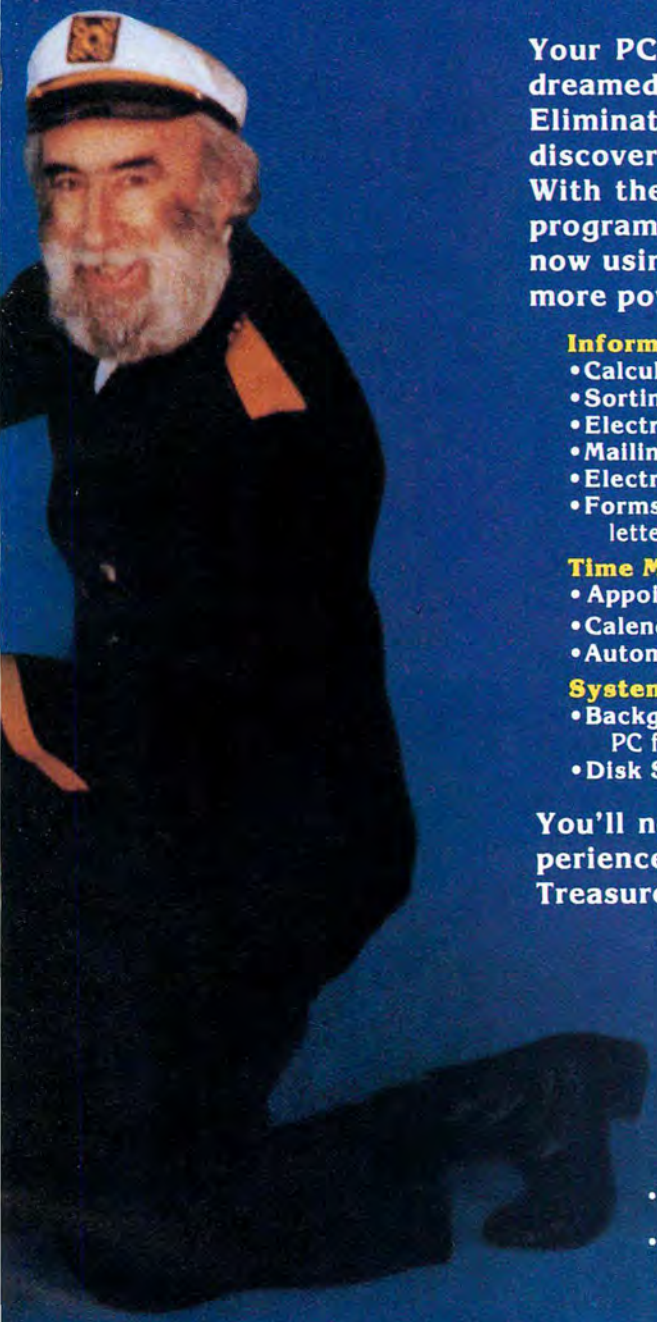

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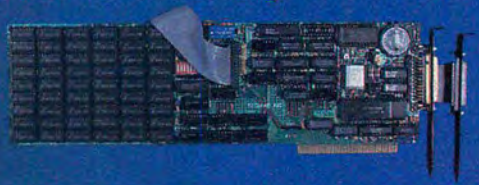

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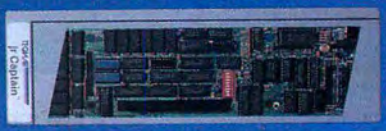

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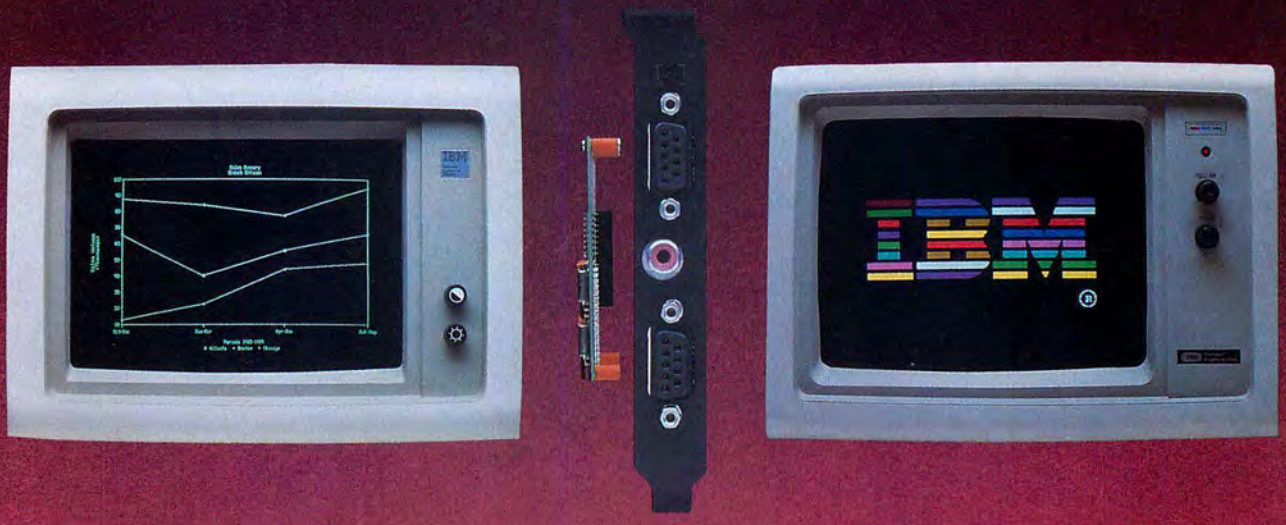

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Bi-Graphix I replaces both the IBM Monochrome Display/Printer Adapter and the Color/Graphics Adapter Card. It will also allow graphics to be displayed on the IBM Monochrome Monitor.

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With **Bi-Graphix I** you can run Lotus 1-2-3 with the IBM Monochrome display, and enjoy the benefits of superior text quality and graphics without sacrificing compatibility.

Bi-Graphix II is a piggyback card with 128 k of memory. By installing Bi-Graphix II onto Bi-Graphix I you will be able to reach resolutions of 640 × 400 in 16 colors, using any standard high resolution color monitor. Resolutions of 720 × 700 can be attained on the IBM Monochrome Display.

	PC Components—Bi-Graphix	IBM—Monochrome/Printer Adapter	IBM—Color Graphics Adapter	Hercules Computer Technology—Graphics Card	Techmar—Graphics Master	Paradise Systems—Multidisplay Board	STB—Graphix Card	PC+ Products Colorplus
100% compatible with the IBM Monochrome Adapter Board, IBM's highest quality text mode	YES	YES			YES	YES	YES	
100% compatible with the IBM Color Graphics—for RGB and composite video monitors, lightpen	YES		YES		YES	YES		
Operate standard IBM Color Graphics software on the IBM Monochrome Display—(Lotus Graphics, etc.)	YES						YES	
Connect two monitors simultaneously and switch either by software or an external switch	YES					YES		
Graphics resolutions on the IBM Monochrome Display of 720 × 700, includes advanced software support	YES			YES				
Graphics resolution on an RGB Monitor of 640 × 400 with 16 colors, includes advanced software support	YES				YES			
Requires device drivers to operate Lotus 1-2-3 Graphics on an IBM Monochrome Display	NO			YES	YES		NO	
Includes a standard IBM Parallel Printer Port	YES	YES		YES		YES	YES	YES
Operate with a standard television set	YES		YES		YES	YES		

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The Help Screen

PC World offers answers and advice at every level.

Karl Koessel

This month's *Help Screen* begins with a reader's alternatives to the advice given here in May for reducing the PC's interference with television reception. The next item opens a discussion about potentially superior microprocessors and computer systems we should be seeing in the not-too-distant future. Another reader wants to know how to switch from the monochrome display to the color graphics display and back. Then a reader asks about the effects of operating a PC with the 50 hertz (cycles per second) electrical power found in most countries besides the United States. We close with a look at what can be done for computer users who work in areas where power failures are frequent.

Reducing Television Interference

There are better alternatives than the two you suggest for reducing television interference caused by the PC (see "PC vs. TV," The Help Screen, PCW, Vol. 2, No. 5). Asking for help from a microcomputer-using amateur radio operator is a good first step. Call the local sheriff's department and ask for the local emergency amateur radio club (be careful—you don't want the CB club). Or call the American Amateur Radio Relay League, 203/666-1541, for the number of the club closest to you. These amateurs can provide good suggestions for cutting down television interference (TVI).

Radio amateurs often hook their PCs directly to high-powered radio transceivers for Telex, RTTY, and Morse code transmissions. The amateurs have to solve the radio frequency interference (RFI) and TVI problems so they can hear on their own receivers. Most would be glad to share their experiences with other microcomputer enthusiasts.

There are special metallic spray paints that can be applied to the inside of plastic microcomputer and television cabinets to keep TVI from escaping or entering. TVI filters are also available that can be placed on the microcomputer power cord to keep it from acting as an antenna for radiating TVI. You can also buy inexpensive filters that can be placed on the TV antenna and the TV power cord to stop stray TVI from entering. Sometimes just a good ground to the house wiring will help. Lots of things can be done, so don't give up. Find help.

Ben Norman
Davis, California

To Buy or Not to Buy

Q. I have recently retired from an executive position where, although I had very little personal exposure to computers, I became very much aware of their almost infinite abilities. Now I am thinking of buying a personal computer for home use.

Reading PC World *has made me feel more comfortable with these amazing machines, and I have narrowed my choices to either the IBM PC or the Compaq, the latter because I have space restrictions. Personally, I must admit I prefer Texas Instruments' PC, but I am aware of the restricted choice of available programs. The article "The Compatibles Line Up"* [PCW, *Vol. 2, No. 4*] *leads me to believe that the IBM PC or a "99$^{44}/_{100}$% compatible" is the appropriate way to go, but the evaluations in the article also raised the following questions:*

Is the 8088 chip here to stay, or does the advent of others such as the 8086, the 80186, and other true 16-bit chips indicate a trend to better and more sophisticated equipment?

If such a trend is on the immediate horizon, can current machines be modified at a reasonable price, or would it be better to postpone purchasing a computer system until these changes are made?

I fully understand that I am asking you to pull out your crystal ball and don your seer's cap, but since retirement has put me on a somewhat fixed income, I am not too anxious to leap into the unknown without some clarifications.

J. H. Ferry
Portland, Oregon

A. In answer to your first question, yes, the 8088 is here to stay, and yes, the recent mass availability of 16-bit chips means more powerful and sophisticated computer systems. Machines using microprocessors more powerful than the 8088 have already come—and some have even come and gone. A machine's—and its manufacturer's—longevity depends on more than power and sophistication. Immediate usefulness, mass acceptance, and continued hardware and software support are far more important factors. The PC and some of the compatibles possess these qualities and thus will endure, even amidst new and future systems.

As for your second question, although reasonably priced modifications will give existing machines many of the features that future ma-

chines will sport, a modified computer will never be able to fully duplicate one originally designed with such features. On the other hand, technical innovation is an ongoing process; just as today's computer systems will be improved, tomorrow's will be improved—you could end up waiting forever for the ultimate system. In fact, enhanced systems already exist and new ones keep popping up (see "Compaq Settles Down and Powers Up," *PCW*, Vol. 2, No. 9), but the original PC, the XT, and many of the compatibles are very functional tools; the increase in productivity that you could achieve now far outweighs the additional benefits that future features will eventually provide. Therefore, I do not recommend putting off a computer purchase. Jump in; the water's just fine.

Active Display

Q. I hope this doesn't sound too ridiculously simple, but I can't figure it out myself: I need a DOS-level program to switch from my monochrome display to my color display. A program that works the other way would be helpful, too, if the solution isn't obvious from the first program.

Wayne Crawford
Alameda, California

A. The MODE command of DOS 2.00 can be used to switch control of the display from the color graphics board to the monochrome board and back. MODE may also be used to toggle the screen width (the number of characters per line) between 80 and 40 and to change the display mode of the color graphics board (that is, to enable or disable the color burst signal for composite monitors). The syntax for the command is MODE *n* where *n* is 40, 80, BW80, BW40, CO80, CO40, or MONO. While 40 and 80 are the only valid parameters for changing the display's width, you can use MODE C, MODE COLOR, MODE C-8, or MODE C-4 to switch to the color display and MODE M, MODE MONOCHROME, or even MODE MONOCHROME DISPLAY PLEASE to switch to the monochrome display.

> Immediate usefulness, mass acceptance, and continued hardware and software support are far more important than technical sophistication.

For DOS versions earlier than 2.00, you can use FLIP.COM, a program that changes the active display or changes the width of the color display (see "Flip Lock," *.*, *PCW*, Vol. 1, No. 4). FLIP.COM can also set the <NumLock> and <CapsLock> keys on or off. "Flip Lock," which includes a BASIC program that generates FLIP.COM, also lists a collection of statements for BASIC programs to perform the functions of FLIP.COM.

Foreign Frequency

Q. I am a prospective PC or PC-compatible owner, and like all neophyte computerists, I am currently in the throes of deciding what hardware to buy. However, because of my active-duty military status, I have the additional problem of anticipating moves around the country and around the world.

One question that no retailer or programmer I've asked can seem to answer concerns the ability of a machine to operate with electrical power other than our standard 60-cycles-per-second/110-volt alternating current (60 Hz/110 v AC). The United States is the only country in the world that uses 60 Hz/110 v as its standard household power supply. Other nations use 50 Hz/220 v, which is normally stepped down to 110 v for use with American-made equipment. Yet nothing can be done to convert 50 Hz into 60 Hz short of rectifying it into direct current and then converting it back into alternating current.

Low-tech machinery like motors will use 50 Hz power without great difficulty, but the operating speed will be slowed by an amount proportional to the difference in current frequency. I am concerned about the more critical timing requirements within the microcomputer and its peripherals. Will attempting to operate a computer, monitor, or printer with 50 Hz/110 v power stress them excessively?

Daniel Else
Virginia Beach, Virginia

A. The digital electronics of solid-state devices are powered by direct current (DC), not alternating current. The power supplies of such devices convert incoming AC to DC. Current technology provides two common types of power supplies: linear and switching regulator. A linear power supply, which employs a transformer, is the older of the two types and is more cost-effective for devices that draw roughly 50 watts or less. Today equipment requiring more than 50 watts usually uses a switching regulator power supply, which is fairly frequency-tolerant. Most switching regulator power supplies will work properly if the AC is between 47 and 63 cycles per second.

You will generally find that external monitors use linear power supplies and that internal monitors, most printers, and newer computer systems and expansion units are powered by switching regulator power supplies, but you should check the power supply input requirements for each device you are considering for purchase. The power input specifications for the switching regulator power supply of the PC sold in the United States indicate that the AC frequency must be between 57 and 63 Hz. However, the power supplies of the IBM PC XT, Expansion Unit, Portable PC, and of many compatibles containing 100-watt and larger power supplies will function properly with AC between 47 and 63 Hz, as long as the input voltage is close to 110 v.

The power supply of the IBM Portable PC has an input voltage selector switch that may be set for 110 or 220. This switch eliminates the need for an external step-down voltage transformer to use 220 v power, but a Portable PC power cord with the proper plug for the country you are visiting will still be necessary.

One caution: Although the sensitive timing requirements of microcomputers are not dependent on the AC frequency, the speed (and thus the performance) of the fan is. If you intend to install a lot of expansion boards or a hard disk drive, be sure the fan will generate sufficient airflow to keep your computer system within acceptable operating temperatures when powered by 50 Hz AC.

Blackout Backups

Q. I am a missionary serving in Port-au-Prince, Haiti. Recently we purchased and installed a computer in our head office here. We have had some problems with frequent power failures wiping out a day's work, and we were hoping you might be able to give us some suggestions for solving our problems.

I am aware of inverters, UPSs (uninterruptable power supplies), and cassette tape backup. Would you tell us the pros and cons as well as the costs of these systems and from whom we may purchase such equipment?

We are on 60 Hz/110 v power. Sometimes the frequency ranges a little on the over-60 side, but complete power failure is our most recurrent problem.

George Harding
Port-au-Prince, Haiti

A. As explained in the previous item, minor frequency variations should not affect your system. Brownouts and blackouts, of course, are another matter. Since cassette tape backup (or any backup storage device) can't duplicate what hasn't been saved in the first place, backup subsystems won't help the problem of power failure. An inverter, which converts DC into AC, is part of an uninterruptible power supply system. UPSs also include a DC power source (a battery), a voltage regulator, a loss-of-utility-power indicator, and a low-battery warning signal (see "Battery Backup," in "Faster Than a Spinning Floppy," *PCW*, Vol. 1, No. 4). Most UPSs have line filters and surge protectors, which—with or without a UPS—are recommended safeguards, especially when the quality of electrical power is suspect.

UPSs vary in price from $500 to $2000, depending on the amount of power they provide (typically from 100 to 1000 watts), how long they can supply such power (generally 5 to 15 minutes), and whether they are a switching-type power backup system (which switches to battery power when utility power fails) or a true UPS (which provides constant power and thus has no switching time—see "Powerful Problems," *PC World View, PCW*, Vol. 2, No. 1). Some UPSs also allow additional batteries to be connected, extending the time they can supply power.

A UPS will certainly solve your power problems, but a better way to safeguard data is to save your work to disk every 20 to 30 minutes.

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Manufacturers of standby power systems include:

BITS Power Systems, Inc.
11020 Audelia Rd. #B114
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San Diego, CA 92123
619/279-0831

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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.*

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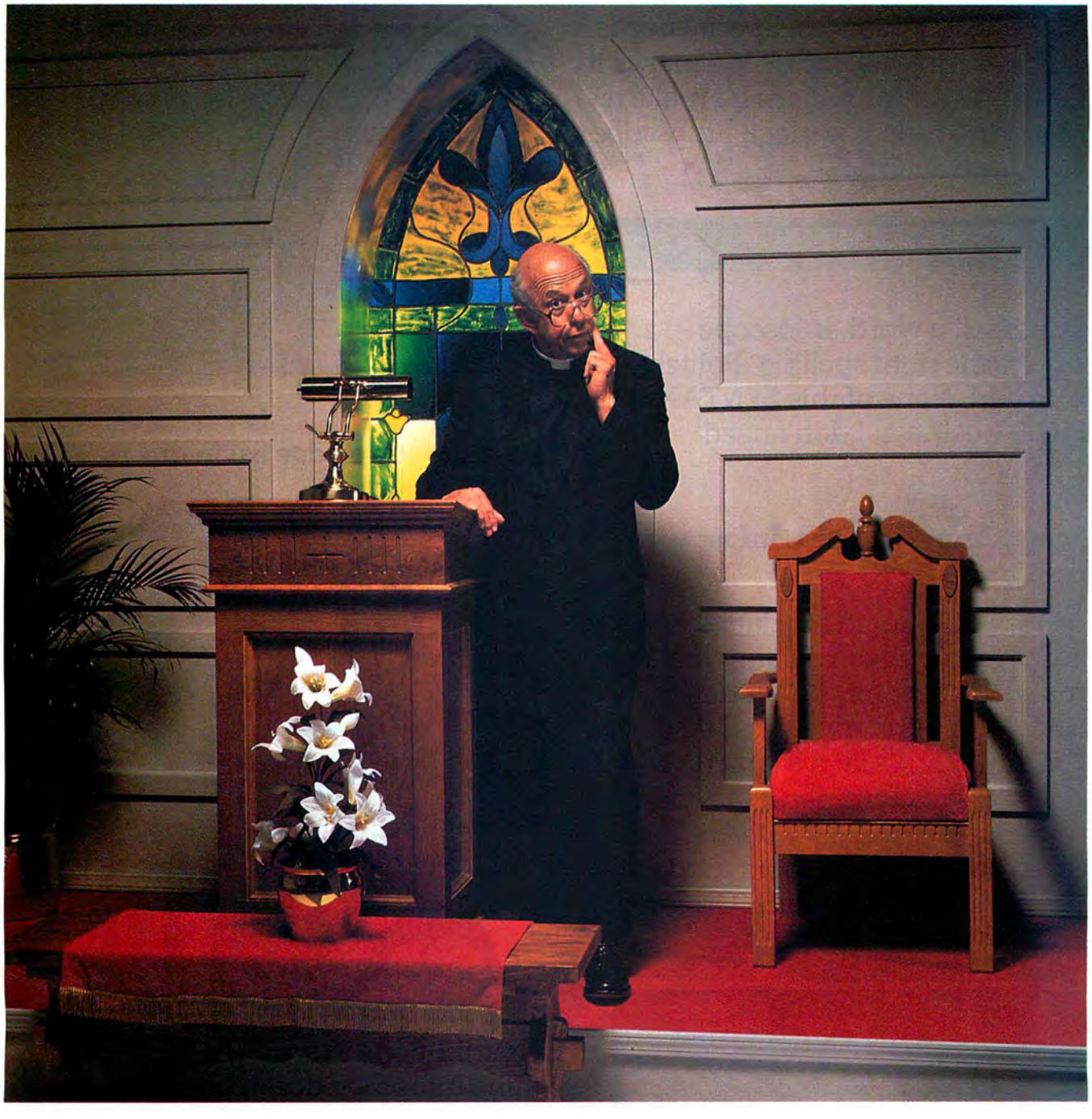


Before we got Infoscope, I frankly didn't know what to do with our church's personal computer. Now I don't know what I'd do without it. Infoscope lets me put virtually anything in our computer, and take anything out in whatever form I need. I can see how a business could use data management like that. But my "business" is my congregation — and I never knew my congregation so well before.

Wait till you see what we get out of Infoscope ...

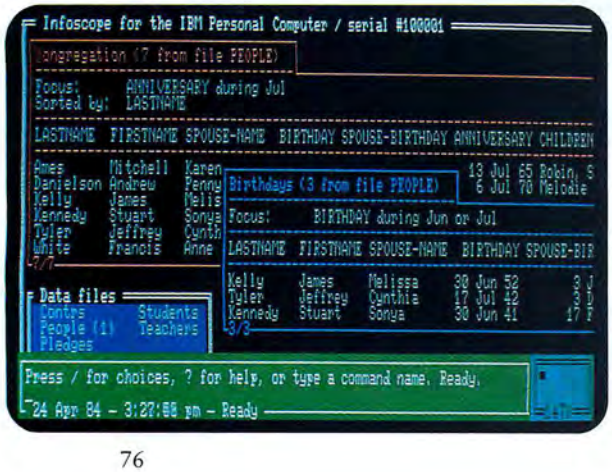
"Our Computer Never Did So Much Before."

I've got every church member in here. Names. Addresses. Children. Anniversaries. Pledges. Special needs. Volunteer projects. Infoscope makes it easy to enter information. If I make a mistake (no man is perfect), Infoscope suggests an alternative.

If I misspell a word, Infoscope suggests the right spelling. Politely, I might add. None of this SYNTAX ERROR business. I don't need scolding.

I Forget Anniversaries. Infoscope Doesn't.

Once I've entered the data, I just ask Infoscope to pull out all anniversaries of our members for, say, January. Before I can blink my eyes, I've got it. I remember birthdays the same way. My congregation thinks it's wonderful, the kind of memory I have. It's hard to believe that pastors used to keep all this in their heads. Or, forgive me, but maybe they didn't ...



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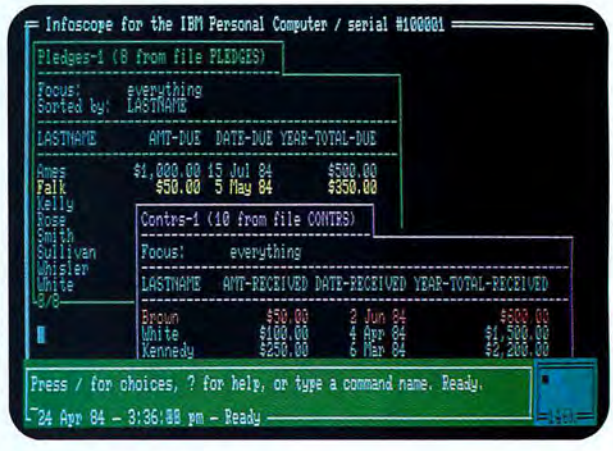
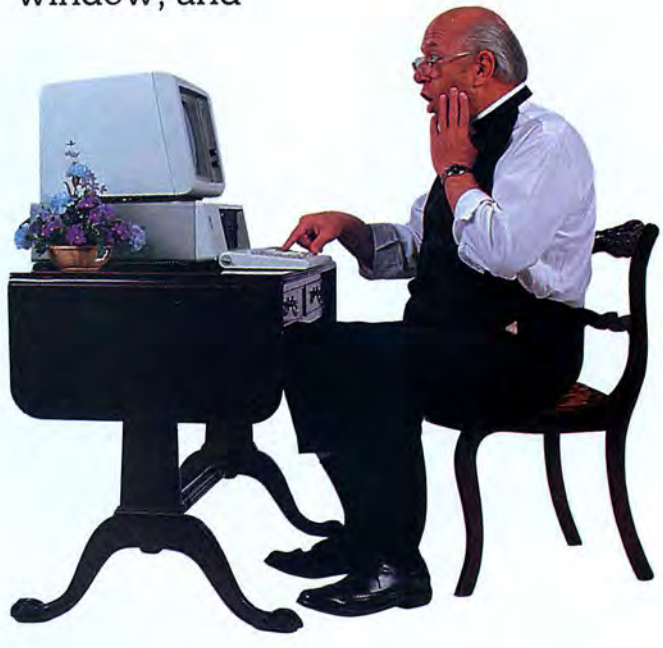
Anytime you want to compare data, Infoscope lets you create windows.



I can see our pledge list in one window, and



contributions in another. The only thing Infoscope doesn't know is that Bill Martin is late paying his pledge because Sue has been sick. That's my department.

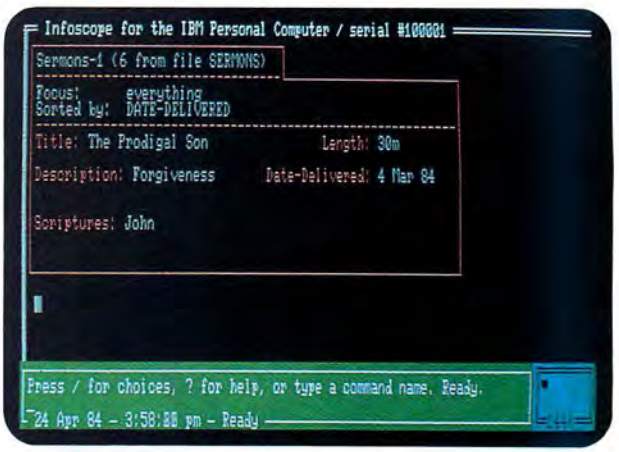
I Can Create a Window for Everything.

For example, Vacation Bible School. In one window, I pull out and display all the volunteer teachers. In another, I scroll through last year's students. In another, all the class projects.

And so on. I can make each window as large as I want, and put it anywhere on the screen I want.

At Last, Our Computer Performs Miracles.

It just took the right program. With Infoscope, we can enter data ... sort it



... compare it in expanding movable windows ... even pull out data from a larger data base. No software ever did so much to make a microcomputer so valuable. I swear by — well, I appreciate very much what it does for me.

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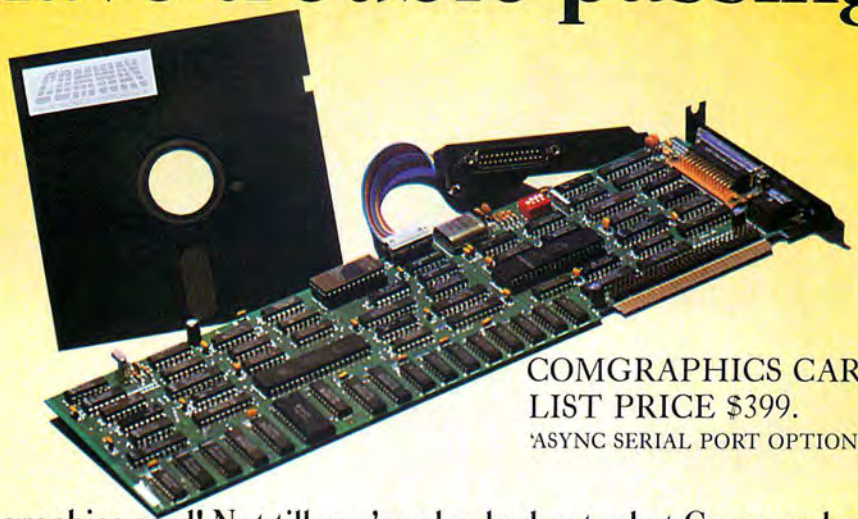

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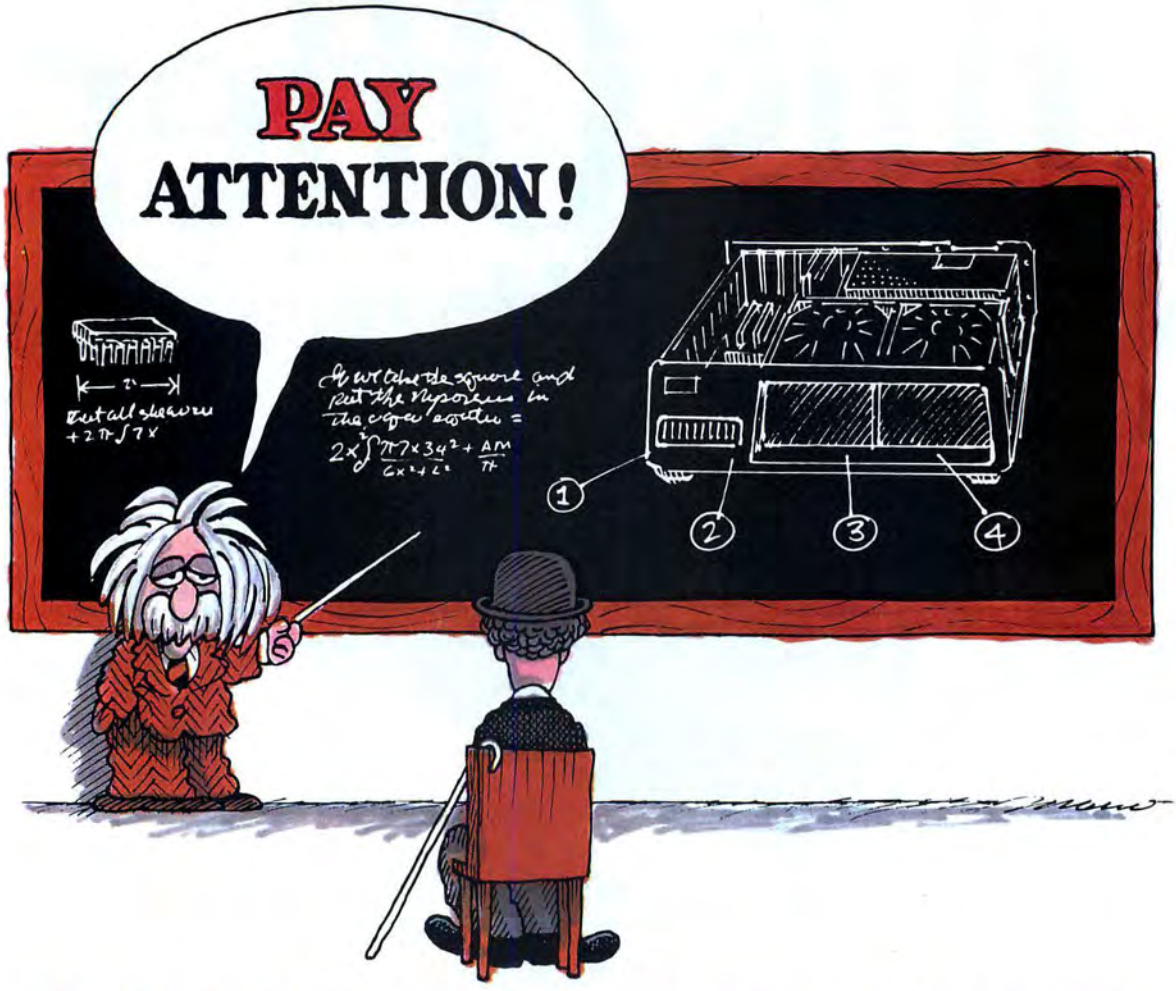

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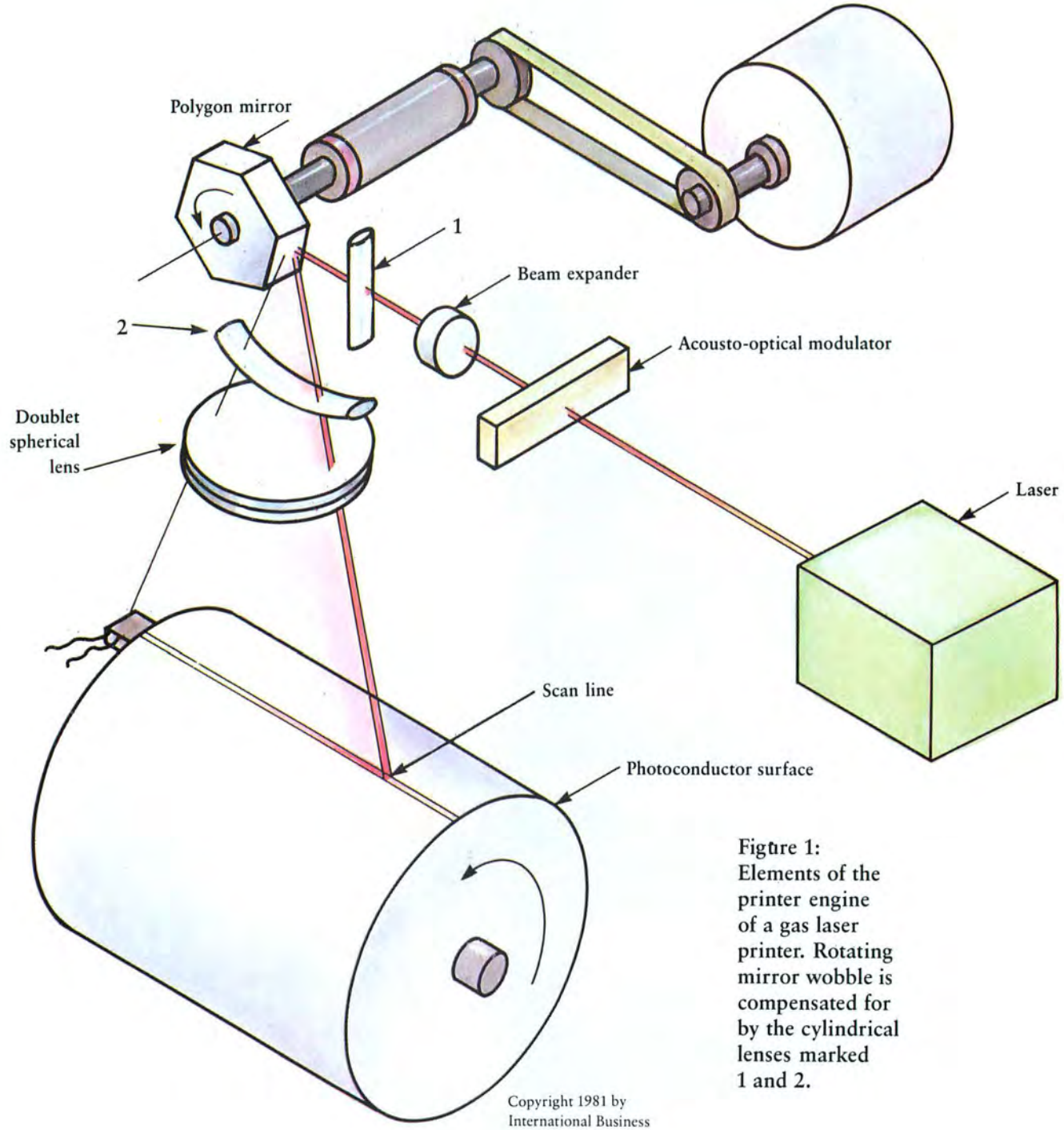

Figure 1:
Elements of the printer engine of a gas laser printer. Rotating mirror wobble is compensated for by the cylindrical lenses marked 1 and 2.

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Laser Printers

Janette Martin

Thanks to innovations in solid-state technology, laser printers are dropping in price, shrinking in size, and, in some cases, becoming integrated with optical character recognition, photocopying, and facsimile technology. Several desktop laser printers have already appeared on the market, and more are on the way.

Although the word *laser* conjures up visions of Flash Gordon and Luke Skywalker, laser technology is now becoming commonplace in industry, science, and the arts. Lasers are also playing an increasingly important role in the microcomputer peripheral market, predominantly in optical storage disks (see "Seeing Is Retrieving," *PCW*, Vol. 2, No. 7) and in laser printing. Of these two applications, laser printing should have more immediate impact on the PC market.

Due to recent technical innovations that have reduced both their size and cost, laser printers are beginning to make up a major portion of nonimpact printer sales. Nonimpact printing is distinguished from impact printing in that an image is achieved without contact between the print mechanism and the paper. The combined traits of imaging flexibility and quality and quiet operation make the laser printer a valuable partner for the PC.

The three major technologies competing for the nonimpact printing market are thermal, ink jet, and laser. Thermal printers use heat to "brand" images onto specially coated paper. Ink jet printers spray images onto paper (see "Silent Running," *PCW*, Vol. 1, No. 10). Laser printers, on the other hand, sweep a pulsing beam of light rapidly across an imaging surface. This scanning technique forms an image one line at a time, from top to bottom, much like television raster scanning.

A Hybrid Technology

Laser printing has evolved from the fortunate union of a high-quality laser exposure process and the electrophotographic techniques developed for document copiers during the 1960s. In the mid-1970s Xerox introduced the Xerox 9700 laser printer, which was the first printer to combine digital input, laser scanning, and copier-type electrophotographic imaging. Other industry leaders quickly followed suit, adding enhancements and refinements that have brought the hybrid technology to its present state.

Laser printing involves several major components. In a typical laser printer an intense light source is emitted, turned on and off with a control system ("modulated"), channeled and refined with a precisely tuned optics system, and directed to a photoconductive drum where it "writes" an image; the image is then developed on paper into readable form (see Figure 1).

Two of the most common techniques used to originate the laser beam in laser printers are gas and solid state. Gas is the original laser technology for printers; the solid-state method is a more recent development. Each method has its benefits and drawbacks.

To produce the intense light source in a gas laser printer, an electrical discharge is sent through a cavity filled with helium-neon, helium-cadmium, or argon gas. In solid-state printers the discharge passes through a cleaved gallium arsenide crystal. The electricity excites the atoms to higher than normal energy states. As the atoms fall to lower energy states, they emit light spontaneously at a wavelength corresponding to the change in energy.

This "spontaneous" emission is the source of what most of us consider "normal" (to the scientist, "incoherent") light, such as that produced by an incandescent bulb. Lasers, however, require "stimulated emission"; the term *laser* is an acronym for light amplified by stimulated emission of radiation. For stimulated emission to occur, more atoms must be at upper energy states than at lower states, as is the case in a fully charged laser cavity or crystal. When one atom spontaneously emits light, neighboring high-energy atoms are stimulated to emit light at the same wavelength.

In a gas laser cavity, the light waves are reflected back and forth by mirrors at each end of the cavity, further intensifying the light. One of the mirrors is partially transparent, allowing a fraction of the light to escape to form the laser beam. In a solid-state laser, mirrors are not required because opposing ends of the crystal itself can be designed to act like mirrors.

In either case, the single-frequency, intensified light is emitted in a narrow, coherent (in-phase) beam. Gas lasers require an external magnetic modulation source to turn the beam on and off since the beam emitted from the gas laser cavity cannot be turned on and off directly (see Figure 1). However, in the solid-state laser a magnetic field can be applied directly to the crystal to turn the beam on and off, simplifying the process of modulation.

The Optics System

Laser beam pulses must be channeled and refined before they are scanned onto the surface of a photoconductive drum. The optics system used to do this may include special lenses that expand the beam, collimate it (make it parallel), and compensate for intensity variations. Figure 1 shows a beam expander and three lenses used to channel and refine the beam.

To aim the beam at the photoconductor surface, a reflecting surface such as the rotating polygon mirror shown in Figure 1 is often used. The mirror has multiple faces, each of which reflects successive scans of the laser beam. One problem with a polygon mirror is that it may wobble during rapid rotation, resulting in distortion of the scanned image. To compensate for possible distortion, the reflected laser beam is often further refined by lenses positioned between the mirror and the photoconductor drum.

Manufacturers are experimenting with using a hologon scanner in place of the polygon mirror scanner (see Figure 2). The hologon scanner uses a holographic beam deflector similar to those used in making holograms. Hologon scanners are desirable because of their optical simplicity and freedom from wobble.

The Electrophotographic System

The printing process used in laser printing is almost exactly the same as that used in electrostatic copier machine technology. Electrophotography employs a photoconductor drum whose surface is coated with a substance that changes in electrical conductivity depending on the amount of radiation to which it is exposed.

Gas lasers emit light beams in the blue, green, and red spectrum that are visible to the naked eye and are easily detected by a standard, copier-type photoconductor. Solid-state lasers emit light beams in the infrared spectrum that are not visible to the naked eye and that require use of a special photoconductor. Laser beam scanning discharges rows of dots, which are deposited on the photoconductor until an entire latent page image is formed on the surface of the drum.

The latent page image is transferred to paper through an electrostatic process in which powdered toner is deposited on the drum. The toner, similar to that used in copier machines, has a charge opposite to that of the latent page image. The toner is therefore attracted to the laser-formed image and clings to the surface of the drum. Excess toner is not attracted by the charge and drops away. Paper is rolled onto the drum surface, where it receives the toned image.

Once the toner particles are transferred from the drum, the image is fused to the paper by pressure and heat. The photoconductor drum is scraped clean before the laser beam scans the next latent page image onto it, and the process begins again.

The Shrinking of a Printer

Gas laser printers have typically been bulky, complex, and costly due to their precise mirroring systems. A typical gas laser beam cavity may be several feet in length and several inches in diameter. With this type of laser it is also more difficult to modulate the beam. In addition, because gas lasers require more power than solid-state lasers, gas laser printers often require an external power supply, adding to their overall size and cost.

Solid-state lasers have the advantage of being extremely small (the crystal is about the size of a thimble), easy to modulate, and less expensive than gas lasers. The power supply may be separate from or integral to the printing system. However, solid-state laser beams tend to

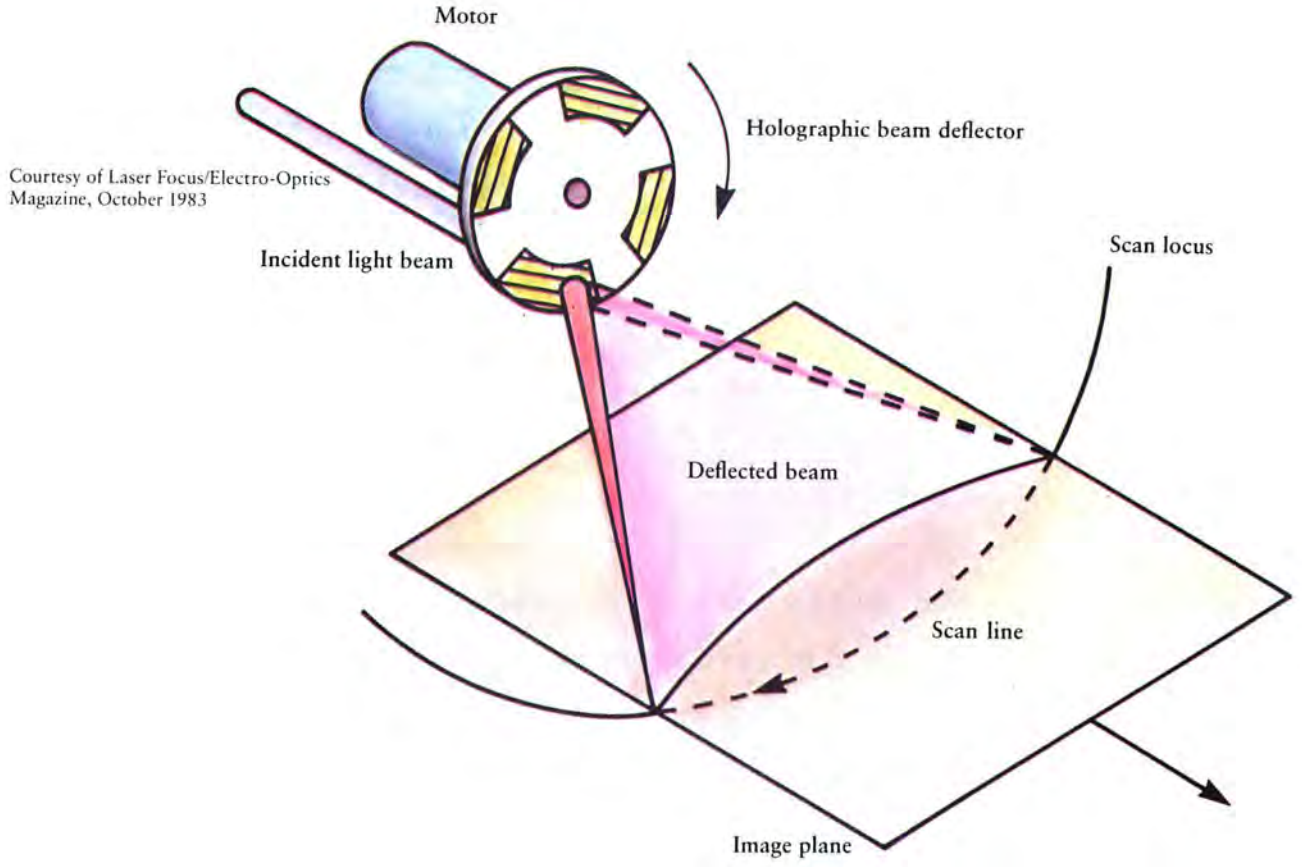

Figure 2: Hologon scanner. The holographic beam deflector uses a high-diffraction-angle transmission hologram to make the system free of wobble.

produce lower-quality images than gas lasers. Still, due to their simplicity, small size, and low cost, solid-state lasers appear to be the trend.

Another factor that is bringing down prices for desktop laser printers is the introduction of disposable drums and toner components, which eliminate costly service calls and the messy handling of toner. The Canon LBP-CX desktop laser printer requires a new cartridge drum about every 3000 pages. The drum costs about $100, but Canon claims that the cost is comparable to outfitting an impact printer with carbon ribbons.

Another cost-cutting factor in the new desktop laser printers is the use of less precise, mass-produced polygon mirrors. The mirrors' lack of precision is compensated for by special lenses that refine the beam after it is reflected from the mirror.

Most laser printer manufacturers produce only the printer engine, which includes the laser beam source, the optics, and the electrophotographic system. These manufacturers sell their printer engines to other manufacturers, who add controllers and software interfaces.

The original manufacturer typically sells a desktop laser printer engine to the second manufacturer for $1000 to $5000. After completing the printers, the second manufacturer might sell them for $2000 to $14,000, depending on the printers' capabilities, speeds, and options. The average desktop laser printer will soon fall into a price range that is competitive with fast (80 characters per second, or cps) letter quality impact printers.

The difference between one typeface and another is often very subtle; it may be no more than a slight difference in the shape of the serif, the length of the ascenders and descenders, or the size of the x-height. But regardless of how small the difference, the typeface, and therefore the appearance of the printed page, will be affected.†

THE DIFFERENCE BETWEEN ONE TYPEFACE AND ANOTHER IS OFTEN VERY SUBTLE; IT MAY BE NO MORE THAN A SLIGHT DIFFERENCE IN THE SHAPE OF THE SERIF, THE LENGTH OF THE ASCENDERS AND DESCENDERS, OR THE SIZE OF THE X-HEIGHT. BUT REGARDLESS OF HOW SMALL THE DIFFERENCE, THE TYPEFACE, AND THEREFORE THE APPEARANCE OF THE PRINTED PAGE, WILL BE AFFECTED.†

The difference between one typeface and another is often very subtle; it may be no more than a slight difference in the shape of the serif, the length of the ascenders and descenders, or the size of the x-height. But regardless of how small the difference, the typeface, and therefore the appearance of the printed page, will be affected.†

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Date _____ Time _____

MEMO

M _____

of _____

Phone No. _____

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WILL CALL AGAIN	WANTS TO SEE YOU

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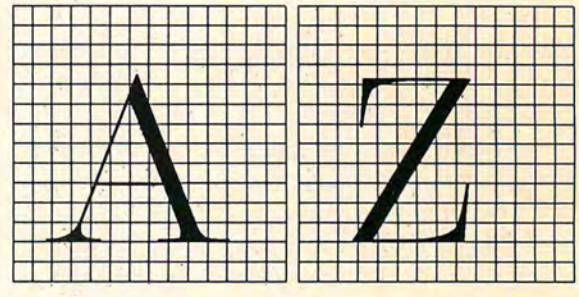
$$\Psi(P) = i \frac{Ak}{4\pi} \int_\sigma \frac{e^{ik(r+r_0)}}{rr_0} (\mathbf{e}_r - \mathbf{e}_0) \cdot \mathbf{n}\, da$$



† Phototypesetting: A Design Manual by James Craig

Figure 3: Document printed on a Canon LBP-CX. One advantage of laser printers is that they can print different fonts on one page.

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Das Louvre–Museum

Dieser ehemalige Palast eines königs wurde im 16. Jahrhundert von Franz I. geplant wurde, und erst im 19. Jahrhundert fertiggestellt worden. Der Louvre ist ein majestätisches Gebäude, das die Ent–wicklung der französischen Renaissance widerspiegelt. Der west–liche Teil gegenüber dem Cour Calais ist die älteste Einrichtung. Der größte Teil des Palasts ist heute das Louvre Museum, eines der größten Museen seiner Art in der Welt.

Der Eiffelturm

Der Eiffelturm, 1889 für die Internationale Ausstellung gebaut, ist 300 m hoch. Besucher können zur Aussichtsplattform fahren und haben dort, in einer Höhe von 274 m, eine ausgezeichnete Sicht über Paris und seine Umgebung.

Figure 4: Fujitsu's M30725 laser printer output with integrated text and graphics. The image overlay function merges graphics with text sent from the PC.

Laser printers produce high-quality images and can print multiple fonts on the same page (see Figure 3). This capability works hand-in-hand with integrated software that mixes graphics with a number of text styles in documents. Usually a laser printer comes with up to three fonts, and additional ROM font modules are optional. Many laser printers produce high-resolution graphics of 300 by 300 dots per inch (dpi). The printers print on cut-sheet paper.

If you're thinking about buying a laser printer, be sure to consider the cost of supplies (disposable drums and font modules) and electric bill increases due to higher power consumption.

Laser Printers for the PC

Desktop laser printers are beginning to appear on the market, and new models should be available in late 1984 and 1985. While the current trend is for printer engine manufacturers to find other manufacturers to finish their products, as laser printers become established in the non-impact printer market, original manufacturers will build their own printers and distribute them.

Hewlett-Packard was one of the first companies to make Canon's LBP-CX solid-state laser beam printer engine available to microcomputer users. Canon's machine dressed up in HP's clothing is called LaserJet.

LaserJet retails for under $3500 and produces letter quality print at about eight pages per minute (300 cps). It comes with an RS-232C interface and a 50K buffer that holds up to six pages and prints with a character resolu-

tion of 300 by 300 dpi (75 dpi for graphics). Other features include a cut-sheet feeder; three standard fonts, including Courier 10 in vertical (portrait) or horizontal (landscape) page positions; and an optional plug-in cartridge with up to nine additional software-selectable fonts. Paper sizes include 8½ by 11, 8½ by 14, and European A4 and B5.

Fujitsu manufactures two desktop laser printers, the M3072S and the M3071A. The M3072S prints 16 pages per minute in 300- by 300-dpi resolution. The printer includes a controller and a power supply and is available with either an RS-232C or a Centronics parallel interface.

The standard ROM font cartridge available with the Fujitsu M3072S has one character set, and three font cartridges can be added. An image overlay option merges graphics with text sent from the host computer (see Figure 4). Also available is an electronic forms overlay option that allows storage of a form in a forms overlay buffer. The host computer sends data to fill in the form, thereby eliminating the storage and management problems of preprinted paper forms.

Fujitsu's other desktop laser printer offers photocopying and optical character recognition along with laser printing. The three-in-one M3071A uses laser beam electrophotography for printing; a halogen lamp and electrophotography for copying documents; and a charge-coupled device (CCD) that scans, digitizes, and sends an image to the computer for processing (see Figure 5). The CCD is essentially an optical character recognition device.

Top: Hewlett-Packard's LaserJet with the HP 150 touch-screen personal computer. The LaserJet operates with the IBM PC and compatibles. Bottom: With the LaserJet it is easy to replace printer drums and toner components.

Laser Printer Manufacturers

The following primary and secondary manufacturers are marketing laser printers:

Primary Manufacturers

Canon USA
1 Canon Plaza
Lake Success, NY 11042
516/488-6700
LBP-5/480, 5 pages/minute
LBP-CX, 8 pages/minute
LBP-10, 10 pages/minute

Fujitsu
2945 Oakmead Village Ct.
Santa Clara, CA 95051
408/946-8777
M3071 and M3072 (with controller), 240 dots/inch, 20 pages/minute or 300 dots/inch, 16 pages/minute

Hitachi
59 Route 17
Allendale, NJ 07401
201/825-8000
SL 1000, SL 1000A, SL 1000B, 12 pages/minute

Secondary Manufacturers

Hewlett-Packard
1501 Page Mill Rd.
Palo Alto, CA 94303
800/367-4772
2682A LaserJet Printer, 8 pages/minute, $3495

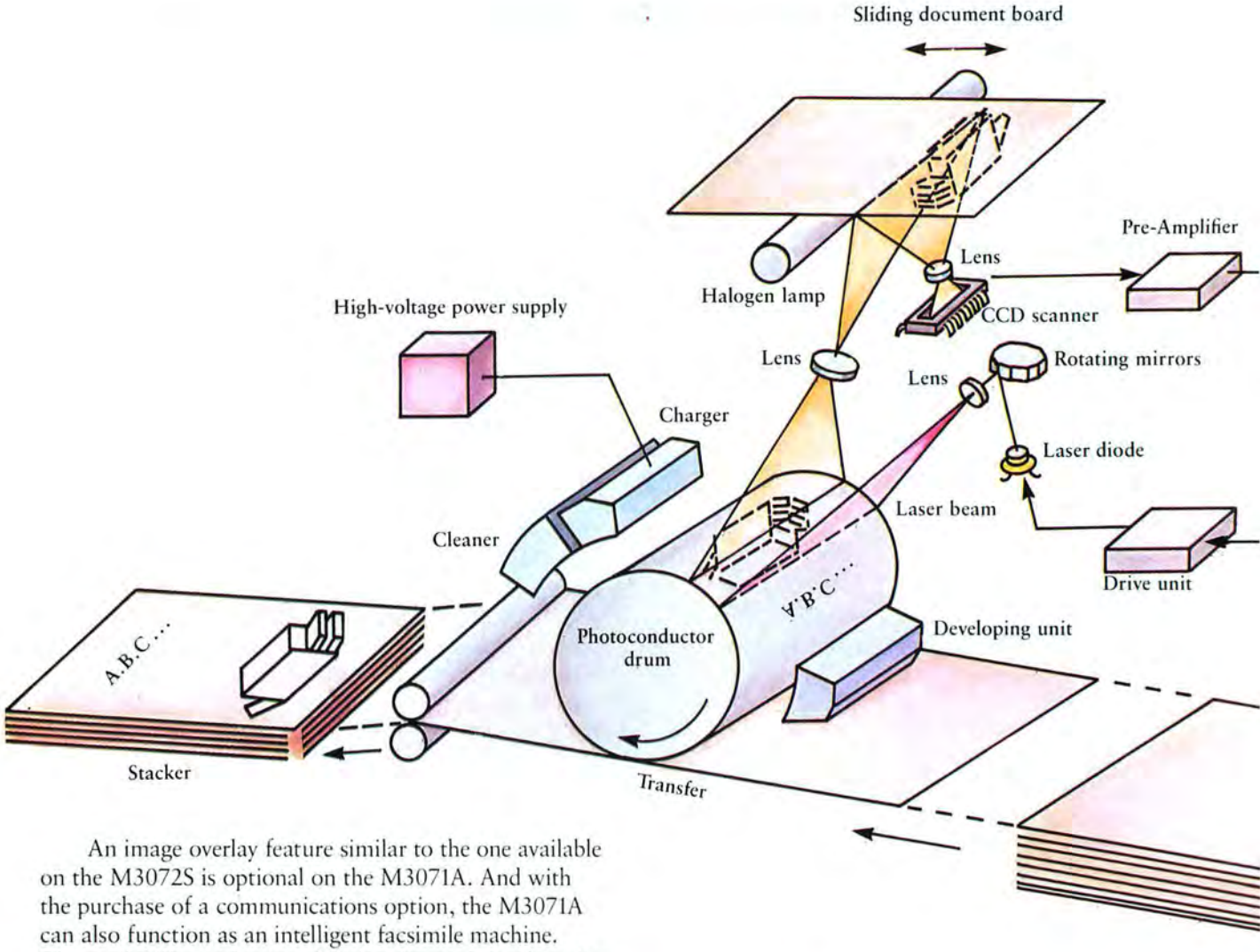
IMAGEN Corporation
2660 Marine Way
Mountain View, CA 94043
415/960-0714
8/300, 8 pages/minute, $9950

Mita
Heights Plaza
Hasbrouck, NJ 07604
201/288-6900
Mita's laser printer is not yet available on the market.

Quality Micro Systems, Inc.
P.O. Box 81250
Mobile, AL 36689
205/633-4300
Lasergraphix 800, 8 pages/minute, $9995
Lasergraphix 1200, 12 pages/minute, $24,995

Ricoh Corporation
5 Dedrick Pl.
West Caldwell, NJ 07006
201/575-9550
LP4120, 12 pages/minute, $14,000

Xerox Corporation
Systems Marketing Division
880 Apollo St.
El Segundo, CA 90245
213/615-6155
Xerox 9700 Electronic Printing System, 120 pages/minute, $400,000
Xerox 8700 Electronic Printing System, 70 pages/minute, $212,000
Xerox 5700 Electronic Printing System, 43 pages/minute, $65,000
Xerox 2700 II Distributed Electronic Printer, 12 pages/minute, $19,995



An image overlay feature similar to the one available on the M3072S is optional on the M3071A. And with the purchase of a communications option, the M3071A can also function as an intelligent facsimile machine. The availability and price of both printers depend on the agreements with second manufacturers.

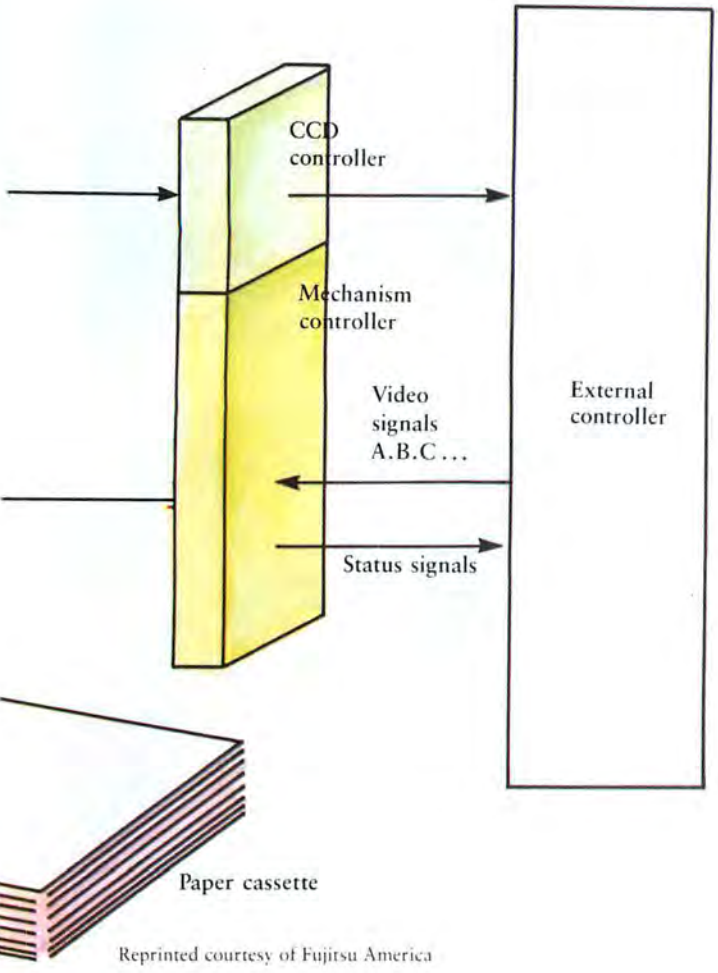
Ricoh's entrant in the desktop laser printer market is the LP4120 tabletop laser printer. The LP4120 prints 12 pages per minute with up to four 128-character fonts on a single page. Nine typefaces are available with the LP4120, including Prestige Elite, Courier 10, Bold Face PS, and Letter Gothic 15. The LP4120 can be purchased with an RS-232C, RS-422, or Centronics parallel interface. LP4120 is available now from a second manufacturer for around $14,000. During 1985 Ricoh will market the printer directly to end users.

Other manufacturers producing desktop laser printer engines include Hitachi and Mita. Their laser printers print in the range of 12 to 26 pages per minute with resolutions between 240 by 240 and 300 by 300 dpi.

Lasers and the Future

One of the greatest potentials of the laser printer is its ability to serve as the focal point of electronic mail systems. The printer can be connected directly to one or several word or data processors, interfaced with local area networks, or linked to a system of remote devices through telecommunications.

MCI, Western Union, and Telecomputer Laser Printing Corporation use large gas laser printers to accept documents through telecommunications from remote computer sources. This enables them to print documents at lightning speeds.



Reprinted courtesy of Fujitsu America

Figure 5: Fujitsu's multifunction laser printer combines optical character recognition and photocopying with printing functions. The laser diode emits a laser beam for printing. The CCD (charge-coupled device) scanner is the OCR component that reads documents and sends video signals to the computer. The halogen lamp generates photocopies.

The next step in the evolution of laser printing is color imaging. This feature is already available with color ink jet printers. Special laser printers can currently print multiple colors by making several separate latent images, one for each color of the final print. Successive powdering and fusing, each with a different color toner, result in multicolor images.

The nascent technology of color laser printing is currently out of the price range of microcomputer users. But the buying power of the PC user is strong enough to be taken seriously by the biggest manufacturers in the industry. We can look forward to a printing future that is fast, quiet, and most likely colorful, in which lasers will play an increasingly important part.

Janette Martin is a freelance writer and Contributing Editor for PC World. *She also trains users of PC software.*

You won't get over what this 350 CPS printer does for under $2,000.

When you see what the CI-3500 Serial Printer can do, you might not believe it's priced under $2,000. Besides giving you data processing printing at 350 CPS, the CI-3500 delivers letter quality printing at a rapid 87 CPS—more than twice the speed of most daisy wheel printers.

And you also get the capability for high resolution graphics, up to 240 X 144 DPI.

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A similar font cartridge system accommodates multiple fonts and character sets, so you can avoid costly PROM installations.

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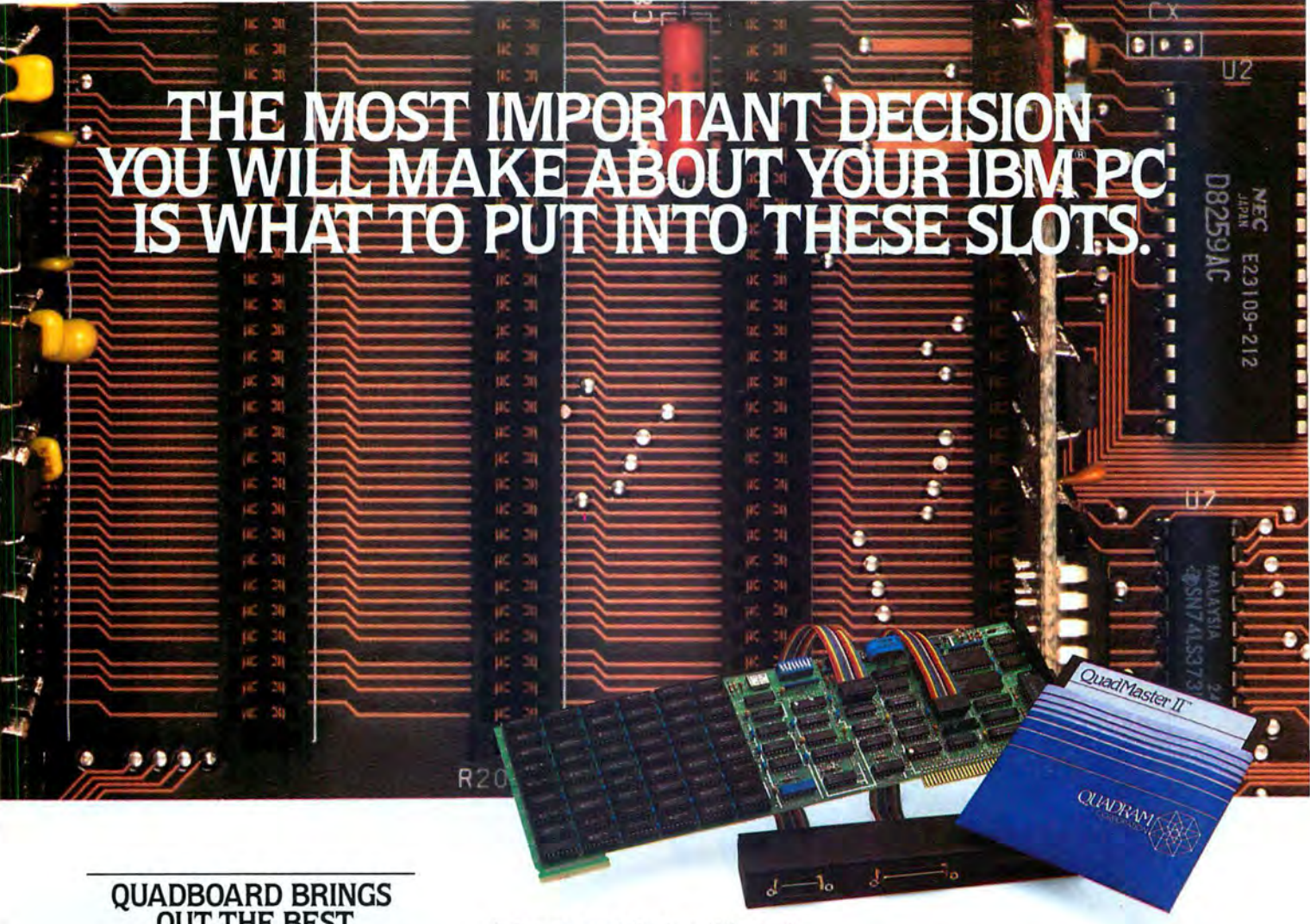

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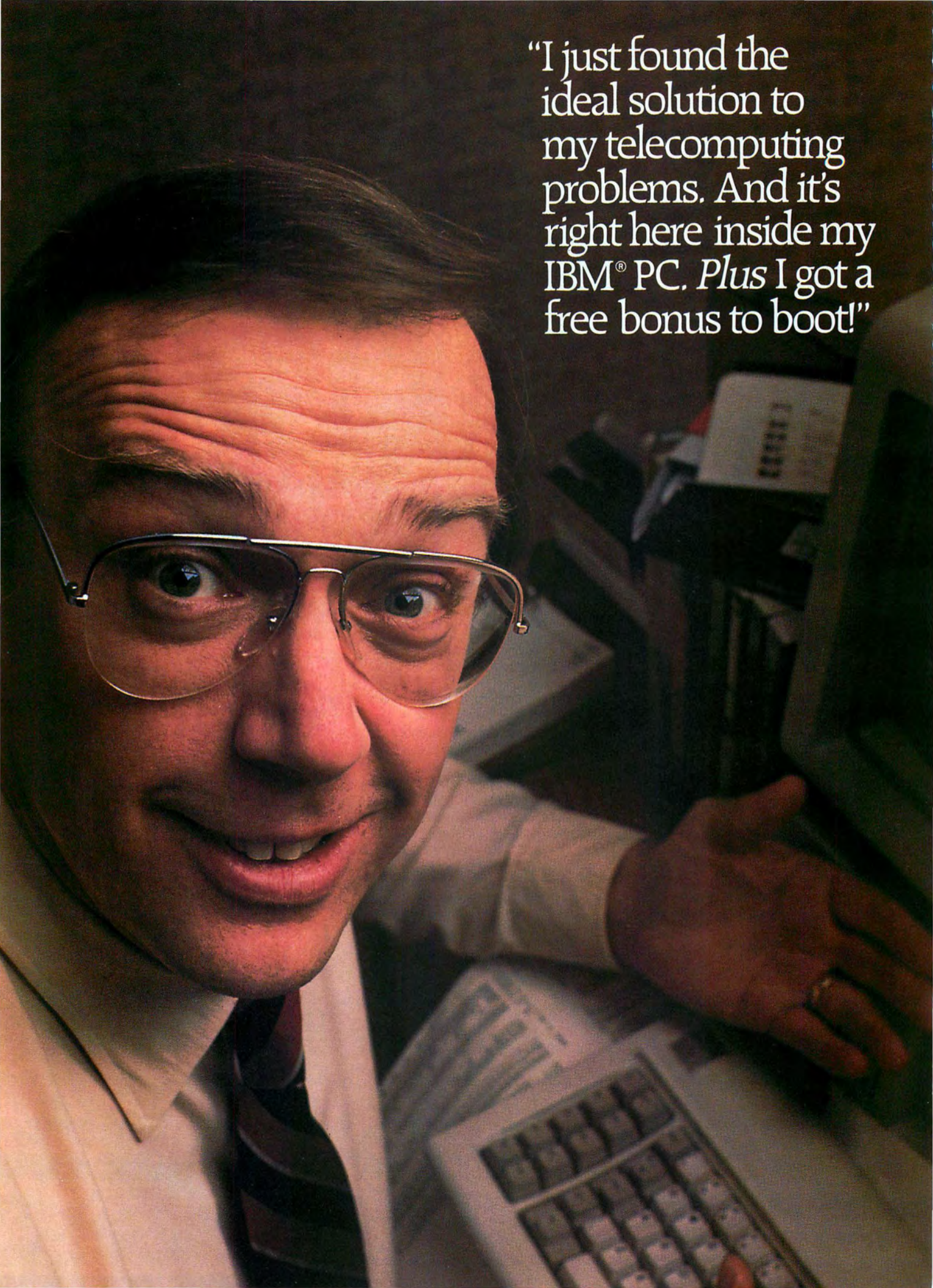
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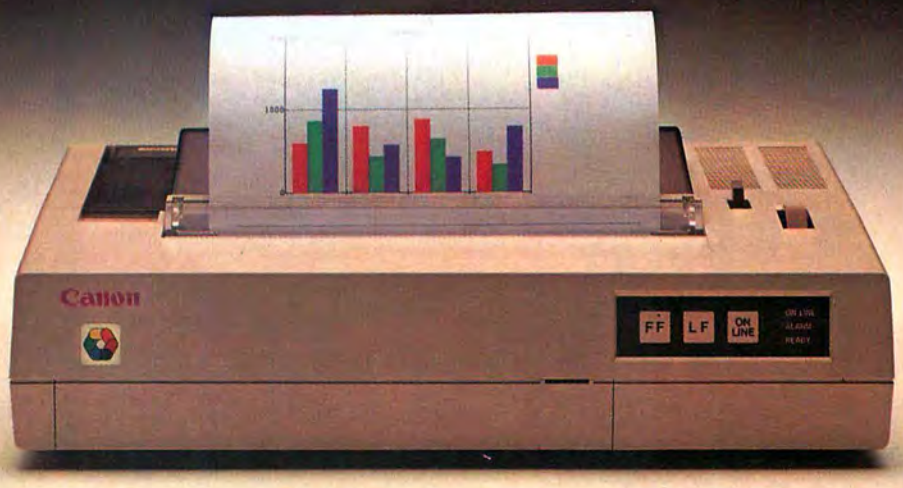
What's more incredible about Canon's color ink-jet printer? The quality... or the price?



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Circle 704 on reader service card

The 3270 Improves Its Image

D. M. Tucker

The IBM 3270-PC is a powerful personal computer and a member of the ubiquitous 3270 family of mainframe display terminals. Two new graphics boards, PC Graphics and Host Graphics, allow the 3270-PC to grow in both directions, expanding its visual horizons and sharpening its pictures to boot.

The IBM 3270-PC is a dual purpose computer that straddles the fence separating personal and mainframe computers. On one hand, the 3270-PC is a powerful personal computer; on the other, it is an advanced mainframe work station—a member of the ubiquitous 3270 family of mainframe display terminals. PC Graphics brings high-resolution, bit-mapped graphics to the 3270-PC when it runs as a PC-DOS machine; Host Graphics lets the 3270-PC in terminal mode perform "image viewing"—the display of photographic-quality images of anything that can be digitized (translated into a form that a computer can understand and store) and stored on a mainframe. PC Graphics offers better, sharper displays; Host Graphics opens up a world of graphics options to the 3270-PC user since it allows any image—letter, dental chart, or photograph—to be stored and displayed.

While you may not want to throw away your microfilm or empty your file cabinets quite yet, you may consider it once you have explored the possibilities of image viewing. Although its implications and uses have not yet been sorted out, Host Graphics points the way toward better and more efficient storage of text and images.

These sophisticated graphics features join a list of powerful capabilities already available on the 3270-PC (see "Mainframe PC," *PCW*, Vol. 2, No. 1). The 3270-PC can handle four concurrent sessions from one or more mainframe computers, along with two notepad tasks and one operation under PC-DOS. Each session or task is managed in its own window, which can be moved, expanded, or contracted at the user's discretion. Data can be copied from one window to another (excluding the PC-DOS window); file transfers between the 3270-PC and a mainframe using the MVS/TSO or VM/SP operating system are straightforward and fast. The 3270-PC control programs can also store and play back keystroke sequences and thus eliminate the drudgery of retyping commands. The 3270-PC hardware and software package is rounded out with an online, step-by-step tutorial that is versatile enough to guide beginning or experienced 3270 terminal users.

PC Graphics and Host Graphics significantly increase the potential number of 3270-PC users. Though both expansion boards can be installed in the same 3270-PC system unit, they function under different conditions. Host Graphics is compatible with the 3279 display station, the 3270-PC's progenitor, and takes advantage of mainframe software already in use. PC Graphics is essentially the 3270-PC equivalent of the IBM Color/Graphics Adapter and works with the many PC packages currently on the market.

> Host Graphics points the way toward better and more efficient storage of text and images.

Symbolic Images

The Host Graphics board allows images or original documents, such as signed papers, forms, and handwritten notes and drawings, to be displayed on the 3270-PC in terminal mode. Images can be rotated, enlarged, or reduced, and paged like a

With the proper mainframe hardware and software, a 3270-PC can retrieve and display actual images—instead of recreating them with computer graphics.

document, but they cannot be altered on the 3270-PC. Since the 3270-PC in this mode acts only as a display terminal, any changes in an image must be made at the mainframe.

Images are captured and digitized by an IBM Scanmaster I (a device that resembles a photocopier) and stored in a mainframe by IBM software packages that support distributed office systems, such as *DISOSS/MVS* and *DISOSS/PS*. Another mainframe program called *Graphical Data Display Manager (GDDM)* sends the images to be displayed, along with the necessary control information, to the 3270-PC.

> Letters from customers can be stored in digitized form in a mainframe data base and later retrieved by any 3270-PC.

The process involves the use of programmed symbols. The Host Graphics board stores 1140 symbols (six sets of 190); each symbol lights up pixels (picture elements) in a unique way in a 9- by 12-dot character cell on the screen, producing colors, shades, patterns, and so on. When an image is captured, the mainframe image-viewing program analyzes the data created by Scanmaster I's digitizing process and determines which symbols are required to display the image. When the 3270-PC asks the mainframe for an image, *GDDM* forwards the appropriate symbols and the image data, which determines the display sequence of the symbols, to the Host Graphics board.

Once the definitions are received by the board, the data representing the image is sent to the 3270-PC. The proper symbols are selected from the programmed symbol sets, the dot matrix patterns are generated, and the image is reproduced on the 3270-PC's screen. A displayed image cannot be stored to disk at the 3270-PC, but it can be dumped from the screen to a printer by pressing <Shift>-<PrtSc>. For reasons relating to limitations in the mainframe software and the Host Graphics board's memory, image viewing is restricted to one 3270 session or to one window managing that session.

Image viewing should open doors to a number of new applications. For example, letters received from customers can be stored in digitized form in a centralized mainframe data base and later retrieved by any 3270-PC attached to the network. Signed documents and forms filled in by hand can be digitized and used in applications that require the storage and verification of handwriting. Banks, credit card companies, and other financial institutions will find the 3270-PC handy for signature verification. Insurance companies and law enforcement and other government agencies can access images of original accident reports, claims, and other documents, and doctors, dentists, and medical technicians can display original patient records and charts. All of these tasks can be performed without the bother of microfilm, file folders, or paper.

PC Graphics

The 3270-PC was originally limited to displaying ASCII characters. With the addition of PC Graphics and IBM's high-resolution, 14-inch 5272 monitor, the 3270-PC can display bit-mapped graphics. Users can choose between high-resolution, two-color graphics (720 by 350 or 640 by 200 pixels) or medium-resolution, four-color graphics (360 by 350 or 320 by 200 pixels). PC Graphics is compatible with software developed for the IBM Color/Graphics Adapter, though some vendors may have to reprogram their software to take advantage of the 3270-PC's higher resolution. Some products, such as Lotus Development's *1-2-3* and Digital Research's *Draw*, have already been modified for the 3270-PC and display crisp graphics on the 5272 display monitor.

Together PC Graphics and Host Graphics bring more of the micro and the mainframe worlds to the 3270-PC. With more adapted PC graphics programs on the market and the growing availability of mainframe image viewing, the dual-function 3270-PC is likely to edge the millions of 3270 terminals off their desk tops. IBM has answered a pressing market need and will likely fatten its pocketbook in the process.

D. M. Tucker was a systems engineer and manager for IBM for 17 years. He was recently editor and publisher of a technical journal on mainframe data management systems, InfoIMS, *and is currently an independent consultant in San Francisco.*

PC Graphics
IBM
Information Systems Group
900 King St.
Rye Brook, NY 10573
914/934-4488
List price: $550
Requirements: PC-DOS 2.00 or 2.10

Host Graphics board
IBM
List price: $800, mainframe image-viewing program $5400
Requirements: PC-DOS 2.00 or 2.10

IBM Scanmaster I (IBM 8815)
IBM
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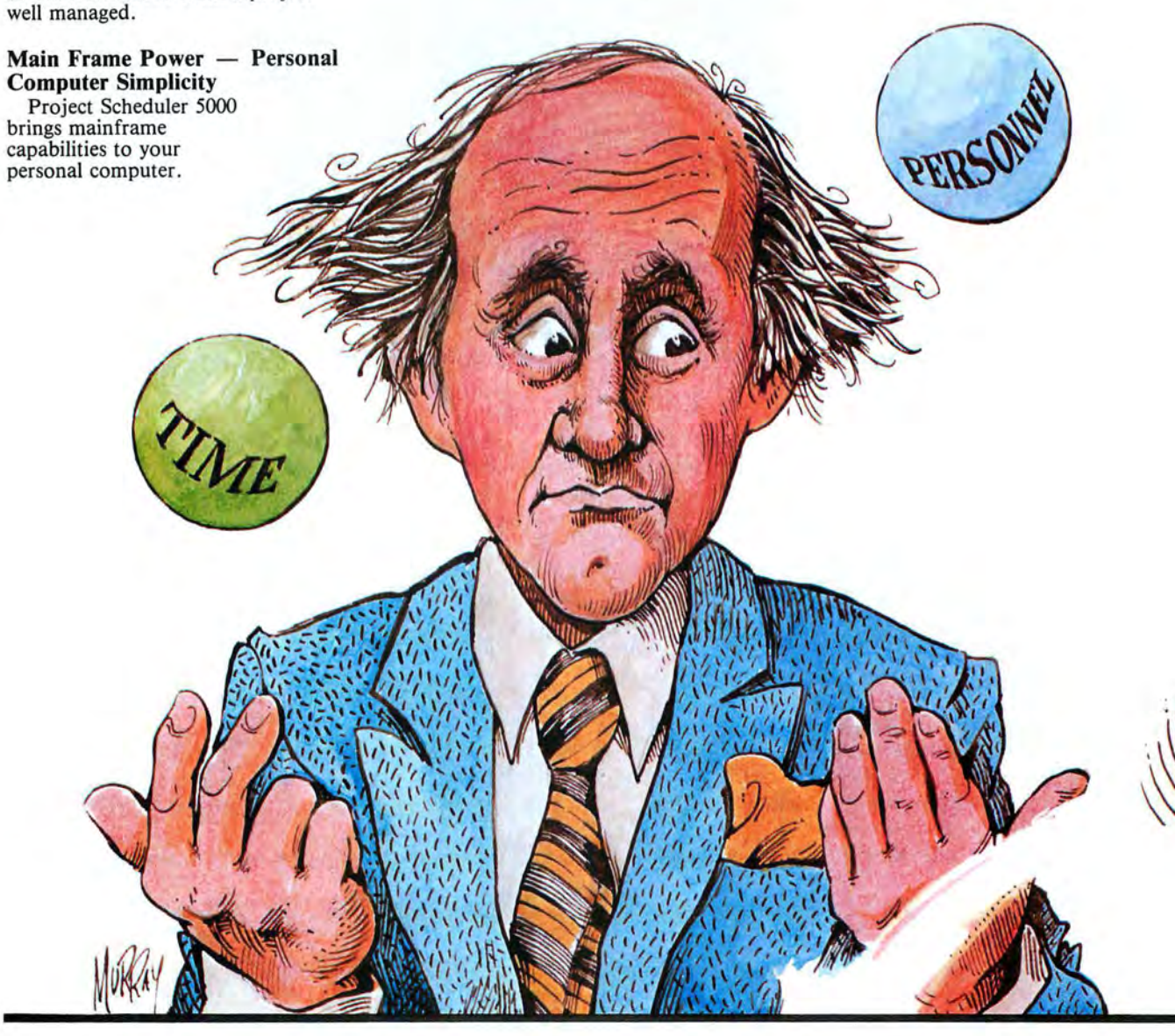

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*Project Scheduler 5000 plus Graphics available 4th quarter 1984.

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Circle 741 on reader service card

Compatibles Update

New and notable developments from the world of PC work-alikes

Ken Greenberg

Compatibles Update keeps tabs on the growing market of personal computers that emulate the IBM standard. The column features news on hardware and software as well as insights into the legal and marketing issues that affect compatibility. *Compatibles Update* also goes behind the headlines and talks to the newsmakers who guide this volatile industry.

Computers

Eagle Flies at XT

When IBM sues you over routines in your BIOS ROM, prompting a brief halt in production and the first quarterly loss in your company's history, how do you respond?

If you're Eagle Computer, you introduce the Turbo XL, a PC XT compatible with speed to spare. Specifications on the 8086-based desktop machine include 256K RAM expandable to 512K, a 10MB hard disk, a single 5¼-inch, half-height floppy disk drive, an IBM-style detachable keyboard, and five expansion slots that are spaced a full inch apart. MS-DOS 2.11 and BASICA are bundled with the Turbo XL, and options include a 12-inch monochrome or a 13-inch RGB monitor. The Turbo XL replaces the Eagle 1600, also an 8086-based machine.

The new Eagle computer comes with a gearbox of sorts. With the flick of a switch on the front of the system unit you can accelerate from a 4.77 MHz clock speed—standard for 8088-based machines—to an 8 MHz rate that makes better use of the 8086's processing power. Shifting into high can be done while a program is running. Eagle claims that this feature makes the Turbo XL 25 to 50 percent faster than the PC XT but affects PC compatibility only slightly. Certain games and some copy-protected software are finicky about timing, according to Eagle spokesperson Ursula Herrick.

The Eagle Turbo XL, a two-speed PC compatible

Eagle is hoping that the Turbo XL's speed will help it carve out a niche as a file server in the EagleNet local area network. The company is also reportedly negotiating to make the Turbo XL a software development tool, principally for a new multiuser operating system. Herrick declined to give details about that system but said that it was not a variant of the IBM PC/IX or Microsoft XENIX versions of UNIX.

Release of the Turbo XL was delayed for roughly one month while the computer manufacturer, based in Los Gatos, California, updated the BIOS ROM for its compatibles. That delay, combined with the recent dent in the company's earnings, prompted a round of price cuts. Eagle trimmed $300 from the price of its PC Plus 1, PC Plus 2, Spirit portable, and Spirit XL hard disk portable computers.

A Graphic Challenge

A couple of Atari alumni and a former Intel engineer have teamed up to produce the Mindset Personal Computer, a portable PC compatible replete with vivid, high-speed color graphics.

The Mindset is the work of Roger Badertscher and Bruce Irvine, both formerly of Atari, and former Intel designer Gary Wood. The 22-pound machine, powered by the Intel 80186 microprocessor, includes MS-DOS 2.00, 64K RAM upgradable to 256K RAM, two ROM cartridge ports and up to 720K of disk storage with two 5¼-inch disk drives, two high-speed graphics coprocessors, and a proprietary ROM that includes graphics calls and commands. Each graphics chip contains more than 25,000 transistors, comparable to chips in CAD/CAM systems. The graphics chips were developed by VLSI Technologies at a reported cost of $200,000.

The $2400 list price of the fully configured system does not include a color monitor. Maximum resolution on an optional high-resolution monitor is 640 by 400 pixels for 2 colors or 320 by 200 pixels for 16 colors (selected from 512 available colors). Graphics are bit-mapped only. The Mindset can be used to create videotex images and supports stereo sound generation.

PC compatibility is a bit of a mystery. Mindset's Chris Berg cheerfully acknowledged that the Mindset cannot run Microsoft's *Flight Simulator*, the usual litmus test of compatibility since the program makes direct calls to the ROM. "We don't want to compromise our graphics for programs with inferior graphics capability," Berg explained. Other differences are that function keys stretch across the top of the keyboard and the Mindset lacks a numeric keypad. The computer can accept a mouse and a joystick.

The Mindset's unconventional design has won plaudits and a place in New York's Museum of Modern Art.

In a handout on the computer, Mindset Corporation addresses the IBM compatibility of its ROM. The company claims that two elements of its ROM BIOS—entry points and entry routines—either are PC compatible or emulate the PC's ROM. Hence the claim that the machine can read and write IBM-formatted disks.

The Mindset's stacked attaché-case look has proven a hit with New York's Museum of Modern Art. Citing the "quality and historical significance of its design," curator Stuart Johnson selected the computer for inclusion in the museum's Architecture and Design Collection. The design firm GVO collaborated with Mindset engineers in fashioning the computer's exterior. The Mindset joins GRiD's Compass and some 2000 other household items in the museum's collection. For more information contact Mindset Corporation, 671 N. Mary Ave., Sunnyvale, CA 94086, 408/737-8555.

Direct Inc. Touts Compatibility, Mainframe Links

Targeting the lucrative Fortune 1000 market, Direct Inc. has unveiled its Integrated Personal Computer (IPC), a PC compatible that features micro-to-mainframe, multihost communications.

Direct is promoting the IPC as a boon to corporations that require both a stand-alone microcomputer and a work station capable of functioning as a terminal for IBM, Digital Equipment Corporation (DEC), and Hewlett-Packard (HP) host computers. Using up to three optional boards and software, the IPC's IBM terminal emulations include the 3278-2, 3279-2, and 3279-3 (color) coaxial; 3270, 3274, and 3780 bisync; and 3270 and 3770 SNA protocols. HP 2622 and DEC VT100 terminal emulation boards and software are also available. In addition, the IPC's multihosting feature permits

window applications. The company claims that a user can, for example, run simultaneous HP-host, IBM-host, and MS-DOS sessions in three separate windows.

The IPC includes an 8088 microprocessor, 64K ROM, 128K RAM expandable to 256K, and two half-height disk drives that leave room for an internal hard disk. Rounding out the specifications are one parallel and two serial ports, an amber monitor and a monochrome video adapter board, and a Key Tronic keyboard. An optional "terminal personality" board offers such features as smooth scrolling and 80- or 132-column display. Direct says the machine can also accept expansion boards designed for the PC. MS-DOS 2.00 and Microsoft BASIC are included in the purchase price. For more information contact Direct Inc., 4201 Burton Dr., Santa Clara, CA 95050, 408/980-1414.

GRiD Update

GRiD Systems Corporation, manufacturer of the Compass briefcase-size computer, does not make a product known as Tempest, contrary to a report in our April issue ("The Compatibles Line Up," *PCW,* Vol. 2, No. 4). The term *Tempest* is used by the United States Department of Defense to describe any computer whose electronic emissions level meets the department's specifications. A computer's electronic emissions can be captured and decoded, which constitutes a potential security risk. Tempest certification means that key components—screen, cables, and ports in particular—have been shielded to suppress emissions. GRiD does manufacture a Tempest-certified product, the 1107. The GRiD 1107 includes 384K of bubble memory and 512K of RAM and lists for $12,495. The Compass line of briefcase-size computers starts at $5995.

Business

Victor Alive and Kicking

No sooner does Osborne Computer resurface, lean and chastened but with a new product, than Victor Technologies shows undeniable signs of life. Victor, which recently had been inseparable from certain adjectives (*failing, troubled, beleaguered*), seems to be weathering its Chapter 11 bankruptcy filing and may indeed be around for a while. Production of the Victor 9000, an MS-DOS-compatible machine, continues at nearly 100 units per day. "We're selling every machine we manufacture," reports Tony Jeans, director of software. "Morale is picking up tremendously."

The outlook in Scotts Valley, California, has improved markedly since February 6, when six of Victor's creditors filed a petition under Chapter 11 of the Bankruptcy Law. The company's indebtedness is decreasing, its court-sanctioned borrowings are up, some former employees are back on the payroll, and founder Chuck Peddle is working on the Victor Plus PC, a version of the 9000 that promises greater PC compatibility. Victor turned a profit during March and April, a performance good enough to help reduce an outstanding bank loan from $27 million to $2.5 million.

The company's board is considering a takeover offer from Applied Computer Techniques (ACT), its British distributor. There's a bit of irony here: ACT currently makes and sells the Apricot, but the Victor 9000 has been particularly well received in Europe, the Apricot's primary market. Victor may yet go it alone, however, bypassing proposals from ACT and other potential suitors, Jeans says. The mere fact that the company has suitors at all is a testament to how far Victor has come in a few months.

Once in third place behind IBM and DEC in sales of small computers to business, Victor found itself in dire straits last winter. Its parent holding company posted debts of $100 million. Victor Technologies, a unit of that company, was in somewhat better shape, with indebtedness of $129 million against assets of $35 million. Victor United, the company's distributor, was in arrears for $63 million against assets of $33 million. Layoffs had slashed the firm's work force in the United States from 2700 to roughly 200. Three major creditors —Tandon Corporation, Epson of America, and Prestige Electronics— were joined by three others in filing the bankruptcy petition. The full roster of creditors is said to exceed 4000. (Tandon remains Victor's primary supplier of disk drives— evidence, Jeans says, of a "cooperative spirit" that is helping the firm pull through.)

Jeans reports that the Plus PC, which features two expansion boards that enable the 9000 to run off-the-shelf PC software, will be released this quarter. Current Victor 9000 owners will be able to have the boards installed.

Victor's software picture, once murky, also appears to be brightening. Jeans says that Lotus Development, which halted production of *1-2-3* for the 9000 when Victor's fortunes were at their lowest, may reverse its decision. A spokesperson at Lotus declined comment.

At least one publisher is sticking with Victor. United Software, of Wichita, Kansas, vows to continue producing its *TMP/Free Form* file management and *TMP/Manager* data management programs. "Just because the company is going through some difficulty right now is no reason to turn our backs on them," says Chairman Bob Manton. "We feel the Victor 9000 is a very good machine."

Something Xtra on ComputerLand Shelves

Boutique computer makers stand aside. For that matter, watch out Texas Instruments and DEC. ITT, "the other phone company," is moving aggressively into the IBM-compatibles market with a PC clone of its own. Competition for shelf space among PC-compatible manufacturers large and small is apt to increase in the wake of ComputerLand's agreement with ITT Information Systems, manufacturer of the Xtra personal computer.

ITT Information Systems, a new division of ITT Corporation, began in May to ship units to the 602 ComputerLand stores worldwide. ComputerLand has become the exclusive retail source for the Xtra, and a spokesperson for the chain indicated that other major manufacturers—DEC and Texas Instruments among them—may eventually be squeezed off ComputerLand shelves. ITT is augmenting its retail efforts with a $15 million ad campaign.

The system unit of the ITT Xtra personal computer may be mounted vertically, conserving desk space.

The Xtra is an 8088-based machine featuring 128K RAM expandable to 640K, machine diagnostics in ROM, various 5¼-inch, half-height disk drive configurations (including a hard disk option), a 14-inch green or amber display, parallel and serial ports on the motherboard, and an enhanced version of MS-DOS 2.11. It boasts a footprint one-third smaller than the PC's.

ITT is taking advantage of in-house talent. A pair of ITT subsidiaries are supplying parts for the Xtra: ITT Courier Terminal Systems provides the machine's display, while Qume Corporation is manufacturing disk drives and printers. Trillian Corporation, which is not an ITT concern, is producing a hardware/software option known as VisuALL that permits the addition of a mouse.

Corona Gets Help From the Far East

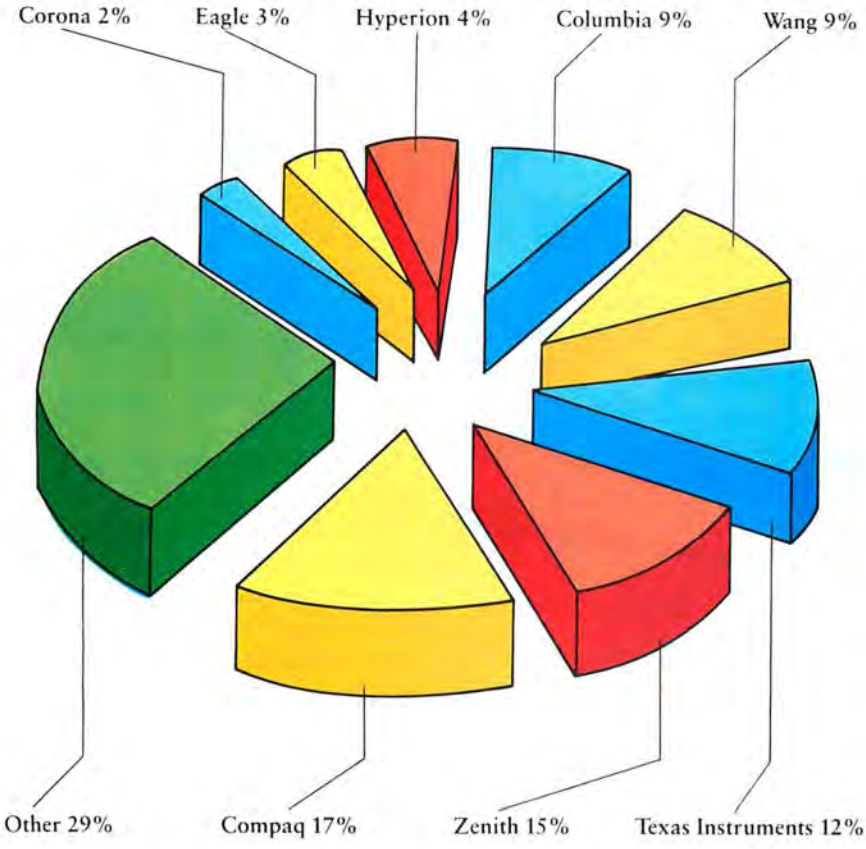
Corona Data Systems, which turns out PC compatibles for such firms as Wordplex and Docutel/Olivetti, is now sharing production chores with a South Korean company. Corona has licensed Daewoo Electronics to manufacture subassemblies for its desktop and portable machines. Daewoo will also produce Corona computers for the South Korean market.

Is Corona, which recently opened a new manufacturing facility in Southern California, following Atari eastward? Not according to company president Daniel Carter, who described the move as "the next logical step" in keeping production up and costs down. Carter said the agreement would not affect domestic operations or employment and noted that the firm has long obtained components from Korean, Japanese, and Taiwanese sources.

Dividing the Compatibles Pie

Who's number one? When it comes to sales, the eyes of the PC compatibles market are on Compaq, from Houston.

Future Computing, the market research firm that watches these things, ranked Compaq first in sales during 1983, with 17 percent of the compatibles market, followed by Zenith with 15 percent and Texas Instruments with 12 percent. Other major players include Wang and Columbia with 9 percent each, Hyperion with 4 percent, Eagle with 3 percent, and Corona with 2 percent. The market for PC-compatible computers exceeded



Compaq, Zenith, and TI have the heftiest pieces of the PC compatibles pie.

$650 million during 1983. If you toss in IBM and other third-party hardware vendors, the hardware total approaches $2.5 billion. Of that aggregate, IBM accounted for 60 percent, PC compatibles for 27 percent, and manufacturers of expansion and peripheral equipment for the remaining 13 percent.

TeleVideo Signs Distribution Deals

TeleVideo Systems's PC compatibles will be easier to find now that the firm has sealed two major distribution agreements.

Arrow Electronics, whose Industrial Computer Products sales organization has been supplying systems houses and original equipment manufacturers (OEMs) with the TeleVideo line for five years, has brought its Commercial Computer Products sales force into the TeleVideo fold. The move is believed to offer TeleVideo an opening to thousands of industrial accounts.

TeleVideo has also worked out an agreement with MicroUnited, a subsidiary of United Stationers, the nation's largest independent wholesaler of office products. The firm will market the Tele-PC desktop computer, the Tele-XT hard disk desktop model, and the portable TPC-II. MicroUnited's distribution system encompasses more than 10,000 dealers in 36 major cities in the United States.

The agreements came amid record first-quarter orders for TeleVideo's line of PC compatibles. The company reported profits up 17 percent on an 11 percent increase in sales. And in a move that underscores the company's aggressive new marketing stance, TeleVideo chairman K. Philip Hwang is reportedly nearing an agreement to place TeleVideo machines on ComputerLand and Entre store shelves.

Software

Programs at the End of DEC's Rainbow

Though on the cusp of PC compatibility, DEC's Rainbow 100 series of personal computers appears to be winning favor with software developers. Nearly a dozen companies have recently unveiled products designed to run on the MS-DOS, 8088/Z80 machine, and DEC has followed with a variety of enhancements.

Most prominent among the programs newly adapted for the Rainbow are Context Management Systems's *MBA*, one of the original integrated software packages; *Samna Word II*, a word processing program from Samna Corporation; and *pfs:File* and *pfs:Report*, a pair of data management programs from Software Publishing. The Rainbow versions of both *MBA* and *Samna Word II* feature windows.

In addition, release 2.7 of Applied Software Technology's *VersaForm* business form data base has been designed for the Rainbow. *VersaForm* enables nonprogrammers to create personalized business applications for the data base in which they're working. The program, which requires

DEC's Personal Presentation System links the Polaroid Palette with the Rainbow, quickly converting screen graphics to color prints and slides.

256K and two floppy disk drives, is available from DEC dealers. Soft Gold is offering a Rainbow version of its Applications BASIC, the firm's business BASIC language. The language features keyed file access, debugging tools, and a variety of data handling capabilities.

There are also bigger machines at the Rainbow's end. Four new terminal emulation products enable the Rainbow to link up with DEC minis and IBM mainframes: Gold Key Country, a keyboard kit that helps turn the Rainbow into a VAX super mini terminal; *Rainbow ReGIS,* which brings VAX and PDP-11 graphics to the Rainbow; *Poly-BSC/RJE,* which permits emulation of the 2780/3780 family of IBM terminals; and *Poly-BSC/3270,* allowing 3270 terminal emulations. In a slightly more technical vein, Microtec Research has released its full line of Rainbow-based Paragon cross-assembler systems for microchip developers.

For businesses and organizations in need of crisp screen shots, Polaroid and DEC are jointly marketing the Personal Presentation System, a combination of the Polaroid Palette slide-making system and the Rainbow's high-resolution graphics capability.

On the operating system front, both Microsoft and Digital Research (DR) appear to be exhibiting confidence in the Rainbow's future. Microsoft has licensed DEC to manufacture and market future Microsoft system and applications software for the Rainbow 100 and 100+. DR meanwhile has released a customized version of Concurrent CP/M for the DEC machine.

DEC itself has beefed up the Rainbow's standard memory. The 100B, the basic unit, now includes 128K RAM on the motherboard and can be upgraded to a maximum of 768K. DEC has also given the Rainbow a palette of more than 4000 colors and made room for a hard disk drive without increasing the power supply.

All of this attention could pay off for the Rainbow, sales of which have been below DEC's expectations. Florists Transworld Delivery is buying $75 million worth of Rainbows for placement in some 9000 flower shops around the country. The machines will be linked to a network that uses a Sperry mainframe as host.

Ironically, DEC—number two in computers behind IBM and long a mainstay in major corporations—may be finding a home in the small business market.

Faraday Distributes PC-Compatible DOS

Faraday Electronics, manufacturer of PC-compatible system boards for the OEM market, is offering MS-DOS 2.11 as an option with its 6400 family of CPUs. Faraday bills its 6400 series as completely hardware and software compatible with the PC. The FE Model 6400 accepts up to 256K RAM, two serial ports, one parallel port, and five expansion slots. The Faraday BIOS ROM runs under CP/M-86 and Concurrent CP/M as well as MS-DOS. Faraday supplies system boards for the Tava PC, among others.

Faraday can offer unique evidence of its PC compatibility. A company spokesperson reports that IBM engineers, faced with a shortage of their own product, have used Faraday system boards for in-house testing. For additional information contact Faraday Electronics, 1029 Corporation Way, Palo Alto, CA 94303, 415/961-0600.

Multiuser OS for Poppy

Durango Systems has made the MBOS/5 multiuser operating system available for its Poppy personal computer, an MS-DOS, 80186-based micro. Durango recently endorsed MBOS/5, a BOS National product that was developed in the United Kingdom. A Poppy equipped with MBOS/5 can be upgraded to a multiuser, multitasking, XENIX-based Poppy II, which includes 80186 and 80286 chips and can support as many as a dozen simultaneous users.

For additional information on compatibles cited in this column, please consult "The Compatibles Line Up," PCW, Vol. 2, No. 4.

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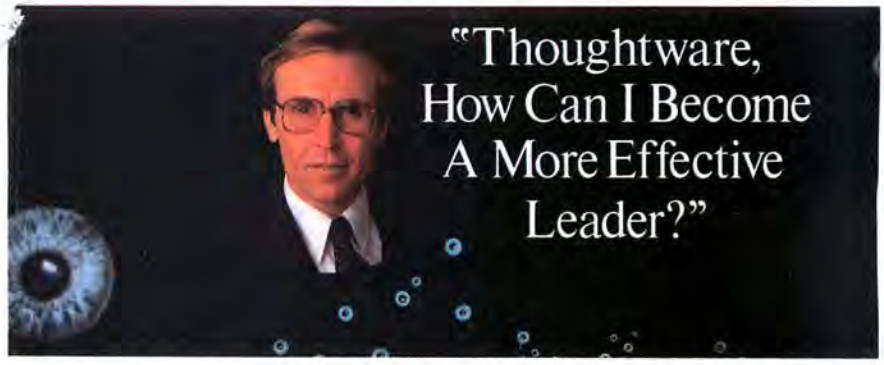

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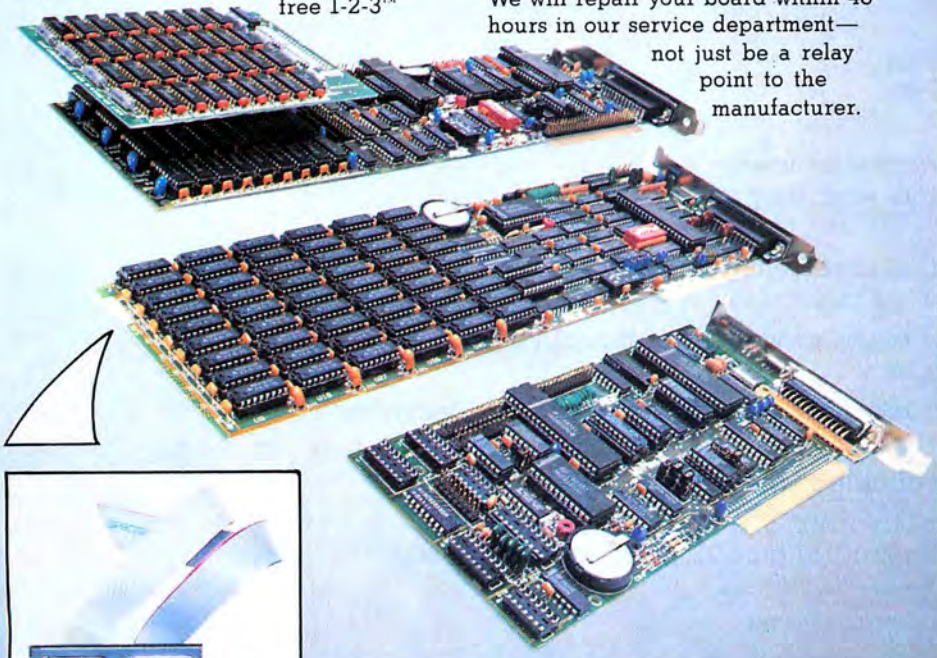

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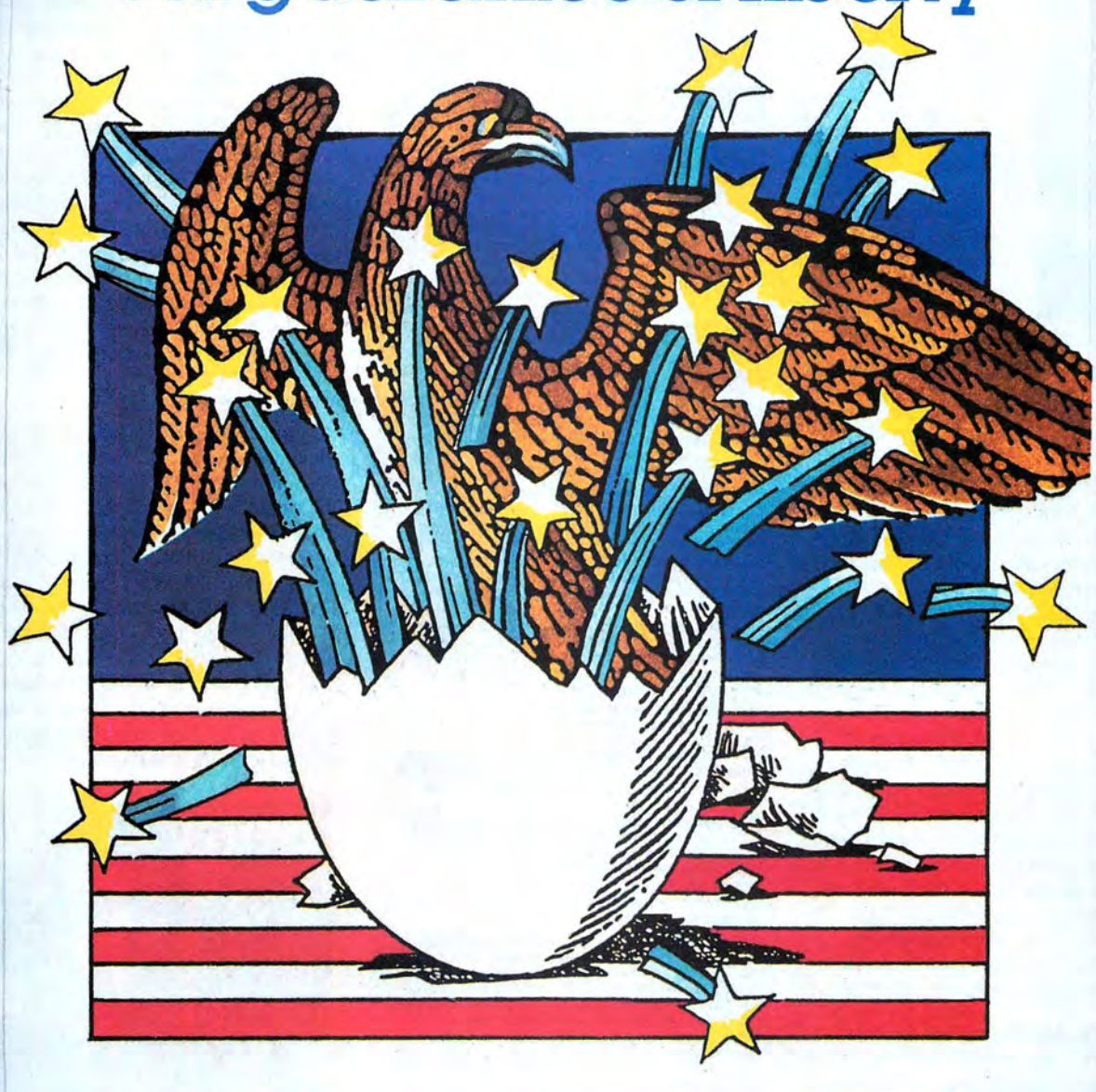

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Social Science Educational Software

SMC Software Systems
A Division of Science Management Corporation

"If one more person asks memory boards,

Multifunction or mass confusion?

We always tell people that the very first enhancement they should buy for their IBM-PC is a multifunction board.

But the tough question is, which one??? Especially now that just about anyone who ever wrapped a wire is coming out with a multifunction board for the PC.

That's why I'm writing this ad. Together we'll cut through the jungles of jargon and topple the towers of tech talk surrounding multifunction boards. And we'll even tell you which one is our personal favorite.

A face only a motherboard could love.

To electronic engineers they may be beautiful. But to most of us, circuit boards (a.k.a. circuit cards, enhancement modules, upgrades, etc.) are strange looking at best and intimidating at worst.

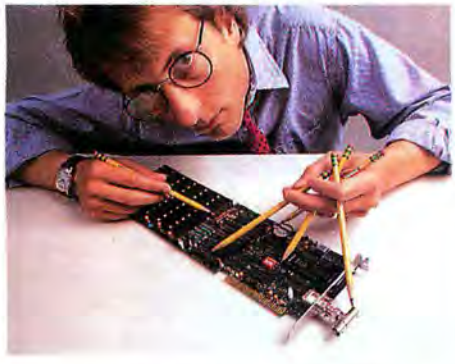
IBM, in its infinite wisdom, gave us *just five slots* to put additional circuit boards into the PC. But the PC can be enhanced in a lot more than five ways. So smart money buys a multifunction board and gets a whole lot of action out of only *one* of those five slots.

A single multifunction board can: 1. increase your computer's memory; 2. set you up to add a printer, mouse, modem, and/or other device; 3. tell your computer the date and the time; and now even, 4. prepare you for networking with other IBM-PC's.

Most multifunction boards come with their own software that puts it on the same wavelength as your motherboard. You'll be able to do things like: 1. input new data while the printer is outputting hard copy; 2. pretend you have additional disk drives; 3. have faster access to frequently used programs or files; and, 4. automatically back-up your data to a hard disk every few seconds.

Those are some of the reasons why multifunction boards are the hottest thing since the push-button phone. But if you want to be able to go to parties and talk about your new "multifunctionboardwith 384KofRAM,parallelport,serialport,clock-calendar,RAMdisk,diskcaching,printspooler, andnetworkinginterface" and actually understand what you're saying, you may have to refer to the very fine print in the glossary. So, whenever you see a term you don't understand, try the glossary.

Up close, multifunction boards look no more complicated than a map of San Francisco.



Glossary

A guide to multifunction board terminology for English-speaking people.

Please excuse the small type. But it was the only way we could squeeze all of these multifunction board basics on two pages. Besides, small type excites some people. So let's get down to business.

Multifunction board. A circuit board that fits into one I/O (input/output) slot and does more than one thing. This ad is about multifunction memory boards—extra RAM, some I/O ports, and other features. There are also multifunction graphics boards. We'll have to save them for another ad.

Memory. The new PC's and the XT have room on the motherboard for 256K. But they can address (a.k.a. find, locate, call up, cope with) 640K. The best multifunction boards have room for an additional 384K. 384K + 256K = 640K. You can add the memory in 64K blocks as needed.

Serial port. a.k.a. "async" or "asynchronous communications port" or "asynchronous adapter." You can hook a mouse, a plotter, a serial printer or any other serial device to this port. A serial device is a gadget that communicates with the computer one bit at a time. Just follow the instructions and the electrons will take care of the rest.

Parallel port. Most printers used with IBM personal computers connect via a parallel port. Parallel devices are gadgets that communicate with the computer eight bits at a time.

Clock calendar. Turn your computer on and it knows what day and time it is. Which is more than you can say for a lot of us when we wake up in the morning.

Game port. Where you plug in your joystick.

Local Area Network (LAN). All of the circuit boards, cables, connectors, and software you need to tie a few IBM's together in one office.

Networking interface. The Orchid BLOSSOM comes with a networking interface. That means that when you slap a PCnet daughterboard on top of it, it knows what hit it and what to do about it.

User transparent. PCnet is user transparent. Each user treats the network as if it were his/her own huge computer with a whole lot of disk drives and memory. There are no complex formulas for going from using only your own computer to using the network.

File allocation table locking. Since DOS is single-user, networks need to protect against cross-locking files on public volumes. PCnet does this by insuring that each disk write request sees a fresh copy of the File Allocation Table. This enables two or more users to write at the same time, and eliminates the need to pre-allocate database files.

Diskless capability. An option with PCnet. Buy this ROM chip. Plug it on to PCnet. Put PCnet into an IBM without any disk drives or disk controllers and take your DOS directly from the file server.

PCnet TALK. Communicate easily with your fellow networkers. Your message on one half the screen. Their message on the other half.

Disk partitioning. On both BLOSSOM and PCnet software. This program allows you to partition any hard disk into multiple volumes, which you treat like extra disk drives (maximum 16 per PC). In addition you can designate any of these volumes as public or private. Keep your public files public and your private files private.

RAM disk. On BLOSSOM, Quadboard, SixPakPlus, and PCnet software. RAM disk lets you designate part of the available memory as additional disk drives. But these "drives" are electronic. In other words, they're fast.

Disk cache. On BLOSSOM, Quadboard, and PCnet software. Disk caching stores frequently used data in RAM. It is an intelligent RAM disk. When your program looks for a data file it first looks at the cache. If the data isn't there it gets it from the drive, and pulls it through the cache, leaving a duplicate there for future quick access. When you save data, a copy is automatically written to the cache at the server PC which flushes the changes back to the disk every 1 to 60 seconds (you choose). You don't have to wait while your data is being written to the disk. The server PC takes care of it.

Print spooler. On BLOSSOM, Quadboard, SixPakPlus, and PCnet software. A print spooler (a.k.a. printer buffer) lets you dump output to the printer as a background process. First the PC dumps the output to the spooler's RAM buffer at high speed. Then the spooler delivers the output to the printer as fast as the printer can take it. You're already back to work at some new project while the printer's still chugging along.

Which ones work?

PC Connection has sold thousands of multifunction boards. Our two most popular ones have been AST's SixPakPlus™ and the expanded Quadboard™ from Quadram. They both offer a very attractive combination of ingredients: 384K of additional RAM, serial port, parallel port, clock calendar, RAM disk, and print spooler. The Quadboard also has a game port, disk caching software, and a "connectall" bracket for arranging your cables neatly. AST offers a game port as an option. We sell both boards for the same price. And our customers have been very pleased with their performance.

The multifunction board breakthrough of the year.

My real inspiration for writing an ad is the new board that just came out from Orchid Technology.

It's called the BLOSSOM,™ and it has all the standard features mentioned above, like 384K of RAM, serial port, parallel port, clock calendar, RAM disk, print spooler, and disk caching.

PCnet, PCnet BLOSSOM, and BLOSSOM are trademarks of Orchid Technology. SixPakPlus is a trademark of AST Research, Inc. Quadboard is a trademark of Quadram Corporation.

me about multifunction I'll write an ad."

——DAVID HALL, C.E.O.
PC CONNECTION

But, unlike *any* other multifunction board, BLOSSOM is designed so that *you can piggy-back a networking board on top of it. Without using an additional expansion slot in the PC.* (In the picture, that's the BLOSSOM Board on the left and Orchid's PCnet™ piggy-back board on the right.)

At last we have one multifunction board that answers all the needs of your typical basic business PC *in just one expansion slot.* And it's actually less expensive than SixPakPlus or the Quadboard. To me that's very impressive.

Networking simplified.

If they gave awards for the computer word-of-the-year, "networking" would be a strong candidate in 1984. It seems that suddenly everyone who owns one PC wants to own two or three or more. And they want those PC's to cooperate—sharing data, printers, disk drives, and even in-house software. Networking saves time. And it saves money.

Orchid Technology has been one of the leaders in networking ever since they developed the very effective, low cost Local Area Network (LAN) called PCnet.

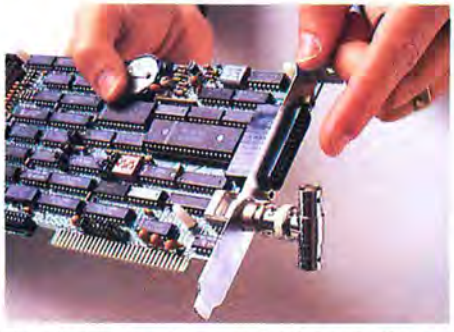
You see other manufacturers selling PCnet as their own product because Orchid licensed it to them. But now you can get Orchid's version along with their most up-to-date version of PCnet software, directly from us. Either alone or, better yet, sitting on top of the Orchid BLOSSOM multi-function board. The picture at the upper right shows how Orchid's new compact PCnet "daughterboard" slips right on top of a set of gold-plated pins on the BLOSSOM board. The coaxial connector for networking is there on the BLOSSOM board, at the right.

Networking complicated.

If you've done some research into networking you know that each system has its own complexities. Orchid's PCnet has a strong reputation for its simplicity and low-cost. PCnet 2.4, the new PCnet software *available only on the Orchid versions,* puts PCnet right up there as far as speed goes.

The key is intelligent use of PCnet 2.4 software—RAM disk, disk caching, partitioning, print spooling, and multi-sector I/O, all of which can work together to keep your data and programs where you want them, for faster access when you want them.

On closer analysis, PCnet turns out to be a very powerful LAN at a very low price. Other features include: diskless capability,



There's your coaxial connector for networking, right on the BLOSSOM board.

PCnet TALK, and true public file sharing via an automatic File Allocation Table (F.A.T.). Best of all, PCnet is so user transparent, and Orchid's new manual is so straightforward, that it can cure your most computer-timid employee of networkphobia. I promise!

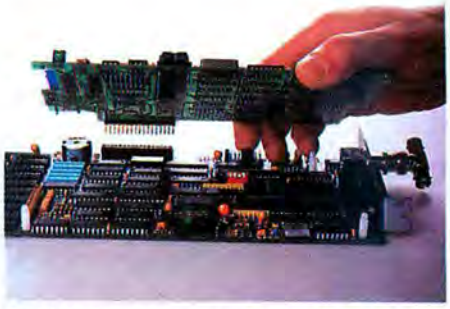
(Networkphobia is not in the glossary—but most of those other fancy words are.)

E Pluribus Unum.

Of the many multifunction boards on the market, I'd definitely choose the BLOSSOM. Because, as far as I'm concerned, if there's one thing in most PC's future it's networking.

1-800/243-8088

For the IBM-PC exclusively.



Orchid's PCnet "daughter board" slips right on top of BLOSSOM.

If networking doesn't interest you, the Orchid BLOSSOM is still a powerful multifunction board. And it looks like there are some other impressive "daughterboards" coming down the Orchid R&D pipeline that you could add on later.

And now that I've written this ad, I'm ready to answer some more questions. About the BLOSSOM, SixPakPlus, Quadboard, other multifunction boards, and/or the other hundreds of hardware and software products we have for your IBM-PC at PC Connection. Just call.

Products and Prices

AST SixPakPlus, 64K	$269
Optional game port	39
Quadram Quadboard, 64K	269
BLOSSOM, 0K	199
BLOSSOM, 64K	259
PCnet daughterboard	call
PCnet BLOSSOM (64K BLOSSOM with daughterboard installed)	call
Cluster kit (25 ft. cable, PCnet software, manual) (additional cable is available)	69
Diskless boot ROM	69
Additional 64K upgrades or any board	59
We install upgrades, put board in an IBM-PC and run diagnostics	10

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Circle 201 on reader service card

Review: Integrated Applications

The Real Jack2 Challenge

Merrily Shinyeda

To promote its new integrated package, Jack2, *Business Solutions hosted a series of software competitions called "The* Jack2 *Challenge." Not surprisingly,* Jack2 *beat all competitors in several benchmark tests. However, the real* Jack2 *challenge begins when you attempt to master the unique concepts and original vocabulary of this complex, jack-of-all-trades software package.* Jack2 *demands a lot from a user and stresses tight integration at the expense of functionality. If you want to create compound documents that mix text, graphics, forms, and calculations, and if you want a program that automatically updates information in various applications,* Jack2 *may be the solution.*

Like other popular packages that offer a combination of integrated applications, *Jack2* offers word processing, data base management, and spreadsheet and graphics capabilities, all stored on a single disk. Unlike most integrated packages, *Jack2* is based in the word processing rather than the spreadsheet application. The integration concept adopted by *Jack2* will seem foreign to most users, with the possible exception of those who have been exposed to forms applications in a dedicated word processing environment.

To make *Jack2* even more challenging, the creators have abandoned generally accepted terminology in favor of a vocabulary of their own. Furthermore, *Jack2* runs under the UCSD p-System and cannot import PC-DOS files. Therefore, files created in MS-DOS programs would have to be manually reentered in order to be processed by *Jack2*, and vice versa. Business Solutions plans

on releasing a utility sometime this year that will enable you to convert PC-DOS files to to *Jack2* files and back again.

The lack of a communications module further underscores the isolationist philosophy of *Jack2*. Business Solutions's message seems clear: take some time to rekey your files and learn some difficult concepts, and you'll never have to buy another software program.

Fortunately, the excellent documentation helps reduce the conceptual leap. *Jack2* comes with a tutorial disk, a program disk, and a data disk, along with an easily accessible tutorial guide, a review of tasks and applications, a reference manual, and a quick reference guide. All of the documentation is bound in disk-size spiral booklets, and the whole set fits into two plastic disk holders. The packaging is superb, and the writing and organization of the documentation is clear.

Zooming In

Jack2 is composed of five hierarchical levels: disk, envelope, contents, form, and record. You can move between these levels using menus and on-screen prompts.

Review

After you load the program, the Disk screen appears, displaying icons that represent the disks currently in the PC (see Figure 1). The eight command options that appear on the top line of the Disk screen give you the ability to zoom (open up), find, copy, erase, print, rename, set up, or quit a disk. The SetUp option enables you to create a phrase glossary by assigning a string of up to 30 characters to each of the ten function keys. In addition to generating a glossary of macro strings, the SetUp command can also be used to configure *Jack2* for a specific printer.

You can select commands by cycling through the options using the <Space> bar or by typing the first character of the command. A helpful hint line located directly under the command line provides a brief explanation of each option when it is selected.

> Word processing documents are restricted to nine pages per envelope and only ten envelopes per data disk.

To view the contents of a particular disk, select the Zoom option. Throughout the program, Zoom is used to advance through screen levels, and the <Esc> key can be used to take you back to a previous screen level. When you zoom a data disk, the Envelope screen appears (see Figure 2). The Envelope screen displays an overlapping lineup of six envelope icons in addition to an icon representing the disk in use. Envelopes are roughly analogous to what most programs call "files." While only six envelopes can be displayed at one time, a disk can contain up to 50 envelopes. You can scroll through the envelopes by pressing the <CursorUp> and <CursorDown> keys.

An envelope that has previously been opened is labeled with a name at the top of the icon and a number indicating the number of "records" (variations of the form) the envelope contains. The command options available from the Envelope screen are basically the same as those offered by the Disk screen. Envelopes can be zoomed, found, copied, erased, or renamed.

To move to the next level, the Contents screen, point to any envelope in the lineup and select the Zoom option. The Contents screen's icons display the contents of the zoomed envelope (see Figure 3). The icons representing the disk and the envelope in use continue to be displayed. Another icon represents a "form." If a form contains fields for inserting variable information, one or more records are displayed behind the form. In the Contents screen, the command options make it possible to zoom a record or form, find a record by name, copy a form or record to an unused envelope, merge a record with information in another envelope, or erase a record. You can also print a form or record, reorder (sort) information contained in an envelope, or select certain records based on predefined criteria.

The Form—Where Applications Meet

The form represents the "working surface" for *Jack2*. This is where documents are typed and edited, where spreadsheet templates are designed, and where fields for data bases are created. Depending on how the form is structured, it can result in an article for publication, a form letter, an invoice, a spreadsheet, a graph, or a compound document containing any combination of applications.

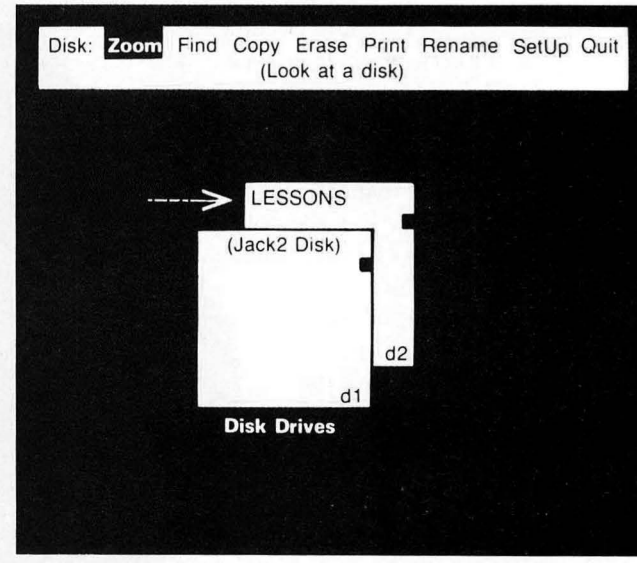


Figure 1: The Disk screen is the first screen you see when you boot the system. Here you can perform disk maintenance chores such as copying and erasing.

Zooming the form icon on the Contents screen takes you to the Form screen. Directly below the command line on the Form screen is an inverse video band that contains a tab line and a status line (see Figure 4). The band defines the working area in which you create, manipulate, and revise text and fields. The word processing orientation of this package becomes apparent when you look at the command options given on the Form screen: Insert, Alter, Erase, Locate, Replace, Margins, Highlight, Copy, Field, Over, and Save.

Word processing documents are restricted to nine pages per envelope, and only ten envelopes per data disk can be dedicated to "text form" documents. Therefore, although *Jack2* is designed around word processing, the program severely limits the length and number of word processing documents it can handle. The word processing application is also limited by the designers' decision not to use the PC's <Ins> and <Del> keys, making even the most basic text editing cumbersome. Insert is the default typing mode on *Jack2*. In order to switch to overtype, you must first press <Esc> to move from the form to the command line, select Alter, and press <Enter>.

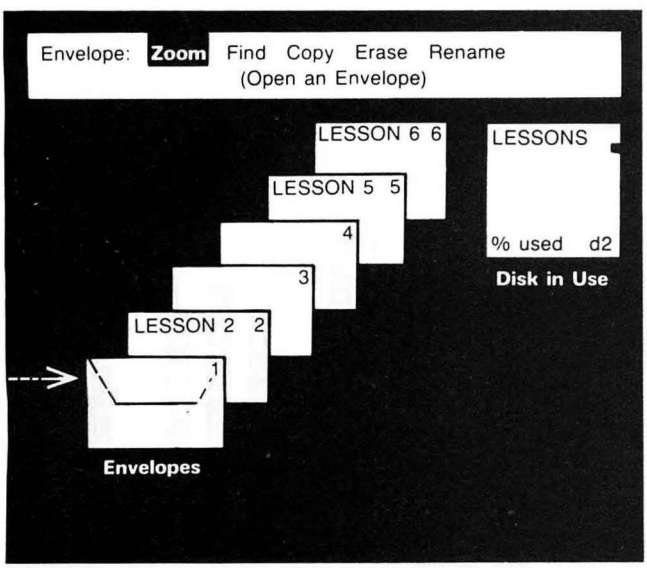


Figure 2: The Envelope screen is like a disk directory. The lineup of icons represents envelopes (files). The lineup shows only 6 envelopes at a time, but up to 50 envelopes can be stored on a disk.

Mistakes can be corrected during input by pressing the <Backspace> key to erase preceding characters. However, since *Jack2*'s screen response is somewhat sluggish, it is difficult to determine the exact amount of text that has been deleted with the <Backspace> key. For longer deletions it is wise to use the Erase command, which deletes in a forward direction only. To activate the Erase function, you must first press <Esc> to escape from the current mode, select Erase, and press <Enter>. As you press <CursorRight>, characters disappear and are replaced by blank spaces. When you reverse the direction of the cursor, deleted characters reappear. Pressing <Ctrl>-C completes the function and automatically reformats the text according to the margins in effect.

Text can be moved or copied to a new location within the same document or to a different document on the same disk or on another disk. Selecting Copy gives you three options: Mark, Get, and Put. Mark is used to indicate the beginning and end of a segment of text to be moved or copied. Pressing <Ctrl>-C completes the marking procedure and positions you back at the command line. At this point you can either complete the move or continue editing and finish the operation later. To complete the operation, move the cursor to the new location and select the Put option. The program inserts the text segment and prompts you to delete the text from

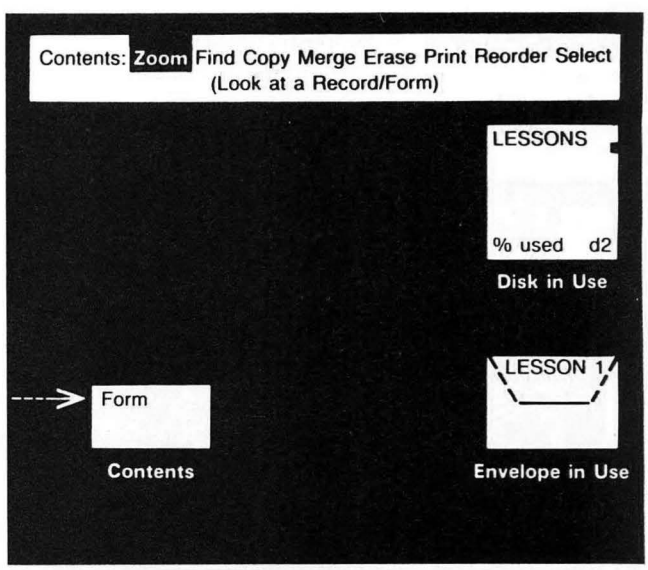


Figure 3: The Contents screen displays what is in an envelope. The screen displays an icon of the form (work space) followed by the variable records, if any. The icons on the right display the disk and the envelope in use.

its original location. Deleting the text results in a "move" operation; not deleting the text results in a "copy."

To move or copy text from one envelope to another, you must mark the text in the source document before you exit from the current working envelope. After entering the destination document, you position the cursor at the location to which you want the text moved or copied. When you select the Get option, you are asked to designate the disk and the envelope containing the text to be moved. Selecting Put completes the move and prompts you to delete the original segment.

Jack2's word processor provides global search and replace and standard page formatting commands. Print enhancements include underline, score, bold, emphasized, and nine others that you can define yourself. The nine enhancements, which can be assigned in the SetUp menu, include such options as backspace, start-stop, overstrike, multipass, and printing special ASCII characters and codes.

While *Jack2* approximates the level of word processing available with other integrated packages, it cannot compete with the sophistication and ease of many single-program word processors. The keystrokes required to perform basic text editing are too numerous to allow this module of the package to be considered anything other than mediocre. However, its ability to integrate with other applications to accomplish complex tasks such as creating variable form letters compensates for the awkwardness of its basic functions.

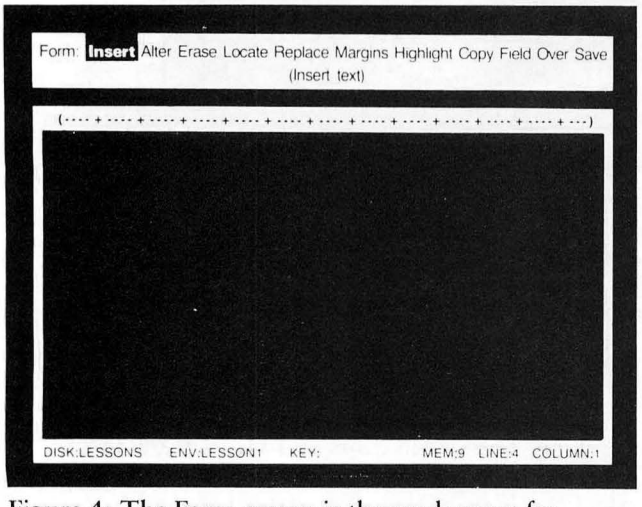


Figure 4: The Form screen is the work space for creating text, spreadsheets, record formats, and graphs. Jack2 allows you to integrate a number of formats on a single page.

Spreadsheet Field Command

The key to *Jack2*'s integration ability is its Field command. Any number of fields can be positioned anywhere on a form, making it possible to create compound documents that contain any combination of interrelated text, statistical data, and graphics. *Jack2*'s fields fall into five categories: box, row, column, variable, and graph.

A Box field is a single area of predetermined size that can accept text, numbers, and spreadsheet calculation rules. Box fields are used primarily for applications, such as printing forms or mailing labels, in which information must be confined to a specific area.

A Row field is a horizontal line of equal-size cells designed to hold values. A Column field is similar to a Row field, except that its cells are arranged vertically. Both Column and Row fields are primarily used for the creation of spreadsheets.

A Variable field is an expandable area that adjusts to fit the amount of text that is entered into the field. Variable fields can be used to personalize letters or customize proposals. Because any amount of information can be inserted without affecting the surrounding text, each letter or proposal will look like an original.

A Graph field graphs values from as many as six fields in either a bar or line format. The graphs can be any size and can be located anywhere in a document. It is possible to add text to graphs and to incorporate graphs into reports for added impact.

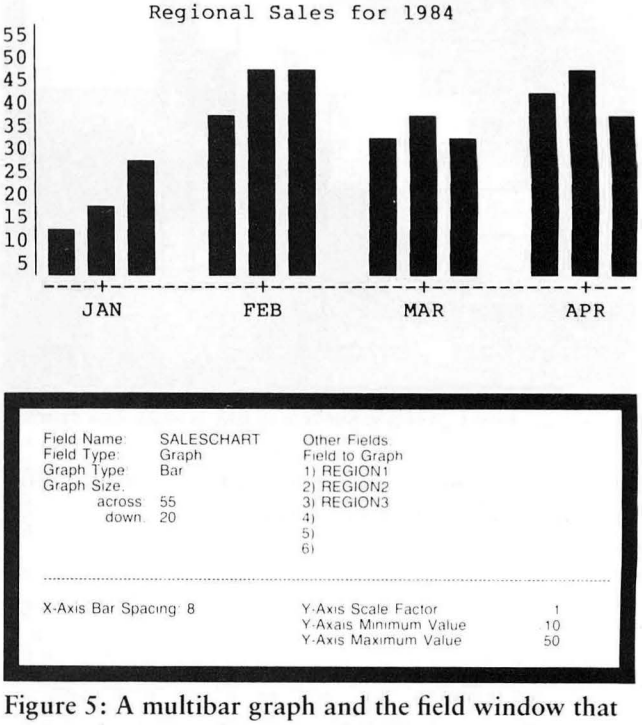


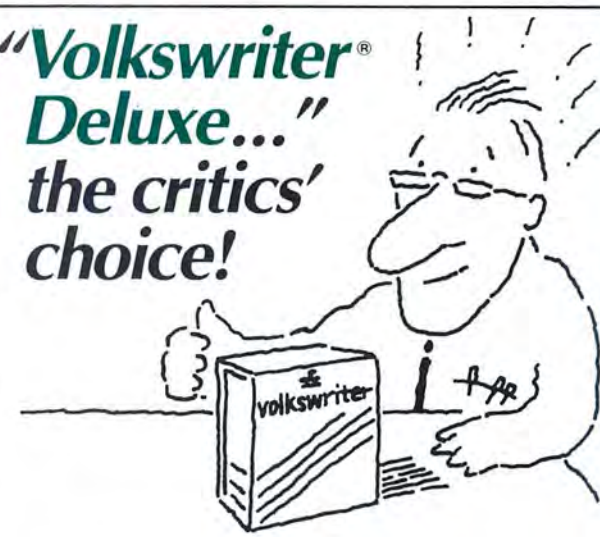
Figure 5: A multibar graph and the field window that opens when you select a graph field. Bar graphs are created with values of specified fields. Each bar represents one field value. Jack2's graphics are limited to bar graphs and line graphs.

A field can be designed to accommodate any type of variable information and can easily be positioned anywhere in a document. Selecting the Field command opens a window on the screen that displays a number of controls, including the field's name, type, size, and format and whether the field contains a calculation rule.

You construct a spreadsheet by creating Row and Column fields on a form. These fields can be copied or moved to other locations within the spreadsheet and can contain calculation formulas of up to 255 characters. You create a calculation rule using the name given to the field when it was created and applying mathematic or algebraic operations, Boolean statements, or one of several built-in functions. Built-in functions include the common SUM (total), CUM (subtotal), AVG (average value), MIN and MAX (minimum and maximum values), LOG (logarithm), ABS (absolute value), INT (integer), NPV (net present value), and IRR (internal rate of return). In addition, *Jack2* has a few new functions. LOOKUP identifies the cell that contains the value closest to a specified value; CHOOSE identifies the value of a specified cell; and JOIN combines Row and Column field values with

Figure 6: On the Record screen you enter data in fields created on the Form screen. After you save a record, the Record screen displays another blank record to fill in.

"Volkswriter® Deluxe..." the critics' choice!



"Thirty word processing programs were reviewed . . . no other program received a higher overall evaluation than Volkswriter Deluxe."
Software Digest Ratings Newsletter, January 1984

"If WordStar™ set a standard . . . Volkswriter Deluxe sets a new standard for transparency, simplicity, and speed. You can learn Volkswriter in under an hour . . . because it does so many things exactly the way you think they should be done."

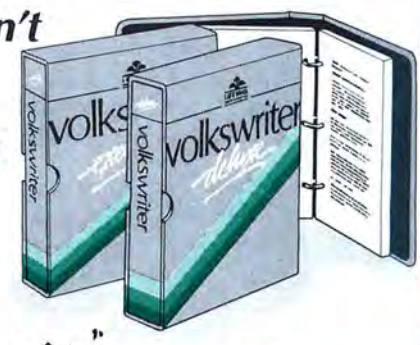
"VOLKSWRITER DELUXE is the best buy in the IBM-PC™ writing tool arena."
Charles Spezzano, Whole Earth Software Review, January 15, 1984

"Volkswriter Deluxe . . . a simple way to word processing power . . . for writers who like to think."
Washington DC Capital PC User's Group Vol. 3, #4

"Lifetree . . . provides exceptionally helpful and competent assistance to registered owners, and the company's update policies are excellent."

"In sum, this is a unique word-processing program."
John Lombardi, Reviewer, InfoWorld, April 16, 1984"

We couldn't have said it better ourselves!



Suggested Retail Price: Volkswriter Deluxe $295 for the IBM-PC, PC compatibles, TI Professional™ and TRS-80 Model 2000™

"simply, amazing"

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the values of another Row or Column field. *Jack2* offers more than enough built-in functions to satisfy the casual spreadsheet user.

Unlike most spreadsheet packages, in which each cell is considered a separate entity with its own address, *Jack2* groups a range of cells together and designates it as either a Row or a Column. With this format it is not possible to perform a calculation on data entries using values that are located within the same Row or Column field. To avoid this problem, you must plan ahead and create separate fields for values that will be calculated together.

Jack2's graphics capabilities are limited to creating line and bar graphs (see Figure 5). To incorporate a graph into a document, first position the cursor where you want to locate the upper left corner of the graph. Then activate the Field command and designate the type of graph you want to create. After you have specified the graph's dimensions, select a character to be the symbol used to plot the points, and designate up to six field names to be charted. Pressing <Ctrl>-C closes the Field command window and displays the completed graph. While *Jack2*'s graphics capabilities may not be as extensive as those of other integrated packages, they are easy to use and adequate for users who want to give their documents additional impact.

Records Processing

Grouping a number of fields together creates a record format that can be used for data management. A single field can be up to 255 characters wide and 50 pages long. As many as 1024 fields can be contained in a record. Depending on their size and the number of fields they contain, as many as 2500 records can be stored in an envelope.

You can zoom into a record from the Contents screen, just as you can zoom into a form. The Record screen is used for filling in the fields that are created on the Form screen and for saving completed records. Helpful information is presented on the status line at the bottom of the screen during data entry, including the number of the record you are working on, the name of the field in which the cursor is located, whether you are in automatic or manual calculation mode, whether you are viewing selected or all records, the amount of memory remaining on the disk, and the line and column position of the cursor (see Figure 6).

Using the records processing capabilities of *Jack2*, you can manipulate the information contained in records in a number of ways. For example, after setting up simple selection controls, you can select employee records based on specific criteria such as time on the job or current salary. Records can be sorted alphabetically or numerically, in ascending or descending order; this enables you to organize a mailing list by zip code or to create a company telephone directory listing employees alphabetically. Three sorts can be performed simultaneously with the Reorder (sort) command.

Automatic Updating

Jack2 enables you to revise automatically all records within an envelope by simply editing the form. This automatic updating capability is the key to the power of integrated applications. For example, the automatic updating feature could be used to calculate the maximum contribution an employee can make to a stock option program based on annual income. If the current limit is 8 percent of the employee's annual gross salary, and it is being raised to 10 percent, modifying the calculation rule in the form would result in the automatic recalculation of all records within that envelope.

> *Jack2* offers more than enough built-in functions to satisfy the casual spreadsheet user.

Jack2's strength lies in its ability to intersperse spreadsheets and business graphs throughout a document and link together information that can be automatically updated. It usually takes a pair of scissors, a pot of glue, and a copying machine to create documents containing a combination of text, charts, and graphics. *Jack2* provides an alternative. Its forms approach enables you to create a single document that embodies text, graphics, and statistical formats with calculated values. The integration capabilities of *Jack2* make it possible to link these formats together to create compound documents in which values in a spreadsheet can be linked to a bar chart or a line graph and to spreadsheet references within the text. As information contained in the spreadsheet is changed, the graph is automatically recharted, and references to spreadsheet entries in text are updated to reflect the new values.

Information contained in a data base can be retrieved and inserted into a document even when text and graphics are positioned side by side on the page. Because the text and the graph are separated by an artificial boundary, insertion of variables into the text will not affect the graph. The compound document can be displayed on the screen simultaneously and printed in a single pass.

While the extent of integration achieved by *Jack2* is excellent, *Jack2*'s unique approach to document creation results in some housekeeping problems. For example, since editing a form automatically alters all records that are part of that form, customizing a single record within an envelope is a major undertaking. First, you must copy the form to an unused envelope, then select the record you want to customize and move it to the new envelope. Finally, you edit the form to make changes in the record. While the design of *Jack2* provides maximum integration, it also results in minimum flexibility.

Jack2's unique forms environment is a good medium for handling repetitive form letters and proposals or for creating spreadsheet templates for monthly reporting. However, it is not an appropriate medium for producing the customized applications found in most business offices. The "form" is a concept that takes time to fully appreciate—time that most busy managers will be unwilling to invest.

Integration versus Limitations

Jack2 is an example of the difficulties encountered in the attempt to combine a full range of powerful and sophisticated features on a single disk. Its word processing is at best adequate and at times awkward; its spreadsheet and graphics capabilities are clearly limited; and the method it uses to process records requires a lot of work from the operator. Each of the four applications is limited, making *Jack2* inappropriate for professionals and managers who require powerful decision-support and analytical tools. The fact that files created under PC-DOS-based programs cannot be imported into *Jack2*'s environment is another potentially crucial limitation. Still, the ability to integrate the applications tightly compensates for many of the package's weaknesses. For PC users who frequently create compound documents (or would like to try), *Jack2* is a likely choice.

Merrily Shinyeda is a Contributing Editor for PC World *and the director of the Sierra Group, a Tempe, Arizona, office automation marketing research and consulting company.*

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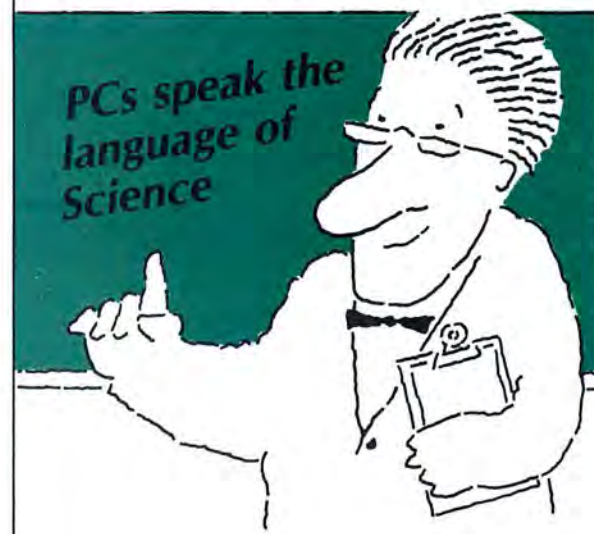

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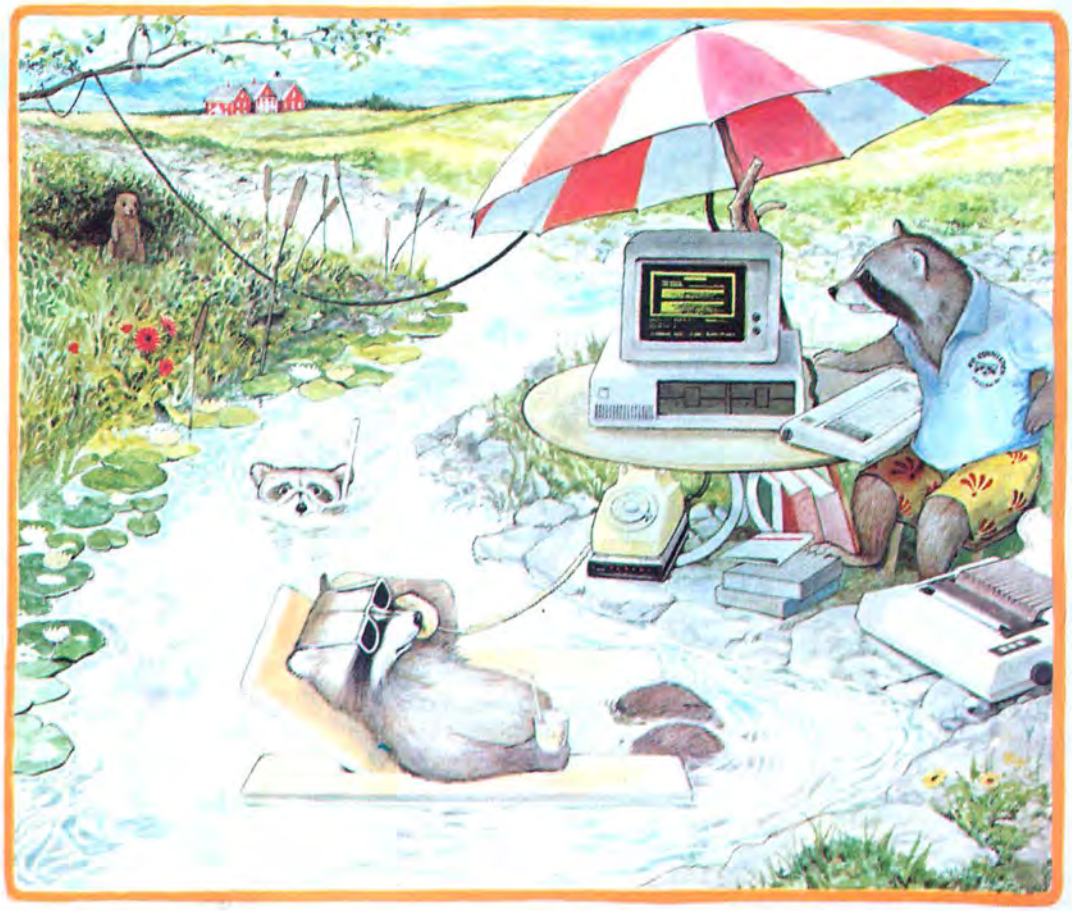

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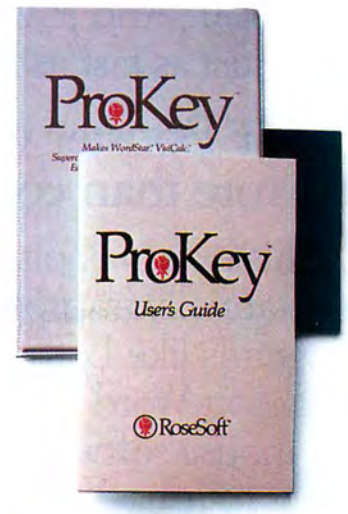

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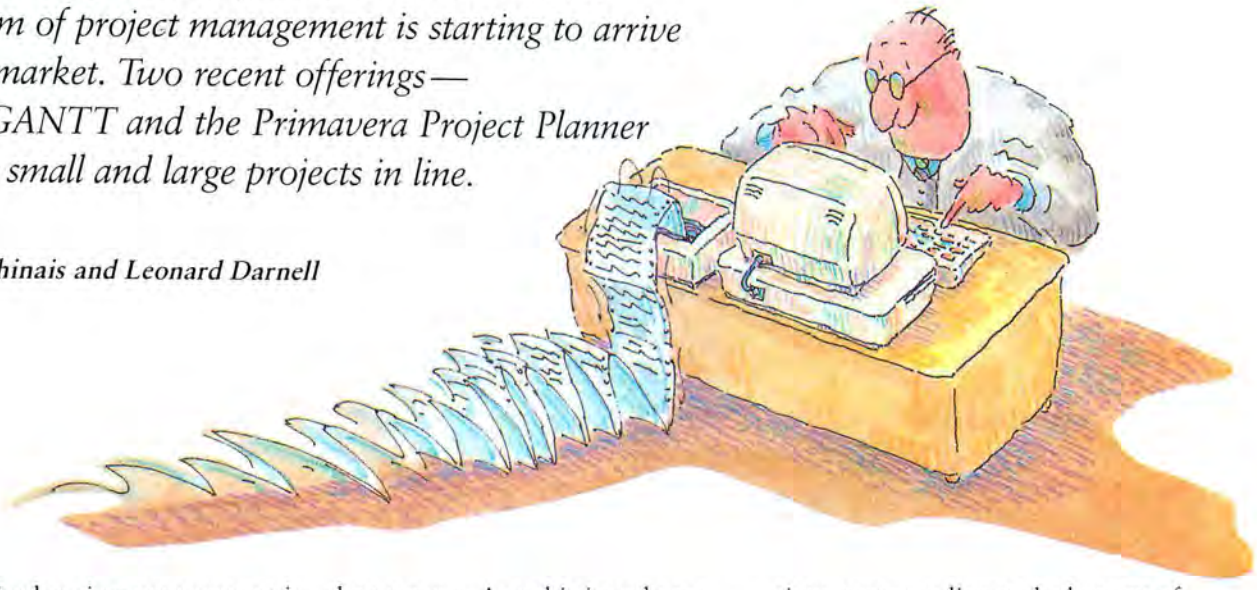
Task Force

Project management software that embraces the spectrum of project management is starting to arrive on the market. Two recent offerings—MicroGANTT and the Primavera Project Planner—keep small and large projects in line.

Bill Dauphinais and Leonard Darnell



Computerized project management is no longer solely the reserve of the big-budget project manager. Project management software can cost as little as $90 and as much as $3000. Within this range are affordable programs that generate useful information for the less-experienced manager handling a small project and pricey ones for the expert project manager overseeing the construction of a skyscraper. (For information on how project management software works and what features to look for, see "Project Management: One Step at a Time" in this issue.)

Project management software enables a manager to develop a model of a project that can be used to estimate the time, money, and resources that the project will require. What project management software is appropriate for a given project and manager? That depends on the complexity of the project and the skills of the manager. A sophisticated program like the *Primavera Project Planner* will produce optimal results when it's used by an experienced project manager, just as a trained statistician will best take advantage of statistical modeling and analysis software. For less demanding projects, a program such as *MicroGANTT,* which offers ease of use and functionality, is more suitable.

MicroGANTT

MicroGANTT, from Earth Data Corporation, is a single-disk, menu-driven project management program designed to tackle projects in which tasks play a bigger role than resources. Project data is entered and edited using a screen form; useful error messages are displayed if an incorrect entry is made. The effects of adding new tasks, deleting old ones, or updating projected task durations with actual results can be observed quickly on a Gantt chart displayed in the center of the screen. Menu options occupy a line at the bottom of the display. The program also produces three printed reports: a task list, a cost summary list, and a Gantt chart.

Given its task-oriented nature, *MicroGANTT* is best suited for smaller projects, like building a house or developing software, or for forward-looking projects that need little tracking information. For example, *MicroGANTT* would be useful in planning a convention, since this is a project that involves coordinating and managing many tasks—such as setting up booths or reserving hotel rooms—but is not resource-intensive. *MicroGANTT* makes task data available while summarizing less vital resource information at the project level.

Using Tasks

In *MicroGANTT* a task can have a complete or partially complete prerequisite task, be tied to the availability of a resource, be assigned a specific duration, or be used as a

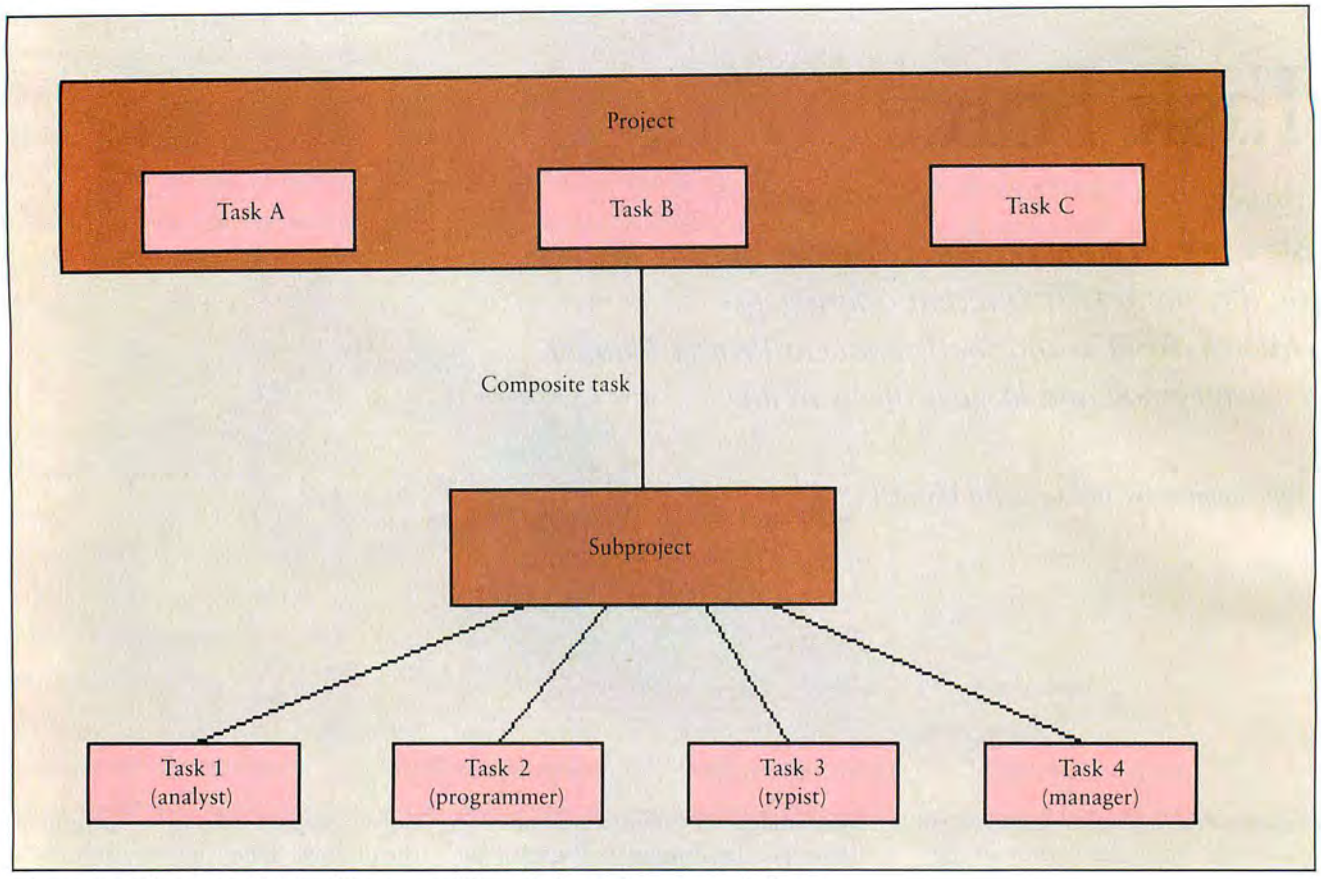


Figure 1: MicroGANTT will not provide task-by-task resource information, only project summaries. You can show what resources are associated with a task by defining that task as a subproject. Each subproject task can represent a resource and the time or money related to it.

milestone. You can even represent a group of tasks or another project with a "composite" task—a powerful feature that many similarly priced packages do not offer and one that is essential to overcoming some of *MicroGANTT*'s inherent limitations.

MicroGANTT is limited by its ceiling of 100 tasks per project and its inability to easily link multiple resources to individual tasks. If you want to record resource information at the task level or if a project swells beyond 100 tasks, you must create subprojects—projects within a project—using the composite task feature. Each subproject can have as many as 100 tasks. Thus, with a little artful design *MicroGANTT* can accommodate a larger project or link resources to tasks (see Figure 1).

Using this scheme, *MicroGANTT* could theoretically define a project with thousands of tasks. But the program is not intended to manage projects that large. As subprojects are added, disk space is consumed, the program executes more slowly, and the entire project becomes increasingly difficult to control. Since subproject data is accessed by exiting the main project, the more subprojects you define, the more time is spent moving from project to subproject and back again. Keep in mind, too, that subproject information is for reference only; it can be printed out, but it cannot be used to generate detailed resource reports at the project level.

Resources

MicroGANTT can assign resources only to billable tasks or to composite tasks with billable components. When a billable task is defined in an on-screen form, the time, cost, and availability of related resources can also be entered. *MicroGANTT* then calculates the task's resource requirements by time period. All tasks can have assigned fixed costs, though the costs cannot be categorized.

Project Calendar

Like many project management packages, *MicroGANTT* uses a calendar to monitor the sequence and duration of tasks. Reporting can be done by

the day, week, month, quarter, or year. A project's duration is limited to 61 time units—thus a project's maximum length can be as short as 61 days or as long as 61 years.

Tasks in the project calendar that lack a prerequisite task or a start date are automatically given the project's start date, which can be changed at any time. The calendar is less flexible when it comes to the workweek, since it cannot account for holidays, sick leave, or other non-workdays.

Planning, Monitoring, and Tracking

MicroGANTT is strongest in the planning phase of a project. Tasks can easily be added, inserted, modified, and deleted, and the use of partially complete prerequisite tasks provides added flexibility. The program's Gantt chart quickly displays changes, allowing a manager to ask "what if" questions painlessly as the design of a project is refined.

Using these same planning functions, a project manager can monitor a project and adjust it to reflect current progress in terms of tasks completed, resources used, and costs incurred. The revised sections of the project provide tracking information that serves as a guide for revising the remainder of the project. *MicroGANTT* distinguishes between completed tasks and those in progress when reporting, but not when recalculating a project's time line, making it difficult to readjust the project calendar.

Reports

MicroGANTT produces three on-screen and three printed reports. An on-screen Gantt chart shows billable, calendar, milestone, and composite tasks, the critical path of the project, project "slack" (those tasks not on the critical path), and how close the project is to completion. A second on-screen report lists resource requirements and costs by task by time period, with a project total and totals by time period. A third report shows fixed costs assigned to tasks by time period, with a project total and totals by time period. Each report is displayed one at a time in the report section of the screen. If a report is too large to be viewed all at once, portions of it can be scrolled by. You can create additional display space by suppressing *MicroGANTT*'s menu.

Printed reports include a task listing, a project cost report, and a Gantt chart. The task listing includes task numbers, names, and types; resources needed to start and complete a task; resource costs; fixed costs; whether the task lies on the project's critical path; and what percentage of the task is completed. The project cost report (see Figure 2) resembles a spreadsheet, with tasks listed on one axis and resource use and costs listed to the right; fixed costs by task and by time period and totals by time period and for the project are produced. The Gantt chart is the printed equivalent of the on-screen chart (see Figure 3). A report summarizing information from several projects can also be generated with the composite task option.

MicroGANTT can use most 80- or 132-column parallel printers. The program will print out large reports or charts in left-to-right, top-to-bottom sequence so that wall charts can easily be assembled. *MicroGANTT Select*, a report generator that allows reporting by task code or task description, is included with the package at no charge.

MicroGANTT is strongest in the planning phase of a project.

Documentation

MicroGANTT's 55-page user manual provides an overview of project management concepts, detailed operating instructions, application design guidelines, and sample project reports. A step-by-step tutorial using actual data is notably absent. The user manual also lacks instructions for installing DOS on the *MicroGANTT* disk or for moving the program onto a hard disk.

MicroGANTT may not be every project manager's dream, but it's a competent program that performs well within its limits. Its combination of flexible features and a menu approach makes it easy to learn and use—a decided plus for the manager with little project management experience. *MicroGANTT*'s composite task feature gives it the power to perform jobs usually reserved for more advanced—and more expensive—programs.

Primavera Project Planner

The *Primavera Project Planner* is a menu-driven project management program that offers sophisticated planning, monitoring, and tracking for managers well versed in formal project management techniques. *Primavera* comes on four disks, and the user manual suggests that the program be used on a PC XT or a PC with a hard disk drive. The program was originally developed for mainframe computers, so it's not surprising that it offers features seldom found in most personal computer project management software. Experienced project managers will appreciate *Primavera*'s powerful report writer and the program's handling of complex task interrelationships; detailed projections and tracking information on resources and related costs are particularly strong points of the program.

(continues on page 138)

```
          HOUSE$1:  MODEL FOR HOUSE CONSTRUCTION              Begins:  2/21/1981
          Scale: MONTHS, Week: 41 Hrs 5 Days, Billing:  $12.75/Hr, Tasks: 14
         +---------+---------+---------+---------+---------+---------+---------+
         I         I         I         I         I         I         I         I
         I  2/81   I  3/81   I  4/81   I  5/81   I  6/81   I  7/81   I  8/81   I
         I         I         I         I         I         I         I         I
         +---------+---------+---------+---------+---------+---------+---------+

 1 -cp-        41h
SURVEY       1,312

 2 -cp-        56h      168h
FNDATION      936     2,809
              266       796
 3 -cp-                 78h       58h
BASEMENT              1,112      827
                      1,769    1,327
 4 -cp-                         304h      152h
WALLS                         3,694    1,847
                              2,037    1,018
 5                                       118h      131h      106h
PLUMBING                               3,776    4,192    3,392
                                         272      302      242
 6 -cp-                                 266h      190h
WALLS                                 3,232    2,309
                                      1,782    1,273
 7 -cp-                                          114h       64h
WIRING                                         4,104    2,304
                                                 466      259
 8 -cp-                                                   205h
INSULATE                                                2,614
                                                          491
 9 -cp-                                                    89h       89h
INTERIOR                                                1,713    1,713
                                                          907      907
10
WAITROOF

11
EVENT$1
                                                      1,975
12                                                      178h
ROOFING                                               2,270

13                                                       49h       74h
EXTERIOR                                                625      944
                                                         36       53
14 -cp-
FINISH


-------------------------------------------------------------------------------
Hours            97h      246h      362h      536h      662h      538h       89h
Billing $      2,248     3,921     4,520     8,855    13,499    10,967     1,713
Fixed $          266     2,565     3,364     3,072     4,052     1,952       907
-------------------------------------------------------------------------------

Total Hours        2,530          Total Fixed      $16,178.70
Total Billing   $45,722.80        Final Total      $61,901.50
```

Figure 2: A MicroGANTT project cost report. Tasks are listed from top to bottom; resource use in hours, resource cost, and assigned fixed costs are listed to the right of each task. Totals for each time period are computed and listed at the bottom of the chart.

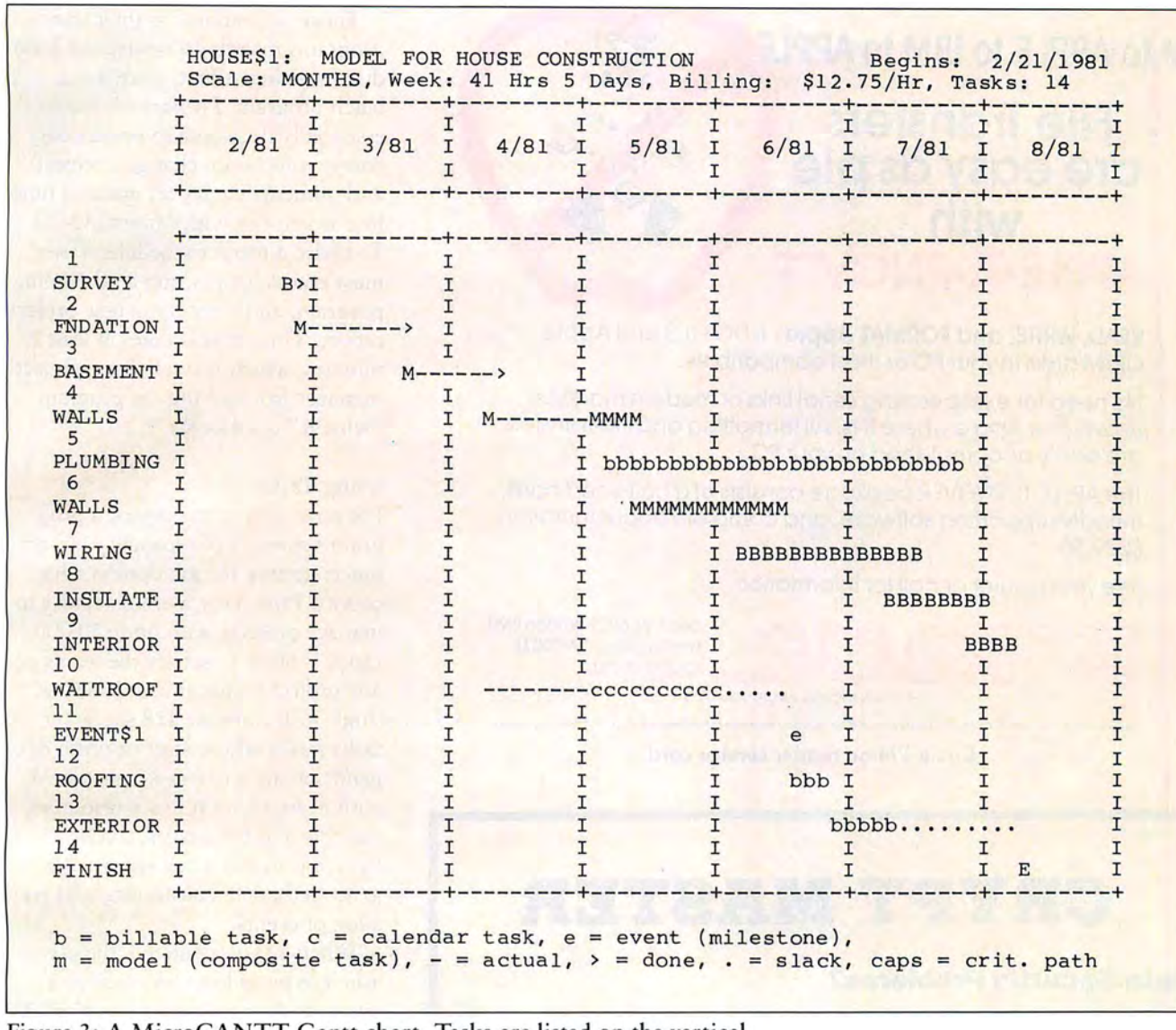


Figure 3: A MicroGANTT Gantt chart. Tasks are listed on the vertical axis; their place in the project is noted to the right. Capitalized letters indicate that the task is on the project's critical path.

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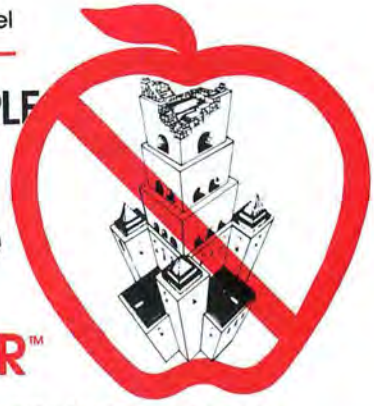

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Review

Those accustomed to interactive programs may find *Primavera* a little disconcerting at first, since it is a batch program. *Primavera*'s screen is essentially dedicated to project data entry; you cannot change a project and immediately see an updated time line as you can with *MicroGANTT.* To revise a project schedule, a user must enter changes, run a scheduling program, and print out a new project report. This process takes at least 2 minutes, which may inhibit a project manager from asking the program "what if" questions.

Using Tasks

For most project managers, a program's speed is of secondary importance; getting the job done is what counts. *Primavera,* with its ability to manage projects with up to 10,000 tasks, is likely to satisfy the wants of any project manager using a PC. A single task can have 128 successor tasks (tasks whose start or finish depends on an active task) associated with it, in addition to six resources, variable and fixed costs, a code (which is useful when reports are generated), date constraints, and even a log of events.

When a task is entered, the user is asked to provide a task number, a name, and an estimated duration. A task's duration can be specified by the user or calculated by the program based on needed or available resources using the resource leveling option. Additional information about a task is collected in seven screen forms that are displayed on demand. The forms are used to enter (and, to a limited extent, to display) information on successor tasks, resources, costs, task codes, time constraints, and project dates. A form for an electronic notepad records comments up to 400 characters long and appends them to the appropriate task. The forms are simple to use, and each is accompanied by a help screen. *Pri-*

mavera Project Planner will print out any form's contents on demand. The result isn't summarized, but it does give a project manager a quick look at task-related information.

The relationship between a task and its successors can take three forms: start-to-start, finish-to-finish, or finish-to-start. In the first relationship, a successor task starts a number of days after the preliminary task starts; in the second, a successor task cannot end until the preliminary task ends; while in the third, the end of one task triggers the start of the next. The number of days a task must wait before it starts or ends is also specified.

> Task codes allow a project manager to produce very selective reports.

Task codes allow a project manager to produce very selective reports. For example, task codes can be linked to a supervisor responsible for overseeing the completion of certain tasks, to geographical locations, or to subprojects. At any point in the project, the project manager can print out a report detailing the supervisor's productivity in terms of tasks completed on schedule, resources expended, and associated costs. A task can have up to 20 codes.

Projects are always in a state of flux —critical supplies are late, workers leave and new ones are hired—so task projections must be constantly recalculated. But *Primavera* also allows a project manager to impose specific start or end dates for a task. This constraint can override a task's computed start date, duration, and end date if the computed figures do not accurately reflect the project's requirements. These constraints are edited and viewed in the constraints form.

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Review

Resources and Costs

Perhaps *Primavera*'s greatest strength lies in its handling of tasks, resources, and costs. As noted earlier, tasks can be associated with all sorts of data. This same flexibility extends to the areas of resource and cost management. Six resources can be assigned to a task and 96 resource categories to a project—less than what mainframe packages offer but sufficient for managing many large projects. A resource's code, description, basic unit (such as manpower or gallons of gas), and availability (normal units per day and maximum units per day before a certain date and after it for up to four dates) can all be recorded and linked to tasks and costs. Resource duration (the number of days a resource will be used) and resource lag (when it will be used) can be specified. With this information in hand, *Primavera Project Planner* calculates the resources needed to complete a task (or a project) and compares actual data against budgeted quantities.

Costs are associated with tasks and resources and are assigned numeric and alphabetic codes. The alphabetic code designates cost category, such as labor or equipment, while the numeric code defines subcategories, such as excavation or electrical under subcontract. A project can have up to six cost categories and a virtually unlimited number of subcategories.

Most importantly, *Primavera Project Planner* offers resource leveling—a feature that averages out the availability of a task's vital resources and uses this information to determine the task's duration. *Primavera Project Planner* will automatically adjust a task's schedule based on six scarce resources. If more than six resources are leveled, the process becomes unwieldy and the results are inaccurate.

Project Calendar

Primavera's project calendar embraces workweeks based on from four to seven days. The user can specify a project's start and stop dates and, unlike with *MicroGANTT,* can take into account holidays and other non-workdays. When a non-workday is defined, the program assumes it will recur in every project year unless told otherwise. The project calendar can be printed out in its entirety or by date range, in a detail or summary format.

Planning, Monitoring, and Tracking

Primavera schedules project tasks based on the Critical Path Method (CPM) using either the activity-on-arrow or activity-on-node methods. These approaches particularly illustrate *Primavera Project Planner*'s power to interrelate tasks, resources, and costs—the components that make up a project. These components can be changed with relative ease to generate alternative project models, even with models incorporating thousands of tasks.

Primavera excels at tracking and monitoring a project. The program will track resources and costs by task, for the smallest allowable time period, and calculate variances. An unstarted task's duration, resource requirements, and start and stop dates can all be updated with actual results produced by completed tasks or tasks in progress; consumption of resources can likewise be monitored, with projected use compared against actual use. *Primavera Project Planner* will create two project schedules—one based on the original project plan, the other on the plan and tracking data—and report on the differences.

Reports

Primavera doesn't do much on the screen, but it makes up for it with a variety of printed reports and charts. Because tasks, resources, costs, and other information are coded and associated with one another, *Primavera*

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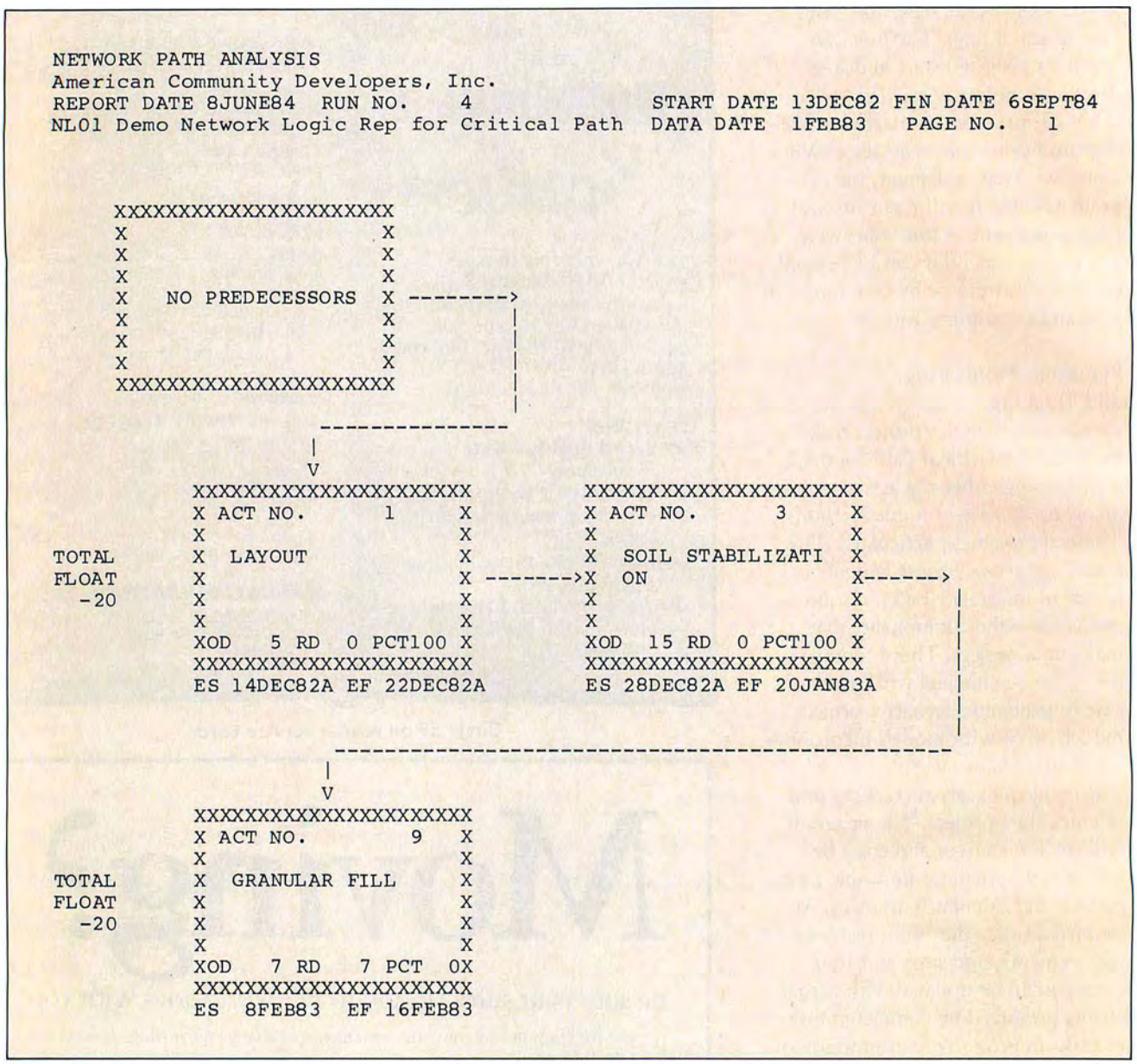

Figure 4: A Primavera network diagram. Each box represents a task in the project and contains the task's accounting code, name, original duration, remaining duration, and percentage complete. Underneath the box, the task's projected early start and finish dates are listed.

RESOURCE USAGE REPORT - MONTHLY

American Community Developers, Inc.

REPORT DATE 8JUN84 RUN NO. 6

Demo Cash Flow Report (Tabular) - Monthly START DATE 13DEC82 FIN DATE 6SEP84
DATA DATE 1FEB83 PAGE NO. 1

PERIOD ENDING	EARLY SCHEDULE USAGE	EARLY SCHEDULE AVG.DAILY	EARLY SCHEDULE CUMULATIVE	LATE SCHEDULE USAGE	LATE SCHEDULE AVG.DAILY	LATE SCHEDULE CUMULATIVE
TO DATE			119142.20			119142.20
28FEB83	11321.80	595.9	130464.00	20249.80	1065.8	139392.00
31MAR83	8928.00	388.2	139392.00	51835.50	2253.7	191227.50
29APR83	55890.39	2661.4	195282.40	2572.50	122.5	193800.00
31MAY83	30382.29	1446.8	225664.70	2572.50	122.5	196372.50
30JUN83	8319.86	378.2	233984.60	24739.48	1124.5	221112.00
29JUL83	22490.43	1124.5	256475.00	11503.14	575.2	232615.20
31AUG83	6710.53	291.8	263185.50	637632.10	27723.1	870247.30
30SEP83	637165.60	30341.2	900351.10	157271.10	7489.1	1027518.00
31OCT83	139492.80	6642.5	1039844.00	21883.75	1042.1	1049402.00
30NOV83	31692.50	1509.2	1071536.00	35754.19	1702.6	1085156.00
30DEC83	34877.55	1660.8	1106414.00	15346.02	730.8	1100502.00

Figure 5: A Primavera resource usage report. The summary report lists resource consumption by a chosen unit (other than dollars) for an early and late project finish.

can produce almost any view of a project. A report can give cost and resource summaries by task, disclose a supervisor's productivity, summarize the differences between estimated and actual project costs, or illustrate the complex task relationships that make up a project. *Primavera*'s reports fall into five categories:

Network diagram. This chart portrays prerequisite and successor task relationships. A task's code, name, duration, remaining duration, percent completed, and earliest possible start and finish dates are shown in the chart. Reports can be selected based on total task slack among various paths. (See Figure 4.)

Gantt chart. This task time line displays a project's critical path and indicates whether or not a project is on schedule. Task codes, earliest start and latest finish dates, durations, and remaining durations are also displayed. Task information may be selected and summarized by task code and sorted by early start, late finish, or slack time. The basic reporting time unit is the day, week, or month.

Resource reports. Primavera produces five resource reports. The resource profile details an individual resource's use by day, week, or month. The cumulative resource profile is essentially a line graph that summarizes total resource use. The resource control report lists budgeted resources, resources expended to date and during the reported period, resources needed for completion, and variances. The resource usage report (see Figure 5) estimates the resources needed to complete a project on time and at the earliest and latest possible dates. The earned value report compares the value of work completed in resource units versus the actual resource units expended. For example, an earned value report may disclose that a project has used 50 percent of its resources but is only 30 percent completed. Most contractors working for United States government agencies are required to submit this report. The company's promotional literature claims that all of its reports can meet the requirements of the Department of Defense and other United States agencies.

Task list. Primavera's task list includes task codes, names, durations, percent completed, constraint dates, and prerequisite and successor task information. The report can include all tasks or those selected by resource, task code, early start date, late finish date, and slack time.

Cost reports. Cost reports closely mirror the form of resource reports. Cost profile, cumulative cost profile, cost control, cash flow, and earned value reports are available. Costs are reported by task, resource, or cost code.

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Review

Reports don't have to be printed one by one. The user can classify report formats into groups and print them out together. This and other report writing features take a little time to master, but the results are worth the effort. All reports require a 132-column printer. The program includes a utility that supplies proper codes for compressed printing.

Further Features

Primavera offers a host of additional features seldom found in other project management packages, including resource leveling, output to other programs, data transfer between projects, project merging, and graphics. The resource leveling feature adjusts task durations when there aren't enough resources to go around for all the active tasks in a project. *Primavera* attempts to reassign resources without seriously altering the project's critical path or completion date.

> *Primavera,* originally developed for mainframe computers, offers features seldom found in most personal computer project management software.

Information can be transferred within a project or to a different project. This is particularly useful to any manager planning a number of

similar projects who wants to duplicate results but not effort. Task data, subprojects, report specifications, project calendars, and resource, task, and cost codes can be transferred from project to project. Reports that summarize the activities of several concurrent projects or level the critical resources they share can also be produced.

Primavera can print any of its reports to a printer or to a disk file. With some modification, project data can be used by packages such as *1-2-3* and *dBASE III*. The *Primavera* manual supplies the ambitious programmer with enough information to reformat project data files for other programs as well. Future releases of the program will provide .DIF formatting of project files.

Primavera Systems has announced the release of *Primavision*, a graphics package that produces enhanced network diagrams and Gantt charts on Houston Instrument and Hewlett-Packard pen plotters.

Documentation

The *Primavera* manual comes in three sections that provide tutorial, technical, and planning information. The tutorial guide shows a first-time user how to modify task and project information and how to create, designate, and print out a report. The technical reference section describes *Primavera*'s menus, commands, features, and file structures and includes a data dictionary of the fields the program uses. The third section includes an overview of project planning techniques and describes in detail the design of *Primavera*, providing insights that are valuable to the beginning or sophisticated user.

Though *Primavera* was designed with the knowledgeable project manager in mind, the tutorial makes the program accessible to less experienced users. Whatever your skill

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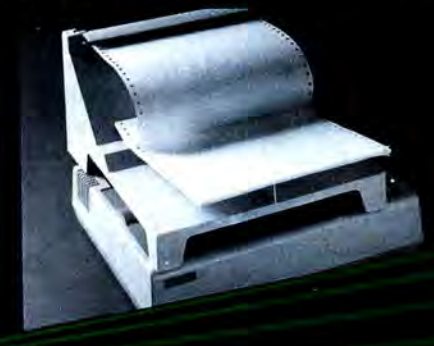

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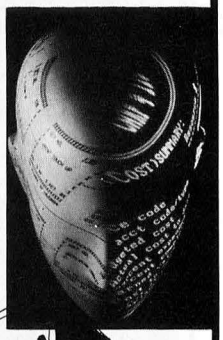

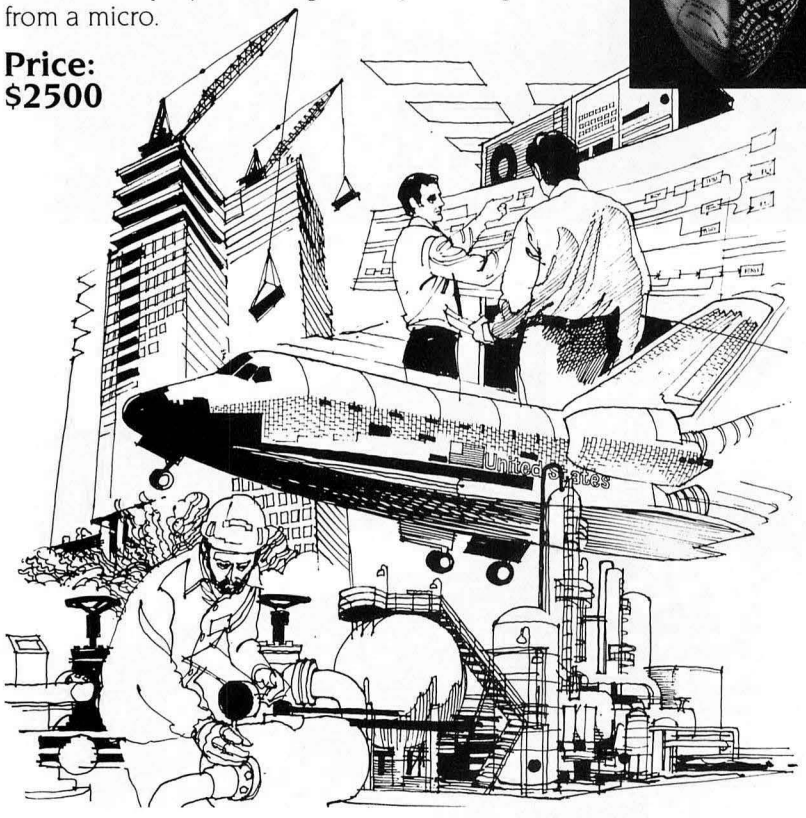

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Review

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Bill Dauphinais is a CPA and the partner in charge of management advisory services at the Sacramento, California, office of Price Waterhouse. Leonard Darnell is a CDP and a manager at the Los Angeles office of Price Waterhouse.

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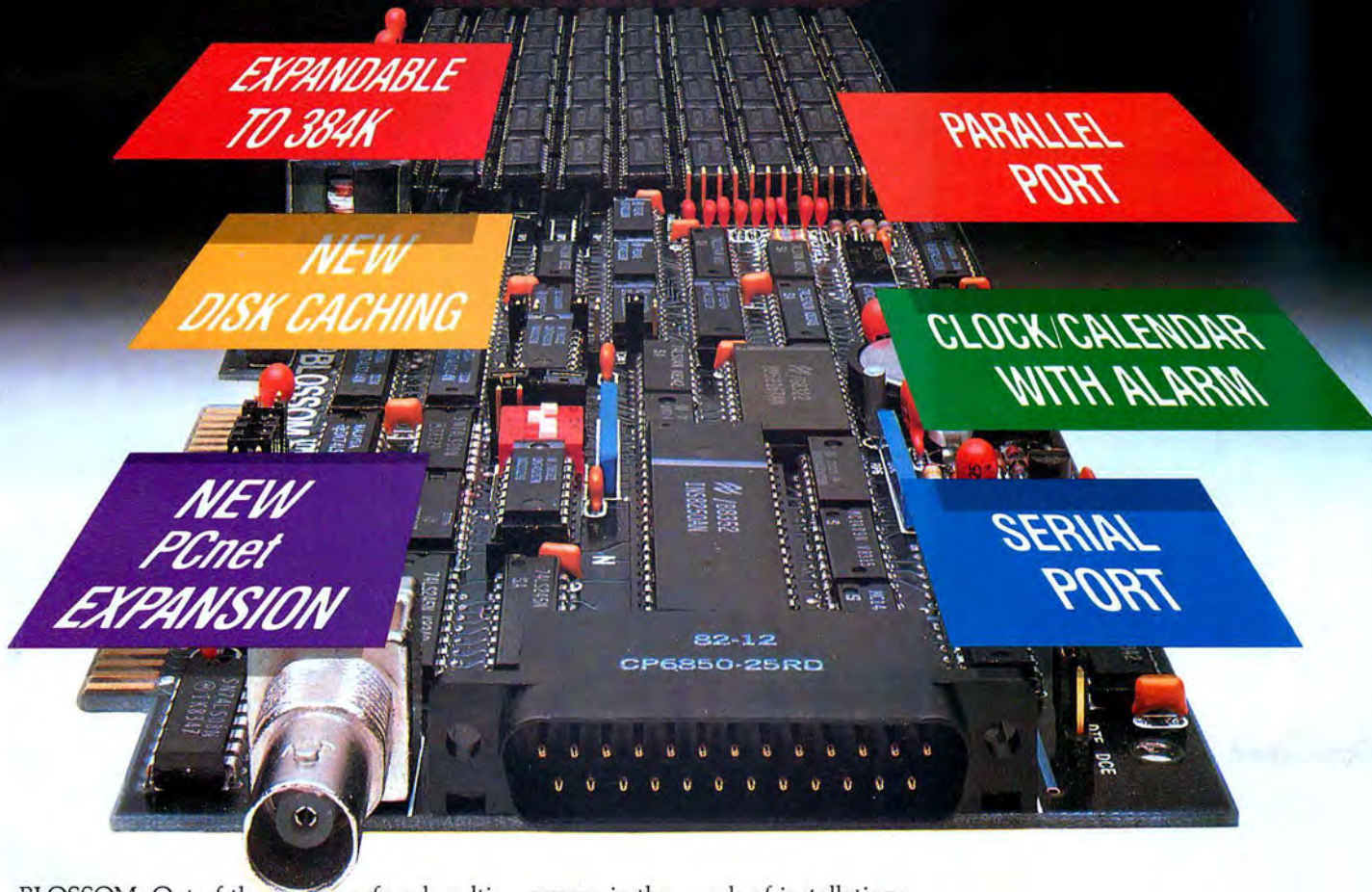

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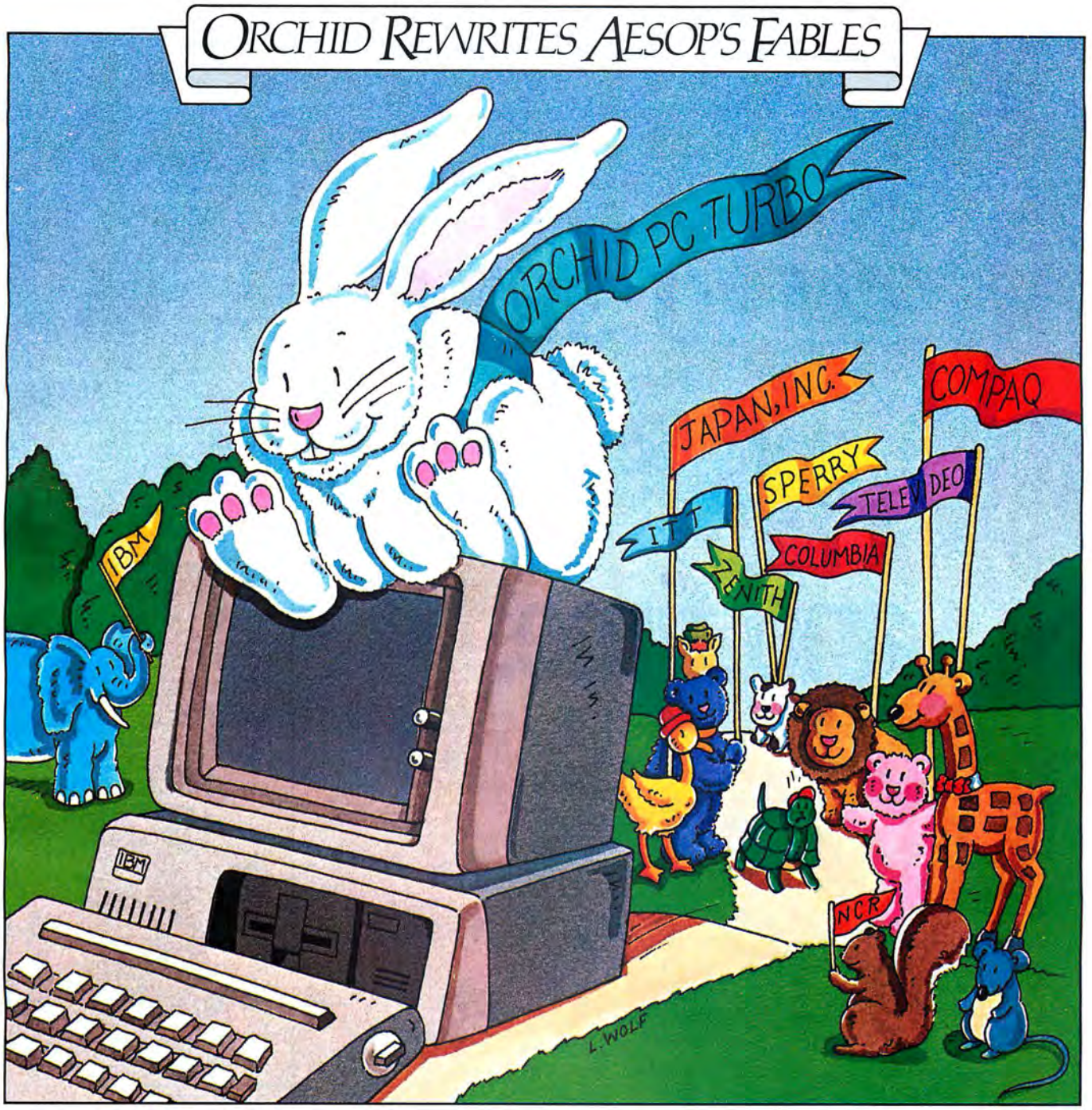

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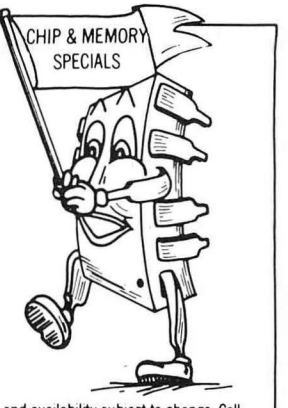

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Bubbles That Last

Bubble memory is faster than floppy disk drives, cheaper than hard disk drives, less volatile than RAM—and more durable than all three. But should it replace any of them in your PC?

Peter Neuhaus

Bubble memory has been around for nearly 15 years and, until recently, did duty everywhere except the personal computer. Bubble memory devices were first used by Bell Telephone and the military. Later they were incorporated into industrial robots when the need for shockproof and dustproof memory overrode cost considerations. When Intel introduced a 128K (128,000 characters) bubble memory module in 1979, for a then-bargain price of $2500 per module, the prospect of powerful, diskless lap-size computers seemed attainable. Production costs soon plummeted, and bubbles started appearing in portable—albeit expensive—personal computers such as the GRiD Compass. Today the same 128K module costs a mere $100.

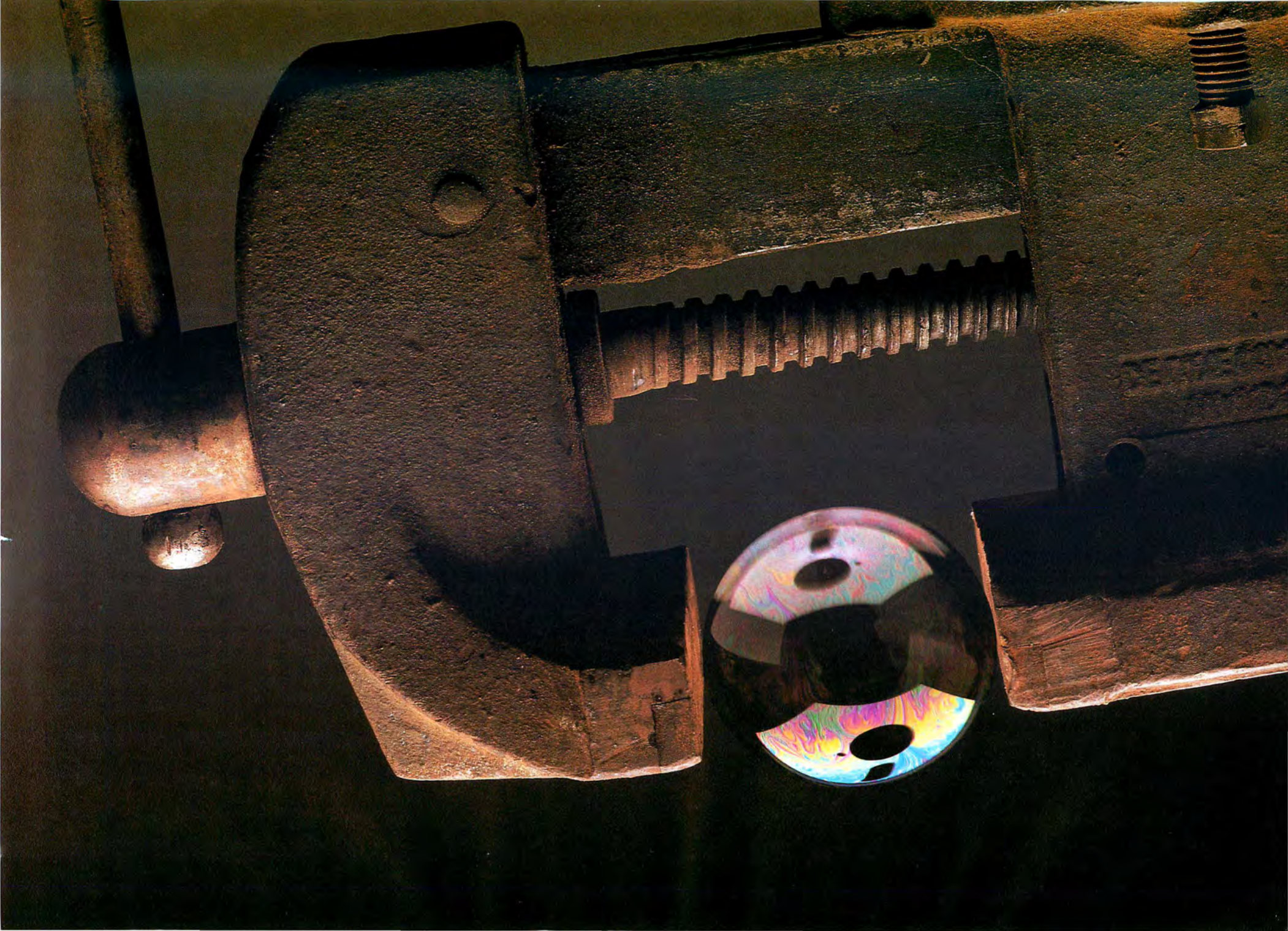
As a result, bubble memory is no longer a novelty item for the PC. Bubble memory expansion boards for the PC can provide as much as 512K of storage, allowing you to omit a second disk drive and perhaps even skip buying a hard disk drive. Unlike RAM (random access memory), a bubble memory board keeps its data when the PC is turned off. It shares with the floppy and hard disks this security, or "nonvolatility," of data, while matching a hard disk drive's accuracy and data transfer speed.

Bubble memory for the PC is currently confined to expansion boards that hold from one to four 128K bubble modules; depending on the amount of storage offered, a board will emulate either a floppy disk drive or a hard disk drive. All the reviewed boards use direct memory access (DMA), a technique that speeds up operation by allowing direct transfer of data from a bubble memory board to RAM. Bubble memory boards completely simulate floppy or hard disk performance, and most standard DOS functions and utilities can be used with a bubble board; data overflow conditions are even flagged with the familiar 'insufficient disk space' message. Once you have copied DOS onto a bubble board, you can start up (boot) the PC from the board instead of from drive A: or a hard disk.

> Bubble memory is no longer a novelty item for the PC.

One board even features password protection whenever the PC is turned on or reset.

Although bubble memory has been used as a replacement for RAM, it is essentially a sequential access device and is therefore slower. Microscopic magnetic bubbles representing data must circulate past a read/write head to be decoded. (For more information about bubble memory, see "A Lasting Memory," *PCW*, Vol. 1, No. 6.) If a bubble board has one bubble module and the PC's microprocessor asks it for 1 byte (8 bits) of information, that module must be accessed eight times—once for each bit (see Figure 1). If a board has two modules, the byte is split in half, each module holding 4 bits. Because the two modules are active at once, the 8 bits are gathered in four steps instead of eight. A four-module board is even faster, since each module holds 2 bits of each byte. But parallel operation only works with an even number of bubble modules; you can't break a byte into unequal portions, and it's desirable for each module to have the same storage format. A bubble board



with an odd number of modules (such as Pure Data's three-module board) stores each byte in one module; while one module is active transferring or receiving data, the others are dormant.

A bubble board working in parallel mode is faster than one with an odd number of modules working serially, but it also requires more power. An inactive bubble board needs about 4 watts; one that is transferring data needs anywhere from 8 to 14 watts. A PC's 64-watt power supply driving a four-module bubble board and peripherals may not have enough power to go around. A bubble board with several modules working at once also generates a lot of heat, another consideration that proponents of bubble memory seldom mention.

Testing Bubbles

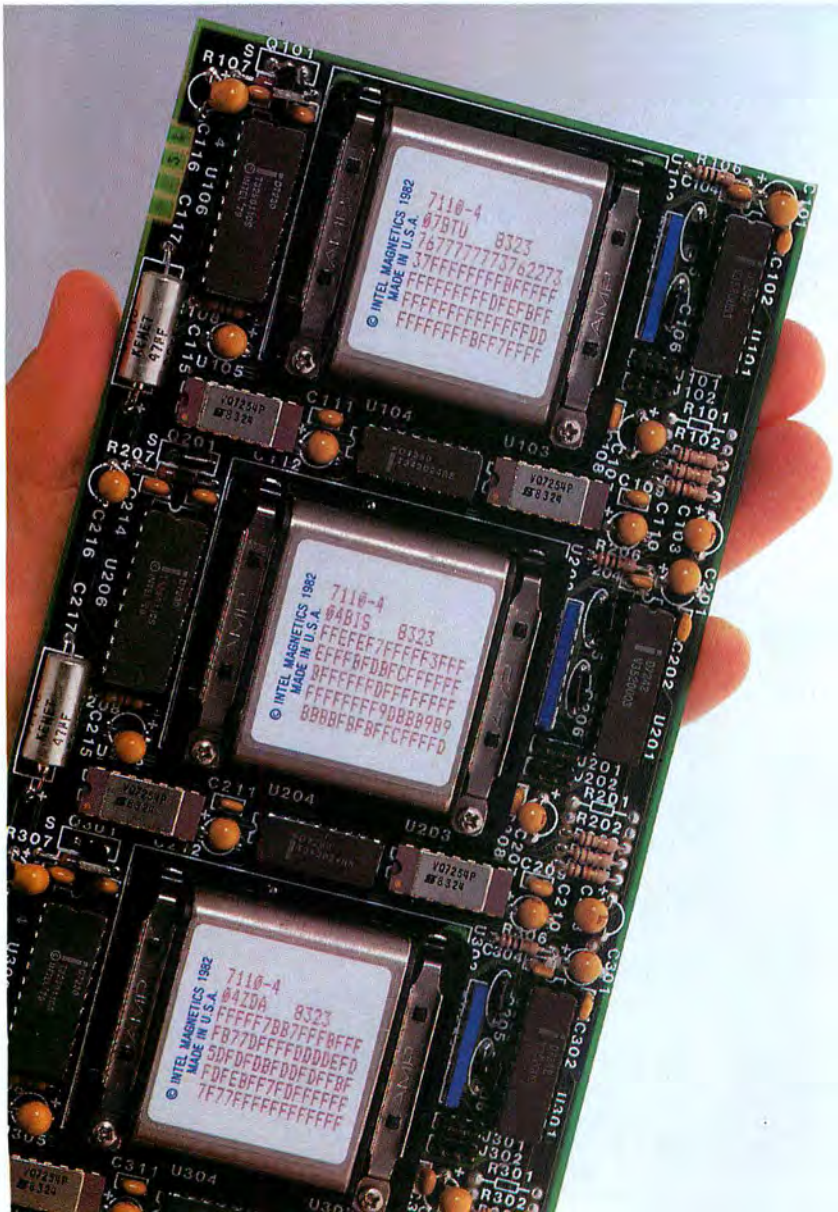
The three boards reviewed—the Helix PC Bubble Disk, the HICOMP MBM-502 Bubble Drive, and the Pure Data PDIB-384—were evaluated for cost per stored kilobyte and for performance compared to floppy, hard, and RAM disks. Each bubble board was installed in a PC XT. Two tests were run on each board: the first copied three files totaling 240K from the XT's hard disk to the bubble board—a measure of a board's ability to transfer and receive data; the second compiled a 303-line Pascal program—a test measuring a board's working relationship with the PC's microprocessor. Each test was duplicated on the XT's RAM and floppy and hard disk drives. Test results appear in Tables 1 and 2.

All the boards use identical Intel 128K bubble modules with the same inherent data transfer rates. Variations in performance are primarily due to the access method—parallel or serial—required by the number of bubble modules installed on the board.

Installation

Installing a bubble board requires only a screwdriver and a modicum of patience. DIP switches on the PC's motherboard must be set to indicate the bubble board's drive designation. You must also determine if other installed expansion boards are using an area of memory addresses needed by the bubble board. Each of the three bubble boards comes with instructions for reconfiguring it in case of a conflict.

One important note: If your PC has a BIOS ROM dated prior to 10/27/82, it cannot pass control to



The Helix PC Bubble Disk uses four 128K Intel bubble modules to offer half a megabyte of storage. The board emulates a hard disk drive.

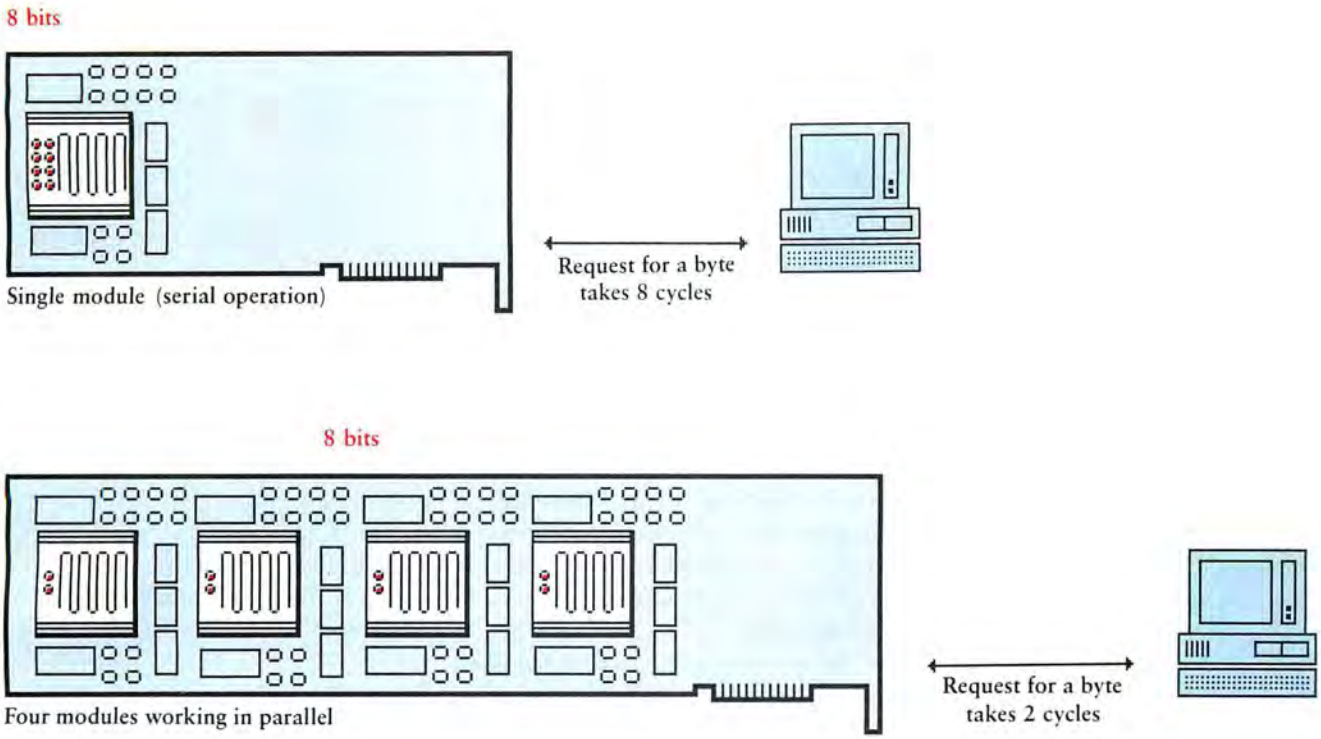


Figure 1: A bubble module stores data sequentially. Each of the 8 bits representing a byte must "step" past a read/write head and be decoded. A bubble board with one module must be accessed by the PC eight times—once for each bit. But a four-module board (with all the modules active at once) need be accessed only twice.

the special ROM chips on a bubble board that initialize the board and connect it to DOS. PC XTs and PCs with 256K motherboards use a new version of the BIOS ROM; newer compatible machines also have the equivalent ROM. Instructions for determining your BIOS ROM's date are included with all three boards. If you have an older BIOS ROM, you must use the bubble board manufacturer's device driver.

Helix PC Bubble Disk

Helix's PC Bubble Disk provides 512K of storage and, accordingly, appears to DOS as a hard disk drive. (A device with this much storage will not be recognized by DOS as a floppy disk drive.) The PC Bubble Disk, like a hard disk, can be partitioned to hold several different operating systems. Tests were conducted under DOS. The board also supports both CP/M and the Softech p-System.

Like any hard disk, the board must be initialized, partitioned, and formatted using DOS's FDISK and FORMAT utilities. If you already have one hard disk drive, the PC Bubble Disk is automatically designated the second. To start the PC from the bubble board, you need only install DOS in the active partition and start the system up with the floppy disk drive door open. Once set up, the board performs exactly like the hard disk it emulates, even using the DOS 2.00 BACKUP and RESTORE utilities.

When it comes to speed, the PC Bubble Disk is clearly the star performer among the bubble boards, though it is not, as Helix claims, "eight times faster" than a floppy disk drive. Data transfer of 240K from hard disk to RAM is almost 30 percent faster than a hard-disk-to-bubble transfer; the bubble is just 10 percent slower than a hard-disk-to-hard-disk transfer. In the Pascal compilation test, the PC Bubble Disk was only 25 percent slower than a RAM disk, and it nearly equaled the hard disk's performance.

> The PC Bubble Disk can hold several different operating systems.

Once you become accustomed to the convenience of the PC Bubble Disk, you might want to expand its storage capacity. By adding another three Helix boards, you can increase

storage capacity to 2MB. Unlike bubble boards that emulate floppy disk drives (such as the Pure Data or HICOMP boards), PC Bubble Disks do not increase the number of designated drives but simply expand the size of the existing emulated hard disk. This makes managing and backing up bubble data much easier.

Of course, adding all these boards might impose a serious drain on a PC's 64-watt power supply. A PC XT's 130-watt power supply should be able to handle the load, although its capabilities may be exceeded if other expansion boards are also installed. Nonetheless, the PC Bubble Disk's price and performance compare favorably enough with a hard disk's to make the bubble board a worthy replacement.

HICOMP MBM-502 Bubble Drive

HICOMP's Bubble Drive is a dual bubble module, 256K floppy disk emulator. The board tested was a prototype, and although documentation was brief, it was sufficient to ensure trouble-free installation. Since the HICOMP Bubble Drive emulates a floppy disk, it is formatted using the DOS FORMAT utility. Interestingly, it is the only bubble board reviewed here that uses DOS 1.10; formatted storage is 257K, 252K with DOS 2.00. Once installed in the PC XT, the Bubble Drive became drive D: and the hard disk switched to drive E:. There is apparently no way to retain the hard disk's default drive C: designation.

Performance tests demonstrate that the Bubble Drive, while faster than the Pure Data board, is much slower than the Helix board—in fact, it is slower than a floppy disk drive. If your application requires fast data transfer, HICOMP's 504 board with 512K of storage (using four parallel modules) would be a better choice.

Destination Device	Transfer Time
RAM[1]	8.3 seconds
Floppy disk drive	20.7 seconds
XT hard disk drive	10.7 seconds
Helix PC Bubble Disk	11.8 seconds
HICOMP MBM-500 Bubble Drive	22.4 seconds
Pure Data PDIB-384	35.0 seconds

[1]13 buffers of 512 bytes each

Table 1: Results of the data transfer test. Three files totaling 240K were copied from a PC XT hard disk to the three bubble boards, RAM, and a floppy and hard disk drive.

Device	Compile Time
RAM	51.2 seconds
Floppy disk drive	96.1 seconds
XT hard disk drive	61.9 seconds
Helix PC Bubble Disk	64.2 seconds
HICOMP MBM-500 Bubble Drive	77.4 seconds
Pure Data PDIB-384	91.3 seconds

Table 2: Results of the compilation test. A Pascal source code file of 303 lines was compiled by Microsoft's Pascal Compiler (version 3.11).

Bubble Board	Storage
Helix PC Bubble Disk	512K
HICOMP MBM-502 Bubble Drive	256K
Pure Data PDIB-384	384K

[1]Either DOS 1.10 or 2.00 can be used

Table 3: Bubble memory board features

Pure Data PDIB-384

Like HICOMP's Bubble Drive, the Pure Data PDIB-384 bubble board is a floppy disk emulator. While the board provides 384K of storage, its use of three bubble modules dictates that a serial—not parallel—data accessing scheme be used. Since only one module can be active at any one time, the PDIB-384 uses less power but is considerably slower than boards working in parallel mode. Pure Data is currently working on a four-module, 512K product that will use parallel data access; this should improve performance and place Pure Data in direct competition with Helix and HICOMP.

Pure Data's user manual is amply illustrated but somewhat out-of-date. Earlier versions of this board did not use DMA and had problems if you issued a print screen (<PrtSc>) command while the board was being accessed. These difficulties have since been remedied, but the changes are not reflected in the documentation.

Type of Disk Emulated	Other Operating Systems Besides DOS Supported?	DOS 2.00 Required?	Password Security	Compatibles Tested by Manufacturer	Number of Modules	Power Consumption	Access Method
hard disk	yes	yes	no	Compaq, Tava	4	14.5 watts	parallel
floppy disk	no	no[1]	no	Compaq, Sperry PC, Leading Edge PC	2	8.0 watts	parallel
floppy disk	no	yes	yes	Compaq, Sperry PC, Leading Edge PC	3	9.0 watts	serial

Interim documentation supplied by the manufacturer adds to the confusion by noting that "the modified PDIB-128/384 is only an interim product which will be discontinued when the new [512K] bubble board becomes available."

Since the documentation is mum on the board's assigned drive designation, I had to expend much effort before the PDIB-384 could be used. The Pure Data ROM that allows the PC to boot from the PDIB-384 will not work with the PC XT; Pure Data's B-Disk device driver must be installed for this function.

Once in use, the PDIB-384 reveals one of its unique features: password protection. Anyone who is tired of collecting floppy disks at the end of the day and locking them up will appreciate this security feature. The security level is set by moving a small connector (known as a jumper) on the bubble board. Two security options are available: the password required when the system is turned on or reset and the password required only when the system is turned on. Both options prevent DOS from being loaded unless the correct password is supplied. Two additional modes allow a user who does not know the password to disable the bubble board and use the rest of the system. The only way to defeat this password feature is to remove the board and change the jumper settings.

> The PDIB-384 uses less power but is considerably slower than boards working in parallel mode.

While the password protection feature is useful, it doesn't compensate for the PDIB-384's overall poor performance—a result of its serial access method. Data transfer is sluggish; the PDIB-384 is for those who require low power consumption or password protection. If you are interested in high-speed access, use the Helix board or wait for Pure Data's 512K board.

Pricing Storage

Bubble memory is getting cheaper, but it still has a hard time beating the performance or the cost-per-stored-byte offered by RAM, floppy disk drives, and hard disk drives. A hard disk drive is fast and stores 1K of data for about 13 cents; a floppy disk drive has removable disks and stores 1K for about 70 cents. Even RAM, the fastest storage medium around, stores 1K for about $1—while a bubble board stores 1K for, at best, a little under $3.

A hard disk drive often gives you more storage than you need; floppy drives are slow; and both are electromechanical devices subject to wear and tear. RAM drives, while fast, still lose their data when the system loses power. So bubble memory can be the proper solution—if its unique characteristics fit your particular requirements (see Table 3). But for an overall, cost-effective, high-performance storage device, a hard disk drive is still the best deal.

Bubble memory may yet catch up. While it's difficult to predict what various storage devices will cost in

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Review

the future, it's likely that bubble memory prices will continue to tumble. Prototype boards using Intel's new 512K bubble module should appear in early 1985. That means commercial bubble boards offering 2MB of storage will be available—probably for under $2000. That's a deal you may not want to pass up.

Peter Neuhaus is a computer graphics consultant specializing in graphics design applications.

PC Bubble Disk
Helix Labs Inc.
16776 Bernardo Center Dr.
San Diego, CA 92128
619/451-0270
List price: $1495
Requirements: DOS 2.00 or 2.10

MBM-502 Bubble Drive
HICOMP Computer Corp.
5018 148th Ave. NE
Redmond, WA 98052
206/881-6030
List price: $995, MBM-504 $1495, RS-232C port $50
Requirements: DOS 1.10 or later version

PDIB-384
Pure Data Ltd.
950 Denison St.
Markham, Ontario
L3R 3K5 Canada
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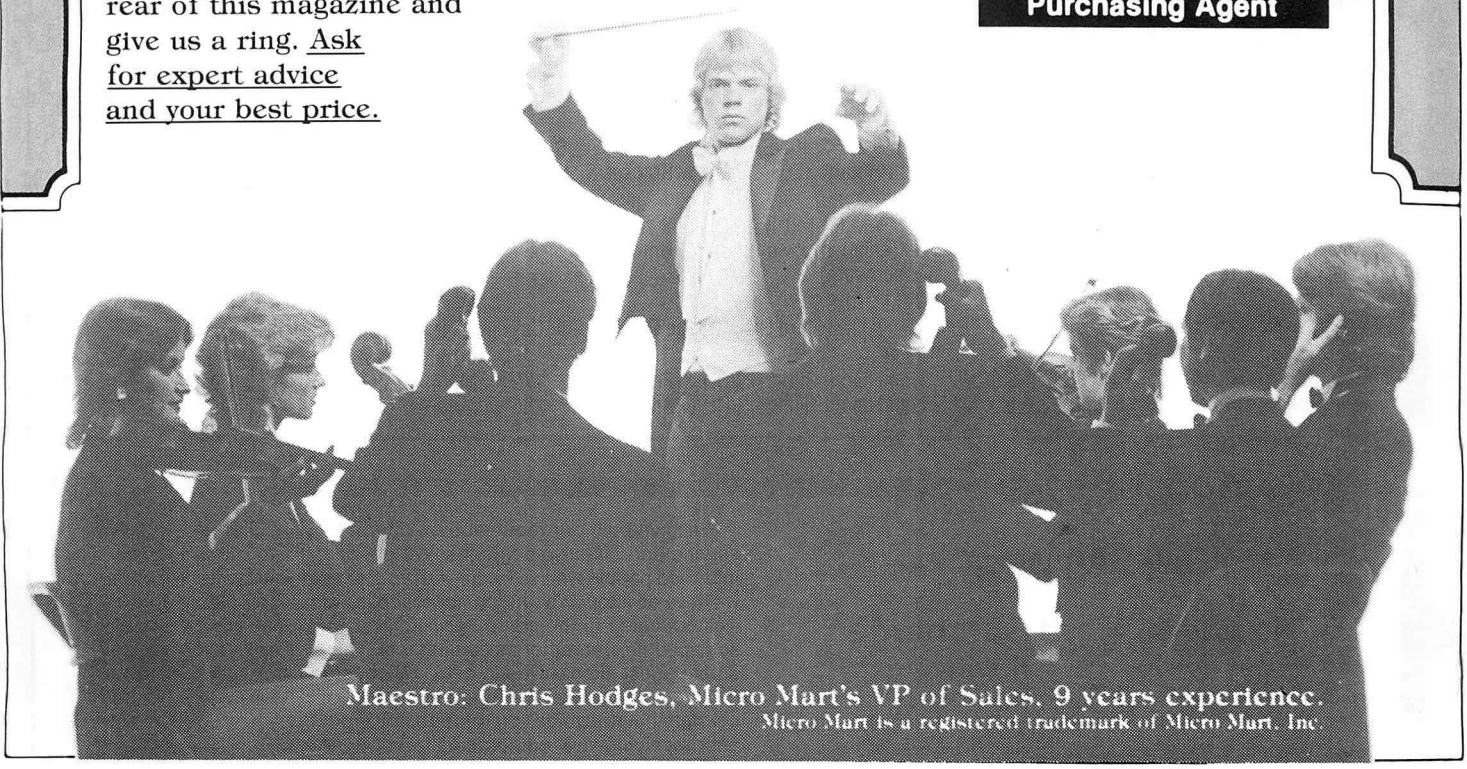

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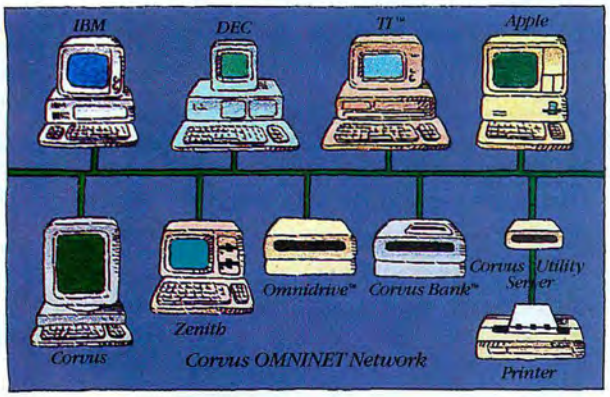

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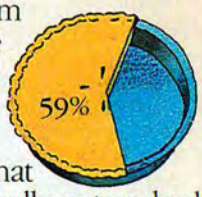

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Circle 362 on reader service card

Intelligent Communications

Go on-line with five all-purpose smart terminal communications packages for the PC—Telios, Relay, Omniterm 2, Blast, and Crosstalk XVI.

Larry Jordan

By itself an IBM PC can be a useful ally in the office and home, helping you see words and numbers in different ways. But once you hook the PC up to the telephone line via a modem controlled by communications software, the PC becomes much more—a connection to a vast world of information. The key to this connection is the software that controls the modem and the communications session. So much information exists in information services, on-line libraries, corporate mainframe data bases, bulletin boards, and other modem-equipped PCs, you'll be lost without a communications program that can easily and flexibly handle a wide variety of communications sessions. Although many exotic and specialized programs exist for setting up bulletin boards, imitating the dumb terminals of specific mainframes, and establishing complex electronic mail networks, there is no substitute for a good all-purpose smart terminal communications package that can handle a variety of chores. This review explores five such smart terminal packages for the PC.

Due to the increasing complexity of communications software and the differences in capabilities between packages, you should assess your communications needs before you start testing software. Once you have started to use a particular package, it is difficult to change, particularly for a large organization that has made a substantial investment in software and training. During the assessment process it is a good idea to work with a chart similar to the one shown in Table 1, listing the features you require and noting how each package you consider meets each requirement.

It is also a good idea to experiment with the inexpensive packages that are available either free or at a nominal cost on bulletin boards or through the mail. Several of these products, including *PC-Talk III* and *PC-Dial,* are rich in features and may meet most of your needs. If you find, however, that they do not, the experience will help you evaluate the more expensive products. The characteristics and capabilities of *PC-Talk III* are listed in Table 1 along with those of the five smart terminal programs reviewed below. If you're new to communications, see "The Communicators" (*PCW,* Vol. 1, No. 5) for a full description of the features listed in Table 1, or see "Communications Features Explained" for a brief glossary of communications terms.

Only the highlights of each program are presented. The packages all require a PC or compatible with at least one disk drive, a modem, an asynchronous adapter, and an RS-232C cable. Other requirements are noted in "Smart Terminal Packages for the PC."

Telios

Of all the communications packages sampled, *Telios* (version 3.0) proved to be the easiest to use in relation to its power and flexibility. *Telios* is rich in data transfer utilities and provides a variety of public-domain file transfer protocols. In addition, *Telios* supports terminal emulation of the DEC VT100.

When you start the program, an animated greeting appears. Press the <Space> bar and *Telios* goes directly into conversation mode. There are no complicated menus to try your patience; the screen is blank except for a status line at the bottom that displays the time and a mode indicator.

Telios uses <Alt> and alpha key combinations to execute frequently used commands. Pressing <Alt>-H produces four help screens that briefly describe the 26 *Telios* commands. You can execute commands by pressing <Alt>-C followed by a command word or an abbreviation

Software Features	Blast	Crosstalk XVI	Omniterm 2	PC-Talk III	Relay	Telios
Data capture direct to disk file	●	●	●	●	●	●
Data capture to memory buffer	●	●	●	-	-	●
On-line display of capture buffer	●	●	●	-	-	●
On-line editing of capture buffer	-	-	●	-	-	-
Filtering of control characters	-	●	-	●	●	●
Blank-line expansion	-	●	-	●	-	●
Linefeed editing	●	●	●	-	●	●
Upload text throttle	●	●	●	●	●	●
Menu of prestored uploadable strings	●	●	●	●	●	●
Transmission of prestored strings	●	●	●	●	●	●
True break signal	●	●	●	●	-	●
Tab-to-space conversion	-	●	-	-	-	-
Xmodem protocol file transfer	-	●	●	●	●	●
XON/XOFF handshaking	●	●	●		●	●
Operation with non-auto-dial modem	●	●	●	●	●	●
Auto-dial telephone directory	-	●	●	●	●	●
Auto-dial modem support	●	●	●	●	●	●
Auto-redial of last call until connect	-	●	-	●	-	●
Modem/telephone hang-up	●	●	●	-	●	●
Return to operating system	-	●	-	●	-	●
Elapsed time of call display	-	●	●	●	●	●
On-line switch between originate/answer	●	●	-	-	●	●
On-line duplex toggle	●	●	●	●	●	●
On-line selection of communications parameters	●	●	●	●	●	●
On-line listing of selected parameters	●	●	●	●	●	●
On-line printer on/off toggle	-	●	●	●	●	●
On-line viewing of disk directories	●	●	●	●	●	●
On-line viewing of disk files	●	●	●	●	●	●
Deletion and renaming of disk files	●	●	●	●	●	●
Save/reload of customized parameters	●	●	●	●	●	●
Batch operation from operating system	●	●	-	-	●	●
Command file	●	●	●	-	●	●
Remote takeover and operation	●	●	●	-	●	-
Display of help files	●	●	●	●	●	●
Line 25 abbreviated help menu	-	●	●	●	●	●
Terminal emulation	-	●	●	-	●	-
Split-screen option	-	-	-	-	●	-
Ease of command key use	●	●	●	●	●	●
User manual	●	●	●	●	●	●

● Excellent ● Good ● Fair

Table 1: Comparison of communications software. See "Communications Features Explained" for explanations of the above criteria.

and an optional parameter. The help screens are sufficient guidance for experienced telecommunicators, but novices will find it necessary to read the manual.

Telios provides command files that can be customized for easy access to a variety of remote host computers. Any *Telios* command can be stored in the files to dial up and log on to remote computers automatically. Communications parameters, special text and control character strings, and any other command can be assigned to function keys for single-key logon to remote computers. The function key assignments can be customized for a number of host computers and the definitions may be displayed at any time by pressing <Alt>-F.

The program provides several features that are useful for communicating with minicomputers or mainframes. At any time during the connection with a host, you can scroll back through a 20K buffer (a temporary holding area of the computer's memory) that contains all recent information exchanges. Another feature allows you to instruct the program to wait for a specific character prompt or for a given amount of time before it sends text. These features enable you to quickly transfer data (upload) to a host file editor that expects relatively slow manual keystroke input rather than a constant stream of uploaded blocks of text.

Telios's blank line expansion feature causes blank lines containing only a carriage return to be padded with a space followed by a carriage return. This prevents a host editor from misinterpreting the carriage return character as a signal to change modes from input to edit.

Telios offers three file transfer options. Text and binary files can be transferred in non-error-checking ASCII or in two error-checking protocol modes, Xmodem or Kermit. Both error-checking modes provide at least 99.6 percent error-free file transfers. The Xmodem protocol is excellent for communications between microcomputers, and the Kermit protocol is best for communications between a PC and a large host computer (see "Kermit—A Bit Beyond Xmodem").

> Relay has one of the best communications manuals on the market.

Telios also provides several useful local operation features. Without exiting the program, you can use DOS commands to list files and disk directories and to erase files. Color monitor owners can use *Telios*'s color commands to control background and foreground colors for the command prompts, the text screen, and the status line.

The only shortcoming of *Telios* is its substandard manual. The software publisher indicates that a new manual is under development.

Relay

The recent release of *Relay* version 2.2 adds several new capabilities that turn this smart terminal package into a powerful communications tool. *Re-*

Smart Terminal Packages for the PC

The following packages are reviewed in this article:

Blast
Communications Research Group, Inc.
8939 Jefferson Hwy.
Baton Rouge, LA 70809
504/923-0888
List price: $250
Requirements: 64K, 80-column monitor

Crosstalk XVI
Microstuf, Inc.
1845 The Exchange #140
Atlanta, GA 30339
404/952-0267
List price $195
Requirements: 96K, 80-column monitor

Omniterm 2
Lindbergh Systems Inc.
49 Beechmont St.
Worcester, MA 01609
617/852-0233
List price: $245
Requirements: 128K, 80-column monitor

Relay
VM Personal Computing
60 E. 42nd St.
New York, NY 10165
212/697-4747
List price: $149
Requirements: 128K, 80-column monitor

Telios
Genasys
11820 Parklawn Dr.
Rockville, MD 20852
301/468-9600
List price: $119.95
Requirements: 96K

lay has one of the best communications manuals on the market. The professionally typeset documentation provides well-designed figures and a full explanation of functions and commands. Good examples of commands and an excellent glossary of terms are also included.

Relay provides good on-line help and a well-designed dialing directory. Help appropriate to a particular menu or screen is as close as the <F10> key. The dialing directory is a single keystroke away from the main menu and contains excellent sample dialing setups. After you select a specific host computer from the dialing directory, a single keystroke causes the PC to dial the host and invoke selected communications parameters. A different key selection allows you to list and modify the parameters associated with each host computer.

Relay is designed to operate in either a TTY (teletype) or a PC mode. The TTY mode enables you to interact with a host computer using the keyboard; the local input and the host responses are displayed sequentially on the screen. The TTY mode also enables you to transfer files either in an ASCII text mode or in one of the two Xmodem modes—checksum or CRC-16.

In the PC mode, *Relay* expects to communicate with another *Relay*-equipped PC or with a mainframe equipped with a companion package called *Release*. The PC mode offers several advantages over the TTY mode. First, file transfers are performed using *Relay*'s own proprietary CRC-16 error-checking protocol, which is superior to the public-domain Xmodem. Second, the operators of *Relay*-equipped PCs can chat at the keyboards while files are being transferred. Third, the PC mode provides split screens that let you separate received data from transmitted data, a design that makes keyboard interaction less confusing. Finally, the PC mode allows *Relay*-equipped PCs to transmit to and receive binary files from a *Release*-equipped mainframe computer. This last feature is a rarity due to the lack of protocol-matched software available for mainframes.

Relay allows you to simultaneously capture, edit, and print a file.

Relay uses script files to control host logon procedures and automatic file transfers. Script files are programmable files that allow you to set up the PC for a number of batch operations, including unattended operation and timed delivery of files. With script files the text strings assigned to the function keys can be used to send frequently used commands to the host.

Aside from excellent file transfer and auto-dialing features, *Relay* offers several modes of multitasking. At any time during an interactive session or a file transfer with the host, *Relay* allows you to simultaneously capture, edit, and print a file. You can also run any external .EXE or .COM files (with some minor exceptions) during communications.

Relay makes full use of color when used with a color graphics board and a color monitor, but the colors can be disconcerting. Bright red, blue, and green borders are used along with a variety of highlights and inverse video.

One advantage of *Relay* is the variety of modems it can support. The initial setup menu includes the Hayes Smartmodem, the Rixon PC212A, the Racal Vadic VA212, and a null modem (direct cable connection to another computer).

I had a problem with *Relay* during Xmodem file transfers. I tried to download files from several systems using the checksum Xmodem technique, but the software terminated the transfer after 512 bytes were received. The problem has now been corrected. If you encounter a problem using Xmodem, you can request from the manufacturer a program called RELAY.PTF that will correct this bug.

Omniterm 2

Omniterm has been popular with Radio Shack TRS-80 owners since 1981 but was only released for the IBM PC in March 1984. The initial release for the PC contains many useful features, and the package promises to be a contender in both the smart terminal and host software categories.

Omniterm 2 relies heavily on the use of the function keys. The package includes a function key template that provides easy-to-read and easy-to-understand command summaries. The function keys can be programmed to contain up to 40 commonly used keystroke sequences specific to the remote host. At any time you can press <F2> for on-line help. The help screens are well conceived and are matched with the menu or function in progress.

The main menu has 14 options that lead to other menus. Some menus provide system configuration selections; others allow selection of parameters associated with remote host systems. For those who have color monitors, the main menu and all submenus have excellent color combinations that emphasize user selections. The functional flow of the menus is also well designed.

(continues on page 174)

Communications Features Explained

Eric Brown and Art Wilcox

The following short descriptions of common communications features correspond to the features listed in Table 1.

Data capture. Data capture, also called downloading, is the process of storing received data in memory or in a disk file. Some packages capture data directly to a disk file, whereas others capture data to a buffer in RAM for later storage in a disk file. Some packages also enable you to display and edit the contents of a memory buffer without terminating the communications link.

Filtering of control characters. Some computers transmit control characters that can be confusing or disruptive when displayed as part of the received data. To eliminate these characters, the program should enable you to use a command string to filter them out.

Blank-line expansion. When uploading (sending) files to a mainframe host editor, the mainframe editor often misinterprets lines that contain only carriage returns as a request to change from input to edit mode. When this happens the transmission is terminated. The blank-line expansion feature automatically pads blank lines by inserting a blank space before the carriage return, thereby avoiding this problem.

Linefeed editing. Linefeeds are the control characters that tell the screen (and ultimately the printer) when to begin a new line. Some communications packages add linefeeds after each received or transmitted carriage return, but others do not. When a package does not allow you to control linefeeds, each line may either print over the previous line, making the text impossible to read, or else produce extra blank lines. These files must then be edited to remove or add linefeeds.

Upload text throttle. To match the file transfer rate of a PC with the system response of a mainframe, it is sometimes necessary to throttle, or pace, the transfer rate. You can throttle the transmission using time delays, character receipt delays, and character prompt delays. A time-delay throttle allows you to control the length of the time between the transmission of each line. A character-receipt delay enables you to specify the number of characters that must be received before the next line of data is sent. A character-prompt delay allows you to define the character string that must be received before another line of data is sent.

Prestored uploadable strings. Frequent communications with systems that require extensive logon procedures can mean a great deal of repetitive typing. Many communications packages enable you to store logon strings in macros, which can later be uploaded with one or two keystrokes. Some software displays a list of these strings while you are logged on to another system.

True break signal. Many mainframes and some information services require a break signal in order to interrupt a program's execution. The ability to send an attention-getting, 200- to 600-millisecond, high signal can be a useful feature.

Tab-to-space conversion. Some programs save valuable disk space by representing up to eight spaces with a single tab character. Other systems, however, do not follow the same convention, so you may want to convert tab characters back to spaces. Some packages allow you to turn this automatic conversion on and off.

Xmodem protocol file transfer. The Xmodem protocol performs 99.6 percent error-free error detection on transferred blocks of data and automatically retransmits erroneous blocks. Xmodem is desirable when you are sending files in which the change of a single number may be critical, or when sending 8-bit program files.

XON/XOFF handshaking. When telecommunicating files at rates greater than 300 bps, speeds become less precise, and the receiving buffer may fill up too fast. When the buffer begins to fill up, the software tells the

transmitting computer to stop sending data by issuing an XOFF character. When the buffer is emptied, the software signals the host to resume sending data by issuing an XON character.

Manual- and auto-dial modem support. Communications software that supports only manual-dial or only auto-dial modems limits flexibility. It may be a good idea to get a package that supports both.

Auto-dial telephone directory. A package should allow you to list a directory of available telephone numbers. Numbers that are buried in command or batch files are often inconvenient to locate.

Auto-redial of last call until connect. Information services and bulletin boards are frequently busy. Most communications packages can automatically redial the last dialed number. However, some packages can also redial a number until a connection is made. In some cases the software provides an alarm signal when the connection is finally established.

Modem/telephone hang-up. Some remote systems do not automatically break the telephone connection when you log off. There should be a software command available that "drops the line" when an auto-dial/auto-answer modem is being used. Without this option the modem might have to be turned off to break the connection; frequent use of the power switch in this manner may shorten the life of the modem.

Return to operating system. Communications software should not require you to reboot the computer each time a communications session is completed. Many packages use a function key or an <Alt> key combination to return to the operating system, while others require you to pass through a series of menus before arriving at the operating system. Another useful option is the ability to return to the operating system without breaking the communications link.

Elapsed time of call display. Information services generally charge a rate based on connect time. An indicator of the connect time (or time elapsed) can help you monitor costs.

On-line switch between originate/answer. To receive a call from a remote computer, the modem must be switched from the originate mode to the answer mode. Manual- and auto-dial modems provide a switch that activates the mode change, but most auto-dial modems can also be switched easily through software control.

On-line duplex toggle. A communications package should provide a way to switch between half-duplex (one-way) and full-duplex (bidirectional) communication modes. Most information services and bulletin board systems operate in full-duplex mode, but other systems may operate in half-duplex mode.

On-line selection and listing of communications parameters. You must be able to match the parameters of your system with those of the remote system. These parameters include bps rate, parity type, number of data bits, and number of stop bits. The communications software usually provides default values for these parameters, but it should also allow you to modify the default values both before and during a telecommunications session. An on-screen dialing directory should list the established parameters for each phone number.

On-line printer on/off toggle. Some packages enable you to display and print out data simultaneously as it is received over the phone line. A single key that toggles the print function on and off without interrupting the data transfer allows you to print portions of the text selectively.

On-line viewing of disk directories and files. During a communications session it is helpful to list the directories of all disk drives so you can easily select files for transfer or make sure that the file name for received text is not currently in use. Some

(continues on page 173)

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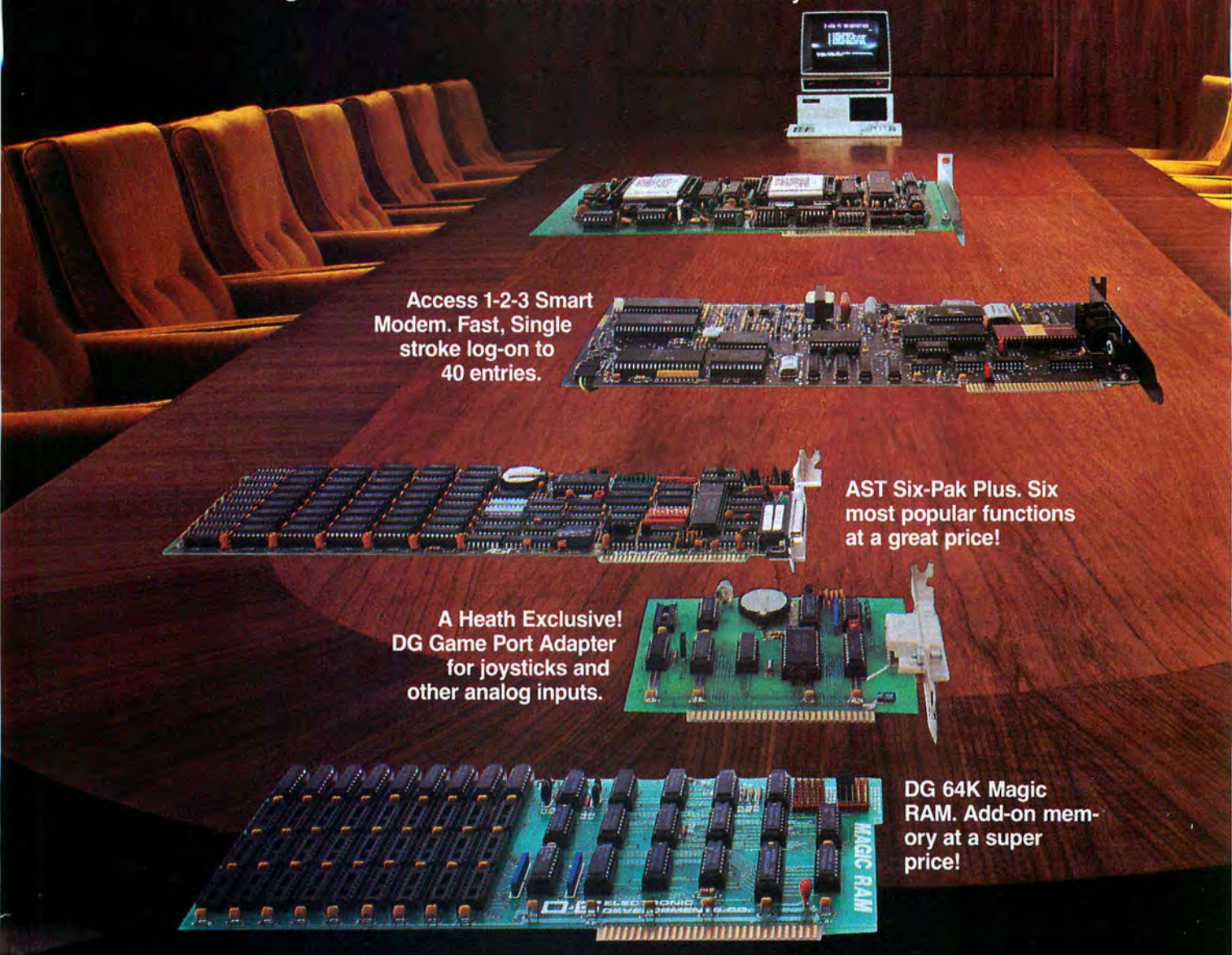

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- **ROCHESTER, NY** 937 Jefferson Rd.
- **N. WHITE PLAINS, NY** 7 Reservoir Rd.
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- **CLEVELAND, OH** 28100 Chagrin Blvd.
- **COLUMBUS, OH** 2500 Morse Rd.
- **TOLEDO, OH** 48 S. Byrne Rd.
- **OKLAHOMA CITY, OK** 2727 N.W. Expressway
- **FRAZER, PA** 630 Lancaster Pike (Rt. 30)
- **PHILADELPHIA, PA** 6318 Roosevelt Blvd.
- **PITTSBURGH, PA** 3482 Wm. Penn Hwy.
- **WARWICK, RI** 558 Greenwich Ave.
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Communications Features Explained *(continued)*

programs also enable you to view a menu of parameter files or batch files and to enter and view the file itself. Some software also allows you to delete and rename disk files while connected to a remote computer.

Command file support. If you call the same computer system frequently, you can use command files to store logon information—such as the name, phone number, and transmission rate—for that system on disk. When loaded, these files perform the commands automatically, as if you had entered them from the keyboard.

Batch operation from operating system. Batch mode operation is similar to command file execution, but it supports several commands not supported by command files. A batch file can modify communications parameters and dial a telephone number, but unlike a command file, it can also continue the communications session after a connection is established. Logon messages can be sent and files transferred without operator assistance. A batch file can also be programmed so that it executes at an hour when telephone costs are low.

Remote takeover and operation. Some communications packages allow users to call in from a remote location and control the computer as if they were sitting in front of it (see "Remote and Unattended," *PCW*, Vol. 2, No. 2). To perform this function both systems must be using the same software.

Display of help files. On-screen help files are not a replacement for a good user manual, but they provide a quick reference for the keys required to perform certain functions. These help files should be readily accessible and written in clear, concise English. In addition, some programs offer a "status line" (usually line 25), which provides help specific to the current task at all times.

Terminal emulation. As PC-to-mainframe communications increase, many packages are offering the ability to imitate dumb terminals for specific mainframes. Without the correct terminal emulation modes, the mainframe may not accept your connection, and communications may be difficult or impossible.

Split-screen option. The ability to split the screen enables you to separate the messages you type from the messages you receive during chat mode (real-time keyboard communications). When you split the screen, your input appears on one side of the screen and received messages appear on the other.

Ease of command key use. Communications software should be operable in a command (off-line) or a conversation (on-line) mode. You should be able to switch easily between the two modes.

User manual. A communications package is incomplete without a good user manual. A package that contains all the features described above is of little use without a manual that clearly describes the use of each feature. A communications primer, while not a necessity, can prove invaluable to beginning users.

Review

Omniterm 2 provides some unique screen functions. You can split the screen and display 8-line windows of a buffer of past PC/host interactions on the top of the screen. The window can be scrolled up or down or searched for specified strings. *Omniterm 2* allows you to select, edit, and retransmit any line of text that still remains on the 16 lines of active screen. This feature allows you to

Blast enables you to send data at rates of 9600 bps on voice-grade telephone lines.

correct host commands easily and quickly and to retransmit them rather than key in the entire sequence again.

When used with an auto-answer modem, *Omniterm 2* can act as an unattended host. In this mode *Omniterm 2* can automatically answer any incoming call, and callers can leave messages or transfer files to and from the system. Using programmable macro functions, you can set up menus, greetings, and caller access passwords.

I experienced only one problem with *Omniterm 2*. When operating at 300 bits per second (bps) on a Hayes 1200B internal modem, *Omniterm 2* continually dropped some incoming characters. When operating at 1200 bps, *Omniterm 2* dropped whole strings of characters. The software has an error-detection indicator located on the bottom right of the terminal mode screen, but the error trap did not detect the communication port overruns. I switched to my stand-alone Hayes Smartmodem 1200 and had no problem performing file transfer in either mode. The manufacturer reports that the bug that caused these errors has been fixed in the most current update, version 5.02.

Blast

Blast is named for its unique method of file transfer—BLocked ASynchronous Transfer. The MS-DOS version is one of a family of *Blast* communications packages that provide error-free file transfers among a large number of computers. *Blast*'s main limitation is that much of the power of the program is unavailable unless you are communicating with another computer equipped with *Blast*.

The software is menu-driven, and configuration is simple and easy to follow. A series of menus lets you set up and store configuration command files for automatic call, logon, and file transfer with remote computers. You can also select the correct communications parameters before calling a remote computer.

Blast enables you to send data at rates of 300 to 9600 bps on voice-grade telephone lines and up to 19,200 bps using a null modem. The program takes advantage of full-duplex modem capability by allowing simultaneous file transfer in both directions—a technique that can nearly double the data throughput speed. If you send a file at 1200 bps, actual speeds can approach 2400 bps.

Blast offers a well-designed and effective file transfer protocol. You can send non-error-checked ASCII text files to any remote computer, but if you are communicating with a *Blast*-equipped computer, you can take advantage of the program's proprietary block-oriented protocol. Like Xmodem, the *Blast* protocol requires 8 data bits and no parity checking, but the effective data throughput is higher due to the unique error-checking signals used.

Kermit—A Bit Beyond Xmodem

The first time I heard about Kermit I couldn't help but think of the funny green frog. I had difficulty taking a file transfer utility that reminded me of an amphibian seriously. The more I learned about Kermit, however, the more I liked it.

Like Xmodem, Kermit is a utility that can be built in or added to your communications software to ensure error-free transmission. Both utilities transfer data between computers in blocks or packets, checking each packet for communication errors. Both the transmitting and receiving computers calculate a checksum (a complex mathematical equation) based on the contents of each packet and then compare the two checksums. The receiving computer requests a retransfer of a packet if the received checksum does not match the transmitted checksum.

Many Xmodem enthusiasts may question the need for yet another public-domain protocol. After all, Xmodem guarantees 99.6 percent error-free transmission. What more could you want?

Still, there is a legitimate need for Kermit. Xmodem cannot transmit data to or from mainframe computers that can only operate using 7 data bits. In response to this need, Columbia University developed and released Kermit, which can handle *any kind of file* and can be used with just about any kind of computer. The protocol can convert data into the equivalent of printable 7-bit ASCII characters and numbers. When Kermit is asked to communicate 8-bit binary files, it simply sends the extra bit by itself. This "prefixing," or "8-bit quoting," overcomes the 7-bit limitation of some old mainframe front-end processors.

Kermit has three other advantages over Xmodem. First, it allows wild-card file transfers. An asterisk can be used in place of several file name letters in order to sequentially and automatically transmit several files with common file names or extensions. (Xmodem must be manually restarted at the end of each file transfer.) Second, minicomputer and mainframe versions of Kermit often include a Server mode. After the host Kermit is placed in the Server mode, the local Kermit performs all handshaking necessary to both send and receive files. The local Kermit completely controls the remote host Kermit. Kermit's wild-card and Server features are both time-savers when several files must be transferred consecutively. Finally, Kermit avoids the "deadly embrace" that can abnormally abort Xmodem transfers when handshake character synchronization is thrown off by a bad telephone connection.

Will Kermit displace Xmodem for error-checked file transfers? Not in the near future, but perhaps it will eventually win out as the public-domain protocol of choice. It is already used in many universities and several major federal government organizations. The Source is testing Kermit and may begin to support the protocol sometime this year.

The Kermit software is free, available from a number of bulletin boards and public-domain software libraries. To get the complete package, including a nine-track magnetic tape, a user guide, and a protocol manual, send $100 to Columbia University. The university can make only tapes, not floppy disks. However, bootstrapping procedures are provided to allow the microcomputer versions to be downloaded from the mainframe for which the tape is produced. The tape includes all source programs and documentation. When contacting the university, please list the machines and operating systems on which you expect to run Kermit. Also specify the tape format and the listings desired.

Kermit
Columbia University Center for Computing Activities
Seventh Floor, Watson Laboratory
612 W. 115th St.
New York, NY 10025

Review

Blast divides a text or binary file into 100-byte packets and transmits them one at a time. The remote computer checks each packet it receives to be sure no errors were introduced during transmission. After it receives each block, *Blast* sends a single character to the sending computer, indicating whether or not the block contained errors.

This process is similar to other protocols, except that *Blast* does not retransmit bad data packets as soon as an error is detected. Instead, *Blast* pumps all packets through without handshaking (synchronization) pauses before retransmitting the blocks that contained errors. The constant flow of data and follow-up retransmission used in this "sliding-window" protocol gives *Blast* at least a 10-percent throughput advantage over Xmodem and most other stop-and-wait protocol transfers.

Blast is a good choice for those seeking the next plateau in high-speed communications for microcomputers. This year a number of companies are releasing 2400-bps and 9600-bps full-duplex voice-grade modems for the PC (see "Modems in the Fast Lane," *PCW*, Vol. 2, No. 7). Compared to expensive synchronous hardware and software combinations, *Blast* can move a lot of data in a short period of time at a reasonable cost.

Most asynchronous data transfer protocols require complete retransmission of a file if the line connection is lost. If a communications failure occurs during a *Blast* transmission, the program marks the point at which the line was broken and automatically restarts the file transfer from the point of interruption. This method saves time while ensuring the integrity of previously captured data.

The final advantage of *Blast* is the variety of hardware and operating systems that it supports. A partial list of available versions is shown in Table 2. Versions are also under development for both the UNIX operating system and the PRIME 50 series of computers, which operates under the PRIMOS operating system.

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Digital Equipment Corporation VAX, PDP-11, and Rainbow

Table 2: Computers supported by Blast

Blast's protocol transfer and ASCII file transfer both perform as described in the software's documentation. These transfers are characterized, however, by a stark lack of consideration for user needs. There is no display of available memory as files are downloaded to the memory buffer. During ASCII file transmis-

sions, *Blast* does not echo the files to the PC screen. A final frustration is that the only indication of the time remaining for file transmission is a percentage whose value changes infrequently. The system could benefit from some user interface enhancements to match its other superior features.

Crosstalk XVI

Crosstalk XVI tries to be all things to all people and does a good job of it. A cursory glance through the table of contents of *Crosstalk*'s well-designed manual shows an impressive array of features and capabilities. *Crosstalk* scored strongly in last year's communications roundup, and the latest version improves on its record.

The only major shortcoming noted in last year's review was the absence of the Xmodem protocol. That shortcoming has been remedied. Owners of earlier versions of *Crosstalk* can upgrade to the Xmodem version at no extra cost.

Exploring *Crosstalk XVI* reminds me of playing *Adventure*. Every time I open the manual or try a new set of commands, I discover new features. Some of the recently added features include terminal emulation of the IBM 3101, the DEC VT100, and the TeleVideo 910/920 series of asynchronous terminals.

The *Crosstalk XVI* answer mode can turn the PC into a limited host system, permitting unattended operation when used between two *Crosstalk*-equipped computers. *Crosstalk*'s proprietary protocol provides CRC-16 error-checking and wild-card file transfers during both attended and unattended operation. Password protection is also provided to prevent unauthorized access to data stored on the PC.

The *Crosstalk* script files feature provides an easy-to-use macro language that enables you to write high-level programs for unattended operation. Script files offer 17 commands that perform functions similar to those found in BASIC. For example, the Ask command (much like BASIC's INPUT command) allows you to prompt the operator for information. The If statement and the Jump (to a label) feature also provide powerful structured programming capabilities.

The *Crosstalk* script files feature provides an easy-to-use macro language.

The Snapshot and Retro-Capture commands are also useful. Snapshot lets you capture a selected portion of a screen display, which can be viewed at a later time. This feature is good for capturing a remote system menu; you can refresh your memory without returning to the menu. The Retro-Capture feature allows you to capture data that has already scrolled off the screen. All incoming data is routed through a 4096-character circular buffer that holds roughly the equivalent of two full screens of text. The contents of this buffer can be captured to the main *Crosstalk* data capture buffer. You can also use Retro-Capture to capture all subsequently received data.

Intelligent Choices

Smart terminal communications software for the PC is reaching maturity. It is becoming difficult to recommend one package universally over another. The best basis for choice is how well a package supplies the particular features you need. A company that communicates with both information services and other PCs would be well served by the *Crosstalk XVI* package. An office that communicates mostly with host computers, on the other hand, would find that *Telios* meets most of its needs. *Blast* is an excellent choice if you want to send or receive large amounts of data in a limited period of time. The specialized multitasking features of *Relay* or the unattended host features of *Omniterm 2* may persuade you to choose either of those packages.

Larry Jordan is a freelance writer and a communications and data base management system consultant with NUS Corporation. He coauthored the book Communications and Networking for the IBM PC, *published by the Robert J. Brady Company (Bowie, Maryland, 1983), and has just completed another book titled* IBM PCjr Communications, *which will also be published by the Brady Company.*

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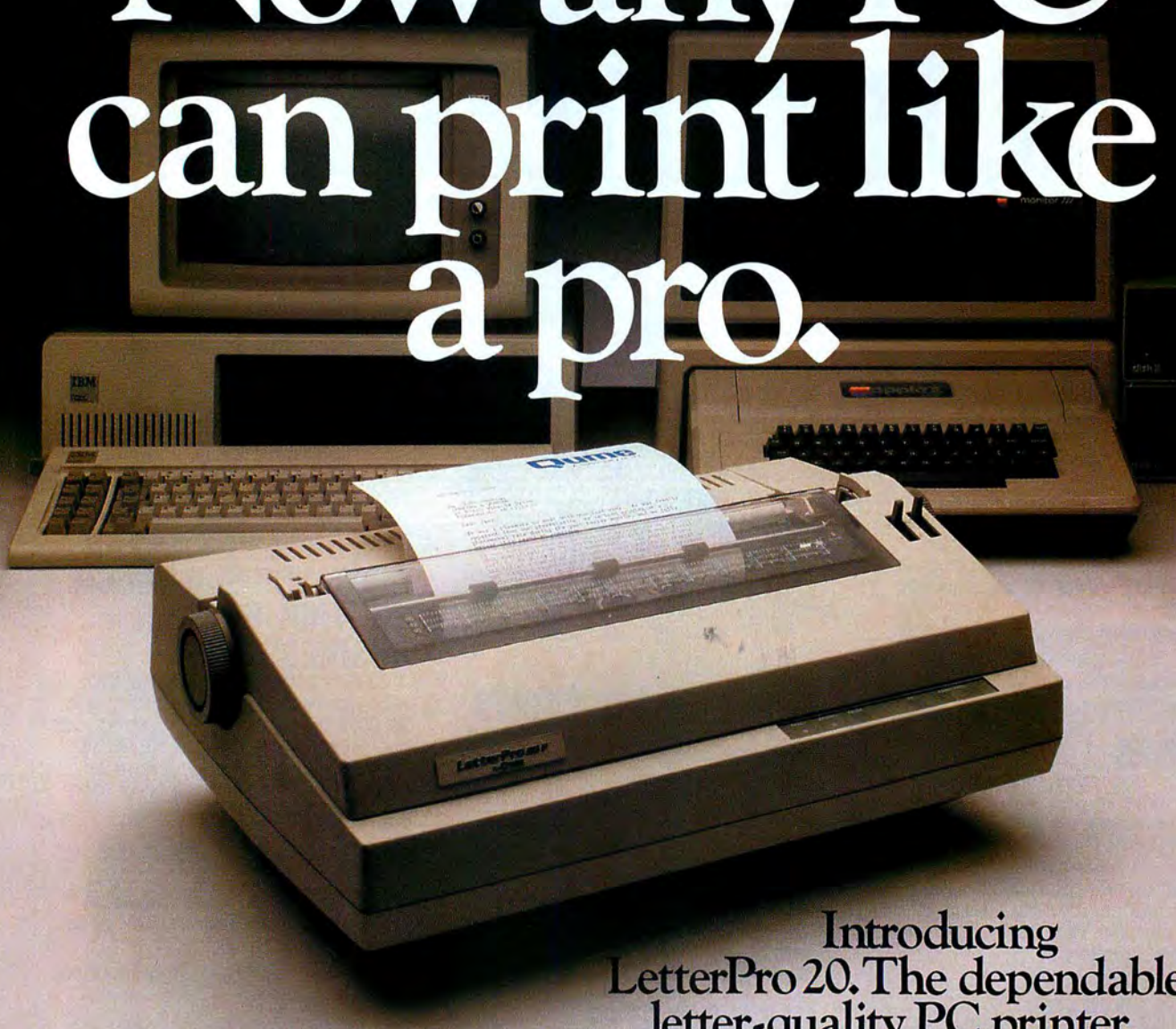

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Statistical Quintet

Over 40 statistical programs are now available for the PC. Here are five new packages for under $500 each.

Nancy Goodban and Kenji Hakuta

"Statistics" is a general term that covers a broad range of methods used to process, analyze, and interpret data. Various types of statistical analysis are used by businesses, professionals, and hobbyists. A baseball statistician calculates the batting average of a baseball player, a civil rights lawyer explores whether a particular company pays higher salaries to its male employees than to female employees who do similar work, and an insurance company determines the risk factors of extending coverage to personal computer owners. Statistics are used by political scientists, market researchers, engineers, and anybody else who needs to analyze data.

At least 40 statistical packages are currently available for the IBM PC, and the number is rapidly growing. Here we review five that each offer a broad range of commonly used statistical procedures for less than $500: *AbStat 3.3, Crisp 83.1, Microstat Release 4.0, SL-Micro,* and *Systat.*

This evaluation considers four major dimensions: each program's ability to manipulate data, the types of statistical procedures it provides and the quality of the output it produces, the accuracy and speed of its computation, and its ease of use.

Ratings of each package in terms of these criteria are listed in Table 1. Since the science of statistics, like other specialized fields, is inundated with jargon, some of the terms used in this article are defined in "A Statistical Glossary," and basic statistical concepts are outlined in "A Statistical Primer."

Data Manipulation

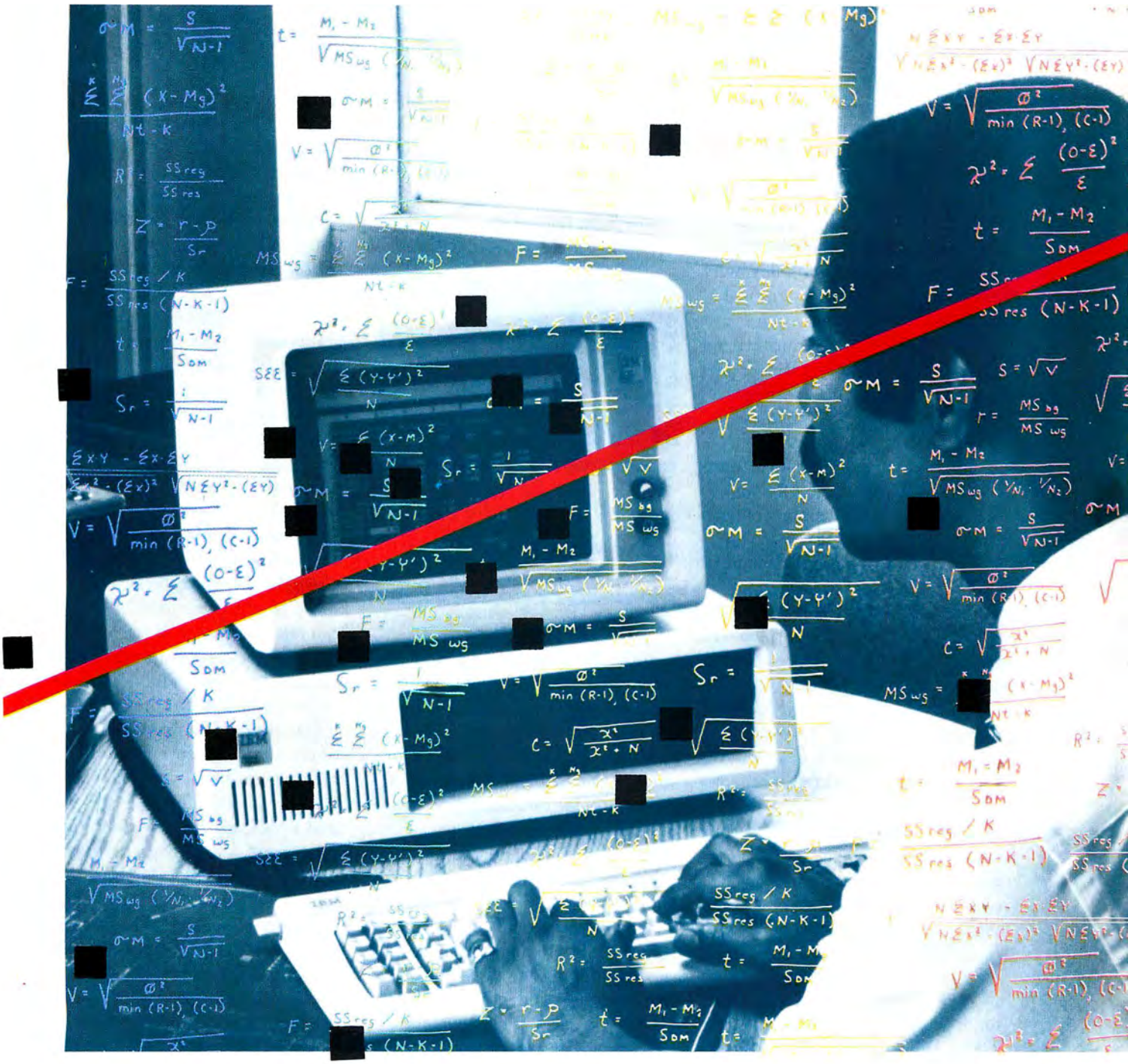
Statistical packages should enable the user to input, manipulate, and store raw data. All the packages reviewed except *SL-Micro* allow the user to enter data directly at the console. *SL-Micro* is run in batch mode from command files created on a word processor.

A statistical program should be able to read data from an ASCII file created by another applications program and to write data to disk in a form that can be used by other packages. This would make it possible, for example, to use a mainframe to manipulate or summarize large data sets, to import data from PC spreadsheet or data base management programs, or to read files containing experimental lab data stored directly on disk (see "Lotus in the Lab," *PCW,* Vol. 2, No. 2). Communications capability is also necessary if you have to upload the data to a mainframe for additional analysis or present it in an alternative fashion with a spreadsheet package on the PC. All five packages discussed here can read and write ASCII data files, but they vary greatly in how easily and flexibly they do so.

For users familiar with the use of format statements for input variables, the packages that most easily accept ASCII files from disk are *SL-Micro,* which requires variable formats almost identical to those of the mainframe package *SPSS,* and *Systat,* which is similar to the mainframe package *SAS. Crisp* and *Microstat* are also straightforward; they prompt the user for the variable list and format. *AbStat* provides a utility to read data from an ASCII file, but the program has some undocumented bugs.

> All five packages can read and write ASCII data files.

All the packages reviewed except *SL-Micro* enable you to write a file to disk so that it can be read internally by the program. *Systat* offers the most flexibility in writing data to disk in ASCII format; you can output data in any format desired. Writing



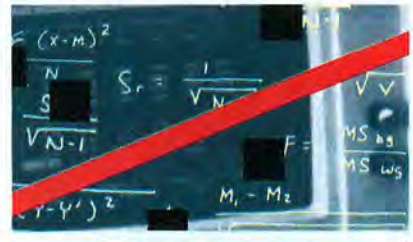
output files is also relatively smooth in *AbStat* and *Microstat*. *Crisp*'s "file export" utility works, but it is inconvenient; *Crisp* presents a menu and requires the use of function keys to specify variable locations and lengths. It is easy to make a mistake, and if an illegal value is typed in, it is stored in memory and registered as the answer to the next question.

Once data is available to the program, you need to be able to transform and edit it. Transformation is a general term that covers a number of computations that change the values of variables. For maximum flexibility a package should offer conditional statements, such as IF SEX = F THEN GROUP = 1, for transforming data as well as the ability to recode values and compute new variables. *Systat* contains its own version of *BASIC*, allowing you to write and save the full range of transformations available in the language. *AbStat*, *Crisp*, and *Microstat* let you transform and save new variables easily using a number of basic logical and arithmetic functions. *SL-Micro* allows transformed variables to be saved but stores the transformed data in a special file. To use the transformed data file, you have to edit the command file to specify the location and variable layout of the special file. In order to write new transformations, you must first erase or rename the special file.

Only *SL-Micro* and *Systat* accept character data, such as *M* and *F* for male and female. The other packages require all data to be entered as numbers. *Crisp* is able to read only 8 digits, including a decimal point, so larger numbers are truncated.

Crisp, *SL-Micro*, and *Systat* allow you to assign variable names such as AGE or SEX and to refer to a variable by name. *Microstat* assigns all variables both a number and a name; the variables must be referred to by number, but the program can display the variable numbers and names for reference.

It is important to select a package that can handle the largest data sets anticipated. *AbStat* is limited to 64 variables, and *Systat*, to 75 variables. *Crisp* can handle over 250 variables. *Crisp*, *Microstat*, *SL-Micro*, and *Systat* allow virtually unlimited numbers of cases. The number of cases permitted by *AbStat* is limited by the RAM available on the system.



Crisp can handle over 250 variables.

If the data you are working with has been created elsewhere, and values that indicate missing data are embedded in it, your statistical package must allow you to define values for missing data. *AbStat*, *Crisp*, and *SL-Micro* provide this capability. *Microstat* and *Systat* provide a special character for missing data; you must recode any applicable values before they can be interpreted as missing.

Finally, you should consider a program's ability to manipulate files. Ideally, a program should allow you to add new cases and variables to a file, merge two existing files, sort files, and select the cases or variables to be output. *Crisp* has an outstanding set of menu-driven utilities for merging and sorting files, while *Systat* has excellent utilities for those who prefer a command-driven system. At the other end of the spectrum, *SL-Micro* does not provide any of the file-manipulating functions mentioned. *AbStat* and *Microstat* offer some of those functions, but with varying degrees of quality.

Accuracy and Speed

Accuracy is a function of the "precision," or number of digits, handled by the program as well as of the algorithms used in calculations. All five packages perform respectably on the Longley data set (*Journal of the Statistical Association of America*, 1967, Vol. 62, 819-831; see Table 2). This data set is commonly used to test the ability of multiple regression programs to deal with extremely high correlations between predictor variables. Most of the regression programs use double precision, allowing a maximum of 16 digits for each number. This avoids the problems associated with rounding error.

If you're tied down to your PC by a strictly interactive package such as *Crisp* or *Microstat*, the program's speed is important. *AbStat* and *Systat* can take advantage of the 8087 coprocessor math chip, which increases the speed of numerical calculations by a factor of ten or more. If you anticipate using large data sets or creating large correlation matrices on a regular basis, you might well consider purchasing the 8087 chip and a package that can use it. On the other hand, you may prefer to use a mainframe for analyzing large data sets, in which case the speed of the program on your PC is less important.

Comparisons of the five packages' speeds in performing sample analyses are presented in Table 3. Elapsed seconds were counted from the time a command was issued until the program was ready for the next task. Any required program overhead is included along with the time required for the procedure itself. For example, *SL-Micro* spends several seconds

Data Manipulation	AbStat	Crisp	Microstat	SL-Micro	Systat
Input from ASCII disk file in specified format	poor	good	fair	exc	exc
Output to ASCII disk file in specified format	good	fair	good	—	good
Recoding, transforming, and computing new variables	good	good	good	fair	exc
Saving transformed and computed variables	good	good	good	poor	good
Specifying missing values for input data	good	good	—	good	—
Assigning and using variable names	poor	good	fair	good	good
Editor to change specific variables and values	good	good	good	—	good
Utilities to sort and merge files and select cases	good	exc	exc	—	good
Ability to accept character as well as numeric data	—	—	—	good	good
Utilities to list, erase, and rename files	—	good	good	—	—
Statistical Procedures Available					
Frequencies	good	exc	exc	exc	fair
Histograms	—	exc	fair	good	exc
Scatterplots	fair	exc	exc	—	exc
Cross-tabulations	fair	exc	poor	good	fair
Specialized exploratory data analysis	—	—	—	—	exc
Analysis of variance (ANOVA)	good	good	good	—	good
Repeated measures analysis of variance	—	good	—	—	good
Pearson's coefficient of correlation	fair	good	good	good	fair
Student's t test on matched and independent groups	good	good	good	—	fair
Ordinary multiple regression	good	exc	good	exc	good
Stepwise multiple regression	—	exc	fair	exc	good
Output of residuals from regression to data file	good	good	good	—	good
Principal components factor analysis	—	—	—	—	good
Canonical correlation and discriminant function	—	—	—	—	good
Multidimensional scaling	—	—	—	—	good
Nonparametric statistics	fair	good	exc	poor	poor
Options for treatment of missing values	good	good	—	—	good
Output from Statistical Procedures					
Readability of standard table format	good	good	good	good	good
Flexibility of table layout, titles, and labels	fair	good	fair	good	poor
Display of significance tests and probability	poor	good	fair	good	poor
Routing output to disk file	good	good	exc	good	exc
Routing output to printer	good	good	exc	good	exc
Ease of Use					
Batch or interactive	both	int	int	batch	both
Menu-driven or command-driven	comm	menu	menu	comm	comm
Ability to exit smoothly at any point	—	good	good	N/A	—
Accuracy (see Table 2)	fair	fair	exc	fair	exc
Speed (see Table 3)	fair	good	good	fair	fair
Documentation					
Overall quality, readability, and organization	good	exc	good	good	exc
Description of computational formulas and methods	good	good	good	fair	fair
On-line help	good	—	—	—	good
Index	—	good	—	good	exc
Listing of error messages	good	—	—	poor	—

Table 1: Statistical software compared

reading the variables from disk, while *Crisp, Microstat,* and *Systat* take as long to write out sorted data as they do to sort it. We did not test the performance of any of the packages using the 8087 chip.

Ease of Use

Statistics is a complex field, and there is no reason to expect a statistical package to be easy to use. However, it should be designed so that the user is not led into making errors. Ideally, a program should flag mistakes so they can be corrected and should assign a key to provide easy exit from errors. The listed programs vary greatly in their ease of use (see Table 1).

The ability to exit smoothly from each function at any point is important, particularly for an interactive or menu-driven package. It is frustrating to be forced to begin again at the first menu or, worse, to have to reboot the system entirely after inadvertently issuing the wrong command. *Crisp* and *Microstat* are the only packages that define a special exit key that aborts almost any function.

When judging the ease of use of a package, you should note whether it is command-driven or menu-driven. Novices often prefer menu-driven systems because they do not require knowledge of command syntax. On the other hand, experienced users are often frustrated by having to type responses to each menu item when a one-line command would suffice. *AbStat, SL-Micro,* and *Systat* are command-driven, while *Crisp* and *Microstat* are menu-driven.

Another differentiating feature is whether the system is batch or interactive. Interactive packages require you to issue commands sequentially when prompted, and you must wait until one command is processed before issuing the next. This often causes extensive delays, and all commands must be reentered if a similar analysis is run. The advantage to interactive packages is that if a syntax error is made, it is caught immediately.

With a batch system, an editor or a word processor is typically used to create a file containing all the necessary commands. To execute a function you direct the program to the command file for instructions. With a batch system you are not tied to the console while the batch file is processed, and you can easily alter the command file to run a similar analysis.

Systat offers the widest range of analyses.

SL-Micro is a batch system. *AbStat* and *Systat* are designed as interactive systems but allow the option of specifying a command file for batch processing. *Crisp* and *Microstat* are strictly interactive.

Help and Documentation

Systat and *AbStat* are the only packages reviewed that provide on-line help, a valuable feature, especially for those who like to acquaint themselves with software by booting up the system before unwrapping the manual.

The most comprehensive documentation is provided by *Crisp* and *Systat*. Both have thorough tables of contents and indices and provide satisfactory descriptions of procedures, often backed by references to articles and books from professional statistical literature. The sophisticated statistician will not feel insulted by the level of discussion in *Crisp*'s and *Systat*'s manuals.

A Statistical Glossary

The following list provides definitions of terms frequently used in statistics:

Analysis of Variance (ANOVA). A common method in experimental science for examining the extent to which a set of variables (groupings) predicts the value of another variable.

Box plot. A graph of the values of a variable showing the median and the spread of scores.

Canonical correlation. A method of predicting a set of variables from a different set of variables.

Case. An entity, such as a person, a classroom, an institution, or a machine, on which observations are made.

Categorical variable. A variable whose values are restricted to discrete categories, such as sex.

Chi-square. A commonly used nonparametric statistic used to examine associations between categorical variables.

Continuous variable. A variable that can theoretically take on an infinite range of values: for example, temperature.

Correlation matrix. A table that lists all possible correlation coefficients among a set of variables.

Discriminant function analysis. A method for predicting a categorical variable from a set of predictor variables.

Fisher's exact probability test. A test similar to chi-square.

Format statement. A statement instructing the computer how to read variables in the data file, including information about

how many variables are in the file and what columns each variable is in.

Frequency distribution. A list of all values for a variable and the frequency with which each value occurs.

Histogram. A display of the frequency of values for a variable.

Kolmogornov-Smirnov's goodness of fit test. A nonparametric method for estimating the magnitude of association between two categorical variables.

Kruskall-Wallis's one-way analysis of variance. A nonparametric method of Analysis of Variance that is used when values are rank ordered.

Log-linear analysis. A method of analyzing cross-classified categorical data.

Mann-Whitney U. A nonparametric test of differences between groups when the values are rank ordered.

Mean. The arithmetic average of values for a variable.

Median. The midpoint of the values for a variable; half the values fall above the median and the other half below.

Missing value. A value assigned to a variable when no valid value can be collected for the case.

Mode. The most common value for a variable.

Multidimensional scaling. A method for locating a set of variables in multidimensional space according to how closely associated they are.

Multiple linear regression. A method for predicting the value of one variable from the values of a set of different variables.

Multivariate linear models. A set of methods for analyzing multiple sets of variables.

Multivariate regression. A method of multiple regression that allows multiple variables to be predicted.

Nonparametric statistics. A set of methods used when certain properties of the data are unknown or unusual; nonparametric statistics require fewer assumptions about the data than parametric statistics.

Parametric statistics. A set of methods used when samples are drawn from a population that has known statistical properties.

Pearson's correlation coefficient. A commonly used parametric measure of the association between two variables.

Predictor variables. Variables whose values are used to predict the values of other variables.

Principal components factor analysis. A method for determining how a set of variables fit together in smaller subsets, or factors.

Probability functions. Mathematically derived specifications of the likelihood of the occurrence of an event (or a series or group of events) under various conditions. These functions are used to test statistical significance. Common probability functions include normal, Student's t, F, chi-square, binomial, and Poisson distributions.

Range. The difference between the minimum and maximum values of a variable.

Repeated measures Analysis of Variance. An Analysis of Variance in which the same variables are measured for the same cases at more than one time.

Sample. A group of cases, selected from a larger population, on which data has been gathered.

Scatterplot. A method of displaying the relationship between two variables.

Standard deviation. A measure of the spread of values around the mean for a variable.

Stem-and-leaf display. A version of a frequency distribution in which values are grouped into intervals for preliminary exploration of the characteristics of data.

Stepwise multiple linear regression. A version of multiple linear regression in which the predictor variables are entered into calculations one at a time rather than simultaneously.

Sum of squares. A mathematical term commonly used to calculate parametric statistics.

Test of significance. A set of statistical tests, based on probability theory, that determines the likelihood that patterns in sample data have been obtained by chance.

Time-series analysis. A method for analyzing trends in data across time.

Univariate descriptive statistics. A set of statistics used to describe the values of a variable.

Value. The score of a case on a particular variable.

Variable. A characteristic that may take on different values for different cases.

Wilcoxon's rank sum. A nonparametric method of testing differences between two groups.

Predictors Variables		AbStat	Crisp	Microstat	SL-Micro	Systat	Longley
Deflator	X1	15.0619	15.05666	15.06187	15.0621	15.06187	15.06187
GNP	X2	−.03581	−.03582	−.03582	−.0358	−.03582	−.03582
Unemployment	X3	−2.02023	−2.02018	−2.02023	−2.0202	−2.02023	−2.02023
Number in Armed Forces	X4	−1.03323	−1.03322	−1.03323	−1.0332	−1.03323	−1.03323
Population	X5	−.05110	−.05113	−.05110	−.0511	−.05110	−.05110
Time	X6	1829.15	1829.12744	1829.15146	1829.1596	1829.15146	1829.15146

Table 2: Comparison of accuracy on multiple regression analysis using Longley data set (last column presents calculation from Longley, 1967); shading indicates perfect score on Longley data test

Statistical Procedures

We found considerable variation in the availability, flexibility, and quality of statistical procedures provided by the packages (see Table 1). All packages reviewed performed basic univariate descriptive statistics, cross-tabulations, and some form of regression. All programs except *SL-Micro* provide Analysis of Variance (ANOVA), although *Crisp* and *Systat* offer repeated measures. *Systat* offers the widest range of analyses, from outstanding exploratory analyses certain to delight statisticians (for instance, stem-and-leaf displays, box plots, and probability plots displaying the shape of a distribution) to the most sophisticated multivariate linear models (canonical correlations, multivariate regression, discriminant function analysis, multidimensional scaling, and principal components factor analysis). *Systat* also offers advanced functions such as log-linear models for analyzing categorical data.

Crisp offers an excellent regression procedure, allowing stepwise and forced inclusion of predictor variables. *SL-Micro,* designed principally for questionnaire data analysis, and *Systat* also allow mixing stepwise and ordinary regression models. *Microstat* provides stepwise regression as an alternative to ordinary regression but does not allow the two models to be mixed. *AbStat* does not provide stepwise regression at all.

	Sort	Cross-Tabulation	10 by 10 Correlation Matrix
AbStat	10	270	200
Crisp	100	45	135
Microstat	190	90	105
SL-Micro	—	230	180
Systat	120	60	240

Table 3: Comparative speed in seconds (all calculations based on 138 cases and 25 variables); shading indicates packages with best scores overall

Microstat offers by far the widest range of nonparametric tests, being the only package to provide Kolmogornov-Smirnov's goodness of fit test. *Crisp* also offers a range of nonparametrics. *Crisp* and *Microstat* provide Wilcoxon's rank sum, Kruskall-Wallis's one-way Analysis of Variance, and Fisher's exact probability test. *Crisp* and *AbStat* provide the Mann-Whitney U test.

Output from Statistical Procedures

The standard output from all five packages is readable, but quality in other output categories varies. Ideally, you should have the option of creating titles specifying the number of significant digits to be displayed or specifying alternative layouts. In general, *Crisp* and *SL-Micro* provide the most flexibility in layout. For example, standard cross-tabulations print the frequency in each cell with the option of including row, column, and total percentage. *AbStat, Crisp,* and *SL-Micro* let you specify which percentages are to be printed in a table. *Systat* allows you to print these percentages only as separate tables, and *Microstat* does not provide any of these options.

Most of the packages are adequate in displaying statistical tests and their significance levels. However, *Systat* does not display the significance level for Pearson's correlation coefficient, and *AbStat* forces you to calculate the probability level separately for all

procedures. *Systat* is the only package that enables you to specify the number of digits to be displayed after the decimal in output.

It is useful to be able to direct output to a disk file for later use in reports prepared with a word processor. Ideally, you should be able to view the results on screen and then decide to route the output to the printer or to a disk. *Microstat, SL-Micro,* and *Systat* provide this capability. With *AbStat* and *Crisp* you must route the output in advance and rerun the analysis if alternative routing is desired.

For some procedures it is important to be able to define the treatment of missing values. For example, when calculating a correlation matrix, you often need to specify whether to exclude all cases with missing variable values (known as listwise deletion) or whether to exclude cases only if they are missing values on one of the two variables (pairwise deletion). *SL-Micro* always uses pairwise deletion in calculating correlations, while *Microstat* uses listwise deletion. The other packages offer both options.

Summary of Specific Packages

AbStat is well documented and easy to learn. It is the only package reviewed that reads and writes *dBASE II* files. It also sorts quickly, in part because the output file need not be saved unless saving is specified.

One minor irritation is *AbStat*'s requirement that all commands be typed in uppercase. *AbStat* provides probability functions, but the probabilities must be calculated separately from significance tests, which is inconvenient but not insurmountable. *AbStat*'s output is unattractive; the variable number is always presented along with its label. Bar graphs, plots, and cross-tabulations are displayed particularly poorly. A major drawback is that every file is limited to 64 variables.

Crisp is generally easy to learn and use, even without its excellent manual. One strength is the program's

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A Statistical Primer

Statistics are used both to describe data and to make inferences about a population from the description of a sample of that population. All statistical analyses begin with the description of data. Inferences can be made using probability theory, which states the likelihood of an inference being correct by applying a test of significance.

Regardless of the statistical procedure used, data consists of "cases," "variables," and "values." For example, in a market survey each person who responds to the survey represents a case (e.g., Smith or Cohen); each question on the survey is a variable (e.g., How old are you?, How well did you enjoy the program?); and each person's response to each variable is represented by a numerical value (e.g., Smith is 30 years old and liked the program 4 on a scale of 7; Cohen is 23 and liked the program 6).

Descriptive statistics are commonly used to describe the "central tendency" of the values of the cases for a variable (e.g., the average age is 24.6 years old) and the "dispersion" of values around the central tendency (e.g., 50 percent of the respondents are between 22 and 26 years old). Other "univariate" procedures, such as frequency distribution, stem-and-leaf display, and box plots, describe the features of a single variable.

Normally a statistician wants to describe more than one variable at a time. A "scatterplot" is a graph that shows the relationship between two variables, one represented on the vertical axis and the other on the horizontal. Individual cases are plotted at the intersection of the values on the two variables.

The strength of a relationship between two variables can be expressed numerically through "correlation." A statistician can also perform a "regression," based on the correlation, that estimates the most likely value of a case on one variable given a certain value on the other. Regression using more than one variable to estimate a value is called multiple regression. Insurance companies, for example, use multiple regression to predict life expectancy from a large number of predictor variables that, taken together, account for a certain amount of the variation in life expectancy.

In situations in which values are categorical (for example, men and women or Democrat, Republican, and Independent) other kinds of descriptions can be made. Procedures of this kind include cross-tabulations and log-linear models.

When groups of cases (e.g., men versus women) are compared on a continuous variable (e.g., age), a number of statistical procedures are used to assess whether the groups are different. These include ANOVA, Mann-Whitney U, and Kruskall-Wallis. Which test is used depends on the number and kind of groupings to be compared and on statistical assumptions about the nature of the spread of the values. If the spread of scores conforms to a certain set of assumptions, more powerful, "parametric" tests can be used. If it does not, "nonparametric" tests are used.

For further reading in statistics we recommend starting with the following sources, listed in order of increasing complexity: *Modern Elementary Statistics* by J. Freund (Prentice-Hall, Englewood Cliffs, New Jersey, 1979); *Applied Statistics* by J. Neter, W. Wasserman, and G. Whitmore (Allyn & Bacon, Boston, 1982); *Exploratory Data Analysis* by J. Tukey (Addison-Wesley, Reading, Massachusetts, 1977); *Statistical Methods* by G. Snedecor and W. Cochran (Iowa State University Press, Ames, Iowa, 1967); *Statistical Principles in Experimental Design* by B. Winer (McGraw-Hill, New York, 1971).

ability to transform variables into observations and vice versa. Another unique feature is *Crisp*'s ability to process subgroups, such as male and female, separately without respecifying the analysis. *Crisp* also provides the most flexible specification of regression models of all the packages, allowing both stepwise and ordinary multiple regression to be intermixed easily.

Working with *Crisp* involves several minor frustrations, but none of them poses major difficulty. For example, if you try to print output when the printer is off line, you are bumped all the way back to DOS. Syntax errors in transformations are not immediately checked, and all transformations are lost if you make a syntax error.

Microstat offers the widest range of nonparametric statistics procedures. It also performs time-series analyses and provides a number of probability functions, including binomial, Poisson, normal, F, and Student's t. Other strengths include the ability to display an ASCII file from within the program, the ability to assign a descriptive title to every file, and the ability to direct output to a disk or a printer after viewing it on the screen without respecifying the analysis. A major drawback is that cross-tabulations are limited to 20 rows and 5 columns.

SL-Micro has data definition statements identical to those of *SPSS*. We were able to download a mainframe file created for *SPSS* and run it on *SL-Micro* with only minor editing. If the statistics in *SL-Micro* were sufficient, an *SPSS* user could use this package with minimal learning. Unfortunately, the program has a limited set of statistical procedures, and unless you are certain that the procedures provided will be adequate to meet future needs, you may be better off finding a package that offers more.

Systat provides the widest range of statistical procedures as well as the most flexibility in manipulating data. Fans of the *SAS* mainframe statistical package will be familiar with many of the data and statistical procedures in *Systat*. Although the program is difficult to learn, *Systat* is well documented.

Systat's main drawback is its inflexibility in displaying results. This poses a problem for anyone who wants to present output directly in writing up analyses. But the shortcomings of *Systat*'s output are more than compensated for by an outstanding range of statistical procedures.

Recommendations

Several factors must be considered in deciding what package to buy. Obviously, price is one element. More importantly, you should consider your needs and your level of experience in statistical computing.

Based on tests and the criteria shown in Table 1, *Crisp* and *Systat* are the best systems currently available for the IBM PC. They both offer a wide range of well-documented and easy-to-use statistical procedures. *AbStat* and *Microstat* are recommended for anyone teaching a beginning statistics course; they are both elementary enough that they are easy to learn, and they provide some nice touches such as calculation of probability functions. *SL-Micro* is recommended only for users who are familiar with *SPSS* and do not require a broad range of statistical procedures.

The state of the art of statistical packages currently available for the PC is impressive. During the last few years, many programs have been developed that adequately approximate the luxuries of computing on mainframes. This achievement is magnified when you consider that many of the programs were developed on personal time and funds by talented individuals rather than by the corporate world. The inclination to wait for *SPSS* and other mainframe packages to be released for the PC should be checked by the fact that excellent and affordable packages are already available.

Nancy Goodban is a social psychologist and a postdoctoral fellow at Yale University. Kenji Hakuta is an associate professor of psychology at Yale University. Both authors received Ph.D.'s in psychology from Harvard University.

AbStat 3.3
Anderson-Bell
P.O. Box 191
Canon City, CO 81212
303/275-1661
List price: $395
Requirements: 128K, DOS 2.00 with one disk drive, DOS 1.10 with two disk drives

Crisp 83.1
Crunch Software
1541 Ninth Ave.
San Francisco, CA 94122
415/564-7337
List price: $495
Requirements: 128K with DOS 1.10, 152K with DOS 2.00, two disk drives

Microstat Release 4.0
Ecosoft, Inc.
P.O. Box 68602
Indianapolis, IN 46268
317/255-6476
List price: $375
Requirements: 128K, one disk drive

SL-Micro
Questionnaire Service Company
P.O. Box 23056
Lansing, MI 48909
517/641-4428
List price: $250
Requirements: 128K, two disk drives

Systat
Systat, Inc.
1127 Asbury Ave.
Evanston, IL 60202
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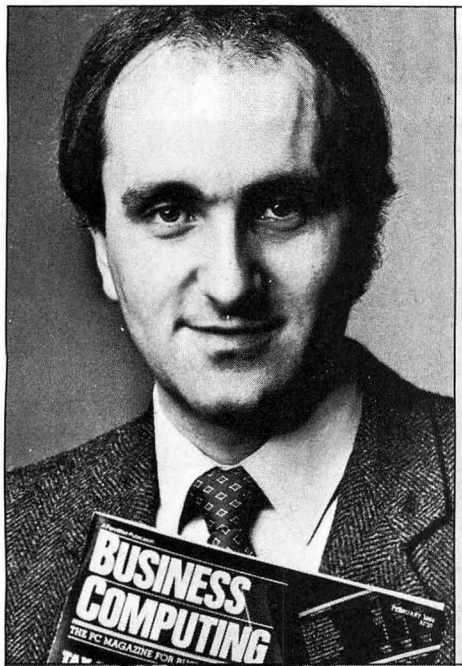

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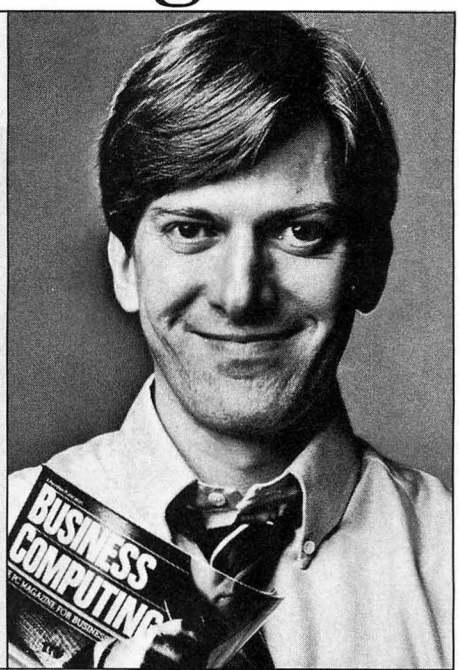

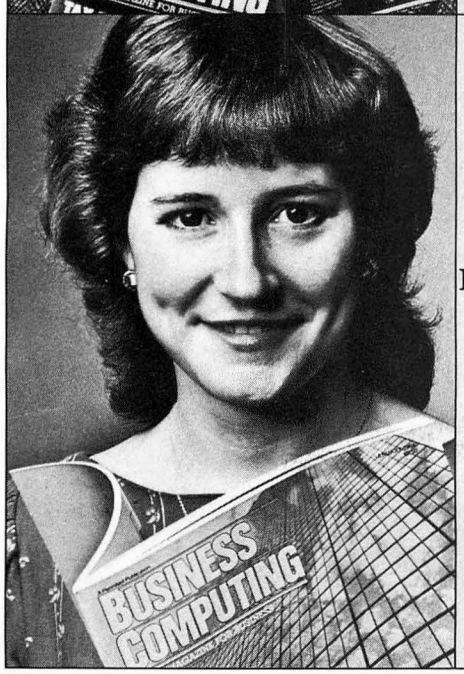

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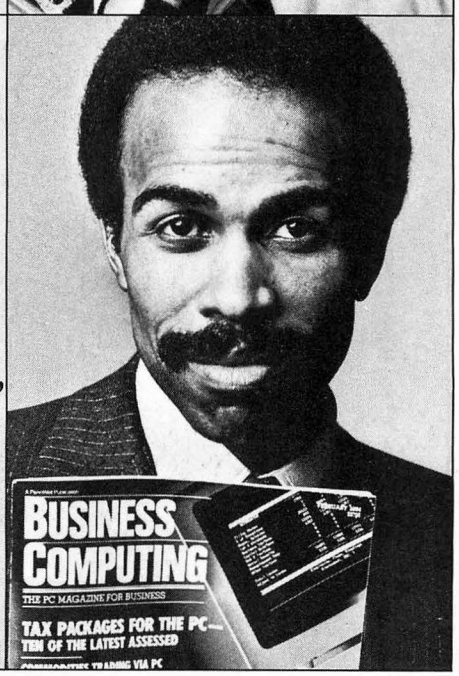

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BUSINESS COMPUTING

For the PC user who isn't playing games.

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Circle 775 on reader service card

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THE BEST HARDWARE FOR THE BEST PRICE.

Features	Tele-PC	IBM PC	Tele-XT	IBM XT
Monitor	YES	OPTIONAL	YES	OPTIONAL
Screen Size	14″	12″	14″	12″
Tilt Screen	YES	NO	YES	NO
Quiet Operation	YES (NO FAN)	NO	YES	NO
Memory	128K	128K OPTION	256K	256K OPTION
Graphics Display (640 x 200 resolution)	YES	OPTIONAL	YES	OPTIONAL
Printer Port	YES	OPTIONAL	YES	OPTIONAL
Communications Port	YES	OPTIONAL	YES	YES
MS™-DOS/BASIC®	YES	OPTIONAL	YES	OPTIONAL
System Expansion Slot	YES	YES	YES	YES
RGB and Video Port	YES	OPTIONAL	YES	OPTIONAL

PC compatibles. for the best software.

has the standard—not optional—features you need to take full advantage of every job your software can do.

Study the chart below. It proves that TeleVideo—not IBM—offers the best hardware for the best price.

Note that TeleVideo's ergonomic superiority over IBM extends from fully sculpted keys and a comfortable palm rest to a 14-inch, no glare screen that tilts at a touch.

THE BEST PORTABLE FOR THE BEST PRICE.

Features	TPC II-S	IBM PC
High Capacity Storage	YES	YES
Quiet Operation	YES (NO FAN)	NO
Display	YELLOW	AMBER
Memory	256K	256K
Graphics	YES	YES
Communications Port	YES	OPTIONAL
Printer Port	YES	OPTIONAL
MS™-DOS 2.11	YES	OPTIONAL

THE BEST MICROCHIPS.

What is perhaps most impressive about the TeleVideo IBM PC Compatible can be found deep within its circuitry. We use the same 8088 central processing unit that runs an IBM PC. But we also employ new VLSI (Very Large Scale Integration) microchips that are designed and built exclusively for TeleVideo. These interface more efficiently with the powerful 8088 and yield numerous benefits.

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Fewer circuit boards to cool also allowed us to eliminate the noisy, irritating fan IBM and most other PCs force you to put up with. And TeleVideo compatibles accept any IBM hardware options without modification.

THE BEST LINE.

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The TeleVideo IBM PC Compatible line is made by the world leader in multi-user computer systems and the number one independent manufacturer of terminals.

Call 800-538-8725 for the dealer nearest you. In California, call 800-345-8008.

Before you invest, make a few simple comparisons. You'll find that TeleVideo—not IBM—has the best hardware for the best software. At the best price.

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Personal Computers
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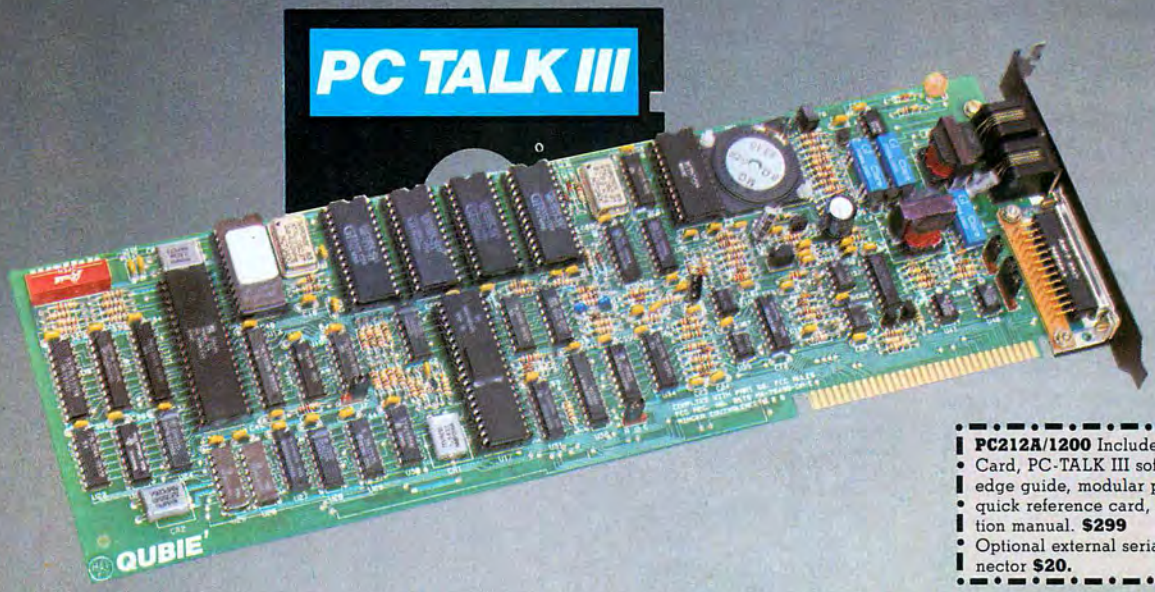
Circle 701 on reader service card

Thinking of buying a modem? Inside You owe it to yourself to check



PC212A/1200 Includes: Modem Card, PC-TALK III software, card edge guide, modular phone cable, quick reference card, and instruction manual. **$299**
Optional external serial port connector **$20.**

Just a few years ago, computers needed big air-conditioned rooms to operate in, balefuls of money to buy, and a team of wizards to keep them running. The constant march of technological progress has given more and more powerful machines which cost less and less. Desktop computers more powerful than the early mainframe computers are the result of the evolution. The Qubie' modems represent the latest extension of this progress. Because up until now, a 212A compatible modem cost at least $500. Through the use of four low-cost, state of the art microprocessors, we can now offer two versions of our full featured 212A modem at prices the competition sells 300 baud modems for.

In The Beginning

In September of 1983 we introduced the first 212A modem card for the IBM PC available for under $300. The PC212A/1200 is a complete communications package including PC-TALK III software, modular phone cable, card edge guide, and instruction manual. The modem is an auto-dial, auto-answer type, which uses all the Hayes software commands so it can be used with any of the popular software packages including Crosstalk,™ and Smartcom.™

We picked the best software package we could find based on it's ease of use and features, PC-TALK III. Our modem includes features the old industry standard missed out on. Like being able to fit in one slot in a Portable PC or PC/XT. Or an optional connector to use the modem's serial port when not using the modem. Of course the topper is the $299 price, hundreds less than the competition.

Our standalone modem, the 212E/1200 can be used with any computer or terminal with a RS-232C serial port. You can use any Hayes compatible communications software on anything from an Apple to a Zenith. Many owners of IBM PC's are using it because they lack available expansion slots, or have more than one computer they want to use their modem with.

It's attractive gold anodized case houses seven status lights (who says low prices means a shortage of features). It fits comfortably under a standard telephone. It is also a 212A compatible auto-dial, auto-answer modem which supports all Hayes software commands. Even the switch settings are the same, so any software giving recommended switch settings for a Hayes modem can be used, without knowing

Outside

out the Qubie' 212A modems.

212E/1200 Includes: Standalone modem with cable (specify male or female), modular phone cable, and instruction manual. **$329.**

what the switches do. There is a volume control knob for easy adjustment of the speaker's output. Included in the package is modular phone cable, a cable to hook it to your computer or terminal, and instruction manual. Choose the communications package right for your needs, and you're ready to go!

Four Hearts

The heart of the Qubie' modems are four digital signal microprocessors. Two handle sending, and two do the receiving. Rather than attempt to filter all but the relevant tones used for modem communications, the microprocessors measure the tones digitally. This allows them to overcome line noise and static better than analog filter based modems.

Why Buy From Qubie'

Because you will get a product as good or better than any available, pay less for it, and get factory direct help if you need it. If at any time during the one year warranty period your modem should require service, we will fix it or replace it within 48 hours. Notice also there are no hidden charges in our prices. No extra for freight, insurance, credit cards, or COD fees. In a hurry? UPS 2nd day air service is just $5 extra. If you are like many who say, "Nah, it's too good to be true," just apply the acid test and find out. Then you will be asking yourself, "Why should I pay what these modems used to cost?"

The Acid Test

Qubie' gives you a 30 day satisfaction guarantee on your modem. If you are not completely satisfied we will refund the entire amount of your purchase including the postage to return it. If you can, get anyone selling another modem to give you the same guarantee. Buy both, and return the one you don't like. We know which one you will keep.

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Circle 605 on reader service card

From the Software Shelf

First impressions of recently released software

Edited by Robert Luhn

From the Software Shelf samples a small portion of the many software programs flooding the PC market. These reviews—written by the staff of *PC World*—provide a brief glimpse at new word processors, spreadsheets, data base management programs, utilities, tutorials, and other products, including new additions to established software families, that might otherwise be overlooked. These impressions are not intended to take the place of a full-length review of the product but rather to keep you informed of new products that we think will be of interest. *From the Software Shelf* examines programs for ease of use and installation as well as for the strong features or most significant weaknesses of these contenders for future software fame.

Turtle Power

I have a special, three-year-old friend named Annie. She gives me lots of excuses—excuses to go to the circus, to read Winnie-the-Pooh stories, and to buy Double Rainbow ice cream cones. When Annie's parents need an occasional night off, she comes over to my apartment and spends the evening. Usually we occupy ourselves with our old standbys—coloring, rearranging the magnets on my refrigerator door, and reading storybooks. But the last time Annie came to visit she wanted to "play something else."

Luckily, the day before, *PC World*'s Product Review Editor had given me a copy of IBM's *Turtle Power* to take home and try out. The program, developed by Cybertronics International and marketed as part of IBM's Education Series, explores the power of Logo turtle graphics. What better acid test for an educational program than a bored three-year-old?

Turtle Power has three modules: Playground, School, and Advanced Programming. Playground, designed for Logo beginners, was our first stop. With an anxious child on my lap, I did little more than skim the first part of the manual, but the documentation and the screen menus were clear and helpful. I easily found my way to the Playground menu and, following the book's advice for first-time users, chose the Sketch option.

Sketch is sort of an Etch-a-Sketch for the computer. You control the program's "turtle," a cursor symbol that acts like a drawing pencil, with simple, one-key commands. Pressing the F key moves the turtle forward; the B key moves it backward; and the L and R keys turn the turtle to the left and right. Children see immediate results as they draw, but they also learn that they have to tell the turtle what to do. I've watched a beginning Logo class, and some children get frustrated because they have to memorize the language's syntax before they see results on the screen. With *Turtle Power*'s Sketch option, Annie didn't have that problem because her drawing was immediately displayed. Annie and I played with many of the Sketch commands. We cleared the screen, made circles and squares, and filled in screen shapes.

Of course, *Turtle Power* is more than just a sketching program. As children learn, they can move on to other parts of the program, learning in the School option how to write and store real Logo programs. With their Sketch experience, most children can quickly grasp the language's commands and begin to write, edit, save, load, and run their own programs. These children already know what the turtle can do; in School they simply learn how to control it with Logo statements. The School option also includes impressive demonstration programs sure to inspire many young hackers to create beautiful geometric designs.

The third option, Advanced Programming, explains commands for calculation, variables, coordinates, and parameters. Programming music with Logo is also explored in this third module, so children learn how to take advantage of the language's eight-octave range.

I think *Turtle Power* is a terrific way for children, even preschoolers, to explore Logo. The program is more than just a stepping-stone to complete Logo language packages such as Harvard Associates's PC Logo, Digital Research's Dr. Logo, and IBM's own version of Logo; *Turtle Power* gives children a firm foundation in the structure and complexities of the programming language.—*KS*

Turtle Power
IBM
Systems Products Division
P.O. Box 1328

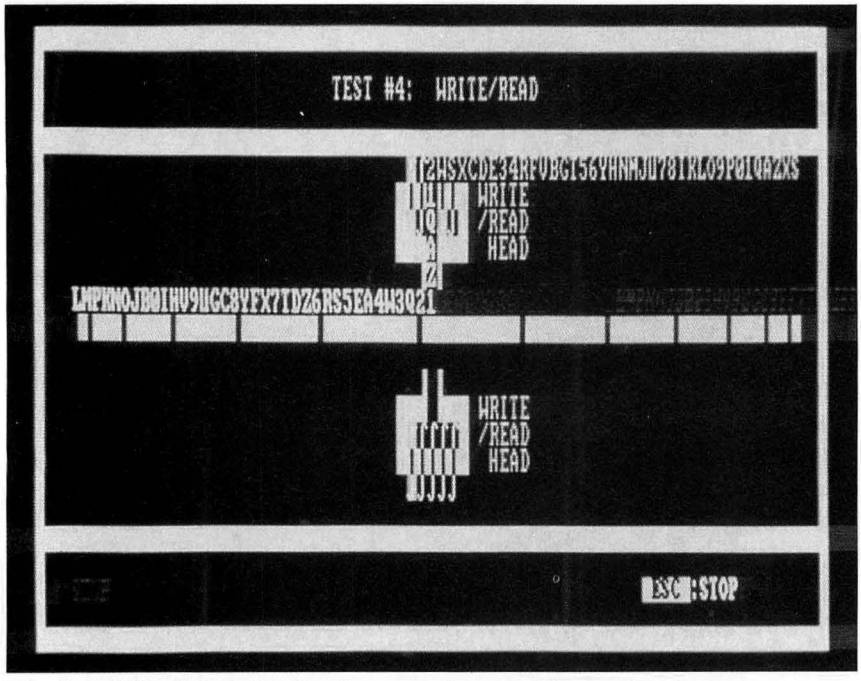
Annie running the Turtle Power demo.

Boca Raton, FL 33432
800/447-4700, 800/447-0890 Alaska and Hawaii, 800/322-4400 Illinois
List price: $50
PC requirements: 128K, one disk drive, color graphics board, color monitor
PCjr requirements: 128K, one disk drive

Datalife Disk Drive Analyzer

As most PC owners can attest, floppy disk drives are among the crankiest components in personal computer systems. Unlike circuit boards, disk drives are electromechanical devices and are thus prone to mechanical breakdowns. Unfortunately, disk drive problems are elusive and incremental by nature—and all the more devastating since they seldom exhibit themselves until data has been destroyed.

Verbatim's *Datalife Disk Drive Analyzer* prevents data loss woes by diagnosing and reporting disk drive ills before they get serious; if nothing else, the program will tell you why your day and data have been ruined. The program tests read/write head alignment, disk rotation speed, and disk door clamping and verifies the accuracy of reading and writing—four critical areas that affect disk drive reliability and performance.



The Datalife Disk Drive Analyzer performing the read/write test.

Tests can be run one by one or automatically on a PC, an XT, a Columbia, or a Compaq and are illustrated with compelling and entertaining graphics. Test results are expressed either as good, fair, or poor or as pass or not pass. The program also gives specific service recommendations.

A cursory use of *Datalife Disk Drive Analyzer* at *PC World* disclosed that one PC's disk drive speed was poor (the program suggested that an authorized service center adjust the drive); that a Compaq's poorly clamped disk drive door was the source of disk read errors; and that the drive A: read/write head in my new PC will need alignment, though in the words of the program 'it works ok now'.

This program won't replace computer repair technicians, but it will keep them honest, since it lets you check the thoroughness of their work. That alone is worth the price of admission.—*RL*

Datalife Disk Drive Analyzer
Verbatim
323 Soquel Way
Sunnyvale, CA 94086
800/538-1793, 408/737-7771
List price: $39.95

The 1 Dir

As Product Review Editor I see or hear about dozens of products each week. A noticeable trend, and a reassuring one for novices, is the increase in the number of easy-to-learn and easy-to-operate business and home software packages.

One product designed to quell a beginner's fears is *The 1 dir* (pronounced *wonder*), a file management program intended primarily for members of the Why-Can't-Computers-Speak-English Club. *The 1 dir*'s menu system eliminates the need to memorize and type in frequently used DOS (disk operating system) commands such as DIR, ERASE, RENAME, TYPE, COPY, DATE, and TIME.

Anyone who hasn't learned these commands can use *The 1 dir* as a DOS tutorial and as a tool for getting started. If you are better acquainted with DOS, *The 1 dir* can help you organize hard disk files and DOS 2.00 subdirectories.

The 1 dir display is divided into six main sections; the three most important are the command menu, the file directory, and the DOS command line. The command menu is a one-line rectangular box at the bottom of the screen that lists six DOS commands (ERASE, RENAME, TYPE, COPY, DATE, and TIME) plus three special *1 dir* commands—Compose, Execute, and Run. The file directory, which displays a list of files for a designated drive, occupies the left side of the screen above the command menu. A DOS command line with the A> prompt is located between the command menu and the file directory.

In addition to the command menu, file directory, and DOS command line, the screen displays a statistics section and a toggles menu. The statistics section provides disk and memory usage information identical to that provided by the DOS CHKDSK command; the date and

time are automatically displayed as well. The toggles menu lets you choose the on or off position for the <CapsLock> and <NumLock> keys, as well as the Print Echo function, which is identical to pressing <Ctrl>-<PrtSc>.

There's also a set-up menu that lets you choose the default drive; the file directory's source drive; whether, when a command is completed, the *1 dir* screen reappears automatically or only after a certain keystroke; and whether the file directory is to be sorted by file name, extension, date, or size.

Three steps are needed to initiate a command. First, you position the cursor at a selection in the command menu with the <CursorLeft> and <CursorRight> keys. You then move a second cursor with the <CursorUp> and <CursorDown> keys to the appropriate file in the file directory and press <Enter>. You also have the option of directly keying in commands at the A> prompt command line.

Two of *The 1 dir*'s special commands—Compose and Execute—allow you to string together several commands (either DOS commands or command files such as 1DIR.COM that DOS will interpret as commands) and then execute them as you would a batch file. *The 1 dir*'s Run command will open and run a program. You simply choose Run, point at the appropriate file, and press <Enter>.

Advanced program features enable you to use function keys to choose commands, use commands on many files at one time, display a wild-card directory, customize default options such as the Sort option in the set-up menu, and display DOS 2.00 subdirectories.

Help files on *The 1 dir* disk explain DOS 2.00 commands. Unfortunately, these files don't automatically copy onto the DOS disk along with *The 1 dir* command file 1DIR.COM. Although no instructions are given, the DOS command Copy b:*.hlp will put those files on the DOS disk in drive A: if *The 1 dir* disk is in drive B:.

The manufacturer does provide a comprehensive reference card if you want to get started without reading the manual. A second manual with a short tutorial on DOS 2.00 subdirectories, naming files, and disk backup is also included.

Although advanced users may find *The 1 dir* helpful in organizing hard disk files or DOS 2.00 subdirectories, the program's main purpose is to help beginners use DOS commands. After you use *The 1 dir* for a while, directly typing in DOS commands will seem less forbidding.

Beginners will also find it harder to make such mistakes as erasing an entire disk (it happens, believe me) when using *The 1 dir* menu system. The extra steps that *The 1 dir* requires you to take promote more careful consideration of which commands to choose and execute. This peace of mind could make your first interactions with the PC less painful than the trial and error method—and less boring than reading the DOS manual.—*CW*

The 1 dir
Bourbaki Inc.
431 Main St.
Boise, ID 83702
208/342-5849
List price: $95
Requirements: 64K (96K recommended), one disk drive

Managing Your Money

I have this recurring daydream: I am rich—filthy rich, to be exact. I have all the time in the world to do as I please: cruise the Caribbean on my yacht while I write the Great American Novel, improve my forehand (the yacht has a tennis court, of course), and actually read all of the Sunday *New York Times.*

The daydream doesn't last for long. I flip open my checkbook. The paltry number of digits in my account balance brings me back to reality. I am rudely confronted with the fact that I never seem to save any money.

If anybody needs Andrew Tobias's *Managing Your Money* from MECA (Micro Education Corporation of America), I do. Tobias, the best-selling author of *The Only Investment Guide You'll Ever Need, The Invisible Bankers,* and *The Funny Money Game,* is one of the company's two celebrity authors. The other, jogging expert Jim Fixx, created MECA's software *The Running Program.*

Managing Your Money is a three-disk set of seven integrated programs—Reminder Pad, Budget and Checkbook, Income Tax Estimator, Insur-

ance Planner, Financial Calculator, Portfolio Manager, and Net Worth—that help you manage every aspect of your personal finances. The package's integrated design saves you lots of time; for example, if you record a tax-deductible contribution in the Budget and Checkbook option, the program stores the check amount in the Income Tax Estimator for your April calculations. The program lets you track your cash flow, analyze rental property and tax shelters, and perform "what if" calculations on actual or probable investments; it also performs routine tasks such as printing checks and tax schedules.

Managing Your Money comes with a very brief user manual that gives you an overview of the product and explains such tasks as installing DOS, setting up the printer, and printing checks. The true documentation is found on disk in a tutorial called "Hello, New User." Each program option has its own help screen (retrieved by a push of the <Esc> key) that not only clarifies a program's operation but also offers suggestions and guidance for personal finances. Tobias's friendly tone and often humorous writing style make learning the program fun.

Tobias suggests that you load the program once a week and spend a half hour paying bills and recording transactions. Then, he advises, use the program for regularly scheduled financial planning. Some tax estimations based on first-quarter records can give you a good idea of how to spend and invest for the next nine months of the year; a careful review of your portfolio may also reveal that you need to put some money into an IRA. Although Tobias can't give recommendations on particular stocks or real estate purchases, he does give sound financial advice; for example, he says that one large insurance policy is better than four smaller policies and that you should track your stockbroker's investment recommendations to see if the broker is earning his or her commission. On top of all that, you can even incorporate new tax laws into *Managing Your Money* so it won't become obsolete.

You probably won't use all of this package's features. Since I am single and come from the Spend-It-Now School of Finance, the program's life insurance information is wasted on me. But if anything can get me on that yacht in the Caribbean, *Managing Your Money* is it. Besides, the program is tax deductible.—*KS*

Managing Your Money
MECA
285 Riverside Ave.
Westport, CT 06880
203/222-9087
List price: $199.95
Requirements: 128K, one disk drive

Word Proof

Few writers or editors will admit that they can't spell their way out of a paper bag, but let me be the first. Without a copy editor, I'd be unveiled as the word wimp that I am. But my ingrained resignation to lexical fate may have been changed, at least in principal—uh, principle—by IBM's *Word Proof.*

IBM bills *Word Proof* as not just a spelling checker but a "complete writing system" that also supplies synonyms and generates anagrams. The main word list of 125,000 words can be supplemented with a temporary user-defined word list of up to 2000 characters (roughly 200 words), which resides in memory until you exit from the program, and a permanent user-defined word list of up to 6000 characters (roughly 600 words). User-defined word lists are especially useful if you check documents that use proper nouns, names, titles, and particularly, professional jargon that would stump both the smartest spelling checker and some of the best human spellers.

Word Proof can be run on a black-and-white or color monitor displaying 40- or 80-column text. The program provides a full-screen editor that allows you to write, format, and print text. *Word Proof* displays 22 lines of on-screen text and can be used with most word processors. If the word processor doesn't create ASCII format files—as is the case with *WordStar*—you must convert your text file to ASCII format before using it with *Word Proof. Word Proof* comes as two disks: the program disk that holds the main and permanent user word lists and a synonym list disk. When you load *Word Proof,* the program and main word list are read into memory. This allows *Word Proof* to perform a spelling check very quickly, pausing only to read from the disk when it searches for a word in the permanent user-defined word list.

To start the spelling check, load DOS, then *Word Proof,* and open a document; you can start a spelling check anywhere in the text by pressing the <F2> key. When the program discovers a word it doesn't know, the word is highlighted, and a window appears on the screen offering four options: list all possible spellings, ignore the word and continue the spelling check, remember the word and continue the spelling check, and remember the word and stop the spelling check. If the correct spelling of the word is in *Word Proof*'s suggested list, you move the cursor to that word and press <Enter> to enter the correct version in the text. If *Word Proof* encounters a correctly spelled word that is not in its dictionary, you can tell *Word Proof* to save it in the temporary word list and continue the spelling check. Once the spelling check is completed, you can add the word to the permanent user-defined word list.

The 125,000-entry main dictionary is sufficient for most documents. Since IBM does not divulge the printed source of *Word Proof*'s electronic dictionary, I had no way of knowing the extent of the word list. *Word Proof* did not recognize fairly common words such as *prosthesis* or *psychodynamics.* You probably won't use these words in a letter home to Mom, but any time the program comes up against a word it doesn't recognize, the spelling check comes to a dead halt, and you must select one of the four options from the window to continue the scan. *Word Proof* recognized *martinet* and *shillelagh,* caught the missing initial capital in *indiana,* and breezed through butchered spellings of *mercenary, tyrannical,* and *archaeological,* always offering the correct spelling at or near the top of its list of possible replacements.

Since the *Word Proof* synonym finder is on a different disk than the main program, it is cumbersome to use. With *Word Proof* in drive A:, you must load the document from drive B: into memory, remove the disk, and then insert the synonym list disk. You can avoid this headache by copying *Word Proof* and the synonym program onto a double-sided disk. If you include DOS on the disk, there won't be enough space for *Word Proof*'s user-defined word list. You can free up sufficient space for the list by not copying LIBERTY.DOC, the *Word Proof* tutorial, onto the new disk.

A synonym search is performed by moving the cursor to a word in the text and pressing <F4>. Move the cursor to any of the synonyms listed and press <Enter> to replace the word in your text and save the change. Since synonyms often do not mean exactly the same thing as the source word, IBM recommends that you use a dictionary in tandem with the program.

Word Proof's documentation is extremely well written and easy to understand. I am particularly pleased that it discusses the inherent limitations of spelling checkers: any text that is run through *Word Proof* must still be proofread carefully because a spelling checker cannot check for style or word usage. *Word Proof* only finds words that are misspelled and cannot correct words that are spelled correctly but misused. Thus, the program will not flag *affect* when *effect* should be used or note that your wholesale order for *frozen fist* should actually be *frozen fish.* And if you thoroughly mangle a word, *Word Proof* may not suggest a correct substitute. However, it will bring the word to your attention and give you a chance to try another spelling or consult a dictionary.

Keeping these limitations in mind, you'll find *Word Proof* useful for catching many common typographical errors and misspellings, especially those that might get overlooked in proofing long documents. For syntax and word usage, I am pleased to report that there is still no substitute for Strunk and White's *The Elements of Style,* first published in 1935.—*RM*

Word Proof
IBM
Systems Products Division
P.O. Box 1328
Boca Raton, FL 33432
800/447-4700, 800/447-0890 Alaska and Hawaii, 800/322-4400 Illinois
List price: $60
Requirements: 96K, two disk drives (a one-drive system will run all but the synonym checker)

CP+

I'm one of those people who believes that computers won't fundamentally change us. That is, once a slob, always a slob. Though my personal appearance is pristine—some would even say dapper—my desk is a certified federal disaster area, and my filing cabinets reflect the calm, orderly approach that characterized Pompeii during its last volcanic brouhaha.

Unfortunately, I'm not finding it any easier to eliminate bad organizational habits when handling files that consist of scattered magnetic spots on a mylar sliver. My disks are cluttered with old backup files whose contents are obscured by bewildering file names. That's why file management programs hold all kinds of possibilities for us slovenly types. The cryptic qualities of MS-DOS have spawned a host of utility programs that humanize and organize operating systems, or at least the parts of them that we use daily.

If you're a nontechnical (read slightly phobic) PC user who'd rather not be bothered with mastering DOS commands, *CP+* from Analytica may be just the ticket. If you're a more accomplished user, *CP+* will be a convenient, though hardly essential, intermediary between you and the operating system. *CP+* is a fast and reliable utility program that helps you structure files and gain easy access to applications. The program opens with the start screen menu, which offers four options: Select and Run a Program, Review Commands, Print Commands, and File Commands. Information is managed on the screen in areas dedicated to displaying command selections, prompts, messages, or data being worked on.

Select and Run a Program enables you to access any application program on a disk by simply typing *S* and the number that *CP+* automatically assigns to the program file. Review Commands not only will open a file but will display the disk directory, a file description catalog, and several standard printing formats. File Commands includes facilities for renaming, copying, formatting, erasing, and arranging files. But *CP+* really goes to town when it's time to print. The program lets you print multiple copies of a file automatically or print a number of different files in a sequence you specify; this print queue can be altered at any time. You can select from nine print formats with preset page lengths and margins, or you can create your own custom format.

With *CP+* you can alphabetize directories, represent keystrokes with macros, and organize the files on a hard disk. Only the program's disk-copying and disk-formatting features are linked to DOS; the remainder of the functions operate as an independent "shell" around the operating system.

Befuddled by file names of your own creation? *CP+* provides space to augment standard 8-character file names with file descriptions of up to 54 characters. Retrieving any file is simply a matter of entering the number *CP+* assigned; typing in the actual name is not only unnecessary, the program won't allow it.

CP+ is a snap to learn, largely because Analytica provides detailed help screens and a disk tutorial that makes extensive use of simulation. The user manual is generally thorough and is complemented with abundant screen reproductions, though for reasons I can't fathom, instructions for installing *CP+* are terse and buried in the manual.

The user would also benefit if online help included an index of all *CP+* commands. Moving from menu to menu is not always easy, and copying files—a two-step process of listing and then ratifying choices—is a bit cumbersome. But this is the price you pay for the program's overall simplicity. An "undo" feature for the Print and File commands would also be a big plus.

Still, none of the program's drawbacks constitute anything more than an annoyance. Some may question the logic of putting another barrier—albeit a friendly one—between the user and the operating system. I have never trusted schemes that promise to organize chaos, but *CP+* can definitely help you make sense of your sectors.—*KG*

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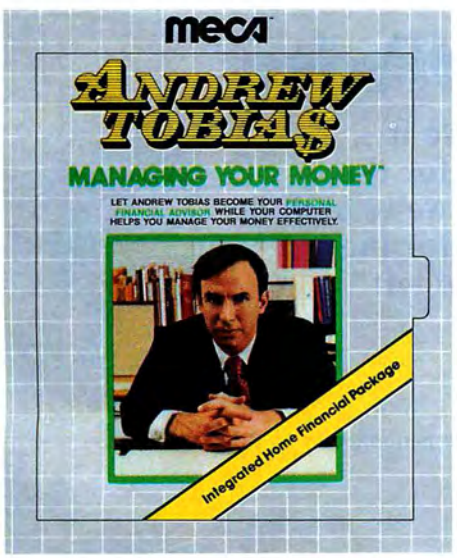

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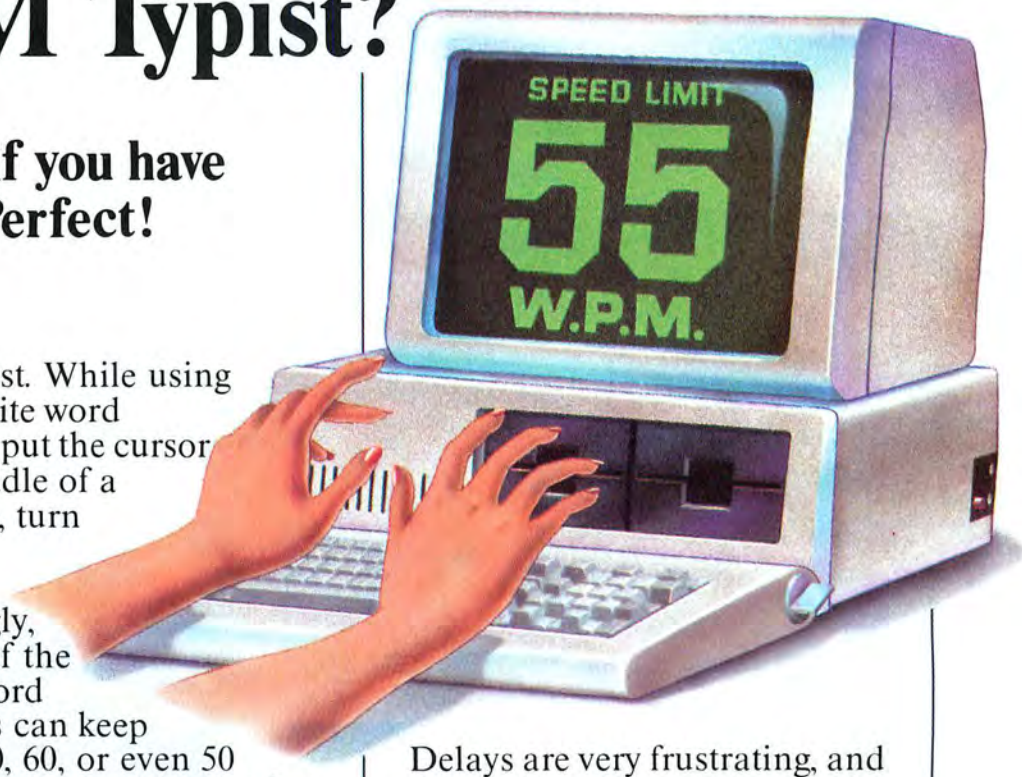

Try this test. While using your favorite word processor, put the cursor in the middle of a paragraph, turn insert on, and type. Surprisingly, very few of the leading word processors can keep up with 70, 60, or even 50 words per minute. WordPerfect keeps up easily at speeds well above 100*.

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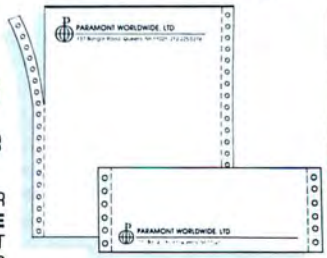

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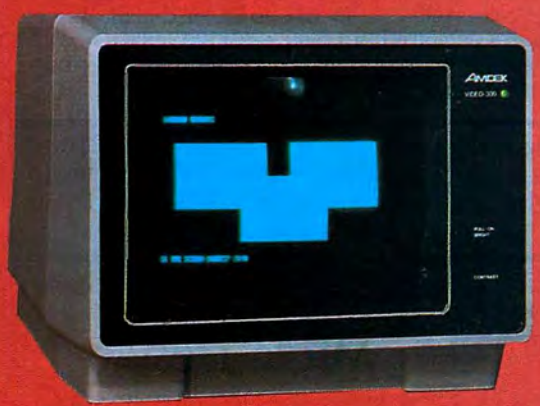

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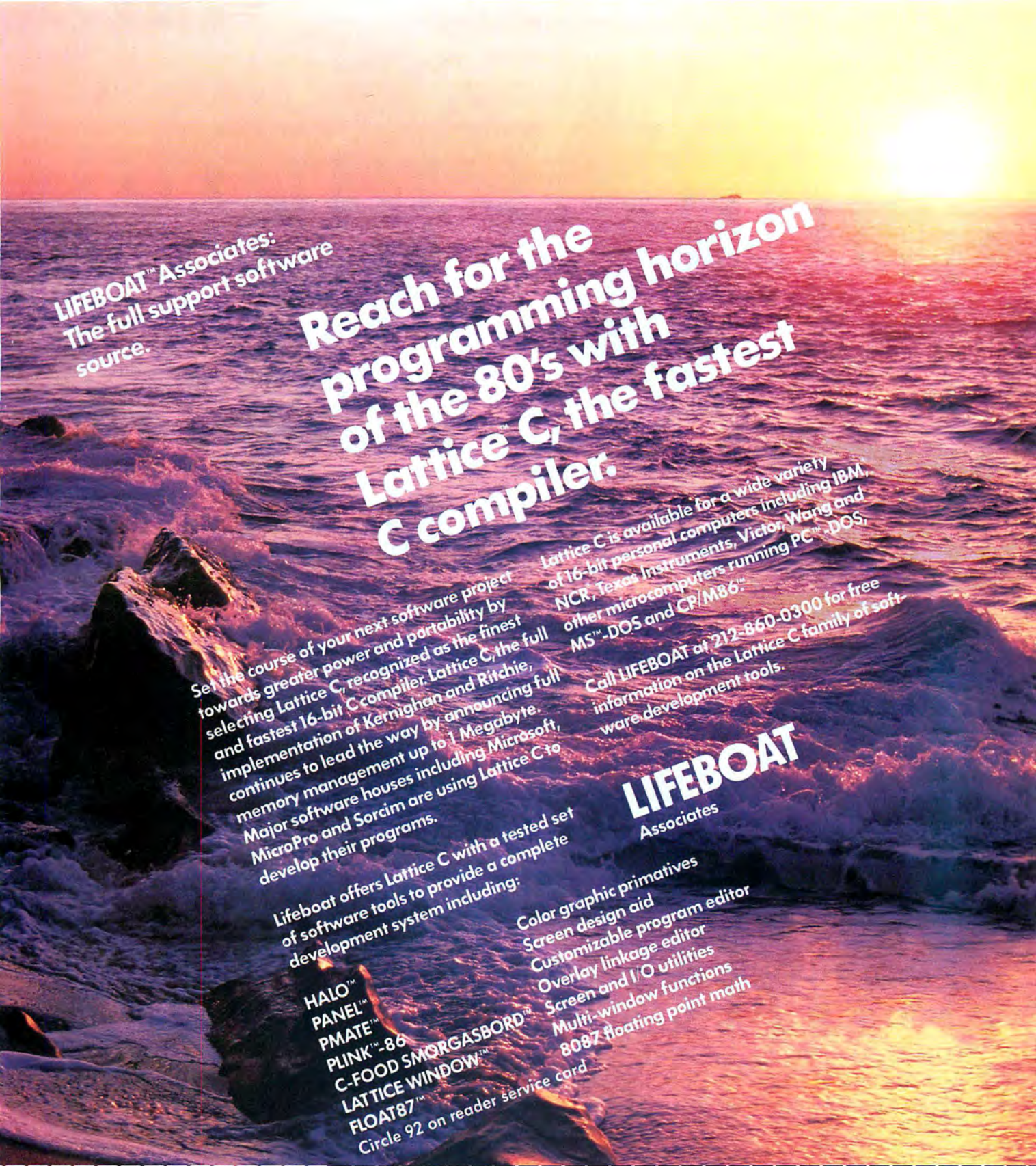

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PCjr WORLD

September 1984

The Home Computer Magazine
for People with PCjrs and Compatibles

Electric Desk

Stress Management With Your Computer

An integrated software package for office management

Electric Desk

Keith Richard Cook

Hunting for a full complement of applications programs—data base, spreadsheet, word processing, and communications—can be hard work. First you have to ask yourself some questions: What types of software do I need? What features do I want each program to have? Do I want—and can I afford—several packages? And can those different packages work together? Then, armed with your answers, you have to hunt down the right programs.

Cheer up, I know a shortcut. *Electric Desk* from Alpha Software, the latest in the new generation of integrated software, combines four different applications—word processing, spreadsheet, data base, and communications—all on one disk. Although *Electric Desk* lacks the graphics capabilities of other integrated programs, it is a powerful, easy-to-use, and well-designed package that will suit many business needs.

Table 1 lists features that are common in dedicated word processing, communications, data base, and spreadsheet programs and marks which features are included in the *Electric Desk* applications.

People in an office seldom sit down at their desk and perform one task—such as updating a data base or writing letters—without interruption. Instead, the scenario goes something like this: you are writing a

SINGLE ENTRY
LEDGER

	Yes	No	
Word Processing (Document)			Largest size of document file: 18 double-spaced pages
	■		Insert character
	■		Insert lines or blocks
	■		Typeover
	■		Transpose characters
	■		Change uppercase to lowercase (and vice versa)
	■		Delete character
		■	Delete word
		■	Delete line
	■		Cursor movement by word or line
		■	Cursor movement by page
	■		Cursor movement to top of document/end of document
	■		Automatic word wrap
	■		Automatic reformatting
	■		Right justification
	■		Left justification
	■		Center lines
	■		Move blocks
	■		Headers and footers
	■		Automatic page numbering
	■		Automatic section numbering
	■		Automatic chapter numbering
	■		Find and replace character, word, or phrase
	■		Find and replace character, word, or phrase a specified number of times
	■		Copy file
	■		Delete file
	■		Merge files
	■		Underline
	■		Boldface
	■		Subscript
	■		Superscript
	■		Print text as displayed on screen
	■		Print several documents
	■		Print multiple copies of same document
	■		Print one file while editing another
	■		Split screens
	■		Macros

	Yes	No	
Communications*	■		Data file uploading (transmission)
	■		Data file downloading (receiving) to disk
	■		Data file downloading to printer
	■		On-line parameter selection/save in file
	■		Xmodem protocol file transfer
	■		ASCII file transfer
		■	Non-ASCII (binary) file transfer
	■		On-line viewing of disk directories
	■		On-line viewing of disk files
	■		Deletion of disk files
	■		Renaming of disk files
		■	Filtering of received control characters
	■		Upload wait for host prompts
	■		Non-auto-dialing modem support
	■		Auto-dialing modem support

*For more information on communications software features, see "Intelligent Communications" in this issue.

Table 1: This table lists the main features usually offered by dedicated versions of the applications included in Electric Desk and notes which of those features Electric Desk provides. Specifications for some of Electric Desk's services are also included.

	Yes	No	
Communications *(continued)*		■	Auto-redial of last telephone call
		■	Auto-redial of last call until connect
		■	Manual dialing
	■		Modem/telephone hang-up
		■	Originate/answer mode switch
		■	Remote takeover and operation
	■		Terminal emulation
	■		Split screens
	■		Macros

	Yes	No	
Data Base			Maximum number of records: 65,000
			Maximum fields per record: 50
			Maximum characters per field: 1000
	■		Labels fields
		■	Automatically formats numbers
	■		Can accommodate monetary decimal points
		■	Duplicate record checking
		■	Data entry verification (within specified range)
	■		Search on part of key
	■		Formula search
	■		Ascending sorts
		■	Descending sorts
		■	Multiple-field sorts
	■		User-chosen report format
	■		Report format saved on disk
		■	Generates reports from more than one data base file
		■	Calculation capabilities for reports
	■		Split screens
	■		Macros

	Yes	No	
Spreadsheet			Maximum worksheet size (columns by rows): 255 by 255
			Maximum column width (characters): 72
			Data capacity per cell (characters): 72
	■		Displays current cell address
	■		Column headings
	■		Adjustable column width
	■		Copies single cells
	■		Copies ranges of cells
		■	Names ranges
	■		Enters formulas by pointing
	■		Copies to a range by pointing
	■		Automatic and manual calculation
		■	Forward and circular references
	■		Built-in formulas
	■		Accepts templates
	■		Merges worksheets
	■		User-chosen print format
	■		Split screens
	■		Macros

Figure 1: Electric Desk's split-screen feature lets you view two files simultaneously. For example, you can compose a letter with the Document service that uses information from the Data Base service.

letter with a word processing program when John Smith calls. You need access to his data base record, so you exit the word processor, pull out the data base disk, insert the data base program, and load it. Smith gives you some information that revises job cost data in a spreadsheet. Now you must exit the data base, swap some more disks, and load a spreadsheet program.

If you want to send the revised data to a branch office in another city, you have to insert a different program to telecommunicate the data over a modem and telephone lines. Finally, you have to exit your communications program and reload your word processing program to get back to where you were before Smith called. You're constantly popping disks in and out of your computer. But *Electric Desk* frees you from all that.

All four applications on the PCjr version of *Electric Desk* are on a single disk and two ROM cartridges; the PC version is all on one disk and uses a second disk as a data disk. Each application, or "service," is accessible from the others; you move from one task to another at any time simply by pressing the <F10> key, which moves the cursor to the service menu, and choosing the service you want. *Electric Desk* lets you easily copy and move data among all the programs, and you can split the screen in half to display two files simultaneously. On top of all this, *Electric Desk* costs only $290 for the PCjr version and $345 for the PC version.

The PC and PCjr versions of *Electric Desk* are essentially identical, though the PCjr's memory limitation does affect the program's capabilities. Depending on the size of the data files and the PC's memory, a maximum of nine documents, nine spreadsheets, nine data bases, and two communications lines can

be open at the same time. A 128K PCjr can open no more than three files at one time. For instance, you could open two spreadsheets and one communications line or three document files at once. *Electric Desk* is such a useful program that you may want to add a memory expansion unit to your PCjr so that you can take full advantage of the program.

Electric Desk is both menu- and command-driven, and it runs in either color or monochrome mode. The PCjr can take advantage of *Electric Desk*'s choice of eight foreground and eight background colors, but PC owners will have to invest in a color graphics board to use this program feature.

Screen Layout

All of *Electric Desk*'s programs have the same screen layout. Each screen has four primary areas: the service menu, the command menu, the work area, and the dialog area (see Figure 1). The service menu is the bottom line of the screen. It lists the four program services and Help and Exit options. The command menu is the top three lines of the screen and lists the commands available for the service you are using. The command names are preceded by the function key number that you press to give the command. The work area is the center portion of the screen. This large area is where you work on documents and files. The dialog area is the second and third lines from the bottom of the screen. *Electric Desk* uses the dialog area to prompt you for information and to display your replies.

The Document Service

Have you ever accidentally deleted the wrong sentence or paragraph from a document file you were editing? If so, you no doubt wished your word processing program had some way to retrieve that lost data. The *Electric Desk* Document service includes such a feature. When you delete a block of text, the program creates a miniature file for that data instead of eliminating it. *Electric Desk* will permanently retain the data on disk if you assign it a file name; otherwise the program puts the data into a temporary file called Flash, where it remains until you delete another block, at which time the program replaces the old Flash file with the newly deleted data. The size of a Flash file is limited only by the computer's memory.

Automatic reformatting is another convenient *Electric Desk* feature. When you insert or delete text in some word processing programs—*WordStar*, for example—you have to reformat the affected paragraphs. Not so with *Electric Desk*; paragraphs are automatically adjusted whenever you manipulate data.

Like the other *Electric Desk* program services, the Document service lets you access the directory by pressing the <CursorUp> key. And *Electric Desk* has standard word processing features—search and replace, centering, setting tabs, line spacing, and underlining. The program includes other handy commands that transpose characters, change text to uppercase or lowercase, and combine files. But *Electric Desk* lacks some editing features I rely on, such as commands for deleting text by word or line. When you do lots of writing (and rewriting), erasing characters one by one is time-consuming.

The PC and PCjr versions of Electric Desk *are essentially identical.*

Time lost editing can be made up with the program's printing commands. *Electric Desk* lets you write and edit one document as another is printed. Another time-saving *Electric Desk* feature lets you queue up eight documents to print in a sequence you specify.

The largest file you can create with *Electric Desk* is 18 double-spaced pages, so if you're writing a doctoral thesis you will have to spread it out across several files before you get your sheepskin. On balance, however, *Electric Desk*'s Document service holds its own in the word processing software market.

The Data Base Service

The *Electric Desk* Data Base service offers many more data base features than you might expect from an integrated program. It includes a full-screen editor for entering and changing data and displays field names in normal, boldfaced, or underlined type or in inverse video. A record can include 50 fields, and the program can store and search through 65,000 records. *Electric Desk*'s "paint" feature is especially well suited for the Data Base service because color coding can be a helpful organizational detail in a data base application. You could, for example, paint field labels one color and field data another color. Although *Electric Desk*'s Data Base service is not as sophisticated as *dBASE II* and other stand-alone programs, it can easily replace your Rolodex as well as handle much of the data businesses must store and manipulate.

In the Data Base service, you can search for records in two ways: with either "index commands" or "search commands." The program lets you define up to five indexes for a file, such as name, title, and company; you can then sort the records in a file by these indexes, one at a time. The program's search commands use formulas that define the characteristics of the record or records you want to find. You use seven symbols—the = (equals), < (less than), > (greater than), ~ (contains), <> (not equal to), >= or => (greater than or equal to), and <= or =< (less than or equal to) signs—in compound search formulas, such as CITY = SAN FRANCISCO AND COMPANY ~ CONSTRUCTION AND NAME => M.

The index method is faster for finding a specific record in a large data base, but the search method is more flexible, since it can find records that meet several criteria and sort for information that corresponds to an unindexed field. However, a search formula is limited to 80 characters, so criteria must be chosen carefully.

When you find the record or records you want, you can send the information to another service or you can print a report. Records in a report are printed out in the order in which you've defined index fields or search criteria.

The Spreadsheet Service

Electric Desk's Spreadsheet service uses a roomy, 255-column by 255-row worksheet. The service is adequate for analyzing cash flow and tracking inventory, but it is not as fast or powerful as *1-2-3*. For example, *Electric Desk* identifies cells by column and row number instead of by letters and numbers like *1-2-3*. Thus, A1 in *1-2-3* would be r1c1 in *Electric Desk*. An *Electric Desk* spreadsheet formula might look like r7c2+r8c2+r9c2.

Since *Electric Desk* is an integrated program, spreadsheet data can be sent to other services. However, if you want to incorporate spreadsheet data into a document file, there is a program limitation. If a spreadsheet is wider than a document file's margins, the program wraps the inserted spreadsheet on screen so that it conforms to the document margins.

You can incorporate and print a spreadsheet with larger margins than your document's by putting the spreadsheet at the very beginning of the document or by using embedded print commands for the spreadsheet's right margin to override the document's margins.

Electric Desk's spreadsheet memory management is actually superior to *1-2-3*'s. *Electric Desk* allocates memory for data only, regardless of where that data is located on the spreadsheet. If you make a single entry at the bottom-right corner of a *1-2-3* spreadsheet, besides saving the entry itself, *1-2-3* reserves enough memory for pointers to each cell—empty or not—of the entire rectangular area between cell A1 and the entry. *Electric Desk*'s memory management may save you some time during computations.

The Communications Service

Electric Desk's Communications service enables a PC or a PCjr to communicate via a modem with other computers. Like programs such as *Crosstalk* and *PC-Talk*, the Communications service lets you receive, save, and send data via the telephone line. If you have two modems and two serial ports, *Electric Desk* can open two lines simultaneously.

Before you send or receive a file, you must specify certain information, such as your modem's data transmission speed (bits per second rate) and the number of stop bits used. The Setup Communications command asks a series of questions to obtain these specifications or parameters. The program does not provide default settings for these parameters, but it does ask you if you want to save this set-up information on disk so that you can use it the next time you telecommunicate.

When you communicate with another computer or with a service such as The Source or CompuServe, you often log in by entering account numbers and passwords. The Communications Service Directory, which is made up of "log-in scripts," greatly simplifies this process. The Communications service lets you store dialing and log-in sequences so that most of the telecommunications hookup work is done automatically. The scripts can even be told to wait a specified amount of time or to wait to receive a particular character before carrying out the next instruction.

The number of log-in scripts is limited only by disk space. The program could have benefited from a manual dialing procedure, which would allow you to call phone numbers without including them in log-in scripts.

Memory Keys

Electric Desk lets you create and use macros, or "memory keys." A macro redefines a key on a keyboard. You can save time by creating macros that store words, phrases, or commands that you type repeatedly.

Electric Desk's memory keys consist of the <Alt> key combined with a letter, number, or certain symbol keys. You can create 12 systemwide memory

keys—macros that work under all the services—using <Alt> with the 0 through 9 and the plus and minus symbol keys. Twenty-six service-specific memory keys are available in each service, using <Alt> with the A through Z letter keys. There's virtually no limit to the number of keystrokes you can assign to one memory key. The PC version of *Electric Desk* limits the total number of keystrokes of all your macros combined to 1000; the PCjr version limits total macro keystrokes to 255.

Documentation

The *Electric Desk* user manual explains all of the program's features and how they work together with a minimum of computer jargon. You won't need a computer dictionary to get through it. In fact, you may not even need the manual. Besides printed documentation, *Electric Desk* has comprehensive on-line help that can be displayed anytime. The help screens contain information about each *Electric Desk* application. By paging through a service's help menu you can learn its features and procedures. *Electric Desk*'s various services work logically, but if you need a quick review, or if you want to get right into the program without studying the user manual, the Help option is there like a friendly librarian.

Alpha Software is touting *Electric Desk* as a no-frills program, but in fact it is loaded with features. While *Electric Desk* can't match all the features of dedicated programs, it serves a variety of business needs well. *Electric Desk* may be the first program that can make the claim "one size fits all."

Keith Richard Cook is a Contributing Editor for PC World.

Electric Desk
Alpha Software Corp.
30 B St.
Burlington, MA 01803
800/451-1018, 617/229-2924
List price: PC version $345, PCjr version $290
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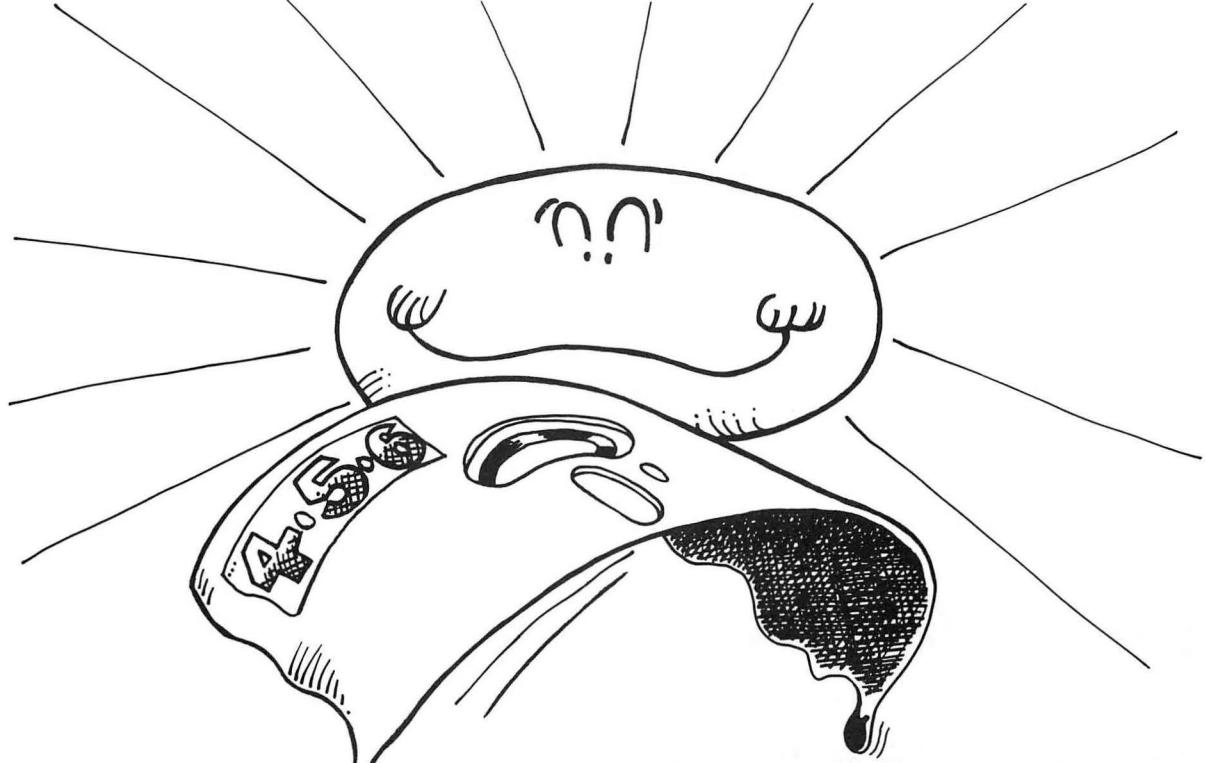

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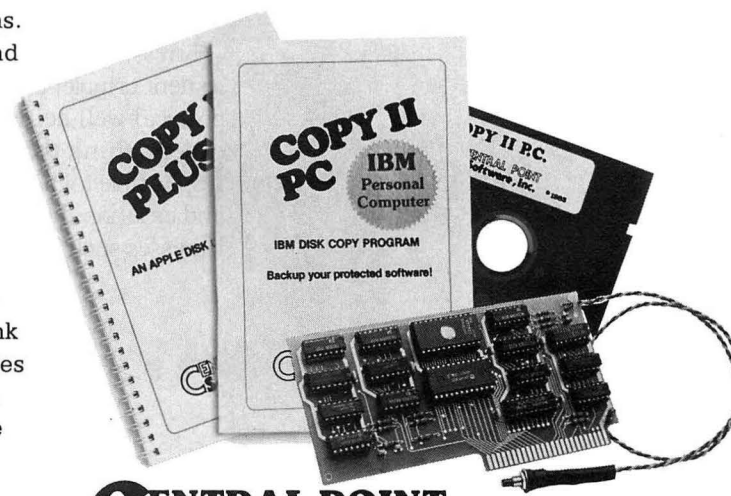

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Circle 31 on reader service card

A new program turns your computer into a biofeedback machine.

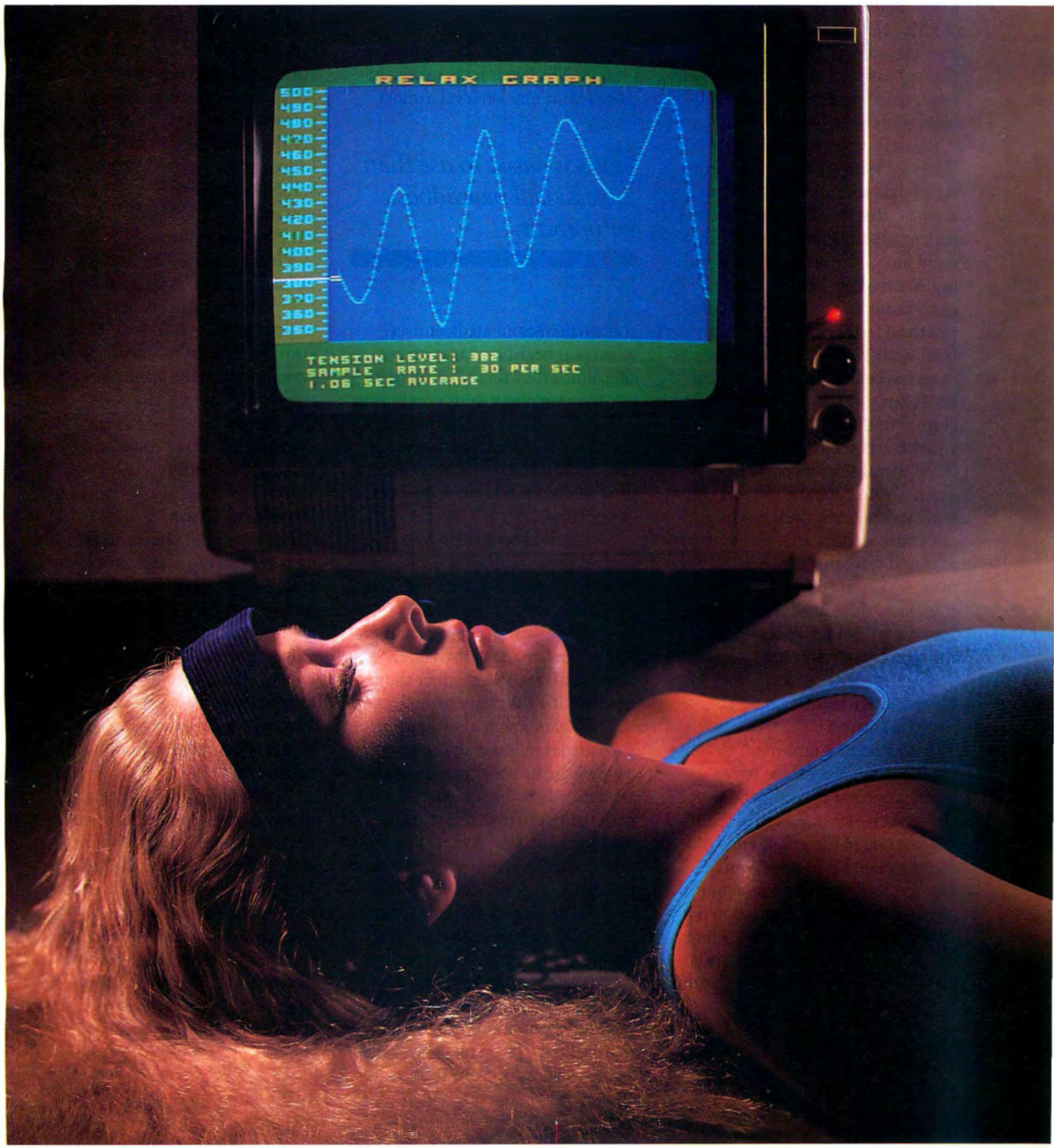
The Stress Manager

Joseph C. Hager

Stress treatments range from supervised medical care in clinics to prosaic exercises such as petting your cat. Now Synapse Software offers stress treatment in the form of a hardware and software package, *Relax*, that lets you hook your body up to a PC or a PCjr and explore ordinarily undetected muscular activity. This monitoring technique is called "biofeedback," and *Relax* uses it to help you learn to recognize the subtle signs of muscular tension that reveal stress.

Stress, as many experts attest, is a silent crippler of mental and physical well-being. Many health experts think that stress may be responsible for a number of mental and emotional problems and for illnesses such as heart and vascular disease, stomach and skin disorders, and even cancer. Stress may become too pronounced to ignore or try to treat yourself. If you suffer from stress symptoms such as headaches, high blood pressure, anxiety, and sleeplessness, you should probably consult with your doctor and work out a stress management plan.

Such a plan might include improved nutrition, exercise, time management, positive thinking and visualization, psychotherapy, and progressive relaxation that includes biofeedback. Supporters promote biofeedback monitoring as a valuable stress-reduction tool. Although research on biofeedback's contribution to stress reduction is inconclusive at present, monitoring is certainly one technique a person can use to reduce stress. Just keep in mind that biofeedback is not an end in itself.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360
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TENSION LEVEL: 382
SAMPLE RATE : 30 PER SEC
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Putting the Pieces Together

The biofeedback instrument that records skeletal muscular activity is called an "electromyograph," or EMG. *Relax* includes a small box of EMG electronics, a headband, an audio cassette that leads you through a series of relaxation exercises, three program disks, documentation, and a workbook.

Relax is easier to use than professional biofeedback equipment, which has several electrodes, or sensors, that must be attached to a patient's head. Professional equipment also requires much fine tuning. With *Relax*, you wrap the cloth headband around your forehead and fasten it behind your head with Velcro strips. A wire from the headband plugs into the EMG box, and a wire from the box plugs into the PC's or PCjr's joystick connector. The headband's three metal sensors press lightly against your forehead. When your muscles contract, they produce electrical activity that the sensors read and transmit to the EMG unit, which in turn amplifies and translates this muscular activity into digital information that the computer understands.

Graphs, Kaleidoscopes, and Balloons

Relax's first program disk, Graph, simulates on screen the paper chart recorders used in laboratories and clinics (see Figure 1). On the left side of the graph are a numeric scale that provides a measurement of muscle tension and a needle that moves up and down to indicate muscular activity. The needle draws a graph that scrolls left to right off screen. The bottom of the screen displays the tension level and the settings for two options that control the parameters of the graph.

The first option, Sample Rate, lets you select from eight rates ranging from 60 to .25 samples per second. The faster rates take samples of your tension level almost continuously and are best used when you begin a relaxation session, since they reveal immediate information about your condition. The graph moves slower as fewer samples per second are taken; the slower sample rates let you observe your tension level over longer periods of time.

Relax *is easier to use than professional biofeedback equipment.*

The second option lets you choose either to display each sample or to average a number of samples taken during a set time period. Averaging gives you a more stable view and reveals true trends in muscular activity rather than momentary fluctuations.

The *Relax* graph also offers a subliminal message option, which lets you create short messages that are flashed on the screen at random times during the program. Messages such as 'Be calm' or 'Breathe deeply' may enhance your relaxation experiences. The user manual notes that the topic of subliminal communication is a highly controversial one, but in fact most experts agree that fleetingly displayed messages have no more motivational value than regularly displayed messages, such as diet slogans on your refrigerator door.

If you like impressive displays of color graphics, you'll appreciate *Relax*'s Kaleidoscope program. This program creates dozens of colorful, symmetrical patterns whose details and colors change rapidly or slowly depending on your tension level (see Figure 2). As you become more relaxed, the patterns slow and merge into one gently pulsating image. The Kaleidoscope is an entertaining and somewhat hypnotic program that you may want to run even without the EMG equipment.

The Balloon Game is the third *Relax* program. A balloon floats over various terrains, responding to your EMG levels. As you relax, your balloon drifts slowly downward and into the hands of a waiting child. Like the Kaleidoscope, this display is intended to aid relaxation as well as to indicate your muscular activity.

Pros and Cons

Relax is fun but not frivolous because stress is a widespread problem. The program can be used by people who think that EMG biofeedback might be helpful to their existing stress management plan. It may also appeal to people who are curious about EMG or who are looking for innovative applications for their computers. But *Relax* has limitations.

The *Relax* equipment is adequate for showing increases and decreases in the activity of muscles in the head and face, but a relaxed face does not necessarily mean that the rest of your body or your mind is at ease, and facial muscles are easy to relax without biofeedback. The program was not designed to detect the activity of other muscles—such as neck,

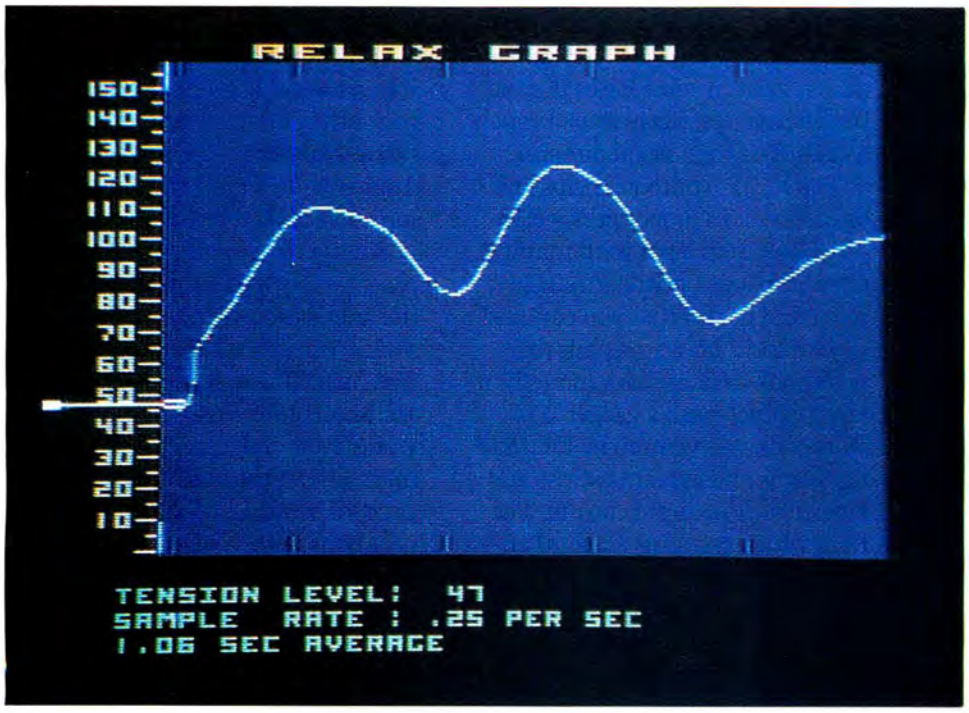

Figure 1: The Relax Graph simulates a paper chart recorder that provides a measurement of muscle tension.

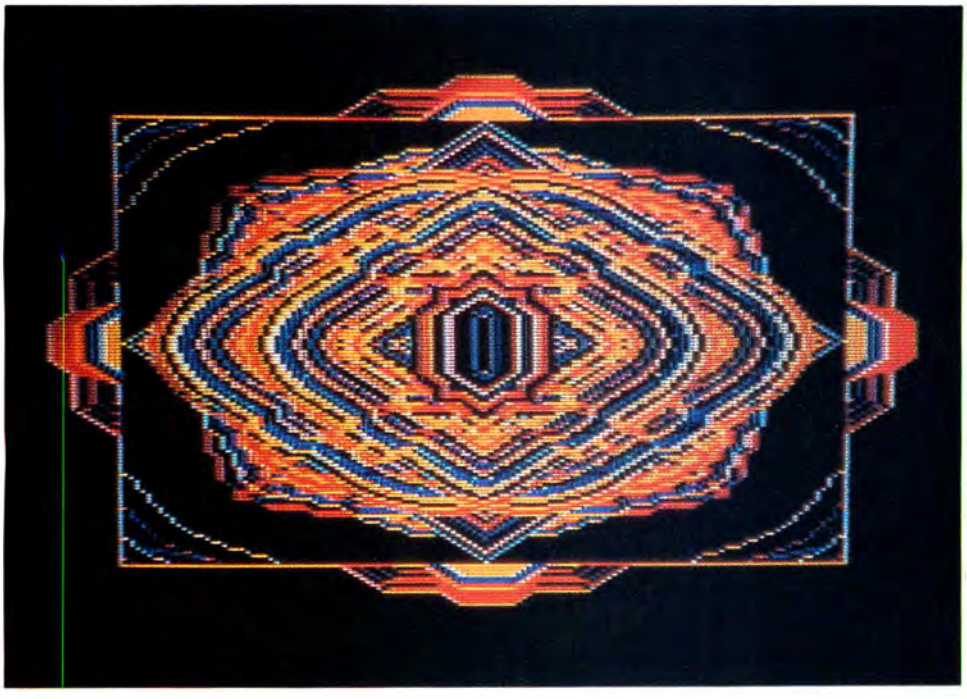

Figure 2: The Relax Kaleidoscope patterns slow down and merge into one image as you become more relaxed.

shoulder, and back muscles—that might more clearly reveal your unique expression of stress. You may, however, experiment by placing the headband's sensors over muscles in the neck and shoulders. Use a belt to hold the headband in place and to ensure good contact between the sensors and your skin, and follow the same relaxation procedures for these different muscles as you did for your facial muscles. You cannot directly compare these readings to your facial muscle readings, but you can monitor the new readings over time to chart your relaxation progress.

The workbook helps you create a 'stress profile' of yourself.

Although muscle relaxation is an aspect of many stress-reducing techniques, remember that muscular relaxation is not the same as stress reduction. Classic stress response involves not only neurally controlled skeletal muscles but hormones, glands, and internal organs. One goal of a stress reduction program is to return these internal body components to their normal conditions after a stressful event, and the value of simple muscular relaxation in meeting this goal is not yet clear. Other ways to relax and to reduce stress, such as meditating, listening to music, or reading a good book, may be more appropriate for your lifestyle. Research on some of these techniques—meditation and physical exercise, for example—has shown that at least in some cases they actually have restorative effects such as reducing high blood pressure.

The *Relax* workbook helps put biofeedback in proper perspective. The book is on a par with many popular books on stress management and health that you can find at your local bookstore, but the workbook makes *Relax* more than just graphics with a gadget. The workbook was written by Dr. Martha Davis and explains stress and biofeedback in simple terms. The text, which contains a useful annotated bibliography, covers the role of stress in your life and helps you create a "stress profile" of yourself.

The workbook suggests that you complete a series of checklists for identifying stress symptoms and their possible sources. The checklist includes factors that can offset stress, such as your network of friends, social supports, and personal traits that help you cope with adversity. Unfortunately, the checklists are poorly developed. It appears that the author culled questionnaire items from various psychological research papers but did not make sure the items were useful in this context. The lack of development shows, for example, in the failure to provide a way to score the questionnaires. You have no way of measuring your checklist results against other people's scores or your own scores over a period of time.

Overall, my evaluation of *Relax* is positive. For the moment, *Relax* is one of the few ways you can use a computer to relax; because of this it may fit better into your work routine than other techniques. You may not be able to go out for a 5-mile run in the middle of your workday, but you can probably set aside a few minutes, close your office door, switch on the program, and relax. A *Relax* "electronic coffee break" may help ease some job-related tension.

Relax is one of the first examples of what will surely be a growing application of microcomputers: self-help and health maintenance. The biofeedback equipment, while not up to professional standards, works well and, together with the manual and the software, is a bargain for someone who wants to experiment with EMG equipment. The programs and the equipment are easy to use and entertaining to watch. If you spend a significant part of your day at the computer, *Relax* may fit nicely into your complete stress management plan.

Dr. Joseph C. Hager is an adjunct professor at the University of San Francisco and a behavioral science consultant who specializes in emotion and expression and their relation to computing.

Relax
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Richmond, CA 94804
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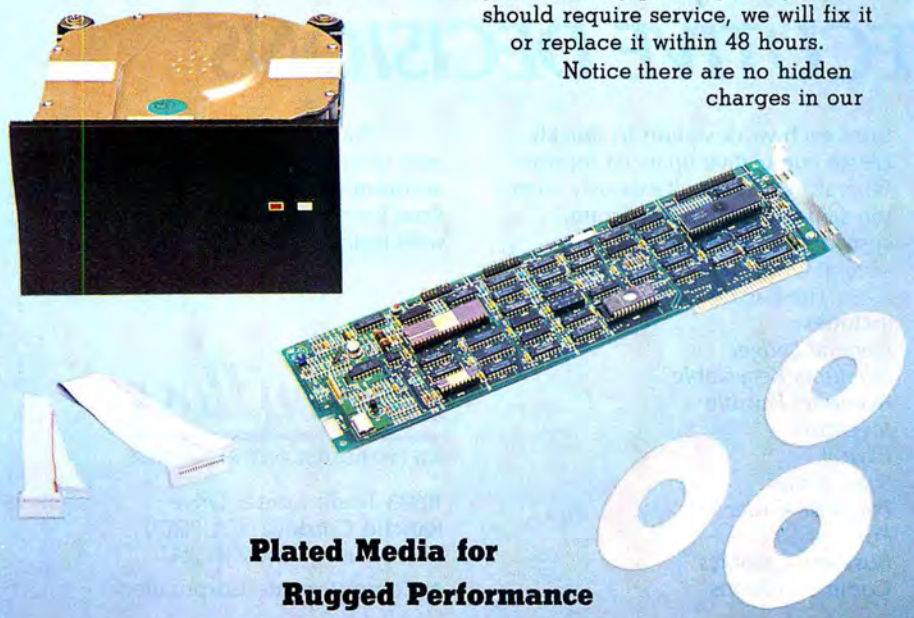

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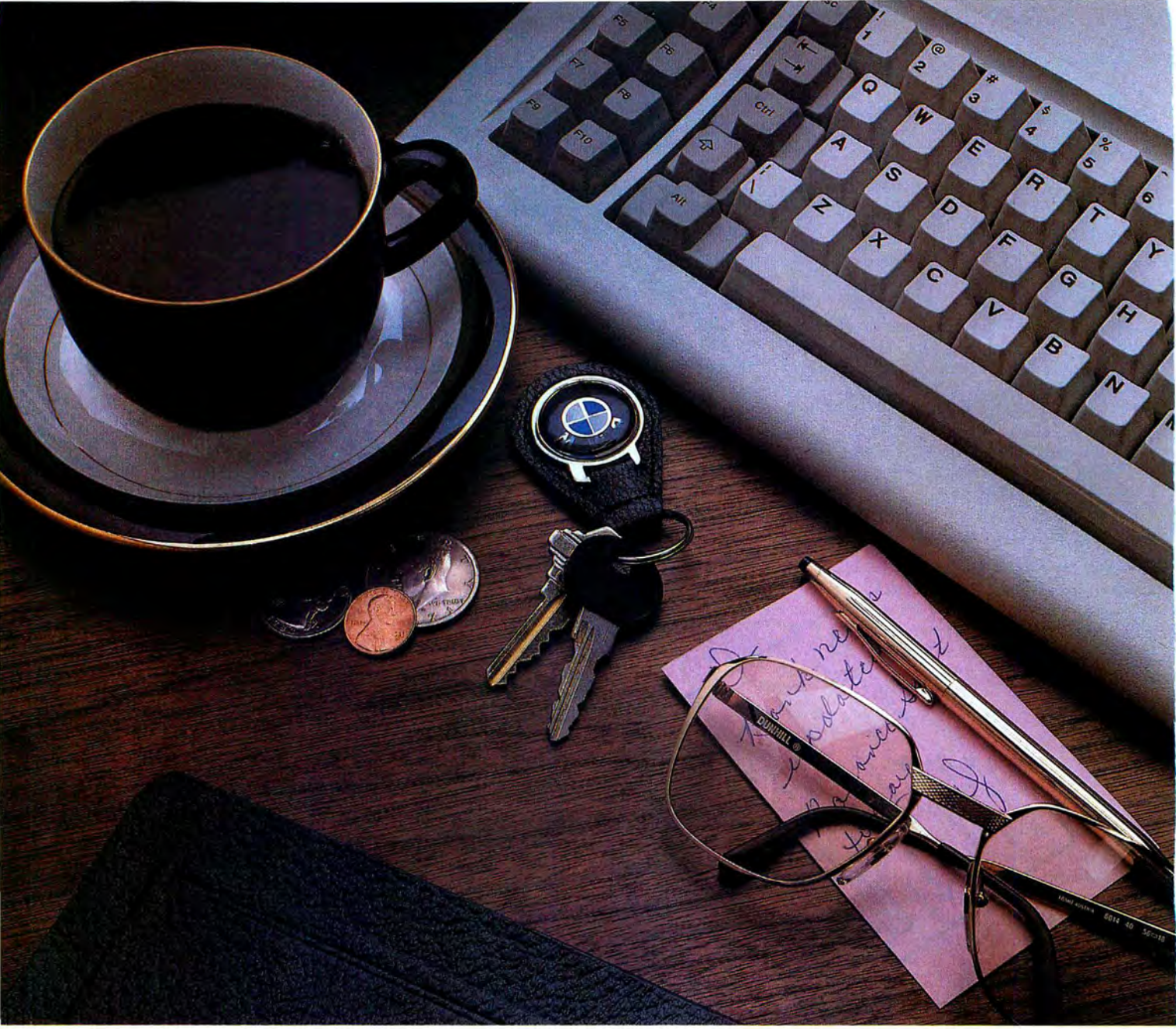

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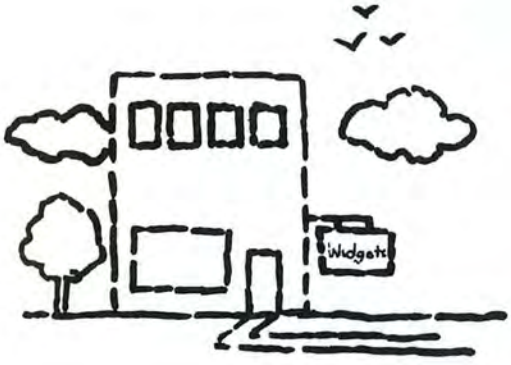

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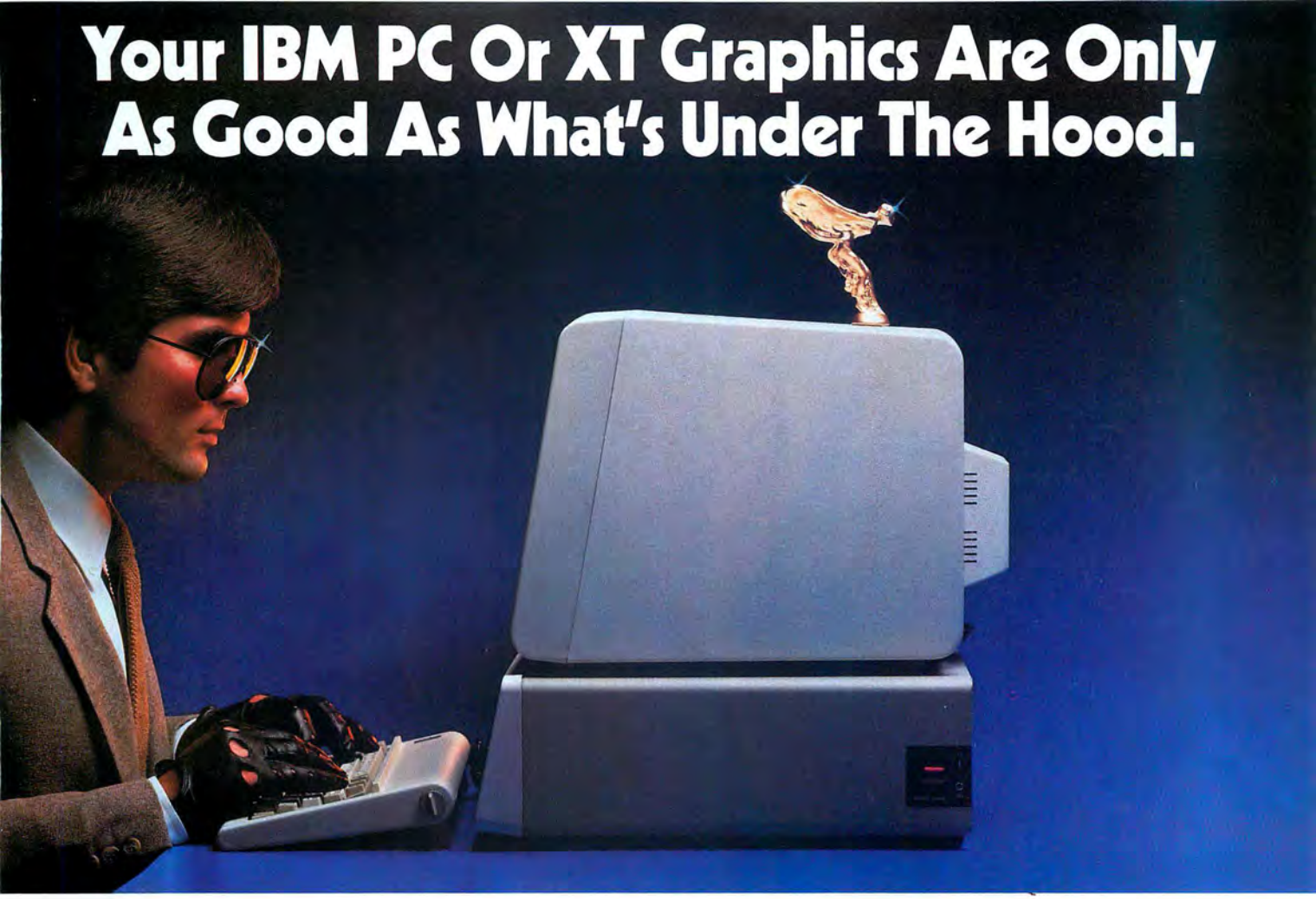

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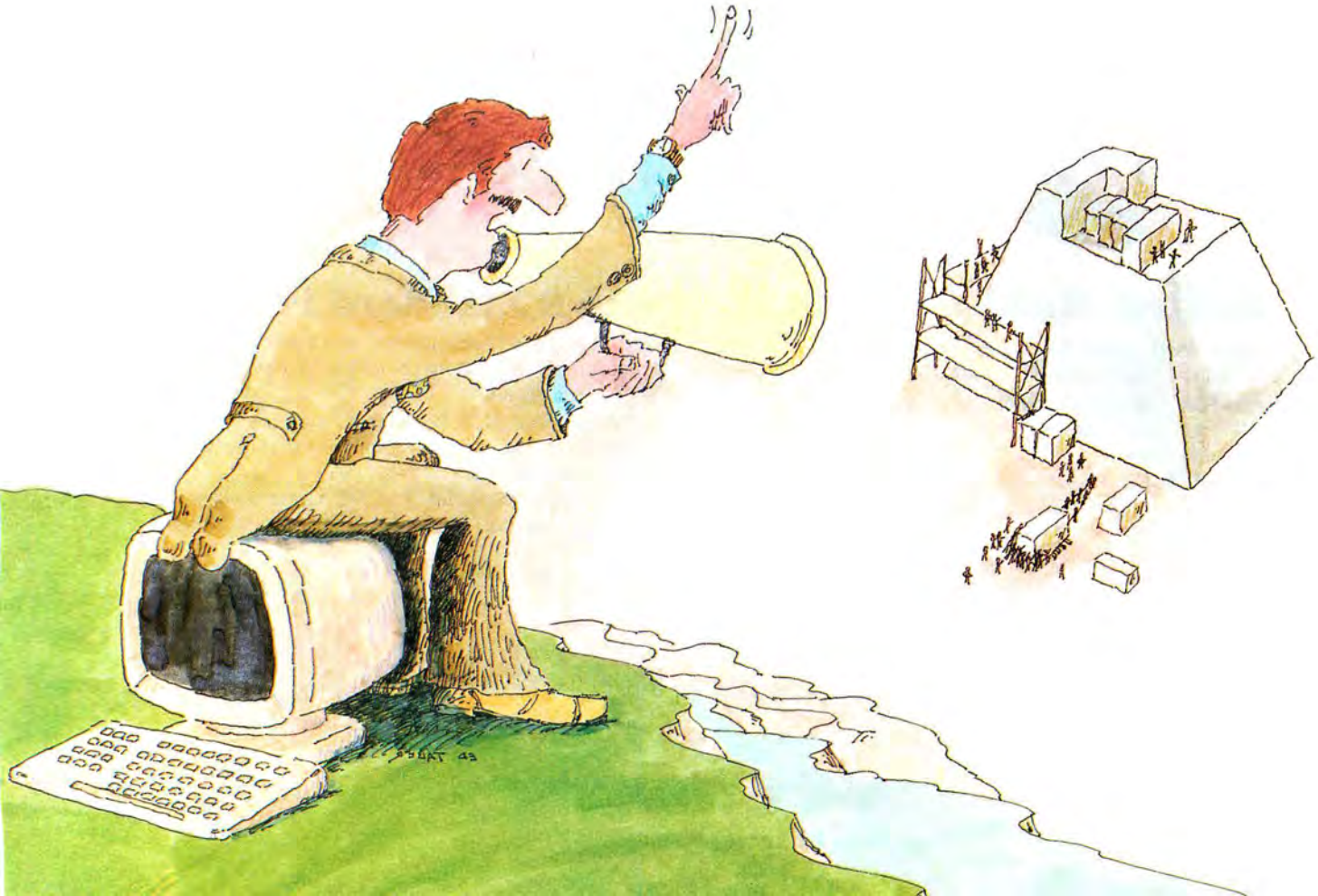
Project Management: One Step at a Time

Bill Dauphinais and Leonard Darnell

A successful project is usually the result of good planning based on good information. With the IBM PC and new project management software, you can increase the quality, quantity, and timeliness of the information you use and turn a seemingly unmanageable project into a success. This is a guide to project management software features and what they can do for you.



Managing a project, whether it is building a skyscraper, designing a better mousetrap, or developing software, is a little like herding a thousand head of cattle across a treacherous, uncharted plain. A number of small and large details may make the difference between success and failure. Getting to market late means losing money, but pushing too fast may exhaust resources. Rustlers whittle away your investment; unfamiliarity with the terrain means lengthy detours; and forgetting to scout ahead can bring a quick, withering end to your venture.

A project's success depends on planning, monitoring, and tracking.

In short, a project's success depends on planning, monitoring, and tracking—the techniques of project management. Refining these techniques produces optimal results: the best use of available resources and the least time and money spent.

Project planning means anticipating the steps needed to complete a project. It includes identifying tasks and their sequence, establishing a project schedule that includes milestones and deadlines, and estimating what resources (such as people, machines, and raw materials) will be needed, when they will be needed, and at what cost. A project plan is a model that reflects a project's component parts and their relationships.

Once a project is underway, of course, the project manager may discover that a task cannot be completed on time or that needed materials are unavailable. For example, a contractor may discover that the price of shingles is 30 percent higher than it was originally expected to be or that electricians are only available after a certain date. How will these changes affect the rest of the project? Will the project be completed on time and come in under budget? Project monitoring takes into account unexpected changes; in effect, project monitoring is "real-time" planning—you alter the project in progress and observe the resulting changes in the plan.

The distinction between project tracking and project monitoring is subtle; project monitoring is forward-looking in nature, while project tracking is historical. Data from completed parts of a project is compared with earlier projections. This information—on duration of tasks, resources expended, and costs incurred—is not only used for accounting and billing but can indicate how efficiently a project is proceeding. If, for example, certain jobs take too long or expenditures for raw materials are way over budget, project tracking can indicate deficiencies in your method of monitoring the project and help you improve monitoring before further cost overruns occur. Since most companies work on many projects of a similar type, project-tracking data from one project can lead to improved planning on others.

The PC Project Manager

Like accountants before them, project managers are leaving the pad and pencil behind for the speed and convenience of the PC. Once confined to university business classes or defense contracting using mainframe computers, computerized project management techniques are gaining acceptance, and manual systems are being replaced by PCs and other personal computers. "What if"

programs such as *VisiCalc* and *1-2-3* have made the PC an acceptable management tool—and have cleared the way for more sophisticated project management software.

These packages, often using established Gantt and CPM (critical path method) techniques, offer a sophisticated level of project management. (The Gantt method represents a project as a series of tasks plotted out on a time line. CPM deals not only with tasks but with their associated resources; a CPM network diagram plots tasks and indicates their interrelationships.) During the planning of a project, the relationships between tasks and the resources they consume can be explored painlessly; schemes can be developed to meet project deadlines at the lowest cost. Most programs generate reports and charts that provide a readily understandable picture of a project's status and graphically illustrate how changes at one stage in a plan reverberate throughout the rest of a project (see Figure 1).

Since projects vary, keep your needs firmly in mind; use the package that best fits the nature of the project and most closely matches the planning techniques you use. None of the packages mentioned in this article utilizes every project management technique; most lack comprehensive project tracking. But the following overview of relevant project management features can help you determine which features are most important to you and, thus, which package to choose. (For an example of how a project management system works, see "Putting a Project Management System to Work.")

Project-Planning Features

Planning is probably the most essential part of project management. A project management package must therefore be strong in this area if it is to be of any real use. Some packages immediately display revisions; with others you must wait for reports to be printed out. Planning features vary significantly from package to package, but those that do a better job in helping you plan a project are typically not well equipped to gather and report actual performance against the plan. You should consider the following features when choosing project management software.

Project calendar. Time is a fundamental element of any project. Project management packages use calendars to monitor time devoted to the tasks that make up a project. Standard time units include hours, days, weeks, months, and years. Some packages, such as Scitor's *Project Scheduler*, use a day as the smallest time unit; others, such as *Milestone*, use an hour. Advanced packages take into account weekends, holidays, other non-workdays (such as company picnics), and extended workweeks (such as eight days on, four days off). Some feature different calendars for different "resources" since, for example, accountants may work from 8 a.m. to 5 p.m. Monday through Friday, while programmers work from 1 p.m. to 9 p.m. Wednesday through Sunday.

Task definition. In the world of project management, a task is an activity or event that can be defined by the way it consumes time. A "billable" task is one that needs a set number of hours of service from various resources in order to be completed. Packages such as *VisiSchedule* and *Project Scheduler* can assume that resources are scarce and that the duration of a task depends on the resources assigned to it. For example, the task Prepare Book Manuscript for Printing takes five days to complete when two graphics artists and two pasteup artists are assigned to it and ten days when the work force is halved.

Since projects vary, use the package that best fits the nature of the project and your planning techniques.

Another method, used by *Plantrax*, assumes that resources are available and requires the project planner to specify a limited time for the task.

A "calendar" task has a fixed duration and does not necessarily have resources assigned to it. The task Wait for Proposals to Be Returned by Vendors takes ten days and requires nothing of a project except time. A "milestone" is a signpost—Proposal Done, Project Complete—a type of task that does not require resources or time to be completed. Almost all project management packages include some form of milestones and calendar tasks.

The more complex a project is, the more involved the project plan will be. In fact, a project plan may contain subordinate plans, which are referred to as "second-level" or "composite" tasks. For example, suppose a company wants to install a large computerized accounting system that handles general ledger, accounts receivable, accounts payable, payroll, and inventory functions. If the company has many branches and the accounting system is large, it may make sense to create an individual plan for implementing each function. The overall project may thus specify only which one goes first.

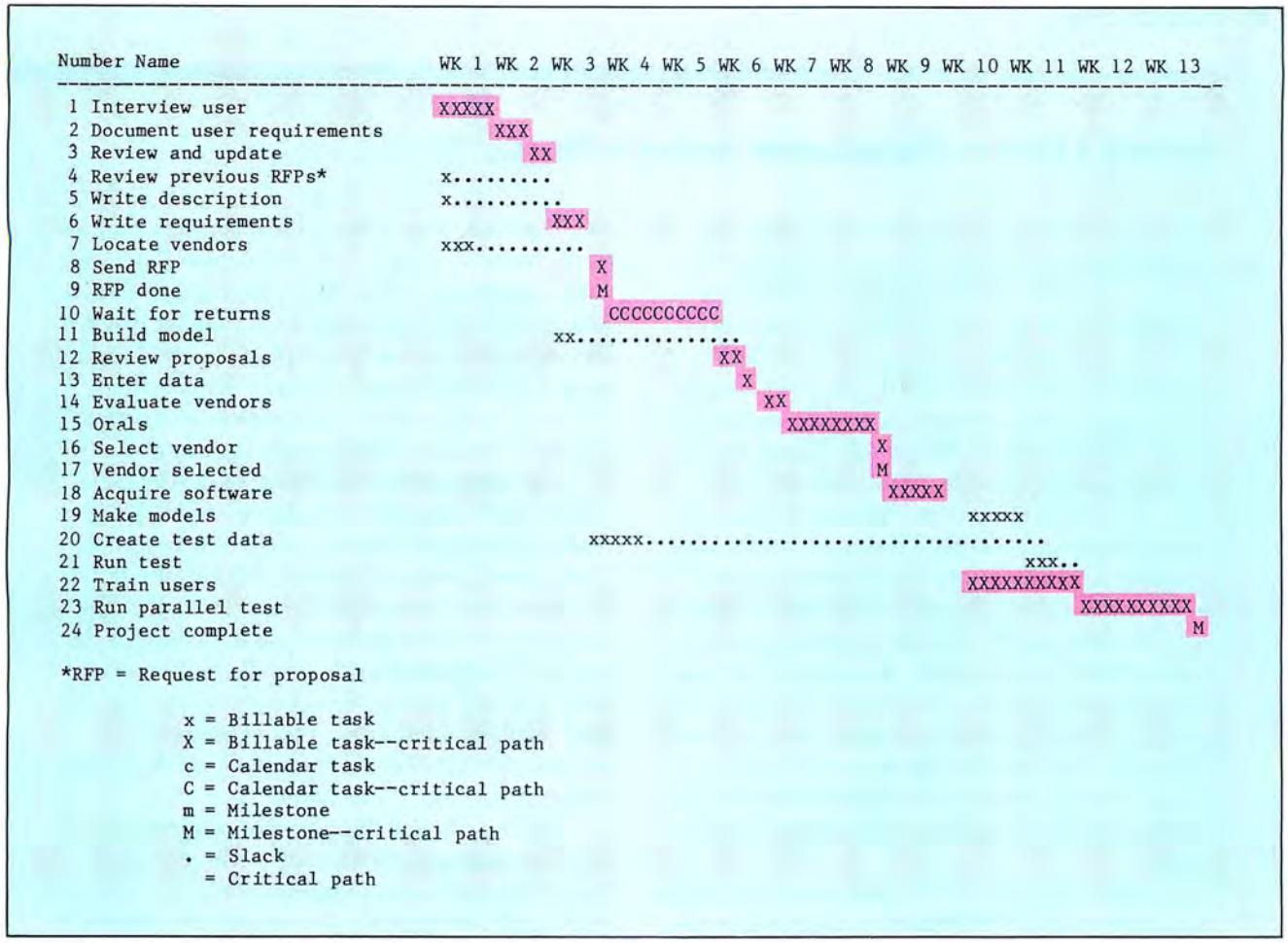


Figure 1: A project time line for selecting a computerized payroll system

Task sequence. Tasks may be scheduled to start on a certain date or may be triggered by other tasks. For example, the task Repair the Roof is dependent upon the completion of the task Receive Shipment of Shingles; the latter is called a "prerequisite" task. Some project management packages such as *MicroGANTT* have tasks that are limited to one prerequisite; *VisiSchedule* and *Milestone* allow as many as nine.

A less common but often useful feature (one that is found in *MicroGANTT*) allows a partially completed task to be a prerequisite. For example, it is standard practice in software development companies to test sections of an incomplete program. Thus the task Run System Test could start when 30 percent of the task Create Test Data is completed. *Primavera* and *Pertmaster* allow one partially completed task to act as a prerequisite for several tasks.

Resource definition. Most PC project management packages limit the number of resource categories available to a single project, though they differ in the way they allocate resources to a task. Some allow one task to have a number of different resources (such as one programmer and two analysts) allocated to it; others, such as *VisiSchedule*, let multiples of a resource (such as several analysts) be tied to one task. A program such as *RMS-II* can even deal with fractions of a resource; a job may require four people, two working full-time but two working only half-time.

What happens if two jobs are scheduled to start at the same time, both need two analysts, and only two analysts are available? By using "resource leveling," an advanced feature in *RMS-II* and *Primavera*, you can adjust the project schedule to allow enough time for the completion of both tasks.

Cost definition. Anyone who fights interdepartmental budget battles is familiar with the concepts of fixed and variable costs. With the former, a seldom-changing expense such as rent is divided equally among all departments; with the latter, a cost like phone expense, which is dependent on variable factors, is allocated according to each department's use. Cost accounting gathers this information and justifies the costs charged to each department. A similar process occurs when you design and monitor a project.

Putting a Project Management System to Work

Now you can use software to find software. Say you have been given the task of selecting and installing a new PC-based payroll system for your company. You have a project team, but as is often the case, each member of the team has other responsibilities. You must plan the project to make the best use of their limited time while ensuring the quickest installation of the payroll system. A project of this nature provides ample opportunity to utilize project management software in planning and monitoring the work. The results would likely resemble the project time line, task list, and resource list found respectively in Figures 1, 2, and 3.

The first step in creating the plan is identifying project resources—analysts, accountants, programmers, and so on. Next, probably with paper and a pencil, you must establish a simple list of the tasks necessary to accomplish the project. Then you should identify important midproject milestones—interim goals that signify actual progress is being made.

Armed with this list of tasks, you can begin to assign the necessary resources to each task, identifying what resources a task needs and for how long it needs them. You can also note the prerequisite relationships for each task. Project data can then be entered, reviewed for accuracy and reasonableness, and modified accordingly. A project time line like the one in Figure 1 can be printed out and given to the project team and others affected by the project.

If nothing else, a project management package forces you to develop a plan. Less obvious, but certainly important, is that such a package provides a structure for your planning. Each package dictates certain restrictions on how a plan is created and reported. This helps impose a style on the entire project team and enforces a common approach to planning a project—and reduces confusion.

The most obvious advantage of developing a plan is that by doing so you identify tasks that lie on the critical path. Further, you know how much "slack time" you have before a noncritical task becomes critical. You will really appreciate the package when your boss walks in and tells you that the new payroll system must be installed in 11 weeks. Then you will discover that you are in a position to freely explore alternatives—using additional resources, cutting short certain tasks—to determine how you can meet the deadline.

Finally, you will discover that continued use of a project management package—with the appropriate reflection upon completed projects—will immeasurably strengthen your project management skills. You may even get the payroll system done on time.

Pro rata project costs attributed to a task are based on that task's resource use. Most project management packages permit each resource to have its own charge rate; some also accommodate rate changes during a project and special rate escalations, such as overtime. *MicroGANTT*, for example, incorporates an inflation factor into long-term projects. *Primavera* will also accommodate overtime costs.

Few packages break down fixed costs into categories. For example, you cannot assign separate fixed costs to rent and power usage—they must be lumped together. Only a few packages, such as *Primavera* and *Project Scheduler*, will divide fixed costs into categories. Most packages allow both resource costs and fixed costs to be associated with a task.

Charts and reports. In project management a picture is worth a thousand spreadsheets. Most packages create on-screen graphics and enable you to print charts and reports. Because of the size and resolution limits of most monitors, graphs and reports representing the bulk of a project are usually printed out, while the monitor is used to display smaller sections of a project.

The task calendar is probably the most common method of showing project data graphically. It generally takes the form of a Gantt or network diagram. A Gantt

Figure 2: A network diagram. Task C lies on the critical path; tasks A and B are prerequisite tasks to C.

chart (see Figure 1) is essentially a time line that lists tasks on a page in the order of their start dates and shows a project's "critical path"—that is, the most efficient possible time path for tasks that must be performed to complete a project. A network diagram (see Figure 2) shows not only the sequence of tasks that make up a critical path but also the associated prerequisite tasks and milestones. Thus a network diagram is apt to give you a better overall picture of a project. The *Harvard Project Manager* is one program that produces these diagrams.

Another common option lists tasks in order of "late start" times (the latest time that tasks can begin without holding up a project), "early start" times (the earliest time that tasks can begin), or "late finish" times (the latest time that tasks can be finished without delaying a project). Some packages, such as *Primavera,* even let you plan in a smaller time unit, such as hours, but report in days or weeks.

A number of other handy reports are featured in project management software. *Pertmaster,* for example, produces task listings that present all the information associated with a task, including prerequisite tasks, pertinent dates, resource assignments, and associated costs (see Figure 3). *Plantrax* includes reports that list total resource requirements by time period—an invaluable aid for anyone who needs to requisition and allocate resources for a project (see Figure 4). *RMS-II* and *Plantrax* also feature cost reports that show projected, accumulated, and fixed costs for a project, broken down by resource, task, cost component (fixed or variable), and time period.

Project-Monitoring Features

During the course of almost any project, it is necessary to modify basic project information to reflect current project status. Altering a project plan is no simple task, but a successful project management package should make this process as painless and uncomplicated as possible. Features to consider:

Updating project information. We are reminded of Blair's well-known extension of Murphy's Law—the best-laid plans of mice and men are often equal. Accordingly, tasks are usually the first things to be changed in a project. Most packages permit tasks to be inserted into or deleted from a plan, and a few will automatically adjust prerequisites, but some manual adjustments are needed to complete a revision. *Milestone, VisiSchedule,* and *Project Scheduler* automate some project adjustment features.

But what happens if a resource changes? A worker may be promoted, or a project manager may belatedly discover that the services of an attorney are needed.

> A network diagram gives you a better overall picture of a project.

Often a resource may change the rates it charges for a task. These changes must be reflected in the project plan. Some packages will redefine resource categories or create new ones after a project has already started.

A project calendar may also need to be revised, and this is provided for in most packages. Less common, but certainly useful, is the ability to revise a calendar's basic time unit. For example, a project's scope may change so radically that planning in hours is cumbersome. Being able to switch to a larger unit—days or weeks—can make project planning and revising more efficient. *MicroGANTT* is one package that is flexible in this regard.

Number Name	Description	Prerequisites	Resources	Duration (Days)
1 Interview user	Interview user to find out system requirements	NONE	2 Accountants 2 Analysts	5
2 Document user requirements	Create user requirements documentation	1	2 Analysts	3
3 Review and update	Review requirements with user and update the documentation	2	2 Analysts 2 Users 1 Manager	2
4 Review previous RFPs*	Review previous RFPs	NONE	2 Analysts	1
5 Write description	Write company and operations descriptions for RFP	4	1 Analyst	1
6 Write requirements	Develop requirements checklist	3, 5	2 Analysts	3
7 Locate vendors	Locate and contact possible vendors	NONE	1 Clerical	3
8 Send RFP	Mail RFPs to vendors	6, 7	1 Clerical	1
9 RFP done	Milestone — RFP done	8	NONE	0
10 Wait for returns	Wait for proposals to be returned from vendors	9	NONE	10
11 Build model	Build a 1-2-3 model to evaluate vendors	6	1 Programmer	2
12 Review proposals	Review proposals, verify with vendors	10	2 Analysts 1 Clerical	2
13 Enter data	Enter proposal data to the computer model	11, 12	1 Clerical	1

*RFP = Request for proposal

(continues)

Figure 3: A project task list for selecting a computerized payroll system. The task list augments the time line and indicates prerequisite tasks.

Number Name	Description	Prerequisites	Resources	Duration (Days)
14 Evaluate vendors	Evaluate the vendors, choose finalists	13	2 Users 2 Analysts 1 Manager	2
15 Orals	Listen to vendor oral presentations	14	2 Users 2 Analysts 1 Manager	8
16 Select vendor	Select final vendor	15	2 Users 2 Analysts 1 Manager	1
17 Vendor selected	Milestone — vendor selected	16	NONE	0
18 Acquire software	Acquire the vendor's software	17	1 Manager	5
19 Make model	Make software model	18	1 Vendor rep 1 Programmer	5
20 Create test data	Create test data	6	1 Programmer 1 Clerical	5
21 Run test	Run system test	19, 20	1 Analyst 1 Programmer 1 Clerical	3
22 Train users	Train users on new system	17	2 Vendor reps 4 Users 1 Manager 1 Analyst	10
23 Run parallel test	Run parallel test	21, 22	1 Programmer 4 Users 1 Manager	10
24 Project complete	Milestone — project complete	23	1 Analyst	0

Project Management Software for the PC

The following is a list of the project management software discussed in this article. See "Task Force" in this issue for a review of three of these packages. Check future issues of *PC World* for reviews of other project management software.

Harvard Project Manager
Harvard Software Inc.
Software Park
Harvard, MA 01451
617/456-3400
List price: $395
Requirements: 128K, two disk drives

MicroGANTT
Earth Data Corporation
P.O. Box 13168
Richmond, VA 23225
804/231-0300
List price: $395
Requirements: 128K, two disk drives

Milestone
Digital Marketing Corporation
2363 Boulevard Circle #8
Walnut Creek, CA 94595
800/826-2222, 415/947-1000
List price: $295
Requirements: 128K, two disk drives, DOS 1.10 or later version

Pertmaster
Westminster Software, Inc.
3000 Sand Hill Rd., Bldg. 4, #245
Menlo Park, CA 94025
415/854-1400
List price: 1500-task version $695, 2500-task version $895
Requirements: 128K, two disk drives

Plantrax
Omicron Software
57 Executive Park South NE
Atlanta, GA 30329
404/325-0124
List price: $325
Requirements: 256K, two disk drives, color graphics board

PMS-II
North America Mica, Inc.
11772 Sorrento Valley Rd.
San Diego, CA 92121
619/481-6998
List price: $1295
Requirements: 128K, two disk drives or 1MB of hard disk storage, DOS 2.00 or 2.10

Primavera Project Planner
Primavera Systems, Inc.
29 Bala Ave.
Bala Cynwyd, PA 19004
215/667-8600
List price: $2500
Requirements: 512K, DOS 2.00 or 2.10, 10MB hard disk drive

Project Scheduler
Scitor Corporation
256 Gibralter Dr., Bldg. 7
Sunnyvale, CA 94089
408/730-0400
List price: $285
Requirements: 160K, two disk drives

RMS-II
North America Mica, Inc.
11772 Sorrento Valley Rd.
San Diego, CA 92121
619/481-6998
List price: $995
Requirements: PC XT, 128K, DOS 2.00

VisiSchedule
VisiCorp
2895 Zanker Rd.
San Jose, CA 95134
408/946-9000
List price: $300
Requirements: 128K, two disk drives

Updating task information. Information associated with tasks—duration, start and end dates, and resource requirements—can be updated by most packages. This is particularly useful when you discover that a task, such as Create User Documentation, needs not only the inevitable systems analyst but a word processor as well.

Project Tracking

As we noted earlier, project tracking means collecting historical data about a project and using it for current needs (billing and revising project monitoring) and for shaping future projects. Unfortunately, few PC project management packages offer much in the way of project tracking. *Primavera* is one package that includes a full complement of tracking features—for $2500. This is not surprising considering how new to the market this type of software is. Similarly, anyone buying accounting software a few years ago would have encountered an abundance of general ledger/accounts receivable/accounts payable packages, but only a few that included a job cost function.

Few PC project management packages offer much in the way of project tracking.

Once project tracking becomes a part of project management software, look for these features:

Resource use. As a resource is expended (materials are consumed, a consultant's time is used up), information about its use should be gathered by task and by the smallest time unit the program allows. This permits you to determine how much a resource is costing a task.

Fixed costs. In spite of the name, fixed costs do change. For example, a project plan may specify the rent associated with a task as $400 a month; when the task actually starts, the rent may have been raised to $450 a month. As fixed costs are incurred in a project, they should be recorded by the smallest unit possible—probably by dollars expended per task per time period. Differences between projected costs and actual costs can then be used to produce variance reports.

Charts and reports. Project tracking information comes in the form of historical and variance reports. Historical reports list the use of resources and associated costs by task and time period. A fixed cost report con-

Record Resource #	Description	Cost of Resource/Day
1	Vendor rep	$500
2	Manager	$200
3	Analyst	$135
4	Programmer	$125
5	Accountant	$100
6	User	$ 75
7	Clerical	$ 60

Figure 4: Project resource list for payroll system project

taining similar information should be available, along with a summary report showing both resource costs and fixed costs. Both *Plantrax* and *RMS-II* provide some of this historical information.

Variance reports compare historical and project monitoring data relating to tasks, resources, and costs. Thus you can quickly see how well a project matches its plan. Current packages present what little tracking information they gather in numerical reports; future packages should be able to produce graphics on screen or in printed reports easily.

Choosing a Package

Like all software, project management packages have certain hardware requirements and restrictions that must be considered. Some are choosy about the kind of monitors, printers, and graphics boards they work with. Some programs, such as *PMS-II* and *RMS-II*, require hard disk storage.

Though project management software is maturing, no single package will be appropriate for every project. With this in mind, look for packages that can export project data or create .DIF files that can be used by other management software, such as *1-2-3* and *dBASE II*. A spreadsheet like *1-2-3* not only can graph project data but with its macro capability can also be used for project tracking. A data base management system is also useful for creating custom reports—something that most project management packages are incapable of. Both *PMS-II* and *Project Scheduler* can pass project data with little difficulty.

In spite of certain deficiencies, project management software is becoming increasingly sophisticated, and this bodes well for anyone trying to wrest control of small or large projects. Most packages have similar features; how these features are implemented determines a package's effectiveness. Remember, too, that a package's features should match not only the project but the project manager's style as well.

Bill Dauphinais is a CDP and the partner in charge of management advisory services at the Sacramento, California, office of Price Waterhouse. Leonard Darnell is a CPA and a manager at the Los Angeles office of Price Waterhouse.

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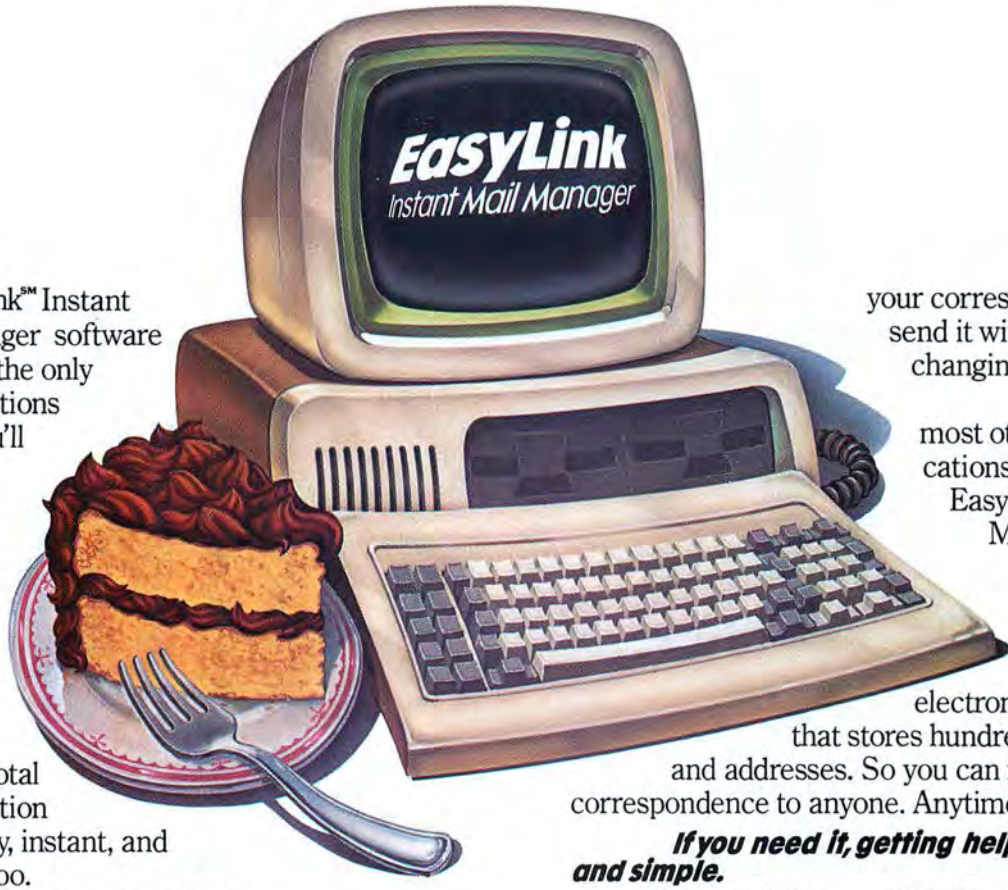

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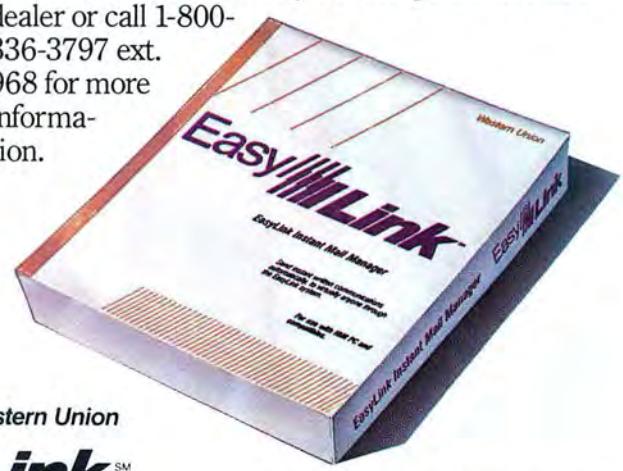

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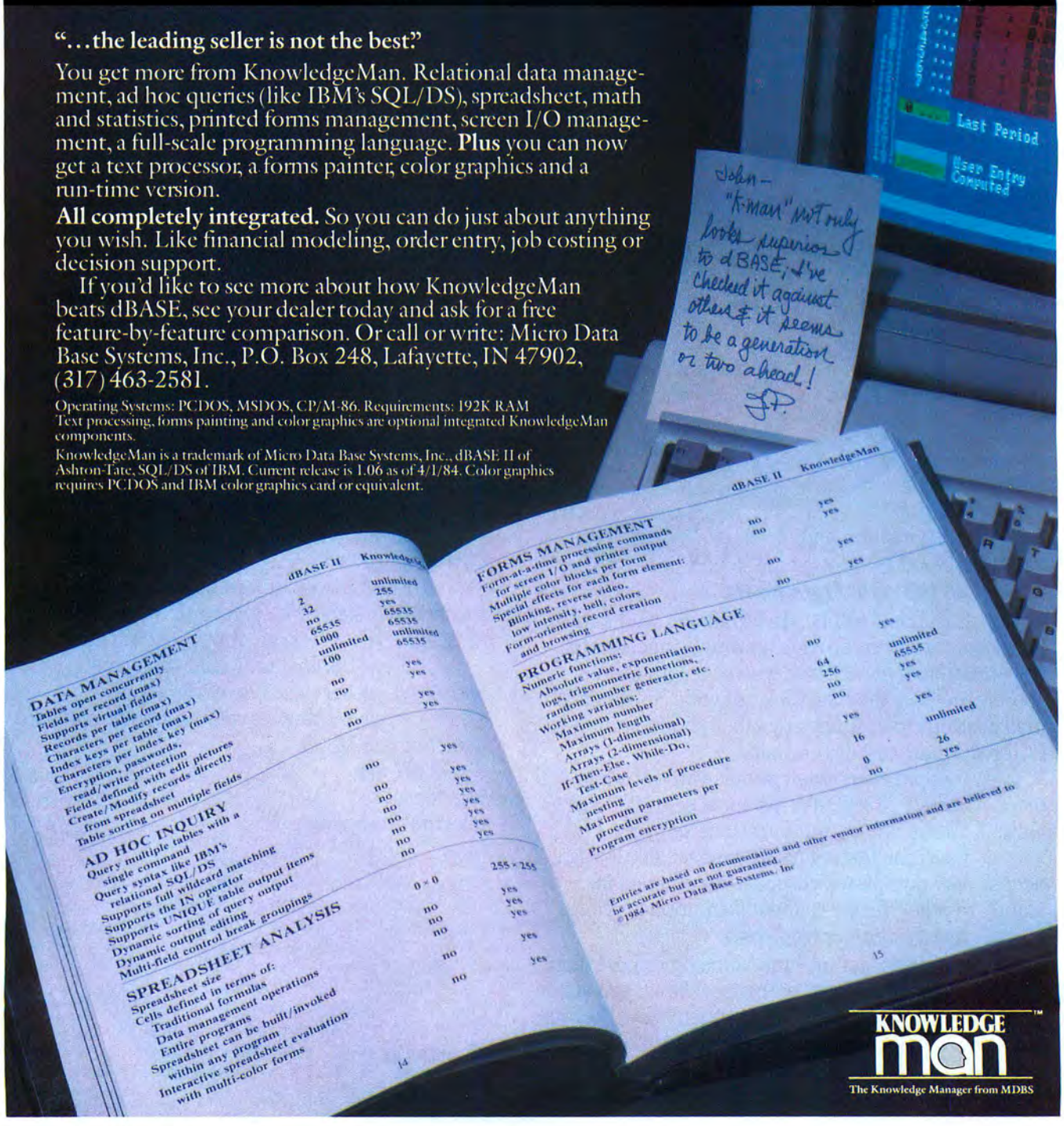

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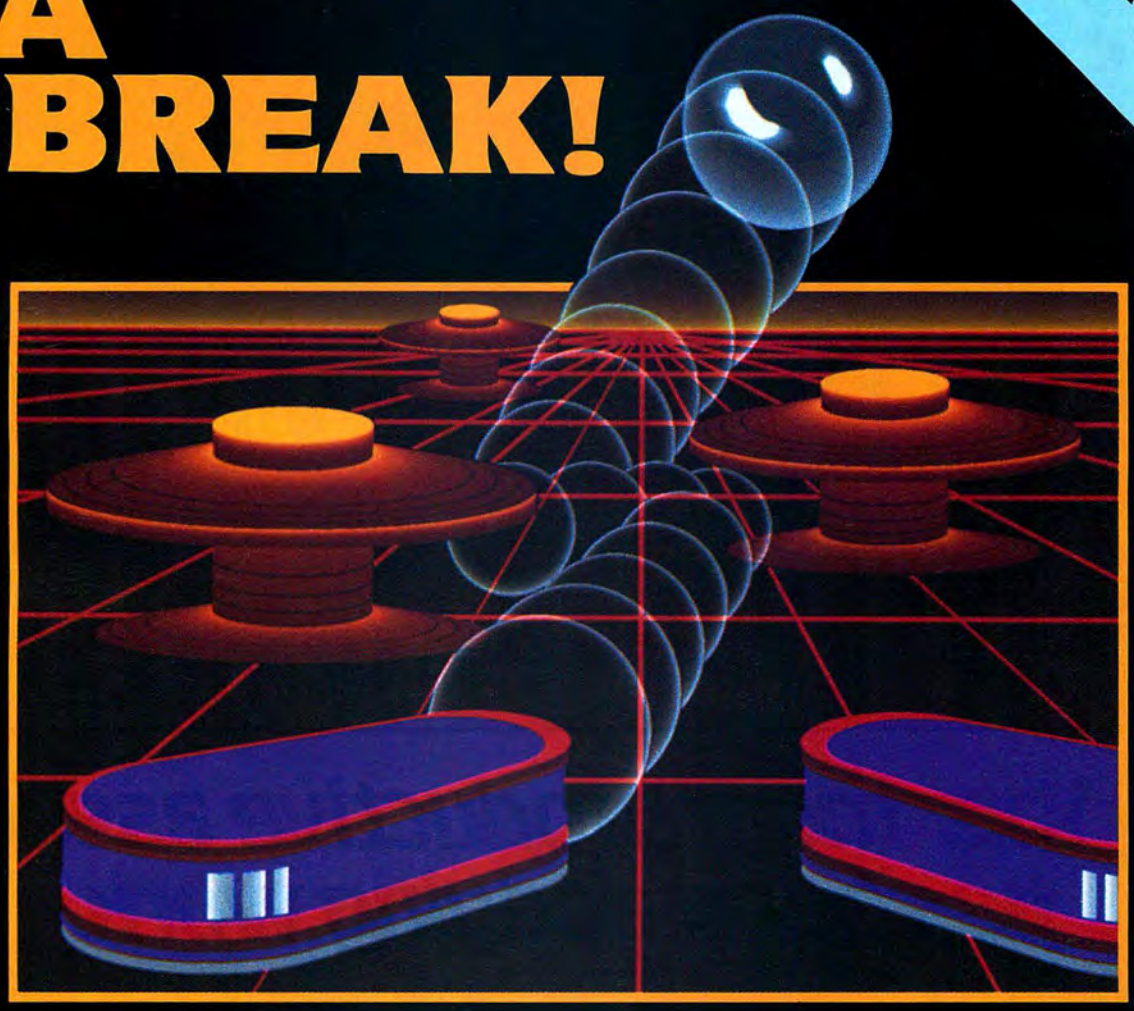

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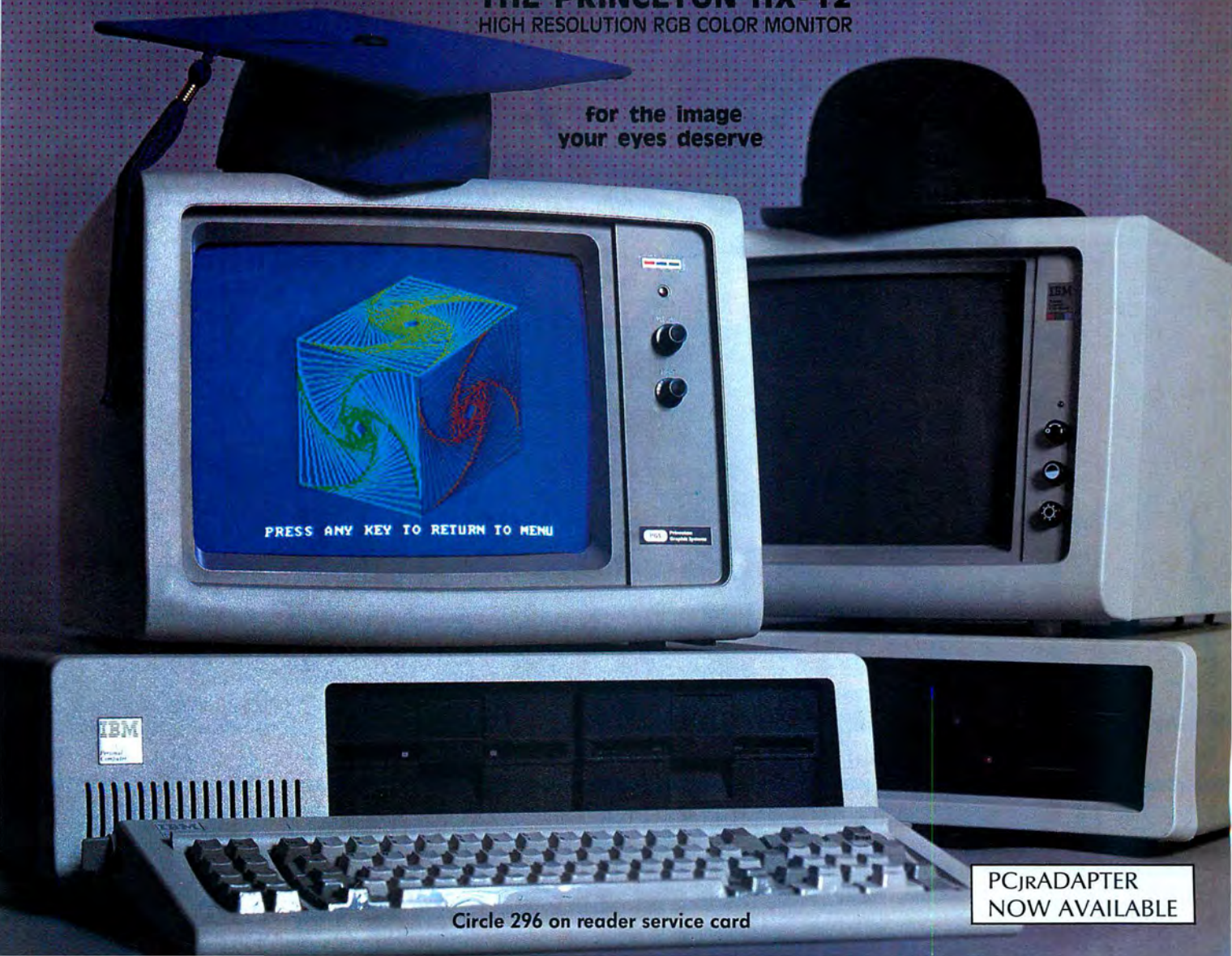

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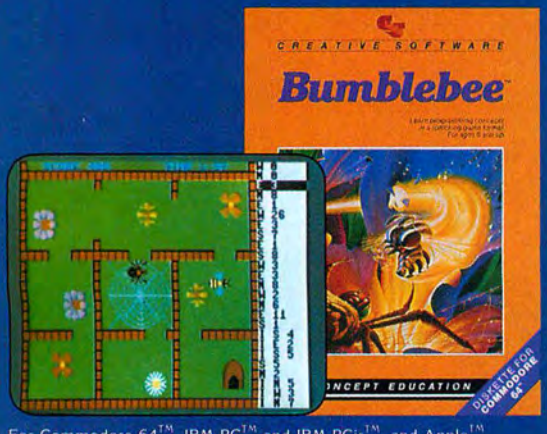

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Linking Worksheets With Multiplan

Multiplan outshines its competition in the ability to link worksheets that can be updated automatically.

Andrew T. Williams

As its name suggests, a major feature of *Multiplan* is that it can link up to eight worksheets into one multiple plan. To use this feature, you name a group of cells on one worksheet and then use that name to link that information to another worksheet. Once the link is established, the dependent worksheet (the one receiving information) is automatically updated each time it is loaded into memory.

The linking function is ideal for consolidating information from several sources, as, for example, when several supporting worksheets are consolidated into a summary report. *Multiplan* makes it easy to create quarterly summaries based on monthly data or divisional reports that draw on regional subtotals.

The linking feature can also be used to create complicated models in which each section of the model is stored on a separate worksheet. This is helpful for people who find it easier to work with relatively small parts of a larger model. Using the linking technique in this way speeds up recalculation time, since only the part of the model you are working with at a particular time is recalculated with each change.

A Rat's Nest of Interdependencies

Some problems can arise when you use "what if" analyses with linked worksheets, because changing the numbers on one worksheet may ne-

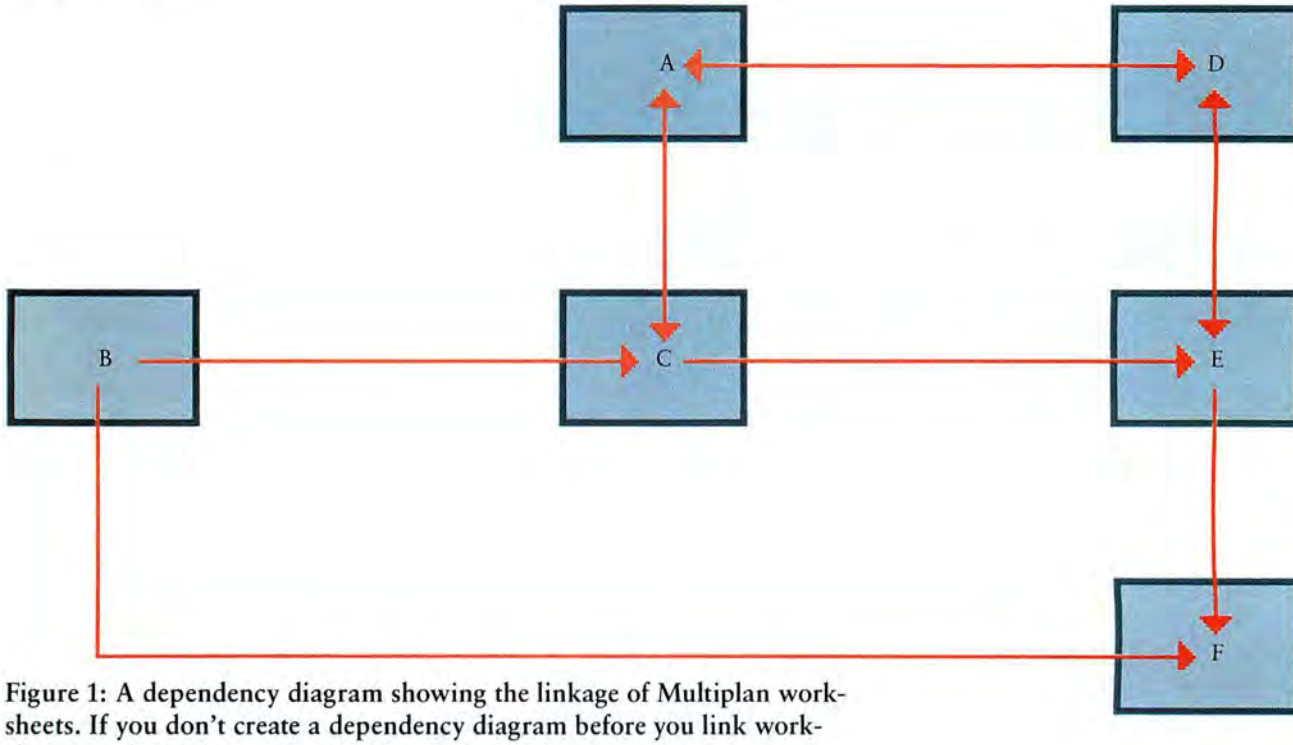

Figure 1: A dependency diagram showing the linkage of Multiplan worksheets. If you don't create a dependency diagram before you link worksheets, updating becomes confusing and errors can occur.

cessitate loading several worksheets before the effect of the change can be observed. The time required to load and store the worksheets can be frustratingly long.

Linking worksheets also presents the problem of how to keep the relationships between worksheets straight. *Multiplan* doesn't give you any information about the links until you load a worksheet. Given that you can link up to eight worksheets, you run the risk of creating a rat's nest of interdependencies. A dependent worksheet is updated with information from a supporting worksheet only when the dependent worksheet is loaded. However, the information in the supporting worksheet may be wrong because it may depend on a third worksheet that has not yet been updated.

Therefore, to update a set of linked worksheets correctly, you must load each worksheet in the correct order, beginning with a worksheet that depends on no other worksheet and then working your way through the dependencies. A complicated model should be accompanied by a dependency diagram like the one shown in Figure 1. You should draw this diagram as you create a model; unraveling the interrelationships after the model has been created can be difficult.

To update the set of worksheets diagramed in Figure 1, you would begin by making changes on sheets A and B (the ones that don't depend on any other worksheets). Then you would load worksheets C and D, which depend on A and B. When loaded, C and D would be updated with information from A and B. After worksheets C and D had been updated, you would load E (which depends on C and D) and finally F. If you loaded the worksheets in any other order, the information could be in error.

A Linking Session

The technique of linking worksheets will become clear as you work your way through an example. Before you start, consider an overview of the linking process. The first step is to build the dependent and supporting worksheets. Then you name the cells or groups of cells on the supporting worksheet that contain values you want to copy. When you're done, the supporting worksheet must be stored and the dependent worksheet loaded. Finally, the eXternal Copy command is used to copy the desired cells from the supporting worksheet to the dependent worksheet. This establishes a permanent link between the two worksheets.

As you go through this process, write down the file name of each worksheet and the exact spelling of each range name that you assign to the cells or groups of cells you want to copy from the supporting worksheets. *Multiplan* provides no way to obtain this information short of reloading the worksheets.

Tables 1 and 2 show a dependent and a supporting worksheet. The name assigned to the supporting worksheet is SPENCOST because that worksheet contains information about costs for Spencer Ceramics Inc. The dependent worksheet is a profit statement named SPENCER.

You must blank the cells into which the information will be transferred.

These worksheets can be found on the tutorial disk of the IBM version of *Multiplan*. The Microsoft version has no tutorial disk, but Microsoft's documentation gives instructions for constructing the worksheets.

The first step in establishing a link between these two worksheets is to name the groups of cells to be transferred from the supporting worksheet to the dependent worksheet. To do this, use the Transfer Load command to load the SPENCOST worksheet. Once the SPENCOST worksheet has been loaded, use *Multiplan*'s Name command to assign the name Material_Costs to the group of cells R9C2:13 and the name Overhead_Costs to the group of cells R17C2:13. The cell-naming convention of *Multiplan* outlaws the use of blanks, so underlines are used in place of blanks. When you have finished assigning the names and have written them down for future reference, use the Transfer Save command to save SPENCOST. Now load the SPENCER worksheet with the Transfer Load command.

Before you can establish a link between SPENCOST and SPENCER, you must blank the cells into which the information from the SPENCOST

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Hands On

worksheet will be transferred. *Multiplan* will not allow you to transfer data into cells that already contain entries. The only exception is if the entries in the cells have been entered there via a previous transfer operation.

After you have blanked the appropriate cells in rows 6 and 8 of SPENCER, move the worksheet cursor to cell R6C2. This is the first cell of the group of cells into which you want to transfer the data named Material_Costs on the SPENCOST worksheet. Type XC (the eXternal Copy command). The command area will look like Figure 2.

This command has three fields. The first, where the edit line cursor is currently located, is labeled 'from sheet'. The prompt line tells you to 'Enter filename'. Do this by typing SPENCOST. Now move the edit line cursor to the next field, labeled 'name'. The command area will look like Figure 3.

Give the same name to row 6 on SPENCER that you used for the group of cells you want to have copied from SPENCOST. Type Material_Costs, the name you assigned to the line labeled Total Material Costs on the SPENCOST worksheet. The command area should look like Figure 4.

Now examine *Multiplan*'s proposed responses in the last two fields, 'to' and 'linked'. You want the copied material to begin in cell R6C2, the current active cell, so the proposed response for 'to' is correct. If you wanted the copied information to go somewhere other than the proposed response, you could use the cursor-movement keys to point to the correct position or you could type in the correct cell address.

Look at the 'linked' field; *Multiplan*'s proposed response (the item enclosed in parentheses) is 'Yes'. Since you want to establish a permanent

	1	2	3	4	5	6
1		January	February	March	April	May
2						
3	Sales	$20000.00	$20200.00	$20402.00	$20606.02	$20812.08
4						
5	Cost					
6	Material					
7	Labor	$7000.00	$7000.00	$7000.00	$7000.00	$7000.00
8	Overhead					
9						
10	Total Costs	$7000.00	$7000.00	$7000.00	$7000.00	$7000.00
11						
12						
13						
14						
15	Gross Profits	$13000.00	$13200.00	$13402.00	$13606.02	$13812.08
16						
17						
18						
19						
20						

Source: Multiplan Electronic Worksheet by Microsoft, 1982

	1	2	3	4	5
1		January	February	March	April
2	MATERIAL				
3	Clay	$2500.00	$2520.00	$2540.16	$2560.48
4	Glaze	$1500.00	$1512.00	$1524.10	$1536.29
5	Brushes	$500.00	$504.00	$508.03	$512.10
6	Sponges	$200.00	$201.60	$203.21	$204.84
7	Plaster	$300.00	$302.40	$304.82	$307.26
8					
9	Total Material Costs	$5000.00	$5040.00	$5080.32	$5120.96
10					
11	OVERHEAD				
12	Utilities	$1100.00	$1108.80	$1117.67	$1126.61
13	Rent	$2500.00	$2520.00	$2540.16	$2560.48
14	Telephone	$200.00	$201.60	$203.21	$204.84
15	Water	$200.00	$201.60	$203.21	$204.84
16					
17	Total Overhead Costs	$4000.00	$4032.00	$4064.26	$4096.77
18					
19					
20					

Source: Multiplan Electronic Worksheet by Microsoft, 1982

7 June	8 July	9 August	10 September	11 October	12 November	13 December
$21020.20	$21230.40	$21442.71	$21657.13	$21873.71	$22092.44	$22313.37
$7000.00	$7000.00	$7000.00	$7000.00	$7000.00	$7000.00	$7000.00
$7000.00	$7000.00	$7000.00	$7000.00	$7000.00	$7000.00	$7000.00
$14020.20	$14230.40	$14442.71	$14657.13	$14873.71	$15092.44	$15313.37

Table 1: SPENCER, a dependent worksheet in Multiplan, ready for linking to the SPENCOST worksheet

6 May	7 June	8 July	9 August	10 September	11 October	12 November	13 December
$2580.97	$2601.61	$2622.43	$2643.41	$2664.55	$2685.87	$2707.36	$2729.01
$1548.58	$1560.97	$1573.46	$1586.04	$1598.73	$1611.52	$1624.41	$1637.41
$516.19	$520.32	$524.49	$528.68	$532.91	$537.17	$541.47	$545.80
$206.48	$208.13	$209.79	$211.47	$213.16	$214.87	$216.59	$218.32
$309.72	$312.19	$314.69	$317.21	$319.75	$322.30	$324.88	$327.48
$5161.93	$5203.23	$5244.85	$5286.81	$5329.10	$5371.74	$5414.71	$5458.03
$1135.62	$1144.71	$1153.87	$1163.10	$1172.40	$1181.78	$1191.24	$1200.77
$2580.97	$2601.61	$2622.43	$2643.41	$2664.55	$2685.87	$2707.36	$2729.01
$206.48	$208.13	$209.79	$211.47	$213.16	$214.87	$216.59	$218.32
$206.48	$208.13	$209.79	$211.47	$213.16	$214.87	$216.59	$218.32
$4129.54	$4162.58	$4195.88	$4229.45	$4263.28	$4297.39	$4331.77	$4366.42

Table 2: SPENCOST, a supporting worksheet in Multiplan. Rows 9 and 17 are linked to SPENCER.

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link between the two worksheets, this proposed response is also correct. If you wanted only to copy the information from SPENCOST to SPENCER and didn't want to establish a permanent link, you could tab over to the linked field and type n (for *no*).

Executing eXternal Copy

Once the copy procedure is properly set up, press <Enter> to execute the eXternal Copy command and to establish the link between SPENCOST and SPENCER. After you do this, *Multiplan* will load the specified information from SPENCOST into SPENCER and recalculate the SPENCER worksheet. At this stage you can name the area on SPENCER that has just received information from SPENCOST. Without moving the cursor, type n (for *name*). The command area will look like Figure 5.

The proposed response for the name of the group of cells receiving information from SPENCOST is the combination of the file name of the supporting worksheet and the name assigned to the linked cells. This default name tells you explicitly where the information comes from and identifies the cells R6C2:13 as dependent. You can choose the default by pressing <Enter>.

To complete this exercise, establish the link between Overhead_Costs on the supporting worksheet and the group of cells R8C2:12, labeled Overhead on the SPENCER worksheet. Once this has been done, the SPENCER worksheet will be updated with information from the SPENCOST worksheet each time the SPENCER worksheet is loaded. Try it out; make a change in SPENCOST and then reload SPENCER. The numbers should change on this dependent worksheet as well.

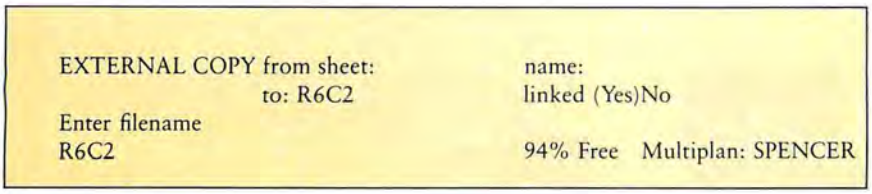

Figure 2: The Multiplan command area after using the eXternal Copy command

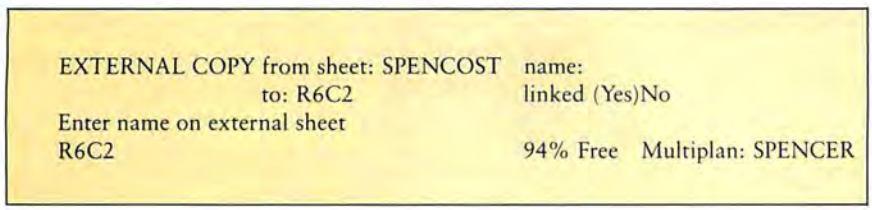

Figure 3: The Multiplan command area after the file name is entered and the cursor is moved to the 'name' field

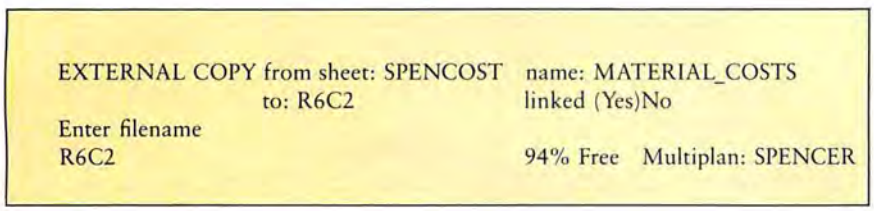

Figure 4: The Multiplan command area after the name Material Costs has been assigned to row 6

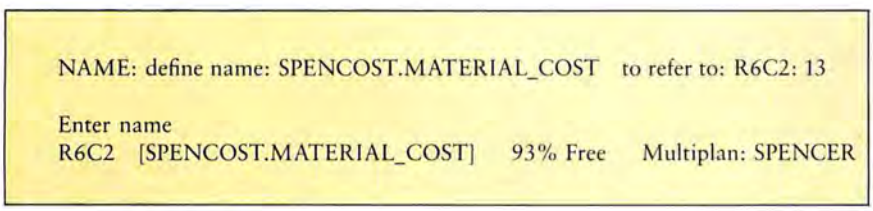

Figure 5: The Multiplan command area after the information has been linked and the linked area on SPENCER has been named

The *Multiplan* eXternal Copy command is easy to use, and you get plenty of help from the proposed responses along the way. Be sure to draw a dependency diagram illustrating how one worksheet depends on another. Write down all the names used in the linking process, including file names and the names assigned to cells and groups of cells.

The eXternal Copy command is only one of several eXternal subcommands. You can also use the eXternal command to list the file names of the worksheets on which the current worksheet depends and the file names of worksheets that depend on the current worksheet. You can use the eXternal Copy command to dissolve links between worksheets and to make one-time copies of named information from one worksheet to another without establishing a permanent link.

Andrew T. Williams is a Contributing Editor for PC World.

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3468	X	X
3903	X	X
4137		X
4136	X	X
4255	X	X
4562	X	X
4684	X	X
4797	X	X
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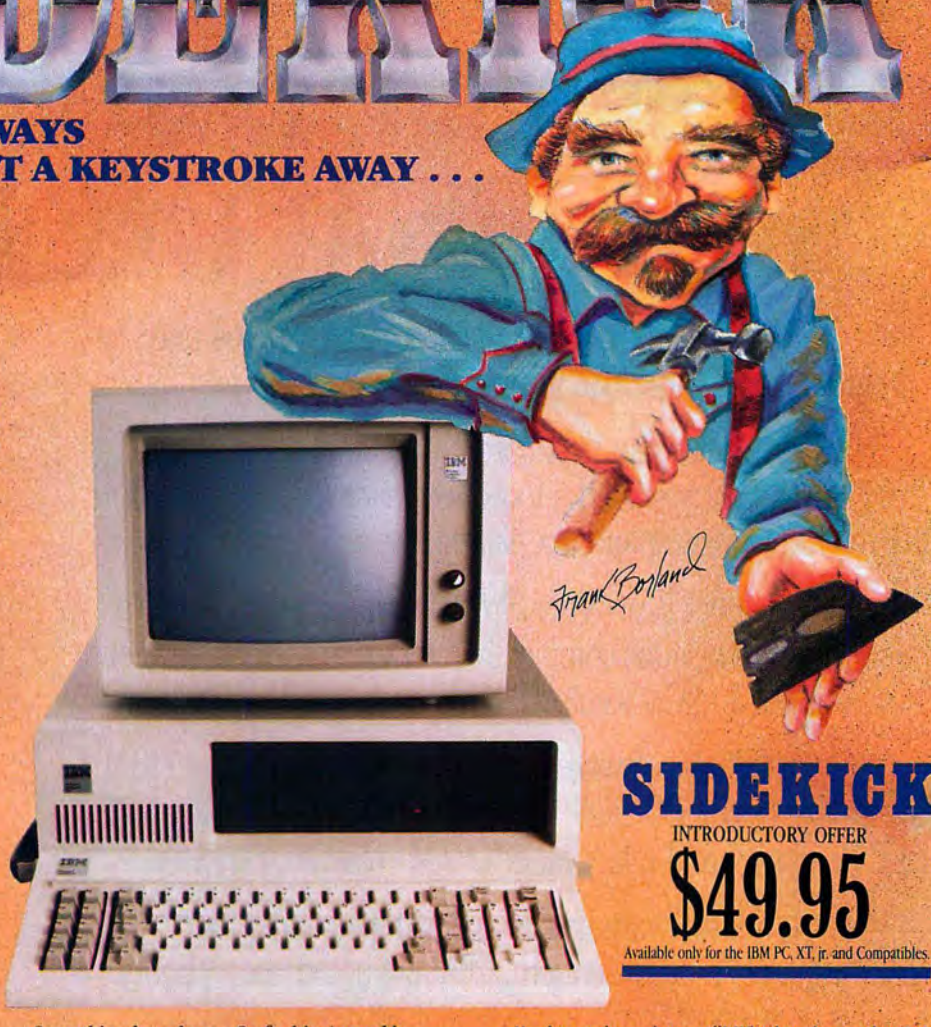

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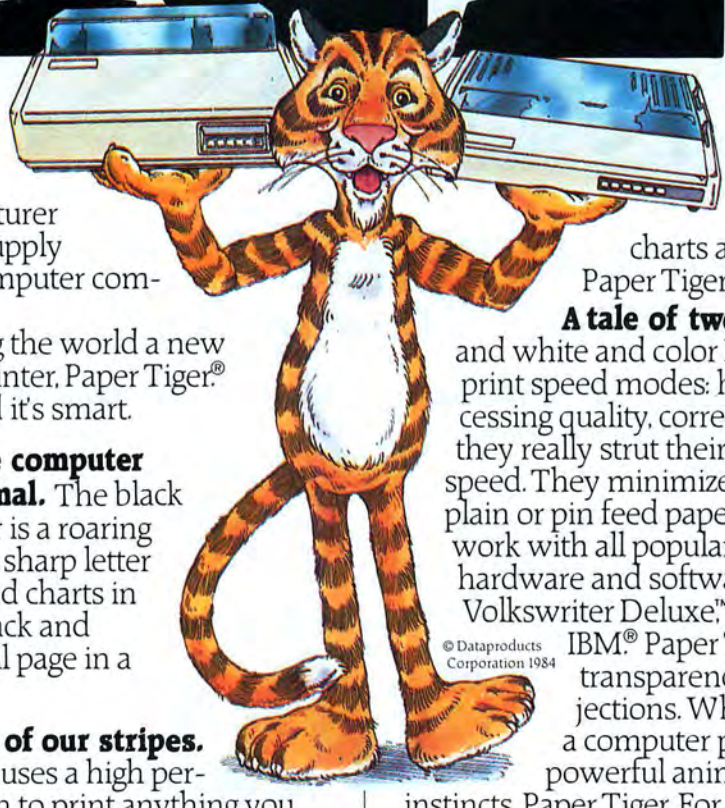

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First-Class MailMerge

If you use the PC and WordStar to create business letters, there's a way to reach more people and still keep the personal touch—with MailMerge.

Bobbie Ray Leach

Most businesses still communicate by letter, whether sent via MCI Mail or the post office. If you're like most PC users, you probably use *WordStar* to write the letters you send to customers, dealers, or potential clients. But what if you want to distribute essentially the same letter to 400 prospective clients? What they receive must look like it came straight from the typewriter. After all, people who may contribute to your prosperity appreciate—and expect—personal treatment. With *WordStar* and a letter quality printer, a letter can look like it sprang whole from a Selectric II.

But creating 400 personal letters is not so easy. You could copy the letter (minus date, name, and address) in a file over and over with *WordStar*'s <Ctrl>-K C command, scroll to each copy of the letter, type in each client's name, company, and address, and eventually print the file. Heaven help you if, in an effort to be even more personal, the letter talks about a client's product; you'll have to insert the appropriate reference into every letter. And if you want to send the same people a different letter later on, this laborious process would have to be repeated.

For *WordStar* users, *MailMerge*—a best-selling but little-used program from MicroPro—can help automate the task of creating and printing a multitude of personalized letters. As its name suggests, *MailMerge* combines files. This article will show you how to deftly meld a mailing list with a form letter to produce personalized letters that can be printed out or stored on disk. To get the most out of the article, a working knowledge of *WordStar* is necessary; you should be able to open a file, create a document, save it, and print it. Familiarity with dot commands is also helpful.

Basic Dot Commands

MailMerge performs its magic with a few files and dot commands. The document file holds the form letter or other document; the data file holds the information to be inserted into the form letter; and a command file brings the two together. Dot commands in the document file direct the process, fetching files and controlling how a document is displayed and printed. Some dot commands are shared by *WordStar* and *MailMerge* (such as .pa, which inserts a page break into a document), while others are specific to one program. A dot command is a period followed by two letters; sometimes the command is followed by a number or text. When a dot command is typed into a document, a character appears on the far right of the screen. A *MailMerge* dot command is identified with an 'M'; an incorrect command is flagged with a question mark.

Many dot commands are available with *MailMerge,* but only a handful are needed in most applications (see "Defining Dot Commands"). A few rules must be followed, of course. Dot commands can be used in any *MailMerge* or *WordStar* document, but they must always be placed at the beginning of a line. In some cases one dot command must come before another. For example, .df identifies the data file to be merged, and .rv discloses to *MailMerge* what fields are in that data file. Logic—and *MailMerge*—dictates that .df precede

> You can deftly meld a mailing list with a form letter to produce personalized letters.

.rv. A few other dot commands, such as .pl, which sets a document's page length, must be put at the beginning of a document.

The Document File

In *WordStar* a document file is created by typing D. The file contains the text of the form letter, the dot commands, and the data fields (such as date, name, and company) that will be filled in when the document file is merged with the data file holding the mailing list. Open a file in *WordStar* and type in the form letter CLIENT .LTR as shown in Figure 1. Note that every data field is bracketed by ampersands.

But what happens if a data field—such as company—is not "filled in" during a merge? By placing /O at the end of the data field, you can suppress the blank space that is left by the empty field and justify the text surrounding the field.

Three dot commands—.df, .rv, and .pa—are required in every document. The first command, .df, identifies the data file, such as CLIENT .DTA in Figure 2, to be merged with the letter; .rv specifies the fields in the data file; and .pa inserts a page break and directs the program to merge the next record in the data file with the form letter. The optional .op command prevents *MailMerge* from printing page numbers on the resulting letters.

The Data File

The data file (see Figure 2) supplies the information—in this case the names, addresses, and other information that make up the mailing list—to be inserted into the data fields in the form letter. Unlike a document file or a command file, the data file is created in *WordStar*'s nondocument mode (the 'N' menu option). The word wrap feature is thus turned off, and a record can be up to 240 characters long. A record is confined to

```
.op
.df client.dta
.rv firstname,lastname,company,street,city,state,zip,item

&date&

&firstname& &lastname&
&company/O&
&street&
&city& &state& &zip&


Dear &firstname&:

I enjoyed our telephone conversation the other day and I think &item& has
real potential. We definitely would like to make a presentation to your firm
about marketing the product.

Please find enclosed our prospectus. I look forward to hearing from you
soon.

Warmest regards,

Alvin "Buzz" Feltzer
Senior Marketing Director

ABF/rl

.pa
```

Figure 1: The form letter CLIENT.LTR as it appears in a MailMerge document file

```
John,Myers,The Fixtures,222 S. Rampart,Wattman,TX,65891,Fix-It-All
Bob,Smith,,1498 Exitor,St. Minna,NJ,07778,The Statue Maker
Elaine,Swisher,,98 Groton,Hickory,SC,01783,Elaine's Paste-Away
```

Figure 2: CLIENT.DTA, a MailMerge data file

```
.cs
.dm Printing the client form letter
.av Date
.fi CLIENT.LTR
```

Listing 1: The command file COMMAND.MRG. This is the file name you give MailMerge in response to the program's 'Request for file to MailMerge' prompt.

one line and must be marked at the end with a carriage return (by pressing <Enter>). Fields in each record must match the type and sequence of the fields in the form letter. Data fields are separated by a comma, and a space cannot lie next to a comma.

If a record is missing information, such as a company name, its counterpart in the document file must be acknowledged in the data file with a comma. For example, as you type in the second record in CLIENT.DTA (see Figure 2), you will notice that 'Smith' is followed by two commas. Even if you do not supply information for a data field, you must type a comma to signal the program to move to the next data field. The two commas following 'Smith' tell the program to move ahead two data fields. If a comma is embedded in a field, the field must be surrounded by quotes. Once a data file is created, it can be used again with other form letters you write.

The Command File

A command file isn't required by *MailMerge,* but it does make the process easier. A command file is created in *WordStar*'s document mode and contains only dot commands. In some ways it resembles a batch file. Type in the command file COMMAND.MRG in Listing 1. When you finally run *MailMerge,* you will see how the dot commands in the file are executed in sequence. In COMMAND.MRG, '.cs' clears the screen, '.dm' displays a message, '.av' prompts the user for the date, while '.fi' calls in document file CLIENT .LTR, which in turn calls the data file for information.

Making the Merge

Now that you have created the document, data, and command files, you can merge full speed ahead. Turn on the printer and select M from the

Defining Dot Commands

Dot commands work like simple programming commands. They can be used to clear the screen, create and display prompts, or format the printed result of merged files. Some commonly used *MailMerge* dot commands are explained here.

.dm. Display message. Text following this command is displayed on the screen. This command is usually placed in a *MailMerge* command file.

.cs. Clear screen. This command removes any previously displayed image (such as a *WordStar* menu), making it easier to read *MailMerge* prompts that follow.

.pa. Process the next record/ insert a page break. This tells *MailMerge* to merge the next record with the document and advance the paper in the printer one page.

.op. Turn off page numbering. When a document is printed out, pages are automatically numbered. The .op command disables this feature when it is unwanted, as when letters are being printed out.

.df. Define data file name. This specifies which data file will be used in a *MailMerge* operation. In this article the data file is CLIENT.DTA.

.rv. Read variable. Specifies what data fields are in the document file. The sequence of these fields (in CLIENT.DTA, for instance, firstname, lastname, company, and so on) must correspond to the sequence of data in the data file (John,Myers,The Fixtures).

.av. Ask for variable. This command is for those data fields, such as date, that change and thus cannot be stored in a data file. The text following the .av command must match the field name in the document file. In COMMAND.MRG the .av command is tied to the date field in the form letter. 'Date?' appears as a prompt when the files are first merged; the user's response is automatically inserted into the date field of every letter printed during the cycle.

.fi. Define file name. This command tells *MailMerge* which document file should be merged with a data file. This dot command is usually placed in a command file; if this command is encountered in a document file, *MailMerge* must insert the specified file into the document before continuing to the next field. The command is useful when you want to create a document by combining other documents.

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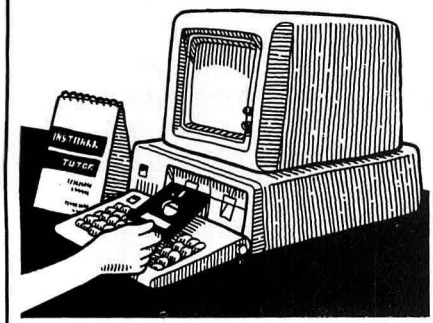

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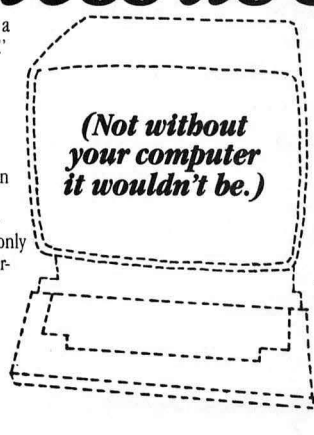

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Hands On

WordStar menu. (Don't forget that the MAILMRGE.OVR file must be on the *WordStar* system disk.) You are asked to name the file to be merged, which in this case is COMMAND.MRG; type in the file name and press <Enter>. The next prompt asks if the merged result should be sent to a disk file. If you answer Y, type in a new file name, and answer *MailMerge*'s few questions; the merged result will be stored on disk. The advantage of merging to a disk file is that you can check your handiwork for errors before you print out hundreds of letters. If you answer N, *MailMerge* presents print options. Once an option is specified, the printer will start churning out letters.

Of course, *MailMerge* does more than create personalized form letters. With a properly crafted command file, *MailMerge* can quickly assemble large documents—such as contracts or updated manuals—that rely on many lengthy, standard clauses. *MailMerge*'s power can even be used to consolidate floppy disk files onto a hard disk drive. Though *MailMerge* can be fussy—particularly about the syntax of data files—you may find it a tool that's hard to put down once you've used it.

Bobbie Ray Leach is a former data processing manager and RPG programmer living in San Francisco.

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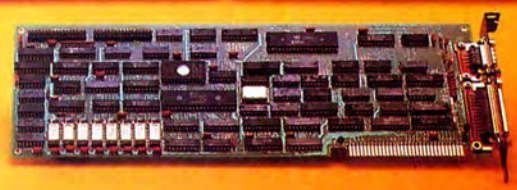

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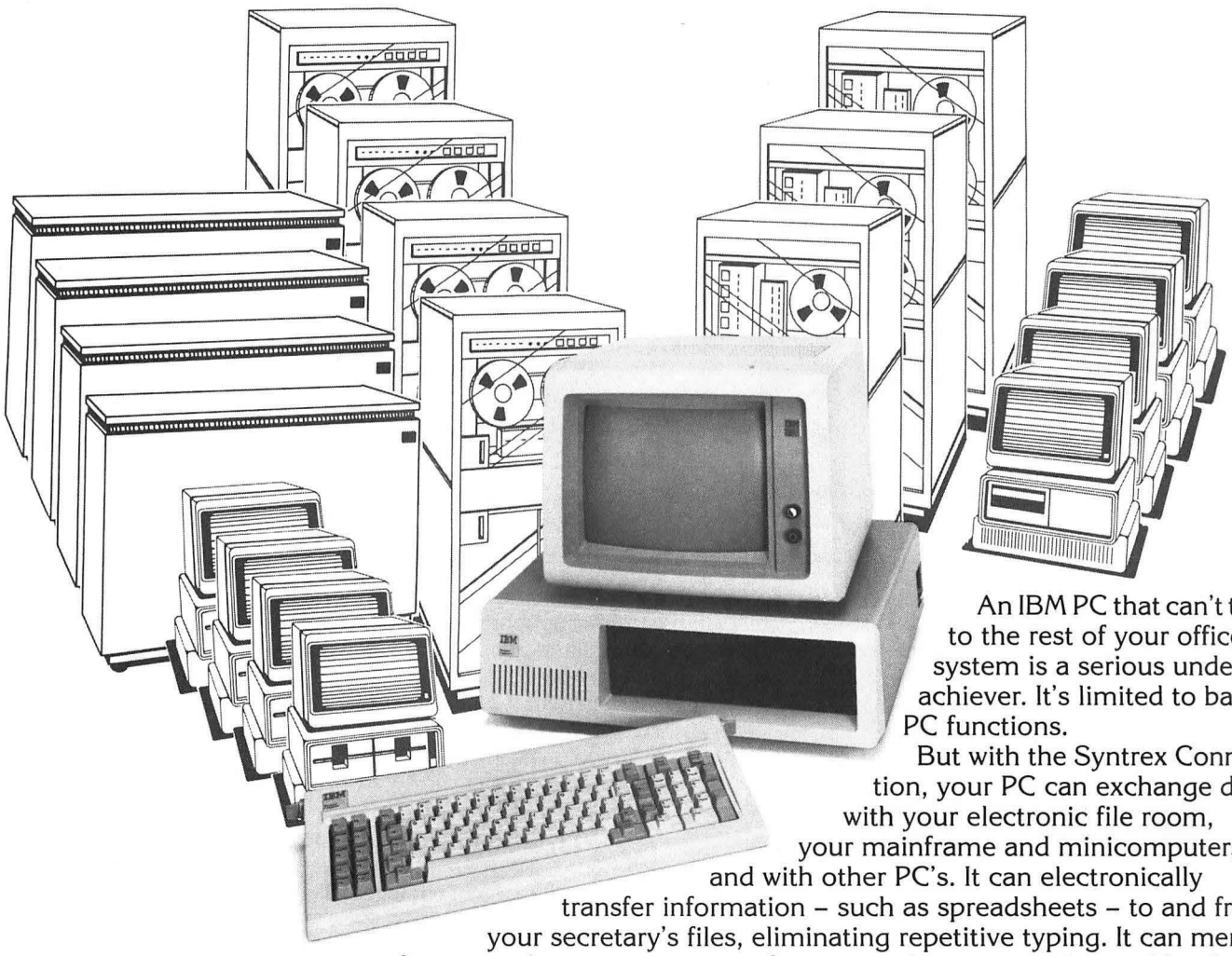

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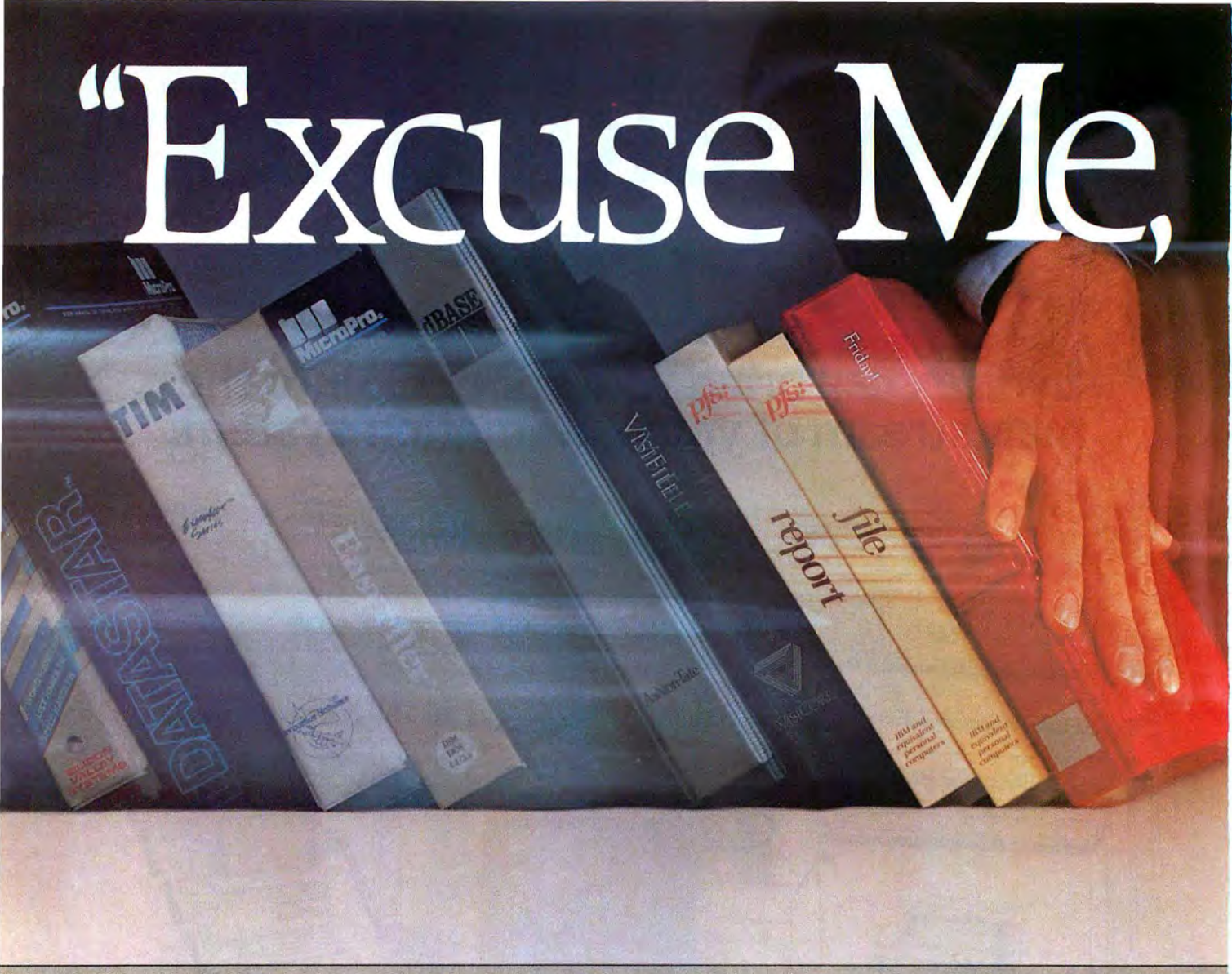

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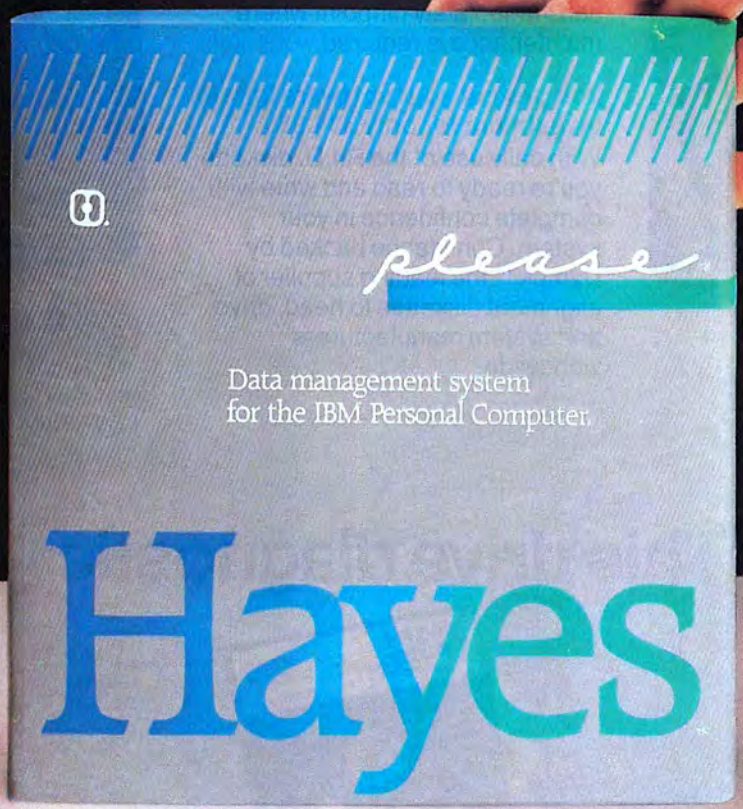

"Put it here, Please."
Design a special screen format to position data in a particular place.

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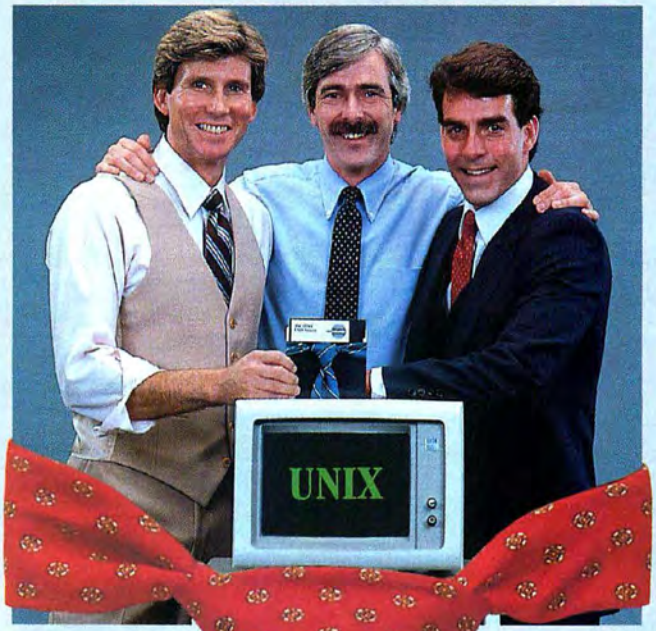

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Executives Rate Their PCs

Ken Greenberg

The word is out: Corporate America is embracing personal computing. Backing up that conclusion is a recent survey commissioned by Arthur Andersen & Co.'s Microcomputer Consulting Group. The survey produced some startling numbers. Personal computers have found a place in 57 percent of large and small businesses, and nearly one-third of the executives surveyed use personal computers. The biggest surprise? Of business personal computer users, 93 percent say that the machines meet or exceed their expectations.

These findings are but a fraction of what accounting giant Arthur Andersen & Co. learned when it dispatched a market research firm to unearth how businesses in the Southwest feel about personal computing. The results are unequivocal: the personal computer has won acceptance from policymakers in every kind of business. Executives are generally enthusiastic about their personal computers, understand them surprisingly well, and use them at home and at the office. Interest in more sophisticated applications is blossoming. Automating the office is no longer an issue; the question has become how to automate.

"The revolution has arrived," says John Houlahan, head of Houlahan/Parker, the Los Angeles-based market research firm that conducted the study for Arthur Andersen. "These results demonstrate a major ground swell in business computing. This transformation is still in its early stages—software has a long way to go. But companies are ripe for more applications, and with them, more computers."

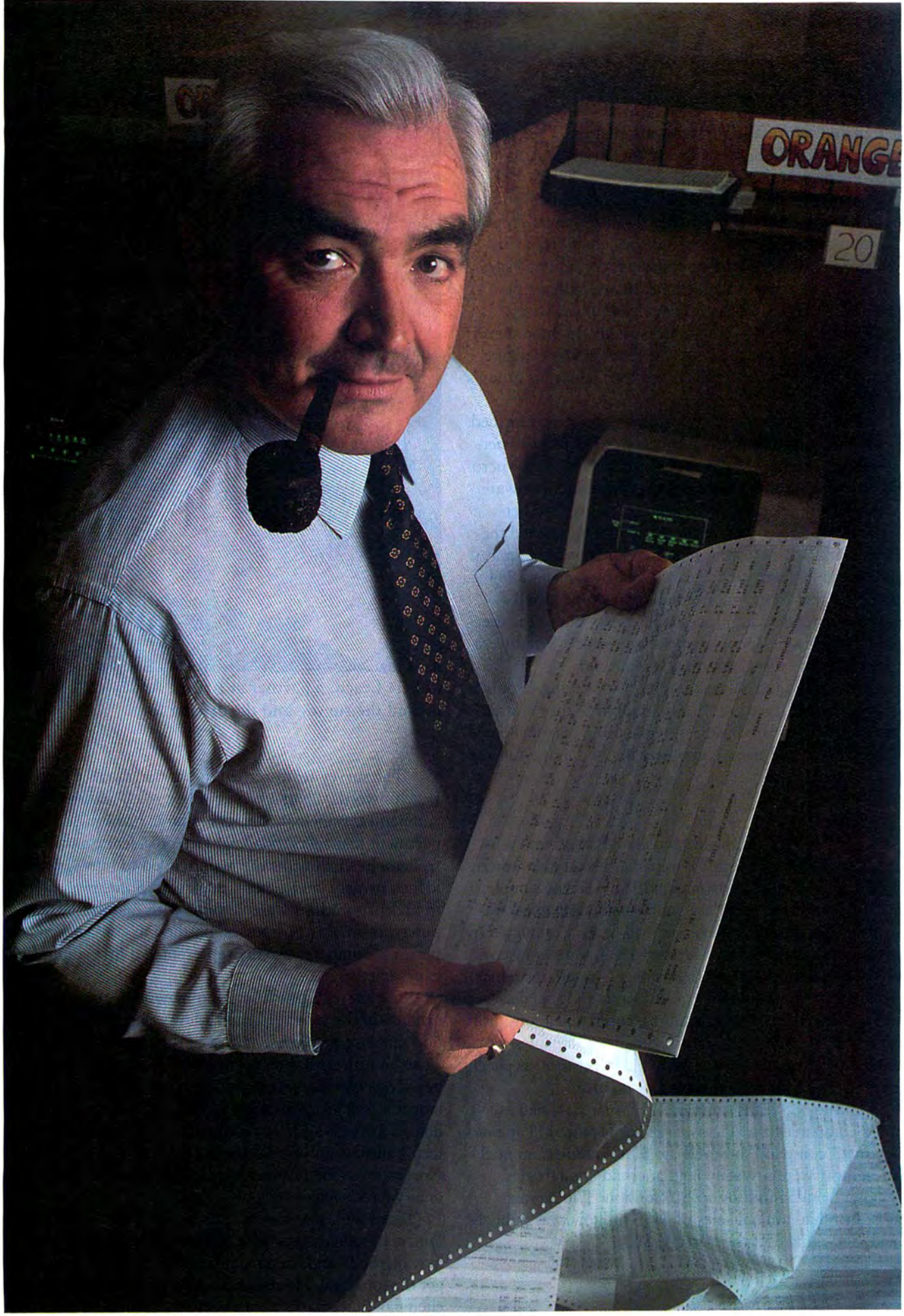
Robert Leach, a partner at Arthur Andersen and the driving force behind the study, says the survey is hard evidence of an "astounding" growth of personal computers in business. "It's remarkable how many decision-making officers use the personal computer," says Leach. "Industry observers assumed that computers would be used mainly by newly minted MBAs and that it would be a while before they showed up in executive suites. From all indications, personal computers are getting there a heck of a lot faster than we anticipated."

Quest for Expertise

Like a certain advertised brokerage house, when Arthur Andersen talks, people listen. Nailing down trends in the personal computer business has become a popular pastime, but when a consulting firm like Arthur Andersen gets into the act and releases its findings, corporate heads will swivel. And for good reason. The company, with

> The personal computer has won acceptance from policymakers in every line of business.

1983 revenues of $1.2 billion, is among the country's so-called "Big Eight" accounting firms. In addition to its audit and taxation arms, Arthur Andersen is a formidable purveyor of business advice. The company's Management Information Consulting Services Division—the biggest consulting arm of any accounting firm—had billings of $334 million worldwide last year, $245 million in the United States alone. The consulting division provides clients such as IBM, Exxon, and the IRS with services that range from strategic business planning to facilities



Market researcher John Houlahan pores over printouts.

design and information systems installation. The two-year-old Microcomputer Consulting Group is the fastest growing part of that division.

Arthur Andersen has undisputed clout in corporate boardrooms. "Lots of companies offer technical support for personal computer users, but they come from the computer industry, not from business consulting," says Houlahan. "Arthur Andersen has a true business perspective. In addition, the firm's release of the study breaks new ground—companies usually do these surveys for themselves." Leach is not shy about acknowledging that disclosure of the results is apt to enhance his group's visibility.

The Microcomputer Consulting Group was formed because so many of Arthur Andersen's clients were perplexed but intrigued by personal computing. The Microcomputer Consulting Group assists clients in hardware and software selection, systems integration, and networking decisions. Before the group commissioned the Houlahan/Parker study, it relied as much on instinct as it did on available market research. But by January 1984 it was clear that more was needed. It was time to talk—not to corporate data processing people, but to the executives and businesspeople who shape policy. What were their thoughts about personal computing?

Leach and the Microcomputer Consulting Group kept two basic questions firmly in mind as they crafted the survey: Why are businesspeople using personal computers? How will these computers be used in the future?

Robert Leach, a partner at Arthur Andersen & Co. behind the survey and the driving force

The Sample

Dun & Bradstreet supplied Houlahan/Parker with a list of 3000 randomly selected companies based in Southern California, Nevada, Arizona, and Hawaii. The sample, evenly divided between large and small companies, was whittled down to a manageable 308 firms. Conducted by phone and completed in February 1984, the survey covered the gamut of American business—retail, insurance, manufacturing, wholesale trade, health and social services, government, transportation, communications, utilities, construction, and finance. Smaller companies tended to be retail operations, while larger firms typically were involved in manufacturing or finance.

Of the 308 firms sampled, 157 were classified as small companies and 151 as large corporations. The average small company surveyed did $3.6 million in annual sales; most were privately held and had annual sales ranging from $1 million to $10 million. The average large firm had annual sales of $133 million, was publicly held, and ranked in the Fortune 500.

The survey team zeroed in on individuals who, in Leach's words, "had a broad policy role" within their companies. Principal contacts in large firms included department managers, financial vice presidents, and controllers. In small firms the team tended to interview presidents, owners, and general managers. Some respondents in big corporations were familiar with mainframe computers; in smaller businesses, on-the-job contact with a personal computer usually represented a first computing experience.

The survey's one limitation may be the geographic makeup of the sample. Leach admits that the cross section may not be representative of the country as a whole. "The Southwest has an economy dominated by technology. The economy in the Midwest is still tied to heavy industry, so the application and acceptance of new technology are slower. If you looked at other centers of high-tech industry, however—the Northeast, Southeast, or Northwest—the responses would probably resemble the ones we received."

Even with that caveat, the survey confirms that the information age is upon us. Businesses are aware that new methods and, in particular, new tools are needed to get the job done. Houlahan and his inquisitors sought to elicit candid remarks about personal computer use, with

emphasis on current and future applications, level of user satisfaction, perceived benefits, installation methods, critical problem areas, and, of course, what users look for in a consulting firm.

Acceptance

Personal computers are conspicuously successful in large organizations; 57 percent of the companies surveyed—73 percent of the major corporations and 42 percent of the small firms—use personal computers. "These are revolutionary numbers, considering how short a time personal computers have been around," says Houlahan. While personal computers are pervasive, they're not yet plentiful. The survey found that most organizations have relatively few units—often fewer than ten.

The number of installed units doesn't matter much to Leach, but who is using the computers matters a great deal: a third of the "policy-level" officers in large companies use personal computers at work, while nearly one-fourth also use them at home. "Think of the implications," says Leach. "Other surveys have suggested that by 1985 a tenth of all American homes will have personal computers. Look how many executives in large companies have them at home. These are fairly senior officers, not people in their early thirties." Adds Houlahan, "When key executives are using personal computers, you can bet they'll spread throughout the corporation."

Personal computers are also good for your career. Leach notes that corporate users are better-than-average employees in the first place. But they will be even more productive than their peers, particularly when preparing and supporting business decisions. Notes Leach, "The computer makes them look good."

Satisfaction

Business users are a satisfied lot indeed. Of those interviewed, 93 percent reported that their personal computing experience has met or exceeded expectations. In large and small companies alike, an average of 69 percent were "very satisfied" with performance, while an average of 24 percent said they were "somewhat satisfied." Executives feel that their systems fulfill the purpose for which they were purchased; the personal computer's reliability and time-saving traits earned particularly high marks.

"Ninety-three percent is a dynamite number," exults Houlahan. "Because personal computers are relatively new, we expected a lot of problems and a great deal of frustration. But when we asked directly about satisfaction, we got this overwhelmingly positive response. For any kind of mechanical product, that's an extremely high level of satisfaction."

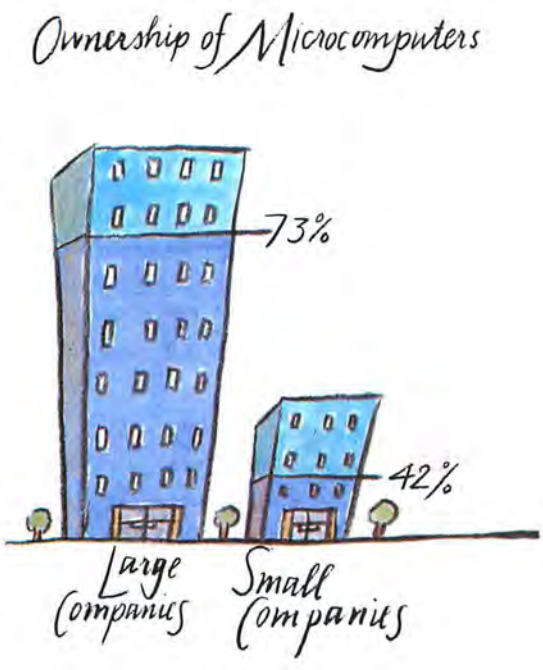
If nothing else, the survey shows that business users care far more about product than process. Assuming that applications software ran as promised and the system performed reliably, the user was happy. "Technical performance—how fast the computer does the job—is currently a nonissue," Leach reports. "Corporate users have been amazed by the speed and reliability of the personal computer—especially compared to the performance of terminals linked to mainframes. But the appearance of high-resolution graphics software, windowing packages, and multitasking applications will raise the performance issue."

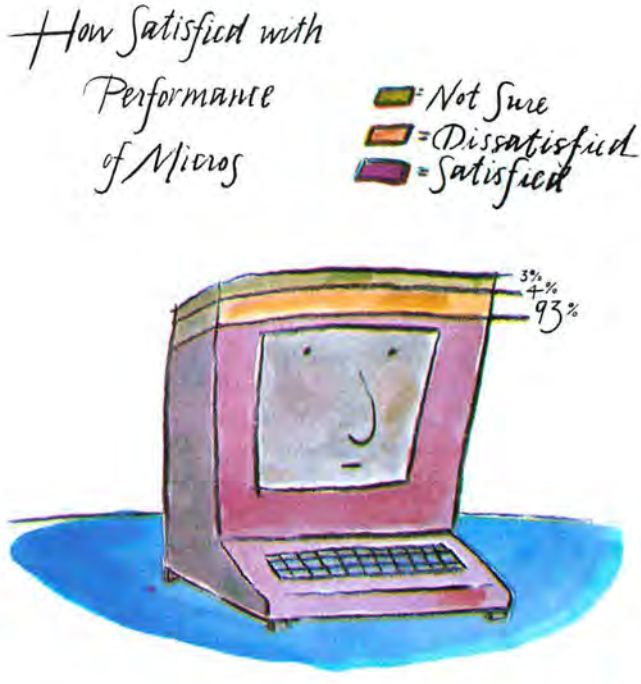
Applications

Personal computers are still confined to a few tasks in both large and small businesses. In small businesses, the computer is like an employee, coping with day-to-day operations, the "bread and butter" of the business. In larger companies, it serves as more of a management tool, spinning "what if" scenarios and providing financial models. There's also interest in integrating personal computers with current mainframes, minicomputers, and other information systems.

Of those interviewed, 93 percent reported that their personal computing experience has met or exceeded expectations.

Eighty-five percent of small business users and 59 percent of those in larger firms reported that they rely on personal computers for accounting, payroll, and budgeting chores. Word processing was a major application in 45 percent of the big organizations, while 41 percent of the smaller businesses used personal computers for inventory and distribution control. Less popular with all users were spreadsheets, production control, graphics, and mailing list programs.





Benefits

Is the personal computer an efficient business ally? The answer seems to be yes. Variations on this theme were expressed across the board. Thirty-seven percent of the respondents lauded the computer's ability to maintain accurate, organized data and records; 31 percent cited its time-saving features; 24 percent mentioned its cost-saving qualities; and 23 percent liked the way it hastened the flow of information. The consensus: The personal computer makes information available in a desired form more quickly and with less expenditure of employee time than was possible in the past. When asked to rank benefits in order of importance, 63 percent of the respondents agreed that rapid and complete information retrieval and manipulation are vital; 47 percent noted that time for complex calculations is dramatically reduced; and 46 percent credited the computer with improving access to data bases.

> Respondent comments crackled with realism when the subject turned to the pitfalls of business computing.

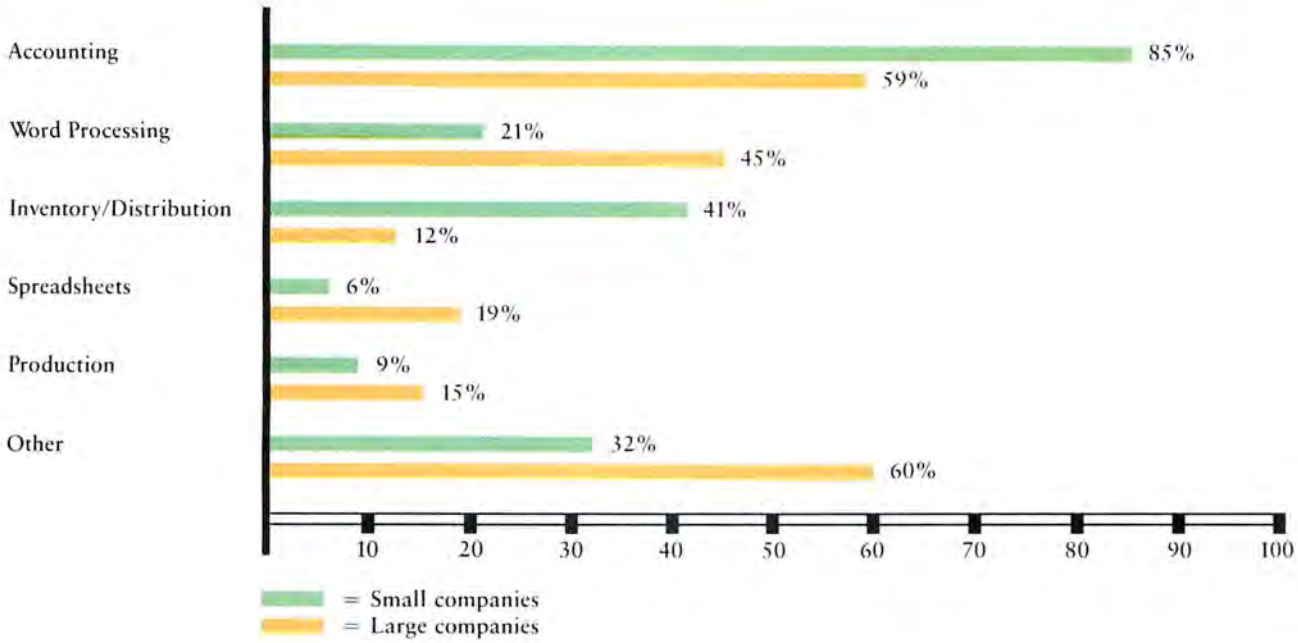
"When computers are working, they're terrific," said one respondent from a small company. "Everything you want is at your fingertips. Records are so much easier to find." Added a manager at a large firm, "Our personal computer helps us control personnel costs—it's not causing layoffs, but we don't have to hire more people to accommodate a bigger work load." A representative of a major corporation offered this: "Personal computers give management meaningful reports—a solid basis for making sound, rational decisions. Traditionally, numbers were just thrown out and people interpreted them any way they wished. The personal computer not only organizes data, it delivers that data into the hands of managers."

Problem Areas

The personal computer's emergence as the preeminent business tool has not been trouble-free, particularly in some major corporations. A personal computer manages information, but who manages the computer? Houlahan's interviewers posed two open-ended questions: What advice would you give others about the pitfalls of ownership? What problems did you expect or encounter during installation?

The prime concerns among nearly 30 percent of all users were obtaining a system specifically geared to their firm's needs and finding adequate off-the-shelf software. Twenty-two percent of all users thought it advisable to seek out a recognized, reliable manufacturer for training and service. Not surprisingly, a quarter of the large corporate users were particularly interested in maintaining

How Micros Are Used in Business



compatibility with existing company computers—something that smaller businesses hardly mentioned.

"One thing that jumped out at us was that larger companies really want to link their personal computers to existing information systems," says Leach. "As a smaller company grows, a similar question arises: How can we tie our personal computers together and have them share information?" Leach suggests that training was not a prominent concern among those surveyed because business users are finding personal computers fairly easy to use. "Problems don't begin to surface until a second application is introduced," Leach says. "The training industry is converting to computer-aided instruction software," he adds. "From here on, training will address software, not hardware."

Respondent comments fairly crackled with realism when the subject turned to the pitfalls of business computing. "You can't expect the computer to do everything immediately," said an executive of a small firm. "Don't be intimidated by the machine," said another. One respondent from a large company offered this advice: "Don't try to solve all your problems with just one product. Try to acquire and apply things incrementally." A Fortune 500 executive warned that "you can't let managers go off in completely different directions. Central control is necessary to maintain compatibility."

Information Sources

Survey respondents attributed much of their computer literacy to the computer press. Overall, 17 percent cited trade magazines from their own industries as the primary source of information for personal computing; 14 percent mentioned *PC World* by name, while another 14 percent cited *ComputerWorld*. The *Wall Street Journal* was next with 7 percent, followed by *Byte* and *Personal Computing* with 6 percent each and *Business Week* with 5 percent. Among respondents from large companies, 25 percent cited *ComputerWorld*, while 22 percent mentioned *PC World*.

Breakthrough or Overstatement?

Computer industry trend-watchers have reacted to the Arthur Andersen survey with interest and a touch of skepticism. Margo Faircloth, an associate editor at Datapro Research, calls some of the survey's conclusions "overwhelmingly optimistic." "The findings are interesting," she says. "We've also found a high level of satisfaction among users. People are simply glad to have control in their hands—particularly at large companies with data processing departments. Personal computers have finally freed these people." Faircloth says Datapro, like Arthur Andersen, is focusing its research on corporate decision makers. She confirms the survey's finding that nearly one-third of the executive work force is already armed with personal computers, and suggests that the figure may soon rise "dramatically, especially with powerful, easy-to-use software."

Community

"Executives are using the computer as a thinking tool," Faircloth says. "It's becoming second nature, something they can't live without." She has less confidence in the relatively scant attention that respondents gave to hardware and software training. "We hear horror stories about word processing and communications software, where a lot of training is needed. But most executives probably don't use these programs."

Brian Leeland, hardware product manager for California-based Businessland, calls the survey results "surprising." Leeland suggests that the 93 percent level of satisfaction with personal computers "seems high," but notes that it doesn't differ significantly from the retail chain's own buyer surveys. One industry observer, who requested anonymity, says the high satisfaction level may contain an element of rationalization. "When people spend that kind of money on a computer, they want to like it," she says. "They justify it and defend it, despite its flaws."

Leeland also has trouble with the reported proliferation of personal computers. "Those figures are extraordinarily high. The executive market is just not that saturated." Leeland is satisfied, however, that business users are every bit as savvy as the Arthur Andersen results indicate. "Overall, it seems that there's a lot of truth in the survey—if you ignore some of the numbers, the observations ring true," he says. "But it seems like such a narrow sample. I wouldn't say these trends extend across the whole U.S. market."

Leeland's concern may be moot. The survey results are now guiding Arthur Andersen's energetic push into the personal computer consulting business. The study is also inspiring fresh outreach efforts by Leach and his colleagues. "A large number of companies are not using personal computers yet," he says. "We're also asking nonusers why their businesses are so different that they can't benefit from these tools."

As the statistical bedrock of the Microcomputer Consulting Group, the survey results are certain to shape the kind of advice and assistance that Arthur Andersen offers—and that gives the study a special kind of influence. To paraphrase Al Jolson, corporate America ain't seen nothin' yet.

Ken Greenberg is an Assistant Editor at PC World.

For further information, see A Survey of Usage and Attitudes About Business Microcomputers, *and* Executive Comments About Business Microcomputers, *Houlahan/Parker Marketing Research, 15851 E. Whittier Blvd., Whittier, CA 90603, 213/947-4602.*

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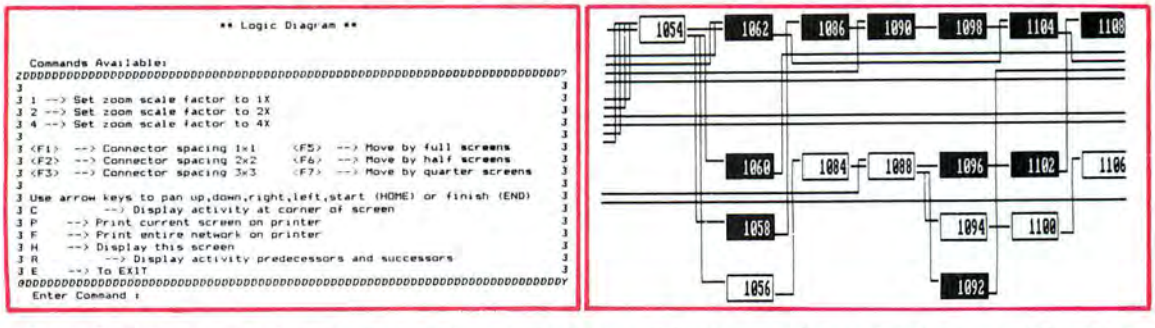

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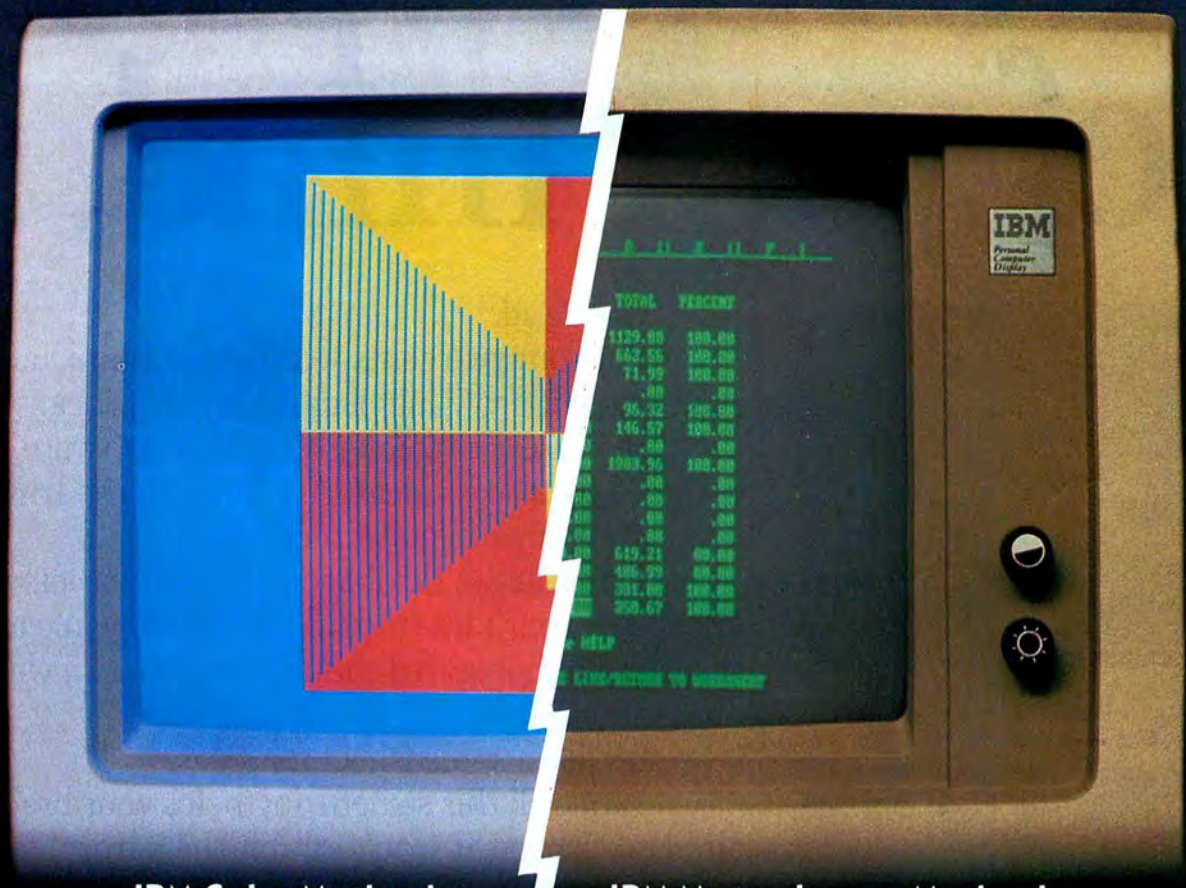

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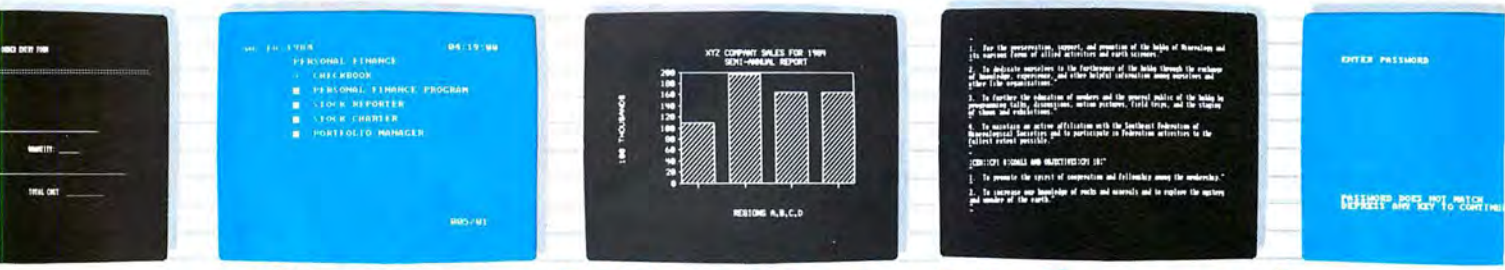

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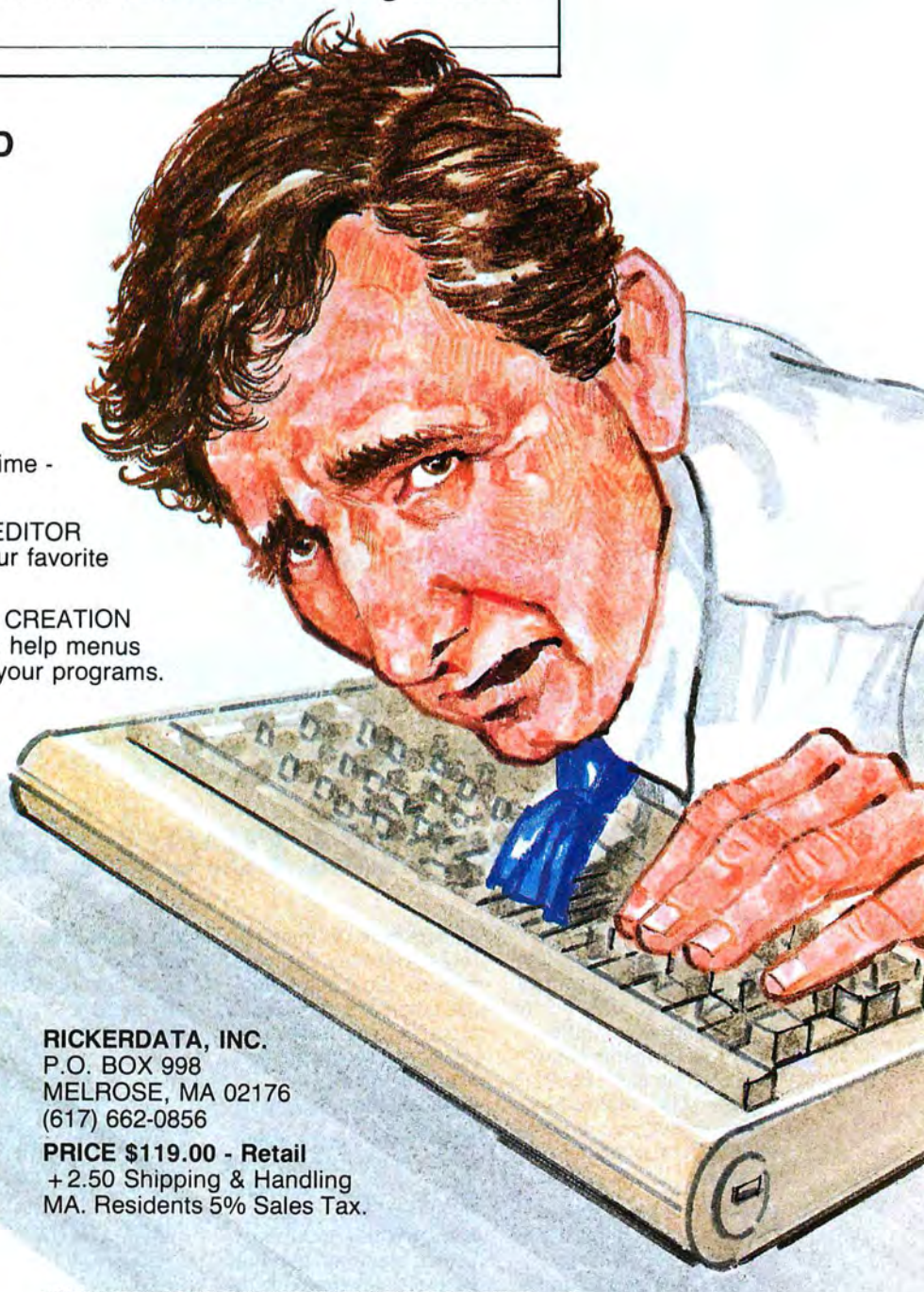

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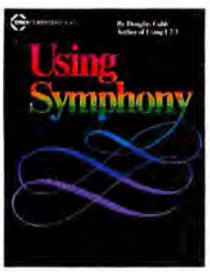

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Edited by Steven Cook

This month I've included a patch of my own for users of AST Research clock boards, some terrific notes for batch file gourmets, an item on how to restore BASIC function key assignments, and yet another way to skin the uppercase-conversion cat. We also have patches to enable owners of Gemini printers to use GRAPHICS .COM and to enable owners of IBM Pascal to use the Pascal compiler on different disk drives. Finally, we have a tip for programmers to prevent printer errors in BASIC and a tip for *1-2-3* users to save them the trouble of searching for their calculators.

Several readers have written regarding Eric Weiss's tip on recovering memory assigned to cells eliminated by *1-2-3*'s /Range Erase command. The easiest way to recover that memory is to use the /Worksheet Delete command to eliminate the rows and columns you don't need and then save and retrieve the file.

In the course of my work I often use several PCs in a single day. Unfortunately, some of them do not contain an AST Research clock like the one I have in my own PC. When using a PC without the clock, I must interrupt my AUTOEXEC.BAT files to set the date and time manually. That's been a nuisance to me for over a year, and recently I decided to do something about it. The result is the program ASTPATCH.BAS, which modifies ASTCLOCK.COM, the program provided with AST Research's clock board products.

The modifications cause ASTCLOCK.COM to return a DOS 2.00 errorlevel that can be tested within a batch file to determine whether a valid date was obtained. If the date was not valid, the errorlevel will be 1; otherwise it will be 0. My AUTOEXEC.BAT files are now set up as shown in ASTBATCH.BAT. They test the errorlevel and prompt for the date and time automatically if an AST Research clock is not present.

Defensive Disk Driving

I find that I put lots of commands into my AUTOEXEC.BAT files. Between asking the clock what time it is and setting up the serial port, print spooler, and disk emulator, most of the batch files are 10 to 15 lines long. The problem is that the long batch files result in a lot of disk drive head movement as DOS reads a line from the batch file, executes the command, and then goes back to read another line. I've adopted the following technique to help guard my disk drives from excessive wear.

As shown in RAMBATCH.BAT, my AUTOEXEC.BAT files create a disk emulator, copy a batch file containing the remainder of the start-up commands into the disk emulator, and then transfer execution to that file. The secondary batch file is read from the floppy disk in one large block rather than line by line; the results are less disk activity and faster operation.

Notice the characters '>nul' after each command in the batch file. They cause the screen output to be suppressed. I use them to prevent messages such as '1 file(s) copied' from appearing after an ECHO OFF command has been issued.

The I/O redirection feature of DOS 2.00 can also be used to provide a much more powerful form of batch processing. The commands shown in COMMANDS.BAT cause a secondary copy of the DOS command interpreter (COMMAND.COM) to take control and to receive its input from a disk file instead of from the keyboard.

Passing control in this way is especially useful because data is taken from the disk file in place of all keyboard input, including responses to the prompts of other programs. I use the extension .SPL for these files to distinguish them from batch files because some lines in .SPL files are commands, but other lines are the responses to program prompts.

The last line in the file must be the EXIT command. This is very important because the secondary copy of COMMAND.COM will take its input only from the disk file. Without the EXIT command there doesn't seem to be any way to regain control short of rebooting.

Jon Shemitz
Ben Lomond, California

Editor's note: Loading a secondary copy of COMMAND.COM consumes about 17K of RAM.

Save the Keys

I have seen that many BASIC programs use the line FOR X=1 TO 10:KEY X,"":NEXT to turn off the function keys. That is a good way to prevent unwanted input, but it makes it inconvenient to restore the original function key definitions when the program terminates. The statements shown in KEYDEFS.BAS can be used to save the function key definitions in an array before they are changed so that they can be restored at a later time.

BASIC marks the end of a key definition with a CHR$(0), so line 19 places that code at the end of each K$( ) to prevent the inclusion of extraneous data when the definitions are restored. The 'KEY OFF' and

```
10 REM  Program to add Errorlevel reporting to ASTCLOCK.COM
20 DEFINT A-Z:SUM=0:KEY OFF:CLS:LOCATE 5,1,1
30 FOR J=1 TO 36
40    READ H$:IF VAL(H$)>=0 THEN SUM=SUM+VAL("&h"+H$)
50 NEXT
60 READ CKSUM:IF SUM<>CKSUM THEN 290 ELSE RESTORE
70 PRINT "Insert disk with ASTCLOCK.COM, press any key: ";
80 A$=INPUT$(1):PRINT:IF A$=CHR$(27) THEN END
90 OPEN "ASTCLOCK.COM" AS #1 LEN=1
100 IF LOF(1)<>813 THEN 270
110 FIELD #1,1 AS BYTE$
120 READ H$:IF VAL(H$)<0 THEN 170
130    OFFSET=VAL("&h"+H$)+1
140    READ H$:IF VAL(H$)<0 THEN 120
150       LSET BYTE$=CHR$(VAL("&h"+H$))
160       PUT #1,OFFSET:OFFSET=OFFSET+1:GOTO 140
170 READ CKSUM,MESSAGE$
180 FOR J=1 TO LEN(MESSAGE$)
190    LSET BYTE$=MID$(MESSAGE$,J,1)
200    PUT #1,OFFSET:OFFSET=OFFSET+1
210 NEXT
220 FOR J=0 TO 2
230    READ H$:LSET BYTE$=CHR$(VAL("&h"+H$))
240    PUT #1,OFFSET + J
250 NEXT:CLOSE
260 PRINT "Errorlevel patches are now installed.":END
270 PRINT "Incorrect version of ASTCLOCK.COM."
280 PRINT "This patch is for the 9-18-82 version only.":END
290 PRINT "Error in DATA statements.  Check your work.":END
300 DATA 276,E9,BE,00,-1,2D7,EB,54,90,-1,32A,E9,D3,FB,3C,FF,75,0B
310 DATA BA,41,04,E8,71,FD,B8,01,4C,CD,21,E8,64,FD,EB,99,-1,-1
320 DATA 6516,"No AST clock in this computer.",0D,0A,24
```

ASTPATCH.BAS

```
echo off
cls
astclock
if not errorlevel 1 then finish
date
time
:finish
```

ASTBATCH.BAT

```
echo off
ramdisk c: >nul
copy continue.bat c: >nul
c:continue
```

RAMBATCH.BAT

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'KEY ON' statements in line 35 force BASIC to update the bottom line of the screen to display the newly restored key definitions.

Roger Host
Woodstock, Illinois

Drop That Cap

I use the function shown in line 20 of FNCAP.BAS to convert the first character of a user response to its lowercase equivalent. The function returns a space character if ANS$ is null. This command can be used in many ways, including those shown in lines 200, 210, 500, and 510. I prefer to convert to lowercase because this filters numbers and most special characters without changing them.

Jeff Johnson
Eastham, Massachusetts

Gemini Graphics

The GRAPHICS.COM program included with DOS 2.00 doesn't work properly with the Star Micronics Gemini 10X printer. The Gemini printer closely mimics IBM and Epson printers, but there is one problem: in graphics mode the vertical step size of the Gemini 10X is different from that of the IBM Graphics printer. As a result GRAPHICS.COM leaves a blank space between each line of the printout. To get an idea of the effect, look at the IBM logo on the front of a PC.

Fortunately, only a simple change to GRAPHICS.COM is required to fix the problem. To begin, make a copy of the GRAPHICS.COM file and put it in drive B: (don't modify the original). Put a disk with the DOS program DEBUG.COM into drive A:, type `debug b:graphics.com`, and press <Enter>. If everything is okay, you will see a hyphen prompt. Type `u 15c` and press <Enter>. This "unassembles" part of the GRAPHICS .COM program. You should see a display like the one shown in Figure 1. (The 'xxxx's will be replaced by a hexadecimal number that will vary from PC to PC.)

The instruction CALL 02DC sends the character in the lower half of the AX register to the printer. Thus, this section of code first sends a two-character command to the printer: hex 1B, which is the ESCape character, followed by hex 33, which is the decimal digit 3.

According to the printer manual, the command ESCape-3 sets line spacing. The third value, hex 18, tells the printer what line spacing to use. For the Gemini the unit of measurement for line spacing is 1/144 inch, so here the line spacing is being set to hex 18 over 144 or, in full decimal notation, 24/144 inch. A little testing showed that the correct line spacing for the Gemini is 16/144. Decimal 16 is hex 10, so to change the value, type `e 169 10` and press <Enter>. The letter *e* in that command means "enter"—you're entering a new value into location 0169, replacing the current value with hex 10.

Now type the unassemble command (`u 15c`) again to make sure that the change is correct. If it is, type `w` and press <Enter> to write the changes onto the disk. Type `q` to leave DEBUG and return to DOS. The GRAPHICS.COM program will now work properly with a Gemini 10X printer.

Kent J. Quirk
Westford, Massachusetts

```
echo off
ramdisk c: >nul
copy command.com c: >nul
copy continue.spl c: >nul
c:command < c:continue.spl
```

COMMANDS.BAT

```
 9  REM  Lines 10-20 will store current function key definitions in K$()
10 DEF SEG
11 P=0
12 FOR X=1 TO 10
13   K$(X)=""
14   WHILE PEEK(P+1619)<>0
15     K$(X)=K$(X)+CHR$(PEEK(P+1619))
16     P=P+1
17   WEND
18   P=X*16
19   K$(X)=K$(X)+CHR$(0)
20 NEXT
29 REM  Lines 30-35 will restore function keys to definitions stored in K$()
30 DEF SEG
31 FOR X=1 TO 10
32   FOR Y=1 TO LEN(K$(X))
33     POKE 1618+(X-1)*16+Y,ASC(MID$(K$(X),Y))
34 NEXT Y,X
35 KEY OFF : KEY ON
```

KEYDEFS.BAS

```
20 DEF FNCAP$(ANS$)=CHR$(ASC(ANS$+" ") OR 32)
200 INPUT "Do you want instructions";A$
210 IF FNCAP$(A$) = "y" THEN GOSUB 5000
500 INPUT "Which option do you want";RESP$
510 RESP$=FNCAP$(RESP$)
```

FNCAP.BAS

Pascal Predicament

Version 1.00 of the IBM Pascal Compiler is set up to read the file PASKEY from drive A:. This can be very annoying if you are trying to run the compiler from a hard disk. Unless the PASKEY file is available in drive A:, you will get the message 'File Access Error In A:PASKEY; Compiler Cannot Continue', and the program will abort.

A simple patch to PAS1.EXE will make the compiler read PASKEY from the default drive. This will enable you to run the entire compile operation from a hard disk. In addition, the process will take less time because PASKEY will be read at hard-disk speed.

To start, make a copy of the file PAS1.EXE and put it into drive B:. Put a disk with DEBUG.COM into drive A:, and type in the commands shown in Figure 2.

The first command changes the extension of the PAS1 file to prevent DEBUG from relocating the file's contents. Next, start DEBUG and load the PAS1 program into memory. When you type the command `r ds`, DEBUG will print the letters *DS* followed by a 4-digit hexadecimal number and, on the next line, a colon, the register (r) command's prompt. The number you will see depends on the version of DOS you are using and the amount of memory in your machine. Add 1 to the first digit of that number (which is usually 0), and enter that value as the next step.

If your calculations are correct, the letters 'A:PASKEY' will be displayed at the end of the line. If you get the proper display, continue to the next step, removing the drive designation from the file name.

```
A>debug b:graphics.com
-u 15c
xxxx:015C B81B00        MOV     AX,001B
xxxx:015F E87A01        CALL    02DC
xxxx:0162 B83300        MOV     AX,0033
xxxx:0165 E87401        CALL    02DC
xxxx:0168 B81800        MOV     AX,0018
xxxx:016B E86E01        CALL    02DC
-e 169 L1 10
-w
Writing 0315 bytes
-q
```

Figure 1: Screen display of Gemini 10X printer patch for GRAPHICS.COM

Type the display command (`d 3d70`) again to verify that the changes have been made correctly. If they are not right, type `q` and start over. Otherwise, store the changes on disk by typing `w` as shown. Finally, use the RENAME command to change the PAS1 file's extension back to EXE.

Phil Ryals
Fremont, California

Easy Printer Check

If a BASIC program attempts to print while the printer is off, the program will halt and the message 'Device Fault' will be displayed on the screen, leaving the user bewildered.

The easiest way to determine the printer's status is to check port #957 as shown in PRINTCK.BAS. The printer is on line if the value returned is 223. Any other value indicates that the printer is not ready, and an appropriate message can then be displayed.

This method is much easier than the complex ON ERROR routine that is often used to perform the same function.

Patrick Lien
Cheshire, Connecticut

1-2-3 as a Calculator

If you want to balance your checkbook in the middle of analyzing your stock portfolio, you can use *1-2-3* as a calculator without affecting the contents of your spreadsheet. You can also calculate with *1-2-3* and put the results of a calculation into a cell.

Information you enter appears on the second line of the display; the top line shows the cell contents and does not change. To get a total or subtotal, press <F9>, the Calc key. The second line changes to the result of the calculation. Don't use the = key.

If you want the results of a calculation to go into a cell, make sure that the cursor is at that cell, and press <Enter> after you press <F9>. The contents of the current cell will be replaced by the result of the calculation. If you don't want to change the contents of the current cell, never hit

```
A>ren b:pas1.exe pas1.tmp <Enter>

A>debug b:pas1.tmp <Enter>
-r ds <Enter>
DS 0B62
:1b62 <Enter>
-d 3d70 L f <Enter>
1B62:3D70    4F 4E 2E 4C 53 54 10 41-3A 50 41 53 4B 45 59      ON.LST.A:PASKEY
-e 3d77 "PASKEY" 20 20 <Enter>
-d 3d70 L f <Enter>
1B62:3D70    4F 4E 2E 4C 53 54 10 50-41 53 4B 45 59 20 20      ON.LST.PASKEY
-w <Enter>
Writing 13E00 bytes
-q <Enter>

A>ren b:pas1.tmp pas1.exe <Enter>
```

Figure 2: Screen display of default disk drive patch for IBM Pascal Compiler

<Enter>. As long as you don't press <Enter>, you won't change the values in the spreadsheet.

For example, while in the READY mode type 25*4/(3+2) <F9>, and 20 will appear on the second line. This value can be used as a subtotal by just continuing to enter data. For example, if you then type ^2-@SQRT(900) <F9>, the result 370 appears. When you reach a total or want another calculation, press <Esc>. The second line will clear, allowing you to start anew.

When you have finished doing calculations and want to get back to the spreadsheet without changing anything, press <Esc> twice. The first time clears the second line, and the second time returns you to READY mode.

Bill Weil
San Francisco, California

```
1000 IF INP(957)=223 THEN 1040
1010 BEEP:PRINT "Printer not ready."
1020 PRINT "Press any key to continue..."
1030 A$=INPUT$(1):GOTO 1000
1040 PRINT "Printer is now on line."
1050 ' Program continues
```

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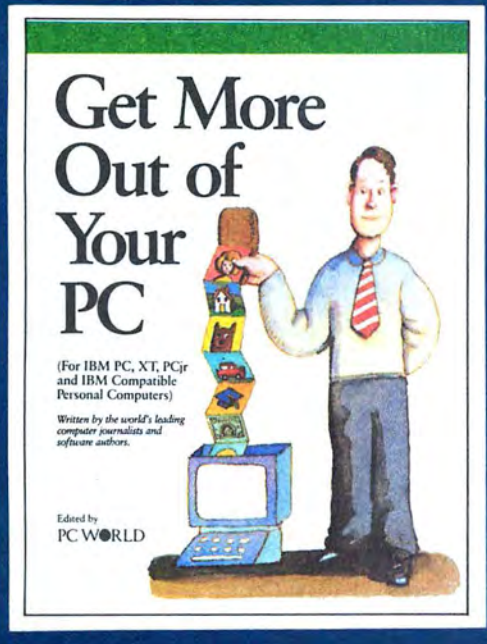

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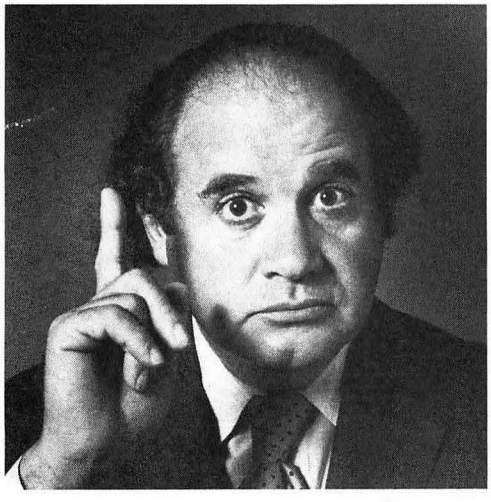

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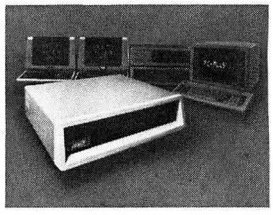

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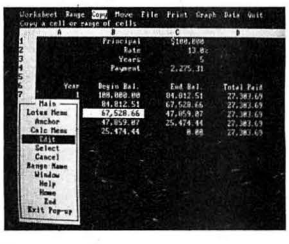

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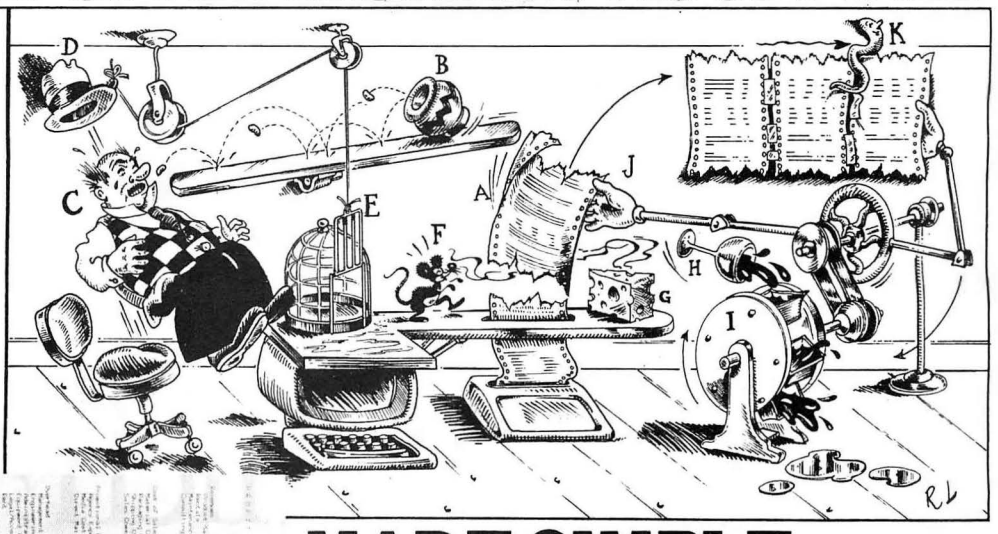

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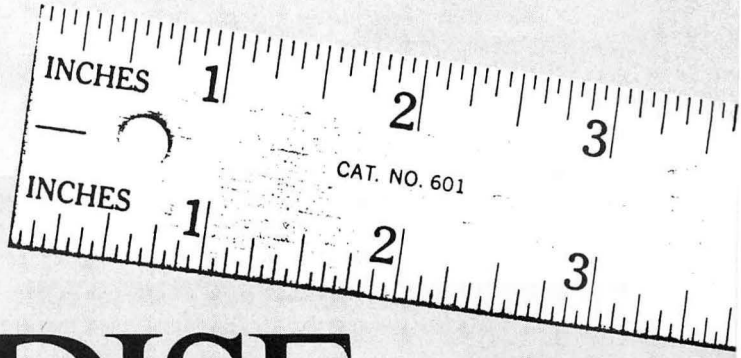

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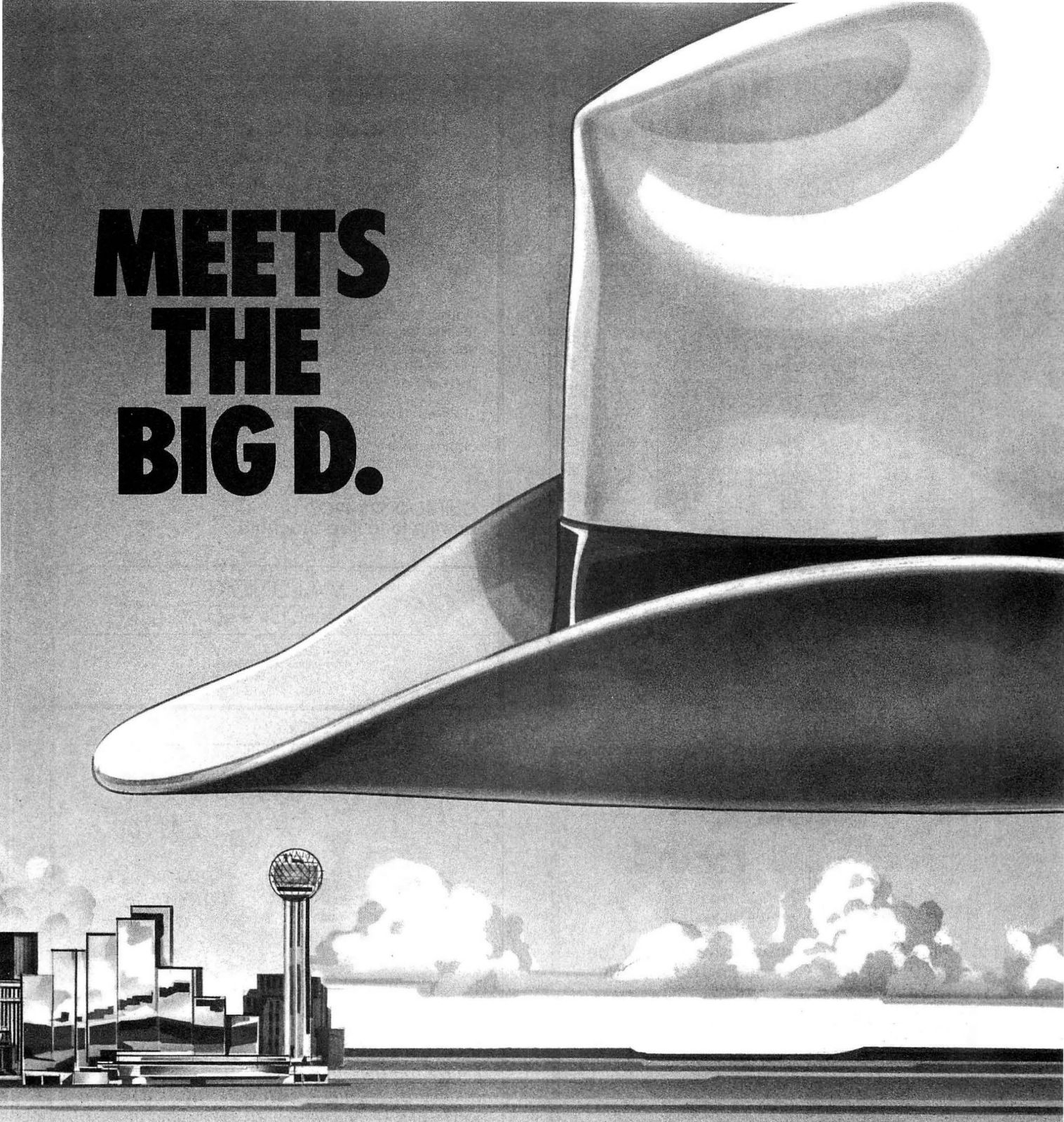

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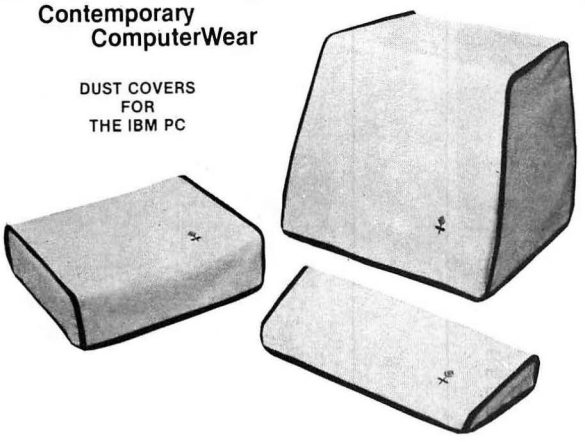

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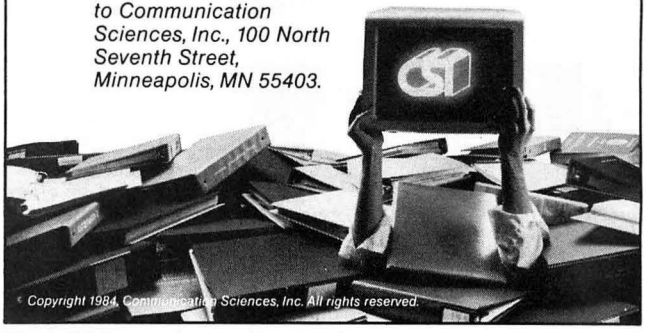

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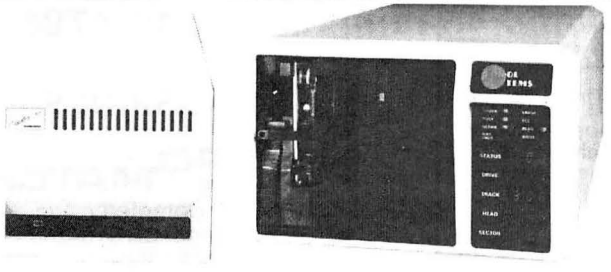

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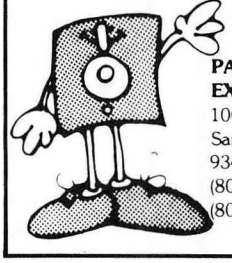

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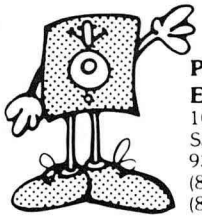

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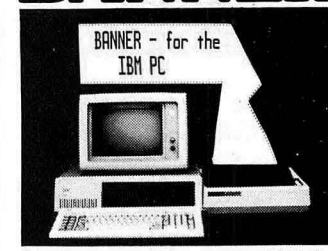

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houston instrument DMP 40 - 2 Pens $799; DMP 29 - 8 Pens $1799

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AMDEK 300 Green $119; 300 Amber $139; 310 Amber $159

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MICROCOM ERA 2 Internal $329 Standalone $439

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QUBIE Internal $299; Standalone $329

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*Except in Alaska and Hawaii. In Illinois, call 1-800-942-8881.

Asher™

Circle 264 on reader service card

Just Announced

The wide world of PC products

Edited by J. Schaffner

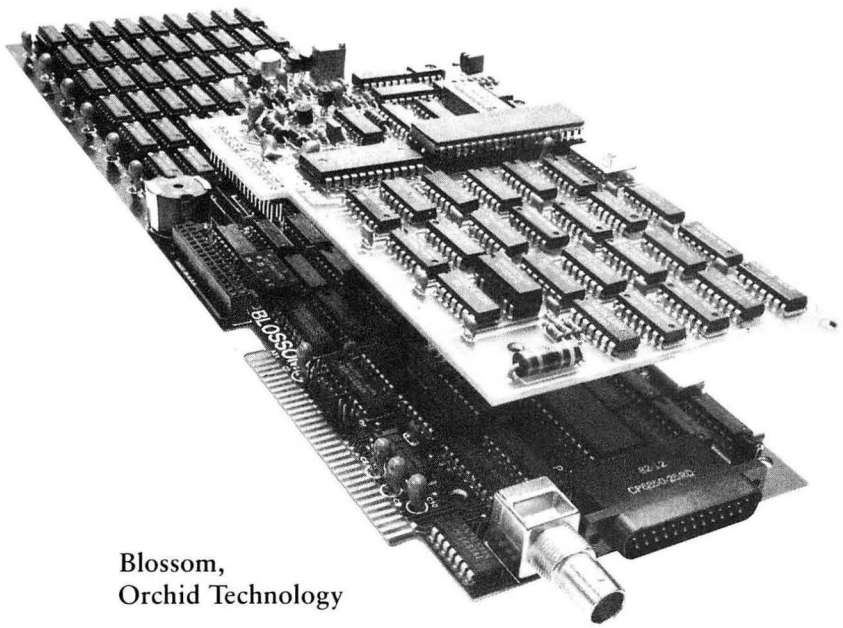
In the dynamic personal computer marketplace *Just Announced* keeps you apprised of the latest developments in IBM PC and compatible technology. Information for this department is provided by manufacturers; these write-ups are not reviews. Many of these descriptions will be followed up by reviews in future issues.

Hardware

Boards

Blossom and PCnetBlossom
A full-size board suitable for the solitary expansion slot in the Portable PC, Blossom offers common expansion functions and an interface for a piggyback PCnet networking board. Blossom provides up to 384K, a clock/calendar with an alarm, and a serial and a parallel port. Software included with the board governs disk emulation, disk caching, multisector I/O, and disk partitioning. These features enhance network performance in the piggyback version, PCnet-Blossom. List price: $295, with 64K $395, with 256K $675, with 384K $795, with PCnet and 64K $795.
Orchid Technology
47790 Westinghouse Dr.
Fremont, CA 94539
415/490-8586

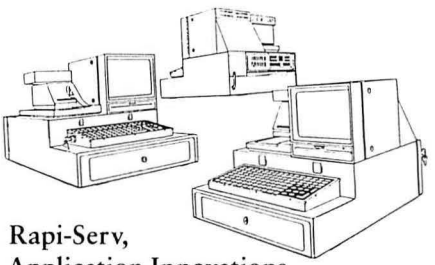
Hercules Color Card
Color graphics capabilities come with a parallel port on the Hercules Color Card. The half-size board, which will fit in a short slot in the XT, provides 320- by 200-pixel resolution with 4 foreground and 16 background colors. It works with graphics software such as Microsoft's *Flight Simulator,* Logo, and *SuperCalc 3*. List price: $245.
Hercules Computer Technology
2550 Ninth St.
Berkeley, CA 94710
415/540-6000



**Blossom,
Orchid Technology**

Computers

Rapi-Serv
Constructed around the PCjr, Rapi-Serv is a point-of-sale computer with a cash drawer and a 9-inch monitor. The computer comes with 128K, a serial port, a parallel port, and a slip document printer. The customized keyboard has 118 software-definable keys for functions such as "subtotal" or "cash." Rapi-Serv supports a number of retail options, such as automatic coin dispensers, magnetic card readers, LED displays, and bar-code wands, scanners, and printers. The point-of-sale software that comes with the system can be modified to suit your needs. Optional software can control inventory and payroll. List price: $3900.
Application Innovations
1550 Old W. Henderson Rd.
Columbus, OH 43220
614/451-7835



**Rapi-Serv,
Application Innovations**

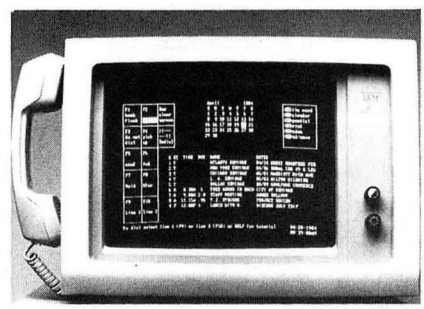
HS-151 Desktop Personal Computer
Heathkit offers its PC-compatible computer either as a kit or fully assembled. The HS-151 uses the 8088 microprocessor and has a keyboard with a large L-shaped <Enter> key and a double-wide <Shift> key. Features include 128K (expandable to

HS-151 Desktop Personal Computer, Heath Company

640K), two serial ports, one parallel port, an RGB jack for a color monitor, and a monochrome monitor jack with eight gray-scale levels. Four expansion slots on the computer's IBM bus accommodate boards designed for the IBM PC. With the kit you can choose one or two 360K floppy disk drives; the assembled version can be purchased with a 10MB hard disk drive. List price: kit with one floppy disk drive $1899, assembled with one floppy disk drive $2699, kit with two floppy disk drives $2199, assembled with two floppy disk drives $3099, assembled with hard disk $4799.
Heath Company
Dept. 349-175
Benton Harbor, MI 49022
616/982-3200

Modems

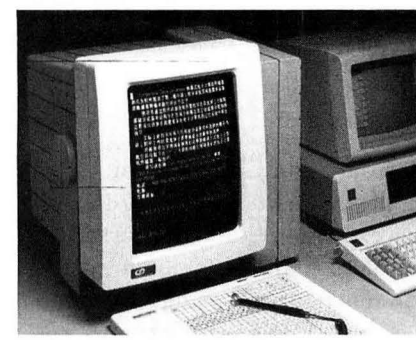
Asher
Businesspeople who frequently use their telephones for voice and data communications will find the Asher hardware and software combination useful. Asher's 300-bit-per-second modem board comes with two jacks for telephone lines and a handset that can sit on the side of the PC. The Asher software includes a menu-driven telecommunications program, a list manager for names and telephone numbers, a calendar, a "to do" list that will carry uncompleted tasks over to the next day, and an alarm to remind you of meetings. The software sits on top of DOS and partitions the PC's memory; you can load several applications into RAM and switch between them and Asher's functions with one or two keystrokes. You can either dial the telephone directly from the keypad or speed-dial from a list of telephone numbers. The program can be customized for automatic access to online data bases and information services. List price: $795. Requirements: 256K, one disk drive.
Wilcom, Inc.
1009 Mansell Rd.
Roswell, GA 30075
404/993-4590



Asher, Wilcom, Inc.

Monitors

Video Scroller Terminal (VST)
With a 17-inch screen that has 1024- by 1024-pixel resolution, the Video Scroller Terminal displays graphics and text on 8½- by 11-inch pages. The monitor's 16-bit AM29116 microprocessor receives data quickly and paints the screen at up to 39.6 megapixels per second. The VTEXT software, which comes with the monitor, lets you use a variety of fonts or character shapes and see exactly what the printed results will be. You can do word processing in Chinese with the optional CTEXT software and a bit pad. The system connects to the PC XT with a half-size expansion board and cable. List price: $5995. Requirements: 128K, hard disk drive.
Corporate Data Sciences
2560 Mission College Blvd. #102
Santa Clara, CA 95050
408/980-9747



Video Scroller Terminal, Corporate Data Sciences

Printers

P1340
You can print letter-quality text, high-speed drafts, and graphics with the P1340 dot matrix printer. The 80-column printer offers underscoring, superscripts and subscripts, proportional spacing, condensed print, and several type fonts and sizes. The P1340 prints 54 characters per sec-

ond (cps) in letter-quality mode and 144 cps in draft mode. Graphics resolution is 180 by 180 dots per inch. The printer can emulate Qume's Sprint 5 for use with many word processing programs. List price: $995.

P1340, Toshiba America, Inc.

Requirements: one parallel port.
Toshiba America, Inc.
Information Systems Division
2441 Michelle Dr.
Tustin, CA 92680
714/730-5000

Miscellaneous

Diagnostics II
A maintenance program for MS-DOS computers, *Diagnostics II* checks all components of the computer system. The program tests the microprocessor, the memory, the disk drives, the terminal, and the printer. The main tests and five quick checks are offered in the main menu. *Diagnostics II* isolates problems down to the level of chips and reports exactly where errors are found. List price: $125.
SuperSoft
1713 S. Neil St.
P.O. Box 1628
Champaign, IL 61820
217/359-2112

FiXT
If you want to start up (boot) the operating system from a hard disk, FiXT is a chip that provides a BIOS interface between the PC and the hard disk system. FiXT plugs into the unused ROM socket on the system board for the IBM PC-2 (the newer version with room for 256K). You can still use DOS's disk partitioning, formatting, and multiple operating systems. The chip works with hard disks from Datamac, Davong, Pegasus, Percom, and Zobex. List price: $70.
Golden Bow Systems
P.O. Box 3039
San Diego, CA 92103
619/298-9349

System Software

Languages

SUNDB86M
A DATABUS compiler for 8086/8088 and 80186 microcomputers, SUNDB86M offers professional business programmers a combination of features from BASIC, COBOL, and RPG. The language uses English verbs in a highly structured, columnar format. Ten definable codes can control display features such as color or secret input. SUNDB86M is written in machine code for quick execution, and it can incorporate subroutines written in assembly language. Sequential, random, and ISAM files are supported. List price: $495. Requirements: 128K, one disk drive.
Sunbelt Computer Systems, Inc.
5525 E. 51st St. #120
Tulsa, OK 74135
918/660-0670

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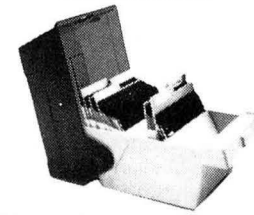

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Just Announced

Utilities

BasicWindow
BASIC programmers can use *BasicWindow* to design screens and incorporate them into programs. The utility consists of a screen editor, a driver, and a macro processor that translates a screen into BASIC statements. The screen editor supports color, inverse video, highlighting, and any BASIC graphics characters. The screen driver merges into a program without external libraries. List price: $99.95. Requirements: 96K, one disk drive, BASICA or a BASIC compiler.
G. Freeman & Company, Inc.
15 Albin Rd.
Stamford, CT 06902
203/327-9868

Professional Programming Environment (PPE)
Designed for those who program in MBASIC, the *Professional Programming Environment* is a set of tools that provides C-like sophistication. During programming, the *Structured Language Processor (SLP)* eliminates the need for line numbers in the source code and offers an English-like syntax. Source functions can be organized in a library by the *Macro Library Processor (MLP)* and passed to arguments with macros. List price: *PPE (SLP* and *MLP)* $55, *SLP* $35. Requirements: 128K, one disk drive, DOS 2.00.
Bendorf Associates
P.O. Box 5910
Roswell, NM 88201
505/347-5358

Applications Software

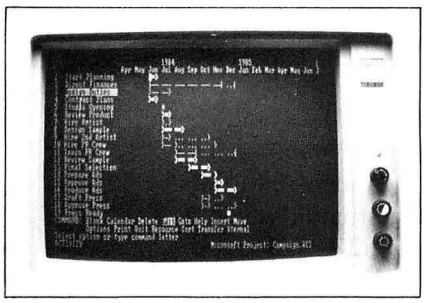
Accounting and Inventory

Back to Basics Accounting System
Small offices, entrepreneurs, and start-up companies can use the *Back to Basics Accounting System* as an introduction to the principles of accounting. The integrated system includes three modules: general ledger, accounts receivable, and accounts payable. The general ledger handles up to 254 accounts and has journals for cash disbursements, receipts, and sales. Accounts payable forecasts cash requirements and prints checks and mailing labels. Accounts receivable prepares bills and can print payment requests on statements when necessary. The manual uses the problems of a hypothetical company to illuminate basic principles and operations. The PC version includes all three modules; the PCjr modules can be purchased separately. List price: PC version $295, PCjr version $195, per PCjr module $95. PC requirements: 64K, two disk drives. PCjr requirements: 128K, one disk drive.
Management Science America, Inc.
3445 Peachtree Rd. NE
Atlanta, GA 30326
800/247-3224

Business Management

Microsoft Project
General business managers can plan schedules, assign resources, and develop budgets for large or small projects with *Microsoft Project.* The program works like a spreadsheet, using English commands similar to those in other Microsoft products. The criti-

cal path for a project is calculated automatically, and "what if" capabilities assess the impact of scheduling changes. A graphic display feature gives a visual schedule of activities. At any time, a resource cost table can provide a summary of the cost of completing a project. *Microsoft Project* includes a resource chart that shows when each resource will be or has been used and by whom. The program also has a report generator for analysis and presentations. Files can be transferred to *Microsoft Chart, Multiplan, 1-2-3,* or *dBASE II.* List price: $250. Requirements: 128K, (192K when used with the Microsoft Mouse), one disk drive.
Microsoft
10700 Northup Way
Bellevue, WA 98004
206/828-8080



Microsoft Project, Microsoft

Communications

PC/Net-Link

When using several information services, you can minimize the time on line with *PC/Net-Link*. Designed for use with Genasys's *Telios* communications software, the program stores the protocol for any remote data base, along with the access numbers and your passwords. You can automatically dial and log on to data bases such as Dialog, Dow Jones, or BRS. *PC/Net-Link* presents the various data bases in menus; help screens describe each service's commands and can include your notes on the service. List price: $550. Requirements: 128K, hard disk drive, Hayes Smartmodem 1200 or 1200B, *Telios.*
Informatics General Corporation
21031 Ventura Blvd.
Woodland Hills, CA 91364
213/887-9040

Data Management

dBASE III

A relational data base manager, *dBASE III* has a mode with menus and prompts that assists novices with commands. The program accommodates over 2 billion records per data base, 128 fields per record, and 4000 bytes per fixed-length record or 512K bytes per variable-length record. You can use ten data base files simultaneously. With the programming language you can develop applications using English-like commands. Designed specifically for 16-bit computers, *dBASE III* features quick sorting and indexing of data, with context-sensitive help available at any time. The program includes report and mailing-label facilities that can be modified. List price: $695. Requirements: 256K, two disk drives, DOS 2.00.
Ashton-Tate
10150 W. Jefferson Blvd.
Culver City, CA 90230
213/204-5570

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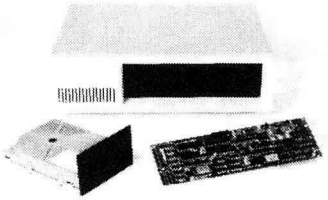

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Just Announced

Instant Recall

For people who want to include lengthy comments with data, *Instant Recall* is a flexible data manager that can store unlimited text for each record in a history file. The program also lets you append new information to a record while keeping the size of the record to 50, 100, 200, or 512 bytes. A computer with 128K can have up to 3000 records, and one with 256K can have up to 10,000 records. *Instant Recall* allows a maximum of 30 fields, and the program totals, selects, or sorts on any of them. The program, written in compiled BASIC, uses "pointers" stored in memory to retrieve the records. The default data base structure can be used, modified, or abandoned in favor of your own structure. A password ensures data integrity. List price: $245. Requirements: 128K, two disk drives.
Intelligent Systems, Inc.
490 Hickorynut Ave.
Oldsmar, FL 33557
813/785-0378

QINT/SQL

If you want to integrate microcomputer data processing with IBM mainframe data bases, *QINT/SQL* is data base management software compatible with IBM's *SQL/DS* and *Database 2* systems. The English-like query language is identical to SQL (Structured Query Language), the IBM mainframe language. The relational data base accommodates unlimited numbers of records and fields; you can sort on any number of fields and speed the process with up to 16 levels of indexes. When creating a data base, *QINT/SQL* automatically generates the optimal structure of tables based on replies to questions about how you will use the information. Each copy of the program comes with a unique "signature" chip that prevents data theft. *QINT/SQL* comes in three versions: *Query,* for data retrieval; *Query + Update,* for data entry and retrieval; and *Administrator,* for the creation and maintenance of data bases. Multiuser versions are also available. List price: *Query* $1000, *Query + Update* $1350, *Administrator* $2400. Requirements: 640K, hard disk drive.
QINT Database Systems Corporation
50 Waban Hill Rd. N
Chestnut Hill, MA 02167
617/527-9329

Entertainment

Gramarcy

A player tries to find all words that can be made from the letters of a given word in the game *Gramarcy.* You can take as much time as you need, but the game gives bonus points for finishing before the clock runs out. While you enter words, *Gramarcy* calculates and reports the number of words it has found. The program selects words from its own data base, to which you can add words. You can also enter a new word to find out how many words can be made from its letters. List price: for use with DOS 1.10 $33.95, for use with DOS 2.00 or later version $29.95. Requirements: 128K, one disk drive, color graphics board.
Robert L. Nicolai
4038 N. Ninth St.
St. Louis, MO 63147
314/621-0730

Hangman
Players guess a secret word the computer has chosen by picking letters of the alphabet when they play *Hangman*. The game comes in two versions: *Hangman for the Superintelligent* and *Foreign Language Hangman*. *Hangman for the Superintelligent* uses esoteric words, which are briefly defined, or famous sayings and quotations with the author's name provided as a clue. The game includes over 1000 words and has four levels of difficulty. Two or more people can also play against each other.

Foreign Language Hangman comes with a list of 700 basic vocabulary words in either French or Spanish and a utility program for creating your own word list. Words and phrases can be presented in English or translation with the clues given in the opposite language. List price: $20. PC requirements: 64K with DOS 1.10, 96K with DOS 2.00, one disk drive. PCjr requirements: 128K, one disk drive.
Norland Software
1014A W. Badger Rd.
Madison, WI 53713
608/255-0294

Integrated Applications

PractiWord, PractiBase, PractiCalc III
A family of three integrated programs, *PractiWord*, *PractiBase*, and *PractiCalc III* use many of the same commands, function keys, and features. Each program offers context-sensitive help, a simple command menu, and a second menu designed for more complex operations. You can "cut and paste" information between programs; data from one module can be manipulated by another.

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PractiWord is a word processor that automatically creates indexes and tables of contents, types in frequently misspelled or transposed words from abbreviations, and executes lengthy commands from macros. *PractiBase* stores up to 60 fields per record and can index and sort by any number of them. The data base has room for short memos about records, and it reads and converts *dBASE II* files. The spreadsheet module, *PractiCalc III*, lets you name groups of cells for quick access, highlight cells with color, and recover the last piece of data you deleted. A window can display a bar or density graph alongside your data. The programs are available separately and as a complete package. List price: one program $99.95, all three $250. Requirements: 128K, one disk drive.
Practicorp International Inc.
The Silk Mill
44 Oak St.
Newton Upper Falls, MA 02164
617/965-9870

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Adler Computer Technology
21777 Ventura Blvd. #228
Woodland Hills, CA 91364
213/703-0350

A.S.K. (Assessment Survey Kit)
You can design your own survey questionnaires and process the results with *A.S.K.* Designed for personnel and market research executives, the programs can help evaluate needs, training programs, work environments, and general topics. Once you have designed the questionnaire and the answer sheet, you can enter data and compose a statistical summary. Correlations between questions and groups of respondents can be studied, and data from different groups can be merged. List price: $295. Requirements: 128K, one disk drive.
Albrecht & Associates
P.O. Box 99097
San Diego, CA 92109
619/272-3776

Personal Management

Financial Cookbook
If you want help making personal financial decisions but don't want to bother with complex models and calculations, the *Financial Cookbook* uses your answers to its questions to project costs. Working like a big "what if" program, it can help you find out how much you need to save to send your kids to college, whether to lease or buy a car, how much life insurance you need, or how to refinance your home. The program covers topics such as taxes, banking, investments and IRAs, insurance, mortgages, and energy-saving devices. Calculations for 11 basic tax shelters are included. List price: $50. Requirements: 64K, one disk drive.
Electronic Arts
2755 Campus Dr.
San Mateo, CA 94403
415/571-7171

Word Processing

The Business Letter Library
Over 200 model business letters for sales, acknowledgments, complaints, thanks, credit, and collection come in *The Business Letter Library*. A search function helps you locate specific letters by selecting from menus. The letters can be altered, or you can use them in their present form by filling in the blanks for dates, names, and amounts. When you want to write the letter yourself, a KeyStyle feature lists items that need to be included in a particular kind of letter. *The Business Letter Library* contains ASCII text files. List price: $99.95. Requirements: 64K, one disk drive, a word processing package.
Delta Point Corporation
711 W. 17th St. #B-10
Costa Mesa, CA 92627
714/642-1827

Miscellaneous

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Data Resources, Inc.
24 Hartwell Ave.
Lexington, MA 02173
617/863-5100

Publications

Used Computer Guide

A blue book for computers, the *Used Computer Guide* lists the market value for 260 models in typical configurations. In addition the guide lists microcomputer brokers, contains advertising advice covering bulletin boards and periodicals, has a section for selling obsolete equipment, and includes a trivia section on market trends such as fast printers or popular software. The *Used Computer Guide* is published quarterly. List price: single issue $14, biannual subscription $25.
The Hansen Publishing Company
P.O. Box 1194
Mercer Island, WA 98040
206/232-7709

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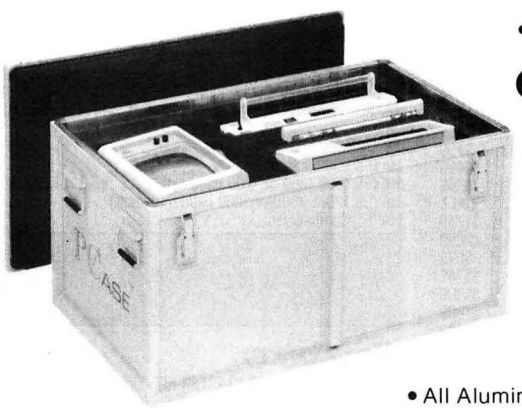

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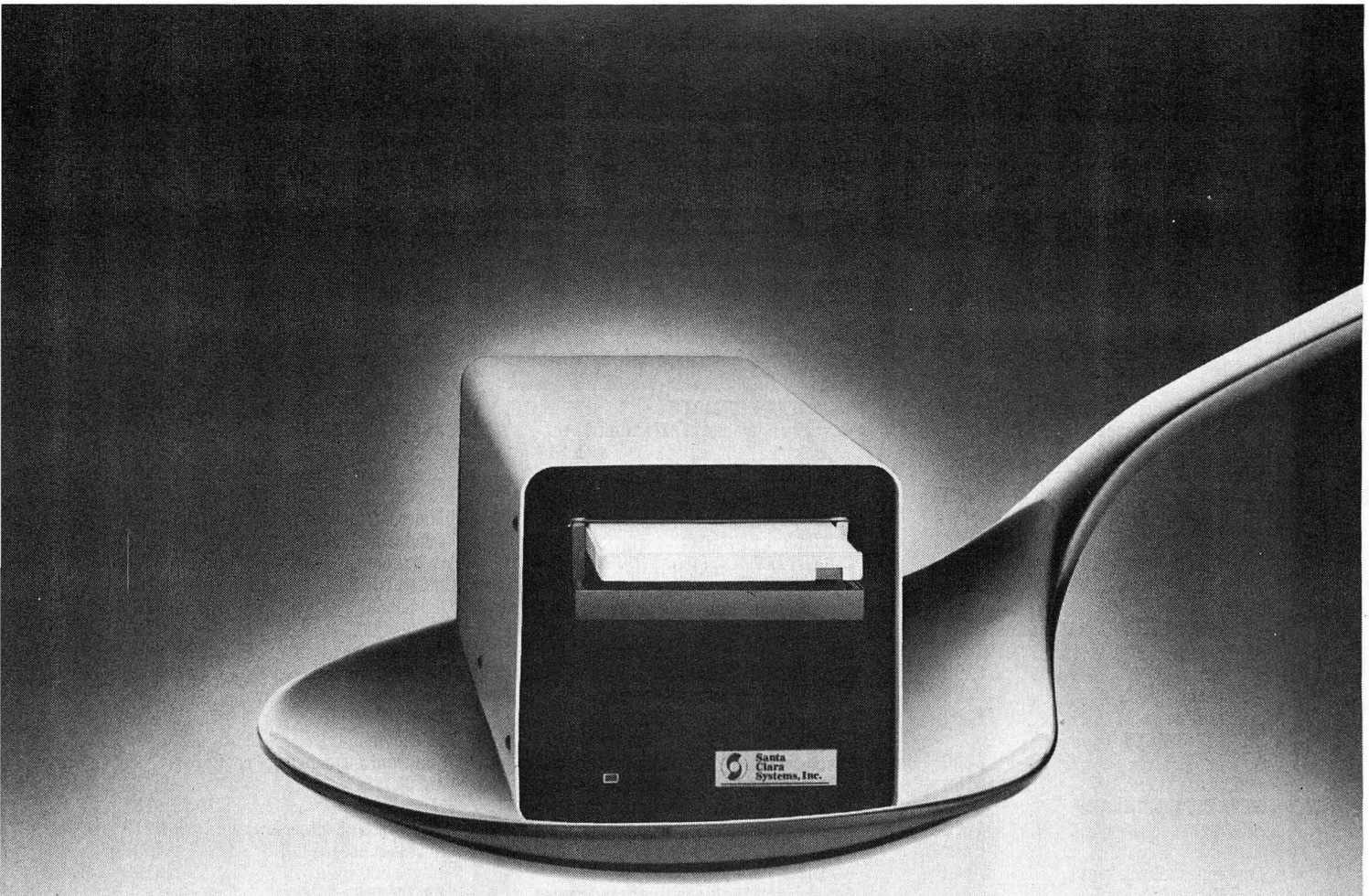

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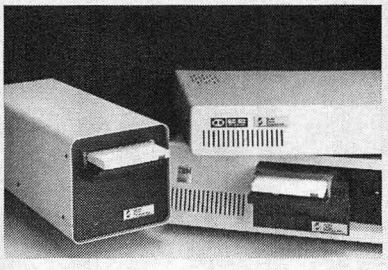

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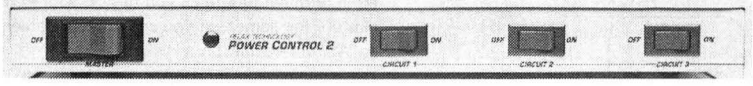

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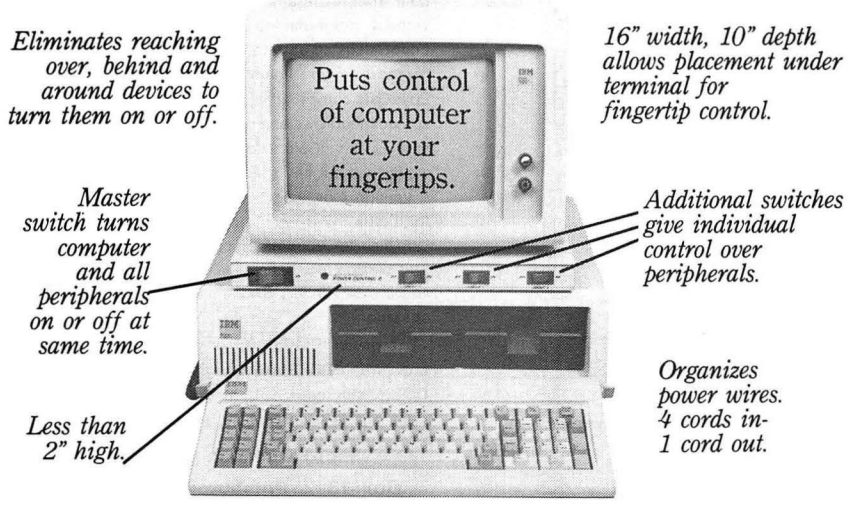

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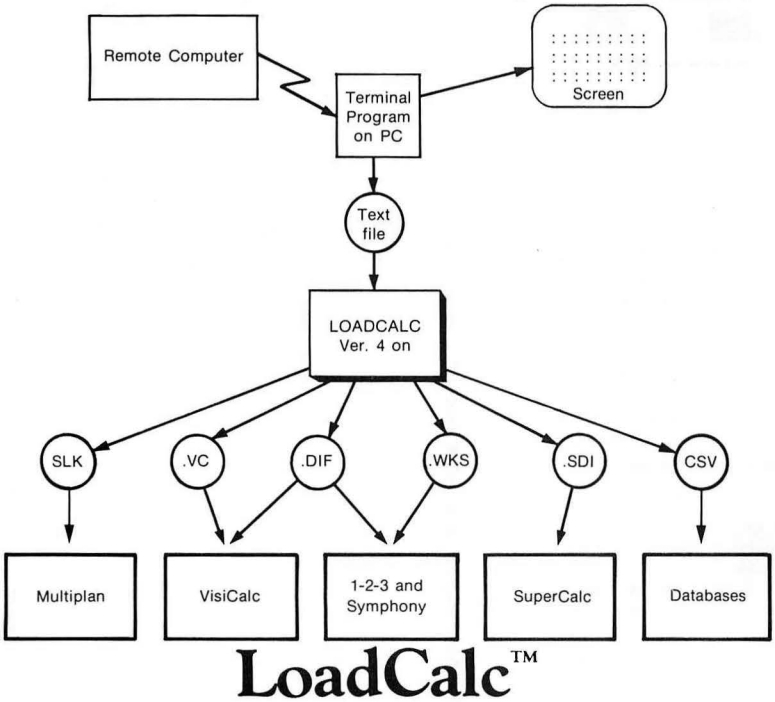

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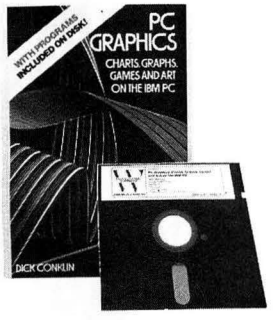

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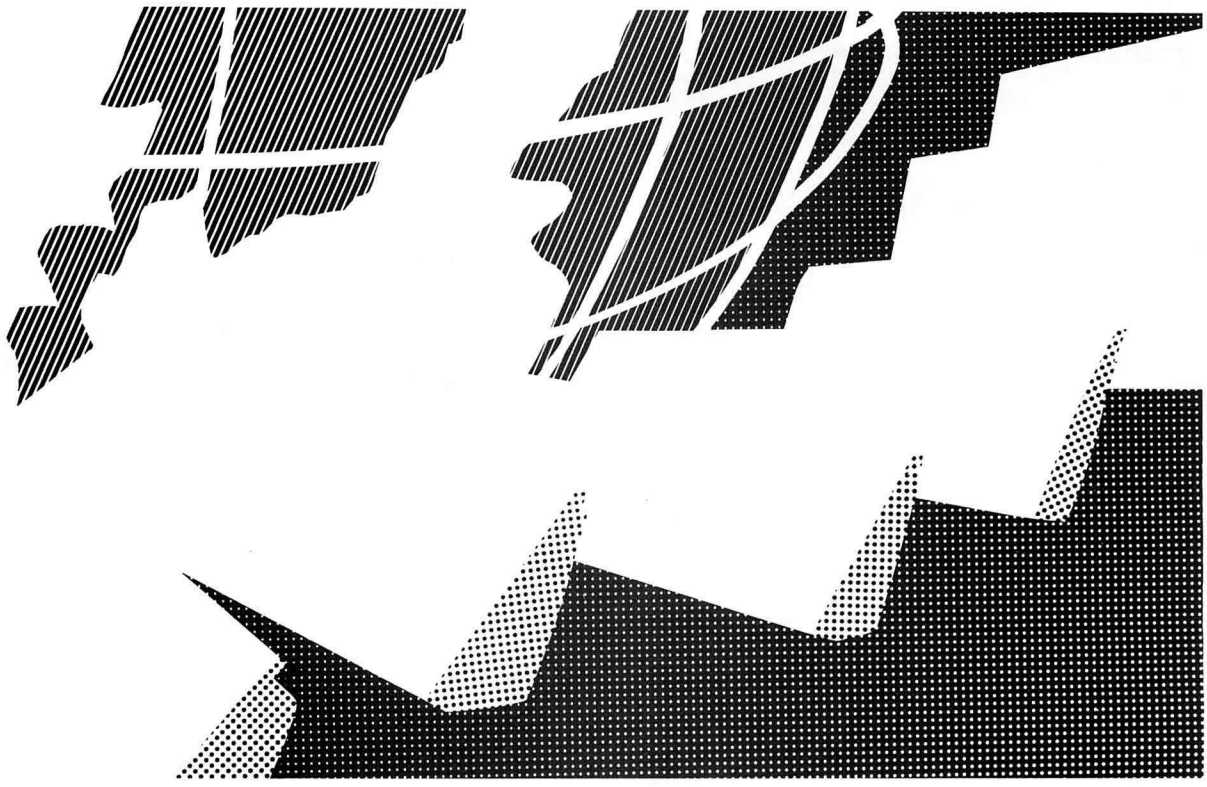

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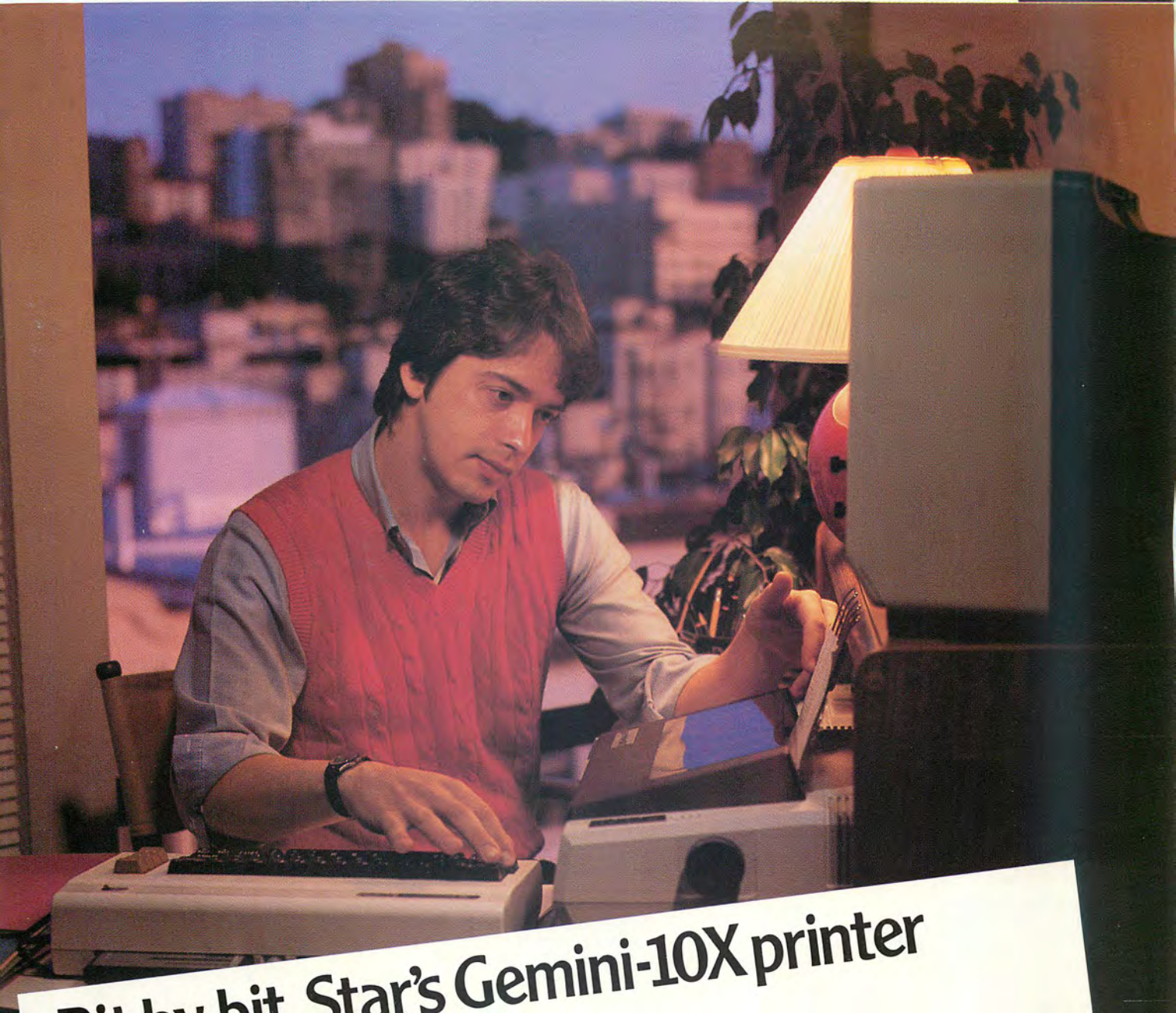

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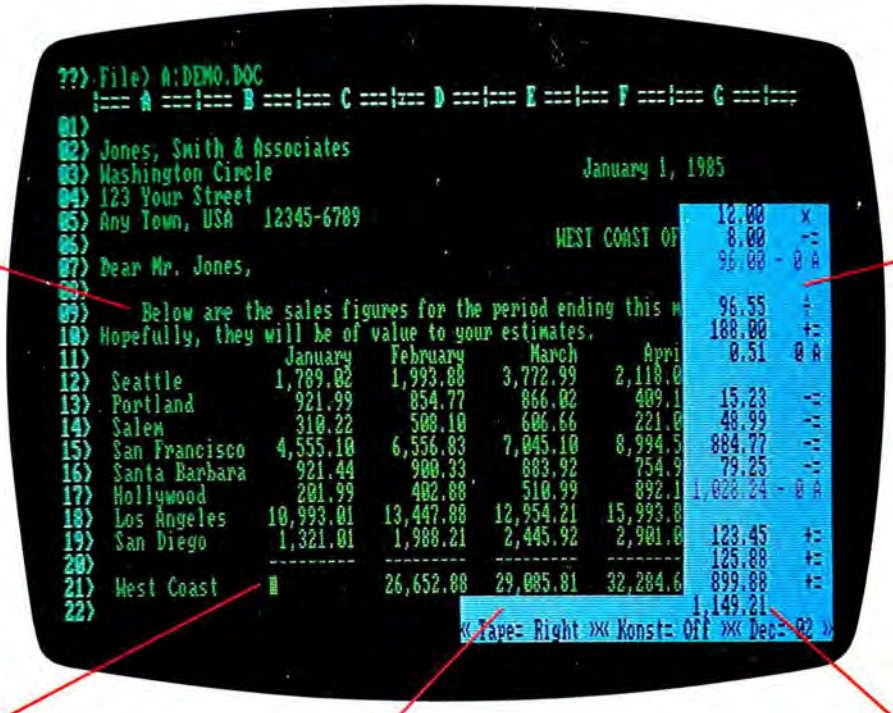

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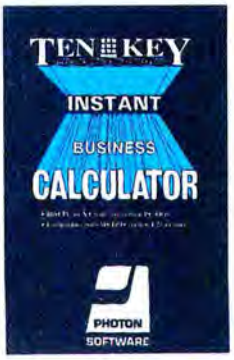

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