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PC WORLD

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*The Comprehensive Guide to
IBM Personal Computers and Compatibles*

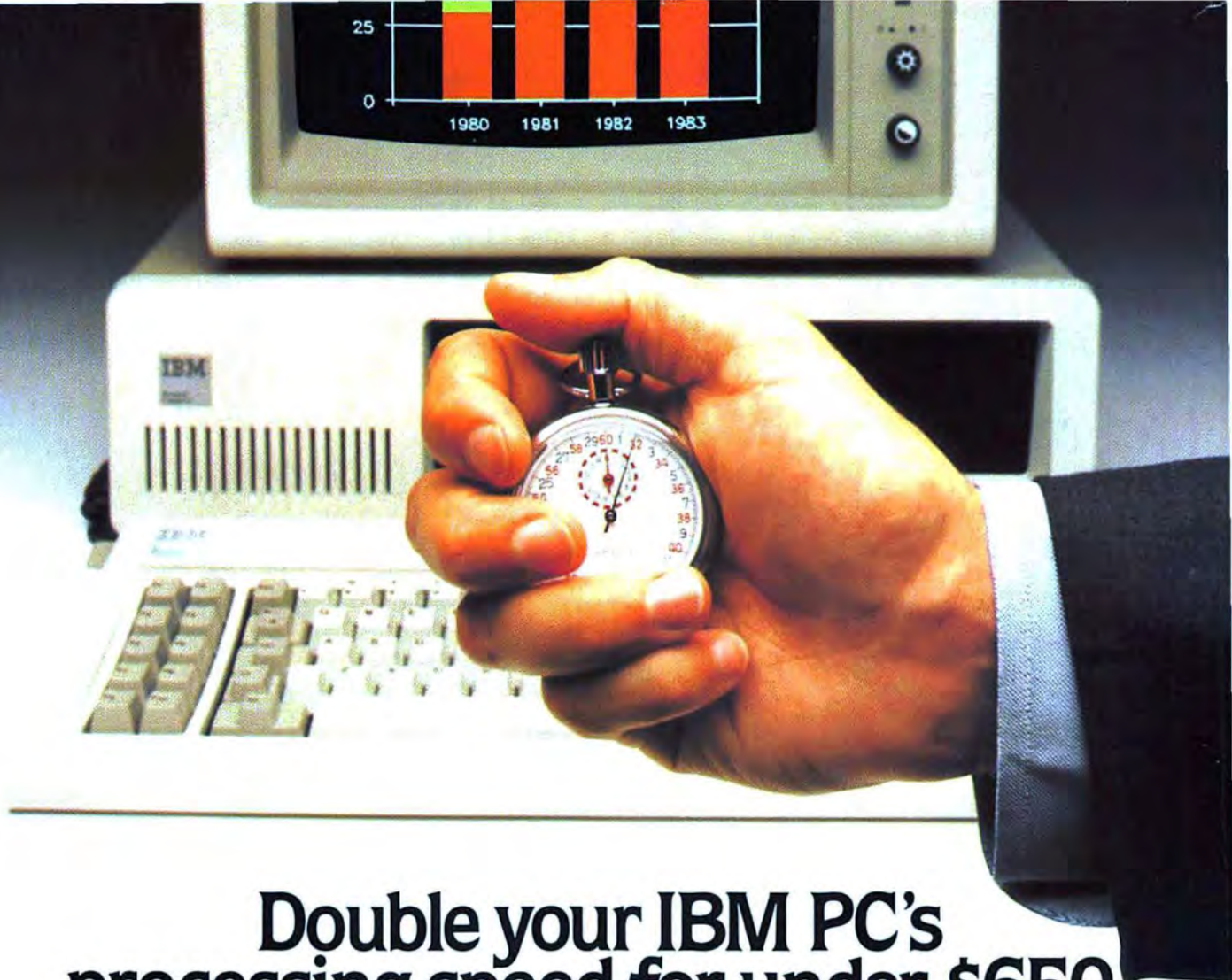
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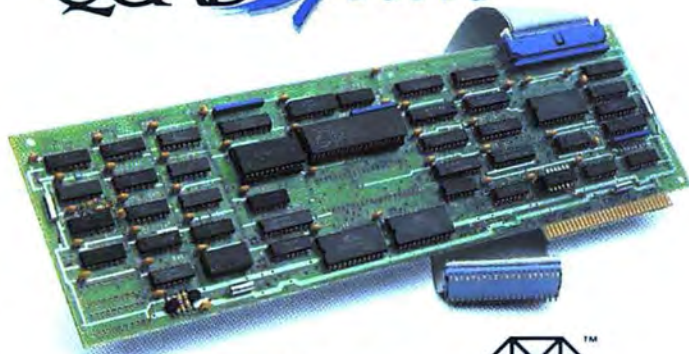
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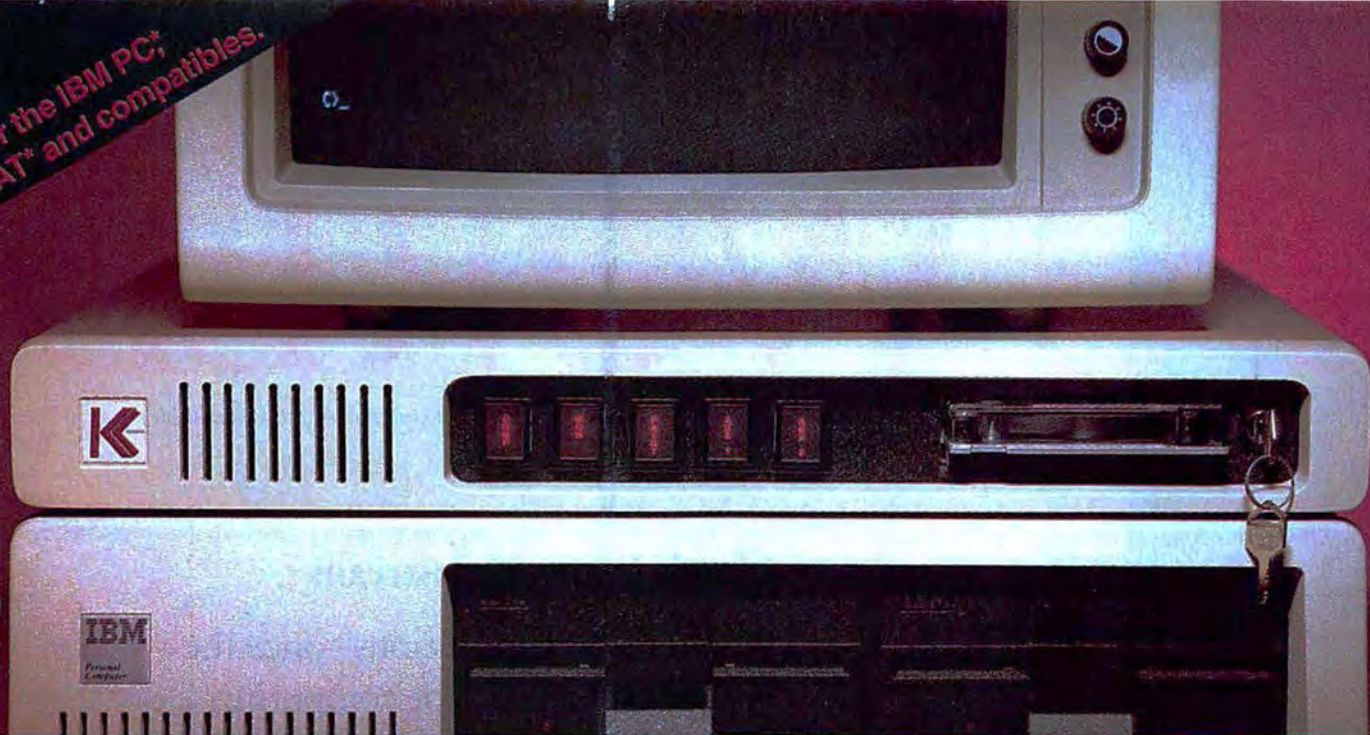
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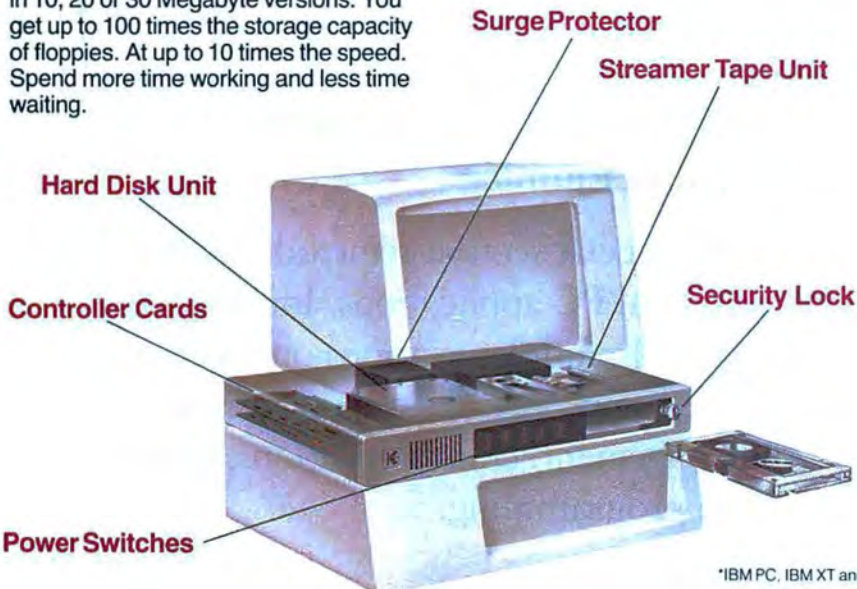
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PC WORLD

The Comprehensive Guide to IBM Personal Computers and Compatibles
May 1985



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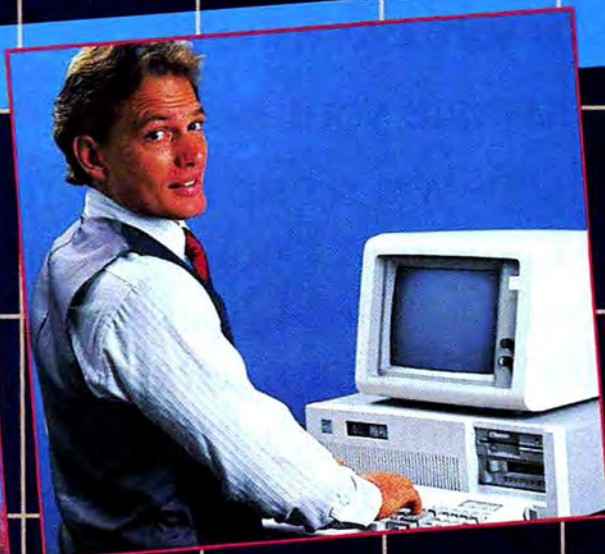
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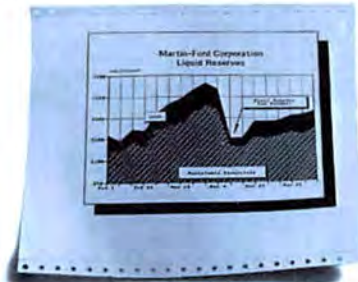
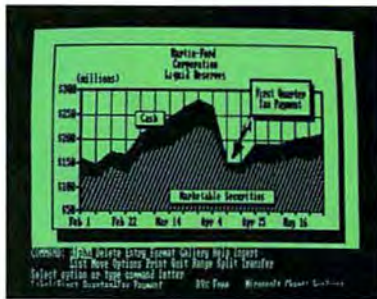


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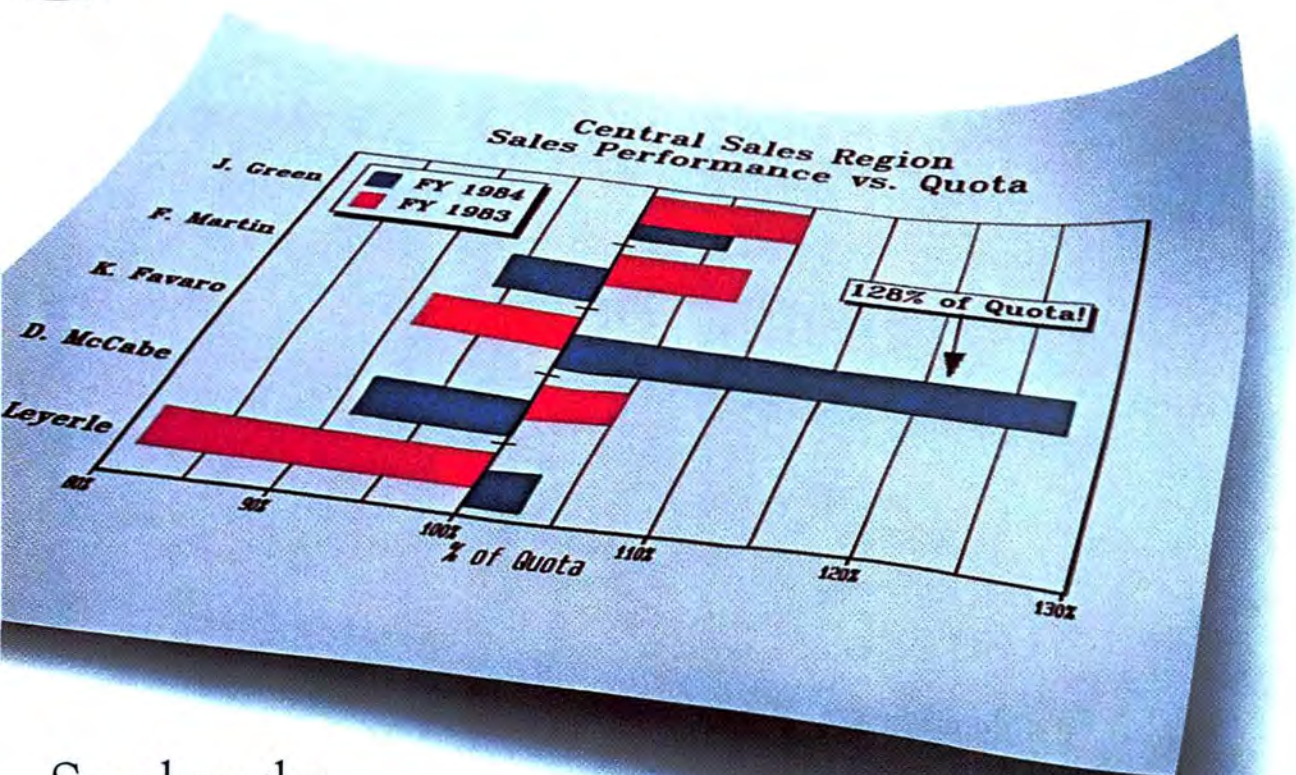
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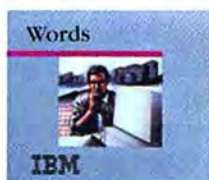
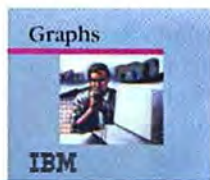
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Software Piracy— One More Time



David Bunnell

Copy protection: balancing user convenience and software publishers' livelihoods

While having lunch with *InfoWorld* columnist John Dvorak recently, I began lamenting that my column was once again late and that I was having a hard time figuring out what to write about. Dvorak, noting that I hadn't written about software piracy for quite some time, suggested that I break down and do my "annual" piracy column.

Initially, I resisted this idea, thinking that software piracy is a worn-out issue—computer writers have been pontificating about it for years with no visible impact. We all know it's a hot issue for software publishers, and there are always several opinions being aired, but nothing is ever accomplished or changed. It may be the one aspect of personal computing that is resistant to updates.

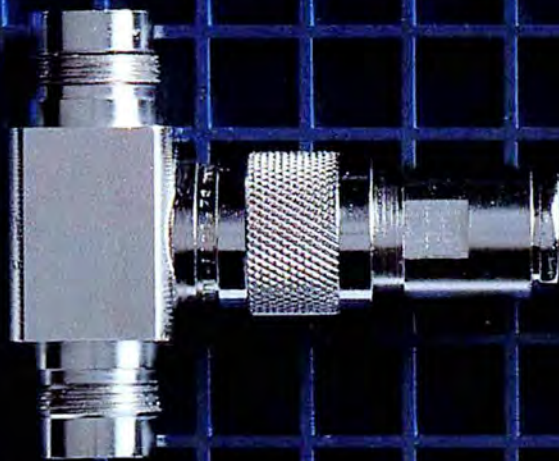
Software piracy appeared in the personal computing arena about ten years ago—almost immediately after Bill Gates shipped the first copy of Altair BASIC (also called MITS BASIC). Bill noticed that there were suddenly thousands of copies of Altair BASIC in use but only hundreds of actual sales; thus

his anticipated royalties were not materializing. He took action in the form of an open letter to computer hobbyists, which was widely published and discussed. However, the now defunct California Computer Society was so irritated by Gates's accusation that most hobbyists steal software that they threatened a class action lawsuit.

One reason for the frequent copying of Gates's original BASIC was Altair's two-tier pricing policy. If you owned an Altair, you could buy BASIC at a reasonably low price, but if you owned a compatible (such as an IMSAI), the program cost four times as much. Most software publishers, pointing to the rampant copying of low-cost games, claim that price is not a factor and that people copy software regardless of its cost. However, publishers don't seem willing to back their postulations.

John Dvorak contends that publishers refrain from copy protecting their programs as a marketing

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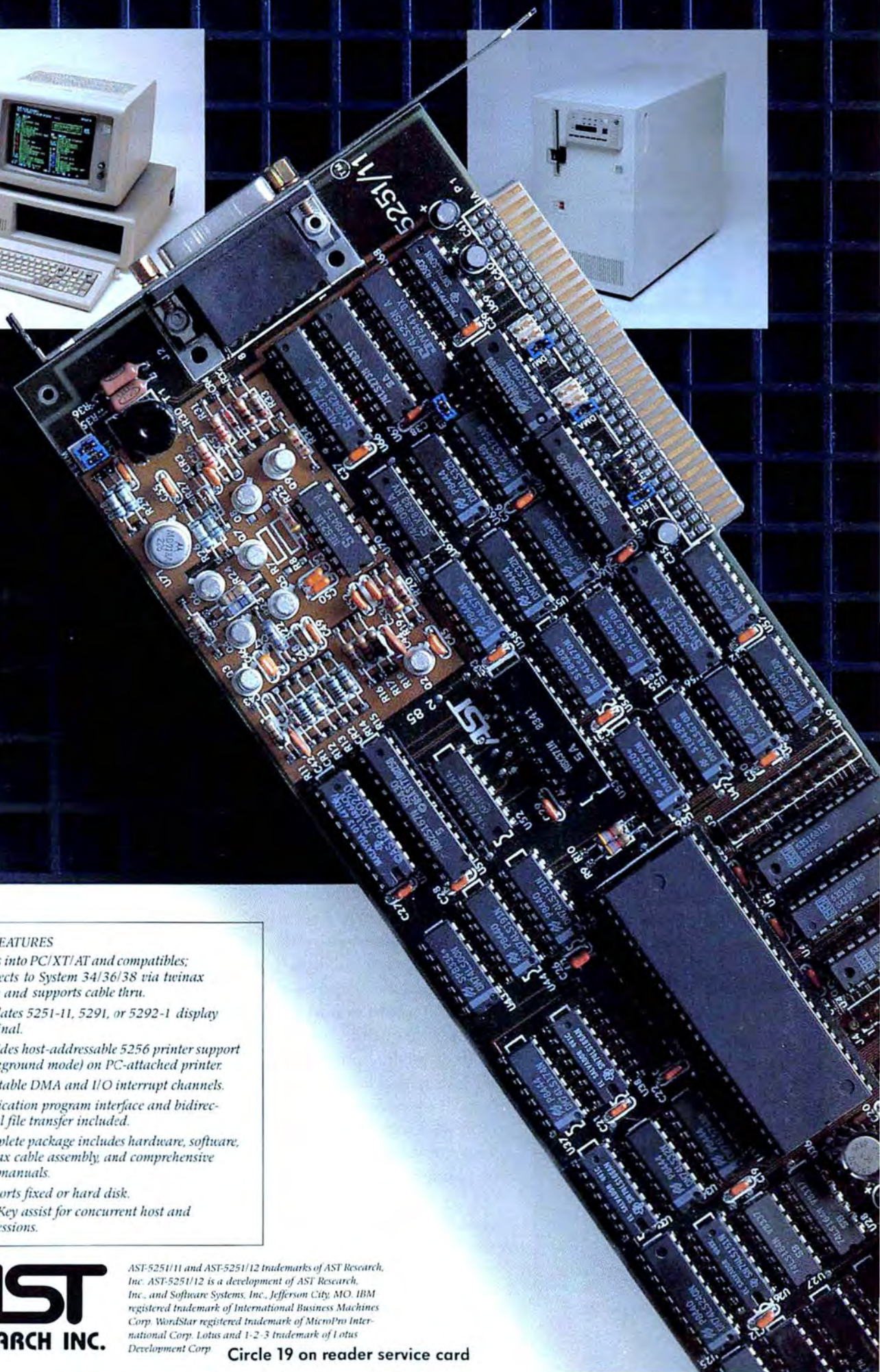
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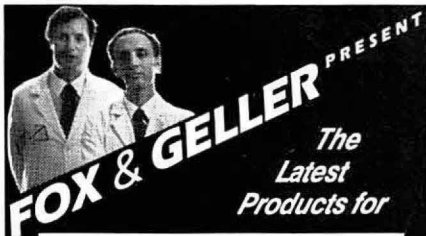
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tactic. His theory is that most pirating is done by computer enthusiasts who—if they like the software—will recommend it to their friends or business associates and influence buying decisions. This concept is finally being tested, by Borland International and other software publishers.

And some manufacturers are driven by a tremendous respect for the user's convenience. Seymour Rubinstein and Glenn Haney cited that motivation when they announced that MicroPro was removing the copy protection from *WordStar 2000*.

A program that is not copy protected has definite ease-of-use advantages. Because, let's be honest, most copy protection schemes are a pain in the neck. It is hard to imagine that there could be a single PC user with a hard disk who hasn't been seriously inconvenienced by copy protection.

Generally, copy-protected software can be installed on a hard disk system fairly easily, but once you've transferred the program, you cannot start it without inserting the system disk into the floppy disk drive. This may seem trivial to software publishers or PC owners without hard disks, but consumers don't spend all that money on a hard disk to still be juggling floppy disks.

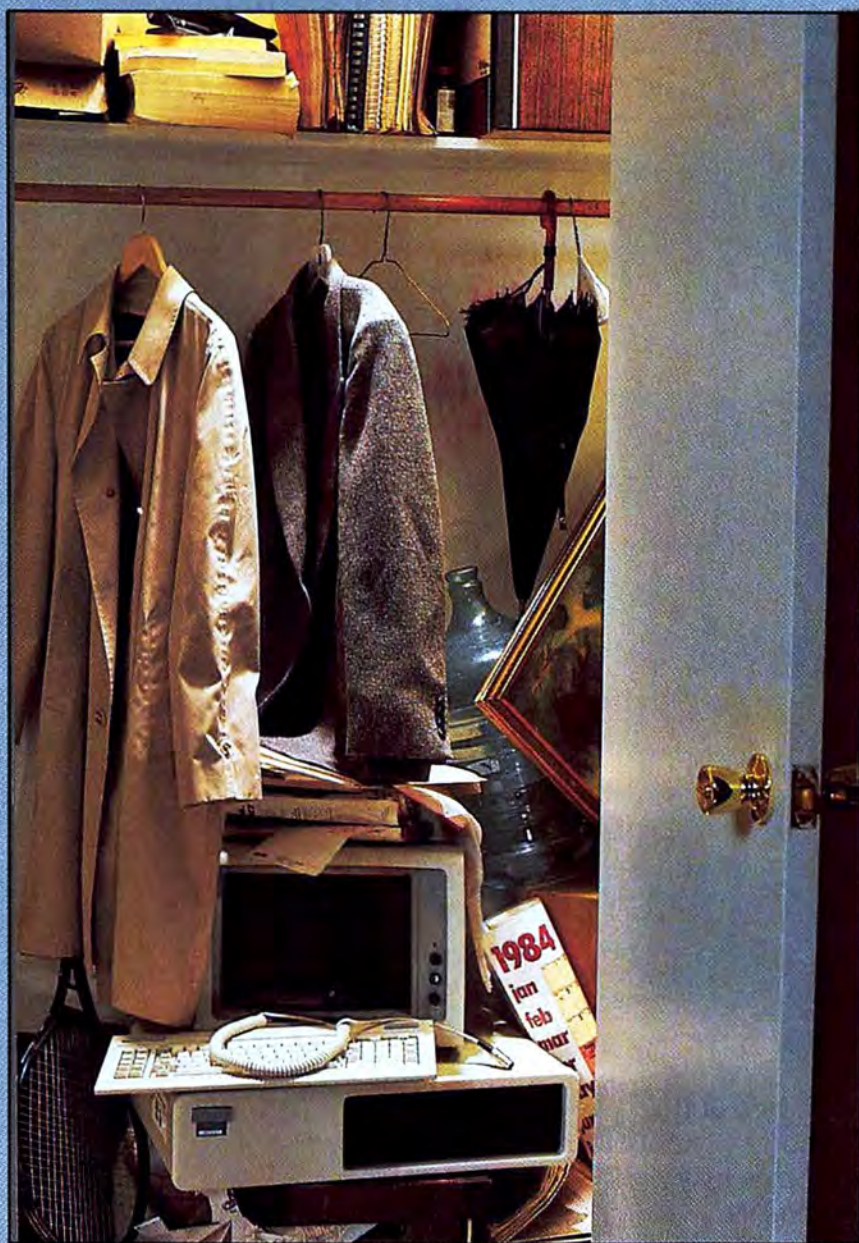
For example, I often use a Compaq-Plus with a hard disk at home in order to work in the evenings or on weekends. Despite the computer's portability, gathering up files, budget sheets, and disks can be a big production. So it is incredibly frustrating when I discover, after clearing table space,

opening my computer, and plugging it in, that I have forgotten to bring along my Lotus master disk. The 1-2-3 budget files and 1-2-3 itself are on the hard disk, but without the master, the program won't boot up. My only alternative is to drive back to the office. Luckily, I don't live very far away.

I still have nightmares about the time I started to boot *Framework* and accidentally inserted my *Symphony* master disk—it garbled my entire *Framework* directory. At that point, since my next major magazine project was on that directory, I considered calling Melvin Belli—but I didn't know who to sue, Lotus Development or Ashton-Tate.

Horror stories and frustrations aside, new ideas continue to surface. For instance, an organization of software publishers called ADAPSO, the Association of Data Processing Service Organizations, wants to establish a hardware-based system of copy protection. Under this plan a "key ring" would be plugged into the RS-232C serial port with a pass-through connection that would still allow you to use the port for other things. The key ring would contain keys to individual applications. This protection system would enable you to make as many backups as you wanted and load software onto a hard disk without bothering with a master floppy. To move to another computer, you would simply move the key ring.

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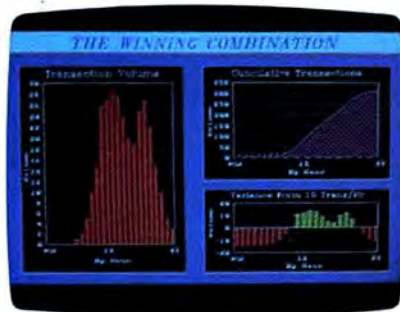


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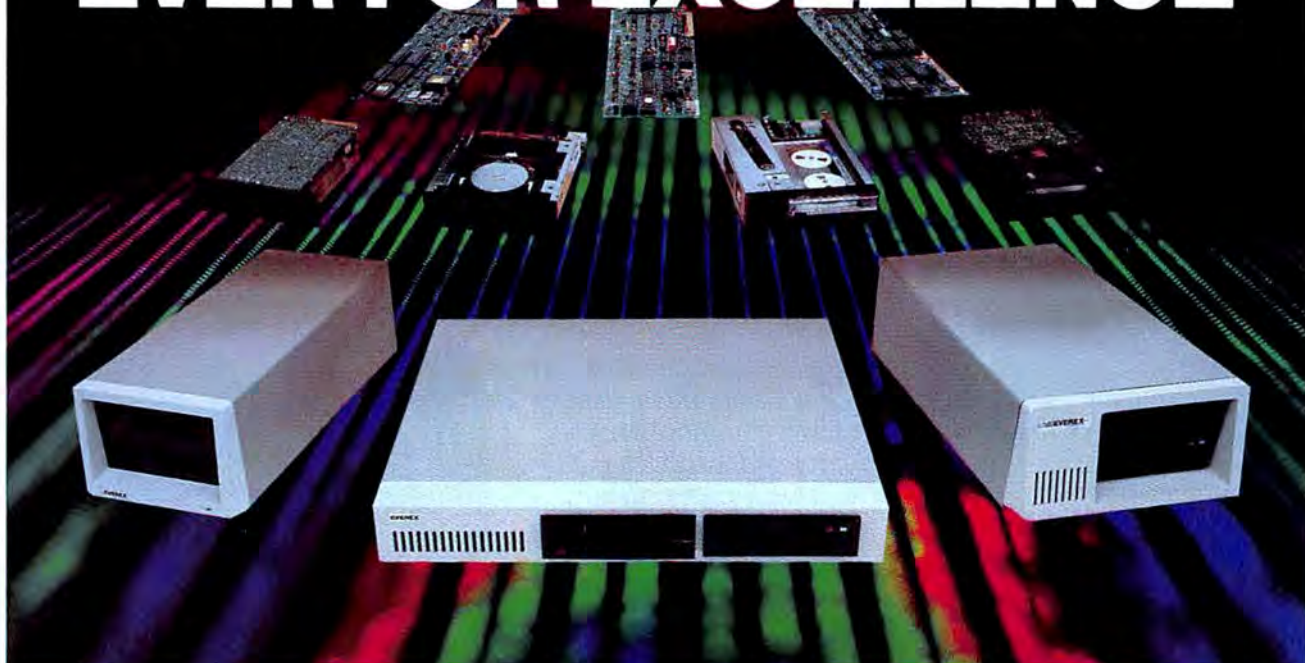
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There is a certain logic to the ADAPSO proposal once you assume that copy protection is necessary. However, the president of a major software company has already complained that ADAPSO's intention is to limit the amount of software on the market and protect the high price of software—making it a very elaborate price-fixing conspiracy.

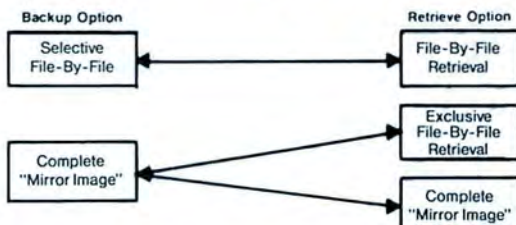
According to the research firm Future Computing, 50 percent of all business software is unauthorized, and every four unauthorized copies represent one lost sale. They estimate that piracy cost software publishers \$600 million in lost revenues in 1984. Thus, you might think that the copy protection movement is driven solely by the software publishers' self-interest. However, Mitch Kapor, chairman of Lotus Development and an outspoken proponent of copy protection, for one, seems completely sincere in his desire and efforts to find a solution to the piracy problem that won't inconvenience end users.

You have to have some sympathy for the notion that programmers, like writers and musicians, have a right to control and benefit from the distribution of their work. But copy protection may be destined to remain one of those ethical gray areas about which nobody will ever agree. Until a mutually beneficial arrangement is reached between the publishers and the users, at least Dvorak and I will always have a column topic when we really need one. ●

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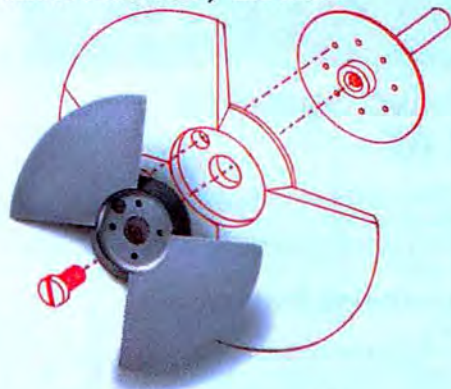
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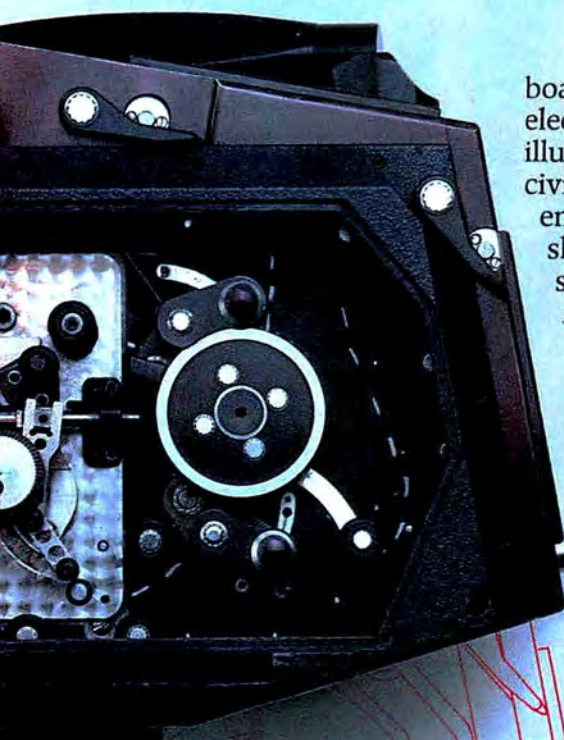
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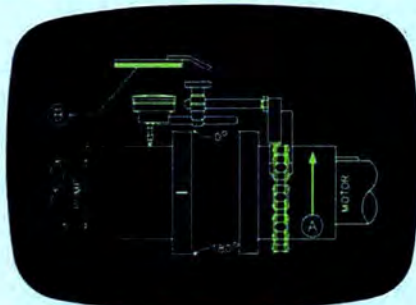
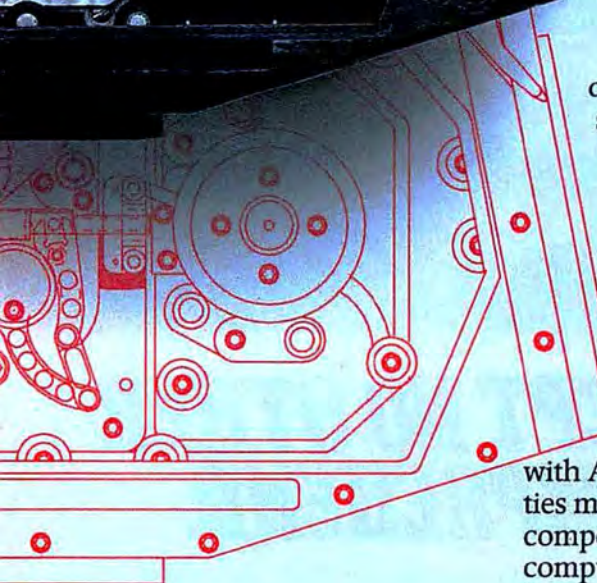
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Eric Brown

Encyclopedia Electronica

This month PC World explores the universe of on-line data bases—and takes H. G. Wells along for the ride.

I want to suggest that something which for a time I shall call a World Encyclopedia is the means whereby we can ... bring all the scattered and ineffective mental wealth of our world into something like a common understanding. ... This World Encyclopedia would be the mental background of every intelligent man in the world. It would be alive and growing and changing continually under revision, extension, and replacement from the original thinkers in the world everywhere.
—H. G. Wells (1936)

H. G. Wells never owned a modem, yet he prophesied to a great degree the impact of the vast stores of knowledge available through on-line services. Not only does the sum of on-line information far surpass that which can be found in a traditional library, but the information can be searched for in new and unique ways. By virtue of its powers of selection, the PC can be a solution rather than a contributor to the problem of information overload.

For many telecommunicators, the on-line world ends after CompuServe and The Source.

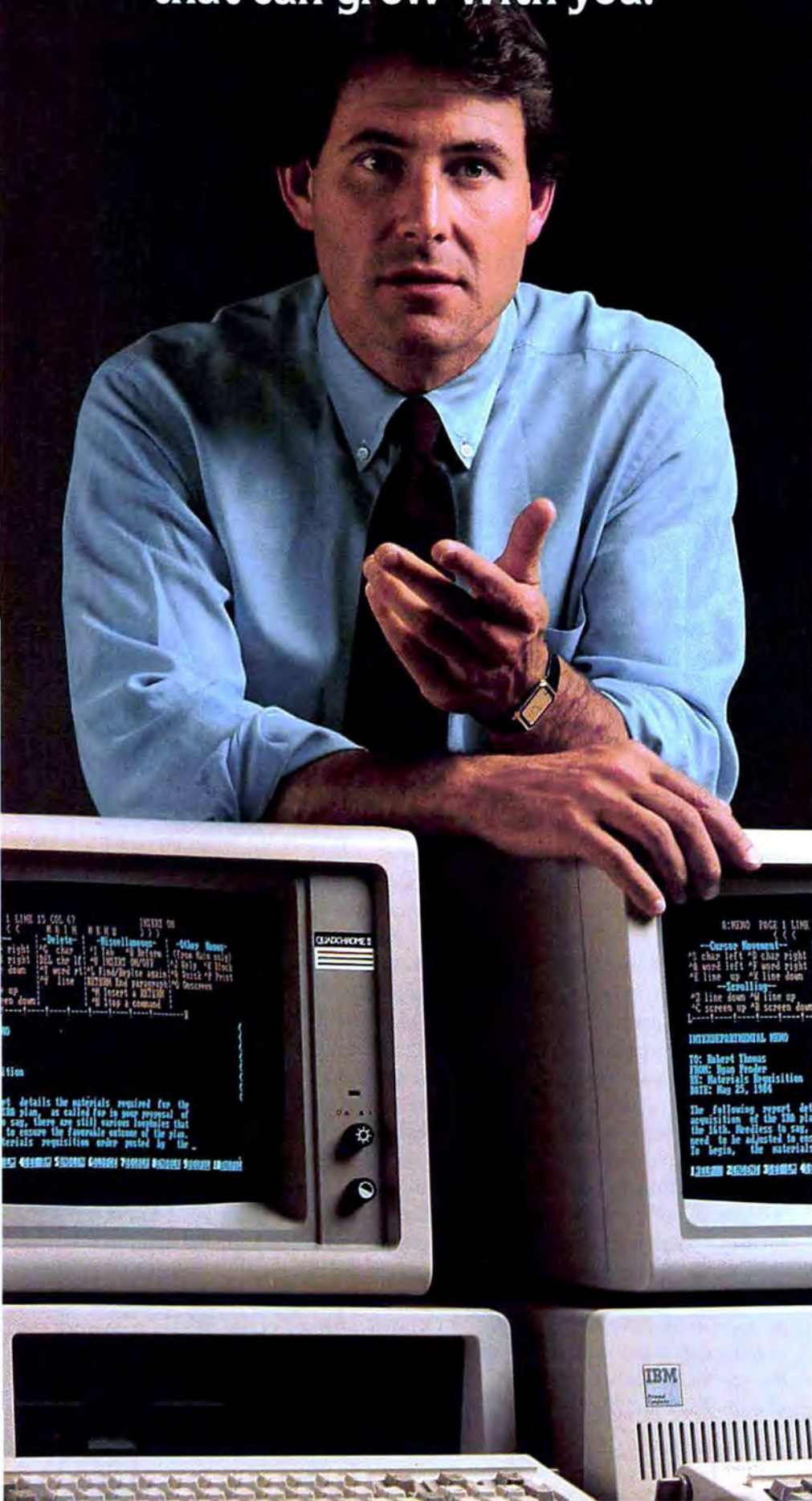
While those services provide a wealth of information as well as entertainment, banking, and shopping services, their combined data accounts for only a fraction of the information that is accessible by modem. Electronic libraries dedicated to the professions have been around for decades, serving a small audience of professionals tuned into dumb terminals. However, with the sudden arrival of microcomputers, on-line data base services have blossomed and are increasingly relied on as necessities.

As the demand for fresh data increases, the on-line retrieval business is turning into a \$2 billion a year industry, growing at a rate of 35 percent annually. Most data bases consist of bibliographic abstracts of thousands of journals from around the world. Yet the trend is toward full text data bases that provide the desired information without the extra step of ordering and waiting for the mail.

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whelmed. In "Tapping Into On-Line Data Bases," Chris Yalonis and Anthony Padgett provide an overview of available services and data bases and lead you through the steps to going on line for the first time.

One offshoot growth industry of the on-line world can be found in software and services that make

vide insights that were never possible with a weekend spent at the Dallas Hilton.

Compared to traditional libraries, on-line data bases have one major drawback: Although they contain an estimated 90 percent of everything published in the last ten years, they carry little material written before that. However, the

The on-line retrieval business is turning into a \$2 billion a year industry, growing at a rate of 35 percent annually.

searching easier. In the "Review" section, Jeremy Joan Hewes takes a look at gateway systems—on-line services and PC software that act as intermediary guides to other services.

The key to successful searching lies in mastering the sophisticated search commands provided by the various services. In "On-Line Search Strategies," Barbara Newlin shows how to develop a sound search strategy and provides helpful tips that work on all the major on-line data bases.

Finally, Lisa Stahr describes another side of the on-line world: teleconferencing. Companies large and small are finding that meeting by modem can save on travel, postage, and phone costs and pro-

libraries of the world are now being scanned with optical character recognition (OCR) devices and their contents placed on line. Eventually the sum total of the world's past knowledge will be available through the modem, and H. G. Wells's dream of a World Encyclopedia will come true. Whether it will lead to a "common understanding" is still a matter for conjecture. ●

Eric Brown is an Associate Editor of PC World.

If you don't have a Hercules Graphics Card, you could end up looking like this:

"I know, because one day it happened to me . . .

"I was running some routine tests on a non-Hercules monochrome graphics card when I was struck by a severe case of *low resolutionitis*. I'm the president of Hercules and that's me exhibiting the symptoms of the disease in its advanced stages. Not a pretty sight, is it?

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"Fortunately for me, a Hercules Graphics Card was nearby. A quick change brought soothing 720 x 348 graphics. That's twice the resolution of ordinary 640 x 200 graphics cards.

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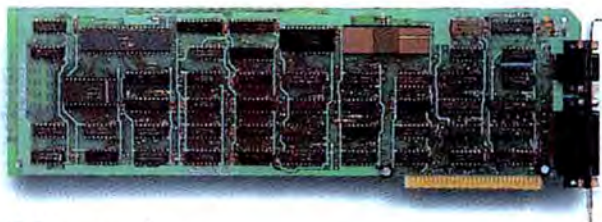
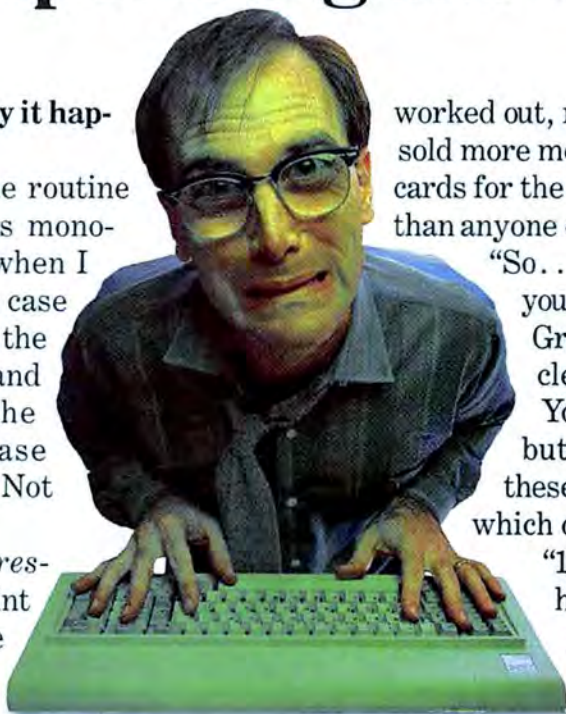
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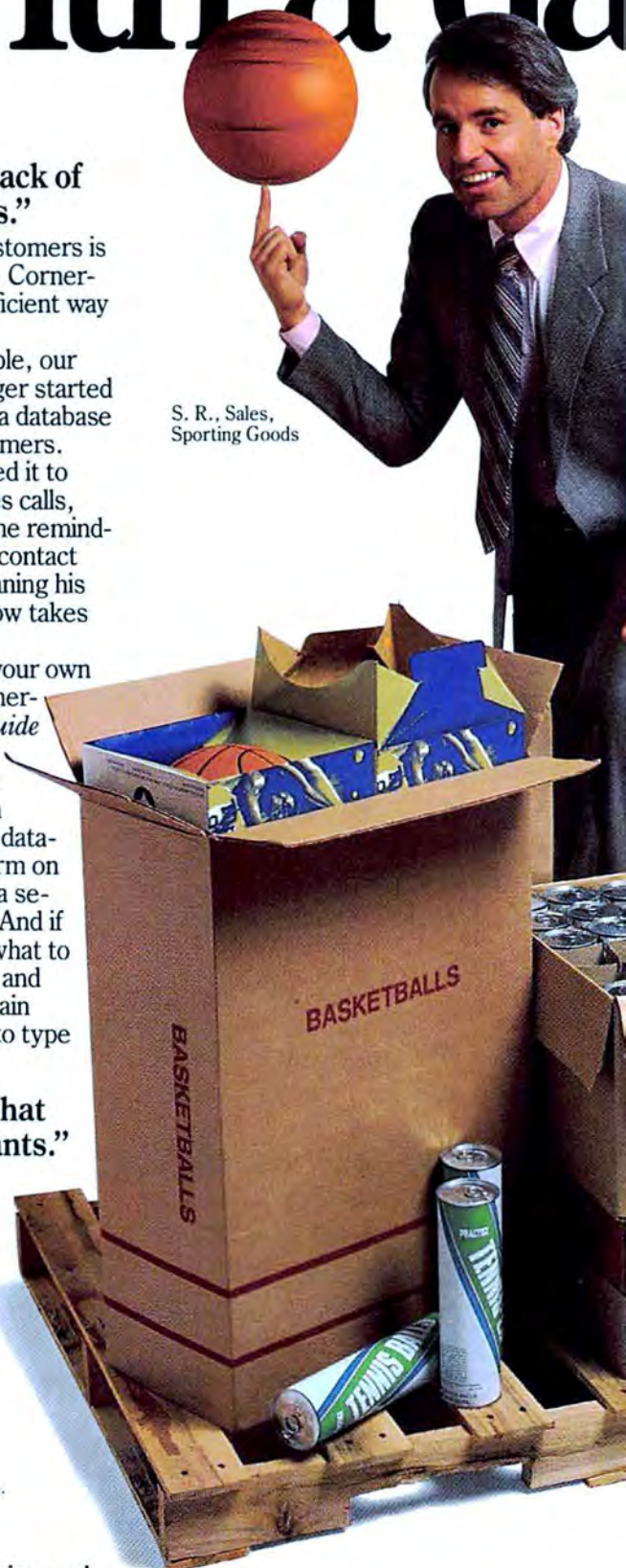
Then he used it to organize his sales calls, with Cornerstone reminding him who to contact and when. Planning his monthly trip to Seattle now takes just seconds.

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propriate discount. Cornerstone can also keep a running summary of orders by customer and region.

```

Select a command from the menu. Use arrow keys or type the command.

```

FILE	ORDERS	CUSTOMERS	REGIONS	REPORTS	HELP
Open	Print	Find	Print	Print	Print
Save	Print	Find	Print	Print	Print
Quit	Print	Find	Print	Print	Print

Summary Orders

Sales Rep	Account	Region	Order #
Abel	Fleet Feet, Inc.	Washington	1001
Abel	The Whiffles & Sons	Washington	1002
Hayes	Quality Sports	Washington	1003
Subtotals For Washington			22870.00
Schwartz	Adding Sporting Goods	Oregon	1004
Schwartz	Nike Portland	Oregon	1005
Subtotals For Oregon			17930.00
Harley	Oakland All Market	Bay Area	1006
Subtotals For Bay Area			11000.00

File Orders Previous mode: Initial File viewed: 1

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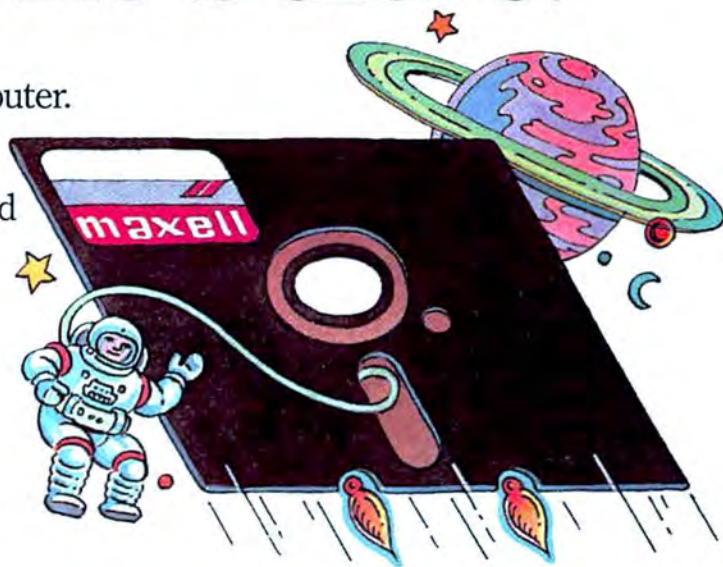


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Letters

Reactions and responses from the PC World community



Getting the Story

The chart included with "Word Processing '85" [PCW, January 1985] indicates that IBM's *DisplayWrite 2* can create ASCII files. If this is true, I'd love to know how it's done. A friend of mine who writes for television bought the program, hoping to use it with MCI Mail for transmitting scripts to his story editors.

I'm one of his story editors.

Steve Gerber

New York, New York

You can create an ASCII file with DisplayWrite 2 by printing to disk, a trick you won't find in the documentation. As David Beckman noted in "DisplayWrite 2: In the Corporate Mold" (PCW, January 1985), the program reads ASCII files with its Get function.—Ed.

The First Word Processor

Janette Martin's brief history of word processing ["New Dimensions in Word Processing," PCW, January 1985] cites 1964, when IBM introduced the MT/ST, as the watershed year for word processing. Although 1964 was a very good year—the year we [at IBM] announced the System/360—it was not the beginning of word processing.

In my opinion, word processing began the day in July of 1961 that I received approval from Fred Brooks, Jr. (manager of the System/360 project), to start work on my text editing proposal called Project Ross. With the help of many programmer friends, the first level was up and running on an IBM 7094 in 1962, but we could print only 64 characters at a time.

The System/360 I/O interface manual was printed with Project Ross and an IBM 1403 printer, a

computer in itself. A version of Project Ross was released to IBM customers as a Type II 7094 program in 1964. A third version was released for the System/360 sometime later.

James W. Franklin

Hopewell Junction, New York

For those of us not conversant in mainframe, the System/360 was the first programmable processor. It was the brainchild of the "Wise Men of the East" who worked at IBM in Poughkeepsie, New York. The IBM 7094 was one of the PC's ancestors, with tubes and boards that had to be wired by hand.—Ed.

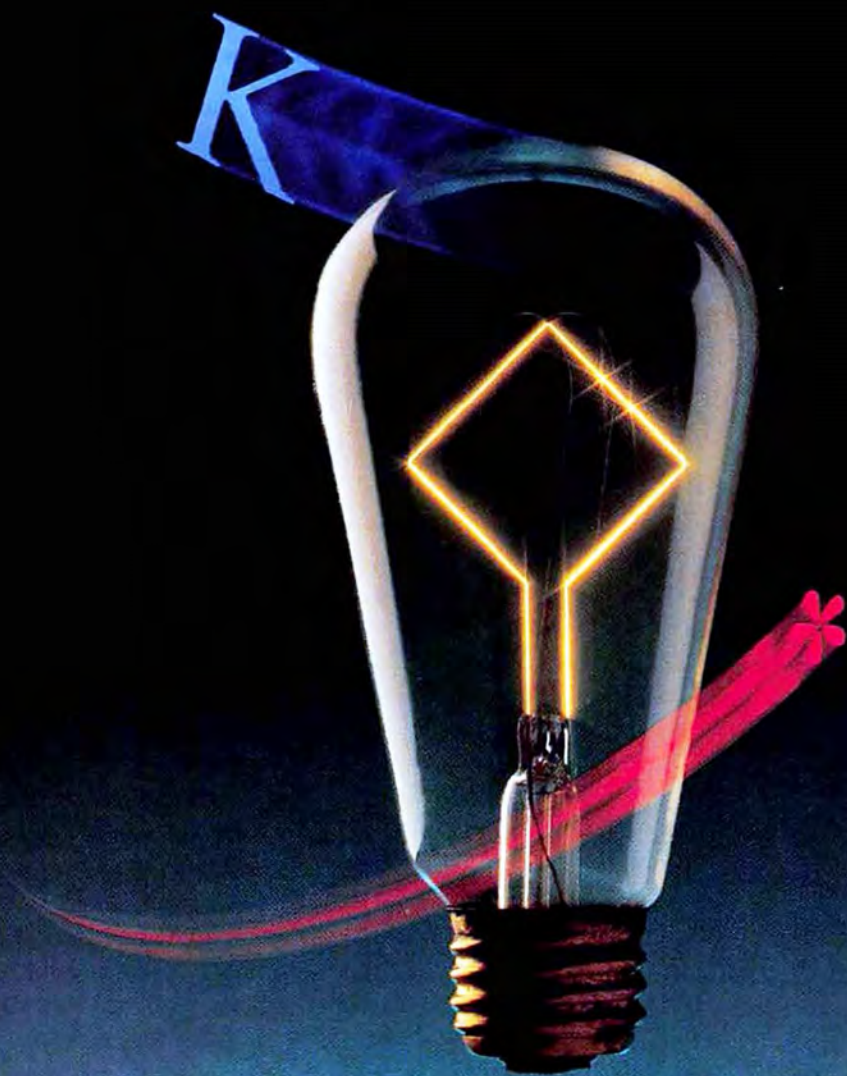
Perfect Knowledge

I congratulate you for commissioning an economist to write a REMark about the prognosis for the microcomputer market ["Predators, Inc.?" PCW, Vol. 2, No. 11].

Andrew T. Williams' analysis rests on the premise that "the personal computer market... satisfies the major requirements of perfect competition." However, Williams did not mention that one of the major requirements of perfect competition is that everybody know everything worth knowing. Economists call this assumption perfect information.

While the assumption of perfect information is not unusual for economists, the thoughtful reader must ask whether such an analysis is reasonable in this instance. Perhaps the topic requires a fundamentally different analytical framework. Information has always been a commodity that must be produced like any other commodity, but in the last ten years the market for information has at-

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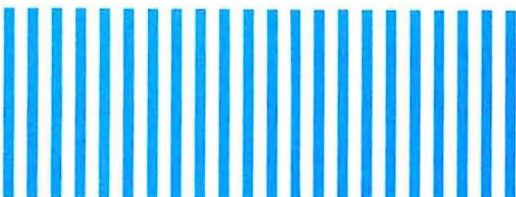


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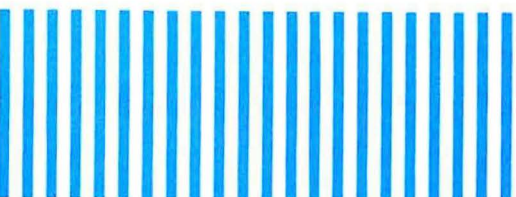


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tained an importance second to none. And no important commodity market can reasonably be analyzed with logic that starts by assuming that said market is saturated.

Woodrow F. Dick, Jr.
Springfield, Virginia

As Mr. Dick notes, many economists (myself included) analyze markets by assuming perfect information, by which we mean that there are no barriers to entry. In other words, any company can find out everything it needs to know to enter the market with its own microcomputer hardware or software. A lack of such information would be considered a barrier to entry.

However, Mr. Dick confuses the information required for the market to function with the information manipulated and disseminated by microcomputers. It would be better to call the former sort of information "knowledge" (knowledge about production methods), and the latter simply "information" (which can be about anything).

In this sense, information is limitless in the same way that art or music may be said to be limitless; the microcomputer has had a major impact on the production and distribution of information of all kinds. But, clearly, information in this sense has little to do with the competitive functioning of the microcomputer market. Information, which is used by computers, is different from the knowledge required to enter the market and to promote competition.—Andrew T. Williams

A Videotex Revolution?

My compliments on your article "Toward a Graphics Standard" in the November issue, concerning the NAPLPS standard [PCW, Vol. 2, No. 12]. Although the article stimulates serious commercial speculation, I was disappointed that no reference was made to NAPLPS's impact on the home IVT (interactive video terminal) or on the age-old analog/digital controversy. Is it prehistoric to value the analog signal for computing and communications, considering its economical mass image storage and fast scan advantages? Does the creation of NAPLPS imply that all images will be re-created for storage in digital form, or will this system advance technology for analog to digital conversion? Is this standard intended only for graphics and videotex generated by internal programming, or will NAPLPS affect and guide the use of converted analog video images?

Norm Meyer
Mississauga, Ontario
Canada

The NAPLPS graphics standard has never been intended as a replacement for the video coding standards used throughout the world. The television standard used in North America, NTSC, is an analog standard and remains the most effective means of transmitting full-motion video signals. Unfortunately, while NTSC allows low-cost reception of high-quality images, it requires roughly 5 MHz,



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or over 1000 voice channels' worth, of bandwidth. Such a requirement makes interactive (two-way) video communication prohibitively expensive. NAPLPS overcomes this drawback of analog coding, allowing images to be transmitted in a reasonable amount of time over ordinary telephone lines and to be stored by low-cost digital devices (personal computers or dedicated videotex terminals).

However, all these advantages come at the price of simpler images. While NAPLPS could, in theory, be used to digitally encode a continuous-tone color image (as opposed to the "cartoon-like" images for which it was designed), such an approach would not be very effective. In short, while graphics standards like NAPLPS hold considerable promise, they by no means make analog video standards like NTSC obsolete or "pre-historic."—Mark Dietrich and Jennifer Stothers

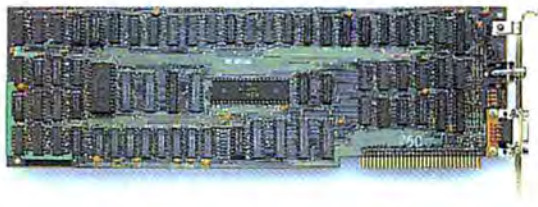
The AT's Network

I enjoyed the December article on the AT ["AT: The PC's Powerful Partner," PCW, Vol. 2, No. 13], but I was disappointed to find a few errors relating to PC Network. As you are aware, Sytek supplies the network adapter card to IBM, and we also developed the protocols that IBM licensed for use in the network.

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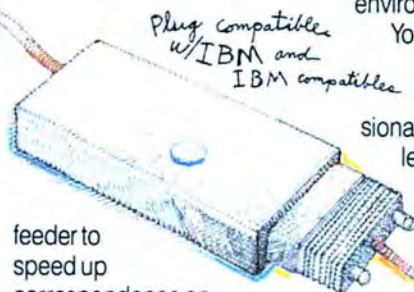
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J. J. Witt
Rye, New York

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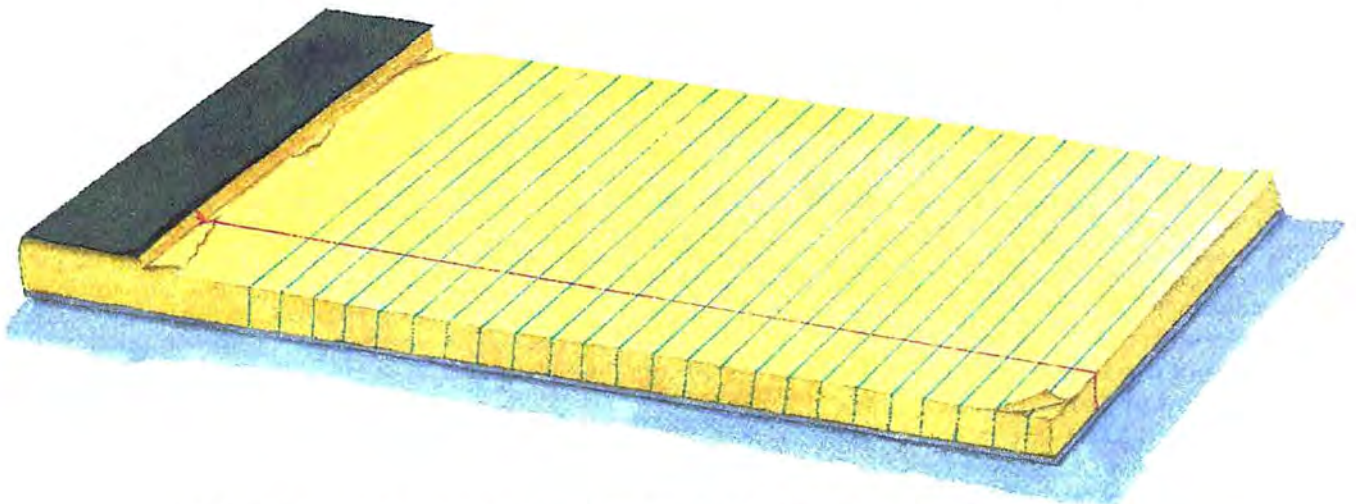
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The Help Screen

PC World offers answers and advice at every level



This month: a version of BASIC that uses up to 640K, and instructions for setting your printer's form length from either BASIC or DOS

Karl Koessel

BASIC Improved

Q. Perhaps you can help with a question that no one seems able to answer. My PC has 560K of RAM, but when I program in BASIC, I can access only 64K. When I compile a program, the compiled code seems to reside outside of the original 64K of memory, but the arrays are still subject to the 64K limit. Is there any way that I can access more than 64K with both program code and arrays?

Allan Easton
El Cajon, California

A. The core of the PC's BASIC interpreter—written by Microsoft—is almost a decade old and was originally designed for 8-bit machines that could be equipped with no more than 64K of RAM. The PC's version of BASIC uses a memory segmenting technique that enables program code to reside in one 64K segment while the data area lies in another 64K segment. This minor improvement was easily (that is, quickly and cheaply) made to the core of the old 8-bit BASIC code. But using Microsoft BASIC to access more than 64K for program or data code is no simple task.

There is an alternative, however. *Professional BASIC*, a product from Dallas-based Morgan Computing, was written specifically to use the PC's full 640K of available RAM. With *Professional BASIC*, your program can exceed 64K; the number of elements and the total size of your program's arrays are limited only by the amount of memory in your machine.

Professional BASIC includes a variety of other enhancements that can bolster a BASIC programmer's productivity. The product features character-by-character

syntax checking, 8087 support, 5-digit line numbers (up to 99999), 311-character line maximums, 10-digit integers (up to 2,147,483,647), plain English, full-sentence error messages, variable and label cross-referencing, and extensive trace and debugging facilities. In addition, line numbers are optional; GOTOs and GO-SUBs can reference line labels instead.

TRS-80 Printer PEEKs and POKEs

Q. While our aircraft flight department was sharing a hangar with Tandy Corporation, I had a great deal of opportunity to develop software for our TRS-80 Model III. When we moved into a hangar of our own, I ended up with a PC.

A fair amount of the old software used PEEK and POKE to track the current number of printed lines and to set the form length for printing. Where might I find this information stored in the PC? Or is there another way around the problem?

Wayne Hoffman
Fort Worth, Texas

A. The PC does not keep track of its printer. Setting the form length and the current print line are functions of the printer itself. Most printers use an Escape code sequence that enables you to set the form length, although different printers use different sequences. Similarly, most printers know the number of lines that have been

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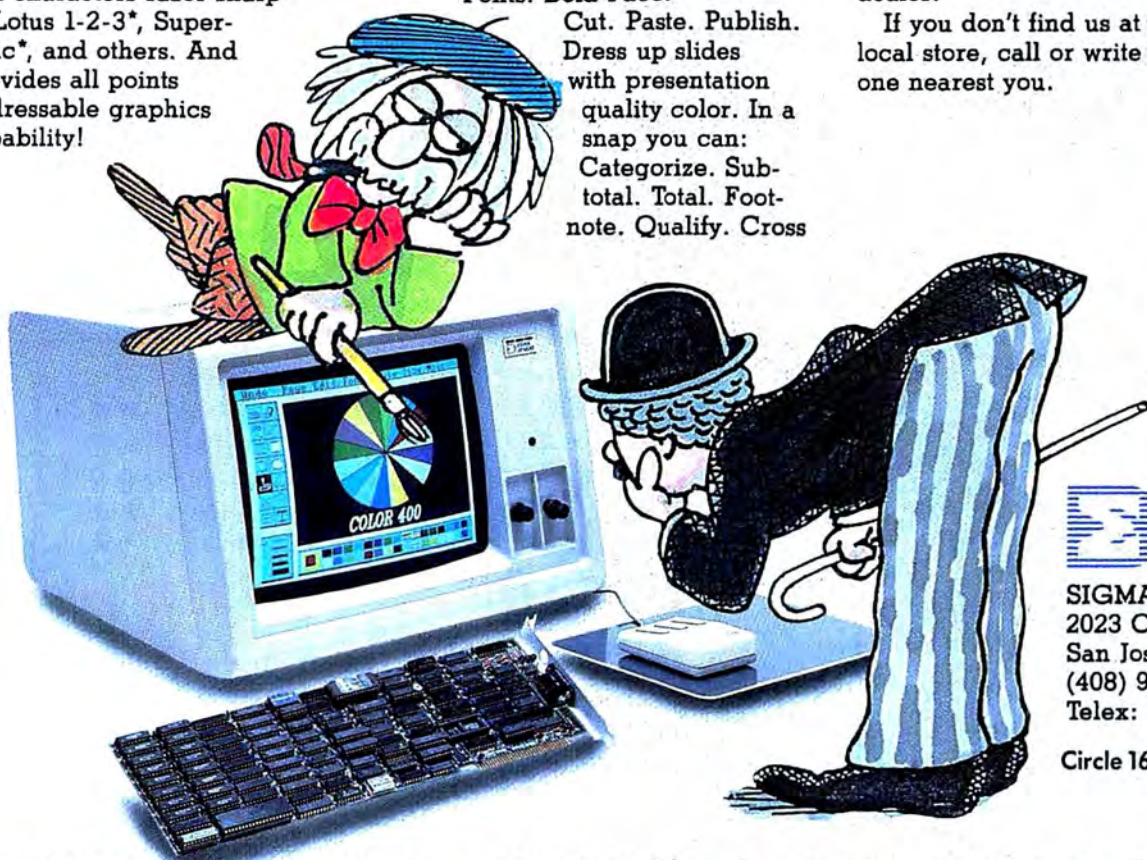
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printed since the top-of-form, but the PC cannot receive that information from a printer.

To set the form length in BASIC on an IBM or Epson printer, use the command
LPRINT CHR\$(27);"C";CHR\$(xx);
in which xx is the form length (the number of lines). To track the number of printed lines, you need to use a counter (a variable that keeps track of the lines printed) and establish increments for each line printed.

Set Form Length From BASIC or DOS

Q. For the past four years I've used a Data General CS-10 computer with two custom software programs. Now, however, I'm switching to an XT, partly because the CS-10 is no longer manufactured, but primarily because the PC's operating system offers much greater flexibility in software selection.

My problem is finding a way to use DOS to set the form feed on the Epson FX-100 printer. I'm using legal-size paper (14 inches long by 8½ inches wide) because all my files are printed in that size. The FX-100 has DIP switch settings that control some of the

printer's modes but not form length. The Epson currently defaults to 6 lines per inch and 66 lines per form.

I can set the print mode and the number of characters per line using the DOS MODE command, but nowhere in the DOS 2.10 manual can I find instructions for setting the form length. The Epson manual lists a form length command, but it's in BASIC. I'd like to have such a command in DOS so I can include it in an AUTO-EXEC.BAT file, automatically setting the printer every time I power up. For now, the only way I can command the correct form length is to use a Set-FX+ program [from SoftStyle], which must be run each time I boot up—a process I find entirely too cumbersome.

Dixon H. Cain
Houston, Texas

A. There are two quick solutions to your dilemma. The first is to create a two-line BASIC program that consists of the BASIC form length command example from the Epson manual, followed by the BASIC command SYSTEM:

10 LPRINT CHR\$(27);"C";CHR\$(51);
20 SYSTEM

Let's assume you name the program FORMSIZE.BAS. Install BASIC and FORMSIZE.BAS on your boot disk and add the line **BASICA FORMSIZE** to the AUTO-EXEC.BAT file.

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(*) Benchmark run on an IBM PC using MS Pascal version 3.2 and the DOS linker version 2.6. The 179 line program used is the "Gauss-Seidel" program out of Alan R. Miller's book: *Pascal programs for scientists and engineers* (Sybex, page 128) with a 3 dimensional non-singular matrix and a relaxation coefficient of 1.0.

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A second method is to use DOS's DEBUG or EDLIN to create a file containing the printer's codes that set the form length. For example, type

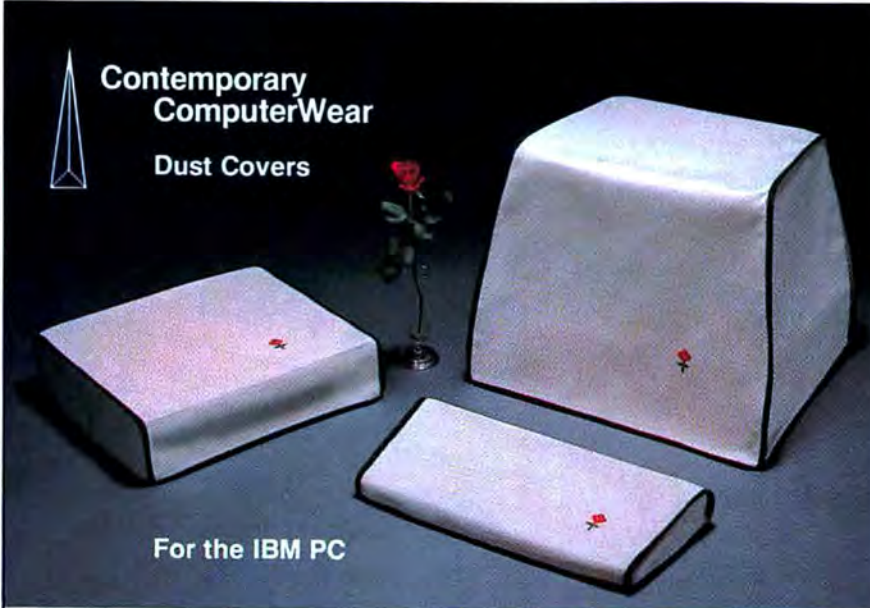
EDLIN FORMSIZE <Enter>

1 <Enter>

<Ctrl> -V[<Ctrl> -V] <Enter> E
(You enter <Ctrl>-V by holding down the <Ctrl> key and pressing V. <Alt>-51 is entered by depressing the <Alt> key, typing 51 on the numeric keypad, and then releasing the <Alt> key.)

Now add the line **FORMSIZE > PRN** to the AUTOEXEC.BAT file. When you start up the XT, that line will send the contents of FORMSIZE to the printer and set the form length to 51 lines.

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



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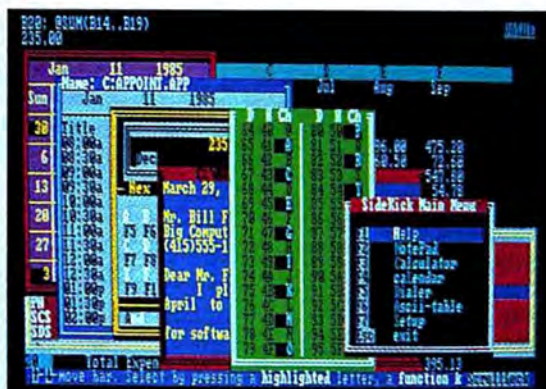
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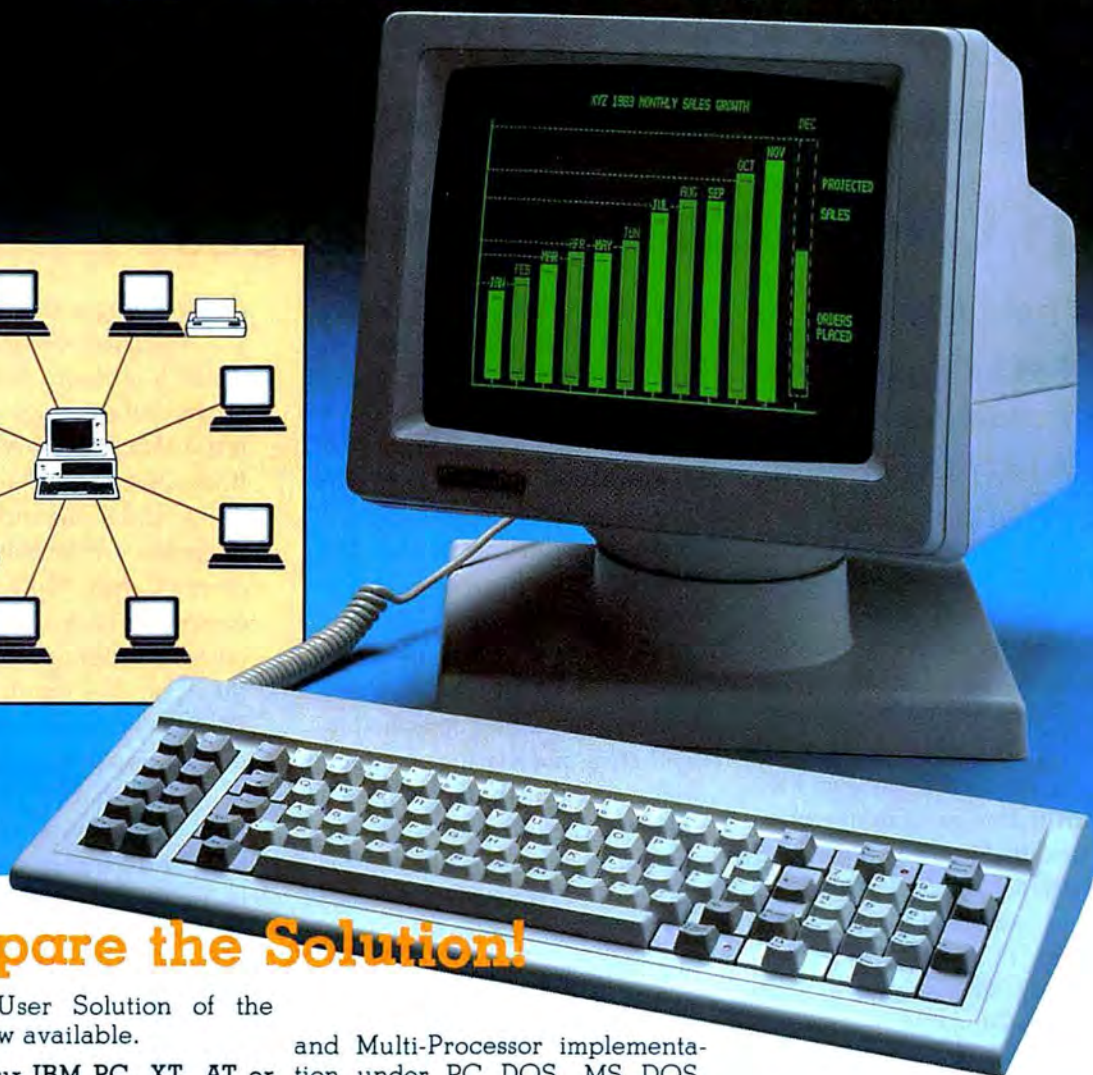
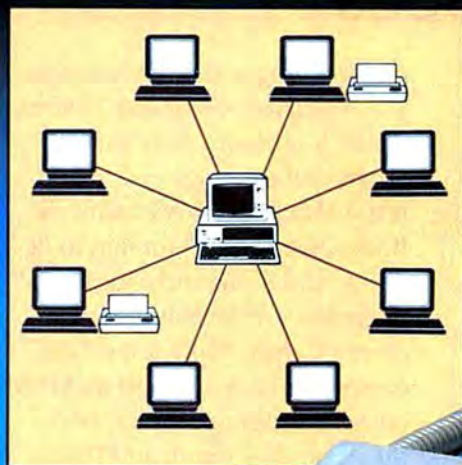
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The president of the Boston Computer Society ruminates about the past, present, and future of personal computing.

The year was 1976. A tumultuous, divisive war on a distant continent had finally come to an end, and the Oval Office high jinks of a notorious administration were history. A nation eager to drown its cares exulted in the excesses of the Bicentennial and looked forward to a less troubled future.

But for 13-year-old Bostonian Jonathan Rotenberg, the immediate future held more frustration than promise. Rotenberg had convinced his high school to replace its \$3000-a-year teletype time-

sharing service with a build-it-yourself Altair personal computer. While soldering together that primitive machine, Rotenberg realized that he was on his own—information about personal computers in 1976 was about as common as atheists in foxholes.

Goaded by frustration and a growing interest in computers, Rotenberg formed the Boston Computer Society (BCS), a non-profit organization dedicated to gathering and sharing computer information with the public. The now wizened 22-year-old Rotenberg notes that when he chaired the BCS's first meeting in January 1977, he had no idea he was making history.

In a world where computer user groups have an average lifespan of three to four years, the BCS is something of an anomaly. The BCS turns 8 this year and boasts a 12,500-member roster spanning 50 states and 20 countries. The society acts as an umbrella organization for more than 40 computer-specific and special interest groups that operate from the society's headquarters in Boston's Government Center district. In addition

to publishing a monthly calendar and magazine, *Computer Update*, the BCS sponsors more than 50 events and meetings each month. It has also joined forces with the Boston Computer Museum to develop exhibitions and educational programs for the museum's Discovery Center. More important, companies such as Apple and IBM take the society seriously: both the Apple Macintosh and IBM's Portable PC were first publicly demonstrated at the BCS.

Of course, the BCS wasn't always so highly respected. Rotenberg held the club's first meeting in his high school's library. As Rotenberg remembers, "Two people showed up—and one was studying late and didn't know what was going on." But in typical success story fashion, the BCS persevered and prospered, much like the industry whose growth it mirrored. One element has remained constant: Rotenberg, who held the BCS's first meeting wearing braces on his teeth, is still in charge.

"From the beginning I've felt strongly about demystifying the technology and providing service to the public," says Rotenberg. His position as founder of a consumer organization, rather than of a hardware or software company,

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.

—Katie Seger

View

News and notes for the computing community



From soldering iron to computer fame: Jonathan Rotenberg, prognosticator and head of the Boston Computer Society, ponders the future of computing—and the possibilities of a million club members.

gives him a unique perspective on the microcomputer industry. (Although Rotenberg has never collected a salary from the BCS, he is not completely altruistic—he earns a cool \$3000 per day as a consultant for companies such as Softcon producer Northeast Expositions.)

Rotenberg regrets some of the changes the personal computer business has undergone. “A lot of the fun has disappeared. The newness, the excitement, the feeling of

(continues on page 60)

An Old-Timer Reminisces

(continued from page 59)

pioneering have been replaced with a bottom-line mentality and, unfortunately, very predatory tactics." He compares the personal computer industry to the turn-of-the-century automobile business; once the automobile caught on, the hundreds of independent manufacturers were eventually bought out—or pushed out—by a few big companies. "It's something that every industry goes through. You have a situation with a lot of companies fighting for a market that is only going to support a few of them."

However, says Rotenberg, economic theories "don't give you a sense of the personal tragedies—the personal bonds and camaraderie that have been ruined along the way. Originally Apple made computers. Software Arts developed application software, which was marketed by VisiCorp, while Microsoft made operating systems," he explains. "Those four worked together in harmony; everyone helped everyone else. As they grew and expanded, they began to move in on each other's turf. Suddenly they found themselves competing with each other."

Despite the recent industry shakeout, Rotenberg foresees good things for consumers as 8-bit personal computers give way to

16-bit machines, such as the PC, and to newer 32-bit computers like the Macintosh. Rotenberg's own future is still an unknown. While he admits that the BCS could survive without him, he has no plans to leave the society in the near future. He speaks of turning the BCS into a truly national organization—"the AAA of the computer world." Such expansionist thoughts are still mostly talk, but Rotenberg has learned to think big. As he modestly asserts, "We have the potential to gain 1 to 2 million members in the United States alone."

Grapevine

When it comes to guarding its secrets, IBM rivals the CIA for diligence. Big Blue is particularly fussy about new product information. When details about a new machine finally do leak out, the trickle of information often comes from the lips of an unimpeachable source (read: IBM). The finely chiseled rumor is passed to an anonymous industry insider, who in turn shuttles the dope to the *Wall Street Journal*, or in this case, to *PC World*.

Our own anonymous industry insider contends that IBM plans to bring out a portable AT sometime this year. Given the increasing

availability of compact hard disks and the AT's Sasquatch-size footprint, this would not be a surprising development. A lap computer featuring a plasma display is also in the works. Plasma displays offer near-photographic-quality images and, naturally, high-resolution character and graphics display. IBM has been making plasma displays for its mainframe terminals since the mid-1970s; the IBM PC Information Panel, a plasma display and adapter for the PC and the XT, was released in November 1984. Although plasma displays offer superior resolution,

they are also likely to inspire sticker shock. (For example, the Information Panel monitor and adapter cost dealers \$3410.) This stiff price has precluded their use in lap-size computers, which have thus far relied primarily on liquid crystal displays.

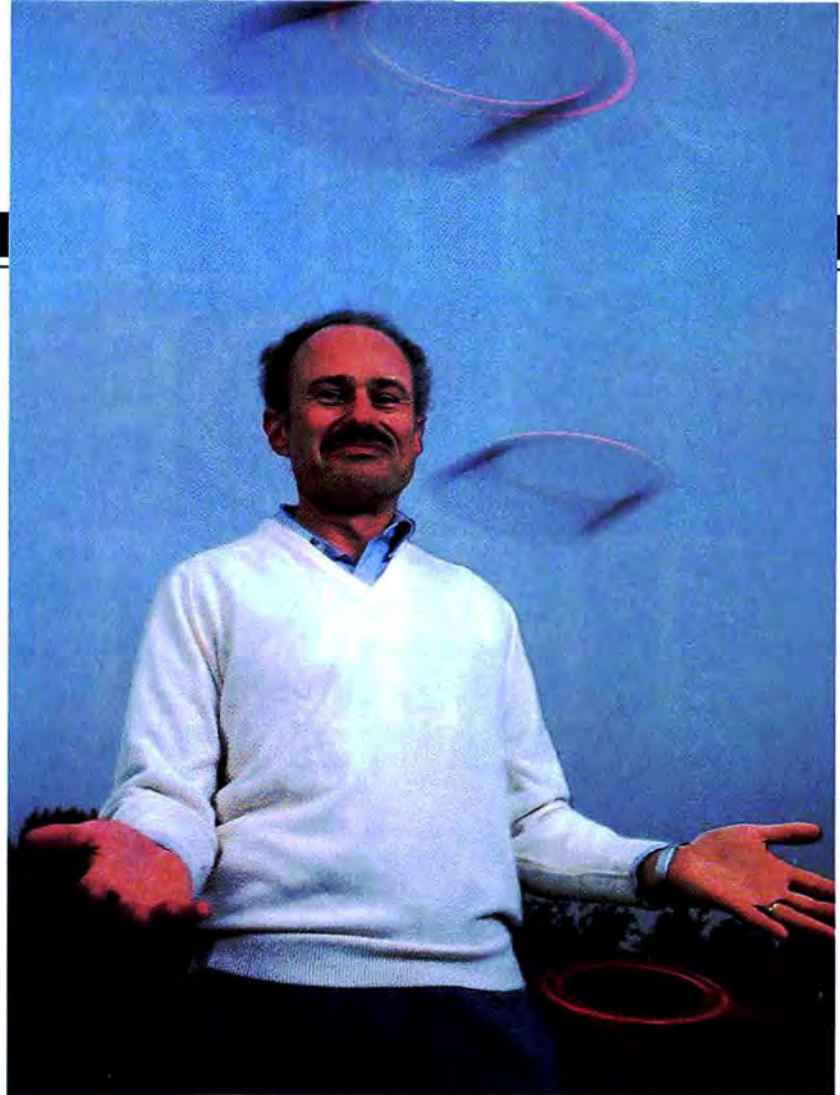
Our source has also heard rumblings that IBM is planning a machine based on Intel's yet-to-be-released 32-bit 80386 microprocessor for sometime in 1986. Such a lightning-fast computer will likely use optical disk storage—which ties in nicely with IBM's recently rumored acquisition of almost 1 million 5¼-inch optical disk drive units.

Flying High

What's black and red and flies all over? The Aerobie, the latest invention from Alan J. Adler. This flying ring, which holds the world record for the "longest thrown inert object heavier than air" (according to the *Guinness Book of World Records*), was developed with the help of the inventor's IBM PC.

During the design process Adler relied on his PC and a BASIC simulation program he wrote to calculate the weight and aerodynamic stability of different plastic ring designs. The program reduced the number of prototype molds required, saving time and money.

The 46-year-old Adler isn't always tinkering in his computerized workshop. In real life he is a consultant and part-time Stanford University engineering lecturer. Adler turned to toy designing because "all my life I've designed products like high-rate tape recorders that I won't use." Keep flying.



Frisbee resuscitatus: Alan Adler takes the flying disk into the next century—and the record books—with the help of his PC.

Big Blue's News

In its brief life the PC AT has had its share of troubles. Industry analysts have suggested that to placate anxious dealers and head off possible antitrust actions, IBM pushed the AT out the door before the company or the machine was ready. IBM has ruefully discovered the effects of this prematurity: escalating demand for the AT has yet to be matched by the company's assembly lines. Big Blue has

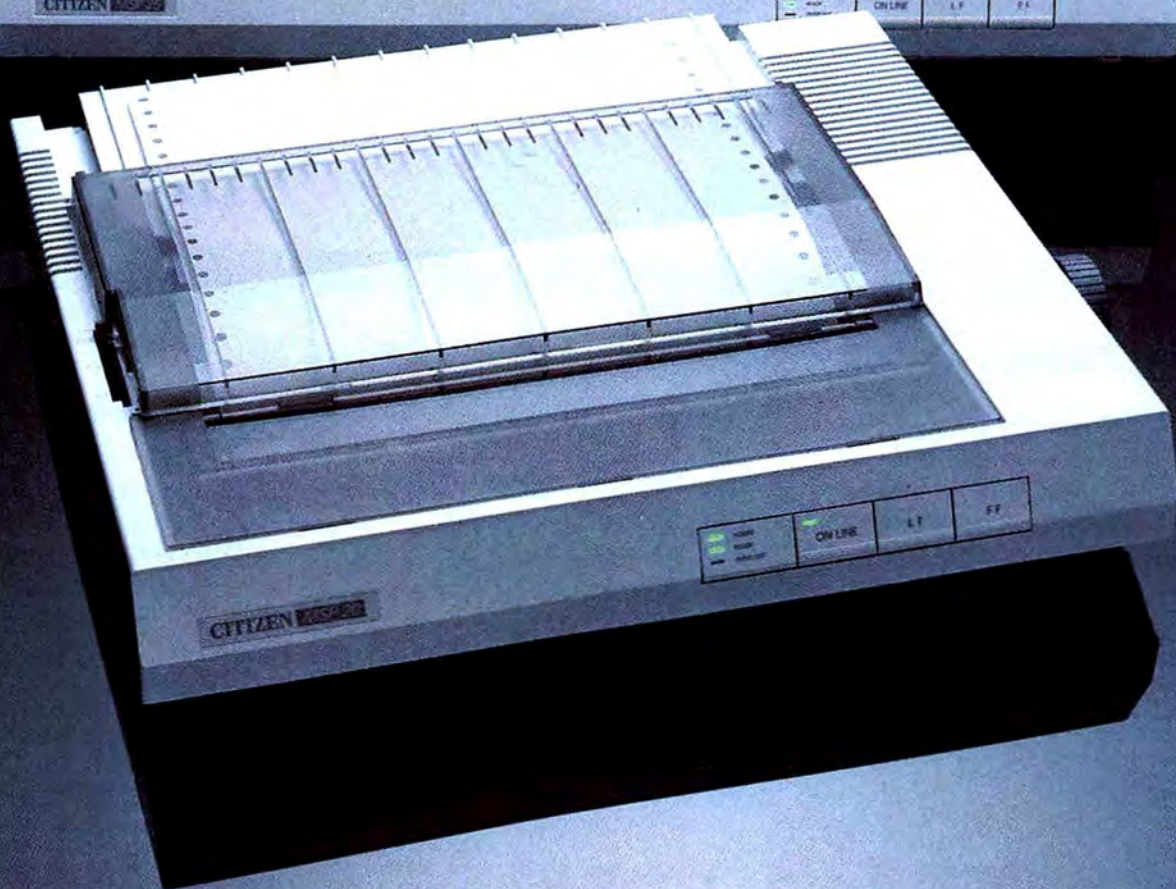
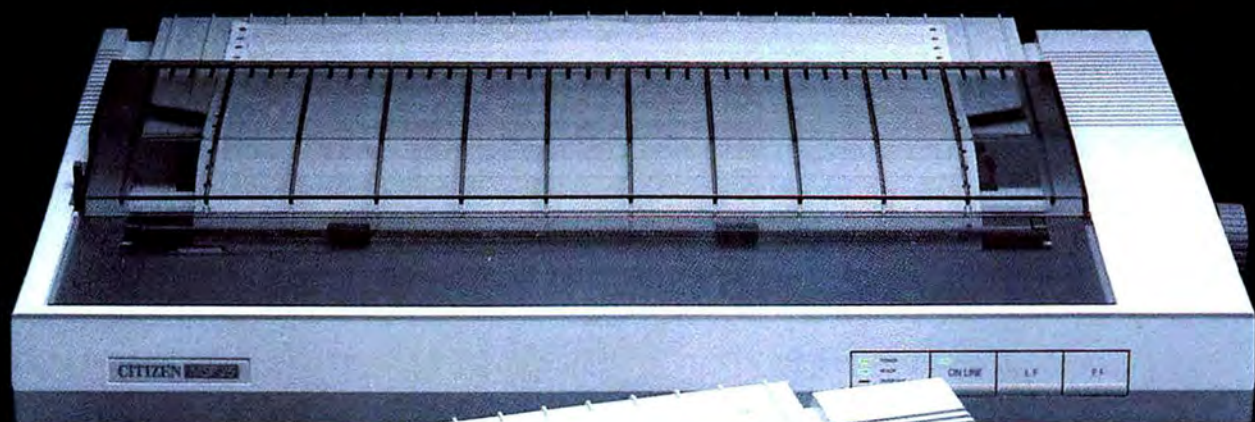
fueled dealer consternation by informing them that "due to component shortages and demand," first-quarter allocations for the enhanced AT would not be met. To complicate matters, reports of technical troubles—especially with the 20MB hard disk used in enhanced AT models—are beginning

to surface. IBM is wisely looking for other companies to augment supplies from Computer Memories, of Chatsworth, California—currently the only source for the AT's hard disk.

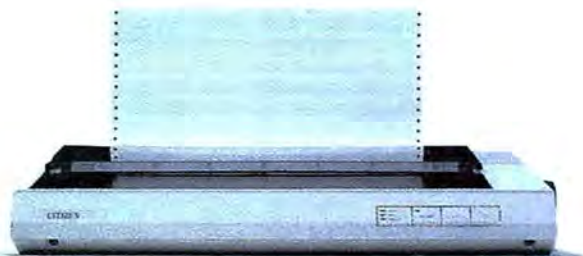
An IBM spokesperson would not speculate on AT availability for the second quarter of 1985, but did deny technical troubles

(continues on page 64)

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Big Blue's News

(continued from page 61)

with the unit's hard disks. "Warranty claims aren't out of the ordinary," the spokesperson said. Nonetheless, one company—Interactive Data Corporation of Waltham, Massachusetts—has rushed in to patch the holes IBM would rather ignore. The company claims its \$149 *DFixer* program will identify bad sectors on the AT's hard disk and instruct the machine to avoid them.

The AT's delayed shipments and hard disk ills will probably mean bigger profits for companies such

as Compaq and Tomcat Computer, which produce comparable computers. According to Michael S. Swavely, Compaq's director of marketing, his firm is pleased with sales figures for its 8086-based DeskPro computer—but he quickly adds that the AT's troubles "give us even more opportunity" to boost sales. Swavely couldn't resist reminding us that Compaq has offered a 30MB hard disk version of the DeskPro since October 1984.

Competition from Tomcat Computer, a 9-year-old Japanese company, may also cut into the

AT's early sales if Tomcat can bring its AT-compatible 3200-AT computer to market. At press time the 80286-based machine had not yet reached American shores, but Tomcat's president, Ken Inouye, anticipates his company will be shipping as many as 4000 machines a month by spring of 1985.

Tomcat will initially manufacture the 3200-AT in Japan, but the company is searching for a U.S. manufacturer as well. Inouye says he would welcome partnership with a company such as Columbia Data Products, even though PC-compatibles makers are weathering tough financial times. Such a

We're Off To See the Wizard

If C. Itoh Digital Products' new advertising plan elicits some chuckles, Gene Murphy will be pleased. Murphy, Digital Products division vice president of marketing and sales, is behind the new campaign, which features characters from the Johnny Hart and Brant Parker comic strip "The Wizard of Id." "The biggest problem with hardware advertisements," says Murphy, "is that the ads are all hardware. There's no warmth." When C. Itoh's advertising agency suggested using the cartoons, Murphy wholeheartedly agreed.

The Wizard, the King, Rodney, the Town Crier, and the rest of the medieval gang started touting C. Itoh's products last fall. "The ads get our message across, but we can be a little bit outrageous be-

cause the characters are speaking," says Murphy. The strip's residents aren't found only in print ads; C. Itoh has incorporated the cartoon theme into its posters, brochures, dealer-support material, and, notably, point-of-purchase printer stands disguised as castle turrets.

"We seem to be able to adapt our characters to the form," says cartoonist Hart. Hart should know, having adapted his solo comic strip, "B.C.," to fit Pitney-



marriage is not all that unlikely; Corona Data Systems has been making unlabeled PC compatibles for companies ranging from Olivetti to Wordplex. Apparently, U.S. and Japanese automobile companies have set a precedent in American/Asian joint ventures.

In spite of its troubles and its competitors, the AT will no doubt find its way onto many desk tops. But the machine's delay does give Compaq, Tomcat, and others a little more breathing space. And when you're competing with IBM, you need every deep breath you can get.

Bowes advertisements. As with "The Wizard of Id," Hart pens the ballooned dialogue and Parker creates the drawings for the C. Itoh ads. Hart jokes that some C. Itoh printers are faster than he is—the ProWriter 8510 Printer, for example, can print up to 180 characters per second. Adds Hart, "It's a good day when I do one character per hour."

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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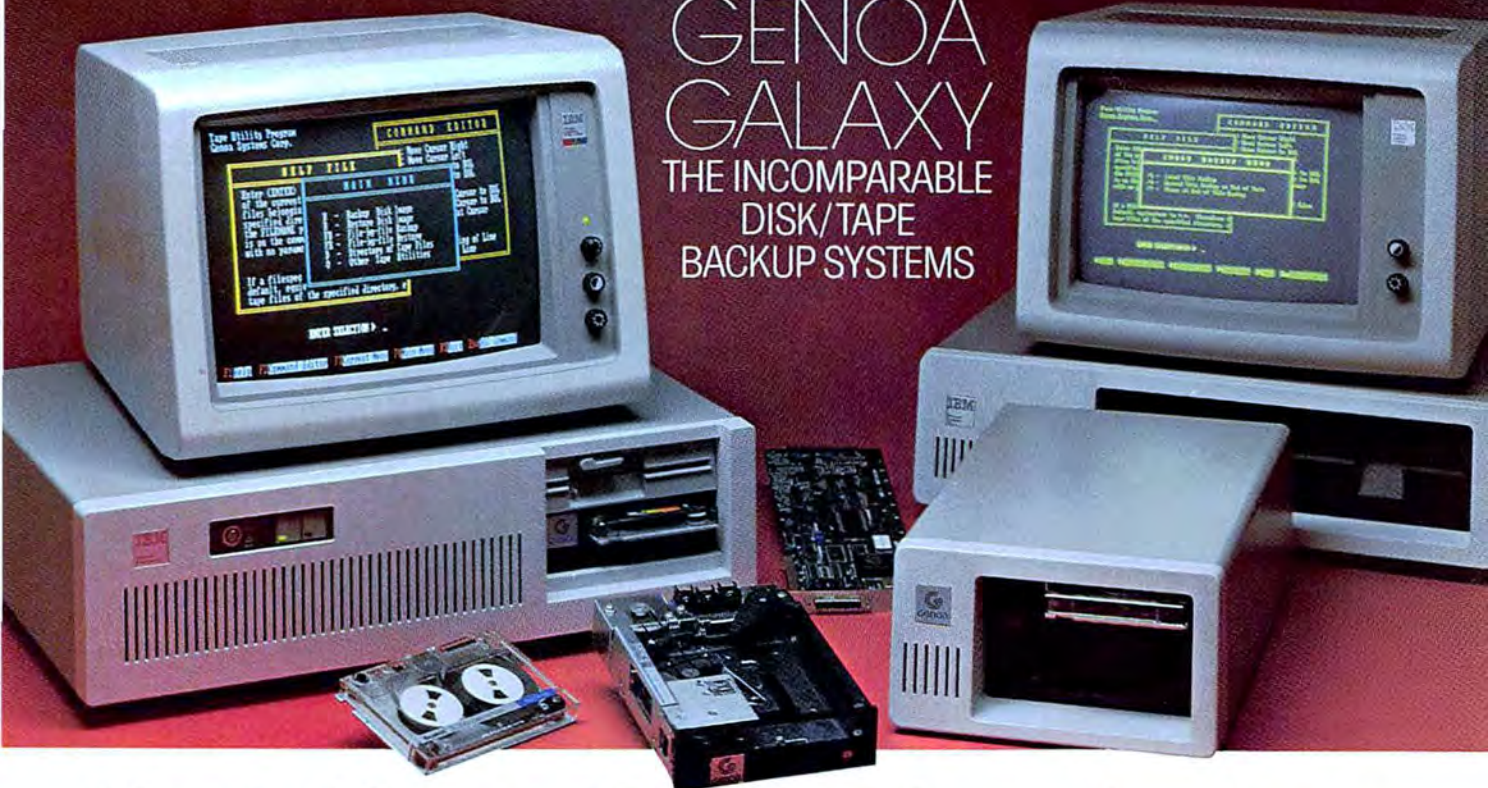
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20 MEGABYTE HARD DISK/TAPE CARTRIDGE SYSTEMS

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Backup/Restore Time & Percentage Indicator	✓				% only
Image Backup/File by File Restore with Directory Display	✓				✓
File by File Backup/Restore by Directory or Subdirectory	✓	✓	✓	✓	
File by File Backup/Restore by Date or Last Modified	✓	✓	✓	✓	
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Compatibles Update

The latest developments in the PC-compatibles marketplace



This month: how to succeed in business by avoiding retail, one major retailer tries Europe, and a way to turn a Kaypro into a PC compatible

Edited by Ken Greenberg



Trends

Going Underground

"Retail is the lowest-cost channel of distribution for this business. Retail is the biggest part of the market—and the most important."

—William Murto, cofounder of Compaq Computer

IBM breathes heavily—cuts a few prices here, sues a few companies there—and small fry teeter. Put generously, it's unrewarding to seriously challenge IBM once it has market share.

The salient question for 1985 remains, how do you pay fealty to MS-DOS, elude the Big Blue juggernaut, and still turn a profit?

Increasingly, boutique PC-compatibles manufacturers are taking steps to write off retail. (The thinning of the retail ranks is also proceeding apace, but that's another story.) Nothing is as it seems anymore; even those machines remaining on your local dealer's shelves tend not to be wearing their original logos. There's now a concerted move among remaining clone makers to go underground, which is typically where the survivors of a war can be found.

In the PC-compatibles business, going underground is spelled O-E-M (original equipment manufacturer) or V-A-R (value-added reseller). The OEM business requires that the PC-compatibles manufacturer—say, Corona Data Systems—act as a sort of ghost-writer for the mainframe maker—say, Sperry—which puts its label on the Corona machine and is thus spared the time and trouble

of designing its own PC clone. (At press time, the two companies were reportedly cooking up an AT compatible as well.) It's what you call a "win-win" situation for both firms.

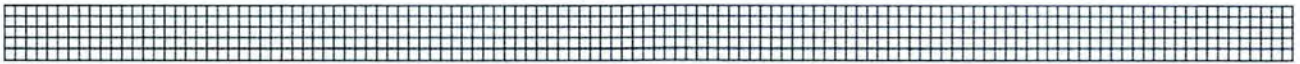
The VAR sector is marked by heavy traffic in souped-up machines. Compatibles are sold to "re-marketers," whose sole purpose is to enhance the units with service, hardware, and/or software—often vertical market applications—and then resell them.

Both the OEM and VAR markets are lucrative distribution channels for companies rebuffed by retail. While these channels are hardly new, they've achieved new prominence as everybody runs for cover.

Corporate players like Sperry have helped turn PC compatibility into a commodity business: just buy the technology from someone else and stick your label on it. There lie the incentives—and the best niches—for the smaller manufacturers. One of them—OEMTEK, of San Jose, California—is offering PC compatibility like clothes off the rack, at 20 to 30 percent below IBM's retail prices.

Fueled in February 1983 by \$4 million in venture financing, OEMTEK decided at the outset that it would be futile to compete for scarce retail shelf space. Instead, the company opted to forfeit name-brand recognition in favor of reaching users via well-heeled corporate buyers who seek PC compatibility.

As the name implies, OEMTEK stands apart by virtue of its decision to relinquish retail for a be-



James Siehl, OEMTEK president, is cultivating corporate buyers with a line of modular machines.

hind-the-scenes approach to the marketplace. While Eagle Computer, Columbia Data Products, and a raft of others backed into the OEM and VAR channels, OEMTEK has plunged in headfirst.

"I would think I'd died and gone to heaven if somebody bought our machines and kept our label on," says a modest James Siehl, OEMTEK president and founder. "I just want a little market niche." For all comers, that "niche" was worth \$2.3 billion for

hardware alone in 1984. Future Computing, the Dallas-based PC market watcher, estimates that by 1987 the OEM segment will more than double to \$5.3 billion, a figure that excludes big-name OEMs who sell retail. Jazzing up the basic product with software brought VARs \$1.4 billion in 1984, a sum that is estimated to climb to \$3 billion within two years.

The way OEMTEK saw it, OEMs and VARs were getting the short end of the deal by settling for hand-me-down hardware de-

signed for retail distribution. In some instances they were forced to assemble their PC compatibles piece by piece, buying a motherboard from one manufacturer (say, Faraday Electronics) and firmware and DOS utilities from another (say, Phoenix Software Associates). What was needed was a one-stop shop that would allow OEMs and VARs to fashion machines in a variety of guises, the better to meet the demands of a shifting marketplace.

OEMTEK maintains a virtual catalog of PC compatibles and stocks it with components manufactured primarily at its joint-venture facility in Taiwan.

IBM's best efforts are now going into Macintosh.

Macintosh and IBM PC software. Compatible at last, thanks to MacCharlie, a rather innovative coprocessing system.

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In addition, MacCharlie allows

IBM PC and Macintosh data files to be exchanged. Talk about flexibility.

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You see, MacCharlie delivers hardware compatibility, as well. For example, IBM letter-quality printers can be easily used with Macintosh.

Furthermore, MacCharlie

now allows Macintosh to perform virtually any networking an IBM PC can perform. Even to the extent of tying in with IBM mainframes.

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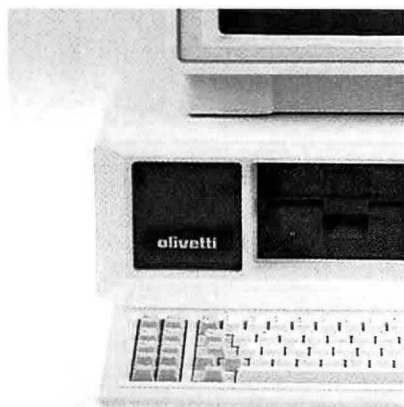
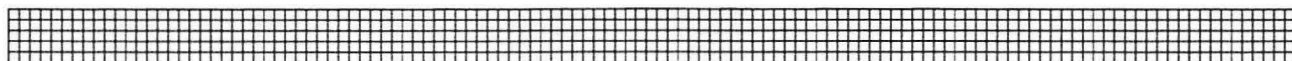
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Circle 973 on reader service card



A Corona by any other name would sell as well—at least that's the hope shared by Docutel/Olivetti, N. V. Philips, and Wordplex, whose logos adorn the Corona Data Systems PC.

company aims to please—theoretically, if you're in the mood for a purple console with a green keyboard, OEMTEK will deliver. System units vary in size, height, RAM, processor (8088, 8086, or 80286), and disk drive configuration. PC compatibility reportedly does not vary; OEMTEK tapped Award Software of Los Gatos, California, for its DOS update and BIOS ROM routines.

OEMTEK's ideal customer is the VAR or software systems house that targets vertical markets—particularly medical and legal professionals—and brings in anywhere from \$2 million to \$20 million on the sale of 200 to 1500 units annually. Of course, the company isn't turning away corporate accounts, either. OEMTEK's mix-and-match approach to PC compatibility gives buyers a choice of three monitors and three kinds of keyboards. The

OEMTEK is perhaps the first IBM-clone maker to tie its for-

tunes to the OEM market on such a grand scale, but a score of formerly retail-hungry compatibles companies are finding the OEM and VAR markets much to their liking. Among those availing themselves of this "second chance" are ITT, TeleVideo, DEC, GRiD, Texas Instruments—and even, to a degree, Compaq.

ITT. Owing to the Xtra's lethargic retail performance, ITT has signed up with a dozen or so VARs and system integrators, many of whom are outfitting the machine for communications-related vertical markets.

TeleVideo. Company officials are smiling at a three-year OEM contract worth an estimated \$35 million from Peking Computer Factory, a China-based supplier to universities and government offices. The pact should help ease the sting of an \$8 million fourth-quarter loss.

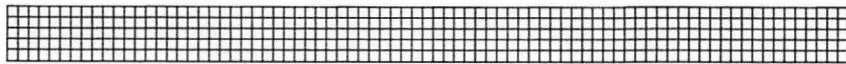
DEC. Digital Equipment is still Number 2 in computers, but its Rainbow 100 never came close to a pot of gold in the retail world.

DEC is now sticking to VARs and its own installed base of minicomputer users and reportedly intends to launch a genuine PC work-alike before year's end.

GRiD Systems. GRiD, looking to "complement" its retail effort and direct sales to Fortune 1000 companies and the Feds, has decided to pitch its pricey new 25-line Compass portable to VARs and OEMs.

Compaq. Compaq's success is rooted in being simpatico with its authorized dealers. Yet even for this bastion of the retail marketplace, other avenues are beckoning. Compaq has inserted a big toe into the VAR waters; Softbridge Microsystems is now bundling its financial planning package with the Deskpro Model 4 (procured via ComputerLand of Boston), then reselling the systems.

The rest. Like TeleVideo, Eagle Computer is living off OEM deals with China, but here OEM could just as well stand for Outstanding Emergency Measures, as in "key to survival." Columbia is providing machines to Honeywell and Control Data, the better to stave off extinction. Bruised by the TI



Professional's poor retail showing, Texas Instruments is marketing its Pro-Lite laptop exclusively to VARs—for now.

The OEM market isn't without its pitfalls and potholes. Leading Edge, which has been on the receiving end of Mitsubishi hardware, recently also found itself on the receiving end of a Byzantine legal hassle with its Japanese supplier. Following a temporary halt in shipments of Mitsubishi machines, Leading Edge filed a \$1 billion breach of contract suit; Mitsubishi countersued, seeking payment of bills. The drama vividly illustrates the perils of relying on just one source of supply. It may have been the supply pinch that led Leading Edge to announce it would market the AT&T PC 6300 under its own label—a claim AT&T swiftly squelched.

"It's a convoluted web we're weaving," says Howard Haller, director of OEM sales worldwide for Corona, perhaps the preferred choice among corporate OEMs. In addition to Sperry, Corona's roster of clients includes Docutel/Olivetti, Wordplex, and N. V. Philips. "Convoluted" surely is the word: witness the deal with Docutel/Olivetti—the U.S. marketing arm for Ing. C. Olivetti of Italy—which sticks its name on the desktop and portable computers it buys from Corona and then retails. (The parent firm, of course, has a company called AT&T labeling and marketing its 8086-based PC compatible.) Product "ownership" is murky at best; Corona has delegated most of the manufacturing responsibilities for its desktop and portable lines to Dae Woo Electronics, a South

Korean conglomerate. Importing hardware recently enabled the company to pare its domestic assembly line staff by 18 percent.

Corona appears to have successfully weathered the switch from retail to OEM. According to Haller, Corona derived half of its 1984 sales of \$120 million from the OEM market; 75 percent of the other half accrued from sales to VARs.

But OEMTEK claims to have an edge on companies like Corona because of its aggressive stance toward the OEM/VAR market. "We're seeing a lot of people in retail trying to shift to OEM," says Dan Seale, the company's marketing and sales chief. "But you can't serve two masters."

Erna Arnesen, VAR market analyst for Future Computing, was initially bowled over by OEMTEK when she saw the company's products and met its management. "I thought they were revolutionary," she says, but reports walking away wondering if the fledgling firm can realize its dream. "I'm not totally convinced they can carve out the niche they want," Arnesen says. "If they can snare big contracts, then maybe they can get the volume they need." The problem, she suggests, is that the smaller VARs in OEMTEK's sights might well align themselves with an NCR or an ITT in order to attract customers.

For now, Seale is mum on the names of the corporate heavyweights that he says are extremely interested in OEMTEK's product

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Circle 223 on reader service card

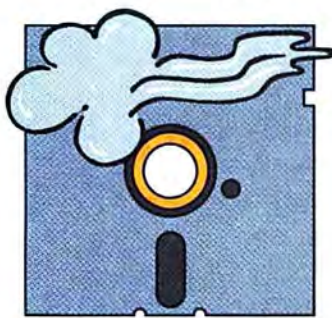
Give us your stained your filthy dirty,



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Regular coffee, two lumps



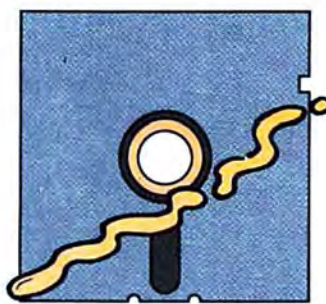
Clouds of smoke



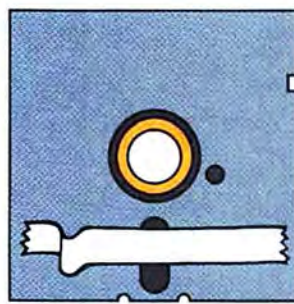
Maria's liquid cover



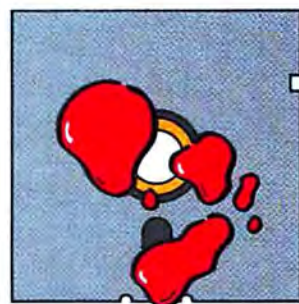
The big chill



Hot dog mustard



Tacky white tape



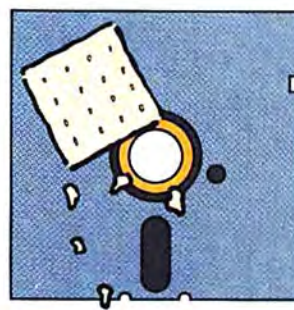
Lunchcounter ketchup



Potted plant—no pot



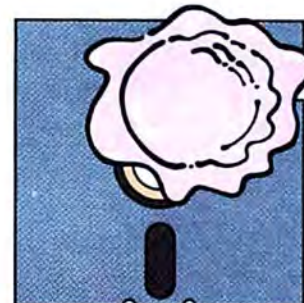
Fizzy orange soda



Cracker crumbs



Dust (cough-cough)



One scoop of ice cream



Sudsy soap bubbles



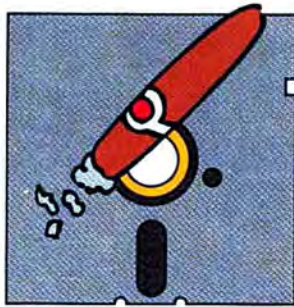
Chocolate fingerprints



And, your dog-eared, your mistreated:



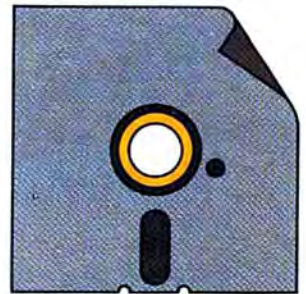
Dry martini, one olive



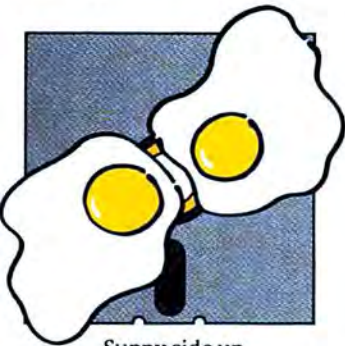
Boss's cigar ashes



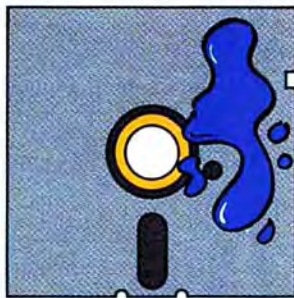
Spilled milk



Dog-eared jacket



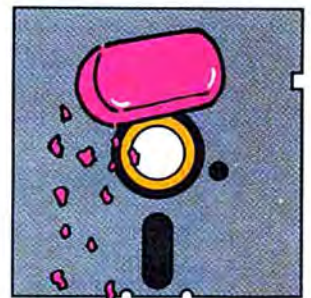
Sunny side up



Waterbased ink spots



English breakfast tea



Eraser bits

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line but haven't yet signed contracts. The company is hoping that 1985 will be the year that propels the firm toward its revenue goal of \$100 million by 1987. If so, look for OEMTEK to be laughing all the way to the bank— anonymously, of course. — *Jane Ferguson*

Jane Ferguson is the former editor of the San Francisco Business Journal.

Tandy Gets Into the ACT

The previous discussion notwithstanding, there's nothing wrong with retail, particularly if you're good at it. Texas's Tandy Corporation and England's Applied Computer Techniques (ACT), two titans of direct sales, have joined forces in a new European venture known as AT ComputerWorld. The alliance instantly created the largest computer retailing operation on the Continent—one devised to keep Olivetti and IBM at bay. The endeavor also represents a breakthrough of sorts for Tandy, whose 430 European Tandy Computer Centers will now admit hardware wearing something other than the Tandy, Realistic, or Radio Shack label. ACT's MS-DOS-based Apricot line is dominant in the U.K. but hasn't fared as well across the Channel.

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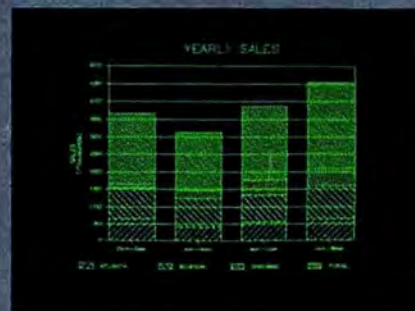
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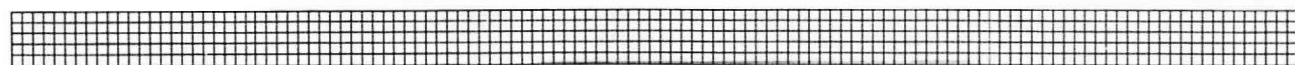
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Tandy itself wasn't faring terribly well as 1984 drew to a close; total sales were off and net income took a 25 percent dive. The silver lining is a new machine enjoying a dazzling debut. The price-busting, PC-compatible Tandy 1000 shattered the first month sales record for a Tandy computer. A single-drive 128K Tandy 1000 lists for \$1199 out the door.



In Review

Kiss of Approval

In the story of the frog-prince, a handsome prince becomes trapped in a frog's body and can be released only by the kiss of a beautiful princess. In computing, DOS is king; CP/M users spend long hours gazing at their once-hand-some machines wondering if there's a prince locked inside.

The SWP Co-Power-88 System is the kiss that has the power to transform CP/M computers (in my case, a Kaypro II) into the somewhat regal "industry standard."

Put a bit more prosaically, the SWP Co-Power-88 System is an expansion board for CP/M machines that brings with it a degree of MS-DOS compatibility. The advantage of an add-on DOS board is that it allows CP/M users to keep their present systems and protect their often substantial investments in programs and data. The Co-Power-88 board can also be used as a RAM disk, increasing both CP/M memory and processing speed.

On board are an 8088 CPU that runs at 5.33 MHz (20 percent faster than the PC) and 128K or 256K of RAM. System software includes DOS 2.11, a set of DOS utilities, and RAMDISK.COM—the CP/M program that lets you use the board as an additional disk drive while you're operating under CP/M. The system is available for Kaypros (including a special version for the Kaypro 10), the Zorba, the Xerox 820 and 820-II, the Bigboard and Bigboard II, the Osborne I, and the SWP ATR8000. Kaypro thinks enough of the board to include it as a factory-installed option for some models.

When you install the Co-Power-88 System, follow your best instinct—be cautious. Installation is neither difficult nor time-consuming (45 minutes should do it), and the documentation is commendably clear. Still, pulling chips, especially the Z80, can be tricky business.

Unless you're familiar with this kind of work, get a book on computer maintenance: you'll want to know how to ground yourself, how to pull chips from their sockets, and what tools you'll need. SWP would do well to provide such information with the board; a pair of chip-pulling tweezers wouldn't hurt, either. But your watchword should be caution, not fear. Even if you've never taken the cover off the box, you can do the job.

To install the system, it's necessary to remove the Z80 CPU chip, then plug the Z80 into an SWP adapter board that goes back into the Z80's socket. The main processor board, which contains the 8088 and the memory chips, fits inside your machine. In the Kaypro, it sits just behind the disk drives. A flat ribbon cable connects the main board to the adapter board. The Co-Power-88 System is driven by the host computer's power supply.

Once system hardware is installed, loading system software is a snap. SWP's version of DOS 2.11 comes on two disks: the first is a CP/M formatted disk that contains the required DOS load programs and the RAMDISK.COM disk emulation program. The second disk contains COMMAND.COM and a set of DOS utilities. To load DOS, you boot up with CP/M and then run MSDOS.COM, which sets up the operating system switch. You then load MS-DOS. The system prompts you when it's ready to accept a DOS disk, and that completes the system load.

Unlike beauty, PC compatibility isn't in the eye of the beholder; a package either runs or it doesn't. The SWP system allows you to format data disks that are fully PC-DOS compatible, but so do many format conversion programs that cost substantially less. A number of MS-DOS programs—and some PC-DOS programs—will run, but only if they're not hardware dependent. DOS-based communications programs, for exam-

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IBM PC Jr.	RCA	RCA	—	CG91	RCA	RCA	RCA	CG91	CG91	—	RCA
APPLE IIE	RCA	RCA	—	SB/CG91	RCA	RCA	RCA	SB/CG91	SB/CG91	—	RCA
APPLE III	RCA	RCA	—	SC	RCA	RCA	RCA	SC	SC	—	—
APPLE IIC	RCA	RCA	—	SI	RCA	RCA	RCA	SI	SI	—	RCA
VIC 20	CG20/64	CG20/64	—	—	CG20/64	CG20/64	CG20/64	—	—	—	CG20/64
COMMODORE 64	CG20/64	CG20/64	—	—	CG20/64	CG20/64	CG20/64	—	—	—	CG20/64
ATARI 600	CG20/64	CG20/64	—	—	CG20/64	CG20/64	CG20/64	—	—	—	CG20/64
ATARI 800/1200	CG20/64	CG20/64	—	—	CG20/64	CG20/64	CG20/64	—	—	—	CG20/64
COLECO ADAM	—	—	—	—	—	—	—	—	—	—	CGCA
TI 99/4	RCA	RCA	—	—	RCA	RCA	RCA	—	—	—	RCA
FRANKLIN ACE	RCA	RCA	—	—	RCA	RCA	RCA	SB/CG91	SB/CG91	—	RCA
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NEC PC-8201A	**	**	—	**	**	**	**	—	—	—	**
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Buffer Size	4K "Bit Image" type
Paper Feed Method Standard Interface	Friction and Tractor Feed Centronics, 8-bit parallel



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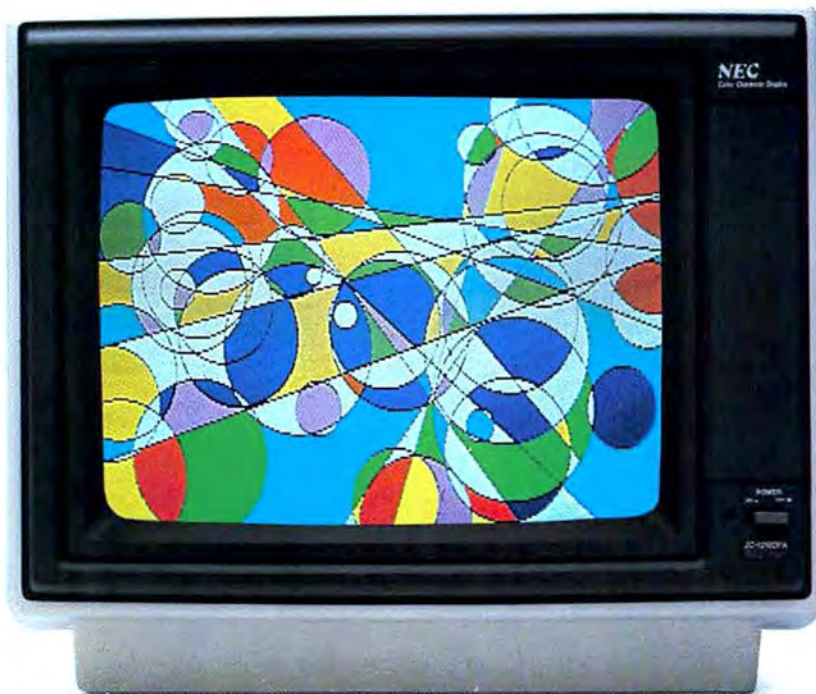
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Printing Method	Impact Dot Matrix Logic Seeking
Speed	105 CPS
Paper Feed Method Standard Interface	Friction and Piri Feed Centronics, 8-bit parallel
Buffer Size	2K



Both the PC-PR103A and the PC-8027A give you all the capabilities you'd normally expect from larger printers. And best of all, they cost less than most of the rest.

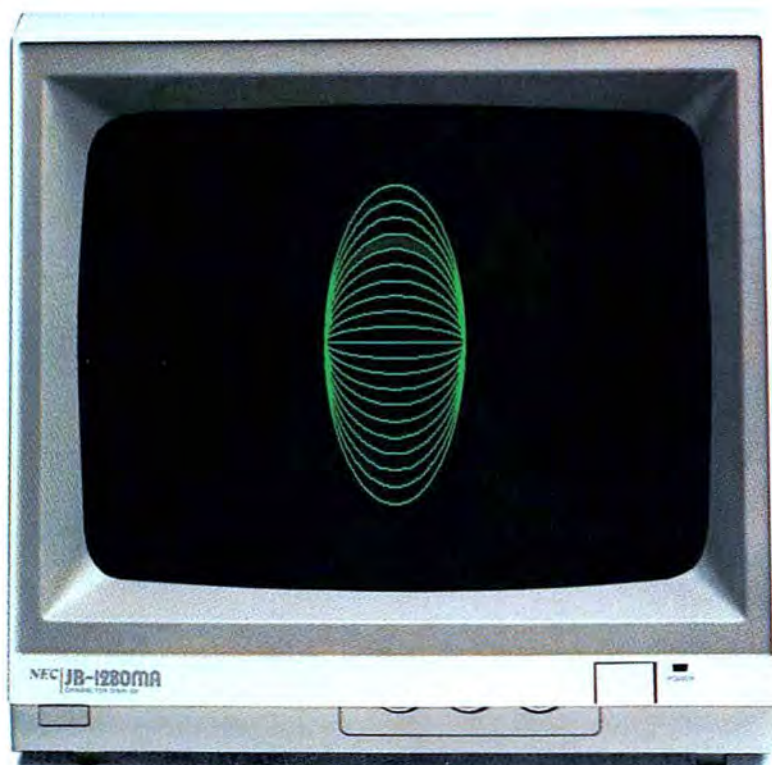
For software installation, choose the PC-8023A or any teletype-like printer. These choices will work with some software programs. All features of the printer may not be supported. Please contact the software vendor for additional information.



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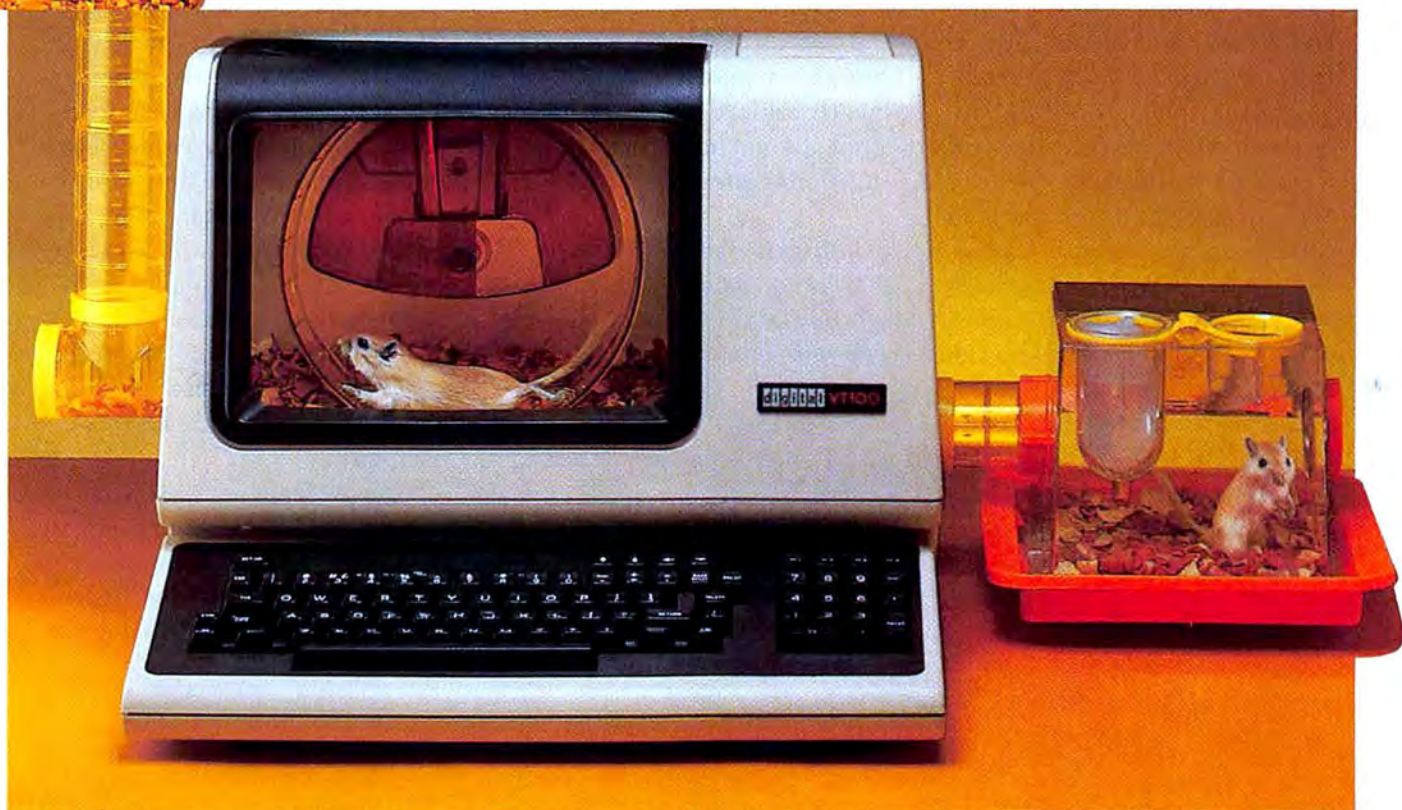
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ple, don't work with the Co-Power-88 unless they allow port modifications. SWP advises discretion in running programs that use the PC's BASICA, a kernel of which is contained in the PC's ROM. SWP's version of DOS includes a screen handler that can emulate either the PC's text mode or a Lear Siegler terminal.

A more obvious source of incompatibility is media. My Kaypro, for instance, has single-sided drives. The bulk of the DOS programs sitting on store shelves are formatted for double-sided drives.

With the system, SWP includes a list of more than 60 off-the-shelf packages that the company has successfully tested for compatibility. Among those passing with flying colors are the General Ledger module of *TCS Accounting*, Ashton-Tate's *dBASE II*, Fox & Geller's *Quickcode*, Microrim's *R:base 4000*, MicroPro's *WordStar* (PC versions up to but not including 3.3), Microsoft's *Multiplan*, and *T/Maker III* integrated software. The list generally jibes with my test results. I had no trouble running *dBASE II*.

Happily, Lotus diehards need not fear. The Co-Power-88 System for the Kaypro 4/84 and the Kaypro 10 runs version 1A of 1-2-3 for

the PC. The system uses a special Lotus utility along with DOS 2.11A to give you bare-bones 1-2-3—that's sans screen graphics. DOS 2.11A for both Kaypros also improves PC compatibility by redefining the Kaypro's numeric keypad as a complete set of PC function keys.

If you're a CP/M devotee looking for a way to add new power to your existing system, or if you've got a PC at work and a CP/M machine at home that you'd like to keep working on, the SWP Co-Power-88 System just may be the magical kiss you're looking for. Shop carefully, however: the board provides a modest but workable level of PC compatibility. SWP's included list of tested software suggests that the company is concerned that potential users be adequately informed of the product's strengths and limitations.

—Clifford Guren

Clifford Guren is a technical writer for Bank of America and former head of the San Francisco Kaypro User's Group.

Co-Power-88 System
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Fort Worth, TX 76115
(817) 924-7759
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256K system \$500

Software

What the Latest Compatibles Are Running...

Alpha Software has placed its *Electric Desk* integrated package in IBM Product Centers. Alpha has also released a version of the program for the TI Pro-Lite laptop machine... In a similarly mobile vein, Traveling Software has unveiled versions of its *Business Manager Series* for the Pro-Lite, the Osborne Encore/Morrow Pivot, the DG/One, and the Sharp PC-5000. The series consists of appointment manager, project manager, sales manager, expense manager, and time manager modules... Corona Data Systems has taken on the Vertical Software Series, Trac Line Software's integrated accounting package that features modules geared to retail and wholesale applications... CertiFLEX Systems has tailored its line of accounting software for the Tandy 1000 and Tandy 1200 computers.

Morrow Designs, Wyse Technology, and MAD Computers have licensed GSS-Drivers, Graphic Software Systems' implementation of ANSI's virtual device

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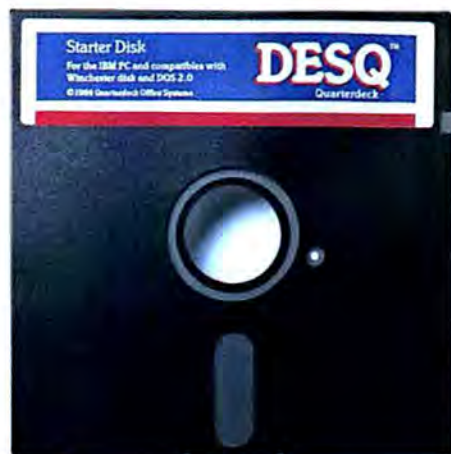
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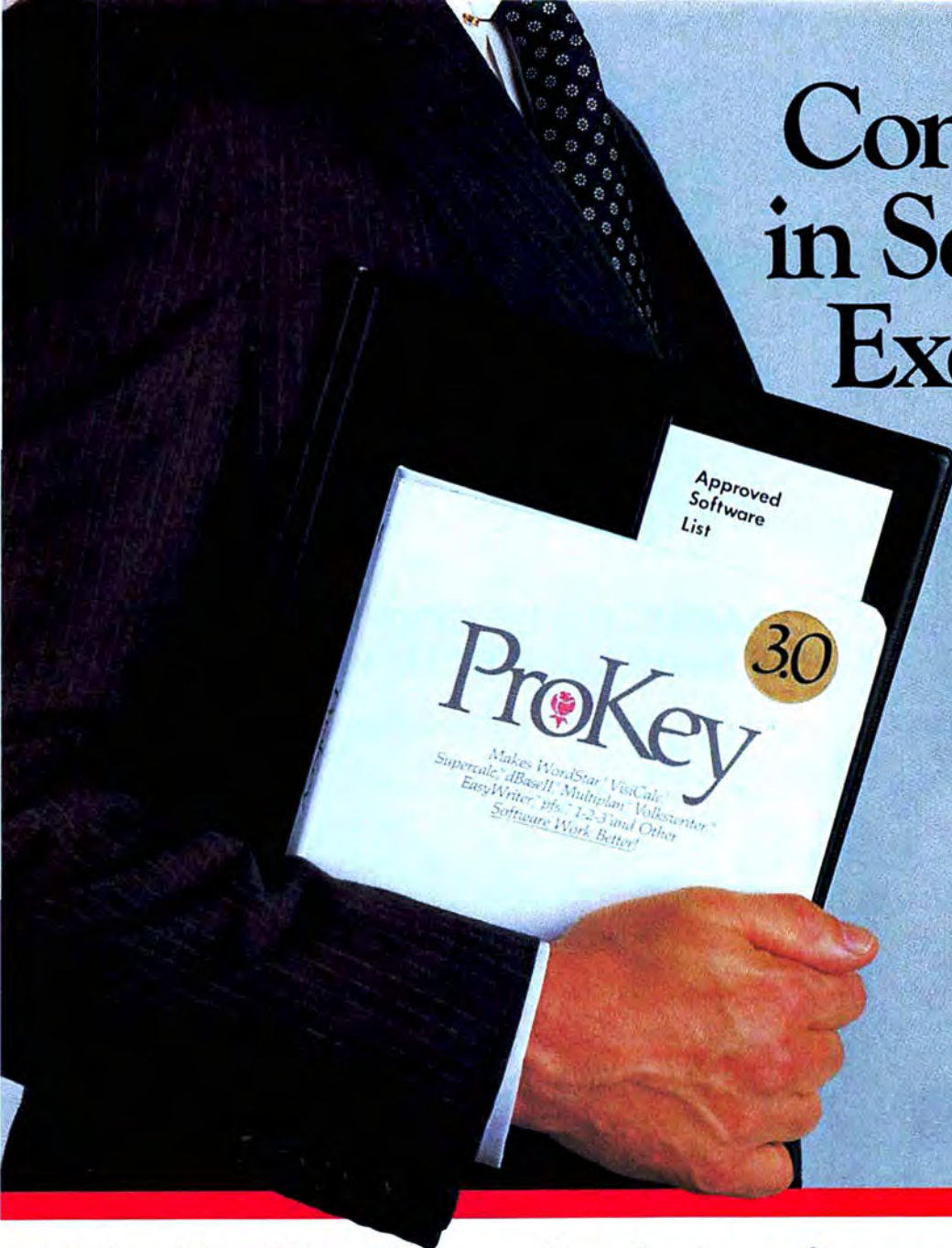
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interface (VDI) ... Digital Research's Mac-like Graphics Environment Manager (GEM) is ready for ACT's Apricot line of MS-DOS machines ... 3Com is now supplying *EtherSeries* local area network products for the Ericsson PC, a highly compatible machine from Sweden. *EtherSeries* includes network boards, servers, and operating system software ... Norton-Lambert's *Lync* communications package has been modified to run on the DG/One (equipped with an internal modem) ... Seequa Computer has reduced some system prices by "unbundling" software. The firm has also introduced the Chameleon RAM PLUS expansion board, which includes 128K, 256K, or 384K of RAM.

Compatibles Update 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 contribution. Send them to Compatibles Update, PC World, 555 De Haro St., San Francisco, CA 94107. ●

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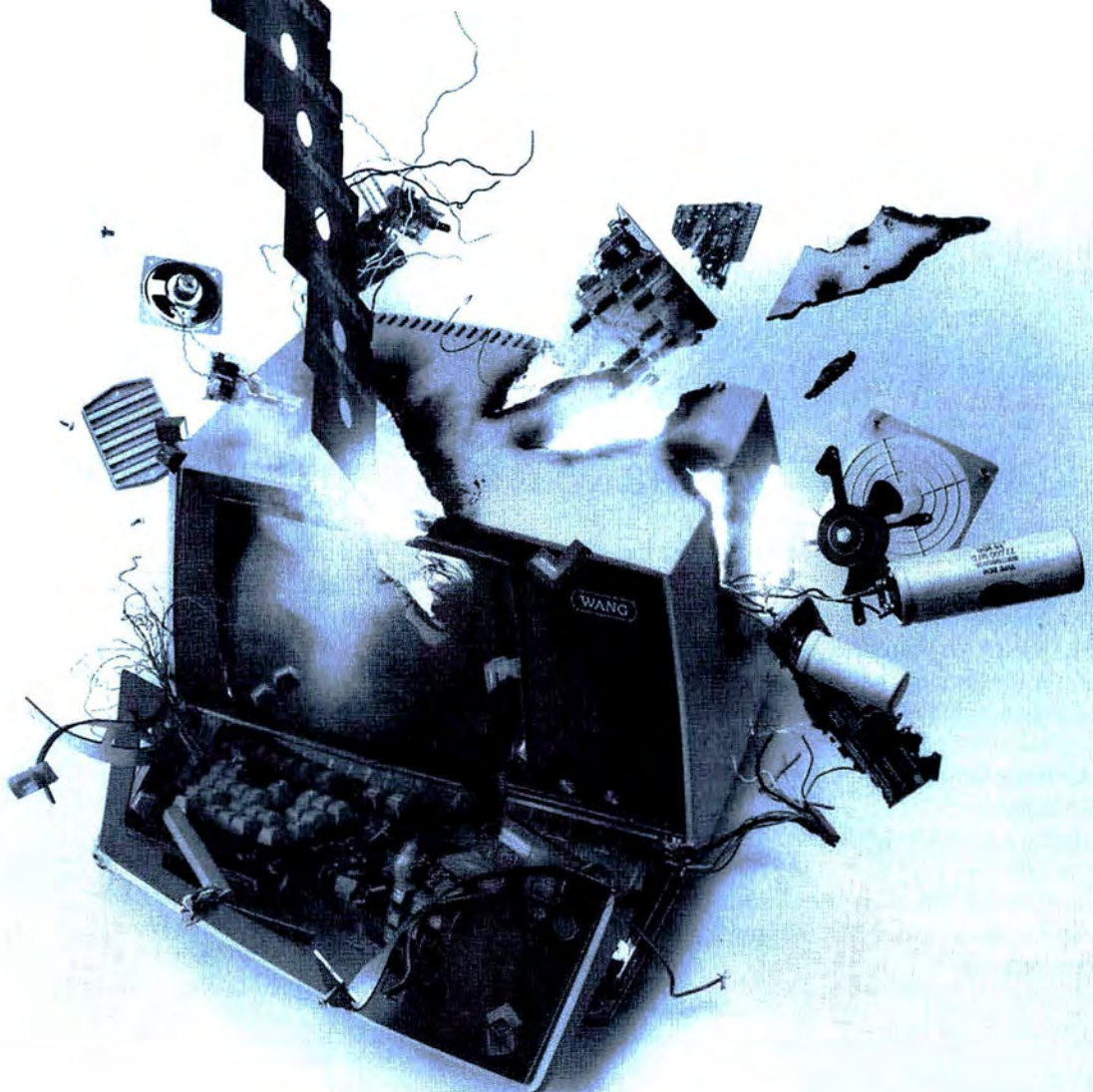
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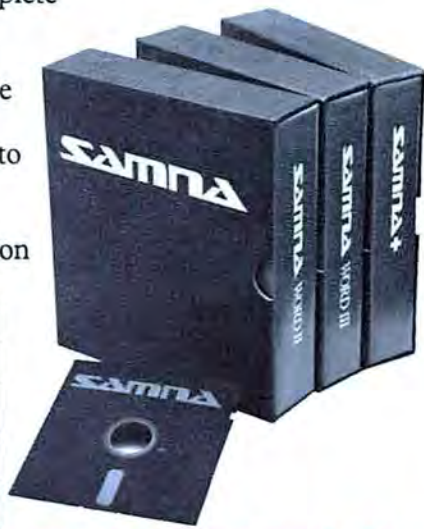
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From the Software Shelf

PC World editors offer first impressions of recent software releases



This month: a box of disks chock-full of free software and demos, a program that looks over your spreadsheet's shoulder, a compiler to speed up dBASE II programs, and an easy-to-use office management tool



Mentor Preview Series

My mama used to tell me there's no such thing as a free lunch. But crafty and resourceful as she is, she also taught me to keep a keen eye peeled for bargains.

Mama, have I got a software package for you. It's the *Mentor Preview Series* from Janus Dysc, and it's more like a free breakfast. It's nourishing, it whets the appetite for a feast of games, tools, and application programs—and it comes with a recipe of sorts plastered on the box.

That terse box-top message conveys instructions for booting the system and is about all the written documentation you get with this first sampler from the Janus software catalog. Here's the deal: you buy a box of ten double-sided, double-density 5¼-inch floppy disks, which Janus has stamped with actual programs—practically gratis. The company is offering an amazing assemblage for a paltry \$39.95. Quick calculation reveals that purchased separately, the assorted contents would set you back more than \$150.

This is the software package as magazine: disks are organized into sections (games, demos, business packages); files constitute software "articles"—32 in all. You pick entries by number from a table of contents, and voilà! Every medium has its peculiarities, of course. In this case, you juggle disks rather than dodge blow-in cards or comb through vast expanses of ads without page numbers.

Like any good magazine, *Mentor Preview Series* is eclectic: a smattering of Scholastic Aptitude Test questions here, a music pro-

gram there. You can sample a reading primer, a BASIC file handler, an arcade-style game, a time manager, an accounting package for the office. For 1-2-3 and dBASE devotees, templates make short work of maintaining mailing lists, address books, sales leads, and budget models. There's even a bone for electronic sleuths: *Two Heads of the Coin*, an exercise in interactive fiction, places Agatha Christie in RAM.

But the real stars of this first edition are Bob Wallace's *PC Write* (see "From the Software Shelf," *PCW*, Vol. 2, No. 12), a quick, easy-to-use word processor bulging with useful features; and its Shareware cousin, Jim Button's *PC-File III*, version 2. *PC-File* is a rudimentary but versatile data manager that's a snap to use. What the program lacks in on-line help, it gains with an intuitive design. Need data to play with? Check out *Letus A-B-C*, a *PC-File* index of article summaries from three months in the life of a batch of PC-specific magazines.

In short, rarely has disk media been so enticing. It's as though Maxell, seeking to sell tapes for your VCR, tossed in a few free movies from up-and-coming directors.

Having lavished such approbation on this package, I've got to heed Mama's advice about not being a Pollyanna. This is not the ultimate Instant Budget Software Library. In my foraging for Mentor's numerous gems, I also encountered a fair bit of gravel. Here, as elsewhere, there's a not-so-fine line between puffery and performance.

Like *Preview Pak's* customers, the audience for *Mentor Preview Series* is amorphous: the package contains something for the heavy-duty BASIC programmer, the 1-2-3 power user, the student, the game buff. System requirements are nonstandard, to say the least; to use every last demo and template you'd need a PC equipped with 384K, a color graphics board, plus 1-2-3, dBASE II, WordStar, and MailMerge.

The on-screen blurbs (product descriptions without demos) range from helpful to wholly hype. On balance, the company could just as easily have printed up a little something describing selections from its catalog. The demos themselves are uneven, but the *Personal Financial Management System* sampler is inexcusably austere, consisting of two meaningless screens to which no data can be added.

Where on-line help could be most useful, it's absent; the trio of handy DOS utilities, for example, cries out for explanation. And the structure of the "magazine" itself could stand refinement; repeated scrolling through the table of contents is a definite drag.

But I suppose that's the beauty of floppy disk media. If you don't like what's on the little platters, you can always wipe 'em clean and use them for your own purposes. Yes. Mama will like that. —Ken Greenberg

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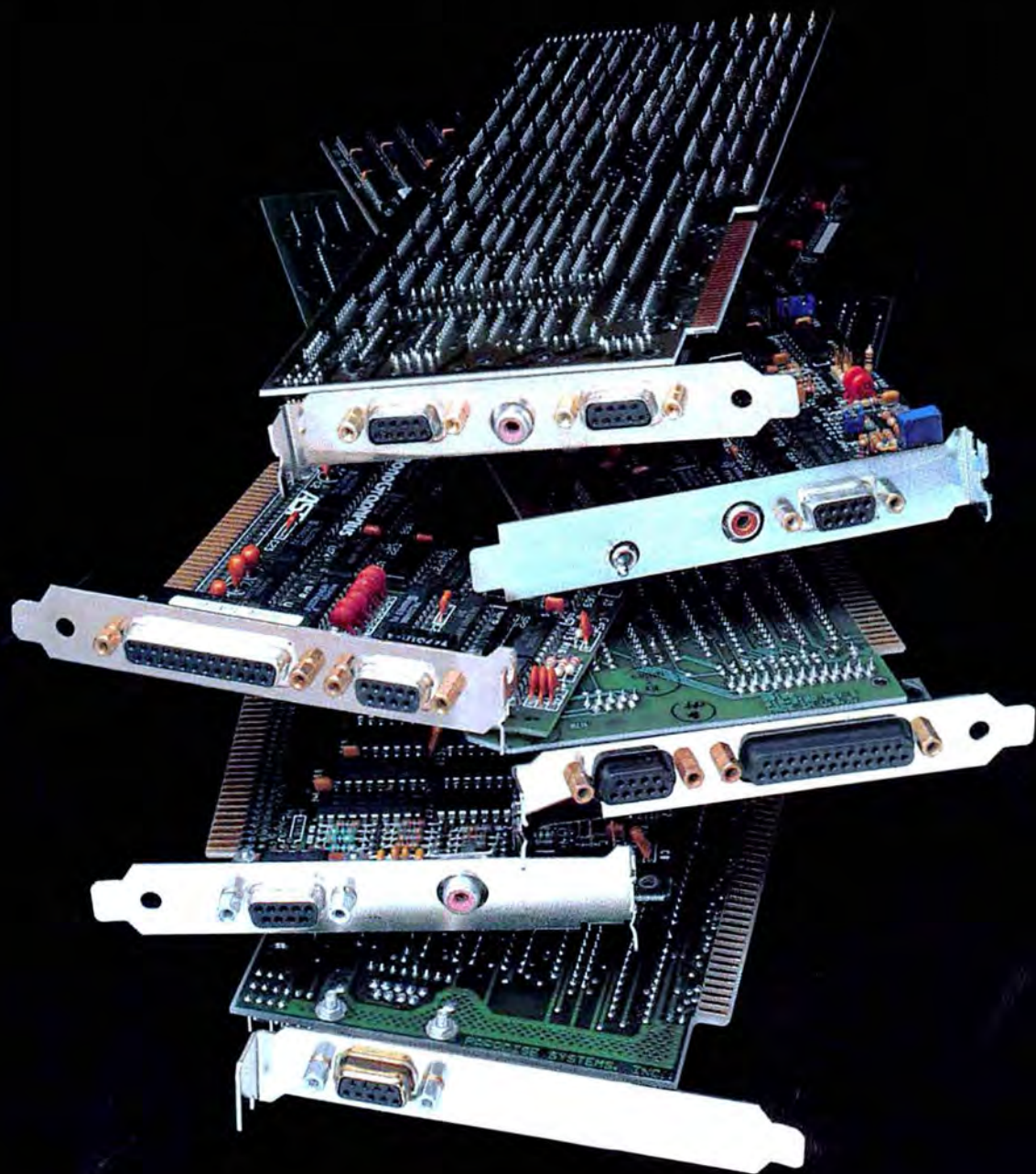
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The Spreadsheet Auditor has one basic purpose: It lets you check your 1-2-3, VisiCalc, or SuperCalc spreadsheet formulas—rather than just the results—for potentially disastrous errors and omissions. It accomplishes this simple miracle by taking your spreadsheet and

printing out all cell formulas in standard spreadsheet-grid format. The spreadsheet programs themselves won't do this, and I still can't figure out why. With 1-2-3, for example, you can either check your formulas ponderously, one at a time, on screen, by moving the cursor from cell to cell, or you can print out a virtually unreadable cell-by-cell listing that in no way resembles the spreadsheet you're attempting to verify. Seems silly, doesn't it? *The Spreadsheet Auditor* prints all formulas, grid coordinates, page numbers, and, in the case of 1-2-3, all named and special ranges.



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From the Software Shelf

To prepare a 1-2-3, *SuperCalc*, or *SuperCalc 2* spreadsheet for the *Auditor*, you must first generate a print file. *VisiCalc* files can be used as is. You select options from a series of menus to designate spreadsheet (or print) source files and determine the format of "audited" output files. *The Spreadsheet Auditor's* output files can be sent to a print file or directly to a printer or the screen. You determine the output file's width and number of lines per page, and choose whether or not to print grid coordinates and use printer form feeds. You can designate more elaborate printer instructions for compressed print, form length, underlining, and boldface.

Column width can be set to default, which means the column will be as wide as its widest entry, or specified, which causes long formulas to wrap into the following row or rows much like a newspaper column. I prefer default mode because long formulas are easier to read in single lines than wrapped into several lines. However, that can make for some extraordinarily wide printouts that require cutting and pasting. You can also designate the range of rows to be processed. Your final choice before auditing a spreadsheet is whether to save or delete input and output configurations for later use; this option is useful if you're processing multiple spreadsheets. Once the program has performed its magic, you can save the spreadsheet and source disk for further processing or return to the *Auditor's* opening menu.

The well-written manual includes a detailed tutorial with samples, a "Quick Guide" to the

program, a reference section, and a short set of suggestions for designing spreadsheets.

Spreadsheet fans take note: Consumers Software plans to offer version 2.0 of *The Spreadsheet Auditor* by the time this review is published. Version 2.0 reportedly adds *Symphony* to its repertoire, generates an "audit trail" of spreadsheet macros, prints wide spreadsheets sideways, and processes files as they are stored on disk without requiring an intermediate print file. One good thing follows another.

At \$99, *The Spreadsheet Auditor* offers an all-too-rare opportunity to cover your assumptions. —Reed McManus

The Spreadsheet Auditor
Consumers Software Inc.
314 E. Holly St. #106C
Bellingham, WA 98225
800/645-5501

List price: \$99

Requirements: 128K, one disk
drive

Copy protection: Yes

dB/Compiler

A compiler for *dBASE II*? Usually we associate compilers with "real" computer languages like Pascal and C, not data management programs like *dBASE II*. But *dBASE II* incorporates a powerful programming language that is used by thousands of software developers to create serious business applications.

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From the Software Shelf

The *dBASE II* language has a lot going for it. You can create a functioning application in a fraction of the time it would take to do the job using a general purpose language like BASIC. But as a software tool *dBASE II* has some drawbacks. One problem is the excruciating slowness of many applications written in *dBASE II*, especially those that perform sorts or indexes on large data bases.

A second problem affects consultants who create applications using *dBASE II*. Anyone who wants to use such a system has to buy a copy of *dBASE II*, unless the consultant has included with the application a special *dBASE II* interpreter called *RunTime*. *dB/Compiler* from WordTech solves both problems. It speeds up *dBASE* applications and lets them run independently of *dBASE II*.

How do you use *dB/Compiler*? Simple. Just load it from DOS, and type **DBC** and the name of the previously created *dBASE II* command file you want to compile. *dB/Compiler* churns out a compiled version of the command file and of any other files called by that command file. You can then use WordTech's linker to produce an executable (.EXE) file that reads in the compiled code as needed when the application is run.

For the technical purist, we should note that the word *compiled* is used loosely here. A true compiler is a sort of programmer's Cuisinart, a software gizmo that slices, dices, and minces software instructions all the way down to the 0s and 1s of machine-readable object code. *dB/Compiler* is actually a pseudocompiler: it does not

reduce *dBASE II* files to binary form, but rather to a special intermediate code.

Technoquibbles aside, the benefits are the same as a true compiler's: The resulting application uses less disk space, runs faster, and is encrypted to prevent others from using your programming ideas or altering your code. All software products have shortcomings, of course, and this one is no exception. Unfortunately, *dB/Compiler* balks at a few *dBASE II* programming techniques, including some uses of the macro substitution function. Programs that use these techniques must be rewritten before they can be compiled.

WordTech estimates that any *dBASE II* application, once compiled, will run about 20 percent faster, and my tests confirm this claim. But the real benefit comes in applications that sort or index very large data bases. Since *dB/Compiler* dramatically speeds up *dBASE II*'s sluggish sorting and indexing commands, compiling causes applications that make heavy use of these commands to run up to five times faster.

Currently, users of *dBASE II* who wish to improve the performance of their programs must choose between upgrading them to *dBASE III* or compiling them with *dB/Compiler*. Fortunately, with the pending release of a version of *dB/Compiler* for *dBASE III*, such a decision will no longer be necessary, and users who took the upgrade route can now enjoy the benefits of compilation as well.

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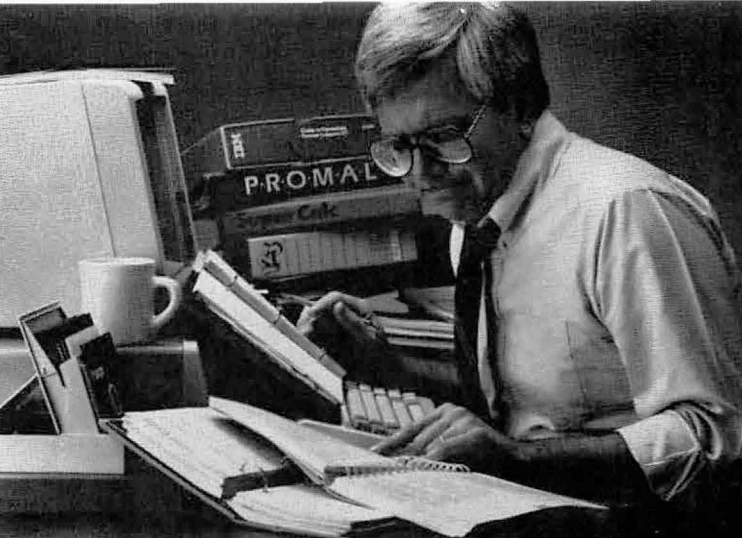
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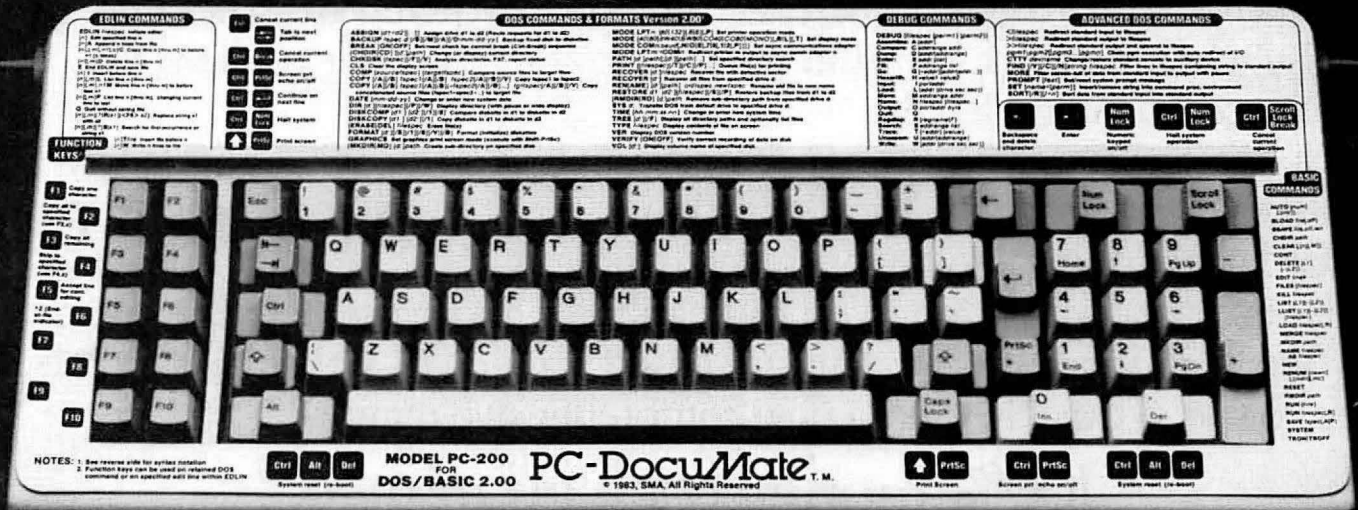
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For Ashton-Tate, the arrival of a compiler for its star program is both an honor and an insult. It's an honor because it confirms *dBASE II* as a serious programming language. The insult is to Ashton-Tate's bottom line: Instead of consultants' buying a copy of *dBASE II* or *RunTime* for every system sold, they need only pay for *dB/Compiler* once. No wonder Ashton-Tate never got around to developing a compiler itself. —*Ted Nace*

dB/Compiler
WordTech Systems
P.O. Box 1747
Orinda, CA 94563
415/254-0900
List price: \$750
Requirements: 256K, one disk drive
Copy protection: Yes

Offix

It seems to be a glaring paradox of our high-tech times that software programs designed to simplify our lives are often accompanied by manuals of baleful complexity. No matter the seductive promises made by flashy packaging—you must still spend tedious hours fighting off somnambulistic prose and wrestling labyrinthine instructions into submission.

It was therefore with no little trepidation that I peeled back the shrinkwrap on *Offix*, especially when I noted that Emerging Technologies was promoting it as the world's easiest-to-use integrated software. To my surprise, I

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couldn't find the manual. After a futile search through the packing material, I finally opened a general information booklet enclosed with *Offix*, hoping to solve this mystery.

You guessed it—no manual. The package also lacks spreadsheet, graphics, and communications capabilities—functions usually found with integrated software. *Offix* is actually a multifunction tool with some data base management capabilities as well as word processing, filing, forms design, and report generation features.

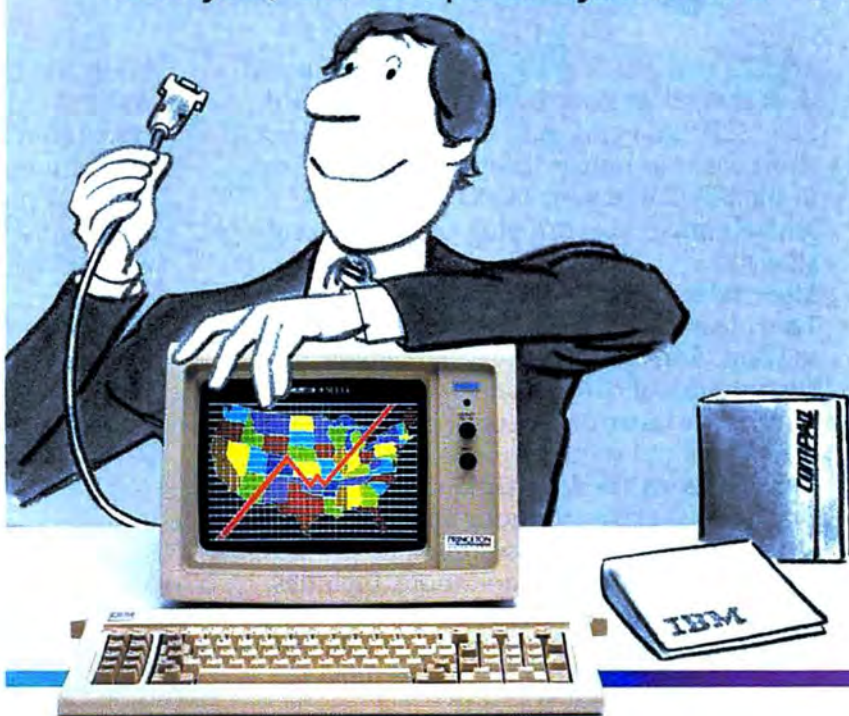
The good folks at Emerging Technologies have provided everything we need to know about *Offix* on disk. With the aid of disk-based tutorials, help screens, and little pop-up windows with menus and error messages, this personal office system takes pains to ensure that even the novice PC user will quickly feel productive.

Offix depicts on screen an office environment called "The Cabinet Room," which features (what else?) two filing cabinets. To enhance the illusion, as you begin to use the program a three-dimensional graphic appears, representing an open drawer with file folders. Instead of the terms *file*, *record*, and *field*, *Offix* uses common office lingo: Each *cabinet* has three *drawers*, and each drawer contains 100 *folders*, which in turn can be filled with *forms*.

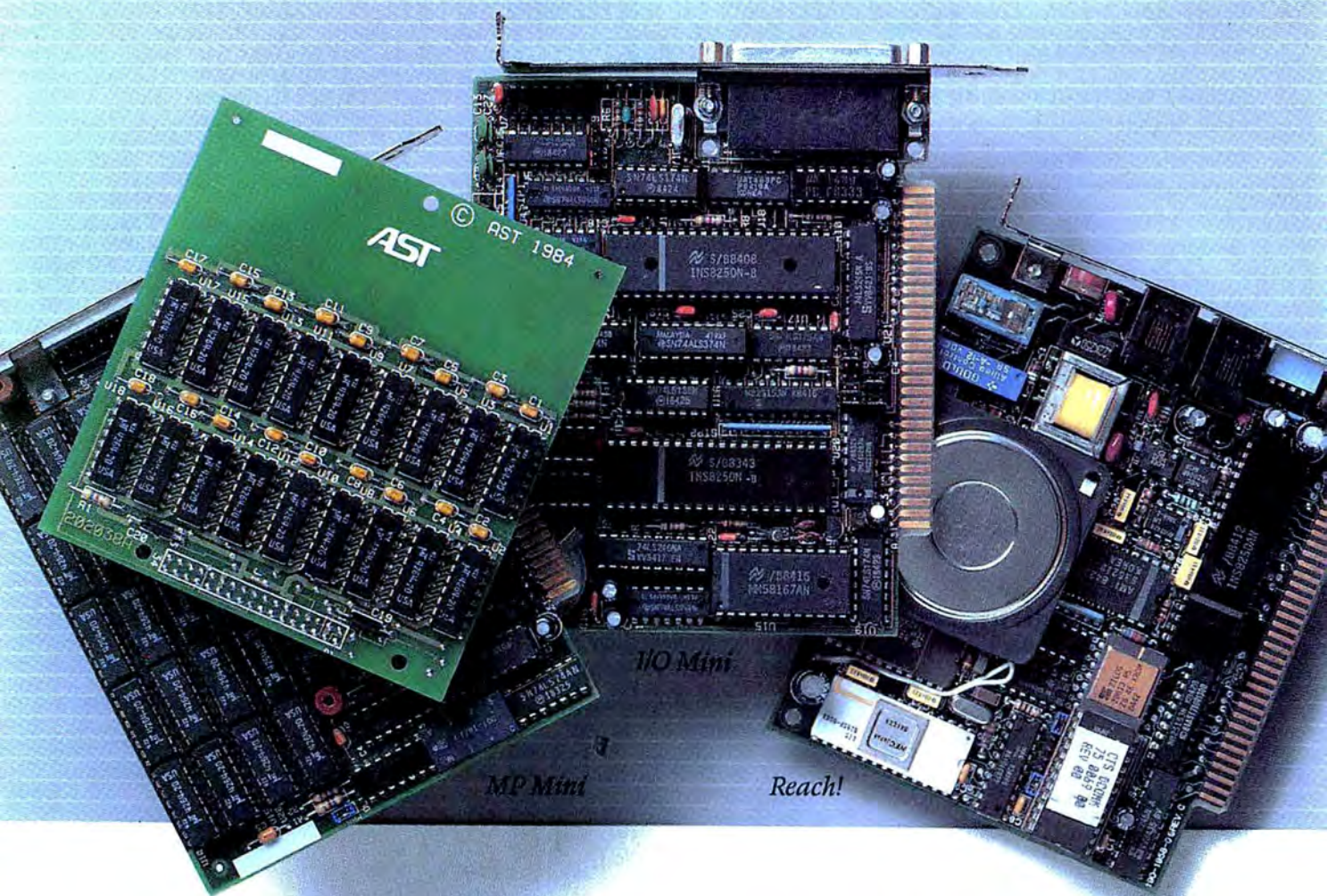
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folder”—provides access to *Offix*'s main features: electronic filing, word processing, forms design, and report generation.

Once a folder is open, the *Offix* word processor is activated. Basic editing functions, coupled with a capacity for block moves, boldfacing, underlining, and merging files—including non-*Offix* files—make this feature more than adequate for basic correspondence and report writing.

With the word processor you can also design a data entry form with as many as 50 entry blanks. (This is analogous to creating a data base template for records having 50 fields each.) You design an *Offix* form as you would on a typewriter, typing labels for various entries and underscoring fields to be filled in. *Offix* lets you fill in more data than a blank has spaces, with excess characters scrolling off the screen to the left. There is also a Forms Search feature that lets you set ten search criteria (for forms) in an open folder. Forms (records) that match the search criteria then appear on screen one at time. A Form Letter function enables you to print envelopes, labels, and form documents, merging information from the file folders you created.

If there's a glaring shortcoming to this “integrated package,” it's the lack of a spreadsheet function. You can produce a report in columnar format using *Offix* data folders. Items in a column can be sorted according to specified criteria, and any column containing numbers can be totaled. But these capabilities are not equivalent to a spreadsheet function.

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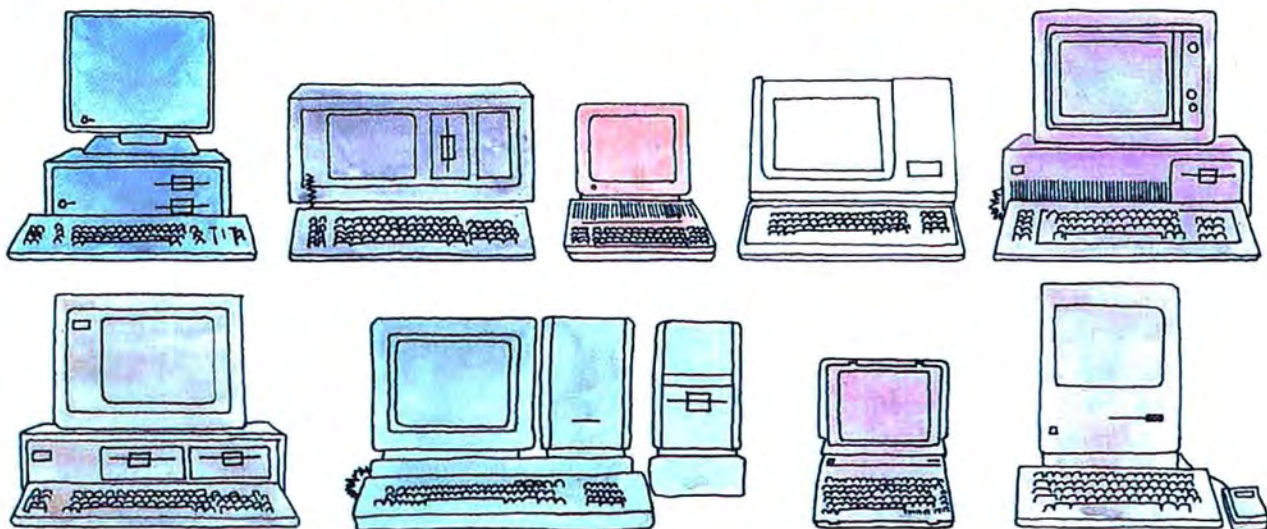
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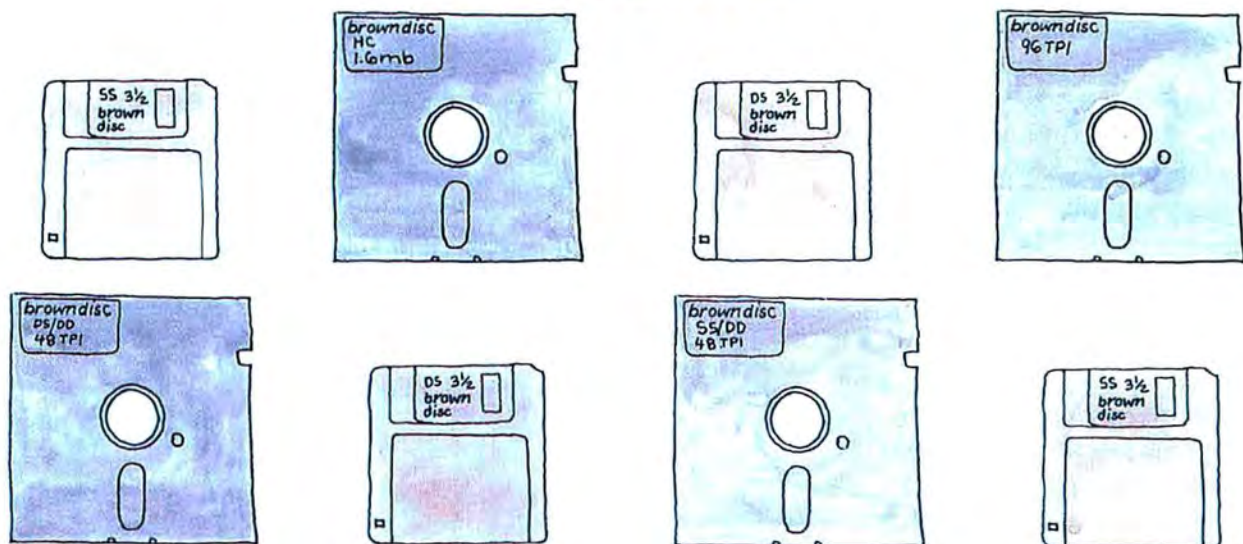
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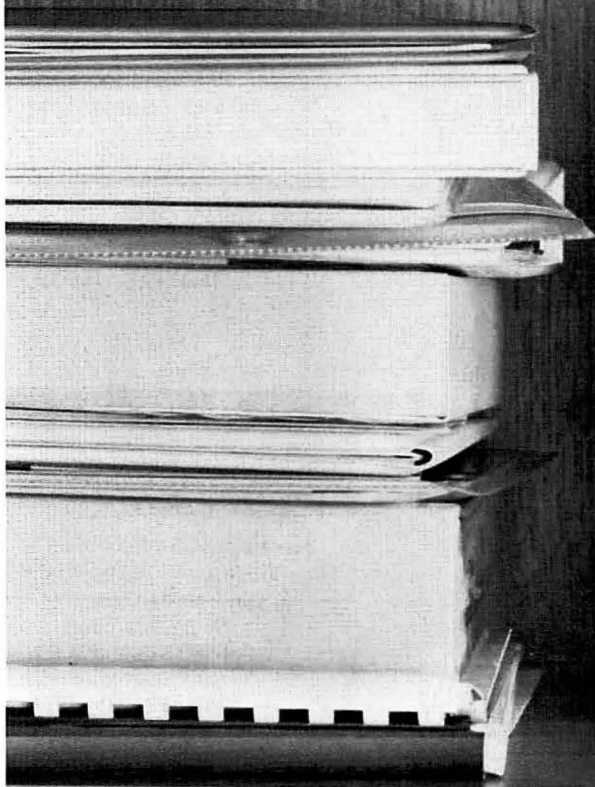
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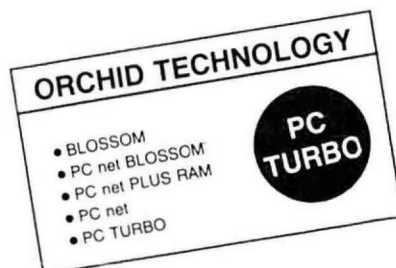
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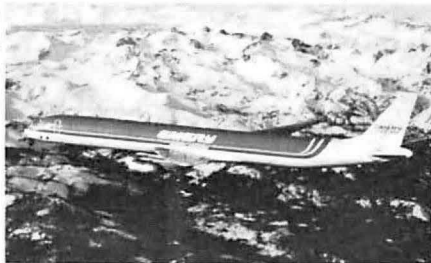
New customer service policy expected to set a new standard in the mail order industry!

BY MICHAEL CHRISTOPHER

GARDEN CITY, N.Y.—Mr. David W. Pasternack, President of Logisoft, a major IBM PC software and hardware distributor, has announced the inception of a unique new customer service policy. . . free overnight courier delivery on their entire product line.

In a recent interview, Mr. Pasternack stated that "We feel our new free overnight delivery service will set a new standard in the computer software mail order industry. In a study we conducted, we found that in addition to competitive pricing, expedience was a factor utmost in our customer's minds. Whether their order was \$300 or \$3000, the need to get their package as soon as possible was the same. Under our old procedures, between processing and shipping time, it could take up to a week and a half to two weeks for an order to arrive. With our new courier service, an order can be processed, shipped, and arrive in our customer's hands in only 3 working days. . . at no additional charge!"

The company is using Emery Worldwide to handle the large number of packages being shipped each evening for next day delivery. "We chose Emery for their competitive pricing structure and excellent delivery record", said Mr. Pasternack. Emery was quoted as saying, "This makes Logisoft the largest single Emery account in the New York Metro area.



LOGIC TIP OF THE MONTH

Choosing software can be mind-boggling. With the proliferation of publishers, how do you choose. Analyze your needs. . . what specific tasks do you want to perform. Read the software reviews; an excellent way to evaluate a package. Ask around. . . you'd be surprised how many associates may be using a package similar to your application. Finally, choose the best package (not always the most expensive). Upgrading will end up costing you more. Remember the key word is research.

TOLL-FREE SUPPORT A Smashing Success

GARDEN CITY, N.Y.—A survey of Logisoft's toll-free technical support policy was done to see if it warranted the continued costs of the 800 toll-free number, personnel costs, etc. After careful monitoring of these calls (both pre-sale and after sale) it was found that 92% of the calls were for legitimate technical support questions rather than for answers already contained in the softwares' operations manual. As a result of the survey, the decision has been made to continue toll-free support as an important part of their customer service.

This service consists of assisting with: • Hardware requirements • Initial boot-up procedures • Initial software configuration (printers, disc drive, etc.) • Back-up procedures • Defective program determination • Alternative program recommendation • Return policy

Logisoft's Lowest Price Guarantee Still Effective

GARDEN CITY, N.Y.—Logisoft, Inc. has indicated that their long time policy of guaranteeing the lowest prices in the mail order market is still being offered and will not be affected by their new free overnight delivery service. "We will continue to beat any price by \$10" a company spokesman said. "We'd be crazy to fool with success", he stated; "since the inception of our lowest price guarantee, sales have skyrocketed."

When asked how Logisoft could afford to give their customers free overnight delivery plus beat any price by \$10, they replied "Buying Power". "Very simply", they said, we buy at the best possible prices and pass those savings along to our customers".

CONTINUOUS STATIONERY: BIG BUSINESS, But "Where's The Class?"

NEW YORK—The growth of Logicforms, Inc., a member of the Logic Group, has been phenomenal. Mr. Ralph Corso, President of Logicforms explains why. "Up until now, buying continuous stationery through the mail has been a take what's available situation". "First off", he said, "almost all mail order firms offer only stock letterheads & envelopes with limited typestyles, colors and stock logos from which to choose, but, 'where's the class?'"

"The individual style and design of a letterhead", said Mr. Corso, "reflects the professionalism and personality of a company and should not have to change because they now have a printer and the need for continuous stationery. While other mail order firms are limited in the variety they can offer, Logicforms specializes in custom stationery. Logicforms offers a large selection of quality paper, ink colors and special effects such as thermography, blind embossing, foil stamping and multi-color printing." Mr. Corso went on to say that

"whether a customer chooses to supply his own artwork or printed letterhead, or wishes to select from our vast array of stock designs. . . We are the Logical Choice".

For a free sample/pricing kit and a handy re-usable shipping envelope for artwork, simply call toll-free 1-800-645-3491 or send a sample of your current stationery for a free firm price quote. Mail to Logicforms, Inc., 300 Garden City Plaza, Garden City, N.Y. 11530

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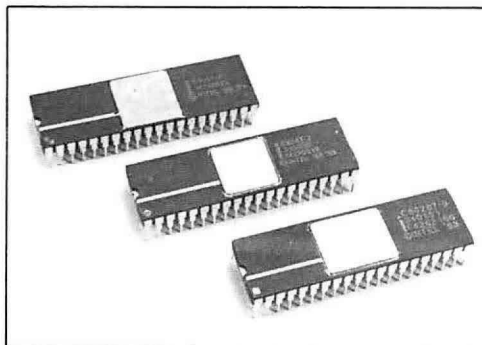
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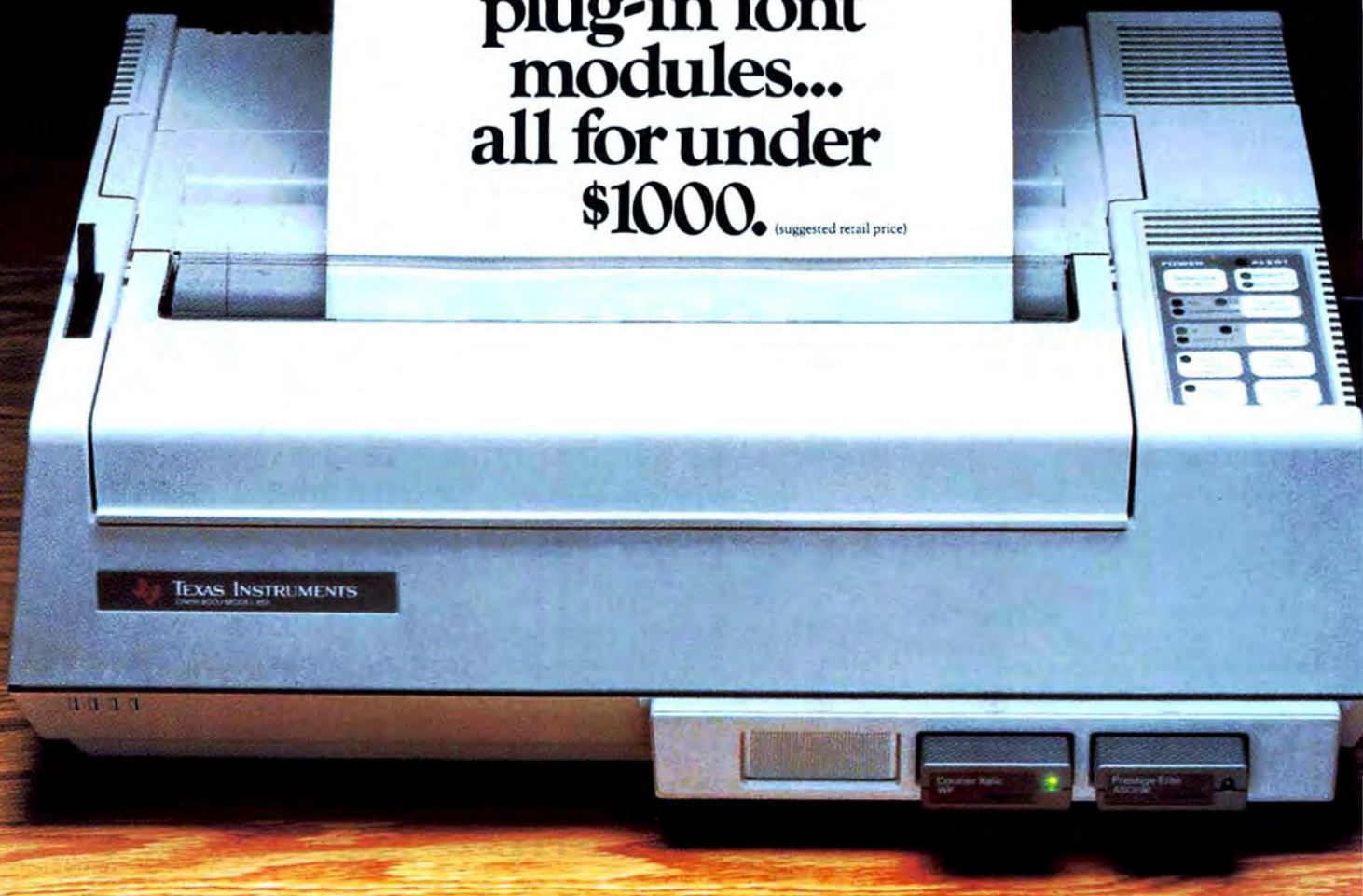
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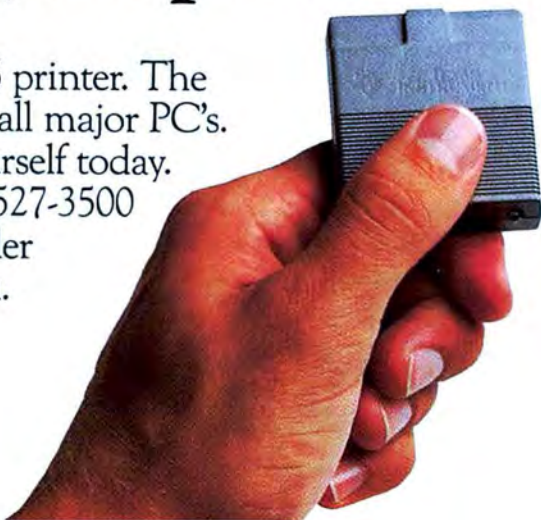
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Tapping Into On-Line Data Bases

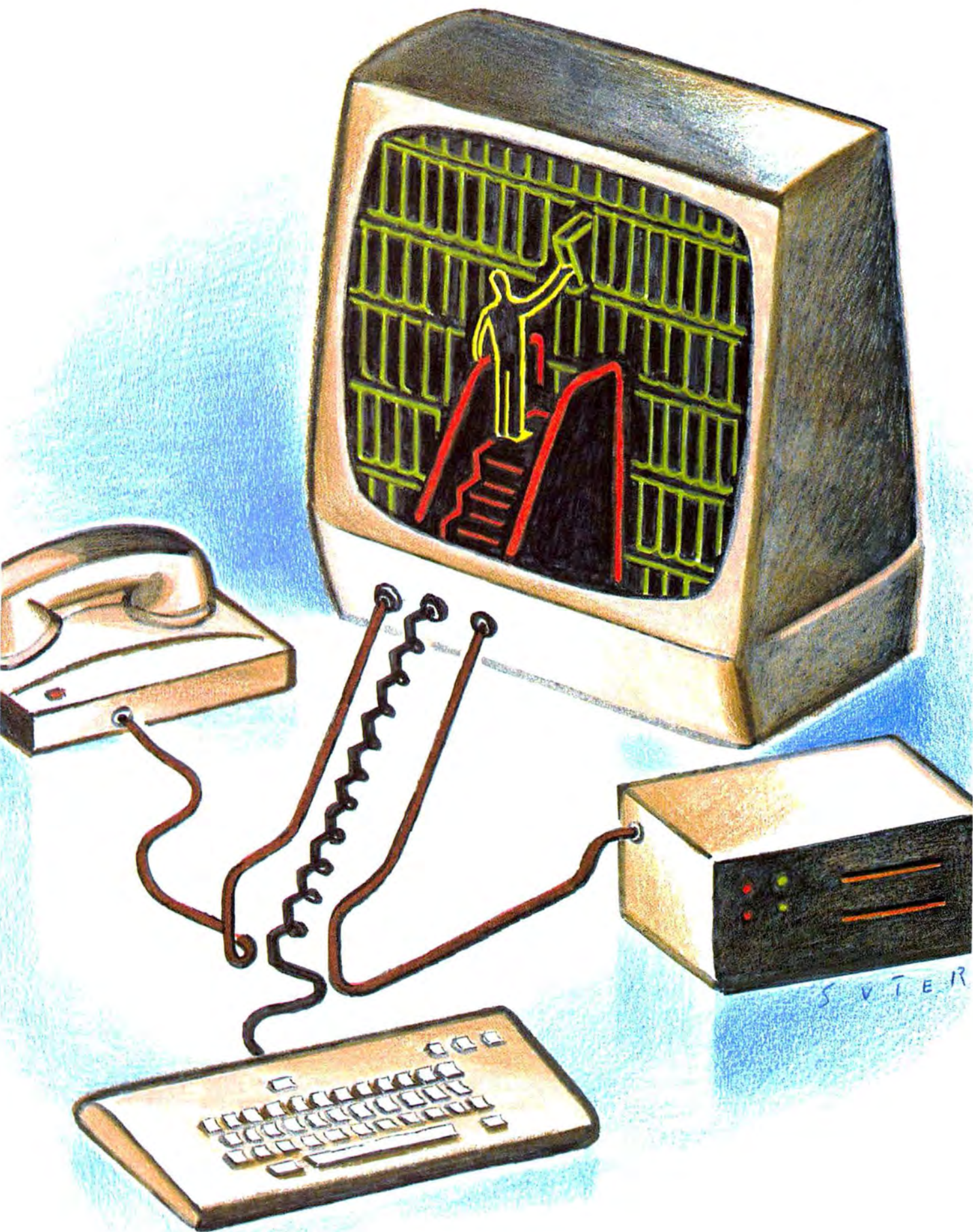
On-line data bases are crammed with information on everything from corporate finances to psychological research. With the help of a PC, you can turn this mass of data into useful knowledge.

Chris Yalonis and Anthony Padgett

 Mark Carlton, an attorney for Mobil Oil in Chicago, is faced with a tricky legal problem that must be solved in a few short hours. Instead of going to a law library and spending precious time paging through casebooks, statutes, and law reviews, he sits down at his PC, dials into a full text legal data base, and within minutes has located most, if not all, of the relevant cases and commentaries. With a few additional searches he finds where the cases have been cited, searches federal statutes, and examines the complete texts of relevant law review articles going back many years. He then prints several full articles and parts of others and scans them, pen in hand. Within a short time, without leaving his desk, Mark has tapped into a larger body of legal knowledge than is contained in even the largest law libraries.

Nick Tarlson, vice president of finance for Brae Electric in San Francisco, has just received a call from the president of a large energy production company, who has proposed a merger of the two companies. "I'd like your decision as soon as possible on whether we should proceed with discussions," the president says. Nick hangs up and turns on his PC. He loads an integrated communications/spreadsheet package and dials Disclosure II, an on-line data base filled with detailed financial information on thousands of companies. Within minutes he finds the data he needs on the potential partner and downloads it into a spreadsheet. By the end of the morning, Nick has analyzed the company's financial reports and has determined that the other company has several weaknesses. "Based on your financial condition, your offering price is much too low," he tells the company president later that same day. Both parties know Nick is right. He has done his homework, and his company has the negotiating edge.

These are just two examples of the often amazing potential of on-line services to regulate the flow of timely information. Tapping into a data base via personal computer to search for information is like being



able to tour the myriad stacks of the immense New York Public Library without leaving home or office. What's more, you can find the information you need in a fraction of the time that it would take to perform manual research.

Currently, more than 3000 data bases contain information on almost every subject imaginable. They are available through over 300 on-line services, most carrying just a few data bases and others, such as Dialog Information Service or Dow Jones News/Retrieval, offering up to 200 separate data bases.

Most data bases offer abstracts only—short bibliographic entries with summaries of the articles. Often, the data base or service allows you to order the full text of an article on line, but delivery takes several days. Increasingly, however, full text data

Full text data bases provide the major benefit of instant gratification, but since most don't provide a subject index, a search can go out of focus.

bases are appearing, especially in news data bases, so you can download the full text of an article directly. The major full text services are Nexis, Lexis, and NewsNet. The other large services have some full text data bases, but the vast majority are bibliographic.

Both methods have their pros and cons. Full text data bases provide the major benefit of instant gratification, but since most don't provide a subject index, you can search only by keywords in the text. If the documents are lengthy, this limitation can cause a search to go out of focus. The longer a document, the greater the chance that your keyword search will yield irrelevant documents that only mention your subject in passing. Furthermore, full text usually takes longer to download or print, which adds to connect costs.

Because each entry is shorter, bibliographic data bases usually provide more sources, and a well-written abstract can often answer your questions, so you won't have to order the full text. Yet some abstracts can be misleading, and delays caused by waiting for text to arrive in the mail are frustrating if you need the information right away.

Once you subscribe to one or more on-line services and receive your password in the mail, you are ready to enter the wondrous (and expensive) world of electronic research. The volume of information available in on-line data bases can be overwhelming, and just as the first-time library user has to be shown the ropes, the novice electronic librarian should make some preparations before running up a steep on-line bill. The following steps should help.

■ Determine Your Needs

Because there are so many kinds of data bases, each varying in subject matter, cost per hour, detail, and ease of use, you must determine your information requirements carefully. What information do you need quickly and regularly? What expense in time and money do you incur in obtaining this information? Does your work require access to a large number of magazines, newspapers, or journals?

If you are like most professionals, you probably spend too much money on subscriptions to magazines and newsletters that you barely skim. While some business data bases can cost as much as \$50 to \$75 per hour, with the right data base and efficient searching tips, on-line searching usually costs less than the combined expenses of research assistant salaries, magazine subscriptions, and in-house libraries. And if speed of retrieval is a priority, electronic research is the way to go.

■ Shop for the Right Data Bases

Finding appropriate services and data bases is not easy. See the list of the major services and directories at the end of the article. If you want more information, call the data base producer or the on-line service vendor.

When calculating costs versus benefits, keep in mind that many on-line services provide more than just informational data bases. On some you can also bank, shop, make airline reservations, buy and sell stocks, check the latest sports news, or chat with colleagues on electronic bulletin board systems (BBSs). Using such consumer services is much cheaper than



logging on to professional data bases. "Supermarket vendors" such as CompuServe and The Source, which contain data bases on consumer and professional topics, are the best way to start.

In making your decision you should also be aware of the services available at night. After-hours services such as Dialog's Knowledge Index and Bibliographic Retrieval Service's BRS After Dark are dramatically less expensive than the companies' daytime services. In addition, searching at night is often faster because of reduced demand on the services' computers.

Choose the Right Software

While just about any microcomputer modem will work with on-line data bases, choosing the best software is critical for getting the most out of going on line. In some cases, you may want to postpone buying communications software until you know which data base you want to tap—some services provide custom software free with the price of a subscription. Communications software for accessing on-line services can be roughly divided into four categories: multipurpose communications software, customized data base software, gateway interface software, and integrated communications/application software.

Multipurpose communications software. Basic communications packages, such as *Smartcom II*, *PC-Talk III*, and *Crosstalk XVI*, have a wide variety of functions for communication with other PCs or on-line services. Such programs are not geared to any one data base and do not provide a customized user-

friendly interface for data base query languages. They simply allow you to dial the data base, log on, download (receive) data to the printer or disk, upload (send) data from a disk file for electronic mail, and log off.

Customized data base software. Many data base vendors provide customized software designed for their own data bases. This software may feature simplified or automatic logon or a menu-driven front end for easier access to information. The Source and Dow Jones both offer this type of software.

Gateway interface software. This software is an offshoot of the previous category, but it goes several steps further. These programs may have an English-like interface to the data base, or the capacity to build the segments of a search while off line and send a query in one shot, minimizing time spent on line. Examples of gateway software are Menlo Corporation's *In-Search* (see "Gateways to On-Line Services" in this issue), which works with Dialog data bases, and Texas Instrument's *NaturalLink*, for Dow Jones News/Retrieval.

Integrated communications/application software. This software allows data or text to be downloaded from a data base directly into a spreadsheet package, a data base management system, or another application program, thus eliminating the time-consuming task of saving or printing the data first and then re-inputting or converting it into a form usable by a stand-alone application program. Examples of this type of software include VisiCorp's *VisiLink*, which works with Data Resources data bases, and Dow Jones's *Spreadsheet Link*, which works with the Dow Jones data bases.

Experimentation and Training

Most on-line services ask for a subscription fee, for which you usually receive a password and a manual. Most manuals could double as tugboat anchors, but they are worth the effort of reading. Once you get your password and you've looked through the manual, it is time to start experimenting.

If you intend to spend a lot of time on line, see if the data base vendor offers classes. It won't take long for the classes to pay for themselves. Many data bases provide a free hour or half hour of search time.

When you first log on to a data base, call at night when rates are lower. Plan your search strategy in advance, and write out a list of search commands and phrases that can be sent in a batch to cut down on on-line time. (See "On-Line Search Strategies" in this issue for a hands-on look at planning a search strategy.)

Vertical Data Bases

Before the spread of microcomputers, on-line searching was almost completely the province of professionals. Although many on-line services now offer consumer-oriented data bases, vertical market data bases still predominate. In the fields of finance, economics, law, medicine, and engineering, electronic research is fast becoming a necessity for busy professionals.

Several hundred data bases are geared to financial applications for stockbrokers, chief financial officers, investment bankers, analysts, and treasurers. Most data bases used by the financial community have expensive subscription and hourly fees. For example, some brokerage houses spend up to \$30,000 a month obtaining the latest quotes, searching for detailed financial data on individual companies, and using the time-sharing facilities provided by some on-line services. Quotron, Dow Jones Quotes, and CompuStat are three of the favorites used by brokers.

Increasingly, personal computers are replacing dumb terminals on financial professionals' desks, thus allowing users to not only view but also manipulate retrieved data. Reflecting this trend, several companies have recently offered software that integrates communications with financial analysis. These packages allow financial data to be downloaded from on-line data bases directly into spreadsheets or preformatted financial and graphics packages.

Before the advent of PCs and lower-cost data base access, the only economists taking advantage of on-line services were those in government or Fortune 500 companies. Times have changed, and along with them, the profile of the typical economic data base user. Vast pools of economic data may now be accessed by consultants, bankers, and academicians. Two of the largest on-line services used by economists are Data Resources (DRI) and Chase Econometrics/Interactive Data Corporation. These two ser-

vices alone offer more than 300 economic data bases, predominantly numeric data such as export figures and consumer price indexes.

Lawyers and other legal professionals used legal data bases years before the micro explosion. However, since data bases in the past were accessed almost exclusively via expensive, dedicated dumb terminals, only the largest law firms could afford to use these data bases. Now, more than 40 percent of all law firms have at least one microcomputer.

Lawyers are in continual need of current case examples, statutes, and legislative background relating to client problems. The cost of research person-hours, in-house libraries, and other research fees can be staggering. Using on-line data bases such as Lexis

Enormous data bases, such as CAS Online, exclusively document the multitude of new chemical compounds that are created every day.

and WestLaw, lawyers can cut research costs and save time. Corporate lawyers can now take advantage of a number of data bases devoted exclusively to monitoring trademarks and patents.

The medical community is faced with the constant challenge of keeping up with the ever-onward march of science and technology. Continuing education for medical professionals is a major undertaking, often postponed due to lack of time. On-line searching can cut down on research time and make ongoing education feasible.

Approximately 50 data bases are geared to the health professions. Doctors can now call up everything from fundamental drug information found in the Physicians' Desk Reference data base, to new drug announcements, scholarly abstracts, and medical news reports. For example, Medline, the data base produced by the National Library of Medicine

(NLM), contains more than 3 million books, journals, technical reports, and other materials. Medline can be accessed via Dialog and BRS or directly through NLM.

The engineering field is as diverse as the financial arena in its applications and information needs. Many engineers, especially in Fortune 1000 companies and large engineering firms, use on-line time-sharing services to run sophisticated models. In addition, more than 175 separate data bases related to engineering have topics that run the gamut from architecture and structural design to environmental impact studies. Enormous data bases, such as CAS Online, exclusively document the multitude of new chemical compounds that are created every day. The energy, chemistry, and environmental fields have at least 30 data bases each. Dialog, Questel, and SDC Search Service are three on-line services that provide large selections of engineering data bases.

Other professionals, such as sociologists, government workers, and journalists, can also find data bases devoted to their needs. Broadcast and print journalists rely increasingly on full text news services, such as Nexis, for instant background on stories they receive over the wire services and from the field. Even the White House is tuned into Nexis for fast retrieval of background information.

Future Prospects

It is clear that the use of on-line services by professionals, business people, academicians, and home hobbyists is expanding and will continue to grow. For many jobs, tapping into financial data bases is becoming a natural and essential function. Although the cost of going on-line is a given for doing business in many large law firms and brokerage houses, with the advance of technology and the increase in the base of users, lower prices for subscriptions to on-line services and easier access to data bases that use artificial intelligence techniques can be expected.

One of the most exciting developments in on-line services is the arrival of natural language interfaces. Using these programs, users can type instructions in everyday language rather than use a confusing and tedious data base query language. Although these packages are in their infancy, more sophisticated yet easy-to-use interfaces can be expected this year.

The trend away from single purpose dumb terminals and toward personal computers will continue. Also, look for the increased use of high-speed 2400-bps and 9600-bps modems to speed data retrieval.

Increasingly, modern society depends on the timely flow of a mass of information that is growing larger by the minute; the on-line industry has arisen in response to this need. The vast amount of information available in electronic libraries is mind-boggling. The tools that make it all manageable are now within our grasp; the result should be a society that is more knowledgeable. As Samuel Johnson wrote: "Knowledge is of two kinds: We know a subject ourselves or we know where we can find information upon it." ●

Chris Yalonis and Anthony Padgett are principals in the Jupiter Group, a Sausalito, California, management consulting and market research firm specializing in the microcomputer industry.

Bibliographic Retrieval Services (BRS)

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New York

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Columbus, OH 43220
800/848-8199, 614/457-0802
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Dialog Information Services Inc.

*Focus: Business, technical,
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3460 Hillview Ave.
Palo Alto, CA 94304
800/227-1927, 415/858-3785
Cost: No initiation fee, data base
access charges only

Dow Jones News/Retrieval

Focus: Business, financial
P.O. Box 300
Princeton, NJ 08540
800/257-5114, 609/452-1511
Cost: \$75 initiation fee, \$1.20
per minute prime time, 20 cents
per minute evenings and
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Cambridge, MA 02139
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data base access charges

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reduction evenings and
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Focus: News
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The Source

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Directories and Publications

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Knowledge Industry

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DataBase Update

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800/345-8112

DataBasics: Your Guide to

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Garland Publishing

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212/686-7492

DataPro Directory of Online

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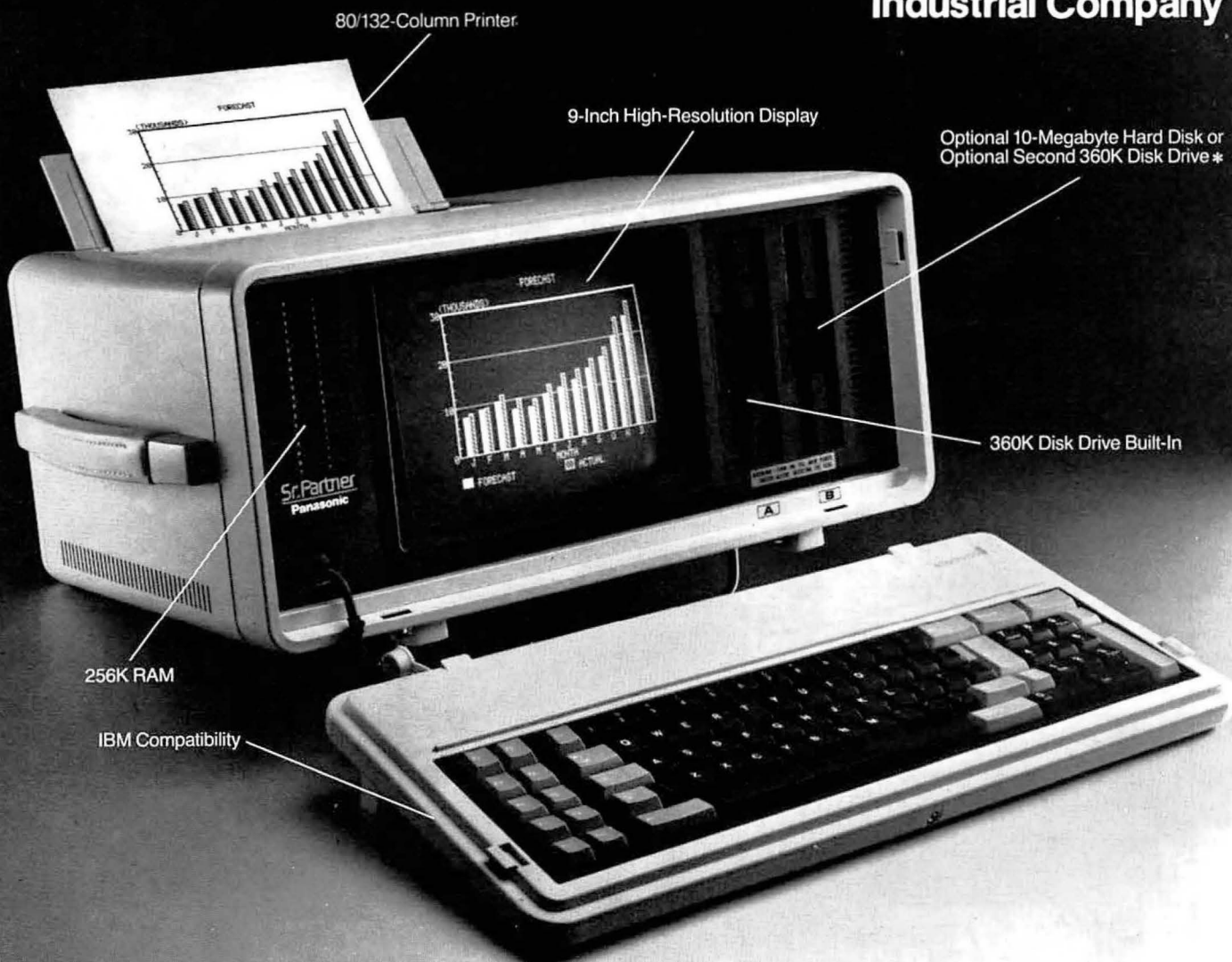
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Islands in the Mainstream

As efforts to join corporate PCs with mainframe systems gather momentum, the potential effects are being hotly debated. Will the new combination of large and small computers destroy the prized independence of PC users—will it take the personal out of personal computing? Or will it make the PC an even better tool?

Bill Weil and Ted Nace

 In the past five years, the battle over the role of personal computers in corporations has shifted its focus significantly. In 1980 the question was whether PCs would be accepted into the organization at all. Jan Willey, who at that time was surveying corporations for Input, a market research firm in Mountain View, California, recalls: "I'd talk to a data processing manager and he'd say, 'No way will we allow those little things in.' And then I'd talk to employees in the company and they'd say, 'We've got to have them.' People were sneaking personal computers into the company to satisfy their own requirements."

With the PC's rapid rise from contraband to status symbol, the debate now revolves around the machine's appropriate role. Two groups within a corporation have special interests at stake. On one side are computer users, who value the freedom of having a stand-alone computer devoted exclusively to their particular needs.

On the other side are data processing and information systems professionals, who advocate the use of the personal computer as a workstation connected to mainframes and minicomputers. This group has traditionally controlled the use of corporate computing power and is now seeking to extend its domain to the personal computer.

In some cases the interests of various groups are incompatible; in other cases the two methods of using the small computer can coexist. James Wilson, manager of microcomputer support for Levi Strauss in San Francisco, says, "At one time we saw personal computers competing [with workstations connected to large computers]. Now our philosophy is that it's a continuum and there's room for both."

The World of Corporate MIS

The issue of how best to use desktop computers is rooted in the history of corporate data processing systems. During the past 20 years, most corporate computer systems have been built to accomplish specific functions, such as payroll, order entry, or inventory control. Each system is responsible for one

kind of transaction processing. In addition, the systems usually produce summary and historical reports for corporate management.

As soon as the DP shop installs a new system, requests from corporate managers for additional information inevitably pour in. What do managers want? Typically, their requests do not fit any convenient category such as sales data, inventory data, or payroll data. Instead, managers are looking for information that cuts across operating boundaries—in other words, corporate data. To meet this need, a separate entity has emerged within corporations, commonly known as Management Information Systems (MIS).

Usually, the demands placed on an MIS department are anything but routine, since systems containing different types of information are not designed for consolidation. Each system handles data elements in its own way. For example, many systems contain return on investment, net sales, and account number data, but each system might define and calculate these items differently. To meet a single request, variant sets of data typically have to be “scrubbed,” or redefined

Just as MIS organizations began to serve up some palatable solutions to the perennial managerial cravings for convenient information, a different remedy arrived from outside the corporation: the personal computer.

and recalculated, before being aggregated. Consequently, MIS organizations have become notorious for multiyear backlogs of requests.

To solve the problem, new mainframe languages have been developed around common data bases, enabling people who lack programming expertise to use terminals connected to a large computer and manipulate the information they need. Ironically, just as MIS organizations began to serve up some palatable solutions to the perennial managerial cravings for convenient information, a different remedy arrived from outside the corporation: the personal computer.



The Pioneers

Personal computers began cropping up in corporations courtesy of the same mavericks who were experimenting with them at home. Cecil Jones, instructor of information systems at Golden Gate University in San Francisco and a strategist with a major financial corporation, compared PC pioneers to early automobile owners. “In order to use a Model T,” said Jones, “you had to be mechanically inclined and know how to operate a magneto and an Armstrong crank. And you had to be self-sustaining. You couldn’t count on finding repair shops in every town or gas stations on every few street corners.”

Similarly, the people who brought PCs into the corporation were on their own, tackling the challenge of installing, operating, and debugging their systems without help from the DP department. But why go through all that trouble? After all, many corporations already offered computer access via time-sharing on large computers. Explains Jones: “If I’m on a time-sharing system my computer can be tied up doing someone else’s work. Having my own computer lets me determine my own destiny.”

With *VisiCalc* and subsequent software applications, managers gained a greater degree of control over information processing. This new-found power quickly became addictive. “Forget the MIS department,” a department head or a corporate analyst could say. “I’ll decide what calculations I want to do on the computer and key in the data with my own bare hands.”

Compared to other corporate computer expenses, personal computers were so cheap that users could often purchase them without getting special corporate approval. PCs could simply be included in budget categories such as office equipment or furniture. There was no need to involve the DP department in purchasing decisions; in fact, the main reason for importing the technology was the DP support organization’s inability to satisfy general computing needs.

Communications Equal Complications

To the early PC users, it didn't matter that each computer was a self-contained island, isolated from the other islands and from the data processing mainland. But once personal computers were up and running, a not-so-strange thing happened: The innovators outfitted with these valuable new analytical tools wanted access to corporate data on the mainframes. Why manually reenter long columns of numbers into a spreadsheet when the information already existed in a mainframe data base? Also, some of the work the PCs did could be greatly simplified if certain calculations were handled by the mainframe computers where the data originated.

Initial efforts to provide personal computers with access to mainframes involved using the PC to emulate a "dumb terminal"—a terminal with no processing power of its own—but this approach was frustrating because users couldn't download data directly into their spreadsheets. Moreover, when personal computer users tried to tap into mainframe data bases, they frequently found themselves lost in the world of communications software, protocol conversion, incompatible data formats, and network hardware (see the sidebar "Close Encounters of the Corporate Kind"). Ironically, the trailblazers began turning to the DP professionals for help.

Support and Standardization

Meanwhile, a new generation of PC user was emerging. Unlike the pioneers, these users relied heavily on the corporation for assistance of all kinds. "Office workers," relates one specialist in office systems support, "are professionals in their own right. They see the PC as a tool—they want results, and they don't care particularly how they get them." As increasing numbers of corporate workers—both clerical and managerial—began using PCs, the demand for assistance grew rapidly. Most corporations responded by setting up some sort of microcomputer support organization, known as the information center or the department of user services.

In assessing the situation, the first thing support organizations saw was, to put it charitably, diversity: Apples trying to talk to TRS-80s, *VisiCalc* trying to talk to *SuperCalc*, *WordStar* trying to talk to *EasyWriter*, and everyone trying to get to the mainframe.

To properly assist the people who really needed help, each support organization established a small, standardized set of products from among the countless number on the market. But how rigidly these standards are enforced varies widely. For example, if someone demands *SuperCalc 3* when the support group's listed product is *1-2-3*, one corporation might respond, "No, you can't do that," while another might say, "You can use anything you want, but unless it's *1-2-3*, don't bother calling us for support."

Some corporations shy away from exerting any control over users and merely offer services and support: discounts and central purchasing, upgrades, current information on software bugs, lists of standard products, selection guidelines, training, configuration and programming assistance, and technical troubleshooting. Departments retain both the power to make their own purchasing decisions and the responsibility for any related mistakes.

At the other extreme are corporations that keep desktop computers under tight central control. The information center is the only department authorized to buy hardware or software. The center relies on a restricted list of standard products and makes no exceptions. Such a situation is not common in large corporations, but it does occur: it mirrors the traditional *modus operandi* of data processing departments.

The typical corporate response falls somewhere between those extremes. For example, the procedures used at Sutro and Co., a full-service regional brokerage firm in San Francisco, attempt to accommo-



Close Encounters of the Corporate Kind

When two unfamiliar cultures meet head-on the dialog can become surreal—especially when the topic is computers. In fluorescent-lit hallways across America, the urge to get at corporate data bases is luring the once fiercely independent tribe of personal computer users away from their isolated caves and into contact with an ancient, entrenched civilization—the world of corporate MIS. The result? Meet Amy, head of microcomputer support at Generic International Corporation, and Mike, a Generic planner and spreadsheet ace extraordinaire:

Mike: I'm using a personal computer now for budgeting, planning, financial analysis, that sort of thing. I'm getting along fine with my IBM PC and *Symphony*. As long as I have a PC I might as well use it to get to the mainframe, too. What do you suggest?

Amy: First of all, what do you want to get to the mainframe for? Do you want to get to the VM system for timesharing, the TSO system for program development, or the IMS system for production data? For security reasons I can't give you access to the production system, but ...

Mike: Whoa. Slow down! I only want to get data out of some *Focus* data bases so I don't have to rekey it into *Symphony*. I don't know what system it's in. Which system do I get when I use the little terminal that you can take home?

Amy: You must mean the Texas Instruments Silent 700. That goes into the VM system. Sure, you can get into that with your PC.

Mike: Good. How do I do it?

Amy: The easiest way is to use TTY emulation. That lets your PC act like a dumb terminal.

Mike: I guess that would work since I use one of those terminals now. But can't I get something that lets me use the whole screen, like what you guys have on your desks?

Amy: You mean turn your PC into a 3278 terminal? To do that you need a special board that costs about \$1000. To make that work you need a communications controller, and you don't have one in this building.

Mike: Well, can I get one?

Amy: I don't know if you can justify it. How many terminals are we talking about? Then there's the question of communication ports at the mainframe, lead times for the controller, higher-speed modems, and ...

Mike: Never mind. Is that the only way to get full screen capability?

Amy: No. There are lots of ways. IBM has a 3101 emulation program that allows you to use dial-up full screen.

Mike: Great. I'll take it.

Amy: Don't be so hasty—it's not easy to set up. You'll want us to do it for you. You'll also have to learn how the keyboard is mapped to emulate a 3101. It takes some getting used to, and it may not meet your needs. Of course, I can't tell because I still don't know what your needs are.

Mike: This isn't working out too well. Any other ideas?

Amy: Well, there's a protocol converter that we could check out. Then you would call the protocol converter instead of the mainframe. If we can make your PC look like a VT 100, I think we can make it work. We'll have to learn more about it. Is this a formal request? Should I add it to my queue? We're planning to do an evaluation of all these alternatives and come up with a strategy. I'm just not sure when we'll be able to get to it.

Mike: Stop! I've had enough. Why does this all have to be complex? Should I just stick with my TI terminal, or can I really use my PC to get to the mainframe?

Amy: I'm sorry, Mike, but it gets a lot worse if you want to load *Focus* data into *Symphony*. We haven't even begun to talk about the problems of how to select the right data from the data base, data compatibility, audit trails, security...

Mike: Never mind. I think I'll go home and play with my Macintosh.



date both personal computing and microcomputing. A subsidiary, Computer Systems Design, processes the bulk of company data on IBM and Tandem systems, using five hundred IBM 3270 terminals.

According to Dick Burg, Sutro vice president for systems coordination, about 30 stockbrokers use personal computers as stand-alone office machines, mostly for tax analysis. Corporate policy, as described by Burg, is simple: "We don't support brokers' PCs." However, the corporation gives brokers free reign to do whatever they feel is profitable for them.

The policy is different for staff in the accounting department. Here an additional 30 PCs are used for running spreadsheets and require access to mainframe data. Burg supports these users, offering one standard computer configuration. "I wanted the units to be swappable across the firm," he explains.

■ The Control Problem

By its nature, automated data processing has always carried the risk that someone might perform the wrong calculation or produce a report using incomplete, out-of-date, misleading, or confidential information. As computer use spreads to untrained people in the corporation, those risks multiply. For example, someone might download data from the mainframe to a floppy disk and walk away with the disk. (To avoid this particular problem, one company uses only PC XTs with the floppy drive removed.) Terminal programs and smart modems that can be programmed to automatically log on to systems and even upload and download data make data base security even more tenuous.

Supporting the swarms of desktop computers that have found their way into corporations may seem like a difficult problem, but it pales next to the

Establishing a Beachhead

Ted Nace

Since the advent of the personal computer, connections between PCs and mainframes have passed through five stages. Achieving the sixth stage—full access to mainframe data and processing power—depends on the establishment of a generic standard for organizing mainframe data. The following breakdown offers a brief approximation of where we've been and where, with any luck, we're headed.

Stage one Initially, PCs were islands, completely cut off from mainframe processing power and data bases.

Stage two Using asynchronous communications programs such as *PC-Talk*, PCs gained the capability to transfer one line at a time to or from a mainframe, via modem.

Stage three Full-screen transmissions became possible with communications software that let a PC emulate an IBM 3101 terminal. But transfers were still slow due to the speed limitations of modems.

Stage four With add-on boards such as IRMA or with the 3270 PC, full emulation of an IBM 3278 display station became possible. But incompatibilities in data structures still hindered the use of mainframe data by programs, such as 1-2-3, that were originally written for the PC.

Stage five New software products such as *PC/Focus* made it possible to process certain mainframe data on either the PC or the mainframe. Because of differences among mainframe data bases, however, each required its own matching program on the PC.

Stage six Ideally, a generic solution will be achieved—a data standard that enables a PC to access any mainframe data base written for the standard.

dilemma of how to safely and effectively integrate the PC into mainframe corporate data bases. Observes Golden Gate University's Cecil Jones, "The proliferation of PCs makes the underlying problems of data management all the more glaring." Alongside the new problem of corporate data security is the dilemma of incompatibility between different corporate data bases that has long plagued MIS departments. Both problems grow every time a desktop computer is connected to a mini or mainframe computer. Moreover, as shown by the sidebar "Establishing a Beachhead," the hardware and software barriers to PCs' having full access to larger computers are falling by the wayside.

If anything can give nightmares to a DP department high priest, it's the specter of thousands of untrained users romping freely through mainframe data bases. "We haven't quite worked out a solution," admits Vita Cassese, director of the Pfizer Company's pharmaceuticals division, adding that the simplest solution "would be to allow people to read data from the mainframe data base but not write to it."

Input's Ralph Wells elaborates: "You can't allow people to tap into these systems indiscriminately. If the person wants to tap in, he'll just get to download data to the PC. No one will be able to use a PC to alter corporate data bases without the same sort of restrictions that have always been in effect on mainframe terminals: controls, edits, validation."

Bleak or Bright?

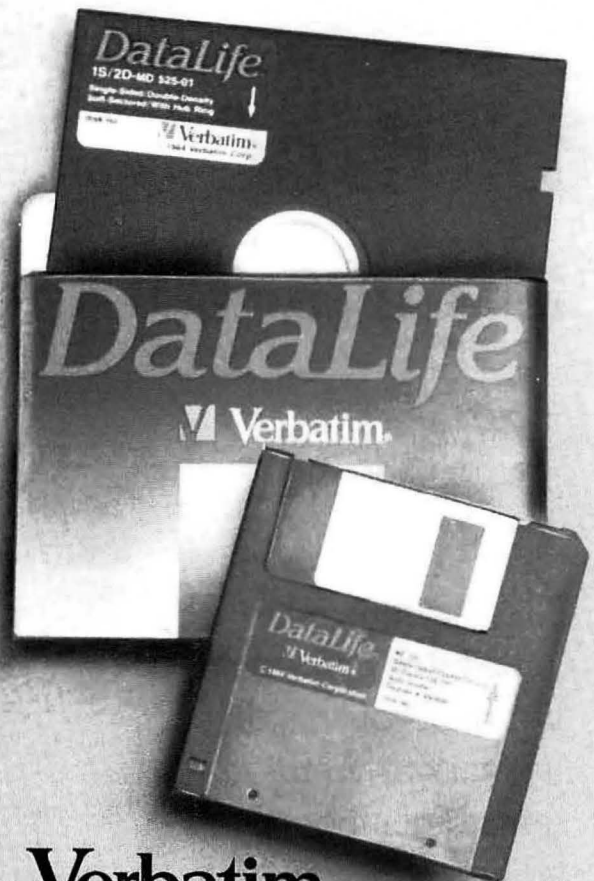
We're left contemplating two futures—one bleak, one bright. On the gloomy side we might imagine a crippled corporate PC, robbed by stifling standardization of its ability to offer unique solutions and denied access—because of unresolved incompatibilities and security risks—to the riches of corporate data bases.

A more encouraging prospect is that of an all-purpose PC, functioning both as a true personal computer and as a workstation connected to sophisticated, easy-to-use mainframe data bases. Analyst Wells calls this scenario “the best of both worlds ... giving people the freedom to use their PCs in a stand-alone mode as they see fit, while also providing access to corporate data.”

Which version of the future will come to pass? The answer, says Cecil Jones, depends not so much on anything data processing or information systems may do, but rather on corporate leadership's recognizing the value of information to business. “We have standard accounting practices to manage most corporate resources, but with information the old rules do not apply,” says Jones. “Information is an unusual type of currency. Unlike other resources, it *gains* value when it is used.”

The implication is that any effort by a company to knit together its information resources more effectively will have reverberant benefits. Engineering a good fit between PCs and corporate computer systems, suggests Jones, should be considered not merely a matter of greater convenience for PC users, but a key to business success in the coming decades. He concludes, “It will determine which companies survive and which fall by the wayside.”

Bill Weil is technical services director at Ferrin Corporation, a personal computer services firm that provides development, systems integration, consulting, and training to large corporations. Ted Nace is an Assistant Editor at PC World.



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Birth of a Sales Tool

The machine may lack a huckster's charisma, but the PC is making its mark as an important contemporary adjunct to the old foot-in-the-door routine.

Melinda Rickelman

||||| *Sam Silvertongue, sales director for Amalgamated Mutton Chops, a mid-size company, has a full-size headache. Like most sales gurus, Sam makes it his business to impress his boss (Amalgamated president Marvin Moneybags) by exceeding sales quotas and building the company's bottom line.*

One Monday morning Marv fires off a barrage of questions that Sam can't answer: How many leads are in the pipeline right now? What's the projected sales volume by month-end? Were last quarter's prospects nurtured properly? What's the latest aggregate total on commissions for field sales reps? As usual, Marv wants the answers yesterday.

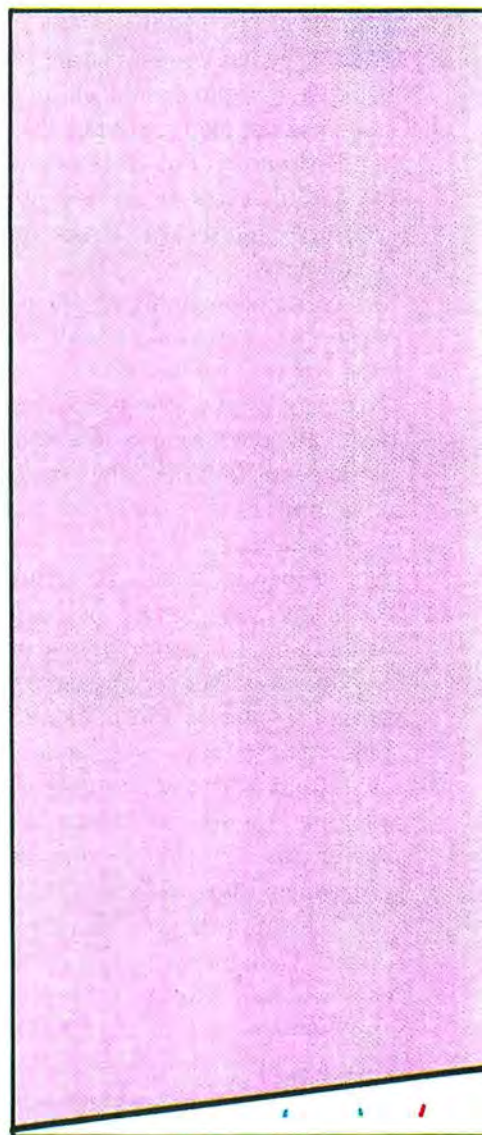
Sam swallows hard, then mumbles something about having sent a request in to the folks who mind the mainframe, which they can't possibly fulfill for another three weeks. Marv snarls and begins a slow burn, whose heat begins to wilt Sam's budding career ...

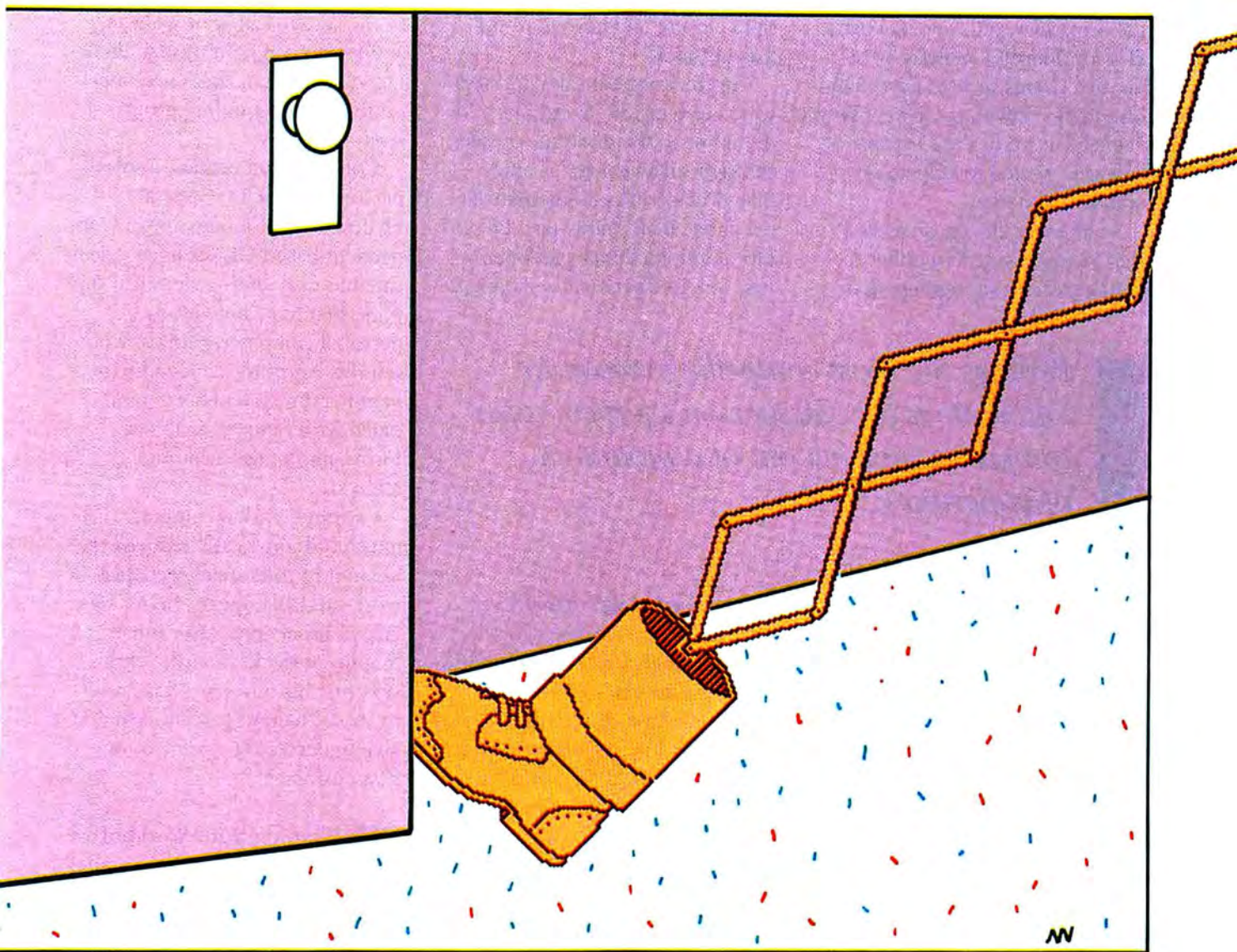
Sales has always been more of an art than a science. The business of selling goods and services is positively steeped in personal chemistry. When intuition is your master, you naturally eschew quantitative tools for qualitative means: a winning smile, a clever rap, a Giorgio Armani suit.

Or so goes the myth. But like all art, sales represents a greater expenditure of perspiration than inspiration. Sales is a business of categorizing, organizing, and monitoring; of targeting prospects and tracking leads; of attending to follow-ups; of corresponding and forecasting and generally doing what you must to obtain and secure a competitive toehold. As it

happens, the personal computer excels at perspiration-reducing tasks.

In fact, the broad discipline of sales is gradually becoming familiar turf for the PC, particularly in the hands of enterprising sales forces armed with presentation graphics software, personal computers the size of briefcases, and "intuitive" programs the likes of *ThinkTank* and *The Sales Edge*. The PC is grabbing supporting roles as a direct-sales tool and an invaluable paperwork-buster.





■ PC for Sale

This gathering momentum for the PC as a modern-day answer to Willy Loman's woes represents a genuine turnabout for sales professionals. Until recently, most companies regarded personal computers as the domain of accounting or financial planning—indeed, of almost any company function but sales.

The experience of PC Wizards, a consulting and training firm based in Walnut Creek, California, is typical. "Most of our clients seek help in automating accounting and payroll functions," says

consultant Dave Furano. "Once in a while a company asks for guidance in applying a spreadsheet program to sales forecasting. But many haven't any idea how to automate their sales efforts.

"Two integrated programs—*Framework* and *1-2-3*—are excellent for sales forecasting, but unfortunately, people often think that automation means doing things in a completely new way," Furano continues. "The sales

strategy could—and should—stay the same. If you want to computerize your quote form, first create the form, then create the data base, and then have the quote form take information automatically from the data base. The only change to the process is that it no longer needs to be done by hand. But if you try to fool with a workable system, you'll ruin it."

A 1984 Dow Jones survey of companies in 40 industries confirms this traditional skittishness about mixing sales and computer systems. Although 75 percent of

the firms surveyed reported using PCs for financial analysis or repetitive chores such as payroll and inventory control, most were only vaguely aware of the existence of software geared to helping products find a market.

Such programs do exist, and they're increasing in number to match steadily strengthening de-

sales closure and beyond to follow-up sales."

This marriage of sales and software is paying off. Programs add discipline to the mystique of sales through such vehicles as automated tickler files, boilerplate letters, and client follow-ups. Presentation graphics packages open a vast range of personalized appeal

to the actual selling of widgets and gizmos. In light of that glum fact alone, selling sales personnel on the PC is becoming progressively easier.

Consider Ron Felmus, a salesperson at GESCO (General Electric Supply Company), a Connecticut-based GE subsidiary dedicated to distributing electrical supplies. Before he opted for a personal computer, Felmus, who sells his wares to semiconductor manufacturers, had been inundated with reports, analyses, forms, and other corporate effluvia.

Outfitted with a computer, Felmus has dramatically reduced the amount of time spent on paperwork—and that means better service to his clients. After three months at the keyboard, Felmus says that his business "has grown by more than 20 percent. I'm now able to devote more time to my best customers."

Perhaps the most compelling reason to automate is the salesperson's fervent wish to make a molehill out of a mountain of paperwork.

mand. Sales reps can now call on an eclectic mix of the usual application programs and a new genre of software created with sales in mind. The result is apt to be not only a cleaner desk but rising sales curves as well, reflecting improved responsiveness and increased customer satisfaction.

Prospecting by PC

The business of every company is selling. Like project management, sales applications appear to be mushrooming into a full-blown family of "horizontal" (as opposed to "vertical," or job-specific) software. Some participants in the automation of the sales game are even grouping these applications under the rubric SMSS, for sales management support systems. According to Michael Lodato, a marketing consultant based in Westlake Village, California, SMSS packages comprise "a new breed of computer system, increasing a salesperson's ability to manage inquiries from point of identification through

formats and make virtually any product or service easier to sell.

Increasingly, the business world is at the sales rep's beck and call: client purchase and payment histories are on line, as are inventory records that yield an ever greater array of product alternatives. Deals can be closed with alacrity, since more efficient preparation boosts the likelihood of a successful transaction. All this in turn increases time devoted to actual sales and bolsters after-sale customer support.

The Big Sell

Perhaps the most compelling reason to automate is the salesperson's fervent wish to make a molehill out of a mountain of paperwork. Three years ago, McGraw-Hill Research scrutinized sales productivity and concluded that sales professionals wiled away more hours on paperwork and related drudgery than they devoted

Winning With Workhorses

Putting sales on line can be as simple as recognizing the applicability of such workhorse programs as spreadsheets and database managers to various sales chores. PC Wizards' clients often create sales applications using the 1-2-3 or dBASE II packages they originally purchased for other departments, reports Furano.

Spreadsheets are prime examples of programs that aid and abet sales on the scene—and behind it. "What if" analyses can be as useful to a prospective customer examining a life insurance policy as to a sales rep devising pricing strategies or sorting sales figures by territory.

OptionWare offers precisely that flexibility. Gerry Baldwin, a sales director for OptionWare, de-

scribes his company's 60-product family as "a super-sophisticated set of Lotus templates." Included in this battery are applications for the sales pro, from sales call reports and client mailing lists to product market share histories and reports on sales performance against quotas. Says Baldwin, "These templates take enormous advantage of 1-2-3's macro capabilities—all the user has to do is enter data" (see Screens 1 and 2).

This ease of use has been a hit with at least one customer. "I use

OptionWare for product line sales projections, and it's helping me tremendously," says Cindy Preston, a marketing manager for a health-care products firm. "I know what I'm budgeted to sell by type of product and period of time. [The template] keeps me on course or tells me that I'm off. What's also nice about the template is that it's idiot-proof."

Made to Order

Packages designed to simplify a salesperson's life go by names like *Lead Manager*, *Easy-Sales Pro*, *Prospecting*, *Saleseye*, and *SalesPrompt*. Carving a niche in the field is Dow Jones, whose Sales Management Series includes *Prospect Organizer*, *Sales Organizer*, and *Sales Director*; all three share data and can be linked to 1-2-3 for added spreadsheet and graphics capabilities. Most sales-

Screen 1: This OptionWare Sales Call Report template enables a sales rep to track prospects. The template locks on the target in columns A through C, but permits horizontal scrolling through pertinent company data.

Screen 2: The Sales Call Report template builds a client data base, with records tailored to sales prospecting.

COMPANY	Contact Name FIRST LAST	TITLE	AREA CODE	NUMBER	EXT.
Bonds Products	John Savard	Dir Mktg	456	256-8845	
Dynamic Services	Terrence Clark	Buyer	456	256-8845	
Edgecomb Controls	Henry Heard	Prod Mgr	456	256-8845	
Higgins & Wiggins	Robert Andersen	Salesman	456	256-8845	
Johnson Steel	Monica Goodwin	Director	456	256-8845	
Kings Company	Mark Retton	Treas	456	256-8845	
L & S Development	Brian Lewis	Buyer	456	256-8845	
R & M Manufacturing	Lina Jackson	Gen Mgr	456	256-8845	
U.S. Steel	George Johnson	Foreman	456	256-8845	

specific packages contain discrete functions for handling inquiries, dealing with customers and prospects separately, calculating expenses and commissions, and measuring performance against quotas and plans.

Scratch a salesperson and you'll find a spate of lists lurking right below the surface—lists of customers, contacts, prospects, targets, follow-ups, ad infinitum. Not surprisingly, much of the sales-specific software on the market is a hybrid of data management and word processing. Another genre, however, seeks to be as intuitive as the sales process itself (see the sidebar “Psyching Out the Target”).

Portable computers in the mold of the laptop DG/One (see “DG/One for the Road” in this issue) put a dynamic new spin on the roving salesperson's pitch and forge new communications ties with the home office. Texas Instruments' Pro-Lite, another 9-pound wonder, was first marketed as a sales and presentation tool. TI initially skipped retail outlets in favor of encouraging software developers to write applications for on-site product demonstrations—an ambitious attempt to woo buyers from among the Fortune 1000. Both the DG/One and the Pro-Lite feature full-screen 25-line liquid crystal displays capable of conveying relatively crisp animation.

Office-bound salespeople are in an even better position to rely on the PC to save a thousand

words—and perhaps the day as well. Sales reps are effectively using presentation graphics packages to generate colorful permutations of charts, graphs, and diagrams, any of which may make the point that cinches the sale (see “The Boom in Business Graphics” in the Special Edition included in this issue). And the sales presentation arsenal is expanding, particularly as Macintosh-like “paint” programs work their way into the business mainstream. Among the snazziest new tools is General Parametrics' Videoshow system, which relies on proprietary hardware and *PictureIt*, an easy-to-use PC-based program, to fashion graphs and charts of unprecedented vividness.

Letter # 81

```

1.1 <To: Marv Moneybags                                     >
1.2 <From: Sam Silvertongue                                 >
1.3 <Re: Sales leads in AMC's pipeline                      >

2.1 <Field reports indicate strong interest                >
2.2 <in our new line of designer mutton chops.            >
2.3 <Full report due to you next Wed.                      >

Letter Type          : <STANDARD      >
Situation            : <GRIM, BUT IMPROVED>
Their Response       : <PENDING        >
Our Next Action      : <WED. CONF.>
Days to Next Action  : <4      >
Sales Sequence Level : <5>
  
```

^F(orward), ^B(eginning of line), ESC = previous line, <RETURN> = next line

Screen 3: With the Marketfax boilerplate letter option, the enterprising salesperson can run standard missives or customize them to the crisis at hand. In addition, the form encourages succinct summaries of a given sale or a sales campaign.

■ Foot in the Boardroom

Arthur Andersen and Company, one of the Big Eight accounting firms, is a trailblazer in adapting the PC to sales-related tasks. The firm originally used its myriad PCs only for auditing and forecasting but recently enlisted all 2600 personal computers to boost an ambitious sales effort for its auditing and consulting arms.

At industry meetings and trade shows, Arthur Andersen personnel feed lead information to PCs on the spot. The data is quickly sorted by location and mailed to the manager nearest the prospect.

Supplementing its lead management program, Arthur Andersen has devised a way to use the PC to help close deals. The plan is part of a complex team approach to client acquisition: Partners, managers, and support staff meet to plot strategy for each potential sale. Before a proposal is made, the team turns to the PC to search a skills bank, identifying other company employees versed in the prospect's field. Other on-line files provide statistics on similar jobs the firm has completed. Data culled in this way enables the firm to assign appropriate staff, anticipate the number of hours and charges a job will require, and present Arthur Andersen's best face to the potential client.

Arthur Andersen's automated system also assists customers post-sale by removing the grunt work from dispatching pertinent updates to them. When information vital to the firm's clients—such as changes in tax legislation—

becomes available, PCs are put to work cranking out mailing labels and the like. Brian Kadison, manager of Arthur Andersen's Microcomputer Specialties Team, says the PC-based direct mail system "lets prospects and clients know that we're on top of every issue. It's a service to them that results in more business for us down the line."

■ Instigating Automation

GESCO, the General Electric subsidiary, boasts a customer base of more than 50,000 electrical contractors and utility companies. GESCO has long been wedded to mainframes, but Wang PCs are steadily gaining in popularity.

Still, the company hasn't widely dispersed its computing resources thus far. That hasn't deterred salesman Joe Roberts, however. Like colleague Ron Felmus, Roberts, an industrial sales representative in GESCO's San Francisco branch, took matters into his own hands by bringing his Macintosh into the office. "The machine increases my reach and efficiency," Roberts says. "It has helped in a big way to organize my approach to selling."

Roberts relies on *MacPaint* to create direct-mail fliers and produce specialized catalogs geared to the varying needs of his clients. This novel approach represents an extra measure of service that isn't lost on customers, he adds.

Like Arthur Andersen's employees, Roberts hits the road with his machine, making the most of the Mac's communications capabilities. "I tap into GE's timesharing network and key in data on a prospect's needs," he explains. The

company then applies its mainframe comparative analysis program to the potential client's equipment and comes up with energy-efficient solutions. "It really impresses a prospect to see a proposal come back on the spot," Roberts says.

Paperwork has become far less burdensome. Roberts uses customer record sheets designed to match his *Multiplan* worksheet; preparation that once absorbed an hour now takes 10 minutes. The Mac has also helped him move out small stock items he didn't have the time to sell in precomputer days. "The machine now enables me to call on the smaller customers via mass mailings," Roberts says. "This frees me to concentrate on large custom jobs."

■ Enterprising Entrepreneur

Big business isn't alone in taking the PC to lunch. At the grass roots, Tom Carroll, a globe-trotting freelance photographer, has turned the PC into a sales companion. Carroll runs his industrial photography business out of his home in Capistrano Beach, California. His "staff" consists of his personal computer and *Marketfax*, a sales package from Scientific Marketing that the company bills as a "human communication accounting system." (See Screen 3 for a sample memo template.)

Carroll generates much of his business through direct mail campaigns—at a rate that was previously impossible. "Since I began using *Marketfax*," he says, "my

Psyching Out the Target

Rick Altman

Some sales software is reaching beyond the mundane realities of lead tracking to knock on the more intuitive doors of human behavior. Programs such as *The Art of Negotiating* from Experience in Software and *The Sales Edge* from Human Edge Software (see "Perfect Pitch," PCW, Vol. 2, No. 7) enable salespeople to fine-tune their ap-

proach to particular prospects—and subtly manipulate their way to success.

The Sales Edge measures a prospect's degree of extroversion, anxiety, gullibility, and conscientiousness, then prescribes a tactical battle plan based on that profile. *The Art of Negotiating* goes one step further, taking on virtually all arenas of conflict and deliberation.

"Our package gets you to think very logically about your negotiation, whatever it may be," says

Roy Nierenberg, president of Experience in Software. "It could be sales, a request to the boss for a raise, or haggling over a painting at an art auction." The program overlooks little in using eight modules to probe for information essential to any confrontation: who's on your side and who isn't; what are the issues, the goals, and the potential problems; and what might conven-

02 Each side's objectives

List as many objectives for yourself as you can, in the left-hand column. Then list as many as you can for Mugs Malone, on the right.

Make the objectives realistic and specific, but not rigid.

You'll have to keep each objective short, so feel free to abbreviate. Use the arrows to move from column to column, as well as up and down.

YOUR OBJECTIVES

sell vacuum cleaners
make big bucks
clean up filth
keep legs intact

MUGS MALONE'S OBJECTIVES

squash this scam
make big bucks
stay dirty
break his legs

ARROWS move cursor; type answer; F10 key moves to next screen.

Screen A: *The Art of Negotiating* gives the discerning sales rep a chance to view both sides of a transaction.

tional strategies yield. The package then moves from fact-finding to framing motivations within what the company calls the emotional climate—both yours and your potential customer's.

"If I play tennis," offers Nierenberg, "my type of serve will determine my opponent's type of return. If you put out positive energy, you'll get positive energy back, but the same is true for negative energy. Suppose I were to make an important sales promotion to a notorious gangster. That would certainly be a highly charged situation, and it's likely that I'd consider the guy a creep. The program would be my restraint, recognizing these feelings as ones to suppress."

Were Nierenberg to pitch vacuum cleaners to Mugs Malone, *The Art of Negotiating* would help him identify which emotional buttons might be pushed in such a meeting and what the results

might be. The program might ask him to anticipate how he'd be feeling about Mugs at any given moment, then spin scenarios based on Nierenberg's responses (see Screen A).

Through that process *The Art of Negotiating* provides critical insights about the sales pro in a sales setting. "The program draws things from you, and it makes you think about yourself, but," Nierenberg insists, "it's not spoon-fed pop psychology. While you can get the program up and running in 5 minutes, it's part of a thorough process. A negotiation session will typically require an hour and a half."

Like a data base manager, *The Art of Negotiating* varies in what it can offer depending on the amount of data you feed it. At a session's conclusion you can obtain printed reports documenting the interchange and its projected outcomes.

And Mugs never even knew what hit him.

business has tripled, maybe quadrupled. In the old days I had to track things by hand, one at a time. Now I get results that an individual could otherwise never approach."

Marketfax helps Carroll identify target firms and then deliver the appropriate type of query letter, derived from a program template. If an assignment sends Carroll to Chicago, *Marketfax* will churn out a list of 40 or 50 local prospects who haven't seen his portfolio. He can also add a personal touch with the *Marketfax* word processor. The program wraps up this phase of the job by printing labels. A week after mailing the pitch letters, Carroll uses the program's appointment calendar and auto-dial features to place follow-up phone calls.

"Now I don't have to wait for the phone to ring," Carroll says. "I can target certain areas and look for very specific types of jobs. You can use 275 potential qualifiers in the program's data base."

Marketfax also handles all the detail work on each prospective client, including the type of assignment (portrait, fashion, or product) and the locale of the shoot. The latter is accomplished via *Marketfax*'s graphics capability, which enables Carroll to compose various lighting scenarios by simulating on-site conditions. Thus informed, Carroll can shape a persuasive, even winning, portfolio.

Tom Carroll is evidence that an automated approach to sales can remain highly personal, and that's what he particularly likes about *Marketfax*. "The best thing about the system is that you design it according to your own needs," he says. "For me, it was operational from day one."

The PC tends to complement the independence of the sales professional. Ultimately, that may be its most salient feature in a sales setting. So far, the machine is doing an admirable job of selling itself. ●

Melinda Rickelman is a writer and marketing consultant based in San Francisco.

1-2-3

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161 First St.

Cambridge, MA 02142

617/494-1270

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Requirements: 192K, two disk drives

Art of Negotiating

Experience in Software

2039 Shattuck Ave. #401

Berkeley, CA 94704

415/644-0694

List price: \$495

Requirements: 256K, two disk drives

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Corporate Pl.

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800/334-2355

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The Sales Edge

Human Edge Software Corp.

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Palo Alto, CA 94303

800/624-5227, 800/824-7325

California

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Requirements: 128K, one disk drive

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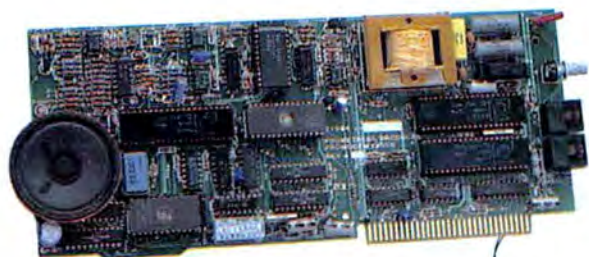
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Gateways to On-Line Services

If complex command languages and an overwhelming array of choices stand between you and the power of on-line data base searching, gateway intermediaries may play St. Peter.

Jeremy Joan Hewes

Commercial data bases and information services offer a huge variety of facts, figures, bibliographic citations, and up-to-the-minute news and financial data. But each service has a different logon procedure, a unique set of commands, and a varying amount of on-line assistance. In addition, some services are so complex in content and structure that you have to master a specialized language to locate and retrieve the information you need.

Recently, several firms have sought to eliminate the inconsistencies among data bases and information services by establishing communications "gateways." Essentially, gateways are English-language interfaces for the communications process; they consist primarily of software that provides a menu or a series of prompts for designating the service to which you will connect and specifying the search's target items or topics. The software then translates your selections

into the appropriate logon sequences and commands, automatically connects to the designated service, and in some cases, performs the search and retrieves the information.

Such gateway systems are the first step in the development of natural-language components for communications. At present, gateways are more limited and less flexible than specially designed natural-language software such as Microrim's *Clout*, which allows you to ask a question or give a command in numerous ways—even with misspelled words—and still convey your meaning to the computer. Gateway systems and natural-language software have the same

Gateway systems are the first step in the development of natural-language components for communications.

purpose, however; both are designed to demystify computer use by avoiding technical jargon and converting simple English words and phrases into the specific form required by a computer.

The three gateway systems discussed here are Business Computer Network (BCN) of Riverton, Wyoming; EasyNet, from Telebase Systems of Narberth, Pennsylvania; and *In-Search*, from Menlo Corporation of Santa Clara, California. Although the three




```

SS 1 /C?
USER:
photovoltaic or solar

PROG:
UNPROMPTED?/PROMPT?/CANCEL? (U/P/C)

USER:
u

PROG:
SS 1 PSTG (21116)

SS 2 /C?
USER:
computer or IBM

PROG:
UNPROMPTED?/PROMPT?/CANCEL? (U/P/C)

USER:
u

PROG:
SS 2 PSTG (59201)

SS 3 /C?
USER:
1 and 2

PROG:
UNPROMPTED?/PROMPT?/CANCEL? (U/P/C)

USER:
u

PROG:
SS 3 PSTG (1732)

```

Screen 1: ORBIT commands and search results

systems vary in scope and applications, collectively they represent the unmistakable direction of communications software and services: ease of use, savings in time and cost, and one-stop shopping for a multiplicity of information sources.

■ Business Computer Network

BCN's major contributions to the communications process are cost savings and easy access to a varied group of information services and data bases.

BCN is the only one of the three gateway systems to combine access to commercial information services, such as CompuServe, and large-scale data base services, such as Dialog, NewsNet, BRS, and ORBIT. BCN also offers the greatest number of specialized data bases, including stock, bond, and commodity information services (from I. P. Sharp, MJK Commodities, and Security Data Services); the Billboard Information Network, an electronic version of *Billboard* magazine's "Hot 100" album list; sports and weather reports; and electronic mail via Western Union's EasyLink.

In late 1984 BCN was completing negotiations with several other major services, including The Source; Dow Jones News/Retrieval; Mead Data Central, which markets the Nexis and Lexis data bases; and the American Airlines on-line reservation system. Some or all of these services should now be available through this gateway system.

Obviously, variety is a chief benefit of BCN, but an even greater attraction is the potential savings in both cost and effort. Instead of having to open accounts and pay a one-time or monthly subscription fee (or both) to each member service, when you join BCN you receive the *SuperScout* communications program free (*SuperScout* is the only program that can be used to log on to BCN) and pay only a \$5 monthly minimum fee. (This fee covers up to 20 logons to BCN per month; more than 20 logons in any month cost an additional 25 cents each.) The rates for use of each member service are the same hourly connect charges paid by direct subscribers to those services. BCN is able to offer those rates because it deals in large volumes of connect time and can therefore pay wholesale or volume rates to the member services. The amount of money that BCN subscribers save through bypassing the initiation fees of the individual services is often substantial.


```

AN - SAND-80-2557/XAB
TI - Analytical Models for Solar-Photovoltaic Energy-System
    Components.
CC - 10B (ENERGY CONVERSION (NON-PROPULSIVE)--Power sources); 97N
    (ENERGY--Solar energy)
IT - *Photovoltaic power supplies; *Solar cells; *Concentrator solar
    cells; *Power conditioning circuits; *Cooling towers; *Weather;
    *Computer codes; Mathematical models; Thermal analysis; Solar
    cell arrays; Electrical properties; Electric batteries; Cooling
    systems; Azimuth; Insolation; Algorithms; Heat exchangers; S
    codes; Fresnel lens; Solar concentrators; Computer calculations;
    ERDA/140600

```

Screen 2: One full ORBIT bibliographic citation

By joining BCN, you can test several on-line services for the cost of your connect time and then decide whether to establish individual accounts. You might want to open an individual account to receive the specialized training or volume-use discounts that some services offer their subscribers.

Using BCN

BCN is highly efficient as a gateway to its member services. You simply turn on your modem, load *SuperScout*, and answer some questions to configure the software for your system. You then provide the requisite credit card information and wait for it to be verified. Then you can connect with any member service by choosing its number from the *SuperScout* menu.

SuperScout provides standard communications features, but they are limited to use with BCN. For example, you can store up to nine phone numbers in the program's directory, then call and "chat" or exchange files with other computer users. The catch is that their computers must also use the BCN software.

When you call one of the BCN member services, the logon process is automatic after you select the member service from the *SuperScout* menu. Once your computer is connected to the service, though, you're on your own. That is, you must direct the information-retrieval process, using the proper commands for that service. Unfortunately, the *Database Guide* and the on-line help for the BCN system in-

clude only a scanty synopsis of commands and data bases available for each member service. Learning to search by trial and error can be a complex process, and you will be paying the service's per-hour connect charges while consulting the BCN manual and typing the commands in the right format. Thus, as with all commercial on-line systems, it is better to study the individual service's documentation and prepare a search strategy and a list of search commands before connecting to the service.

Once you've logged on to a member service—ORBIT for example—BCN and *SuperScout* are transparent. Screen 1 shows the last part of a sequence of commands in the ORBIT format and the results of

By joining BCN, you can test several on-line services.

searching for the terms *photovoltaic* OR *solar* and *computer* OR *IBM*. The object of this data base search was to locate information about the use of IBM PCs and other computers in solar energy applications. These same search terms were used with each of the three gateway systems.

As the line 'SS 1 PSTG (21116)' in Screen 1 shows, ORBIT located more than 20,000 references to computers and solar energy; Screen 2 shows a bibliographic citation containing the terms *photovoltaic* and *computer*. It's clear that the search located the requested information, but unless you are familiar with ORBIT's commands and formats, you are left guessing what all the other codes on the screen mean. The BCN manual is not sufficiently helpful in this regard; nor does it explain how to quickly log off (<Esc>-E).

Despite its weaknesses, BCN serves a useful purpose in providing economical and simple access to a variety of information sources. Although this gateway system supplies the software and takes you in the door to each service, so to speak, you're on your own from that point forward.

EasyNet

EasyNet enables you to connect to many of the same data base services available through BCN, but in addition it puts your requests and search topics into the proper format for each service. EasyNet can be cheaper than using many of the data base services directly or going through BCN. Making cost comparisons between these gateway systems is not easy, however, because EasyNet does not charge according to connect time.

Instead, this system charges \$6 for each logon to its computer (through a toll-free number), plus \$6 for each basic search, which will locate either ten bibliographic citations or 500 lines of full-text records. If a search yields more than ten citations or 500 lines, you pay another \$6 for the next similar batch of data. On the other hand, if a search yields no citations, you won't be charged for that search. In addition, Easy-

EasyNet has streamlined the data base selection process for inexperienced on-line searchers.

Net charges \$2 to display the abstract of each item located in a search; the basic \$6 search gives you the citation (author, title, source of publication, and date) without the abstract. You can order reprints of entire articles by mail (\$8.50 each) or by overnight delivery (\$17.50 each).

The EasyNet system can save you an appreciable amount of money if you make a highly specific search in an expensive data base (some cost up to \$300 per hour). But if your search yields a large number of items (especially citations, at \$6 for every ten), and you display numerous abstracts, using EasyNet is likely to be more costly than using BCN or connecting with a service directly.

As of January, EasyNet offered seven major data base services: Dialog, BRS, ORBIT, Infoline, Prestel, Vu/Text, and NewsNet. Three additional services should be on line by now: Wilsonline, the Oklahoma Data newspaper data base, and the I. P. Sharp financial data base. All are sophisticated data collections that use complex commands, so EasyNet's converting your search topics into the correct formats is particularly useful. Unlike BCN, EasyNet does not offer any of the consumer-oriented information services, such as CompuServe and The Source, and you need your own communications program.

Using EasyNet

EasyNet was designed with novice communications users in mind. Its on-screen messages are clear, and the system progresses through a logical series of menus. At most points, you can obtain on-line help, including sample commands, by typing H.

In addition to offering a comprehensible interface, EasyNet has streamlined the data base selection process for inexperienced on-line searchers. One of the three main EasyNet components features automatic data base selection. Once you narrow the focus of your search by choosing a topic from a series of menus and entering the specific search terms, EasyNet determines the most appropriate service and automatically connects to that source. If more than one member service offers the data base that EasyNet has selected, the system rotates its calls among the several vendors.

The two other components of EasyNet's service enable you to select the data base to be searched. One includes the same menu-assisted searching as the automatic selection component, and the other allows "native" command searching, which is a faster method for people who are experienced in using a particular service's commands.

Like BCN, EasyNet requires that you supply credit card information before you can begin using the system. One annoying feature of EasyNet's logon routine is that you must supply this information each time, whereas BCN's dedicated software stores the

information and automatically verifies it when you log on. This repetitious credit check appears to be the only flaw in a good system, however.

Screen 3 shows the search process, the report of its results, and the display of several citations. EasyNet provides simple menus or questions at each point in the information-retrieval process, and it eliminates the mystifying codes or prompts of individual member services. Even logging off the system is easy—simply type L.

In-Search

The third gateway system is the most narrowly focused and the most elegant. *In-Search* is a stand-alone software product that provides a bridge between your computer and Dialog mainframes. Dialog is the largest on-line service, offering more than 200 individual data bases. *In-Search* allows you to enter the topics and terms for your on-line search before connecting to the service.

Using *In-Search* can result in significant savings over the cost of direct Dialog searching. The program does not involve any surcharges to Dialog costs; once you purchase *In-Search*, you pay only for the actual time that you are connected to Dialog. (You have a standard Dialog account and are billed directly by that firm.) The program operates at 1200 bps if your modem supports it, which also reduces costs because Dialog has no surcharge for 1200-bps connections.

The program connects with Dialog only after you have entered one or more search commands, and you can easily break the connection by pressing <F5>. The program also offers a command that shows the charges you have incurred in a Dialog session. (You may want to use this command frequently, because it lists only the total since the most recent logon—and *In-Search* may log on and off several times during the search process.)

Screen 3: An EasyNet search is initiated and the summary results reported before the citations are displayed.

```
Dialing...(Standby).....Connected.
Completed.
Submitting Password.....Completed.
Selecting Database.....Completed.

Each star equals one line
of retrieved data. This may take
several minutes...
*****
Search completed.....
Press (return) to see
your search results...->

Title # 1
You may stop this display with control c
1/3/1
131878 ICD84B0052
Tackling the Building Environment.
Kelly, M.W.; Clerke, C.M.
InCider Vol.2, No.2, Feb. 1984, P. 52-54.

Title # 2
1/3/2
131876 ICD84B0042
A Solar Survey.
Brennan, T.
InCider Vol.2, No.2, Feb. 1984, P. 42-43.

Title # 3
1/3/3
131875 ICD84B0034
The Solar Connection.
Smith, B.
New Alchemy, 237 Hatchville Road, East Falmouth, MA, 02536
InCider Vol.2, No.2, Feb. 1984, P. 34-40. 6 Pages.
```


Categories	Computers: INSPEC (1977-) DI-13
Business	Computers: INSPEC (1969-1976) DI-12
Engineering & Sci	Computers: THE COMPUTER DATABASE DI-275
Subjects	Computers: COMPENDEX DI-8 abstracts
Chemical Eng	<p>Provides access to the worldwide literature in engineering and technology. Corresponds to the printed Engineering Index. Covers 3500 journals, engineering societies publications, conferences, and selected government reports and books. 1978-: monthly updates. 1,231,000 records.</p> <p>\$99/hour, \$.47/offline print, \$.35/online display</p>
Chemistry	
Civil Engineering	
Computers	
Conferences	
Control Eng	
Dissertations	
Electronics	
<p>Highlight the desired subject by moving the list up and down with the cursor movement keys, or press any letter to move to the first subject that starts with that letter. Press ← to select the highlighted subject.</p>	
Phone = Offline	

Screen 4: In-Search category and subject selection and data base description

Keywords and Phrases		
[photovoltaic? or solar energy) and (computer or IBM)		
Subject and Database Name	Database #	Refs Found
Computers: COMPENDEX	DI-8	657
Computers: THE COMPUTER DATABASE	DI-275	5
Computers: INSPEC (1969-1976)	DI-12	49
Computers: INSPEC (1977-)	DI-13	351
Computers: MICROCOMPUTER INDEX TM	DI-233	9
Computers: SCISEARCH (1974-1977)	DI-186	10
Computers: SCISEARCH (1978-1981)	DI-94	0
Computers: SCISEARCH (1981-)	DI-34	0
<p>Enter a one line search strategy using keywords and phrases. Then press ← to search all databases of the selected subject.</p>		
Phone = Online		

Screen 5: In-Search results of Master Index search. The number of items located by each search is displayed in the right-hand column.

In-Search's greatest strength is its handsome screen displays and impressively thorough documentation. A comprehensive tutorial is on disk and in the manual; four additional "category disks" include synopses of all Dialog data bases. Menlo Corporation plans to offer updates to the category disks as a file on Dialog itself, thus providing almost instant response to system changes.

Using In-Search

In-Search truly shines when you want to choose a search topic, determine the appropriate Dialog data bases to search, or devise search terms and phrases. The program divides the computer's screen into four windows, which display major subject categories, subtopics in the chosen category, summaries of data bases in the subcategory, and instructions (see Screen 4). The bottom line of the screen is used to display the status of certain key operations, such as whether the phone is on or off line and what percentage of disk storage space has been used for files.

To execute most of the program's commands, you select an option from a menu by moving the cursor to it or pressing the letter indicated for that command (in some instances, in conjunction with <F9>, the command key).

Once you have chosen a subcategory (such as *computers* in Screen 4), you can use the *In-Search* Master Index command to determine how many references to your topic are contained in each data base in that subcategory. Screen 5 shows the search phrase (at the top), the data bases searched, and the results of that search. This feature utilizes Dialog's Dial-Index, which reports the number of items meeting the search criteria in a group of data bases. When you have chosen a specific data base (with or without using the index feature), you enter the search terms on a well-designed search-keywords-and-phrases screen. If you have previously searched the index, you may still be on line to Dialog, and *In-Search* will send your first search term or phrase directly to Dialog. As you enter other search terms or phrases, the program sends them to the service, so that searching is continuous. If you are not connected to Dialog, you can enter all of the search terms and phrases, then direct the program to call Dialog and begin the search.

Once the search is complete, you can easily display selected records, designated by set, number, and format. The program scrolls each record in sequence through a large window, and you can pause the

Table 1: Strengths and weaknesses of gateway systems

	BCN	EasyNet	In-Search
Variety of member services	Excellent	Good	Limited
Cost savings	Good	Fair	Good
Ease of use	Fair	Excellent	Excellent
Documentation	Poor	Fair	Excellent
Speed	Fair	Good	Excellent
Efficiency	Excellent	Good	Excellent

scrolling by pressing <F3>. When searching or retrieving records, you can also save all the data on disk or send it to the printer by pressing the appropriate function key. *In-Search* comes with a function key template to simplify the use of these command keys.

In-Search is a pleasure to use and a superb example of a gateway system. Although its focus has initially been limited to the Dialog data bases, versions of the program may soon be available for other major services, such as Mead Data Central's Nexis and Lexis. The program can save time and money for novice Dialog users and for experienced on-line searchers; it is a model of excellent software design and operation.

Apples and Oranges

The three gateway systems—BCN, EasyNet, and *In-Search*—share some features but are not directly comparable. Still, some conclusions can be drawn regarding their usefulness and their strong and weak points; these are summarized in Table 1. Table 2 shows the time required for the *solar energy/computer* search conducted on all three systems and selected other results of the test. *In-Search* performed most speedily, followed by EasyNet, and then BCN.

The three systems rank in the same order for ease of use. *In-Search* surpasses the other systems in documentation, on-line elegance, and applied usefulness, even though it operates with only one data base service. EasyNet maintains an acceptable balance between ease of use and sophistication of features, but it cannot compare with *In-Search*. Of

Table 2: Comparative search times
for three gateway systems

	BCN	EasyNet	In-Search
Modem speed	300 bps*	300 bps*	1200 bps
Data base searched	ORBIT—Natl Tech. Info. Serv.	Dialog—Computer Database	Dialog—Compendex
Time to connect to service and search (minutes:seconds)	6:42**	1:43	1:10
Time to display one record	0:23	0:16	0:12
Time to search Master Index	NA	NA	1:03

* 1200-bps service was not available when these searches were performed.

** Some delay was caused by unfamiliarity with the service's commands.

course, EasyNet offers a greater variety of services to search, which is its clear advantage over *In-Search*. BCN is highly efficient at logging on to a variety of services, and it alone offers general-interest information services such as CompuServe, but it is lacking in on-line assistance and conversion of search commands into the needed formats for its member services. All three systems offer telephone support, and EasyNet promises to provide on-line consulting in real time as well.

At present, each of the systems fills a niche in the communications market. *In-Search* is invaluable if you are already a Dialog user or if you know that you will be using Dialog extensively. EasyNet is appropriate if you want to sample a variety of data base services or you do not need to use any one service extensively. BCN effectively reduces the costs of establishing and maintaining a number of data base accounts. Clearly *In-Search* comes closest to fulfilling its objectives perfectly, but all three systems are helping to make communications a simpler, and ultimately routine, process. ●

Jeremy Joan Hewes is a Contributing Editor to PC World and the coauthor of Writing in the Computer Age (Doubleday, New York, 1983). She is currently at work on a new book about computer software for writers.

Business Computer Network
P.O. Box 37
716 College View Dr.
Technical Research Park
Riverton, WY 82501
800/446-6255, 800/442-0982
Wyoming, 307/857-3722
Requirements: Hayes-compatible
modem

EasyNet
Telebase Systems, Inc.
134 N. Narberth Ave.
Narberth, PA 19072
800/327-9638 (modem only),
215/664-6168 (voice)

In-Search
Menlo Corp.
4633 Old Ironsides Dr. #400
Santa Clara, CA 95050
800/221-4237, 800/221-9029
California, 408/986-1200
Requirements: Hayes-compatible
or Novation Smart-Cat modem
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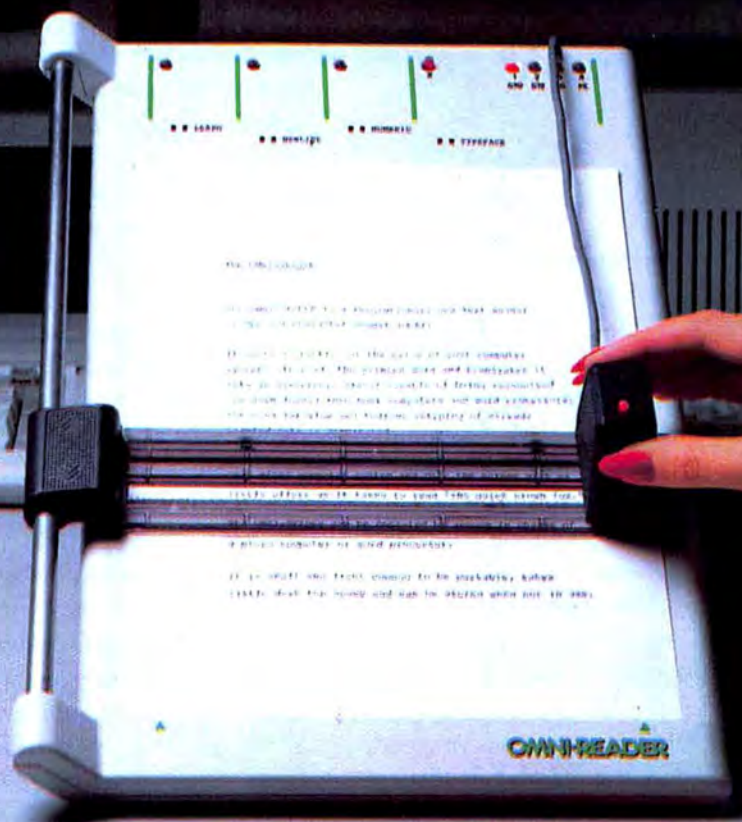
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Merrily Shinyeda

 Portable computing has never been painless. A truly portable "laptop" machine such as the battery-powered, 3.9-pound Radio Shack Model 100, which costs \$599, is so limited by its 24K of memory that it has found a solid niche only among word processing journalists. A marginally portable "suitcase" machine like the 30-pound Compaq offers the power of a PC for \$2255 but is so cumbersome that it gets dragged off a desk top only when absolutely necessary. Even then, it must always find its way to an AC outlet.

Not surprisingly, many manufacturers—among them Morrow, Hewlett-Packard, GRiD, and Sharp—are hustling to market with what they claim are truly portable PC-compatible laptops. It's not an easy bill to fill: Stuffing the power of an 8088, a disk drive, a full-size screen, a keyboard, a modem, and a battery into a 9- or 10-pound package is understandably difficult. The best so far—with reservations, one of them being the big bite the machine takes out of your wallet—is the Data General/One from Data General. It packs more PC compatibility per square inch than any of its competitors.

The DG/One is a 9-pound briefcase-size portable with 128K that operates under MS-DOS and runs PC software. Its low-power CMOS (complementary metal oxide semiconductor) version of the PC's 8088 microprocessor sets the stage for PC compatibility. At \$2895, the DG/One provides a large, 80-character by 25-line display; one double-sided 3½-inch internal floppy disk drive; and a 79-key keyboard complete with cursor controls, function keys, and an integrated numeric keypad. Two

serial ports provide RS-232C and RS-422 compatibility. Extra-cost options include dealer-installed 128K increments of CMOS RAM that boost the DG/One's memory to as much as 512K; a second 3½-inch drive; 300-bps internal and 1200-bps external modems; and a 2-pound rechargeable battery pack that supplies the system with power for up to 10 hours. Also available is an external 5¼-inch floppy disk drive that allows you to transfer programs to and from a PC. Bundled with the computer are MS-DOS, DOS utilities, a text editor, and a communications program.

A Dubious Display

The DG/One's flip-up liquid crystal display (LCD) provides a 10-inch diagonal picture that offers the same size viewing area as a PC's 12-inch monitor. It displays 640 by 256 pixels, 25 lines, and large, well-formed characters in a two-to-one ratio similar to the characters of desktop displays. The DG/One's bit-mapped graph-



ics form crisp images without the distortion common to small screens. The computer even runs programs that feature animation, a rare capability in a portable computer.

Unfortunately, reading the DG/One screen can be exceedingly difficult. When open, the screen is fixed at a 114-degree angle, appropriate only for a typing table. If the DG/One is on your lap, a conference table, or an airline tray, or if lighting conditions are less than ideal, you will find yourself moving about trying to bring fuzzy let-

ters into focus. That is a severe limitation in a machine expected to operate anywhere under variable conditions.

As this evaluation was under way, Data General retrofitted all DG/One displays with a polarized lens that fits flush against the screen, unlike the original lens, which protruded slightly. Eliminating space between the screen and the lens improves the screen's readability.

The 79-key keyboard has a standard QWERTY layout with the <Enter> and <Shift> keys in familiar, typewriter-style locations. Although the keys are

slightly smaller than those on traditional keyboards, the keyboard has an exceptionally nice feel for a portable. Ten function keys, plus <Ins>, , <NumLock>, <ScrollLock>, and <PrtSc>, occupy the top row, while cursor controls are found in a row to the right of the <Space> bar.

A Drive for Every Occasion

The DG/One's PC compatibility is furthered by a clumsy but workable combination of up to three disk drives. The standard

internal 720K double-sided 3½-inch disk drive can be supplemented with a second internal 3½-inch drive as well as an external 5¼-inch drive. A second drive is necessary for most business computing. At least 90 business application software programs are available on 3½-inch microfloppies, including *1-2-3*, *dBASE II*, *Multiplan*, *WordStar*, and the *pfs* series.

The \$895 external 5¼-inch drive allows you to transfer data and non-copy-protected PC programs directly to DG/One's internal drives. For PC users who have already invested in 5¼-inch versions of these programs or who want to share PC data with their DG/One, the 5¼-inch disk drive is essential. Programs can be loaded into the DG/One and data files transferred using a simple DOS COPY command.

Convertible and Compatible

How compatible is the DG/One with the PC? Very. Its disk drives, full-size display, Intel 80C88 CPU, and MS-DOS operating system assure both program and media compatibility. In short, you can run more off-the-shelf PC software on the DG/One than on any other laptop computer. We successfully ran *1-2-3*, *ThinkTank*, and *Multiplan* on 3½-inch microfloppies, and successfully ran versions of *1-2-3*, *SammaWord II*, and *Flight Simulator* on 5¼-inch media.

A full 48K of the DG/One's 128K RAM is reserved for screen graphics, leaving only 80K for program and data handling. Since few business programs run on less than 128K, 80K of usable memory is clearly inadequate. Dealer-installed 128K increments—at

\$599 each—can bring total system memory up to a sizable 512K. Keep in mind, however, that 48K must be subtracted from total memory—a “256K” DG/One actually provides only 208K of usable memory.

VapidWare

DG/One's 32K read-only memory (ROM) contains self-testing diagnostics and primitive text editing and terminal emulation programs. The text editor, Notebook, can be used to create simple documents of up to 500 lines that can be printed or transmitted to a host computer. It offers no word wrap capability; a beep reminds you to press <Enter> at the end of each line to avoid losing text. Although you can insert text, characters are lost if they reach the end of the 80-character line. You can delete characters and copy single lines, but reformatting must be done line by line. Since text is stored in RAM rather than on disk, it is erased if you turn the system off. Clearly, Notebook is not intended to compete with disk-based word processing programs.

Communicating on the Run

The DG/One can be equipped with an internal 300-bps Bell 103A-compatible modem (\$300) or an external 1200-bps modem (\$699). The DG/One's ROM-based communications program emulates a standard teletype interface for gathering information from data bases such as Dow Jones and The Source, or it can



Not ready for the total switch to 3½-inch microfloppies? The DG/One's external 5¼-inch floppy disk drive enables you to pop in—and use—familiar DOS-formatted program and data disks.

emulate a Data General Dasher D210 terminal to communicate with Data General's Desktop Generation multiuser microcomputer or Eclipse minicomputer.

In terminal mode Notebook can transmit commands to a Data General host computer or capture incoming data into a buffer. Data contained in this 500-line buffer can be edited and sent back to the host without leaving terminal mode. Unfortunately, since you cannot save or send disk files with Notebook, captured data must be printed or written to a file on a host system.

Finding a standard communications program to avoid Notebook's shortfalls is not easy. As a general rule, communications programs written for the IBM PC address its 8250 communications chip directly. With no CMOS version of the 8250 available, Data General was forced to use an obscure chip that severely limits the number of communications packages available for the DG/One; the

only completely compatible program is Communications Research Group's *Blast*. A DG/One equipped with *Blast* can transfer documents to or from PCs, Data General computers, and a number of other systems.

■ For Data General Fans

For users of Data General's Eclipse MV/Family host computers, two software packages significantly extend the DG/One's capabilities. *CEO Connection* allows DG/One users to convert and transfer selected DOS word processing and spreadsheet documents to and from systems running *CEO* software. In addition, this program allows the DG/One to operate as a Data General Dasher D210 with access to powerful *CEO* software functions. The DG/One can send a document to an electronic in-box, update a calendar, and gain access to *CEO Word Processing* and *CEO Decision Base* software.

Many Data General minicomputer users have a sizable investment in application programs written in Data General's Interactive COBOL language. *MS-DOS Interactive COBOL Runtime* enables these customized applications to run on the DG/One under DOS without conversion or re-compilation. This ability to download proprietary software to a portable computer opens up a wealth of opportunities for journalists, insurance agents, and outside sales and service staffs.

■ Charge It

When no AC power is available, the DG/One can operate off a \$178 rechargeable nickel-cadmium battery pack. The battery pack fits into the rear of the system, adds 2 pounds to the unit's total weight, and provides up to 10 hours of operation if a single disk drive is not used more than 20 percent of the time. Unlike the HP 110, the DG/One gives no indication of the amount of battery life remaining, so if the power-hungry drives are used ex-

■ Moveable Type

The DG/One's compact \$525 thermal printer is light enough to sit on top of the computer. The 4-pound unit prints 20 to 40 characters per second, depending on whether it is producing near letter quality or draft printouts. It prints compressed or elongated copy as well as graphics, connects to one of the DG/One's two serial ports, and is powered by the AC adapter or its own nickel-cadmium battery pack. Thermal-sensitive roll paper pro-

How compatible is the DG/One with the PC? Very. Its disk drives, full-size display, Intel 80C88 CPU, and MS-DOS operating system assure both program and media compatibility.

tensively, you may receive a prompt that reads 'low battery'—at least that's what the manual claims. When I exhausted the battery's power, however, I did not receive this courtesy or the opportunity to store my text file. The screen flickered, the machine beeped, and the system promptly died.

If you happen to be working where AC power is available, you can plug in the AC adapter and resume work while the batteries are recharging. Since it is impossible to tell how much power remains in the battery, the battery charger should accompany the DG/One at all times. The battery charger, AC power adapter, power cords, and modem cables fit neatly in the \$149 hard carrying case along with the DG/One and its printer.

duces the best results; however, you can use individual cut sheets if you install a thermal transfer ribbon.

■ Costly Things in Small Packages

Buying a DG/One is like buying a Ford: its base price is reasonable, but by the time you add enough options to bring the machine up to the desired level of performance, you've laid out quite a bit of cash. Take the basic \$2895 128K DG/One with one disk drive and add a second internal disk drive (\$599), an additional 128K memory (\$599), a 300-bps internal modem (\$300), and a rechargeable battery



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For those to whom PC compatibility and battery-powered portability are critical, the DG/One, even with its problems, is *the* one. Mobile professionals, such as salespeople and site engineers, will argue that \$4571 is an acceptable price to pay to have important data at their fingertips, to be able to perform in-the-field analyses, and to maintain on-line access away from the office. Pint-size and nearly painless, the DG/One may prove to be as handy a travel companion as your alarm clock or your little black book. ●

Merrily Shinyeda is a Contributing Editor for PC World.

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Keeping Murphy's Law at Bay

What can go wrong
need not go wrong.
Microsoft Project can
help you run your project
instead of letting
your project run you.

*Bill Dauphinais and
Leonard Darnell*

||||| Murphy might not have been such a pessimist had he gotten his hands on a project management program such as *Microsoft Project*. Using *Project*, you define a project plan—an ordered series of tasks—and assign resources such as people, equipment, and facilities to each task. The program rewards your effort with an easy method of viewing, printing, and maintaining your project. It produces a Gantt chart, a time line that shows how project tasks interrelate, and a variety of handy reports documenting project status. You can adjust any part of your project, and the program will recalculate figures throughout.

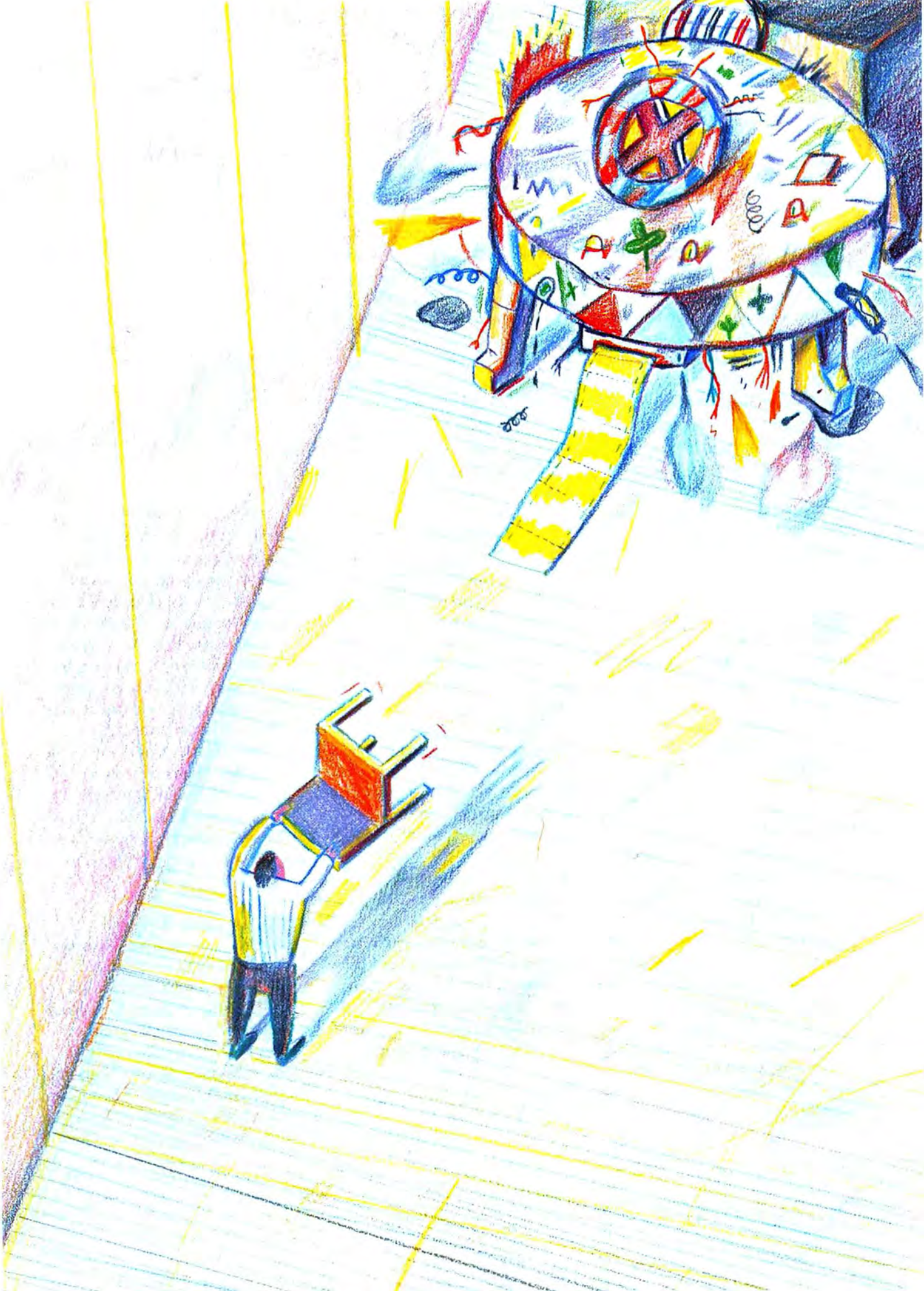
Equally important, *Project* will determine your job's critical path—the sequence of activities that must be completed in a timely manner to prevent delays. *Project* is based on the Critical Path Method (CPM), a planning technique that focuses on minimizing the time needed to complete an entire project. A fundamental requirement of CPM is the ability to estimate accurately the time needed to perform each project task (see "Project Management: One Step at a Time," *PCW*, Vol. 2, No. 10).

Project cannot match the industrial-strength capacities of more expensive project management packages such as *Primavera*, *PMS-II*, or the many mainframe-based systems that engineers and planners have been using for years. However, *Project* is well suited to planning and managing projects that consist of 20 to 50 activities. For these relatively small jobs, such as the creation of a new com-

pany department, the sophistication of larger systems would translate into burdensome complexity. *Project* offers the essential features of project management: critical path scheduling, tracking interrelated tasks, automatic recalculation of time and costs, and production of easily understood graphics and an armload of assorted reports. Yet *Project* allows you to develop your first plan in an hour or two using a system with as little as 128K and one disk drive.

Getting Started

Install DOS on the system disk to make the program self-booting and then start *Project* by typing **PROJ**, or **PROJ filename** to call up a specific file. When you start *Project*, the Activity screen appears; from its menu you can call up *Project's* Calendar and Resource screens. The program's method of selecting commands is similar to *Multiplan's*: Either type the first letter of the command or move through the menu with the <Space> bar or <Tab> key and press <Enter> at the appropriate command.



Project reduces project organization to a three-step process: you set up a calendar, define activities on a schedule, and assign resources to each activity.

■ The Project Calendar

Project's Calendar screen (see Figure 1) lays out general project information: start and finish dates, workdays, and project duration. The Calendar screen's default mode sets weekdays as workdays and weekends as nonworkdays. You can designate nonstandard workweeks using the Workweek command and turn individual days "on" or "off" with the Edit command. A project can start in any year from 1900 through 2068 and can last a maximum of ten years.

■ Creating the Project Schedule

Once you establish a calendar, you are ready to define the project schedule and enter project activities by using the Activity screen, which appears when you first start *Project*.

Before you enter project activities, you need to define general schedule information. Use the Options command to establish the project start date and set the project time scale to days, weeks, or months. Weekly and monthly summaries are useful when you want a general view of a project or when you need a printout in a hurry. A serious *Project* drawback is its lack of an hourly time scale, an essential feature for projects in which costs are based on hourly rates. The smallest units *Project* allows are tenths of a day.

The Options menu allows you to specify foreground and background colors for use with a color system, set *Project*'s numerical recalculation function to automatic or manual, and selectively display slack time. (Slack time is flexible time associated with a noncritical activity whose start date can be changed without affecting the project completion date.)

Activities are entered on the Schedule screen with the Activity Edit command. An activity must be a discrete event with a given duration, have its own start and finish dates, and relate logically to other activities in the project. For each of up to 128 activities, you type in a description of up to 30 characters (though, annoyingly, only 15 characters will be displayed on screen), the activity's duration in days, its start date, and a list of any predecessor activities. (Predecessors are activities that must be completed before another activity can begin.)

The start date of an activity can be designated as a specific date or simply "ASAP." In the latter case the actual start date of each activity will depend on the predecessor/successor relationships you establish between the project activities. Up to eight predecessors can be specified for each activity. *Project* assigns each activity a unique number as you enter it; you indicate predecessors simply by referencing their number. When you add or delete activities, *Project* recalculates predecessor relationships to retain the proper order.



Once activities are entered, you can sort them in a number of ways to fashion the most meaningful presentation of the project schedule. A sort can be alphabetical, by start or finish date, by duration, or by critical activities. All activities or a specified range can be sorted in ascending or descending order.

The Activity screen displays the completed list of activities, the project schedule, a time scale, and the Activity menu (see Figure 2). Of a maximum 128 activities, 19 can be viewed at one time. (The time scale's numerals, stacked vertically, are extremely difficult to read.)

■ Assigning Resources

You can assign a maximum of 64 resources to each project and up to 8 resources to each activity (see Figure 3). Each resource is referenced with a description of up to 15 characters and can also have a specified capacity limit—the amount of that resource beyond which you cannot spend. For example, if the resource is an indi-

vidual who can devote 50 percent of his or her time to the project, his or her capacity would be .5.

As you work with the schedule, *Project* will warn you with an error message if a resource has been assigned beyond its capacity and will give you a chance to adjust resources or activities. Keep in mind that this capacity-limit feature is not the same as the resource-leveling capability found in other project-scheduling packages. Resource leveling adjusts activity duration based on the resource demands of each activity and the total resources available to the project; with *Project*, activity duration is fixed until you adjust it manually.

You assign each resource a daily, weekly, monthly, or fixed cost; *Project* calculates the cost of the resource for the total time it is used, prorating when necessary.

Once you establish a project's resources, you can allocate them to each activity with the Activity Edit command. Each resource can be allocated in days or tenths of days, such as .8 carpenters or 1.5 word processor operators.

Reports for Every Occasion

Project generates three activity reports and three resource reports that can be printed immediately, saved in a disk file for printing later, or modified by a text editor. Conspicuously absent is the ability to print information from the Calendar screen.

Report formats are defined by the program, and a report writer is not included. However, you can choose to print all or just a specified range of activities or resources in a report. This is useful when the recipient of the report needs only a portion of the information available.

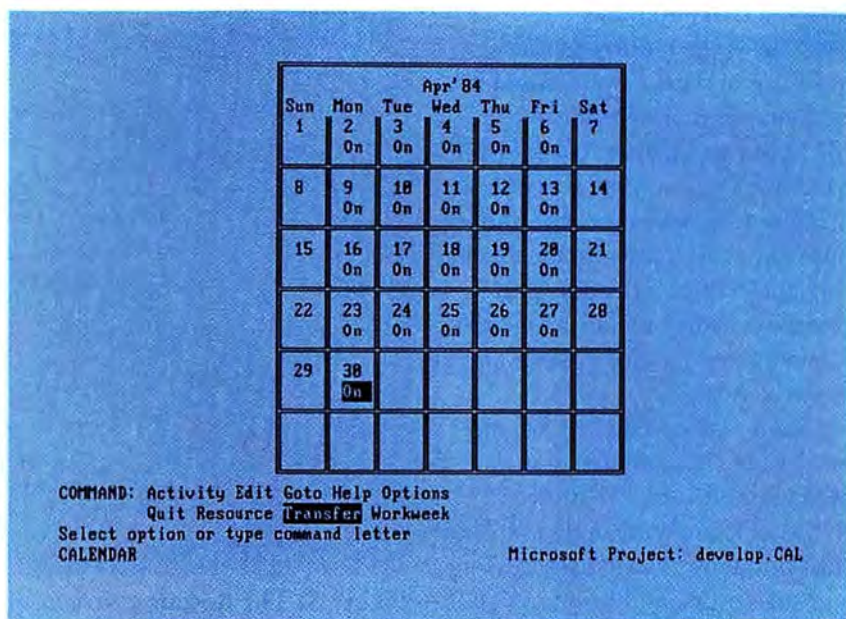


Figure 1: Calendar days can be turned "on" to indicate working days or left blank to indicate non-workdays.

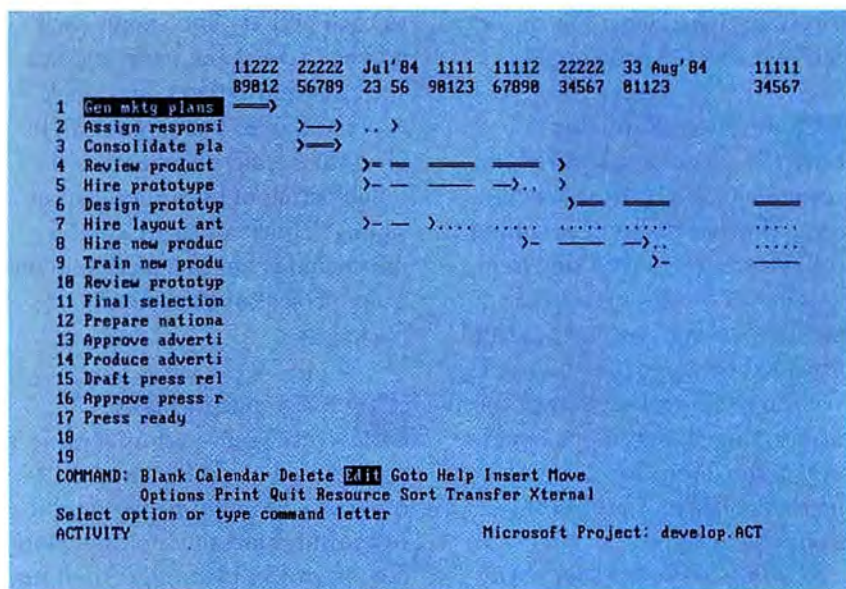


Figure 2: The Activity screen is divided into four areas: the time scale, activity list, project schedule, and command menu.

Activity Reports

Schedule report. *Project's* most useful report is presented in time-line format. If you use an IBM Graphics printer or an Epson MX or FX printer, the schedule is printed sideways in one continuous form, eliminating manual cutting and pasting of pages. The printed schedule includes the full 30-character activity descriptions at both ends.

Detail report. This report summarizes the information associated with one or more project activities. Included are early and late start and finish dates, predecessors and successors, and resources and costs assigned to the activity.

Table report. This report provides a single listing of all project activities, each activity's duration, early and late start and finish dates, and slack time available. It also states whether or not the activity is critical (see Figure 4).

Resource Reports

Resource Cost report. The Resource Cost report is a summary of project resources similar to the Resource screen shown in Figure 3. It includes resource capacities per day, cost per day, and projected resource use and total cost for the rest of the project. You can use this report to plan a new project or to forecast demands for the remainder of a project in progress.

Resource Histograms report. This resource profile shows how a particular resource is used. It reflects the level of activity required over the course of the project and helps you use resources effectively.

Resource Detail report. This report itemizes the activities to which a particular resource is

Resource	Capacity	Unit Cost	Per	Days to Complete	Cost to Complete
1 Forecaster	No limit	1800.00	Month	35.0	2907.90
2 Production mngr	No limit	2550.00	Month	70.0	8239.06
3 Recruiter	No limit	2355.00	Month	32.0	3478.40
4 WP operator	No limit	55.00	Day	37.5	2862.50
5 WP equipment	No limit	26.00	Day	35.0	910.00
6 Production UP	No limit	3700.00	Month	22.0	3757.20
7 Prototype artist	No limit	235.00	Day	38.0	7050.00
8 Graphic artist	No limit	115.00	Day	65.0	7475.00
9 Production sup	No limit	2000.00	Month	28.0	1046.29
10 Marketing UP	No limit	3700.00	Month	28.0	3415.64
11 Ad writer	No limit	250.00	Day	48.0	10800.00
12 Marketing mngr	No limit	2750.00	Month	3.5	444.26
13 Ad mngr	No limit	2400.00	Month	2.5	276.94
14 Paste-up artist	No limit	75.00	Day	7.5	562.50
15 PR mngr	No limit	1900.00	Month	5.0	438.49

Cost to complete: 52864.18	Total cost of project: 52864.18
----------------------------	---------------------------------

COMMAND: Activity Calendar Delete **Edit** Goto Help
Options Print Quit Transfer View
Select option or type command letter

RESOURCE

Microsoft Project: develop.RES

Figure 3: The Resource screen summarizes resource use and costs. Resource descriptions are automatically copied from the Activity screen.

committed. It contains the amount of time the resource is committed to each activity and shows each activity's duration, early and late start and finish dates, and slack time available. The report can be given to a team member as a detailed listing of his or her responsibilities. Such a feature can be useful and is not included in many other project management packages.

A Change in Plans

Once you've set up a project and printed a schedule and other reports, you might be tempted to relax. But remember an important law of project planning: Anything that can be changed will be changed until there's no time left to change anything. Fortunately, making adjustments with *Project* is easy, and projectwide recalculation is fast. You can continually

adjust a project's schedule, calendar, or resources over its course to reflect decision changes, missed milestones, or disappearing resources. *Project's* automatic recalculation gives you quick on-screen feedback regarding the impact of a change on activity and project completion dates, total project cost, and cost to completion.

One of *Project's* best features is its View command. This function generates a bar chart that allows you to review the estimated use of project resources (see Figure 5). The display lists the activities to which a resource is allocated during any time period. View provides an excellent visual representation of resource use that makes short work of identifying overused and underused resources. Such a feature is rare among project-scheduling programs in *Project's* price range. On the down side, *Project* is primarily a planning tool and provides few features that help you track progress and com-

Yo-Yo Project Product Development Table of Activities						
Project: develop.ACT			Date: 05/04/1984			
#	Activity	Duration (Days)	Early Late Start	Early Late Finish	Slack Avail	Critical
1	Gen mktg plans	15	06/04/1984 06/04/1984	06/22/1984 06/22/1984	0	*
2	Assign responsibilities	5	06/25/1984 06/28/1984	06/29/1984 07/05/1984	3	
3	Consolidate plans	5	06/25/1984 06/25/1984	06/29/1984 06/29/1984	0	*
4	Review product lines	15	07/02/1984 07/02/1984	07/23/1984 07/23/1984	0	*
5	Hire prototype artist	12	07/02/1984 07/06/1984	07/18/1984 07/23/1984	3	
6	Design prototypes	30	07/24/1984 07/24/1984	09/11/1984 09/11/1984	0	*
7	Hire layout artist	5	07/02/1984 10/10/1984	07/09/1984 10/16/1984	65	
8	Hire new production crew	10	07/19/1984 10/31/1984	08/01/1984 11/13/1984	68	
9	Train new production crew	20	08/02/1984 11/14/1984	09/06/1984 12/13/1984	68	
10	Review prototypes	5	09/12/1984 09/12/1984	09/18/1984 09/18/1984	0	*

Figure 4: The Table report summarizes information about all project activities. It shows duration, slack time, and early and late start and finish dates and also identifies critical activities.

pare planned to actual cost and schedules. For example, *Project* does not allow you to designate an activity as partially or fully completed, nor does it compare the projected versus the actual amount of a resource used.

When Your Tasks Are Many

You may need to work with a project of more than 128 activities, or you may want to establish interdependencies between the activities of two or more projects. *Project's* Xternal Link function establishes a connection between

two projects—the “current” project (the one with which you are currently working on screen) and an “external” project (one created previously and now stored on disk). When you link your current project with an external project, the external project is represented as a single activity in the current project. This is a useful way to summarize the status of several

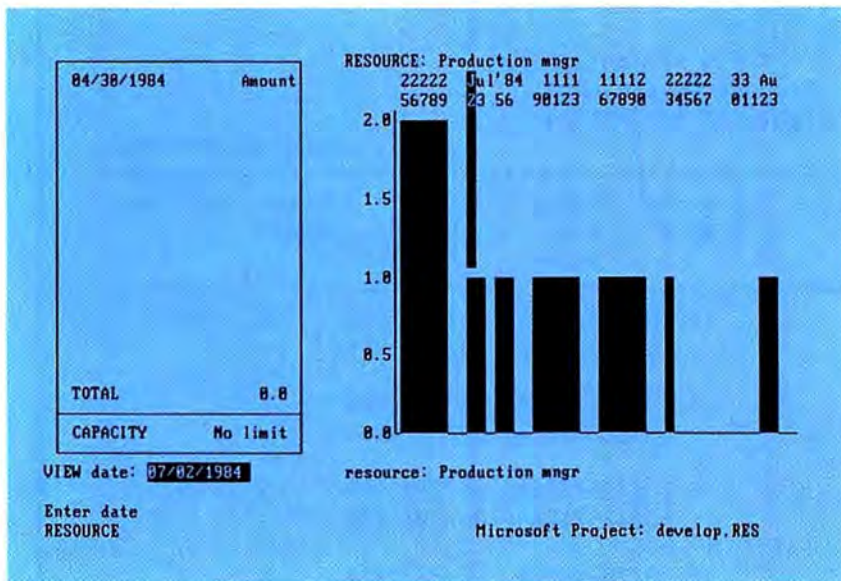


Figure 5: The View screen enables you to look at the pattern of use for a particular resource and see if resource capacity has been exceeded.

projects for senior management or to set up projects that encompass subordinate projects.

Unfortunately, an external project cannot include any predecessors from the current project. Thus, *Project* cannot adjust the external project's start date to accommodate the completion date of a predecessor activity in the current project. However, the linked external project (viewed as an activity) can be designated a predecessor to another activity in the current project.

■ Data to Go

Project data can be exported to other programs such as Microsoft's *Multiplan* and *Chart* packages. Two commands enable you to transfer cost and resource information into a SYLK (Symbolic Link) file that can be used with

those two Microsoft programs. *Project* includes Microsoft's CONVERTD utility, which allows the program's data to be used with columnar and delimited ASCII text files, DIF (data interchange format) files, and SDF (symbolic data format) files. In such formats *Project* data can be transferred to programs such as *dBASE II* and *1-2-3*.

■ Documentation

Project's documentation comes in two forms: on-screen help and a printed manual. The manual is designed to quickly introduce the novice to the program and project management concepts. It is divided into three sections: a tutorial, a user guide, and two reference sections. The reference sections include instructions regarding installation and use of the Microsoft Mouse. A mouse can significantly reduce keystrokes and make the program easier to use.

■ Foiling Murphy's Law

Project is a strong entry in the realm of relatively low-priced project-planning software. Its command structure and editing capabilities make it easy to use. *Project* is apt to be valuable to planners of small projects who need well-organized activity and resource information plus quick feedback on the effects of actual and potential planning decisions. *Project*'s View function and Resource Detail Listing report set it apart from other packages in its class. Keep in mind that a program of this type requires that you accurately estimate the time required to complete each activity. Otherwise, what can go wrong will go wrong, and Murphy will have the last laugh. ●

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Microsoft Project
Microsoft Corp.
10700 Northup Way
Bellevue, WA 98004
206/828-8080

List price: \$250
Requirements: 128K, one disk drive (IBM Graphics, Epson MX, or Epson FX printer required for printing schedules in one continuous form)



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OfficeWriter: Simply Dedicated

OfficeWriter isn't just another Wang-alike. Faster and easier to use than most heavyweight word processing programs, OfficeWriter offers dedicated word processing in a sleek new form.

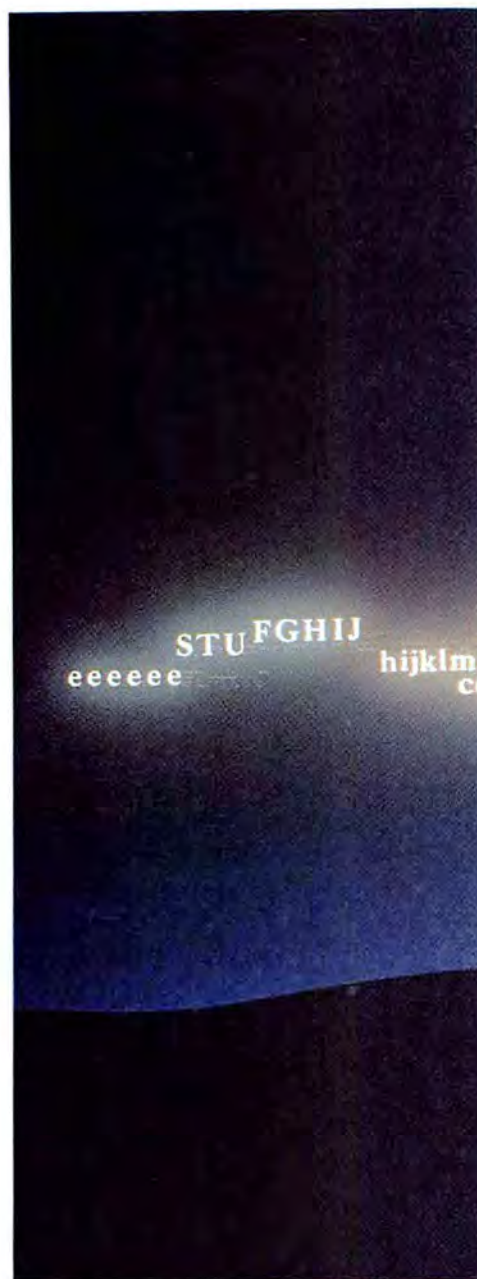
Rebecca Bridges

Every word processing package seems to have something wrong with it. *WordStar* is difficult to learn; *MultiMate* is slow; *pfs:write* lacks power; *Microsoft Word* has unintelligible documentation. Where is the perfect word processing program for the IBM PC? It doesn't exist, but one program comes close. Office Solutions' *OfficeWriter* is fast and easy to learn, and it contains almost all the features of a Wang dedicated word processor.

OfficeWriter offers advanced functions such as mail merge, multicolumn formats, boilerplate insertion, libraries, and a print spooler. For an extra \$120, Office Solutions throws in an excellent spelling checker, *OfficeSpeller* (see the sidebar, "OfficeSpeller").

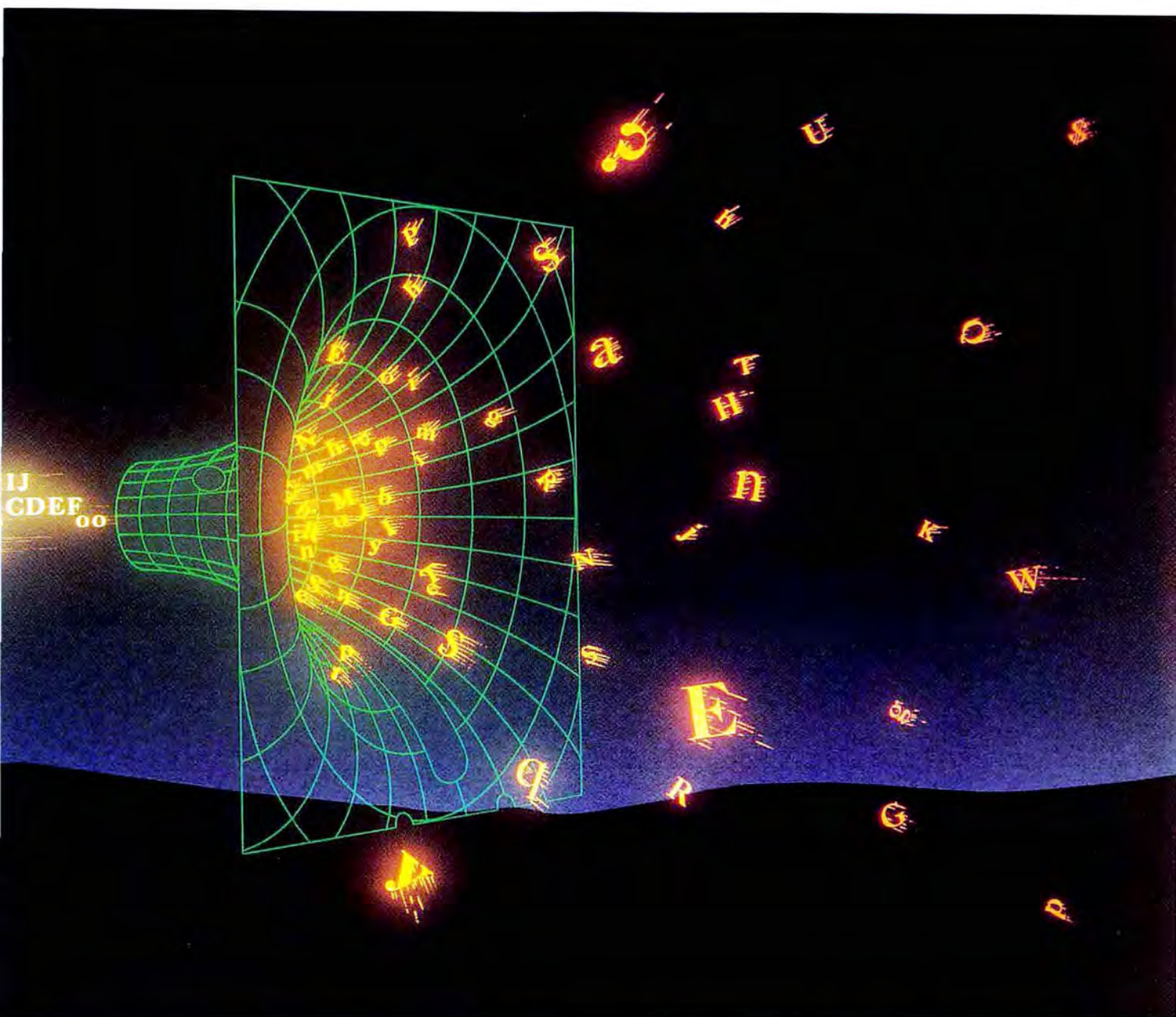
By assigning commands to the function keys, *OfficeWriter* gives the PC keyboard the feel of a dedicated word processor. You do not have to work your way through mazes of menus or memorize complicated control commands. Commands are logical and consistent. Despite a full list of features, *OfficeWriter* is remarkably speedy. The program executes most commands two to five times faster than *MultiMate* and one and a half times faster than *DisplayWrite 2* (see Figure 1).

The size of an *OfficeWriter* document is limited by the amount of internal memory (RAM) available. Table 1 indicates the maximum length of a document for various amounts of RAM. The percentage of memory used appears in the upper left corner of the screen at all times.



Getting Started

Installation involves no more than copying DOS onto the *OfficeWriter* program disk. Unfortunately, the disk is copy protected, and hard disk users must have the original program disk in the floppy drive when starting each session. You can acquire a free backup disk by sending in the



license registration form, which also entitles you to customer support and notification of updates. Updates are free for the first two months and \$50 thereafter.

To get you started, the manufacturer includes an excellent on-screen tutorial on a separate disk.

Unlike those tedious "press the space bar to continue" tutorials that control your every keystroke, this tutorial is an actual *OfficeWriter* file. It explains how to use the most common commands, with exercises and the necessary steps presented on the screen. The printed tutorial in the *OfficeWriter* manual explains more advanced functions.

The manual also contains a detailed table of contents, chapters explaining each option on the main menu, an alphabetized reference section, a list of error messages, a glossary, and an index. *OfficeWriter* does not play hide-and-seek with the program's constraints. Command limitations,

Three “Dedicated” Word Processors Square Off

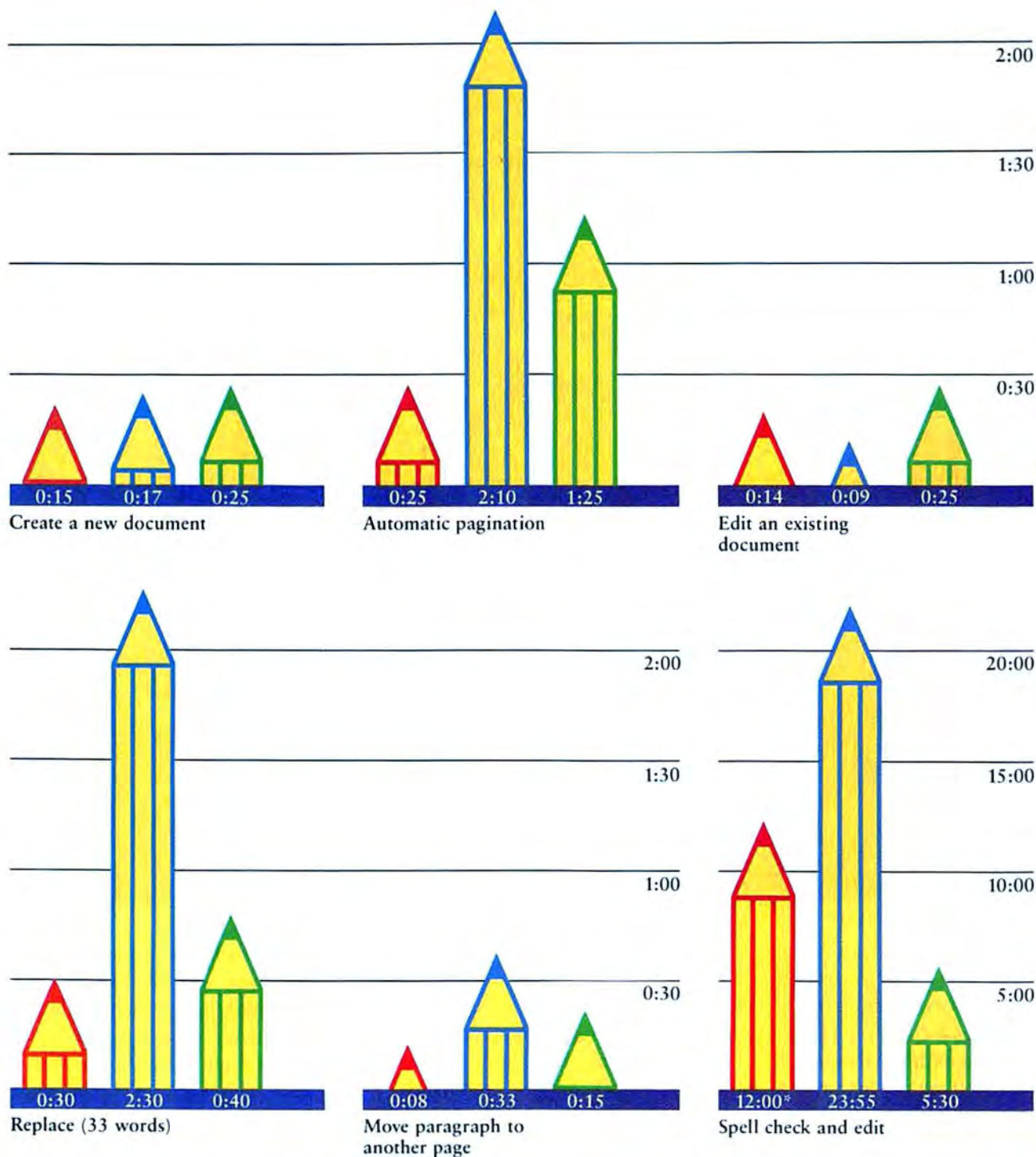


Figure 1: Execution speeds on six word processing tasks. Speeds are shown in minutes and seconds. All tests used a 13-page document on a floppy-based 512K RAM IBM PC.

such as maximum line length or maximum number of lines in a footer, are prominently displayed in the reference section.

Go, Go, Go

To promote the feeling of dedicated command keys, Office Solutions includes a plastic template and stick-on labels for the keys. The <Alt> key functions are listed on a plastic ruler that fits on the keyboard ledge. When you're using the program, you can press the <Esc> key to bring up several help screens.

All commands involving more than one step are executed with the Go key (<GrayPlus>). For example, to search for a word in a document, press <F3>, enter the text you wish to search for, and then press <GrayPlus>. *OfficeWriter* uses the Go key between each step of a command or in executing a command. Any command can be aborted by pressing <F10>, the cancel key.

Screen highlighting is used consistently for marking specific areas of text. To delete, move, copy, underline, or boldface, you give the appropriate command and then use the cursor keys to shade the selected block of text on the screen.

Many cursor commands work logically with the <Alt> key. For example, when you hold down the <Alt> key and press the <Space> bar, the cursor jumps ahead a word at a time. Similar commands move the cursor by sentence, by paragraph, to the beginning and end of the line, and to the top and bottom of the page. Cursor movement is generally quick and responsive. Slight delays

Table 1: Maximum document size depends on system RAM.

	192K	256K	320K	640K
Number of characters	64,000	128,000	192,000	512,000
Number of pages	32	64	96	256

are noticeable in scrolling line by line, moving to the end of the screen or the page, and moving between pages in a long document. But all other commands execute immediately.

Like most word processing programs, *OfficeWriter* uses embedded format lines. You can insert format lines for different line lengths, line spacing, and margin settings throughout a document. If you change settings after text is entered, the text following the format line adjusts accordingly. When text is inserted or deleted, the paragraph automatically adjusts to the current format settings. You can globally change format lines throughout a document by pressing <Alt>-<F4>.

Instead of providing separate commands for deleting words, lines, or characters, *OfficeWriter* uses only the key combined with cursor highlighting. Although this makes the program easier to learn, the editing process is less efficient. Moreover, there is no destructive backspace, so deleting one character requires two keystrokes. However, *OfficeWriter* does provide an Undo Delete command to restore text you have just deleted.

OfficeWriter's default input mode is otype, which is fine except that you can't change the default to insert. This inconvenience is common to most packages that imitate Wang. To insert text you press the <Ins> key, and all text below and to the right of the cursor disappears to make room for the new text. You must press <GrayPlus> to leave the insert mode.

Sensitive Searching

Just about every word processor offers search and replace, but *OfficeWriter* is one of the few that makes case-sensitive searches. For example, if you want to replace the word *file* with *document*, *OfficeWriter* will replace *File* with *Document*, *FILE* with *DOCUMENT*, and *file* with *document*. However, there is no option to search backward through a file or to search for whole words only.

OfficeWriter has four options for saving a document: save and print, save and exit, save and return to document, and cancel—do not save. Oddly, the save and cancel commands are on the same function key, inviting catastrophe. Occasionally, I found myself pressing <Shift>-<F10> (do not save) instead of <Alt>-<F10> when I wanted to save and return to the document. Fortunately my ten-

page document and I were saved by a confirmation message.

One important feature that *OfficeWriter* lacks is the ability to display a directory when it asks you for the name of a document to edit or print. Who can always remember the exact name of a document? However, there is an indirect way around this problem. The Manage Documents option on the main menu displays the names of all *OfficeWriter* documents. If you highlight the name of the document you wish to work with and then return to the main menu, this

Delete commands. Decimal tabs are available to align columns of numbers, but *OfficeWriter* lacks a math function to add the columns.

One nice extra is a date function. Wherever you type **&date** in a document, the current date will be substituted when the document is printed.

■ **Pagination and Printing**

Because *OfficeWriter* is a page-oriented word processor, you cannot simultaneously see the end of one page and the beginning of the next on the screen. If you pre-

Because OfficeWriter is a page-oriented word processor, you cannot simultaneously see the end of one page and the beginning of the next.

name will automatically be entered when you select the Edit or Print option.

OfficeWriter excels in column manipulation features. The multiple column format allows you to print several columns of text side by side. Initially each column is typed on a separate page; then before printing you indicate how many columns you want and where each should print. This feature is useful for newsletters, lists, and other documents in which you may want to edit one column without distorting another.

Columns of numbers or text can be manipulated with the Column Copy, Column Move, and Column

fer, you can type the document without page breaks, keeping it on one long page (up to 64K). Before printing, however, you should run the pagination option, which automatically breaks the document into pages. For more control over page endings, you can enter page breaks manually. Up to three lines of text can be placed at the top and bottom of each printed page as a header and footer. *OfficeWriter* does not currently provide a footnoting feature.

With a few exceptions, *OfficeWriter* is a "what you see is what you get" word processor. Paragraphs, page breaks, underlining, and boldface are displayed on screen as they will appear when printed. If you have a color graphics monitor, underlining appears

in inverse video or can be displayed in a different color. Certain features, such as compressed and double-width print, right justification, and line spacing, do not take effect until the document is printed. You can program special printer codes to take advantage of additional enhancements your printer may have, such as italics, enhanced print, or elite type.

Installing your printer could not be easier. The first time you enter the print option, you press <F1> to select a printer from a list of 32.

Earlier versions of *OfficeWriter* lacked a feature mandatory for any busy office: a print spooler. A spooler allows you to work on other word processing tasks, such as editing, while a document is printing. The newest *OfficeWriter*, version 3.0, corrects this omission. In addition, you can now queue up to ten documents to print and assign a priority for each.

■ **Moving Text**

One of *OfficeWriter*'s most powerful capabilities is manipulation of text between documents. You can copy text into a new or existing document using the SuperCopy command, or you can move text from one document to another with SuperMove. These functions allow you to build documents easily from boilerplate text. You can insert stock phrases or paragraphs into a document by pressing <Alt>-<F1>.

OfficeSpeller

The more expensive version of *OfficeWriter* comes with *OfficeSpeller*, a spelling checker containing an 80,000-word dictionary. To invoke *OfficeSpeller*, press <Alt>-? while you are editing a document. On a floppy-based system you are instructed to insert the dictionary disk. You are then given a choice of checking either a word or the entire document. If you specify 'Spell Check a Word', *OfficeSpeller* checks only the word the cursor was resting on when you invoked the command. This feature is helpful if you don't have a dictionary at hand.

If you want to check the entire document, specify 'Spell Check a Document'. When the program finds a misspelled word, it gives you five choices. You can enter the correct spelling, request *OfficeSpeller* to

00% Doc ID: Iowar Page: 1 Line: 32 Col: 24 Select Alternative Word
started, and the firetrucks arrived on the scene. Ralph
whispered into the ears of the firemen, who then turned
their hoses away from City Hall and aimed them at their own
trucks. Soon they were completely absorbed in washing their
trucks, and they had forgotten entirely about the burning
building. However, the fire was not content to burn only
city hall. It spread to the Laundry House, and soon the
entire town of Iowar was in flames. 4
79

F4 - Select Alternative Word
GO - Replace Word with Selection
F2 - Enter Correct Spelling
F3 - Bypass this Word
F4 - Always Bypass this Word
F5 - Add to Custom Dictionary
F10 - Exit OfficeSpeller

*completely
compactly
completed
completes
complexly
complete
complete
complete

Screen A: Office Speller combines an 80,000-word dictionary with a spelling checker that suggests alternative spellings.

display a list of alternatives (see Screen A), bypass the word once, bypass all occurrences of the word, or add it to a Custom Dictionary.

OfficeSpeller also "remembers" words encountered earlier in a document. If a word is consistently misspelled throughout a document, the program will automatically correct later occurrences of the word once you indicate the correct spelling.

The problem with spelling checkers is that they are slow. Fortunately, *OfficeSpeller* is faster than most. It takes about 10 minutes to check and correct a ten-page document. Some spelling checkers take that much time simply to check the document and report the misspelling.

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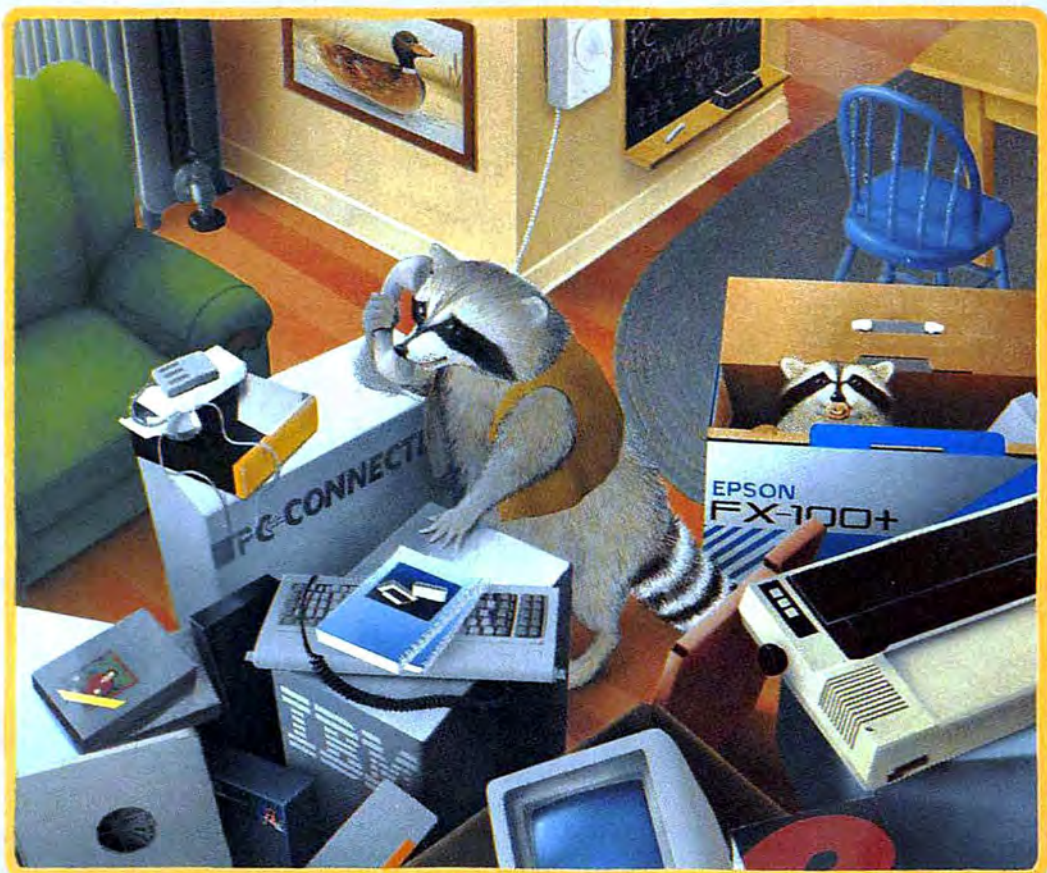
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key tronic

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OfficeWriter's library option is a file organization tool not found in many word processing packages. Similar in function to DOS subdirectories, the library option enables you to group related documents together. You may choose to group documents by subject, author name, or whatever system works best for you. This organizational tool is especially helpful if your documents are stored on a hard disk.

OfficeWriter's merge function allows you to produce form letters, envelopes, and mailing labels. Document Merge offers several data base functions rarely found in word processing packages. Before printing you can specify a range of records to print and enter selection criteria. Up to nine conditions can be entered using logical operators such as equal to, greater than, and less than. This feature is handy if you need to reprint only a few of the form letters.


Setting up the secondary merge document (the name and address file) is needlessly complex. Special merge codes must surround each piece of data. If you forget the codes, the document will not print correctly.

OfficeWriter's conversion utilities enable you to import mailing lists for use as secondary merge documents. If you have a mailing list or a data base program that

can create ASCII files, you can import the file into *OfficeWriter* and convert it to a secondary document.

Since *OfficeWriter* stores its documents in a special format, you must use the conversion utilities if you want to work on an *OfficeWriter* document with another program. Likewise, to edit an ASCII file in *OfficeWriter*, you must first convert it to an *OfficeWriter* document. The conversion utilities are accessed from the main menu but are contained on a separate disk.

An optional conversion utility called *OfficeLink* converts Wang Personal Computer documents to *OfficeWriter* documents and vice versa. Since Wang PC disks can be read by the IBM PC, the conversion is accomplished using software only; no hardware is needed. However, to transfer documents from other Wang word processing systems, such as the OIS or VS systems, you will need to purchase *OfficeCom*. The *OfficeCom* package includes communications software, a circuit board, and cables, enabling you to transfer documents either directly by cable or by modem.

 **Approaching Perfection**
Office Solutions has done a fine job of integrating power and ease of use into a product that is appropriate for a full range of office needs. After working with *OfficeWriter* extensively for two months, I found no bugs. Its simplicity, logical command struc-

ture, and speed of execution set *OfficeWriter* apart from other packages that emulate dedicated word processors.

Several new features, including footnoting, four-function math capabilities, and auto-hyphenation, are scheduled to appear in future releases of the program. My wish list also includes a directory that is displayed automatically when you select the edit or print options, single-keystroke commands for inserting or deleting one character, and an easier way to set up merge documents. Were Office Solutions to add those features, *OfficeWriter* would come close to perfection. ●

Rebecca Bridges specializes in microcomputer training and development. Her firm, Systems Consulting, is located in Palo Alto, California.

OfficeWriter
Office Solutions, Inc.
5708 Odana Rd.
Madison, WI 53719
800/228-0747, 608/274-5047
List price: \$325, with
OfficeSpeller \$445
Requirements: 192K, two disk drives

Hayes Telecommunications Package for under \$500!



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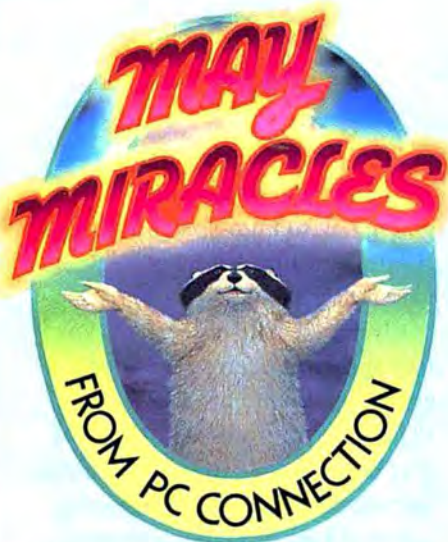
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\$235 Microsoft Word (version 2.0).

Scope it out with Infoscope.



Infoscope is a powerful data manipulation program which deserves a serious look. This window-based software lets you key in on the information you want simply and very quickly. Create your

own style of files, and even your own command vocabulary. Fast, easy-to-use, and very well-rated.

\$129 Infoscope (PC, XT, & AT).

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\$89 VisiMouse (PC, XT, & AT).

390W

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Speaking in Codes

Your code name: Spake Zarathustra. Your mission: to protect sensitive electronic communications. You have only 5 minutes and a limited amount of RAM. What are your alternatives? Two of them are DataSafe and Crypt Master.

Judy Getts

||||| It's an art older than Tutankhamen, but its renaissance began with the first computer. It's called cryptography, the science of disguising messages with secret code. The ancient Persians simply substituted astronomical signs and names of birds for letters of the alphabet. Today, cryptography is an exacting mathematical labor in which code-

books, cipher wheels, and typewriterlike cipher machines have given way to high-speed mainframes running complex algorithms.

Over time, the object of cryptography has been to transform a readable *plaintext* message into the apparent gibberish of *ciphertext* using a code that is as close to unbreakable as human ingenuity can make it. What has changed—changed enough to boggle the mind—are the codes themselves. Today's ciphers consist of layer upon layer of algorithms so complex that they test the wits of even the most powerful mainframes.

The computer is a natural tool in the field of cryptography. Souped-up number-crunchers like the Cray-1 can work their way through a mathematical labyrinth with greater facility than most people can complete a maze on the back of a cereal box. Surprisingly, though, it's the modest PC that is at the forefront of the cryptographic revolution. Some cryptosystems used on the PC are every bit as secure as anything generated on a high-powered mainframe.

Cryptosystems for PCs come in both hardware and software form. The federal government demands hardware encryption of confidential files in its agencies, presumably on the assumption that hardware is harder to tamper with than software; software schemes must be specially authorized. But those standards were set before PC systems and accompanying software options ballooned. PC owners may find that software implementation suits their purposes best. Hardware systems like the Encryptor, from Futurex, offer faster encryption than any software system, but software is usually less expensive and more reliable than hardware and doesn't take up a valuable expansion slot.

No code is uncrackable, but the software packages reviewed here—*DataSafe* from Trigram Systems and *Crypt Master* from Digital Signature—come as close to true infallibility as present technology allows. *DataSafe* is based on the popular federal Data Encryption Standard (DES), and



Crypt Master is modeled on the Rivest-Shamir-Adleman (RSA) public-key cryptosystem, the two leading supercodes of modern cryptography.

Mathematical sophistication aside, one alluring thing about these packages is that they're easy to use. Both are menu-driven and require no more than a few commands to encode and decode files. Their simplicity, together with their speed and the small amount of RAM they require, makes them ideal for securing electronic communications.

■ DataSafe

To be usable, a cryptosystem should fit easily into normal telecommunications routines. To be unobtrusive, it must be fast, performing its transformations within seconds. In this respect, Trigram Systems' *DataSafe* is a winner.

DataSafe, designed by Bob Lucas, is one of the best-conceived software adaptations of DES on the market. Both the program and the documentation are meticulously written. The program is chock-full of security features that would make even a blazing paranoid feel safe. Elaborate data authentication and checksum functions help detect any tampering with encoded files. Even the DES algorithm has maintenance tests, one of which runs automatically whenever the program is started. *DataSafe* encrypts and decrypts at 105K per minute—considerably faster than most other software versions of DES.

The actual encoding and decoding of files with *DataSafe* is ridiculously easy. To begin encryption, you type **E** at the main menu.

Then, as prompted, you supply the name of the file to be encrypted, followed by a file name for the resulting ciphertext. A final prompt requests a secret key, a password that triggers decryption and encryption.

The security of files encrypted with DES depends on the infinite number of ways the algorithm can change plaintext into ciphertext. The secret key serves as the variable that establishes which cryptographic transformations will be chosen. Consider it the DNA strand behind the generation of a wholly unique secret code. Each time you use a new key you are actually generating a brand-new DES cipher with which to encode your files.

When entering your secret key, you have the option of using either ASCII characters or hexadecimal digits, the latter being more secure and the former easier to re-

member. The manual contains an eye-opening discussion of the advantages of hexadecimal over ASCII, and vice versa, turning the selection of the perfect secret key into a trial of your cunning.

For obvious reasons, secret keys aren't stored by *DataSafe*. Once you exit the program, they're gone forever, as are your encrypted files should you forget their keys. DES, like any other worthwhile cryptosystem, is designed to prevent reconstruction of secret keys from either the algorithm or the generated codes.

Transmitting a message or file encrypted with *DataSafe* isn't much different from transmitting an ordinary file, except that the receiver must have some hardware or software implementation of

the damage extend? How much of the file could you decrypt and how much would be lost? A good communications package picks up errors in transmission, but there is always the outside chance of disaster.

With *DataSafe*, encryption transformations are confined to relatively small blocks, so that any damage will run no longer than 16 bytes. The program offers an alternative ciphering mode that keeps damage limited to an 8-byte maximum by encrypting each block individually. By comparison, the default ciphering mode—cipher block chaining—encrypts by combining each 8-byte block with the previous ciphered block, making each block a function of all preceding ones.

rect it. *DataSafe* offers a Destroy function to overwrite and erase plaintext files. The complement to Destroy is Null, a function that the software author describes as a "paranoid thing to do but sometimes essential for maximum security." Null overwrites and erases all existing free space on a disk in case the program creates temporary files without the user's knowledge while he or she is working on a program with sensitive data.

■ Crypt Master

Despite the strength of the Rivest-Shamir-Adleman (RSA) public-key cryptosystem, public acceptance has been weak. The problem is its speed. Even on a dedicated microprocessor, RSA encryption and decryption can be frustratingly slow. That pretty much ruled out its use on a PC until a couple of mathematicians at the University of Chicago attacked the problem and came up with *Crypt Master*.

Crypt Master performs pure RSA at an encryption speed of about 1.25K per minute and a decryption speed of about 131 bytes per minute. That's adequate for short messages, but still too sluggish for anything longer than a paragraph. So the folks at Digital Signature designed slightly weaker versions of RSA that run at several times that speed and added a hybrid cipher for rapid encryption of long documents. The result is a series of fascinating packages, all deceptively austere but with a great deal to offer for PC security.

At the time of this writing, three different *Crypt Master* packages were available, with several more promised. They differ only in regard to code strength, based on the length of the *modulus*, which is the number that must be

The near impossibility of factoring this modulus and returning it to that one prime root that controls decryption accounts for the phenomenal strength of RSA ciphers.

DES. The only other requirement is that your communications link be able to handle an encoded file's 8-bit characters. For this, Ward Christensen's Xmodem protocol works well.

To some, telecommunications is DES's Achilles' heel. The sender must find a communications channel secure enough to transmit the secret key without fear of its being intercepted. If for security reasons keys must be changed frequently, that could be a problem.

A natural question in evaluating cryptosystems is, if part of the ciphertext file is altered in storage or transmission, how far would

Of the two methods, cipher block chaining offers the greater security. By adding random "noise" to the file, this method masks the structure of the file and conceals repeated messages such as strings of "yes" and "no," which, if left unguarded, could eventually be unscrambled.

Once a file exists in a ciphertext version, you must destroy the plaintext. Operating systems don't actually erase a file on command, but merely remove its name from the directory, allowing anyone of even marginal cleverness to resur-

factored to break the code. Codes generated with *Crypt Master/24* would take an estimated 25,000 years to break on an IBM 370/158, while those created with *Crypt Master/16* would take three years, and those with *Crypt Master/8*, no more than a few hours. But the stronger the code, the longer it takes to encrypt, as well as to break.

Steps to encrypt and decrypt files are elementary. You select the encrypt function from the main menu, then choose from user-created RSA ciphers listed on the screen. At the next prompt, you enter the name of the plaintext file, then a file name for the resulting ciphertext. As encryption begins, the screen displays an estimate and subsequent countdown of the total time required for the process.

As in the generation of DES ciphers, you supply a secret key to be chosen cautiously and guarded religiously. Once again, the program doesn't store secret keys, and there is no way to reconstruct them from either the RSA algorithm or the ciphertext it generates. And if you forget your secret key, your encoded files are lost.

To create a secret key, you type the chosen password. *Crypt Master* then requests that you hit a random series of keys. Which keys are struck is irrelevant—the program uses only the time intervals between keystrokes to establish a sequence of random numbers. These, along with the number derived from the secret key, are used as starting points in a hunt for two large prime numbers. Once two numbers, out of hundreds



tested by the program, are determined to be prime, they're multiplied together to form the cipher's modulus.

The near impossibility of factoring this modulus and returning it to that one prime root that controls decryption accounts for the phenomenal strength of RSA ciphers. Factoring such large integers is an area of number theory in which advances have been painfully slow over the past 100 years, and most mathematicians agree that the only foreseeable development will be proof that current factoring techniques are the best that can ever be achieved.

Even more than its strength, though, RSA's biggest selling point is its two-key system. Unlike DES, in which the secret key is used both to encrypt and decrypt, RSA uses the key only to decrypt and relies on a public key to encrypt. This effectively circumvents the problem of exchanging secret keys over a potentially insecure communications channel prior to the transmission of an encrypted message; the secret key remains safely in the receiver's hands. Since the public key contains no informa-

tion that would allow someone to crack its cipher, it can be freely distributed, transmitted unguarded over phone lines, or even published in a company newspaper.

In order to transmit a file or a message with *Crypt Master*, you first encrypt it with the receiver's public key. The receiver must have a copy of *Crypt Master* with RSA ciphers that he or she has generated. After the receiver has acquired the enciphered message, he or she decrypts it with the secret key. Since the public key used to encrypt the file is linked to the receiver's private key, only the receiver can decrypt it.

This combination of public and private keys can be used to create *digital signatures* to certify the authenticity of messages. The process is a mite confusing, but effective nevertheless. First, by prior agreement, the sender uses his or her own secret key to *decrypt* the plaintext message. The usual procedure is then followed: The

sender encrypts the message with the receiver's public key, and after it is transmitted, the receiver decrypts it with the secret key. After decryption, though, the message is

Any communications protocol that handles 8-bit characters can be used to transmit files encrypted with *Crypt Master*. In case your communications software doesn't

Should any errors crop up in ciphertext files during transmission, damage is confined to the encryption block in which it occurs. That's a 48-byte block with *Crypt Master/24*, a 32-byte block with *Crypt Master/16*, and a 16-byte block with *Crypt Master/8*.

At the time this article went to press, Digital Signature was in the process of finalizing a licensing agreement with Trigram, maker of *DataSafe*. Digital Signature will use *DataSafe*'s DES encryption routines in conjunction with its own RSA encryption scheme to create a hybrid code.

The main advantage of the hybrid is that it encrypts and decrypts at a considerably greater speed than pure RSA. At 105K per minute, the pace becomes practical for long documents. In comparison, *Crypt Master/24* encrypts

RSA uses the key only to decrypt and relies on a public key to encrypt. The secret key remains safely in the receiver's hands.

still unreadable, the result of the initial decryption of the plaintext. The receiver then *encrypts* the message with the sender's public key. If the message comes out readable, it's genuine, because the successful process proves the linkage of the keys used to encrypt and decrypt at both ends. If not, it's bogus.

have this capability, *Crypt Master* contains an ASCII conversion utility that transforms encrypted files to 7-bit characters. Unfortunately, the routine doubles the length of ciphertext files, substantially increasing both the time and the cost of communication.

"We need Bob's spreadsheet in our report. NOW!"



at 2.3 seconds per 48-byte block and decrypts at a snaillike 22 seconds per block. *Crypt Master/8* clocks in at over eight times *Crypt Master/24*'s speed, but even that pace is none too speedy. The relatively slow speed can give one reservations about using pure RSA routinely, but you may consider slowness an insignificant concession in light of the super-duper security that the program offers.

Crypt Master isn't a flashy program; the ingenuity that went into it is largely invisible. Its clearest failing is its documentation, which lacks background on several areas of concern to the reader. But that aside, the program is, if not a revolutionary achievement, a long-awaited advance in PC security, finally bringing RSA encryption up

to an acceptable speed. *DataSafe*, though not as secure, still promises years of data secrecy, and its adherence to the accepted encryption standard makes it suitable for a broad range of encryption jobs—chances are anyone you'd want to send the file to would use that cryptosystem. Both programs offer advanced and easily implemented data security for your PC files. ●

Judy Getts is a freelance science writer in Wauwatosa, Wisconsin.

DataSafe
Trigram Systems
3 Bayard Rd. #66
Pittsburgh, PA 15213
412/682-2192
List price: \$139

Requirements: 44K, one disk drive, DOS 1.10 or later version

Crypt Master
Digital Signature
5453 S. Woodlawn
Chicago, IL 60615
312/324-6533
List price: *Crypt Master/24* \$395, *Crypt Master/16* \$245, *Crypt Master/8* \$95
Requirements: 128K, one disk drive

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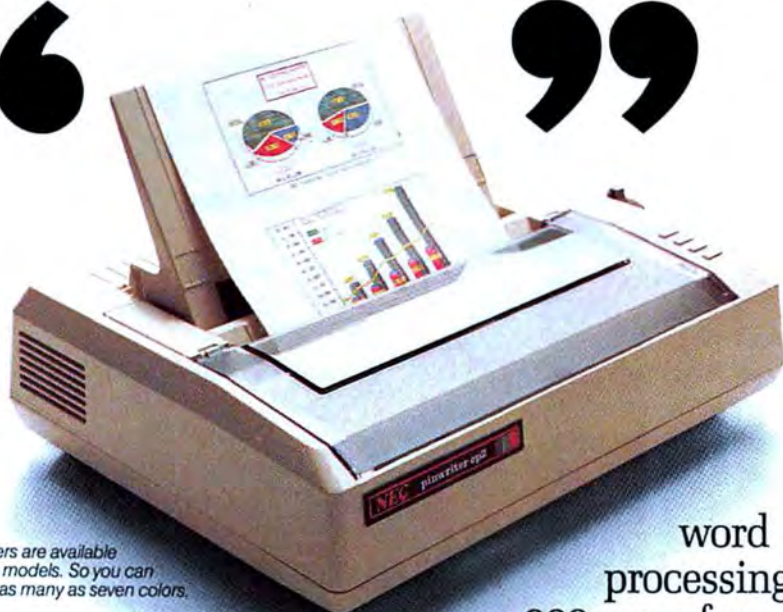
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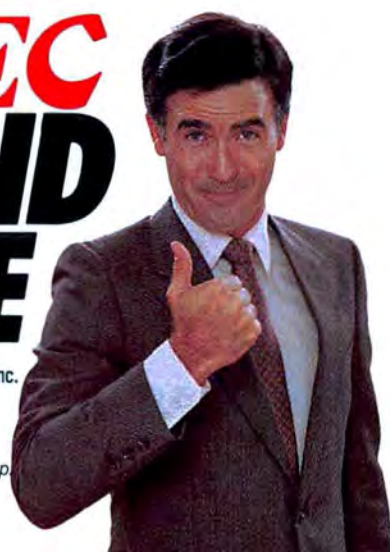
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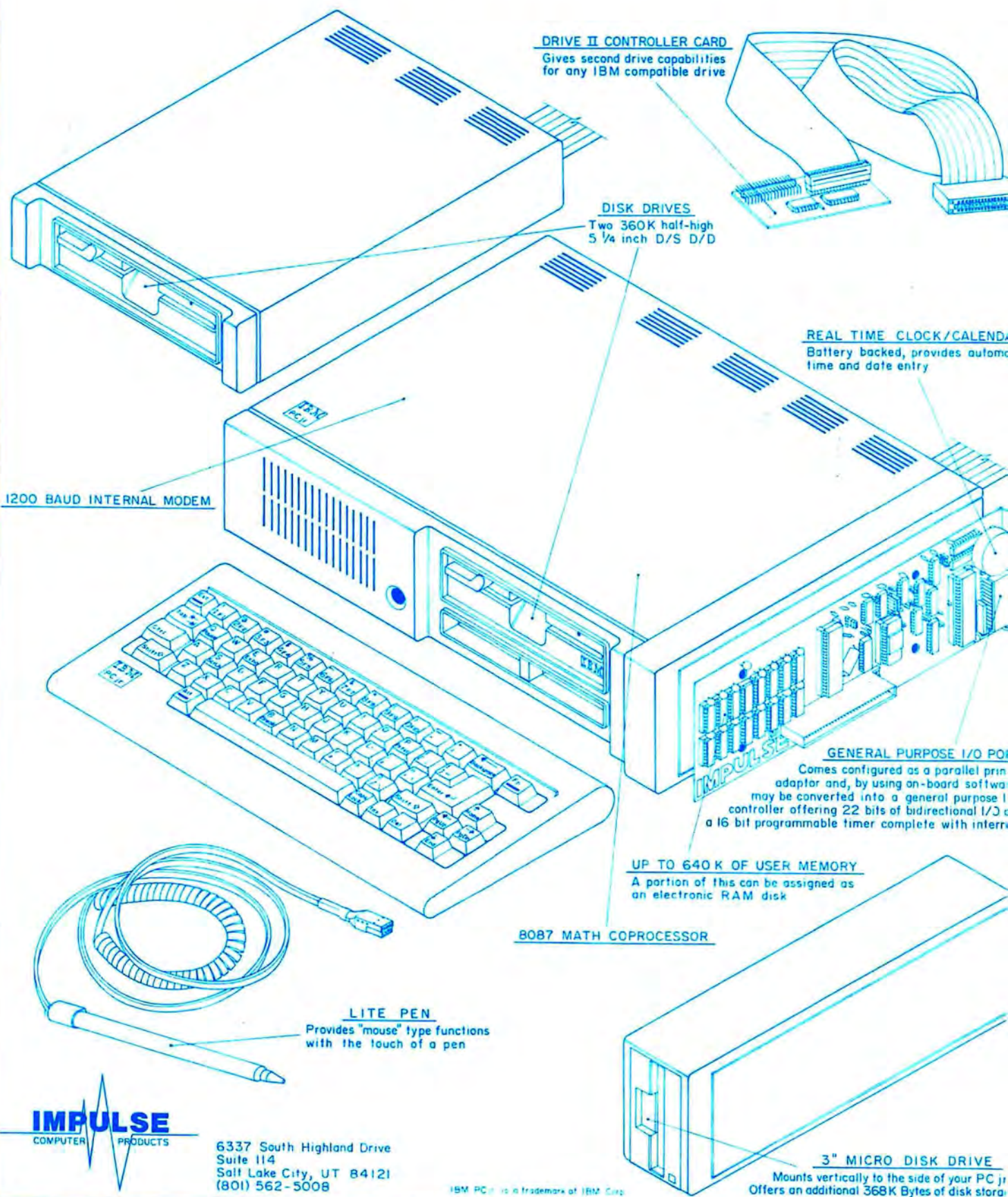
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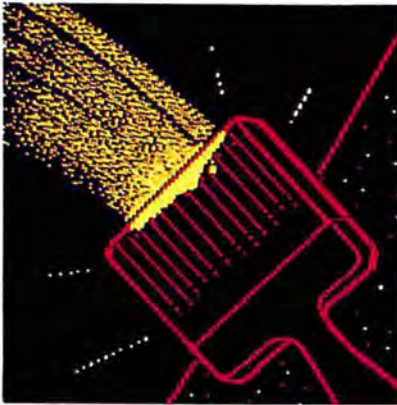
Jr Can
Paint



If graphics are your pleasure, passion, or profession, look before you leap into the open arms of a Macintosh dealer. IBM's ColorPaint may change your mind.

Move Over MacPaint

Katie Seger and Peter Forde



People who sit down at an Apple Macintosh for the first time are almost inevitably drawn to *MacPaint*, Apple's tremendously versatile freehand graphics program that elicits "oohs" and "aahs" from the most jaded computer experts. After a few minutes' exposure to *MacPaint*'s interactive graphics and easily understood icons, even die-hard IBM PC fans are impressed. Aspiring Picassos find they can create competent pictures in minutes; professional artists quickly recognize the Mac's potential as an electronic canvas.

Yet the giddy aura that envelops all honeymoons must fade, to be replaced by the harsh realities of everyday use. Although most Mac owners remain faithful to their machines, many begin to have lust in their hearts: wouldn't it be great if *MacPaint* could work its magic in color?


IBM—anxious to resuscitate PCjr's then-listless sales—responded to that desire in the fall of 1984. Along with the welcome release of a new keyboard and several add-ons for the PCjr (see "PCjr Gets Bigger and Better," *PCW*, Vol. 2, No. 12), IBM announced the availability of *PCjr ColorPaint*, a cartridge-based program that capitalizes on the Mac's monochrome monotony and the PCjr's colorful talents—all for \$99. To be fair, the real price of painting in color is screen resolution—PCjr's 640 by 200 pixels seem somewhat coarse when compared with Mac's 512 by 350.

Of Men and Mice

ColorPaint was not designed to compete with business graphics or computer-aided design (CAD) software. It is primarily a painting program, with built-in patterns and tools (such as a Zoom command) that make creating colorful pictures easy. Children and computer novices will enjoy *ColorPaint*'s ease of use and almost instant results. Amateur and professional artists on a budget will appreciate the program's sophisticated features that, for example, let you merge images, select the colors in the program's "palette," or replace the supplied patterns with those of your own design.

A two-button mouse (the Microsoft Mouse or Mouse Systems Corporation's PC Mouse) acts as the input device for most program operations. (To use the three-button Mouse Systems mouse, simply ignore the

For detailed drawings, a digitizing pad and a stylus are superior to a mouse.



middle button.) Drawing with a mouse takes some practice, if only because it's a less familiar tool than a pencil or a pen. For small, detailed drawings a digitizing pad and a stylus are superior; they also enable you to trace drawings and designs from paper. But digitizing pads and their requisite software are rather expensive. (A mouse, serial adapter, and cable typically cost \$225 or less.) If you aren't in the business of designing nuclear power plants, *ColorPaint*'s sophistication, ease of use, and double-digit price should make the trade-off in precision worthwhile.

Most *ColorPaint* operations are triggered by Button 1 (the left button). A few of the more complicated functions are activated with Button 1 and executed with Button 2 (the right button). For the most part, the

mouse is smoothly integrated with *ColorPaint* operations. Computer neophytes who played with the mouse under our direction caught on quickly.

Menus and Icons

Since *ColorPaint* is a cartridge-based program, no software installation is necessary. To load the program on an entry model PCjr, simply plug the cartridge into either slot and turn on the machine; if your PCjr has a disk drive, slip a DOS 2.10 disk into the drive, pop in a cartridge, and turn on the machine. Once *ColorPaint* is loaded, it displays a drawing area framed by icons, menu selections, and pattern choices. The mouse pointer is positioned at the upper left corner of the screen.

ColorPaint functions are accessible via six pull-down menus—File, Print, Edit, Text, Modes, and Tools. You touch a menu name with the pointer, then press and hold down Button 1 to display a pull-down menu (see Screen 1). Dragging the pointer through the menu highlights each selection; when you release Button 1, the highlighted function is activated.

From the File menu, you can save, load, or delete files on a floppy disk. (Opening files is permitted only if the PCjr is equipped with a disk drive). You select a graphics printer from the Print menu. Currently, *ColorPaint* can be configured for the IBM Compact, Graphics, and Color printers as well as the Quadram Quadjet and the Epson Graphics printers. Use of any other printer requires the installation of a special printer driver program. Program operations that manipulate images are selected from the Edit menu. For example, part or all of a drawing can be flipped from left to right or top to bottom. More important, you can merge images to create new pictures. To label a pic-

ture, you pull down the Text menu and choose text size (small, medium, or large); font (standard, roman, modern, or label); and style (plain, bold, underline, or italics). The Modes and Tools menus control such drawing features as brush shape and the use of grids.

Like *MacPaint*, *ColorPaint* uses a host of icons, which give the artist access to functions that create and manipulate images. Selecting the Brush icon makes available up to 15 brush shapes for painting solid or thatched swaths across the screen. The Pencil icon enables you to do free-form drawing; choose Line to draw the shortest distance between any two points. Use the faucet-shaped icon for filling in an outlined area with a color or a pattern. Click the Scroll icon, and you can scroll large images by as you would text with a word processor—a function vital for painting on a somewhat broader electronic canvas. Regular figures—circles, ovals, rectangles—are also easily generated, scaled, and moved.

When it comes to the fancy stuff, *ColorPaint*'s talents belie its modest price tag. For subtle or startling effects, click the Spray icon to turn the pointer into a spray gun that lays down solid colors or patterns. With a little practice you can even create an airbrush effect by spraying dark colors over lighter background colors. With *ColorPaint*'s Select function, you can capture all

or part of a picture in a frame, then move, copy, merge, flip, or invert it. If detailed graphics or minute changes are called for, the Zoom function is particularly useful, since it enlarges any part of an image.

With Mouse in Hand

Although learning *ColorPaint* requires some trial and error, the program's designers have taken pains to make menus and icons easy to comprehend and program features easy to use. For example, either/or menu options such as Fill Shape/Hollow Shape are marked with arrows showing which choice is activated.

Selecting 'Help' replaces the drawing area with a help screen that clearly diagrams how icons, colors, line widths, patterns, and menus work together to create an image (see Screen 2). The diagrams also illustrate how color and pattern indicators are keyed to their respective functions.

This abundance of on-line help is needed because *ColorPaint*'s documentation is adequate at best. The Getting Started guide bends over backward to simultaneously enthuse and enlighten you, even chirping at one point, "You're about to become a graphic artist!" While this booklet sufficiently grounds you in *ColorPaint* fundamentals, taking you step-by-step through a picture-making tutorial, its gee-whiz tone begins to grate after the second page. Once you become familiar with the program, you need only refer to *ColorPaint*'s

A *ColorPaint* rendition of a photograph of two African tribespeople. The basic image was created with simple geometric shapes. Turning geometry into human form involved creating and interweaving custom patterns and then honing the picture in zoom mode, pixel by pixel.



reference guide, which offers clearly written descriptions of icons, menus, and menu options.

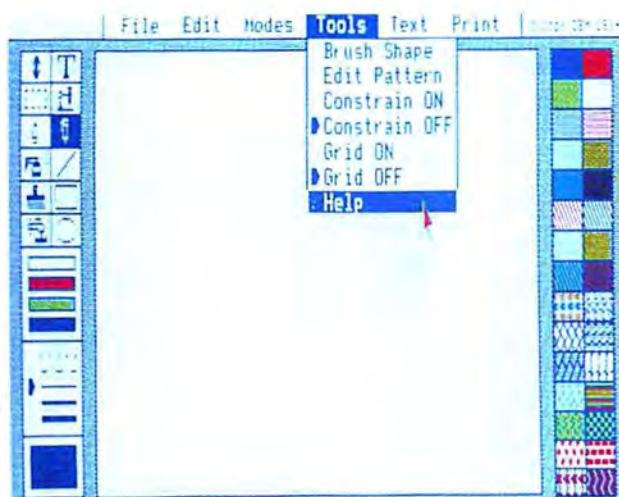
Before you open up this electronic paint kit, it's best to conceptually break down your picture into simple geometric shapes. *ColorPaint* generates geometric shapes quite readily, so those should be the first images you create. Once those basic elements are in place, switch to the Pencil or the Brush and begin some freehand drawing that connects and accentuates the geometric images, varying the line or brush size as needed. Once the picture starts to take shape, trim the rough edges in the Zoom mode. Then use either Fill or Spray to lay down color and patterns. Finish your creation by adding a message to the drawing with the Text function.

Digging Into the Paint Kit

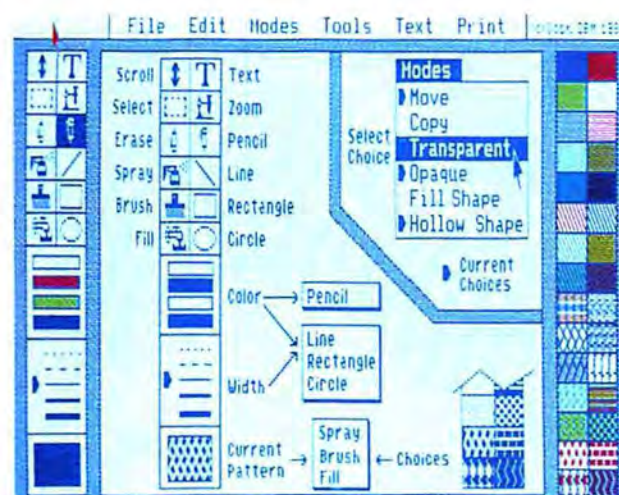
Most artists have a distinctive "signature," determined in part by the color combinations they use. Unlike other, more expensive drawing programs, *ColorPaint* does not impose a preset palette—color relationships are at the discretion of the artist. There are, of course, some restrictions. Only 4 of the PCjr's 16 colors can be used at one time, and 1 color must be white. Naturally, the palette you choose also defines the range of colors available for any pattern.

As noted earlier, a mouse is not the best device for creating small, intricate drawings, but *ColorPaint* partially overcomes this obstacle with its Zoom command. Much like *MacPaint*'s FatBits feature, Zoom magnifies a portion of a drawing so that you can erase or change its color or pattern by manipulating individual pixels. Under the Zoom command, the magnified area fills up most of the screen, and an in-scale "snapshot" of the drawing is visible in a small box in the upper left corner of the screen (see Screen 3). As you alter an image pixel by pixel, the changes are reflected in the snapshot. Like most *ColorPaint* functions, Zoom is simple to use.

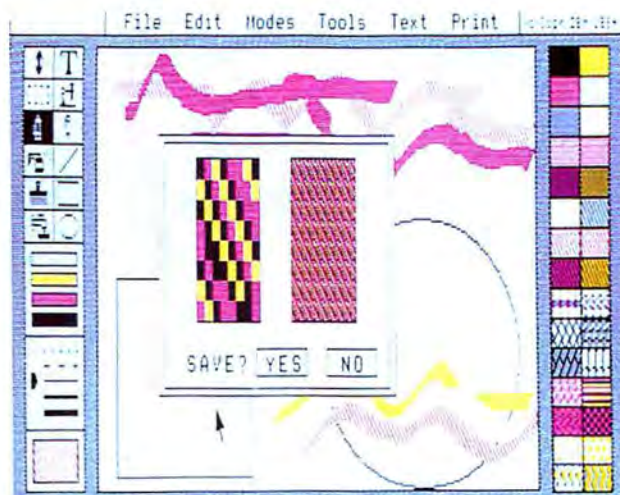
If one of *ColorPaint*'s provided patterns doesn't suit your taste, you can alter it in the Edit Pattern mode. In this mode, *ColorPaint* displays two fixed boxes in the drawing area (see Screen 4). As with the Zoom function, a portion of the selected pattern is magnified in the left box while the entire design appears in scale in the right box; as you make minute modifications on the left, the pattern on the right reflects the change. Edited patterns are saved to disk for use in other drawings.



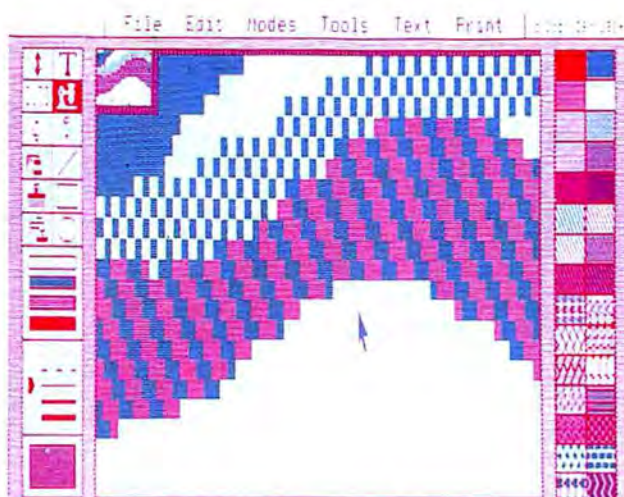
Screen 1: ColorPaint mimics the Mac. Point at a menu selection, click a mouse button, and a pull-down menu is displayed.



Screen 2: ColorPaint's on-line help not only labels icons, but diagrams the interrelationships between icons, colors, patterns, and geometric forms.



Screen 4: The Edit Pattern lets you minutely change a pattern in the left box while the entire pattern appears in scale on the right.



Screen 3: Using the Zoom command in ColorPaint. One area of an image is enlarged for pixel-by-pixel work; an interactive snapshot in the top left corner shows the changes.

The Merge command from the Edit menu merges a section of one drawing with another full screen drawing. (The Merge command, like Copy and Move, can operate on only about one-quarter of the screen image at a time.) In this mode, the drawing that is overlaid by the other becomes the dominant drawing, retaining its palette colors and pattern selections. The resulting image can then be saved to disk under the original file name or another name.

ColorPaint's paint kit offers some interesting either/or options, in particular the Transparent/Opaque options, which give you the freedom to combine picture sections. When Opaque is set, the white areas in a section that is moved or copied to another part of the screen obliterate background images. The counterpoint option, Transparent, lets you create true overlays because any white space in a section appears transparent when the section is copied or moved, letting the underlying image show through. You could thus create a template image that could be overlaid onto many other images.

The Constrain On/Constrain Off and Grid On/Grid Off options on the Tools menu let you create more precise, professional-looking designs. With Constrain On, *ColorPaint* "corrects" any image you create, generating only true squares and circles when the Rectangle or Circle functions are activated. Likewise, when the Line function is active, the program draws lines at 45-degree or 90-degree angles. With Constrain Off, the same geometric functions will generate ovals, ellipses, rectangles, and straight lines at any angle.

In *ColorPaint*'s default mode, you can start a drawing anywhere in the drawing area. With the Grid option on, an invisible grid is laid on the drawing area; lines and other regular figures must start at a point on the grid. The grid is useful for aligning text or drawing equidistant parallel lines. Unfortunately, since the grid is invisible, you must discover the spacing between the lines comprising the grid—approximately $\frac{1}{8}$ of an inch square—through trial and error. A more useful design would permit altering grid dimensions so that users such as architects and designers could choose their own scales.

Wish List

Our major gripe with the program is, in reality, a small one: The *ColorPaint* icons, menus, and pattern selections are constantly displayed on screen. It would be helpful to be able to toggle these images off and use the entire screen for the drawing area without the distraction of the tools lying about. And although these icons are not printed out, they get in the way when you create photographic slides from screen shots.

Although *ColorPaint*'s 15 brushes are more than adequate for most occasions, an Edit Brush option, similar to the Edit Pattern option, would allow you to design additional brushes. Also missing is a function like *MacPaint*'s lasso, which enables you to "rope" irregularly shaped images so they can be copied, moved, and merged without nearby images intruding. *Color-*

Paint's Select function, which frames rather than ropes an image, is not always accurate and often captures part or all of unwanted nearby images.

Another desirable modification would be to make white an optional rather than a required member of

With Constrain On, ColorPaint corrects any image you create, generating only true squares and circles.

the color quartet. Though *ColorPaint* outshines many programs in terms of color flexibility, like most computer users, we're greedy.

These are admittedly niggling concerns. *ColorPaint* is very simply a bargain that budding electronic artists should strongly consider—particularly if their pocketbooks aren't deep. If you love the Mac's graphics but yearn for the colors of the rainbow, *ColorPaint* may just turn your head and change your mind.

Katie Seger is a San Francisco Bay Area freelance writer specializing in computer topics. Peter Forde is a commercial artist and company artist for Advanced Genetic Sciences in Berkeley, California.

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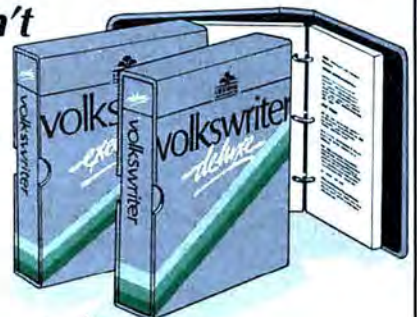
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A Matter of Public Record

Local area network vendors may sell a lot of hardware, but LANs are lifeless without useful software. DATASTORE:lan heralds a new wave of multiuser application programs—and encompasses features essential for survival in a networked world.

Brad Baldwin

 Scenario for the mid-1980s: News of a precedent-shattering lawsuit reverberates through the computer industry, capturing, in particular, the attention of local area network (LAN) software and hardware companies. A disgruntled user of a PC-based multiuser system wins a settlement against a firm that sold single-user data base management system (DBMS) software with its multiuser system.

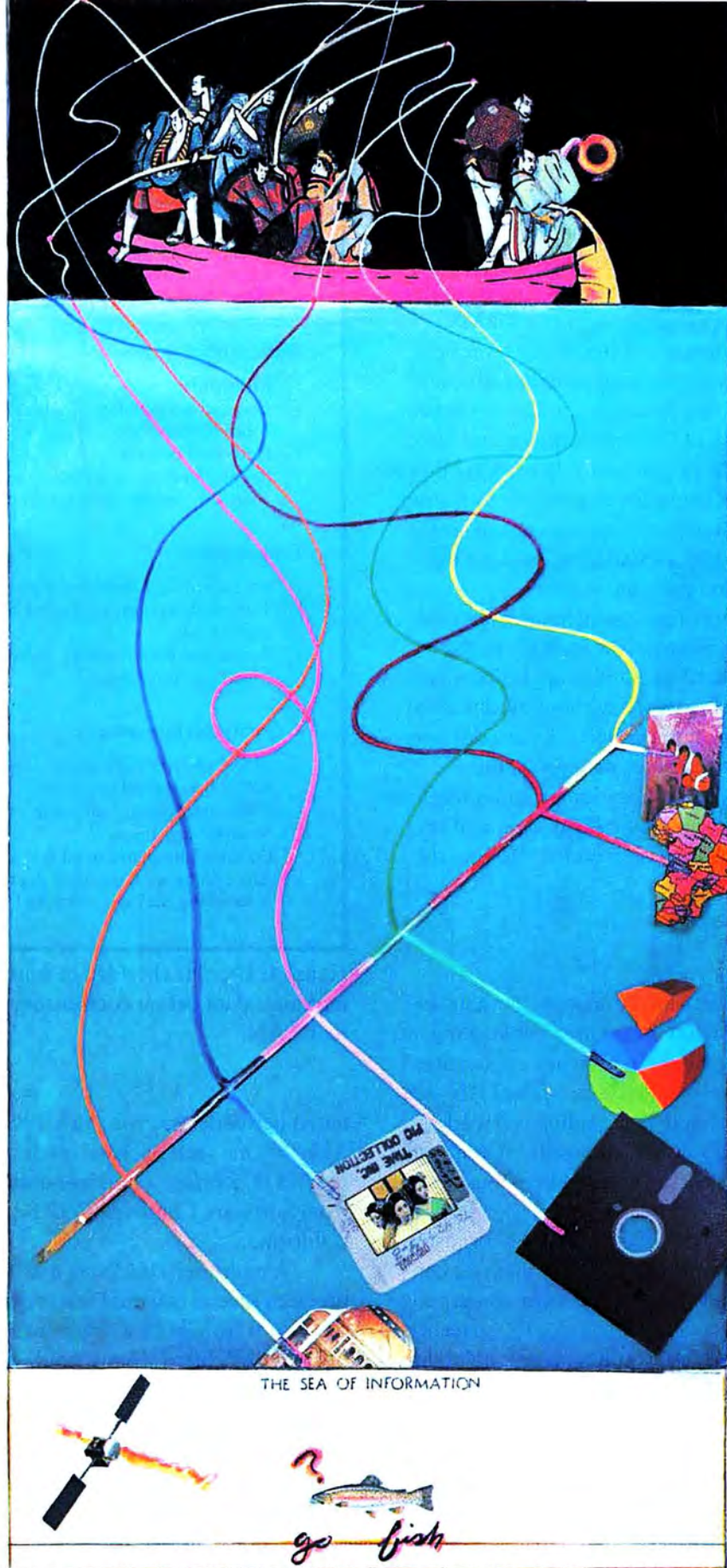
The plaintiff successfully argues that the software is inadequate and inappropriate for use within his multiuser environment. He says it lacks such fundamental multiple-user features as shared access to data base files (without corruption of data) and user-defined data security measures. Performance is also severely compromised when large data bases are handled.

The plaintiff acknowledges that the hardware he purchased is quite powerful and that its operating system does indeed feature record locking, data privacy, and simultaneous access to the same file by two or more users. The system manufacturer, however, either knowingly or unknowingly misled him into believing that single-user DBMS software moved to a multiple-user system automatically incorporates multiuser features. Expert witnesses testify that many network protection and performance requirements for multiuser application software cannot be added to a single-user package.

The court deems that this is not a routine case of caveat emptor. The plaintiff isn't a novice but a person with years of computer experience. The judgment supports the plaintiff's contention that even experienced users are occasionally ambushed by new, relatively untried technologies and ought not suffer the consequences of an ill-advised purchase decision.

The problems that our frustrated but vindicated (and perhaps not entirely hypothetical) user encountered highlight an all-too-common misconception about local area networks—and the software needed to do meaningful work on them. Without the right software, using a LAN is akin to driving in a demolition derby: sooner or later, someone crashes.

Single-user application software on a network operates much as it does in a stand-alone setting. By necessity, such programs play it safe and don't share in the spirit of a multiple-user environment. If a single-user DBMS tried to genuinely inhabit a foreign LAN, data base files would quickly find the business end of a tow truck.



Put another way, single-user application software can offer concurrency, or access to a single file by multiple users, but it's concurrency at risk. True multiuser software promises protected concurrency. That promise is perhaps most critical, and most difficult to keep, in an application such as a DBMS.

There is, of course, an intervening layer between DOS and any application program—the network operating system. According to Larry Jordan and Bruce Churchill, in *Communications and Networking for the IBM PC* (Robert J. Brady Co., Bowie, MD, 1983), you can count on all network operating systems to contain four components: communications, input/output and file handling, user management, and application program support.

The network operating system integrates the network into DOS—more or less invisibly to the user—so that a standard single-user application program can run on the network without modification (although, again, not without risk). A network operating system can have various data protection “hooks,” but unless the application program itself implements those hooks and uses them, data will remain at risk (see the discussion under “Waving the Flag”).

LANs Ho

Fortunately, software developers, perhaps inspired by IBM's foray into local area networking, are moving to end the drought in network application software during this so-called Year of the LAN (see “Six Leading LANs” and “Untangling Networks,” *PCW*, February 1985). IBM, Microsoft, 3Com, and a horde of others are gearing up for a brisk business in LAN applications.

Whether this is *the* Year of the LAN or just a healthy time for networking, industry analysts concur that a boom is under way. The most conservative figure from industry gurus anticipates 100 percent growth over 1984, which would represent an addition of some 15,000 networks.

Several firms have already launched their entries in what is certain to be a new genre of relational DBMSs designed specifically for shared use on PC-

<p>Concurrent access protection</p> <ul style="list-style-type: none"> <input type="checkbox"/> Record locking <input type="checkbox"/> Synchronization logic <input type="checkbox"/> Data base structure protection <p>Data privacy</p> <ul style="list-style-type: none"> <input type="checkbox"/> Passwords <input type="checkbox"/> Transaction privileges (read, write, update, and delete authority) <input type="checkbox"/> Field-level privacy <input type="checkbox"/> Record-level privacy (locks out categories of records to certain users based on field values) <p>Data security</p> <ul style="list-style-type: none"> <input type="checkbox"/> Encrypted user names and passwords <input type="checkbox"/> Tamper detection: encrypted block checksum <input type="checkbox"/> Audit trails <input type="checkbox"/> Automatic data recovery techniques (rollback and roll forward) <p>Capacity/performance</p> <ul style="list-style-type: none"> <input type="checkbox"/> Megabyte-size data bases <input type="checkbox"/> 100,000+ record capacity <input type="checkbox"/> Dynamic garbage collection <input type="checkbox"/> Multiple key fields <input type="checkbox"/> Dynamically maintained B+ key trees <input type="checkbox"/> Algorithms with minimal degradation when handling multiple users and large data bases
--

Figure 1: Use this checklist of features essential to multiuser data before committing your data to a LAN.

based networks (see the sidebar “Share and Share Alike”). One such package on the cutting edge is *DATASTORE:lan*, a multiple-user relational DBMS from Software Connections of Santa Clara, California.

A multiuser DBMS such as *DATASTORE:lan* provides several essential features that clearly distinguish it from both a single-user DBMS and a multiuser DBMS lifted from a single-user environment. These include concurrent access protection, data privacy, data security, significant storage capacity, and optimized performance within a networked environment (see Figure 1). The challenge for Software Connections has been to fuse a useful sharing mechanism and a credible data manager.

Vital Statistics

DATASTORE:lan is a highly portable product. Although the program is not entirely hardware independent, Software Connections did minimal tinkering to create versions for 21 LANs, including the IBM PC Network, Microsoft Networks, Corvus Omninet, 3Com EtherSeries, Novell Netware, Nestar PLAN Series, Orchid PCnet, and Davong MultiLink. For purposes of this article, **DATASTORE:lan** was installed on TeleVideo's Personal Mini multiuser system, which supports up to 16 users and runs under InfoShare, a network operating system based on Novell's Netware.

DATASTORE:lan's true common denominator is the PC (or PC compatible) as workstation. The package requires that each PC on the network be equipped with at least 256K of RAM. Program files, including an extended report writer, consume nearly 600K, so the package is inexorably bound to hard disk-based systems (which does not constitute a drawback, because program files for virtually every network reside on a hard disk server). Up to 16 users are permitted simultaneous access to a data base; 127 users can be defined, each with different security classes (see Table 1).

Creating a data base, reading and adding records, performing searches, and formatting reports are all menu-driven tasks. **DATASTORE:lan** permits creation of up to 15 screens of data base input forms using an integrated full-screen editor.

The program uses a dynamically maintained B+, or balanced, tree structure technique to keep key field data in sorted order. (Briefly, a key index tree is a specific organizational structure used to search for data quickly—a critical concept for a relational DBMS.)

In setting up a data base, you can mark any field as a key and can specify up to 16 keys per data base. The program also performs "virtual" multifield key sorts (that is, a sort within a sort). A multifield sort accomplishes several levels of sorting with a single sort command. It arranges data in sorted order by a primary field, and within that field it sorts by a sec-

ondary field. The program would, for example, sort all folks named Johnson and then sort all Johnsons by city, then by zip code, and so on. The process is virtual, not physical, because **DATASTORE:lan** doesn't actually rewrite the data base.

A handy lookup feature can extract records from several data bases by searching for a field common to all. For example, if a customer identification field is contained in the customer accounts outstanding, credit history, and customer data bases, all three records pertaining to that identification number can be aggregated for viewing. You're spared having to jump from one data base to another.

Gauging Performance

The first PC-based data managers had no problem handling small numbers of records on floppy-disk-based systems. But a growing networked business may well need to store thousands of records on a hard disk; accordingly, algorithms appropriate for a stand-alone, 500-record, 100K data base won't suffice for a shared 50,000-record, 10MB data base. For a network product, this difference in size and scale eventually becomes a difference in kind.

DATASTORE:lan offers extensive storage capacity combined with efficient performance—both mandatory qualities in a network setting. The maximum allowable size of any given data base is 32MB; the program imposes no limit on the number of records per file as long as the total data base size does not exceed that maximum. DOS, as a single-user operating system, lacks a facility to properly handle the creation of files by multiple users. Conceivably, two users can create a file at virtually the same instant, writing to the identical spot on the disk—an unfortunate turn of events for the first user, whose work is overwritten by the second.

When you create a data base file with **DATASTORE:lan**, the program reserves an area on the disk that remains immutable for the life of the file. This process is known as "pre-allocation" and is essential to a multiple-user environment. Once the file is pre-allocated, its location on the disk will not vary; accordingly, updates can occur without other applications vying for that space.

Pre-allocation helps keep the data base contiguous and thus speeds up searches, sorts, and housekeeping functions within a data base of several thousand records. Pre-allocation minimizes the amount of disk space across which files can be dispersed; the hard disk read-write head can therefore perform at peak efficiency.

Ideally, multiuser software should be designed to minimize the amount of time one person can tie up the data base during sorts. Physical sorting techniques, which rewrite all records into sorted order, would obviously be inefficient in a multiuser DBMS of thousands of records. Because Software Connections chose to maintain sorted, dynamic B+ key trees on all key fields, sorts and record selection are almost instantaneous: a search for one record in a 1MB file requires less than 3 seconds. At your request, the program will retrieve records by the order in which they were entered or by keys. Or, if you're looking for a single record, you can invoke *DATASTORE:lan*'s Fastest Access Method to make short work of retrieval.

Garbage collection—the batch deleting of records and subsequent reclaiming of space—is fundamental to a large, shared DBMS. *DATASTORE:lan*

The program's concurrent access protection capability ensures that all users on a network have an equal opportunity to read and update records within the same data file.

performs dynamic garbage collection, immediately reclaiming and reusing the space occupied by the deleted record. As a result, garbage is not permitted to pile up.

DATASTORE:lan lacks the kind of structured programming language that is built into *dBASE* and other DBMSs. Instead, Software Connections sells a separate application development tool kit called *LAN:Datacore*. Designed primarily for professional programmers, the *LAN:Datacore* library routines are invoked from the user's choice of Pascal, Compiled BASIC, or FORTRAN.

A Matter of Concurrency

Once you've structured a *DATASTORE:lan* data base, the program's concurrent access protection capability becomes paramount. That capability ensures that all users on a network have an equal opportunity to read and update records within the same data file; that data integrity is maintained through "record locking," which precludes other users from changing a record while it is in use; and that the key tree structure is not altered by simultaneous users.

Single-user DBMSs, by contrast, do not permit simultaneous reading and writing to the same data base. Such programs as *R:base 6000*, the multiuser version of *dBASE II* (which was recently discontinued in favor of a pending multiuser version of *dBASE III*), and even many UNIX-based DBMSs do not support record locking. Typically, these programs enable only one user at a time to access a file—a condition known as "file locking." File locking is inappropriate for a data base that requires frequent input from different users. A file-locked data base denies everyone else access until the user in possession of the lock completes his or her task and exits the file. In a data base file that permits concurrent access, record locking and key tree structure protection are necessary to safeguard the data base from corruption.

Consider the inventory control nightmares that Consolidated Bottle Caps would encounter under concurrent access without record locking. Suppose Smitty, a clerk, calls up a parts inventory record so he can reduce the total bottle cap count by 30; Moe, another clerk, calls up the same record but wants to add 10 bottle caps to the count. Smitty updates the record to the disk, and Moe does likewise shortly thereafter. The outcome of these two transactions should result in a net decrease of 20 bottle caps from inventory, but instead, Moe's update writes over Smitty's, effectively voiding it. Based on the numbers, Consolidated believes it has 30 more bottle caps than actually exist.

Record locking would prevent Moe from modifying a record that Smitty was using; the record would be unlocked once Smitty moved on. *DATASTORE:lan*'s record-locking feature would not prevent Moe and Smitty from concurrently reading the same record, although if Moe were the second user to attempt a read, he'd receive a message that the record

Table 1: Multiuser data managers at a glance

	DATASTORE:lan (Software Connections)	reQuest (System Automation Software, Inc.)	Informa (Unlimited Processing Inc.)
Data base size	32MB	133MB	8MB
Record size	16,384 bytes	4096 bytes	8190 bytes
Records per file	unlimited	65,000	65,000
Fields per record	512	255	8190
Pages per data base form	15	5	255
Key fields	16	16	50
Simultaneous users	16	dependent on LAN operating system and hardware	dependent on LAN operating system and hardware
Assigned users*	127	unlimited	unlimited
Files open concurrently	15	100	unlimited

* Maximum number of user names and passwords monitored

was in use. If, however, Smitty updated the record and exited, Moe would receive a 'record locked' message were he to attempt an update immediately. The procedure requires that he exit the record, reenter it—which retrieves the newly updated record—and then continue his business.

Waving the Flag

The responsibility for record locking does not belong solely to the application program. Although no network operating system provides automatic record locking, virtually all include a "semaphore," a tool that flags a file or record as locked or unlocked. Semaphores help *DATASTORE:lan* perform disk allocation tasks and provide access synchronization logic (which converts simultaneous attempts at access into serial events that DOS can handle). Both capabilities enable multiple programs or users to update files concurrently.

Some LAN vendors imply that record locking in a network operating system automatically ensures concurrent access and data privacy for any software package. By themselves, however, semaphores are useless at protecting data; the application program must invoke the semaphore in order to lock records and keep data private. (Interestingly, a few network

operating systems include an automatic file-locking feature. A user of such a network who is running *DATASTORE:lan* or any application program that incorporates record locking must first invoke a command to disable the file-locking capability.)

DATASTORE:lan's dynamic maintenance of key trees is another major part of the record-locking process. Essentially, the program automatically updates the key tree structure when records are added, deleted, or modified. Structure protection insulates the key trees from damage by enabling only one user at a time to create, update, or delete a record. Without such safeguards, an entire data base could be quickly scrambled.

Who's Got a Secret?

Data privacy features are vital to the health and welfare of any multiuser DBMS, particularly because a LAN's shared hard disk may host confidential company data. All network users are not created equal, and it's the network system manager's charge to govern access to certain files, certain records within the file, and even certain fields within a record. More

Share and Share Alike

Wes Nihei

The boom in the local area network marketplace echoes an explosive surge in the development of application software designed specifically for networks. Joining *DATASTORE:lan* in the multiuser DBMS arena are *Informa* from Unlimited Processing and *reQuest* from System Automation.

Both of these relational data base managers offer concurrent access with file and record locking. Data privacy is provided through ten levels of security at the file, record, field, and transaction levels, and audit trails are created for each record. According to both manufacturers, the number of users permitted simultaneous access to a data base is limited only by the network operating system and the LAN hardware.

Informa was designed to be a multiuser data base for personal computers in a business environment. It uses a balanced tree structure to keep key field data in sorted order. The maximum data base size is 8MB, with 65,000 records allowed per file. *Informa* performs multiple sorts and retrieves data on 50 key fields.

A \$49 utility program called *LOADUP* loads ASCII text, DIF files, or any fixed-length record file into an *Informa* data base. In addition, a Programmer's Interface, priced at \$200, uses Pascal MT+ to create special applications. *Informa* supports IBM's PC Network, Orchid PCnet, Microsoft Networks, Novell Netware, Un-

germann-Bass Net/One, 3Com EtherSeries, Corvus Omninet, Davong MultiLink, and TeleVideo InfoShare.

reQuest, originally developed for IBM mainframes, uses ISAM (Index Sequential Access Method) to provide nonsequential indexed access to data. The company claims a maximum data base size of 133MB, with 65,000 records per file. Fields can be up to 80 characters in length, but you can enter longer passages of text by repeating the field name up to 25 times. A special function called Question Mark Processing lists the values or translations for field names for any user who may not be familiar with the data base. Information can be retrieved with multiple sorts on 16 key fields.

With its built-in Text File Conversion utility, *reQuest* will import and export files in ASCII, DIF, and SYLK formats. Unlimited Processing offers a command language interface for *reQuest* but no programmer's tool kit, on the premise that a non-programmer can do with the program virtually everything a programmer can do. *reQuest* supports Orchid's PCnet and 3Com's EtherSeries LANs.

The market for multiuser application programs is scarcely limited to data base managers. Scouting out the multiuser milieu is Lotus Development, which plans an enhancement to *Symphony* that will enable it to perform securely and efficiently in a networked environment.

frequently, the system manager assigns passwords and gives the yea or nay on who can read, write, update, or delete records within the data base (see Figure 2).

DATASTORE:lan covers the bases, providing data privacy at the file, record, field, and transaction levels. At the file level, access can be achieved via a system of user identifiers and passwords. Down a notch is privacy at the record level, where a manufac-

DATASTORE:lan makes a stab at enforcing data security. This is done primarily via encryption and dispersal throughout the disk of all user names and passwords.

turing manager, for example, might be restricted to reading only her employees' records. Down another notch is field-level privacy, which denies general access on one or more fields or restricts access by certain classes of users within a company. Personnel matters might well come under the realm of field-level privacy.

Data privacy is at its most exacting at the transaction level; it often signifies the most limited read-only access. Some users, for example, may need only to view data base records without modifying them; others will be granted selective read/write authority but not update and delete rights.

To determine the private or public status of a given data base element, *DATASTORE:lan*'s privacy system relies on a menu-driven security form and a set of relational operators (see Screen 1). These include mathematical symbols such as =, <>, <, and <=, plus character symbols such as *P* (prefix), *XP* (not a prefix), *S* (suffix), and *C* (character string). The result is what the company calls field masking. The data base creator might, for example, key in = *QA* before a department classification field, indicating

"allow the user to see only those records equal to Quality Assurance departments." An *XP DOD* located on an account field might mean "allow the user to see only those records not beginning with the accounting prefix *DOD* (Department of Defense)." Records can be omitted from view based on data held in multiple fields, not merely a single field.

Imposing field-level privacy requires the single character *X*, which tells the program to "cross out" the given field. In Screen 1, an *X* placed before the salary and birth date fields would restrict certain users (selected by the data base creator) from viewing those fields.

Privacy in a shared environment is a slippery issue, however, and the methodology for *DATASTORE:lan*'s delete authority is not airtight. Permitting someone update authority but forbidding delete authority doesn't necessarily achieve its aim: the "no delete authority" designation simply disables the Erase Record command assigned to a function key. The result is that an ill-intentioned user with update authority could erase data in every field in a record one at a time, effectively deleting the entire record.

Hacking Around

Data privacy techniques aren't much good if the network user gains access to the data base through DOS commands. Joe MacHacker might decide to increase his salary by a few decimal places, search out a password, change parts numbers in an inventory, or—shudder—trash several key data bases in the wake of a dismal performance review.

All networks must grapple with ways to prevent unwanted access to a data base through accidental or intentional circumvention of the application program. Once a user is at the operating system level, the application software can do very little to prevent tampering through the back door. The DOS DEBUG program provides the classic means of entering a file, automatically searching for a particular hexadecimal or ASCII data string, changing bytes, and generally gumming up the works (see "Program Patchwork," *PCW*, March 1985). Other programs in general use can read and write to any byte located on any volume, track, and sector of a disk.

DATASTORE:lan makes a stab at enforcing some semblance of data security. This is done primarily via encryption and dispersal throughout the disk of all user names and passwords. In addition, 2 bytes from each 512K block of data are reserved for an internally encrypted block checksum. If something outside the program forces a change in the block—such as data tampering or a power failure—the data base is rendered unavailable for use until the system manager can clear the problem with *DATASTORE:lan*'s Clearusr utility.

Clearusr verifies data base integrity and can display a particular block with a problem, but it cannot pinpoint the problem to specific bytes. Through a series of menu prompts, the system manager can update any faulty blocks.

In addition to encrypted passwords and tamper detection, *DATASTORE:lan* also creates a simple audit trail for each record. During normal data base operation, all new records and record modifications are stamped with the time, date, and name of the last user to alter the record. In essence, an audit trail is an automated fingerprint system that remembers who last touched the record.

What Else Is in Store?

The emerging multiuser DBMS market is helping unleash the power inherent in local area networks. For too long, the old saw has applied with a vengeance: hardware must continually await appropriate software. Concurrent access, data privacy, data security, prodigious storage capacity, and optimized performance remain an elusive but essential combination for PC LAN application packages. Single-user DBMSs can't perform safely or efficiently under in-

Name:

Address:

City:State:Zip: -

Phone: () - SS#: - - Birth date: X / /

Hire date: / / Employee #: Marital status: X

Department: = Sales Start salary: X \$00000 Current salary: X \$00000

Press <Esc> to select a command, or use function keys

F1-Help F2-X Out F9-Continue F10-Go Back

Choose =, <>, <, >, <=, >=, P(refix), XP, S(uffix), XS, C, XC, or X

1 B:EXAMPLE2 UTILITY

Record privacy

Field privacy

Screen 1: The data base creator or the system manager can limit access to fields or records by using a data privacy utility. In this example, the user is not allowed to view the birth date, marital status, or

any other field marked with an "X"; the user can access only those records that have "sales" written in the department field.

tensive shared use conditions. Neither can single-user DBMSs be ported to a multiuser environment; many are makeshift, either ignoring or not fully implementing record locking, data privacy, and security features.

The next generation of network application software is likely to draw on data security features now common in minicomputer DBMSs. These data recovery techniques are known as "before imaging," "rollback," and "roll forward." Such capabilities can prevent data loss during a power failure or return a corrupted data base to an uncorrupted state.

On 8088/8086-based personal computers, such recovery features add overhead to the system, proving a drag on the DBMS. On the 80286 class of chips, however, recovery tasks can be performed without adding a significant burden to the data base. Accordingly, expect recovery features to make their mark in multiuser applications written for this new breed of CPU.

DATASTORE:lan represents a new wave of LAN applications. It's a largely successful attempt to build a multiuser DBMS from the ground up, respecting both network and data management needs for data accessibility, reliability, and integrity. LAN software is surely a wave capable of delivering network users safely to shore. ☸

Brad Baldwin is a partner at Sheehan/Baldwin/Campeau Communications, a high-technology writing firm in Fremont, California. He served with IBM and Osborne Computer in engineering and technical support positions.

(continues)

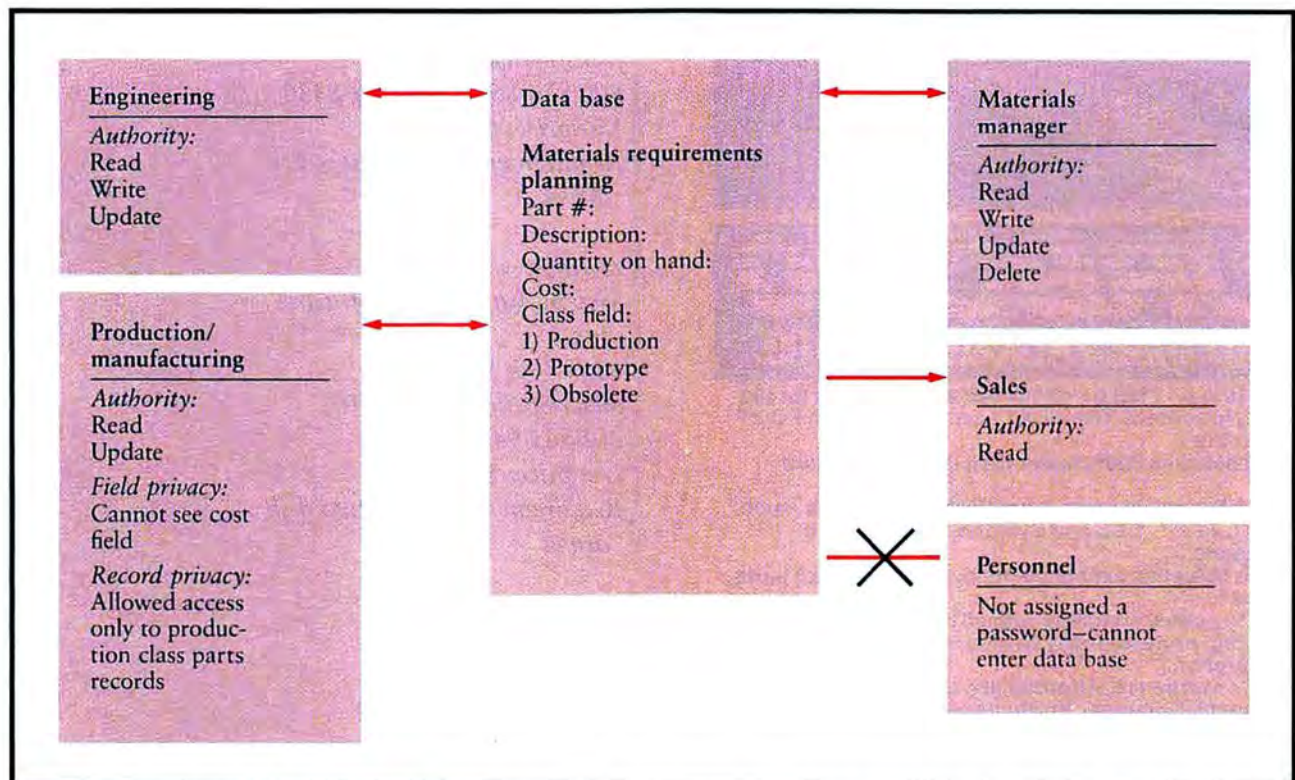


Figure 2: Sample MRP data base illustrates multi-user data privacy: Different departments can be assigned various transactional authorities (read,

write/enter new records, update, delete), as well as file-, record-, and field-level access privileges.

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DATASTORE:lan

Software Connections

2041 Mission College Blvd.

Santa Clara, CA 95054

408/988-0300

List price: 5-user version with quick report \$945, with extended report \$1140; 16-user version with quick report \$1945, with extended report \$2140; extended report writer upgrade \$195; LAN:Datacore application development tool: 5-user version \$945, 16-user version \$1945

Workstation requirements: 256K, one disk drive (hard disk recommended for network)

Informa

Unlimited Processing Inc.

8382 Baymeadows Rd. #8

Jacksonville, FL 32216

800/874-8555, 904/731-8330

List price: \$599

Requirements: 256K, two disk drives

reQuest

System Automation Software, Inc.

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Silver Spring, MD 20910

301/565-9400

List price: \$1495

Requirements: 384K, two disk drives



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ON-SCREEN CALC	BUILT-IN	MUST WRITE PROGRAM	MUST WRITE PROGRAM
FORMS OUTPUT	BUILT-IN	MUST WRITE PROGRAM	MUST WRITE PROGRAM
DATE ARITHMETIC	Y	Y	N
DATA TYPES	DYNAMIC	FIXED	FIXED
COLUMN TOTAL OPERATOR	Y	N	N
QUERY BY EXAMPLE	Y	N	EXTRA
MAX FILE SIZE	4 MB	OPEN	OPEN
MAX RECORD SIZE	4000	4000	1530

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Phone _____ Signature _____

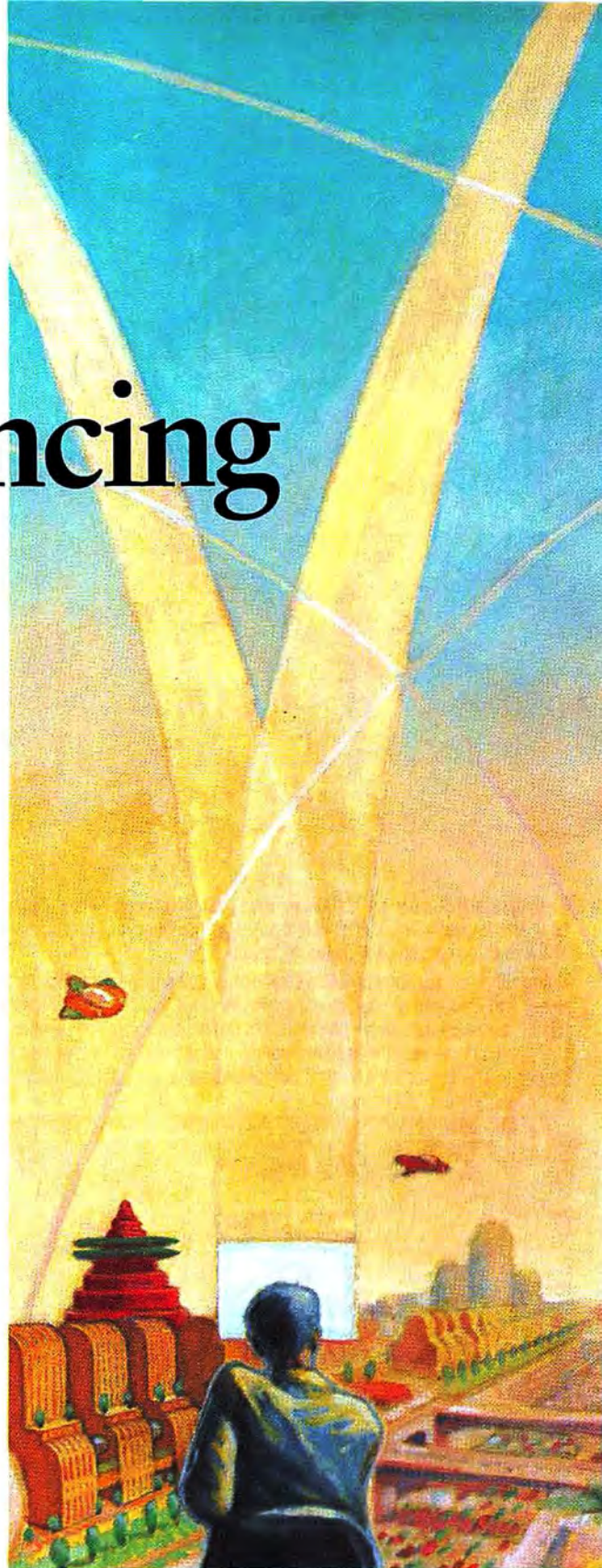
Tactics for Teleconferencing

Teleconferencing combines the flexibility and economy of electronic mail with the direct communication of a conference call. An effective teleconferencing system can make the PC the most cost-effective communication route to headquarters and around the world.

Lisa B. Stahr

When a group of Bechtel International employees went to Papua New Guinea to build a gold mine, they took along an unusual tool: a computer conferencing system. Rather than communicate via telephone or Telex, which Bechtel brass deemed too time-dependent and costly, the team relied on their personal computers to exchange messages and reports with co-workers at corporate headquarters in San Francisco. The Ok-Tedi Gold Mine was finished faster and more economically than planned, and project managers cite the efficient communications as a key to the project's success.

The term *teleconferencing* has been used to describe a broad range of business communications systems, but true teleconferencing systems can accommodate a number of people on line simultaneously and send stored-and-forwarded messages. The most





sophisticated systems allow conferences on several levels; a main conference can include subconferences, each with different participants. Some systems have data base management capabilities that allow participants to search for messages by contributor name, date, or time and to print a record of each conference. Most systems include an on-line work space and a simple word processor for message preparation. Several levels of security are offered to ensure the confidentiality of communications.

If the Bechtel workers in New Guinea had come up against a problem that only experts in San Francisco could remedy, without a teleconferencing system the company would have had two choices: fly the experts to the site or arrange for a conference call to New Guinea. In the second case, headquarters

Not every business can profit from a full teleconferencing system; effectiveness depends on the business's size and telecommunications habits.

would probably have needed to send supporting documents by express mail. Both options would have been expensive.

A teleconferencing system, though, provides a third option. Assuming a main conference (maybe entitled "Project Ok-Tedi") was already set up, Bechtel could then create a subconference devoted to the specific problem (perhaps called "Uncontrollable Seepage") and arrange for the experts and the on-site personnel to communicate on line. In a give-and-take exchange, the workers could describe the problem in detail, including actual figures and even diagrams; the San Francisco staff could ask questions about methods, geography, geological conditions, and equipment.

The experts in San Francisco could then research the problem and brainstorm with associates. When they found a solution, they could send the information via the network. The workers in New Guinea would check the subconference "Uncontrollable Seepage" to find detailed instructions awaiting

them. Over the course of the project, on-site personnel could periodically search the conference data base by contributor name to find any new messages from specific personnel, or by date to refer to a past message.

Choosing the System

At the center of any teleconferencing system are a host computer and software that together store, retrieve, and disseminate the information that callers submit (see Figure 1). The computer may range in size and power from an IBM PC XT to a minicomputer or a mainframe. The software is the most crucial factor in designing a teleconference.

Two kinds of teleconferences are available: those set up and maintained by teleconferencing services, such as InfoMedia's Notepad and The Source's Participate, and those you create in your own office. Creating and operating your own teleconference is usually less expensive than using a teleconferencing service. Signing up with a service, however, gives you more features and the comfort of knowing that your conference is in the hands of professionals.

Before you choose which type of system to use, evaluate your teleconferencing needs. How many people will participate in the conference? Will the participants be local or will they be calling from all over the country or the world? How many topics will be discussed? Will the participants make frequent contributions, say every day or two? Likewise, consider the importance of security. Will the conference include confidential or classified information? Will you want a record kept? Will you need a data base created from the contributed material?

Not every business can profit from a full teleconferencing system; effectiveness depends on the business's size and telecommunications habits. To find out whether your firm could benefit from such a system, take a few minutes to complete the questionnaire in the sidebar "Do You Need a Teleconference?" If your communications requirements don't warrant the cost of a subscription to a teleconferencing service, a less sophisticated system, set up with PCs and an electronic mail program, might be in order.

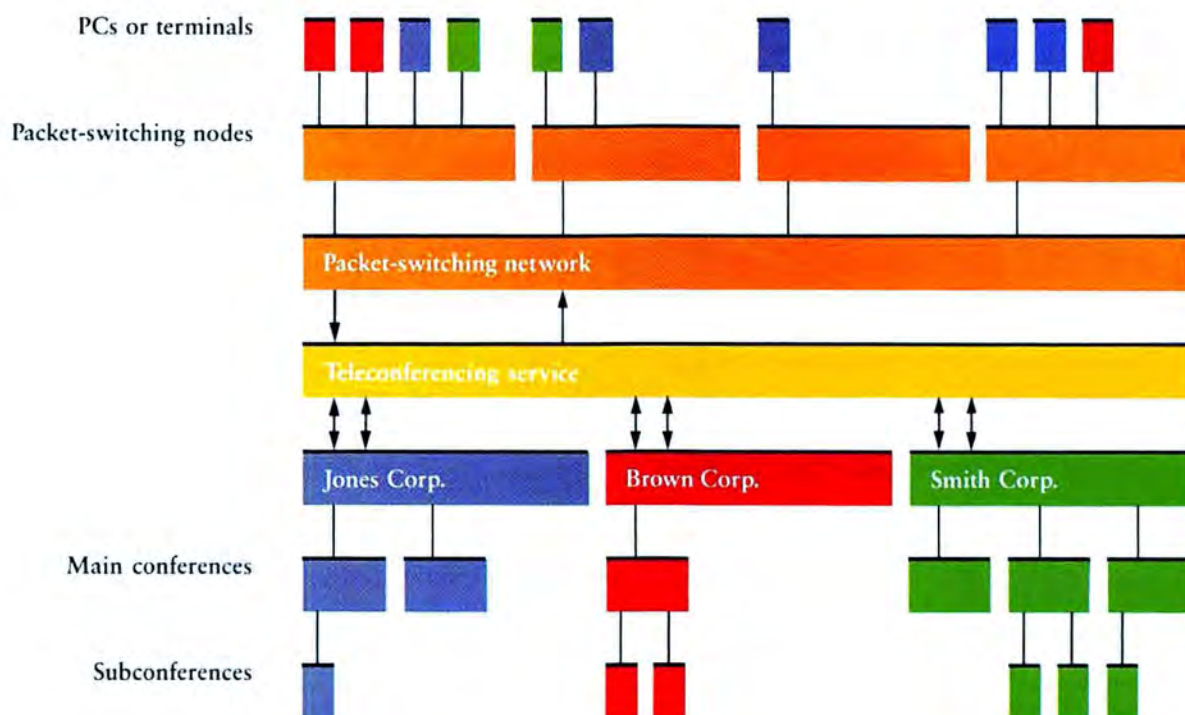


Figure 1: Remote callers use their PCs as links to a centralized teleconferencing service. Communications are routed through packet-switching nodes to the service's central computers, where the contributed information is organized and accessible. Private teleconferencing systems work in much the same way, except each company routes information to its own central computer, which generally has less sophisticated software.

Do-it-yourself systems range from basic electronic mail software, which provides unattended operation for sending and receiving messages, to integrated electronic mail packages, which may also include word processing and text data management features. PC-based teleconferences offer only a narrow choice of options. None allow real-time conferencing. Few include a searchable data base, and some can't save messages for more than two days. Most have fairly loose security, a flaw you can't afford if your discussions are confidential. To acquire the full range of teleconferencing features, including on-line interactive teleconferencing, you'll have to subscribe to a teleconferencing service.

■ Teleconferencing Services

Each of the major teleconferencing services has an area of specialty: Notepad is business-oriented, geared specifically to the project management and operational requirements of a company; Confer, from Advertel Communications, caters to government agencies and associations; New Jersey Institute of Technology's Electronic Information Exchange System (EIES) appeals to academic and computer-oriented users. Participate, from The Source, is the least esoteric of the teleconferencing services, primarily because it was developed to serve the long, multifaceted list of Source subscribers.

Each of the major teleconferencing services provides all the features necessary for effective teleconferencing. In addition to electronic mail and real-time conference capabilities, they can tabulate votes cast during conferences.

The services vary, however, in a few important respects. Notepad and EIES allow 36 and 40 conferees on line at once, respectively, while Confer per-

mits 350 and Participate, none. (There is no on-line communication within Participate; callers must use The Source's Chat mode to talk on line.)

Likewise, the services differ in the amount of data security they offer. Participate and Confer, designed to let users move easily from one conference topic to another, are easier to breach than EIES or Notepad. All incorporate several levels of password protection. Notepad and Confer offer encryption as

An important factor in deciding which service is best for you is the computer expertise of the people who will use it.

well. EIES allows the conference leader to program up to ten questions that participants must answer correctly in order to join a conference. For example, "2 + 2 = ?" might require the answer "387"; any other answer would indicate a possible intruder.

Another important factor in deciding which service is best for you is the computer expertise of the people who will use it. Are your conference participants computer novices? If so, EIES's technical bent may scare them away, whereas Participate or Notepad, systems designed to be used by computer neophytes, may be inviting.

Counting Costs

For all the pluses that a teleconferencing service offers, there is one big minus: the bill. Costs range from a low of \$7.75 an hour (Participate in nonprime time, using a 300-bps modem) to a high of \$60 per hour (Notepad). Also take into account sign-up fees (anywhere from \$100 to \$1000) and packet-switching network access charges (\$2 to \$25 per hour). One Notepad client estimated that a system would cost his company \$5000 a month, with 80 participants logging on every two days, for a total of 30 minutes on line per person per week. That may seem like a lot of money, but weigh it against your firm's monthly telephone, overnight delivery, postage, and travel expenses.

If you want a full teleconferencing system but don't want to pay the hourly rates, you can license the commercial teleconferencing systems for use in-house. The Confer system, for Amdahl V8 minicomputers with the MTS operating system, can be licensed for in-house use for about \$25,000; EIES, the granddaddy of all computer conferences, is available for Perkin-Elmer Interdata computers at \$35,000; InfoMedia will let you use Notepad for \$50,000, for use with any DEC System 20 running the Tops 20 operating system; and Participation Systems, the creator of The Source's Participate, will license its teleconferencing for \$20,000 (\$10,000 for educational institutions). Participate runs on DEC VAX, Prime Series 50, and Honeywell DPS 6 computers.

As you can tell from the prices, only firms with serious teleconferencing needs (and minicomputers) should consider licensing a system. If your numbers are small (less than ten), and your participants are located near one another or their calls are infrequent, then a "do-it-yourself" system, set up with a PC XT or AT, might be the best teleconferencing vehicle, especially if you don't require any special features or security measures.

Software for PC Systems

Most teleconferencing services enable you to communicate with other conference members in real time, like in Chat mode on The Source or with CB simulation on CompuServe, and send messages through electronic mail. A PC-based system won't give you that option. However, Mary Evren, account manager for InfoMedia, points out that only 20 percent of Notepad's time is used for real-time communication; the other 80 percent is used for sending and receiving electronic mail (see "In Box Out Box" and "Electronically Yours," PCW, Vol. 2, No. 6, for a description of the features available in electronic mail software).

The closest you can get to a true teleconferencing system on the PC is by using an integrated electronic mail package like MIST+ from New Era Technologies (see "The Communicator's Tool Chest,"

Do You Need a Teleconference?

Here is a 5-minute evaluation test. Circle the number corresponding to the answer that applies to your organization.

How are messages being sent now?

- 1) Ordinary mail and face-to-face meetings.
- 2) Telephone calls.
- 3) Telex and telegrams.
- 4) No method fully satisfactory.

How much money could be lost if a typical message is lost or late?

- 1) Less than \$1000.
- 2) Between \$1000 and \$5000.
- 3) Between \$5000 and \$15,000.
- 4) Over \$15,000.

When you send a message, how many people need to see it?

- 1) Fewer than 5 people.
- 2) 5-10 people.
- 3) Over 10 people.

Where are the other group members located?

- 1) In the same building.
- 2) In the same city but different buildings.
- 3) In different cities but the same country.
- 4) In different countries.

What is the nature of the issues or information exchanged?

- 1) General ideas, not related to decisions.
- 2) Policy and high-level issues.
- 3) Technical support decisions, technical management.
- 4) Operational decisions.

What is the purpose of a typical message?

- 1) To keep others informed.
- 2) To request information.
- 3) To alert others to new developments or problems.
- 4) To make specific assignments.

When you send a message, how important is the reply?

- 1) Not important.
- 2) Nice to have.
- 3) Influential upon the outcome.
- 4) Vital to the project or group.

How important is it to have project information "on record"?

- 1) It would be better to keep most information private.
- 2) Some information should be recorded to facilitate tracking.
- 3) All information should be on record for better management.

Add up the values of the numbers circled. If your score is:

- 8-14 You do not need a teleconference.
- 15-19 A teleconference would be nice to have, but you can do without it.
- 20-24 Your organization could greatly benefit from a teleconference.
- 25-30 You have an acute need for a teleconference.

From the book Computer Message Systems by Jacques Vallee (McGraw-Hill, 1984).

PCW, Vol. 2, No. 11). *MIST+* combines electronic mail, word processing, and data base management functions. With *Conexus*, the program's optional teleconferencing module, you can easily set up a system that has many of the features offered by commercial teleconferencing systems. You can accommodate 900 participants and assign up to eight security access levels. The software is inexpensive for a teleconferencing system, but even with *MIST+* you can't chat on line. You have to call up the system, create and send a message, log off the system, wait for the message to be received and a reply to be sent, and then call up the system again to read your mail and send a response.

Another option is a bulletin board host system like *Hostcomm* from WBS and Associates. A host system lets remote users leave messages and access files on a personal computer. With the *PCE-Mail* and *Conference* options, *Hostcomm* sets up an effective teleconferencing system much like Participate, including an elaborate password system to ensure the security of messages.

■ Once the System Is Chosen

You might think that once you've chosen a teleconferencing system your work is finished. Not so. You must make arrangements within your company to assure the smooth operation of the system.

First, you need to ensure that every potential participant has the proper telecommunications equipment: a computer or terminal, a communications program compatible with the host system, and a modem, preferably one capable of operating at both 300 and 1200 bps.

If conference participants are scattered around the state, the country, or the world, you will also need a packet-switching network (Telenet, Tymnet, and Uninet are the top three). If you subscribe to a teleconferencing service, packet switching is provided. Packet-switching networks keep conference members' phone bills down by allowing conference access with a local call instead of a long distance call. The caller dials the local packet-switching number and keys in the appropriate access number. The net-

work then connects the caller to the host computer. The network—not the caller—pays the charges, and the network's charges will be lower than conventional long distance rates. Another benefit is that data transfer is faster with packet switching.

■ The Job of the Mediator

After the equipment and the software are in place, the structure and content of the conferences themselves must be decided. The job of shaping each conference usually falls to the *conference mediator*.

One of the mediator's first duties is to construct an agenda for the discussions, as for any business meeting. Past conferences have shown that the more goals a conference has, the more successful it will be. If you are using a professional teleconferencing service, the mediator can plan complex structures for conferences, with subconferences centered around each main conference. For instance, you may have a main conference entitled "Increasing Corporate Productivity," for discussing ways to boost company output, with subconferences for each department. Department members could continue to contribute to the main conference while participating in their department subconferences. The mediator must carefully consider how many subconferences to permit—especially if the company is using a teleconferencing service, since costs increase with the number of conferences.

The mediator also establishes a membership roster, including the names of all conference participants and the level at which each will participate. Some conference members might need access only to get information contributed by others, not to contribute information themselves. Those people would be assigned read-only status. Others who need to read and contribute would receive read/write privileges. Most teleconferencing services provide for several additional security levels. The mediator also decides which participants need to review past information and to pass private as well as public messages.

One of the mediator's most important jobs is to keep discussions on track: keeping comments pertinent to the appointed topic, editing the record when necessary, and encouraging reticent participants to contribute. Some conferences, says Evren, take off on their own and need a mediator only to pull in the

reins. In fact, one of teleconferencing's biggest problems is that people digress from the topic. An attentive mediator can prevent this from getting out of hand.

Choosing a teleconferencing system is only the first step in creating a successful teleconference. Thoughtful planning and tight control will ensure consistent participation and high-quality entries—and greater efficiency and productivity for your project. ●

Lisa B. Stahr is a freelance writer in Palo Alto, California, and the author of Communications for the IBM PC and XT (Simon and Schuster/PC World Books, San Francisco, 1985).

Software

MIST+
New Era Technologies, Inc.
2025 I St. NW #924
Washington, DC 20006
800/368-5787
List price: \$495, Conexus \$195
Requirements: 256K, two disk drives (hard disk recommended with Conexus), serial port, modem

Hostcomm
WBS and Assoc.
P.O. Box 2462
Fairfax, VA 22031
703/978-0866
List price: \$170, Conference and PCE-Mail modules \$80 each, \$125 for both
Requirements: 128K, two disk drives, serial port, Hayes Smartmodem

Services

Notepad
InfoMedia Corp.
801 Traeger Ave. #275
San Bruno, CA 94066
415/952-4487
Fees: initial charge \$1000, access to Tymnet \$7 per hour, usage \$60 per hour

EIES
New Jersey Institute of Technology Computerized Conferencing and Communications Center
323 High St.
Newark, NJ 07102
201/645-5211
Fees: membership charge \$75 per month; access to Telenet \$3 per hour nonprime time and \$9.50 per hour prime time, through special arrangement


Participate
The Source
Source Telecomputing Corp.
1616 Anderson Rd.
McLean, VA 22102
703/734-7500
Fees: initial charge \$100; usage \$7.75 (300 bps), \$10.75 (1200 bps) nonprime time and \$20.75 (300 bps), \$25.75 (1200 bps) prime time

Confer
Advertel Communications
2067 Ascot Rd.
Ann Arbor, MI 48103
313/665-2612
Fees: subscription available through Telenet for approximately \$20 to \$25 per hour

On-Line Search Strategies

Tapping into the immense store of data in electronic libraries can be an overwhelming experience, but a few basic search techniques help relieve data overload and improve search results.

Barbara Newlin

 A PC is a great deal more than a word processor, a financial analyzer, an expensive toy, or even a tax write-off. It is also an information conduit that can access huge amounts of data for you to browse through, interrogate, or manipulate. Connected to an on-line service, a PC can help you make strategic business decisions, gather statistics and marketing intelligence, research a doctoral dissertation, keep up with the news, plan your securities portfolio, read about that drug

your doctor just prescribed, or satisfy your curiosity about almost anything you can name.

Getting the information you want is a matter of finding the right service and data base. This requires some thoughtful preparation and a basic familiarity with informational data bases and the searching process. You also need to learn how to build an elementary search strategy. The following are some basic tips that should improve your results while you search data bases on many of the major on-line services.

The on-line searching process is interactive; you interact with the host system, trading questions and answers with the computer on which the data base is stored. Once you are connected to a data base, you enter a command requesting a search for a particular word or phrase. The host computer responds, telling you how many times that word or phrase

occurs. On the basis of that information, you may decide to add more terms or combine the terms in some way. The process is repeated back and forth until you find the information you are looking for. Then you read, download, or print the data; end the search; and leave the system.

Searches can be performed with varying levels of sophistication. For example, you could perform a very simple search in the PTS PROMT (Predicasts Overview of Markets and Technology) data base by entering the single word *videotex*. Or you could locate information on U.S. sales and consumption data for personal computers with the command:

S PC = 3573098(L)EC = 65(L)CC = 1USA

These codes for microcomputers (3573098), sales and consumption (65), and country (1USA) can be found in the Predicasts user manual.

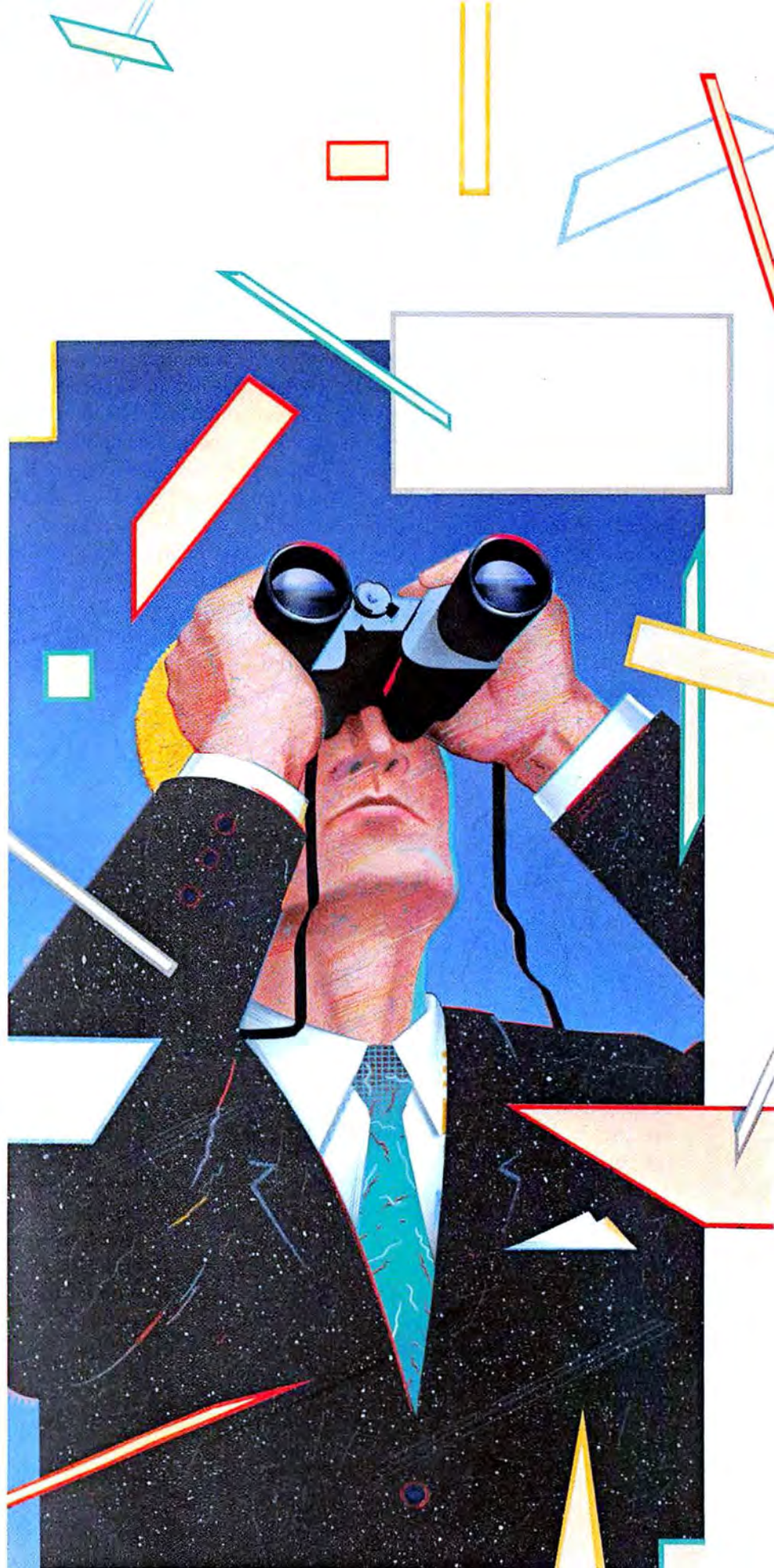
Every on-line service has a set of basic commands that allow you to retrieve and manipulate information in a simple, straightforward manner. In addition to these elementary commands, there are

advanced commands that enable you to do more refined, complex, or time-effective searching. They are not essential but are rewarding to use when your skills improve. Meanwhile, you can do a perfectly adequate search if you have a good grasp of the basic commands that allow you to select a term, combine terms, and display or print the information you find.

■ Boolean Operators

Aside from simply entering a single term, the most basic technique of on-line searching is combining terms or sets of retrieved information by using three words: *AND*, *OR*, and *NOT*. These words are also known as Boolean operators, taken from the system of logical mathematics known as Boolean algebra.

The function of Boolean operators is illustrated in the following search example. Let's say that you're an accountant interested in reading about accounting applications for microcomputers. You de-



cide to search the ABI/INFORM data base, which covers hundreds of business and management journals. After logging onto Dialog Information Service, one of six services on which ABI/INFORM is available, you enter **B15** (for "begin file 15," the identifying number for the data base). Once in the data base, you select the term *microcomputers* as a subject descriptor. The Dialog computer then roams through ABI/INFORM, searching for all occurrences of the descriptor *microcomputers* and shortly returns with the message in Screen 1.

This message tells you that there are 2016 records in the data base to which the descriptor *microcomputers* has been assigned and that they have been assembled into a

workspace identified as set 1. (A record is a single unit of information in the data base, usually a reference to an article or some other type of publication.) If you want to display or print all 2016 records, your search is finished. However, it is likely that you want to make the search more specific. Perhaps you decide to limit the search to accounting applications. You can add this new concept by selecting the subject descriptor *accounting*, creating a second set. Next you combine it with the first set by using the AND operator, creating a third set that represents the intersection of sets 1 and 2. All records in this third set contain

both of the terms you've selected: *accounting* and *microcomputers* (see Screen 2).

If you want to exclude articles on software, you could select the descriptor *software* as set 4, then use the NOT operator to eliminate it in set 5 by combining set 3 NOT set 4. All the records in set 5 contain the descriptors *accounting* and *microcomputers*, but none contains the descriptor *software* (see Screen 3). Adding the concept of accounting reduced the number of records from 2016 to 42. Eliminating software reduced it again to 28.

The OR operator is used when you want to expand a set to include various terms that express the same idea. For instance, the concept of accounting could be expressed with words like *accoun-*

```
File15:ABI/INFORM - 71-83/Dec
(Copr. Data Courier Inc.)
Set Items Description
-----
? S MICROCOMPUTERS/DE
    1 2016 MICROCOMPUTERS/DE
```

Screen 1: A simple search in Dialog's ABI/INFORM data base. The system responds that there are 2016 records in the data base with the descriptor "microcomputers."

```
File15:ABI/INFORM - 71-83/Dec
(Copr. Data Courier Inc.)
Set Items Description
-----
? S MICROCOMPUTERS/DE
    1 2016 MICROCOMPUTERS/DE

? S ACCOUNTING/DE
    2 6506 ACCOUNTING/DE

? C 1AND2
    3 42 1AND2
```

Screen 2: After you combine the "microcomputer" search in Screen 1 with a search for "accounting" and then use the AND operator, Dialog responds with a listing of 42 records that cover both subject areas.

tants, accountancy, or CPAs. You could select each of these terms and connect them with OR to create a larger set of records that contain any of the terms. A record containing more than one of the terms will be counted only once. Including these alternate terms in the search strategy retrieved 11 additional items, bringing the total to 53 (see Screen 4).

The function of each operator is illustrated by the use of the Venn diagrams in Figure 1. Each circle represents a search term, and the shaded areas represent the results of combining the terms with a given operator.

Choosing Search Terms
Once you select the data bases that you need, you must develop a search strategy. To begin this process, ask yourself: What exactly is my question? What words can be used to express its key concepts?

The first decision you must make is how narrowly to focus your question. There is a trade-off in searching between high recall (finding lots of information) and high precision (finding relevant information). The more specific your terminology, the higher the precision will be. The more general your terminology, the higher the recall will be. If your terms are too general, you'll retrieve too many references, many of which will probably be irrelevant. For in-

stance, if you want to read about solar heating for swimming pools, don't try to search a category as broad as *solar energy*; look for *solar heating* instead. If you're interested in direct mail marketing, avoid the general term *marketing* alone—it's too broad. Instead, combine it with *direct mail*. Avoid searching big concepts of which your topic is one small part.

On the other hand, if your terms are too specific, you won't get enough information and you may miss items of potential interest. Say you want to find market data on potato chips and pizza: don't limit your search terms to *potato chips* and *pizza*—try searching the broader terms *snack foods*

File15:ABI/INFORM - 71-83/Dec (Copr. Data Courier Inc.)		
	Set	Items Description

? S MICROCOMPUTERS/DE	1	2016 MICROCOMPUTERS/DE
? S ACCOUNTING/DE	2	6506 ACCOUNTING/DE
? C 1AND2	3	42 1AND2
? S SOFTWARE/DE	4	4498 SOFTWARE/DE
? C 3NOT4	5	28 3NOT4

Screen 3: To exclude "software" from the search you can use the NOT operator. Here, NOT reduces the list from 42 articles to 28.

File15:ABI/INFORM - 71-83/Dec (Copr. Data Courier Inc.)		
	Set	Items Description

? S MICROCOMPUTERS/DE	1	2016 MICROCOMPUTERS/DE
? S ACCOUNTING/DE	2	6506 ACCOUNTING/DE
? S ACCOUNTANTS/DE	3	1393 ACCOUNTANTS/DE
? S ACCOUNTANCY/DE	4	54 ACCOUNTANCY/DE
? S CPAS/DE	5	604 CPAS/DE
? C 2OR3OR4OR5	6	7666 2OR3OR4OR5
? C 1AND6	7	53 1AND6

Screen 4: To expand the search you can use the OR operator to bring in articles tagged with other descriptors that pertain to accounting. The same method could be used with "microcomputers" to bring in the terms "PC" and "personal computers."

and *fast foods* as well. Records using those phrases are likely to contain data on potato chips and pizza along with other foods.

■ Synonyms, Truncation, and Other Variations

Most words or ideas have synonyms, which you must anticipate when you're formulating a search strategy. A search on genetic en-

gineering, for instance, should also include the synonymous terms *bioengineering*, *biotechnology*, and *recombinant DNA*, among others. A search in the National Newspaper Index using all these terms retrieved 135 more references than *genetic engineering* alone would have provided.

You must also consider variations in the form of a search term. You can allow for plurals and

other variant endings by truncating your search terms. Truncation means asking the computer to search for all words beginning with the string of letters preceding the truncation symbol. Each system has its own symbol for word truncation. It might be a colon (:), a dollar sign (\$), or a pound sign (#). In Dialog, it is a question mark (?). Typing *pollut?* would tell the computer to look for *pollute*, *pollution*, *polluting*, and so forth.

Use the truncation feature with care. If you try to search both the singular and plural of *car* by typing *car?*, you'll also get *care*, *cart*, *card*, and *carp*, along with many other words beginning with *car*. Most systems allow you to specify the number of additional letters after the truncation symbol.

You should also remember to include variations in spelling (such as the British *colour* and *flavour*), word segmentation (*antifreeze* and *anti-freeze*), or abbreviations (*EFT* for electronic funds transfer or *HPLC* for high-performance liquid chromatography). You might even encounter combinations of these variations, such as *videodisc*, *videodisk*, *video-disc*, and *video-disk*. In each case, a complete retrieval in a data base search depends on using all the variations. The number of hits (occurrences) resulting when the variations are combined with OR is usually larger than the numbers for the individual terms.

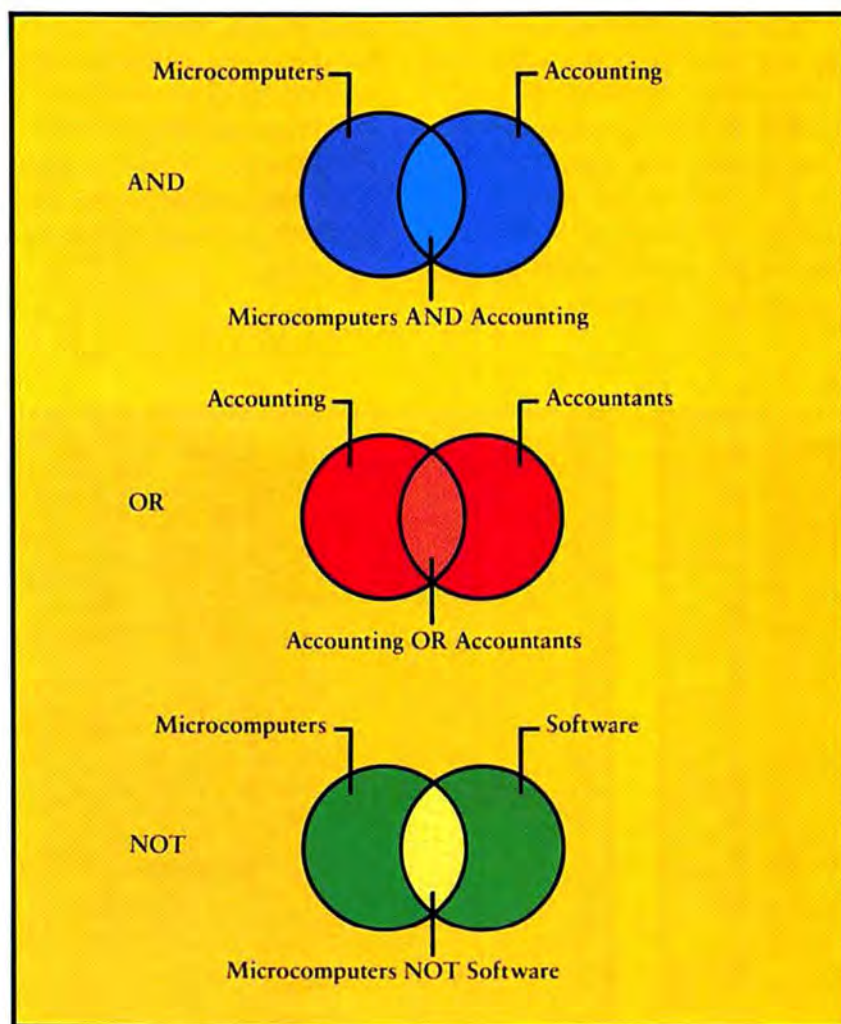


Figure 1: Venn diagrams illustrate the results of using Boolean operators. The AND and NOT operators usually narrow a search; the OR operator expands it.

Expanding

A good way to find search terms is to use a special technique that allows you to display words from the data base in an alphabetical array. Depending on which system you're in, this is known as expanding, rooting, or neighboring a term. When the system re-

ceives the appropriate command, it will display a group of words in the data base that fall on either side of your term. You can see all the words close to your term, with their variant forms and spellings, and you can select words directly from this display to be search terms in your strategy. This process is similar to that of a spelling checker that provides alternate spellings.

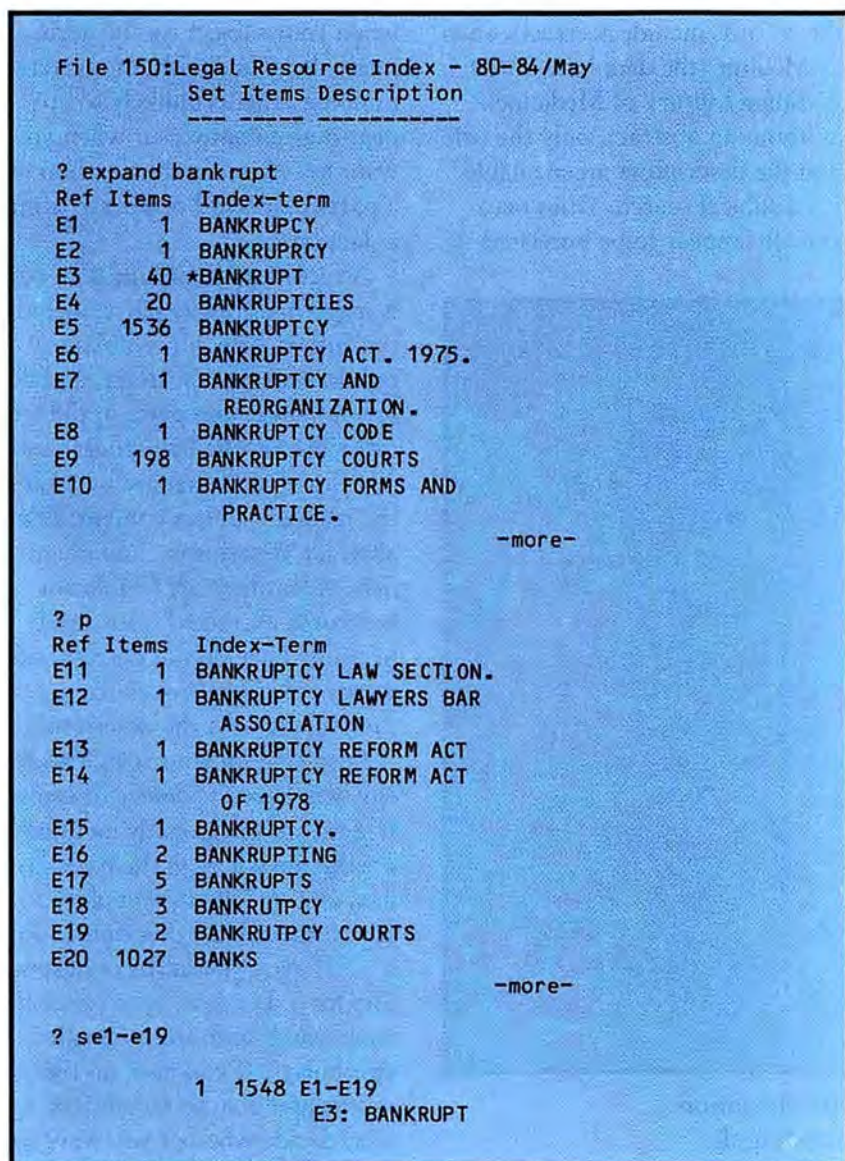
In the example in Screen 5, the Expand command has been used in the Legal Resource Index to find terms for a search on bankruptcy. The terms labeled E1 through E19 have been selected in an OR relationship to make up set 1.

Notice items E1, E2, E18, and E19, which are typographical errors in the data base. Without expanding on the desired term *bankruptcy*, you would never have known these items existed. Data bases frequently contain misspellings that can be detected and then retrieved using the Expand command.

Controlled Vocabulary

When you go to a library to do research, you probably have a topic in mind to look up in the subject card catalog. Let's say you're planning to build a house and want to look at books about houses to get some preliminary design ideas. You flip through the subject catalog and find not a single card listed under *houses*. When you ask for help, the librarian consults a large volume called *The Library of Congress List of Subject Headings* and finds that books about houses are cataloged under *domestic architecture*. The Library of Congress list is a "controlled vocabulary," a guide prepared for book catalogers so that they can use uniform terminology when they categorize books by subject.

The people who index on-line data bases also use controlled vocabularies so they can assign subject headings to material in a uniform, organized manner. These



File 150:Legal Resource Index - 80-84/May
Set Items Description

? expand bankrupt

Ref	Items	Index-term
E1	1	BANKRUPCY
E2	1	BANKRUPRCY
E3	40	*BANKRUPT
E4	20	BANKRUPTCIES
E5	1536	BANKRUPTCY
E6	1	BANKRUPTCY ACT. 1975.
E7	1	BANKRUPTCY AND REORGANIZATION.
E8	1	BANKRUPTCY CODE
E9	198	BANKRUPTCY COURTS
E10	1	BANKRUPTCY FORMS AND PRACTICE.

-more-

? p

Ref	Items	Index-Term
E11	1	BANKRUPTCY LAW SECTION.
E12	1	BANKRUPTCY LAWYERS BAR ASSOCIATION
E13	1	BANKRUPTCY REFORM ACT
E14	1	BANKRUPTCY REFORM ACT OF 1978
E15	1	BANKRUPTCY.
E16	2	BANKRUPTING
E17	5	BANKRUPTS
E18	3	BANKRUTPCY
E19	2	BANKRUTPCY COURTS
E20	1027	BANKS

-more-

? se1-e19

1 1548 E1-E19
E3: BANKRUPT

Screen 5: The Expand command displays an alphabetical array around your search term so you can bring in articles that contain misspellings and other variations.

controlled vocabulary terms are listed in the thesauri published by the data base producers to help you design your search strategies. For example, if you wanted to search the INSPEC data base for articles on computer-aided design, the INSPEC thesaurus would tell you to search under the search term CAD.

Controlled vocabulary words are also known as descriptors, since they describe the contents of a record. In most cases, the data base producers have read the item to be indexed and have decided

which descriptors best represent the record's content. The advantage of searching with a controlled vocabulary is the elimination of guesswork in terminology. You don't need to worry about the exact language someone may have used in writing about a topic.

Descriptors are particularly important in data bases that don't include abstracts, such as the National Newspaper Index, or in data bases for which only some of the records include abstracts, such as Medline (the data base of the National Library of Medicine). Without an abstract, only the title and the descriptors are available for a subject search. Titles occasionally appear to be unrelated to

the contents of an article, so the descriptors then become the only meaningful part of a record to use in a subject search.

Free Text Searching

The alternative to using a controlled vocabulary is free text searching, which simply means using any words or groups of words as search terms. This approach is effective when you are looking for an unusual subject, when your subject can be accurately described with unique terminology that is unlikely to appear out of context, or when you want to retrieve every mention of a particular word or phrase from a data base.

A record in an on-line data base is made up of many parts, including author, title, journal name, publication year, abstract, and descriptors. Certain parts of the record make up the *basic index*, usually those parts that are relevant to the record's subject content: title, abstract, descriptors, and identifiers. (Identifiers are significant keywords extracted from a publication. They do not correspond to any controlled vocabulary, and they supplement the descriptors.)

In setting up your search strategy, you have the choice of using free text to retrieve any mention of a word anywhere in the basic index, or controlled vocabulary to search the subject descriptors only. If you have a thesaurus of descriptors for a data base, you can start your search with the controlled vocabulary. If you have no thesaurus and plan to search free text, decide whether you want to

File15:ABI/INFORM - 71-83/Dec		
(Copr. Data Courier Inc.)		
	Set Items	Description

? S BANKING		
1	9772	BANKING
? S BANKING/DE		
2	6427	BANKING/DE
? S INCOME		
3	21187	INCOME
? S INCOME/DE		
4	5288	INCOME/DE
? S CONSUMERS		
5	6747	CONSUMERS
? S CONSUMERS/DE		
6	738	CONSUMERS/DE

Screen 6: Most on-line services provide the option of searching the entire basic index, including the abstract (free text), or searching the assigned descriptors only (controlled vocabulary). Searching with controlled vocabulary (/DE in Dialog) nearly always yields a smaller number of records.

search the entire basic index or restrict your search to just certain parts of it.

Looking for a word in the title is a good way to begin a well-focused search, especially if your topic is broad or uses common words that may appear out of context. A special suffix is required to search a word in a particular part of the basic index. To select a word in the descriptor section in Dialog, you add the suffix /DE. In ORBIT you add /IW; and in BRS, .DE.

Other suffixes restrict your search to other parts of the basic index. You can stack the suffixes if you want to search more than one part at a time. For example, entering **bicycles/DE, TI, ID** in Dialog initiates a search for the word *bicycles* in the descriptor, title, and identifier fields but not in the abstracts. This technique is useful for eliminating those items that mention bicycles somewhere in the abstract but are not primarily about bicycles.

In Screen 6, the broad search terms Banking, Income, and Consumers were entered as free text in the Dialog basic index and then as descriptors only. As you can see, the numbers of occurrences differ significantly.

In some systems, all fields (parts of a record) are identified with suffixes. You can select a term in any field just by adding the appropriate suffix to the term. In BRS, for example, the field (or paragraph, as

BRS calls it) for publication source is labeled SO. To search for information from a particular journal, you enter a keyword from the journal title followed by a period, the suffix, and another period—for example, **LANCET.SO..** In Dialog, however, if you want to search any part of a record not in the basic index, special prefixes are required.

Thinking and Typing

Despite training, reading your documentation, and carefully preparing your strategy before going on line, you may find that the actual experience of searching a data base is unnerving. On-line searching requires the ability to concentrate fully, to think quickly and creatively, to type accurately while both concentrating and thinking, and to plan ahead while you concentrate, think, and type. All the while you're aware that every second on line is costing you money. The only way you can ever feel comfortable with this process is to do it—often. ●

Barbara Newlin is currently involved in the design and development of data base access software products at Menlo Corporation in Santa Clara, California.

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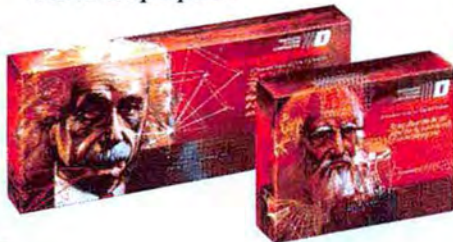
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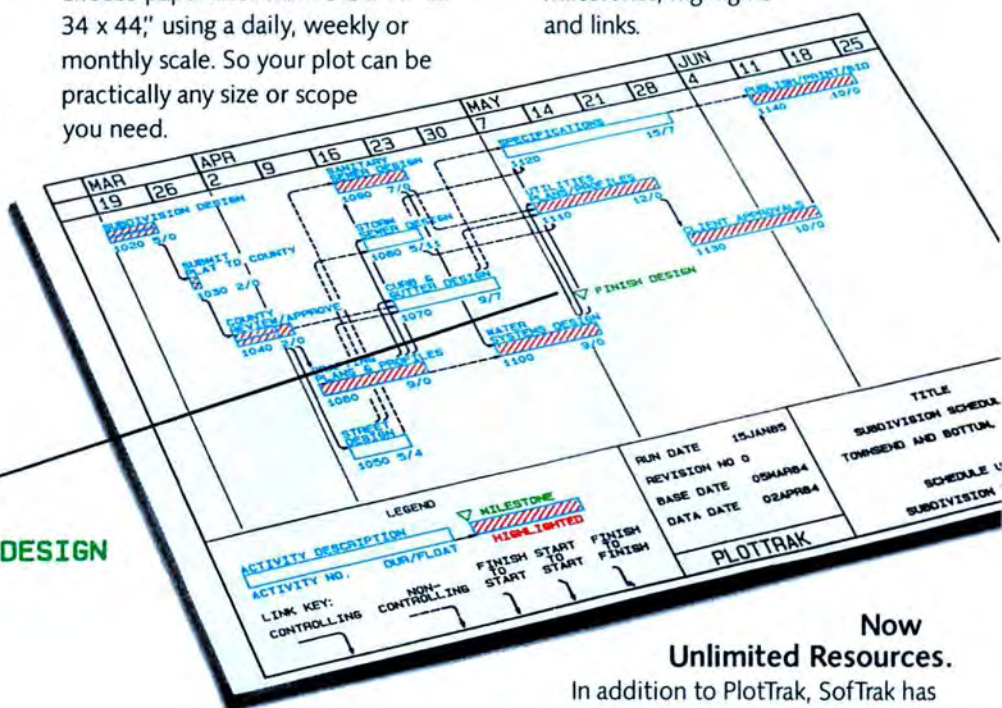
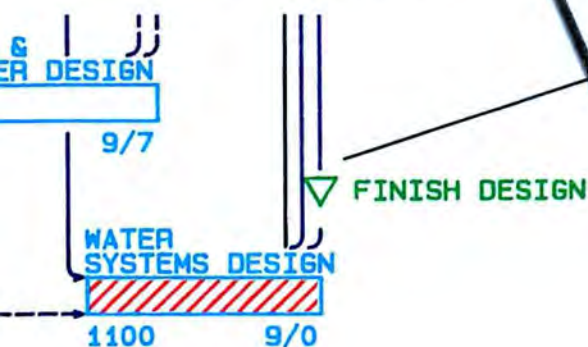
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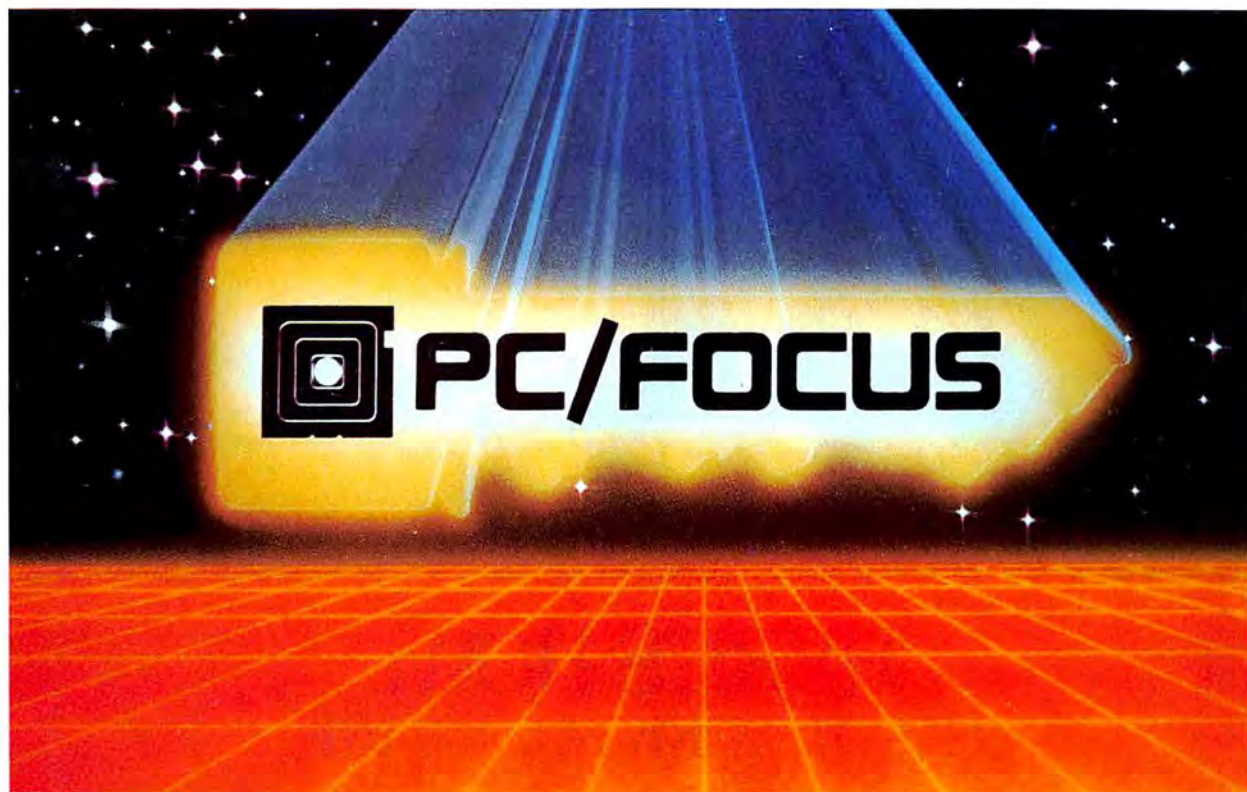
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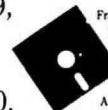
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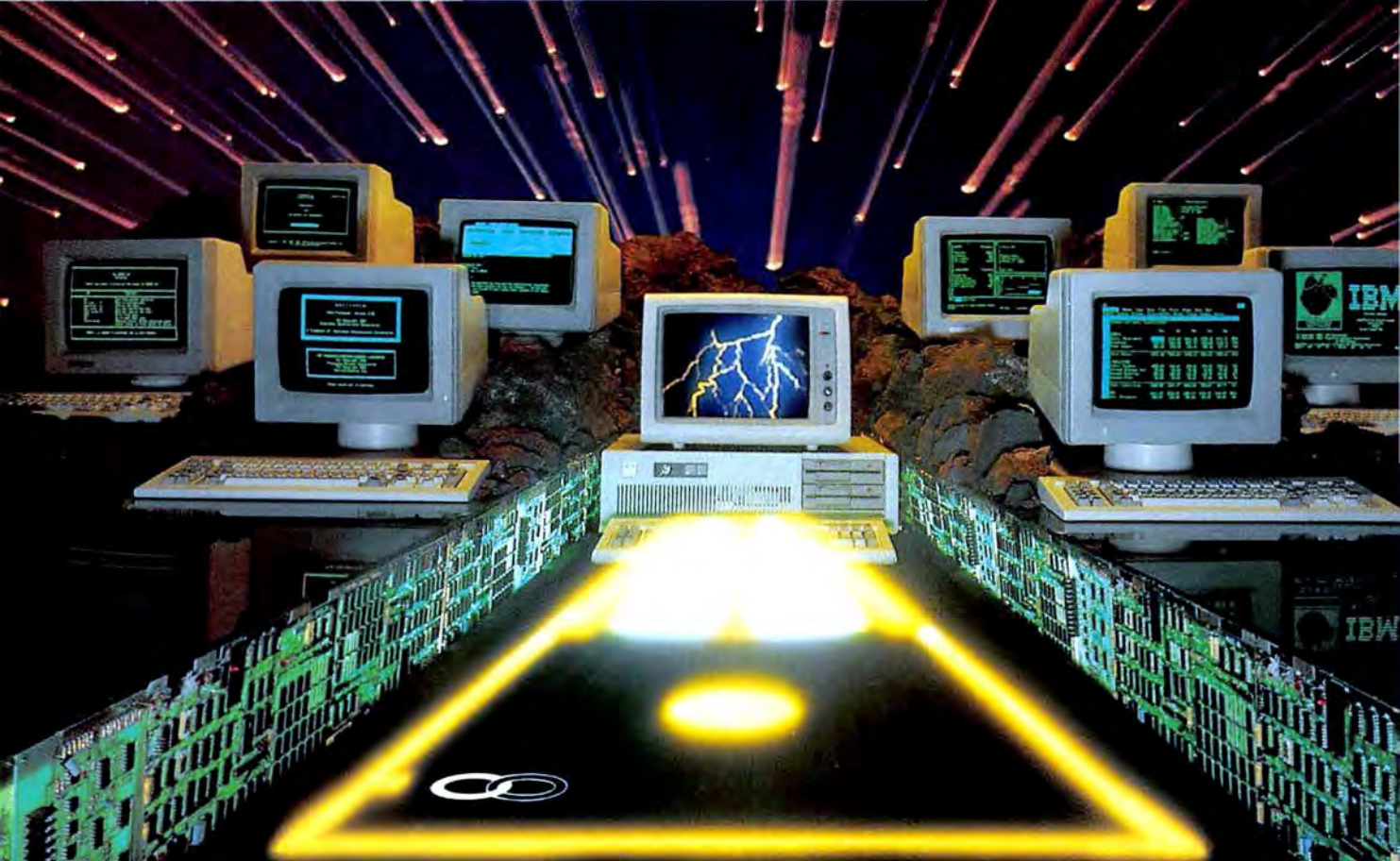
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Harry Miller

The Best of the Basics

PC World gets back to basics with a look at our best articles for beginners.

Computers and software are becoming more attractive and accessible, but getting started with a personal computer is still not easy. This special section, *Up and Running: PC World's Official Beginner's Guide*, is designed to make getting started a little easier. It brings together some of our best entry-level articles. Each article aims to get you better acquainted with an application that gets the work done on the PC. Most of this material has appeared in previous issues of *PC World*. When necessary, the articles have been revised and updated.

This special section addresses the problem of getting started in the same way that any beginner might: first, it explores word processing, then spreadsheets, then data management, communications, graphics, and finally programming.

As you become accustomed to word processing, you'll discover the freedom to write the conclusion before the introduction—if that's how your inspiration flows. When you make forecasts and projections on an electronic spreadsheet, you'll experience the satisfaction of exploring a wider

range of alternatives and seeing the results instantly.

Using data management software, you'll gain control of the data that passes through your business life and be able to organize those shoeboxes full of invoices and purchase orders you've been avoiding for so long. Once you learn to transform that box of chips and wires on your desk into a medium for communication, you'll open up a whole new world of on-line data bases, electronic mail, and electronic bulletin boards.

About graphics, they say a picture's worth a thousand words (in computer terms that's about an 8 to 10K file). But in a business situation, when a picture gets an important point across, it's also worth its weight in gold.

Finally, programming can provide useful direct access to the computer's resources and power and in the process be a challenging and rewarding logical puzzle.

Whether this package represents an exploration or a refresher course, we hope it will be a helpful reference in getting "Up and Running." ●

Word Processing Tips

Whether your word processor is a top-of-the-line powerhouse or a basic economy model, memorizing its commands is just the first step toward tapping your program's potential. Here's an informal guide for getting more out of your word processor.

Terry Tinsley Datz

As most personal computer users can attest, experience is a harsh teacher. Almost every new user has accidentally formatted an important data disk or issued a command that produced unanticipated anguish. Though trial and error teaches many lessons a user manual doesn't, there is a less painful way to acquire the fruits of experience. What follows is a compendium of tips, tricks, and surefire work routines that can get you up and running with your word processing program—and help you avoid some of the pitfalls.



Writing Without Tears

By eliminating most of the physical obstacles to writing and rewriting, word processors smooth the path that ideas must travel between conception and the printed page. But ironically, word processors can create psychological roadblocks. Does facing a blank screen numb your mind? Does a flashing cursor trigger panic instead of inspiration? Don't despair; you're not alone. In a recent *New York Times* interview, novelist John Updike admitted, "When I turn on the word processor, I feel I'm wasting electricity; with the pencil, I'm only wasting my own time."

Whether you are writing a novel or a business report, one way to sidestep these mental barriers is by typing whatever ideas, phrases, or sentences pop into your head. This "freewriting" approach is tailor-made for the word processor: you don't have to feed your computer fresh sheets of paper or endure the thudding rat-a-tat-tat of a typewriter. Chances are one idea will lead to another, and the theme or approach you've been searching for will begin to emerge. No matter how disorganized your thoughts are, they can always be sifted and reordered later.

Write now, edit later. Once you've struggled through the first few paragraphs, resist the temptation to stop and edit them. As you pause to collect your thoughts, it's natural to look over what has been written and decide that it needs reworking. Avoid



falling into this trap or you may never get past the first page. One way to prevent premature tinkering is to scroll existing text off the screen, out of sight; by eliminating this distraction you can concentrate on the writing at hand.

■ Editing

Use the insert mode. Most word processors offer two typing modes: insert mode, in which new typing pushes existing text to the right, and overwrite mode, in which anything in the path of the cursor is replaced. Although overwrite mode is handy for correcting typographical errors, if you forget to switch back to the insert mode you may inadvertently write over valuable text. It's safer to correct mistakes in the insert mode, by first entering the correction and then erasing the error. For fast typists, it is easier still to delete the entire word and reenter it.

When in doubt, don't delete. Reconsider before erasing hard-earned writing, particularly when a large block of text is involved. Instead of deleting the text, move it to the end of the file or to a separate scrap file for safekeeping. Even if your word processor has a Restore or an Undo command, remember that only the most recent deletion can be rescued.

Copy versus cut and paste. Some word processors move blocks of text in a "cut-and-paste" fashion. A block is marked, removed from the document, and placed in a special section of computer memory called a buffer. Once the block's new location is spec-

ified, the program fetches the text from the buffer and puts it back into the document. Unfortunately, if you get sidetracked in the middle of the cut-and-paste process and delete something else before the first block is recalled from the buffer, the block may be purged to make room for the more recent deletion. Not every word processor manages block moves in this manner, but you can avoid the problem altogether by copying a block of text, moving the copy to the desired location, and then deleting the original text.

Search and replace. If your word processor doesn't have a command that moves the cursor to a specific page or marker, it probably has a search and replace function that can be used to jump to strategic points in a document. Simply plant a seldom used symbol, such as \sim , &, or @, in a passage that you expect to revise. When you initiate a search for the symbol, the program locates it and displays the text you need to edit. Don't forget to search for and remove the symbol before printing the final version of the document.

The search and replace feature can be used to insert awkward or lengthy phrases that will appear frequently in a document. For example, if you constantly needed to refer to the @pmt(\$inarea1, ((\$inarea2/100)112),(\$inarea3*12)) ~ macro in a re-

port, you could save time by typing an asterisk in place of the phrase every time it was called for. Once the document was finished, you would direct the program to search for and replace every asterisk with this finger-bending phrase.

Automatically replacing a word or phrase throughout a document is a great time saver, but it can be risky. Computers operate in a literal manner, and a global search and replace may yield unexpected results. For example, if the program cannot differentiate between whole and partial words, changing all occurrences of *man* to *person* will also change *manipulate* to *personipulate*. A slower but safer approach is to confirm each replacement of a word within a document. This one-at-a-time setting is common to most search and replace functions.

Working With Windows

Many new word processors can divide a screen display into several partitions, or windows (see Figure 1). Depending on the program, a window can look into a different file from the one that is currently open or view data in a different part of the same file. Simultaneously viewing data from several sources can be a great convenience and time saver.

For example, updating a report may require referencing company data stored in a separate file. Instead of printing out the latter file, you can split the screen and display the report and the needed data side by side. More important, many programs permit you to move data from one window to another.

However, experience suggests windowing in moderation. While some word processors will partition a display into hundreds of windows, the realistic limit, given the size of most screens, is two or three windows.

Using a Mouse

A mouse allows you to point and click your way through a variety of word processing tasks—choosing menu commands, scrolling through a document, moving and copying blocks of text, and managing windows, to name a few. But a mouse does not always enhance the word processing experience. If the program does not smoothly and elegantly integrate mouse functions, a mouse's usefulness may be limited.

Typing skills are also a factor to consider. If you come from the hunt-and-peck school, a mouse will simplify tasks that require many keystrokes. On the other hand, if you type 90 words per minute on a bad day, a mouse may be superfluous. Chances are your keyboard speed probably falls somewhere in between these extremes, and a mouse may indeed be useful. A mouse is certainly handy with “user-friendly” word processors that make a user wade through a swamp of menus. Opening, moving, and sizing windows or moving blocks of text are other natural tasks for a mouse.

Don't expect pinpoint precision from a mouse unless you have exceptional hand-eye coordination. Until you're an experienced mouser, even highlighting text for block moves can prove frustrating and awkward. Some word processors add to the frustration by creating two cursors—one dedicated to the cursor keys and the other (often in the form of a pointer) to the mouse. When the mouse is not in use, park its pointer at a location outside the text. You'll be able to find it more easily and will be less likely to confuse it with the other cursor.

Formatting and Printing

Save page layouts. A document's layout, or format, is determined by its margins, tabs, page length, spacing, borders, and similar factors. Many word processors permit you to save these settings with commands embedded in the text of the original document. But format settings need not be restricted to a single document. For example, you can create files that hold only format commands. When a new document requires different tab settings—perhaps to accommodate a large table—you need only copy the format commands from an appropriate file.

Programs with limited abilities to save formatting information can benefit from a similar approach. *WordStar*, for example, always boots up with a de-



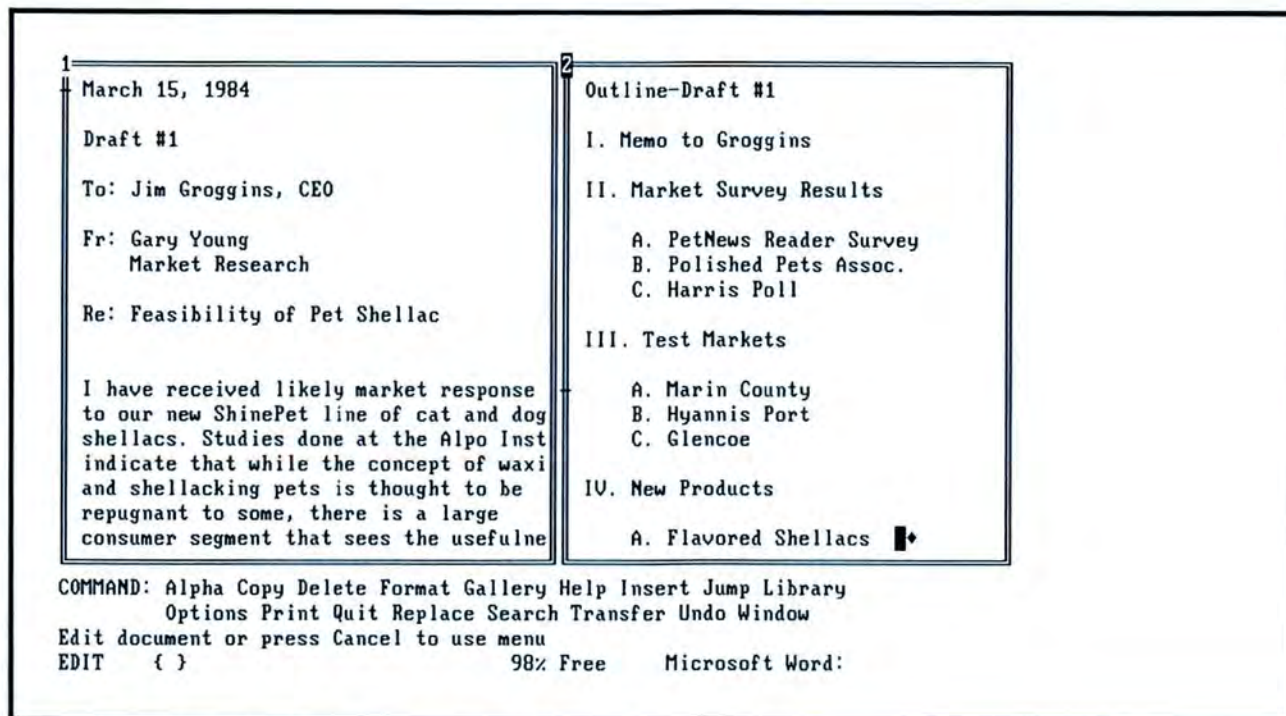


Figure 1: Windows look into other files or different parts of the same file. In this example, a report is written in the left window while the report's outline is simultaneously displayed in the right window.

fault document layout. You can overcome this restriction by typing a ruler line—the margin and tab settings—into a document. If the ruler line is prefaced by . . <Ctrl> -P <Enter> , the line will be embedded in the document, but it won't appear when the document is printed out. To activate this line and thus replace the current ruler, press <Ctrl> -O F. When the document is saved, any embedded rulers are saved as well.

Use controlled page breaks. Most word processors start printing a new page when the previous page has been advanced a given number of lines by the printer. Naturally, sentences or paragraphs may start on one page and finish on the next. This doesn't usually present a problem, but it can ruin a table or figure that must be viewed in its entirety. If your program offers a conditional paging feature, you can

eliminate this problem by placing the necessary commands before the table or figure in question. For example, if you place a conditional command immediately before an eight-line table, the program will start a new page if all eight lines will not fit on the current page. The same technique can prevent headings and subheadings from ending up at the bottom of a page.

Use restraint. Many word processors and printers are capable of special printing effects such as boldface, single and double underlining, and italics. When used judiciously, these special effects can grab the reader's attention; used indiscriminately, however, they may have the opposite effect (see Figure 2).

■ Handling Files

Smaller is better. The larger a file grows, the slower a word processor works. As you become familiar with a specific program, you will discover how large a file can become before performance is noticeably affected. Typical warning signs are sluggish scrolling and file saves that take an inordinate amount of time. Smaller files also offer the advantage of safety: In the event of human or mechanical failure, there is less to lose.

A little emphasis goes a long way. Handled with *taste and good judgment*, it can help direct and inform the reader. However, when someone feels that **EVERY word is important and **MUST BE EMPHASIZED**, the printed page starts to look like a battlefield and becomes difficult to read.**

Figure 2: "All things in moderation" is a thought to keep in mind when using special print features. Overuse can lead to visual abuse.

Save your work. In one sickening second, a power failure (whether by an act of God or man) can wipe out a day's work. Saving your work at frequent intervals is the best insurance against this catastrophe. The problem, of course, is remembering. Follow a routine and save the file every time you finish a new paragraph or reach the bottom of a page. Better still, set a timer or wristwatch alarm to go off every 15

Saving your work at frequent intervals is the best insurance against a power failure. Follow a routine and make it a habit to print out a file at the end of each editing session.

minutes. It's also a good idea to save a file whenever phone calls, visitors, or other distractions call you away from the keyboard. Last but not least, make it a habit to print out a file at the end of each editing session. A paper backup is better than none.

Check your disks. Before you use any disk, find trouble before it finds you. DOS comes with a simple diagnostic utility called CHKDSK that can tell you how much disk space is available and whether a disk contains bad sectors. Knowing both pieces of information can save you heartaches and hair pulling. If a data disk has 4000 bytes of space remaining, it prob-

ably won't pay to begin your next novel on that disk. Some word processors warn you of an impending space shortage and give you a chance to save your file. Others simply ignore the problem until you try to save the document. At that point the program may either delete an existing backup file—if one exists on the disk—or simply destroy all or part of your file.

A bad sector warning is also worth heeding. Though DOS will work around physically and magnetically damaged sections of a disk, the problem may spread, inhibiting the operation of the word processor or preventing document saves. If CHKDSK elicits a bad sector message, copy your files onto another disk.

Choose sensible file names. Although DOS is not generous when it comes to file name length—you're limited to 8 characters plus a 3-character suffix or extension—you can classify files in a clear and useful manner if you plan carefully. First, don't use cryptic names. A file name that seems logical today may be meaningless next week. Second, use a file extension to identify like documents. For example, letters might have the extension .LET, memos .MEM, reports .RPT, contracts .CON, and so on.

Answer DOS time and date prompts. Additional filing help is available if you respond to DOS's time and date prompts. DOS puts this information to good use in its file directory, displaying the time and date each file was last revised. Knowing that the file MEMO was written on a certain day at a certain time may provide the crucial clue to help you figure out what's in that mystery file.

Print disk directories. What's the quickest way to find a file stored somewhere on one of 30 disks? You could put each disk in a drive, issue the DIR command, and see what the disk contained. But it would be far faster and easier to read the directory printout that you've cleverly stored with the disk. To print a disk's directory, display the directory on the screen and press <PrtSc>-<Shift>; DOS sends a

snapshot of the screen to your printer. If your word processing program has a more elaborate directory or sorts file names alphabetically (as *WordStar* does), keep a printed copy of this directory with the disk also. If directory printouts are faithfully updated, your next search for a file could be much shorter.

Create special directories. If you require a more detailed record of disk contents, maintain a file on each disk to serve as an expanded directory. This file could list time spent on a document, remarks about its contents, and the initials of the person who last revised the file. Remember, though, that DOS won't manage this special directory—you have to create and maintain it yourself.

■ Spelling Checkers

Contrary to most manufacturers' claims, spelling checker programs are not proofreaders. A spelling checker won't spot words that are spelled correctly but misused or point out syntax errors. Remember too, a spelling checker is only as good as its dictionary; most dictionaries do not exceed 100,000 words and must be fine-tuned to recognize and accept the technical terms and proper nouns common to your discipline.

Add words prudently. Although this might seem obvious, words that you habitually misspell can slip into a spelling checker's lexicon. Even if you are sure of an entry's spelling, confirm it with a printed dictionary. Furthermore, add words sparingly—the larger the dictionary, the slower the spelling checker performs.

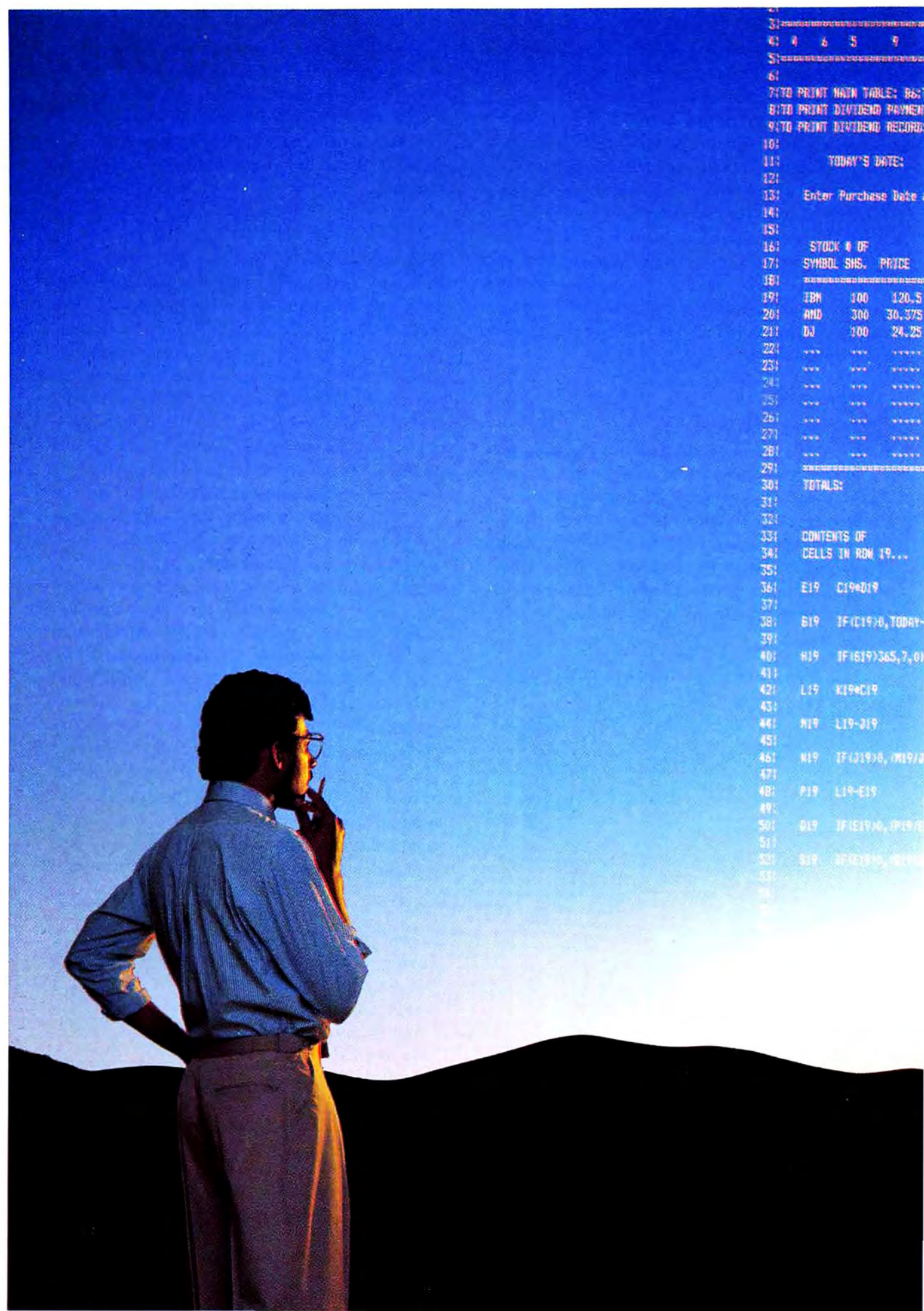
■ Merging

Merge creatively. Though grinding out form letters is the stock-in-trade of most merge programs, they can also perform other functions. For example, you can use a merge program to chain several files (separate book chapters, for instance) into one mammoth manuscript with continuous page numbering. Or if your word processor cannot queue print requests, you can string the documents together and print them in a batch instead of repeating the printing sequence over and over again.

Manage the data file. Some merge programs will start a merge from a specified location in a data file; others dictate that all entries in the file be merged. In the latter case, if the printer malfunctions or chews up a letter partway through the merge, you cannot back up and redo the last record. One remedy is to copy the remaining, unmerged portion of the data file to a new file and use that to finish the merge.

While the suggestions offered here are not all-inclusive, they can get you started on the path to simpler and saner word processing. Still, there is no substitute for experience, so don't be afraid to experiment with your word processor; discover its hidden strengths and find ways to tiptoe around its weaknesses. Just remember one rule: Always use a copy of your program and data disks in any experiment. ●

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3: =====
4: 4 6 5 9
5: =====
6:
7: TO PRINT MAIN TABLE: B6:
8: TO PRINT DIVIDEND PAYMEN
9: TO PRINT DIVIDEND RECORD
10:
11: TODAY'S DATE:
12:
13: Enter Purchase Date
14:
15:
16: STOCK # OF
17: SYMBOL SHS. PRICE
18: =====
19: IBM 100 120.5
20: AMD 300 30.375
21: DJ 100 24.25
22: *** *** *****
23: *** *** *****
24: *** *** *****
25: *** *** *****
26: *** *** *****
27: *** *** *****
28: *** *** *****
29: =====
30: TOTALS:
31:
32:
33: CONTENTS OF
34: CELLS IN ROW 19...
35:
36: E19 C19#D19
37:
38: B19 IF(C19>0,TODAY-
39:
40: H19 IF(B19>365,7,0)
41:
42: L19 K19#C19
43:
44: M19 L19-J19
45:
46: N19 IF(J19>0,(M19/J
47:
48: P19 L19-E19
49:
50: Q19 IF(E19>0,(P19/E
51:
52: R19 IF(B19>0,(Q19/
53:
54:
55:

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Introduction to Spreadsheets

An electronic spreadsheet can transform your fanciful financial speculations into the numbers you need to plot the future course of your business. A look at how this powerful tool works and what it can do for you.

Harry Miller

||||| As its name suggests, an electronic spreadsheet is simply the computerized equivalent of an accountant's worksheet. Like its paper counterpart, an electronic spreadsheet is a grid of columns and rows that enables you to organize information in a standardized, readily understandable format.

Spreadsheets can be used to perform almost any task that had previously been done with pencil and calculator. Spreadsheets are commonly used for preparing budgets, evaluating proposals, comparing alternatives, and measuring results. To these tasks the spreadsheet brings increased efficiency and productivity. Compared to pencil and calculator, the spreadsheet is faster, more flexible, and less error prone. Once you begin using a spreadsheet to make calculations, you will find yourself considering more options and forecasting further into the future because the spreadsheet will eliminate much of the tedium associated with accounting tasks, leaving you free for creative decision making.

Spreadsheet Grammar

The intersection of a vertical column and a horizontal row in a spreadsheet creates a “cell.” A cell can contain either a label (i.e., text) or a value (i.e., a number or a formula).

Formulas create relationships between values in specified cells. For example, you might want to add a column of numbers in cells B2, B3, and B4 and have the result appear in cell B6 (see Figure 1). To do that, cell B6 would contain a formula that depended on the values in the other cells. The formula might look like ‘+B2 + B3 + B4’ or ‘@SUM (B2..B4)’. Going one step further, you might want to add several column totals across the spreadsheet, perhaps to determine the annual total of the quarterly expense columns. The for-

When you type in a new value and press <Enter>, the change ripples through the model as the values of all the dependent cells are recalculated.

mula (in cell G6, which is the 7th column) to calculate the annual total would depend on the value of the cells to the left of it (cells B6 to F6). Formulas can be much more complex than simple sums; they can contain high-level financial calculations such as internal rate of return or intricate mathematical expressions such as logarithms or trigonometric functions.

The underlying concept of formulas is that they determine the value in one cell depending on values in other cells. Once you master this basic concept, spreadsheets are relatively easy to use. What’s important is learning to rethink and express business relationships in terms of values. For example, profit = income – expenses, or administrative expense = 15 percent of revenue. Once you have defined those relationships, you can analyze almost any situation that can be represented by numbers.

One of the reasons for the electronic spreadsheet’s popularity is that it presents and works with data in a tabular format that is similar to what most managers encounter in their daily work. But the true

magic of the spreadsheet lies in its ability to project and evaluate alternatives—the proverbial “what if” analyses. The principle of interrelated cells makes it easy to see the effects of changing assumptions immediately. When you type in a new value and press <Enter>, the change ripples through the model as the values of all the dependent cells are recalculated.

Common Features

Although programs vary, most electronic spreadsheets share a basic set of features. These features are implemented either by spreadsheet commands that usually affect large blocks of cells or by formulas that are tied to individual cells.

The following is a list of some of the most common spreadsheet commands.

Copy enables you to copy the contents of a cell (label, value, or formula) or group of cells into another cell or group of cells. Most programs automatically adjust copied formulas to reflect their new locations; that is, the relationships in the formula stay the same, only the locations change.

Delete removes the column or row at the current cursor position and makes the necessary adjustments to subsequent cell addresses.

Format controls the way in which individual cells, columns, rows, or blocks are displayed. You can usually specify the width of a column, the number of decimal places displayed, whether the text or numbers in a column will be right- or left-justified or centered, whether or not thousands will be separated by commas, and whether negative numbers will be preceded by minus signs or surrounded by parentheses.

Insert adds a row or column anywhere in the spreadsheet and automatically adjusts the cell addresses of all cells that move.

Load or File Retrieve fills the screen with a spreadsheet file that has been stored on a disk.

Move takes the contents of a cell or group of cells to a cell or group of cells at a different location or locations in the spreadsheet. Unlike Copy, Move does not leave a copy of the contents in the original cell or cells.

	A	B	C	D	E	F
1		Jan-Mar	Apr-Jun	Jul-Sept	Oct-Dec	Annual
2	Food	1200	1320	1452	1597	5569
3	Rent	2100	2100	2100	2100	8400
4	Utilities	450	495	545	599	2088
5		-----	-----	-----	-----	-----
6		3750	3915	4097	4296	16058
7						
8						

Figure 1: Simple spreadsheet relationships. Cells in row 6 show the sums of the rows above them, and cells in column F add the values of the cells to their left and display annual totals.

Print provides various methods for getting all or part of the spreadsheet onto paper.

Save places the current spreadsheet in a disk file.

Titles protects a row or column so that it is displayed at the top or the left edge of the screen, regardless of the manner in which the rest of the spreadsheet might scroll by.

Window splits the screen either horizontally or vertically so that distant portions of a worksheet can be viewed side by side.

A function common to most spreadsheets is @SUM, which is used to add a column or row of numbers. Most spreadsheet programs also include some higher mathematical functions, such as average, absolute value, square root, sine, tangent, cotangent, logarithm, and exponentiation. The @LOOKUP function finds values from a previously entered table—a very useful feature for tax calculations, for example. Financial functions such as internal rate of return and net present value are also common.

Advanced Features

As an increasing number of spreadsheet packages are adapted to take advantage of the PC's unique capabilities, many advanced features are becoming standard. Some software companies sell one program or a closely related group of programs that perform a variety of applications, such as spreadsheet, data management, word processing, business graphics, telecommunications, calendar, and project management. These "integrated" packages facilitate your natural thought processes. For example, a data manage-

ment problem or a spreadsheet question may come up while you are in the middle of a word processing file. With an integrated product you don't have to exit one program, remove the disk, put in a different application, and start up again. You merely place the first program on "hold," call up the other program on the screen, do your work, and then return to the first program. This integrated approach makes short work of exchanging data among various applications.

Some spreadsheets enable a user to redefine the meanings of certain keystroke combinations. These redefinitions, called macros, can be quite complex.

Several software companies now offer products that integrate applications at the operating system level. This means that you can use individual application programs from different software vendors and still have the convenience of moving easily from one application to the next while retaining the ability to transfer data among applications. IBM's *TopView*, VisiCorp's *Visi On*, Microsoft Windows, Digital Research's Concurrent PC-DOS, and Quarterdeck's *DesQ* are examples of such integrated "environments."

Some spreadsheets enable a user to redefine the meanings of certain keystroke combinations. Labels, formulas, and commands that would normally require many keystrokes can be stored as one- or two-

Code	Date		Amount	DATA TABLE FOR SUBTOTALS BY CATEGORY AND MONTH			
	Mo	Da		Code	Mo		
DEPT2	1	12	1000	51000	DEPT1	DEPT2	DEPT3
DEPT2	1	22	5500	Mo			
DEPT3	1	25	1000	1	0	6500	1000
DEPT1	2	3	3000	2	3000	4000	0
DEPT2	2	15	4000	3	1000	0	5500
DEPT1	3	18	1000	4	4000	0	7000
DEPT3	3	23	5500	5	5500	4000	0
DEPT3	4	16	3000	6	0	8500	1000
DEPT3	4	19	4000				
DEPT1	4	22	3000				
DEPT1	4	25	1000				
DEPT1	5	4	5500				
DEPT2	5	17	4000				
DEPT3	6	1	1000				
DEPT2	6	25	3000				
DEPT2	6	27	5500				

Figure 2: A 1-2-3 data table. The table calculates sums for each combination of variables (month and code).

key commands. These redefinitions, called macros, can be quite complex and can include long strings of commands with text or cell references embedded in them.

As you might imagine, keyboard macros can significantly save time. A keyboard macro may replace a very short but awkward cursor movement that is frequently used. If you have to enter data in the first and fifth columns of each row, a simple cursor-movement macro (e.g., {down}{left}{left}{left}{left} in 1-2-3 by Lotus Development Corporation) can be very helpful and satisfying.

In addition, key redefinition (via either the internal capabilities of the program or a separate keyboard macro program such as *ProKey*) can liberate keys that have several functions. For example, the cursor movement function of the arrow keys on the numeric keypad could be transferred to another part of the keyboard, freeing the numeric keypad for quicker data entry.

To date, 1-2-3 is the only program that has an automated data table feature. This impressive function lets you define a matrix of possible combinations of variables (such as the month and the code number for a given profit center, as in Figure 2) to be used in a model. The data table function runs through the spreadsheet model using each combination of variables in turn and reporting the results in the matrix.

Comparison Shopping

Although most spreadsheet programs perform the same functions, programs differ significantly in style and capability. Almost any of the best-selling spreadsheet programs will perform simple budgeting and projection tasks. But some spreadsheet programs approach these tasks in a manner that more closely matches the way you like to work. You should consider how each of the programs you look at handles the following features.

Command structure and menu style. Although most spreadsheets use the same basic commands, the method of issuing those commands can vary greatly. *VisiCalc* and *SuperCalc* display a prompt line of initials at the top or bottom of the screen that represents possible command choices; 1-2-3 uses a menu of full-word commands supplemented by a one-line description of what the currently selected command does or what choices are available at the next level. For flexibility, 1-2-3 also lets you issue commands by typing their initials.

On-line help. At its best, on-line help means that by pressing a key you can have access to one or more screens that explain the function being used and describe what you can do next. This type of context-sensitive help screen can save time that would have been spent flipping through a user manual. At the other end of the spectrum, a call for on-line help

would display a skimpy description with little (if any) information about commands that might be currently appropriate.

Data capacity per cell. If long labels are necessary or if an application requires especially long formulas or a data field must be longer than most spreadsheet data, the limitation on the number of characters that will fit in a single cell can make a difference. Maximum cell capacities range from as few as 80 to as many as 8000 characters. Capacity is different, by the way, from maximum column width. Some spreadsheets let you store more characters in a cell than are displayed.

Maximum spreadsheet size. Perhaps more important than cell capacity is the spreadsheet's maximum size, as measured by the number of columns and rows it can contain. Typical spreadsheet applications use small areas, but when you need a few more cells, size becomes critical. *VisiCalc*, *SuperCalc*, and *Multiplan* spreadsheets can encompass 63 columns and 254 rows. *1-2-3* worksheets can contain 256 columns and 2048 rows.

Absolute size specifications can be misleading, however. Values, labels, and formulas take up different amounts of memory. To fill every cell in a *1-2-3*

If a data field must be longer than most spreadsheet data, the limitation on the number of characters that will fit in a single cell can make a difference.

worksheet, you'd have to use only values (no formulas) and have a computer loaded to the brim with RAM (random access memory—the computer's main memory, consisting of chips in the system unit).

Programs also differ in the way they store blank cells. For example, *1-2-3* reserves enough memory to hold a spreadsheet whose size is determined by the cells furthest down and to the right that contain data, and it continues to reserve that amount of memory even after that data is erased. To visualize this, think of a blackboard with figures on it; even when the figures are erased, the blackboard continues to exist.

This means that to fill a worksheet of equivalent size, you might need much more memory for *1-2-3* than for some other programs.

Merging worksheets. Microsoft's *Multiplan* takes a different approach to spreadsheet size than does Lotus's *1-2-3*. Although *Multiplan* can use only 64K of user memory (RAM), its ability to link worksheets means that you can create "virtual" (or "conceptual") worksheets of almost unlimited size. When a large worksheet must be split into smaller ones, the resulting worksheets are either dependent or supporting. A supporting worksheet feeds information—in the form of a range of cells—to a worksheet called the dependent worksheet. Sales figures from a company's regional offices, for example, would constitute supporting worksheets; those figures can be gathered into a dependent worksheet that consists of a companywide quarterly sales summary. In this case, the whole summarizes the parts—and depends on those parts.

If a value designated for such a connection is changed on the supporting worksheet, the relevant formula automatically updates related values on the dependent worksheet the next time the dependent worksheet is used. This is a slightly tricky but powerful technique, since smaller worksheets are invariably easier for a spreadsheet user to handle than larger ones.

Naming cells and ranges. Some spreadsheet programs let you assign a name to a cell or a range of cells. This feature adds convenience and flexibility. Referring to a range of cells called "prices" is easier than remembering that the prices are in cells A1 through A15. More important, if a formula refers to the range called "prices," it will still find those prices if the range containing them is moved to another part of the spreadsheet. If you failed to name the range or had a program that lacked this feature, when you moved the range you would have to go back and manually change all the formulas that refer to that range to reflect the new location.

Speed of calculation. A spreadsheet's calculation speed depends on several factors. Does the program do all of its work in memory, or must it frequently access the disk? (The mechanical disk drive is

(continues on page 256)

A Few Spreadsheet Tips

Create a separate data input area to hold assumptions, opening balances, base figures, and other data. The best place for the input area is the upper left corner of the worksheet. The body of the worksheet should contain only formulas and references to data input area cells. That way you can easily see what assumptions the results are based on.

Establish separate areas in the spreadsheet for data input, criteria (for sorts or searches), and output (results), and then create an area to store all keyboard macros. The data management input area stores all the data that will be searched, sorted, or extracted, and it might be synonymous with the worksheet itself.

Date and number successive versions of the model so that you'll know you are incorporating the latest set of assumptions and data. You might also label the spreadsheet with the author's name and the file name under which the model is saved.

Print out all of the formulas. A printed version allows the methodology as well as the mechanics of the model to be audited.

Use templates. Setting up a basic model of a spreadsheet and saving a copy of the model with no data (a template) will allow you to use that model again and again without wasting time re-creating it. In this way, you've reserved space and left behind the instructions (formulas or macros) for that structure. Just load the file that holds the template you've created, key in the data, and save the resulting worksheet under a unique name. Leave room at the top of the template for the date and notes about what data it contains.

Once you become proficient using templates, you might consider writing keyboard macros that build the templates "on the fly." Such macros take up less memory and disk storage space than templates but may load a little slower.

Include cross-checks. A prudent spreadsheet model should calculate important values more than one way to cross-check the results. You should have an @IF statement signal when a

	A	B	C	D	E	F	G
1		Jan-Mar	Apr-Jun	Jul-Sept	Oct-Dec	Annual	Cross-check
2	Food	1200	1320	1452	1597	5569	
3	Rent	2100	2100	2100	2100	8400	
4	Utilities	450	495	545	599	2088	
5							
6		3750	3915	4097	4296	16058	16058
7							0
8							

Figure A: The formula in cell F6 calculates the annual total as the sum of cells B6 to E6. The formula in cell G6 calculates the same value, but it does so as the sum of column F. The formula in cell G7 says: if cell G6 is not equal to cell F6, display a row of 1s; otherwise, display a zero.

cross-check discrepancy is found. For example, in Figure A the annual total in cell F6 could also be calculated as the sum of cells F2 to F4. As a cross-check, you could type the formula `@SUM(F2..F4)` in cell F6. Then in cell G7, type `@IF(G6 < > F6,1111111,0)`. That will display a 0 if the sum in G6 matches the number in F6 and will display a row of 1s if there is a discrepancy.

Test spreadsheet models using simple and predictable data. If a model works correctly with simple data, it's more likely to give good results when it counts.

Name ranges or single cells as much as possible and use those range names in formulas. You're much less likely to make an error in Total Sales – Total Expenses than in A20 – A40.

Once you've checked the accuracy and appropriateness of a formula, use the range- or cell-protection feature to avoid accidentally corrupting the validity you worked so hard to establish.

Experiment. It's easy to change values and watch the results. Do it often and you will get a better feel for spreadsheet software. Substitute some wildly optimistic or pessimistic values for your assumptions. You may gain insight into the way your model works that you wouldn't perceive under normal circumstances.

much slower than the purely electronic process of manipulating data in memory.) What language is the program written in? (Assembly language is faster than C, which is faster than Pascal or BASIC, which are faster than the p-System.) What mathematical methods and algorithms are used? What degree of accuracy is attained?

A spreadsheet's calculation speed depends on several factors. Does the program do all of its work in memory, or must it frequently access the disk?

Testing the relative speed of spreadsheet programs usually requires a reasonably large model. Such a model can be built by copying a few formulas over a large area of the worksheet.

Automatic and manual calculation. Most spreadsheet programs automatically recalculate an entire spreadsheet each time any value is changed. As a worksheet gets larger, the time spent watching the program redraw the screen becomes increasingly significant. Some programs let you set the calculation mode to manual so that the worksheet is not recalculated until you give the command.

Forward and circular references. Most spreadsheet programs recalculate row by row, calculating the formulas in row 1, then row 2, and so on. Some programs let you change the order of recalculation to column by column. Either way, there's a potential problem: if a formula depends on a value that is recalculated after the formula is calculated, you may get an error known as a forward reference—a cell formula that refers to a value that has not yet been calculated.

Some sophisticated spreadsheet programs such as 1-2-3 avoid the forward reference problem by using a "natural order" of recalculation. A formula is not recalculated by 1-2-3 until the program has calculated all of the formulas on which it depends. If 1-2-3 finds a forward reference, it goes forward and calculates the forward formula.

Virtually no spreadsheet, however, can deal with the circular reference, in which one cell's formula depends on a second cell, whose formula de-

pends on the value of the first cell. The exception is *Multiplan*, which relies on a technique called "iteration" to calculate circular references. Iteration is a process of repeated calculation that leads to conclusions of increasing accuracy each time recalculation is performed, until the correct answer is achieved. Consider, for example, the calculation of a salary bonus based on a company's net profit; the net profit itself is affected by the size of the bonus paid.

In the overwhelming number of instances, however, a circular reference reflects an error. Only in a small class of problems—primarily those concerned with specialized financial and engineering applications—is a circular reference a useful technique.

Data entry forms. One of the nice things about spreadsheets is that they display data in an easy-to-use tabular fashion. But entering data into such a format (particularly with a large spreadsheet) has all the efficiency of hunt-and-peck typing.

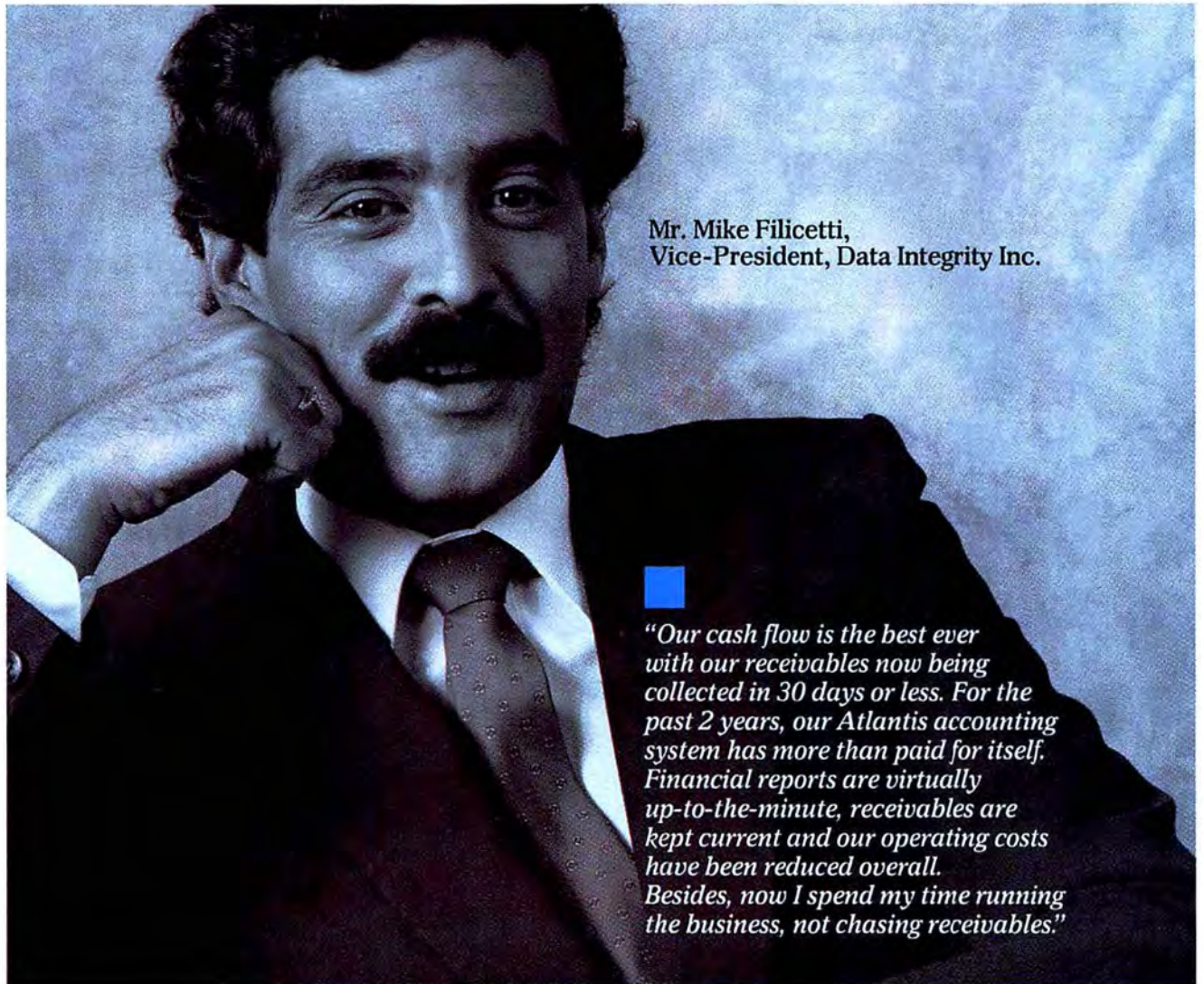
Some spreadsheets (*Context MBA* is the most impressive example) have forms modes that enable you to enter data on a screen form of your own design. The data is then automatically copied into a spreadsheet's tabular format. Some other spreadsheets have the potential, if not the built-in capability, to accomplish this with macros.

Flexible cursor control also facilitates data entry. A spreadsheet program should make good use of the PC's keyboard, including the <Home>, <End>, <PgUp>, <PgDn>, and function keys.

A spreadsheet is a handy tool, but it is not a decision maker. A spreadsheet assembles and organizes all the data and facts about a decision or a plan and then performs calculations that indicate the consequences—for example, profit or loss or cash flow. Remember—you control the assumptions and you control the results. ●

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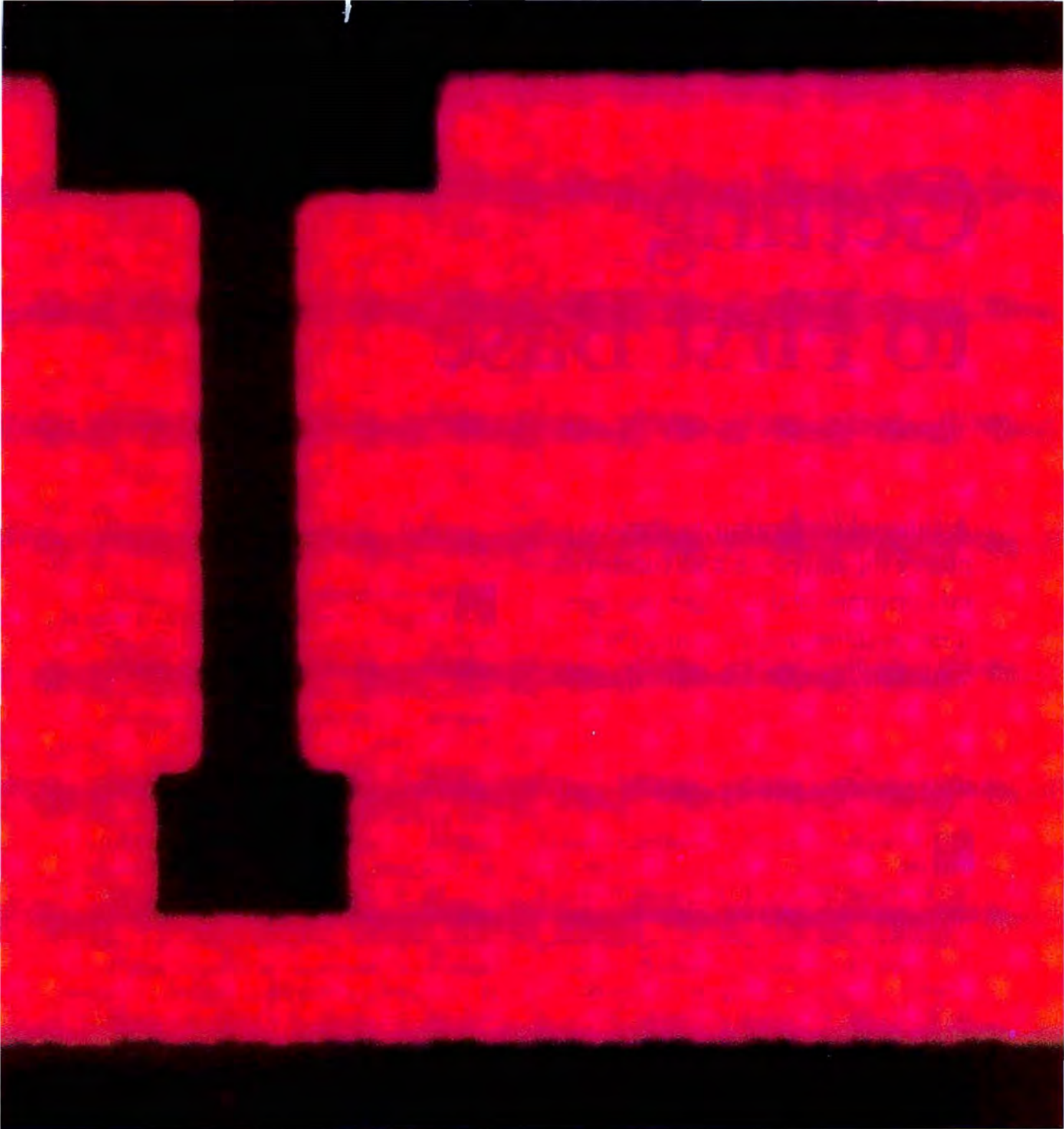
By the time 1-2-3 calculates it correctly, you may have retired.

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Circle 823 on reader service card

Getting to First Base

A tutorial for beginners that explores the purposes and fundamental concepts of data base management systems and explains their structure, use, and technical terms.

David Frankel and Michael Guttman

■■■■ All organizations and most individuals have to organize information systematically for easy retrieval. Most people keep track of appointments, correspondence, and personal budgets. Businesses need records of inventory, creditors, and customers.

Many software packages for the PC are designed to make record keeping easier. These programs are called data base management systems (DBMSs) or data base managers. A data base is simply information collected on disk. A DBMS is a program that organizes and provides easy access to a data base.

Before using a DBMS, you need to understand the basic record-keeping concepts common to both manual and computerized systems. A hypothetical example of a manual record-keeping system used in a typical small business will help illustrate these concepts.

■ Manual System

Imagine you are running the business office of a small retail auto parts store without a computer. You maintain two sets of records: One set contains information on every parts supplier your company does business with; the second set lists the items in your company's inventory. You keep each set of records in a separate file drawer.

The set of supplier records contains a folder for each supplier listing the name, street address, city, state, and zip code. You label the folders with the suppliers' names and arrange them alphabetically.

The set of inventory records has one folder for each inventory item. Each folder contains the stock number, a title or description of the item, the quantity in stock, the quantity on order, the cost, the list price, and the supplier's name. The folder is labeled with the stock number, and you arrange the folders in numerical order.

■ DBMS Terminology

The manual record-keeping system just described makes it easy to understand standard data base terminology. In the office each set of records is contained in one file drawer; in a data base each set of records is called a *file*. In this example you have a supplier file and an inventory file.

Each folder in a file drawer is represented in the data base by one *record*. For example, the folder labeled "Amalgamated Auto Supplies" is one of many



records in the supplier file. The information in this record pertains solely to this supplier. Similarly, each data base record in the inventory file represents a folder with information about a particular inventory item.

In a data base the categories of information in each record are called *fields*. Each record in a data base file has the same fields. For example, each record in the supplier file includes the fields for name, street address, city, state, and zip code. The fields for each record in the inventory file are stock number, title, quantity in stock, quantity on order, cost, list price, and supplier's name. Figure 1 illustrates the hierarchy of files, records, and fields.

One field in each file plays a special role. The purpose of this field, called the *unique key*, is to identify each record unambiguously. The unique key for the supplier file is the supplier's name, because each supplier has a different name. The unique key for the inventory file is the stock number, because only this field precisely identifies each record.

Related Files

A DBMS avoids repeating information in more than one file whenever possible. Instead, files are related so that you can refer to a secondary file when you require further information on a field in the first file. Although the simplest DBMS software does not allow you to define relationships among files, we will assume the use of a slightly more sophisticated package in our example.

An inventory record contains the field for a supplier's name, but the rest of the information about that supplier is in a record in the supplier file. Because the unique key for the supplier file (supplier's name) is included as a field in the inventory file, the inventory file is said to be related to the supplier file.

Suppose you decide to keep a file of all inventory item purchases. You create a purchases file that contains a record for each purchase that shows the purchase number, the stock number, the quantity purchased, and the date of purchase. In this file the purchase number is the unique key.

Each purchases record need not contain inventory information about the purchased item (such as price or supplier's name) as long as it includes the item's stock number. Since the stock number is the unique key for the inventory file, you can use the purchases file to call on the inventory file if you need

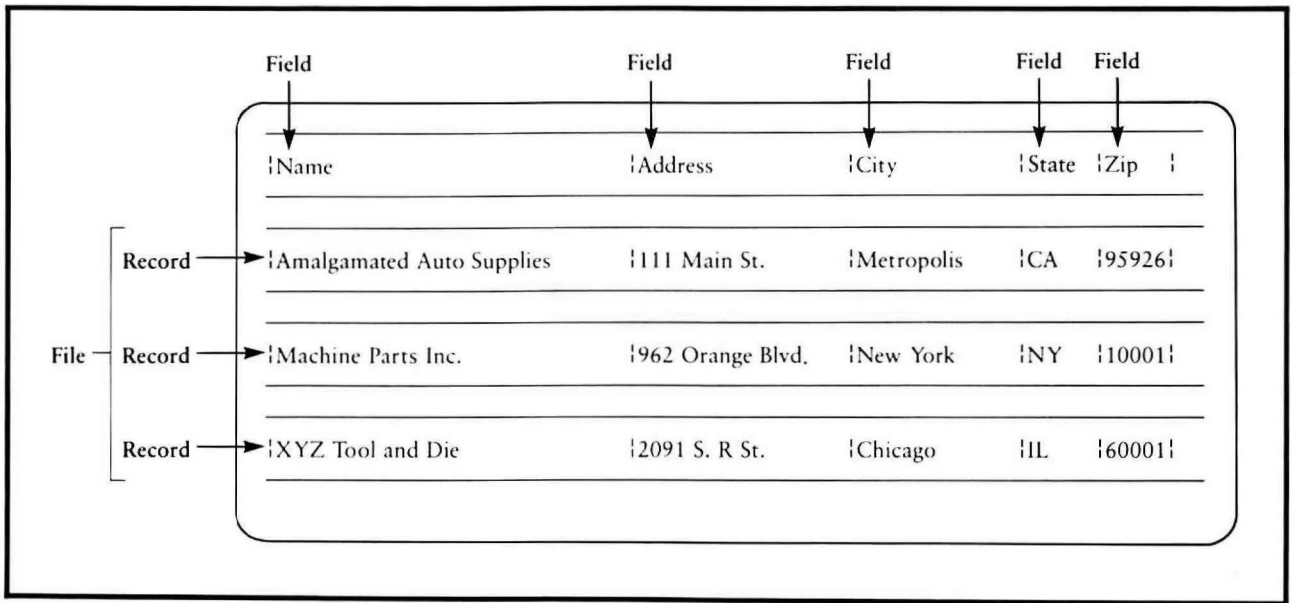


Figure 1: Fields, records, and files. The fields define the structure of each record. A file is a collection of records that all have the same fields.

more information about an item. Figure 2 illustrates how the supplier file, the inventory file, and the purchases file are related.

A DBMS that uses related files performs other special functions. In the parts store example, when you enter a stock number into a record in the purchases file, the DBMS checks for a record in the inventory file that has that stock number as its unique key. If the number entered is not found in the inventory file, a screen message appears to that effect, asking you to enter the correct number. When the DBMS finds the stock number in the inventory file, you can display other information, such as the description of the item, on the screen.

Designing a Data Base

When using almost any DBMS, whether simple or sophisticated, the first step is to define the files. The DBMS prompts you to supply a title for each file, the maximum number of records it can contain, and its total number of fields.

You then define each field by entering the title, the type, and the maximum length. The title is an identifying name for the field, such as address or stock number. The most common types of fields are

numeric, character, logical, and date. A numeric field contains only numeric data, such as quantity or price. A character field, also called an alphanumeric field, can hold any characters—numbers, letters, or other symbols. An address field is an example of a character field. A logical field can be used whenever a simple yes or no answer is sufficient. The field type is important because the DBMS stores each type of data differently.

Specifying the length of a field means choosing the number of digits (whether letters or numbers) the field can hold. To specify the maximum length of a field, decide what the largest piece of data will be for any record in the file. For example, if no address will ever exceed 40 characters for any supplier record, then the maximum length of the address field should be 40. If you never keep more than 200 of any inventory item in stock, then the maximum length for the quantity-in-stock field should be 3. Careful choice of field lengths will result in the most efficient use of disk space. You don't need to specify the maximum length for the date field because it is always the same.

To finish defining the files, indicate the unique-key field for each file. Figure 3 shows typical prompts and responses for defining the attributes of a file.

Data Entry

Once you define the files and fields, you can enter information into the files. When you select the data-entry function, the DBMS prompts you to enter the name of the file that will hold the data. After the video screen clears, a new screen appears that lists the titles of all the fields in that file. Next to each field title is a space, marked by brackets, for entering data. Figure 4 shows a sample data-entry screen completed for the supplier file.

As part of the data-entry function, you may choose to enter new records or to list (display), edit, or delete an existing record. If you are entering a new record, the cursor moves to the space next to the name of the first field. After typing in the data for the first field, you press <Enter>, and the cursor moves to the space next to the name of the second field. When you have entered information for each of the fields, one record for the file is complete. The spaces for entering data are then cleared, and you repeat the process for the next record.

For each field the DBMS checks that the data entered conforms to the field type. For example, if you enter "Amalgamated Auto Supplies" for the zip code, a screen message tells you that the zip code is a numeric field. You then have the opportunity to re-enter the zip code.

If you choose the list option for an existing record, the cursor moves to the unique-key field. You enter the information that identifies the record you want to see. To display an item from the supplier file, for

example, you enter the name of the supplier you want. If the DBMS finds the record you've asked for, the information appears in the spaces next to the field names. A screen message informs you if the DBMS does not find the record.

If you choose to edit the record, a designated key moves the cursor to the field you want to change. After entering the new information, you move the cursor to the next field you want to edit. Pressing another key indicates the editing is complete.

If you select the delete option, a screen prompt asks you to confirm this request. The record is then removed from the file.

Think of the data-entry screen as an electronic business form. When entering data you are essentially filling out a form on the screen. A well-designed DBMS should make data entry easy and efficient.

Reports

The DBMS functions described so far would be of little use unless you could easily get an overview of the information you've collected. A report is an overview of a selected portion of data. The DBMS allows you to specify the portion of the data you want for the report and the format in which it will appear. A screen prompt asks you to give the report a title and to supply the name of the file you wish to view.

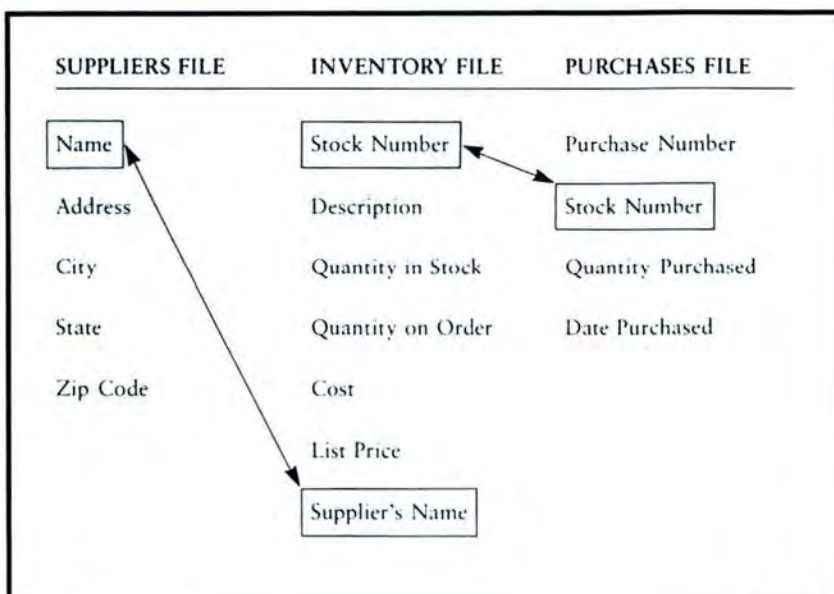


Figure 2: Related files. The field in one file is the key field for another file, so you can always find more complete information without duplicating your data.


```

ENTER FILE NAME      : SUPPLIER FILE
MAXIMUM NO. OF
RECORDS              : 150
NO. OF FIELDS        : 5

FIELD #1
TITLE                : NAME
TYPE                 : CHARACTER
MAXIMUM LENGTH       : 25

FIELD #2
TITLE                : ADDRESS
TYPE                 : CHARACTER
MAXIMUM LENGTH       : 15

FIELD #3
TITLE                : CITY
TYPE                 : CHARACTER
MAXIMUM LENGTH       : 13

FIELD #4
TITLE                : STATE
TYPE                 : CHARACTER
MAXIMUM LENGTH       : 2

FIELD #5
TITLE                : ZIPCODE
TYPE                 : NUMERIC
MAXIMUM LENGTH       : 5

WHICH FIELD IS THE UNIQUE KEY? 1
    
```

Figure 3: When you define a file, you select the title, type, and length of each field.

```

                                SUPPLIER FILE

NAME      : AMALGAMATED AUTO SUPPLIES
ADDRESS   : 111 MAIN ST.
CITY      : METROPOLIS
STATE     : CA
ZIPCODE   : 95926

1) ENTER NEW RECORDS
2) LIST RECORD
3) EDIT RECORD
4) DELETE RECORD

ENTER OPTION NUMBER: 1
    
```

Figure 4: A sample data-entry screen for the supplier file displays the record and lets you handle the information by selecting an option.

You can specify the order in which the records appear on the report by designating a field as the *sort key*. The sort key can be the unique key or any other field. For example, you may want a report from the supplier file that orders the records according to zip code. In this case the zip code would be the sort key. You may request that totals for numeric fields appear at the end of the report. Once you define the report format, you can recall the report by name at any time. A *master list* is a common type of report that shows all the records contained in a file. The master list is divided into columns, one column for each field. The names of the fields appear above the columns. Each horizontal line on the report represents one record. Another type of report is a transaction log, which shows the records in a transaction file in much the same way that a master list shows the records in a master file.

Other Features

In addition to defining related files, sophisticated DBMSs include the following features:

Index file. For a simple DBMS to produce a master list of an inventory file ordered by stock number (or any other field), it must perform a time-consuming sorting procedure.

Some DBMSs have an indexing feature that eliminates this delay. An index file is an auxiliary file that specifies the order of the records in the main file. The *index key* is the field from the main file that you select to determine this order.

The index key doesn't have to be the unique key. For example, a transaction log of purchases could be ordered by date, which is not the unique key for purchases records. Every time a new record is added to the main file, the index file is immediately updated. When you request a report with the records in a particular order, the index file produces the report without any sorting delay.

A DBMS may also allow a main file to have more than one index file. Several fields can serve as index keys so that a file can be reported in a variety of orders, all without the need to sort.

Electronic form. An advanced DBMS offers flexibility for designing electronic data entry forms. You can create forms using a word processor, and you can place field names and spaces for entering data anywhere on the screen. Forms can include instructions and borders, and data can be entered into many files on the same screen.

Report functions. When generating reports, a DBMS can produce subtotals, show totals and subtotals without displaying individual records, select subsets of a file for reporting, produce counts of records that fall into certain categories, and perform arithmetic calculations on numeric fields, such as multiplying cost by quantity purchased to produce an extended price column.

A DBMS can also use unique keys to locate information on related files. For example, a transaction log for the purchases file could display an item description from the inventory file for each purchase.

Think of the data-entry screen as an electronic business form. When entering data you are essentially filling out a form on the screen.

Updating files. Some DBMSs provide a way to update the information in files other than by direct data entry. Returning to the example of the auto parts store, you might want a field in the supplier file called *total purchased*. This field records the total dollar value of all purchases made from each supplier. Upon entry of each record to the purchases file, an advanced DBMS can calculate the dollar value of the sale and add that amount to the total purchased field in the supplier record. To calculate the dollar value of

the sale, the DBMS multiplies the quantity purchased data from the purchases record by the item cost contained in the inventory record.

Menus. Some DBMS systems enable you to construct menus for frequently used procedures. You specify the function to be performed for each menu option. Then instead of having to enter several DBMS commands, you can choose one option to perform the desired procedure.

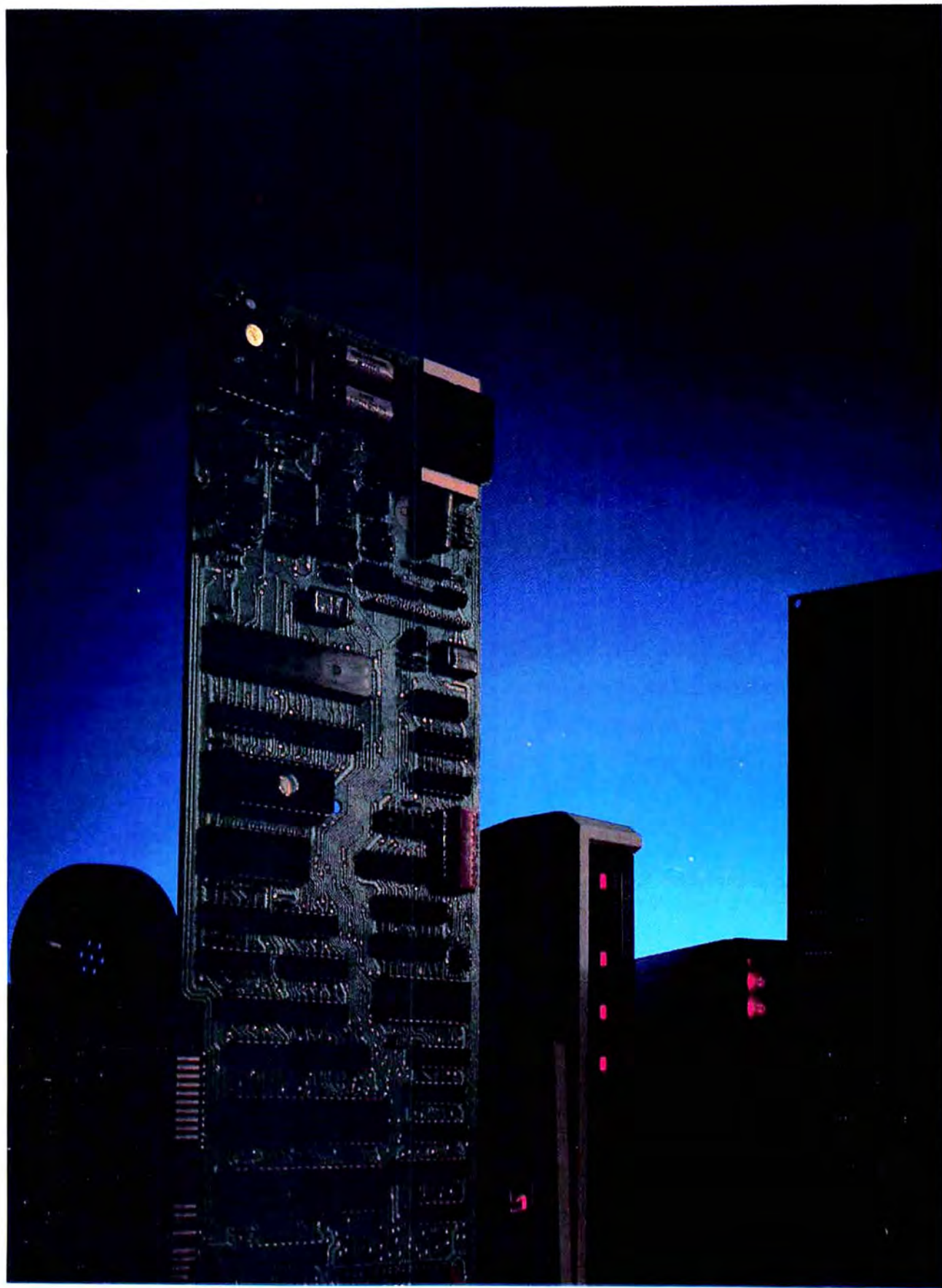
The Changeover

Before the advent of the personal computer, DBMS packages were tools available only to the software houses that developed them. Programmers used DBMSs to produce custom software for their clients. Often these DBMSs were not well integrated and lacked documentation.

Eventually, some software companies realized that general-purpose DBMS programs, carefully integrated and properly documented, were marketable products. These DBMS packages were sold primarily to other software manufacturers or to corporate data processing departments. IBM developed a line of DBMS products for its mainframe computers.

After the personal computer appeared on the scene, DBMS products became available to everyone. Today these products range from simple, inexpensive packages to more sophisticated, costly models. With a general understanding of DBMS features and capabilities, you're better prepared to make the changeover from manual to computerized data management. ●


David Frankel and Michael Guttman are general partners in Professional Computer Technologies, a consulting and software development company in Chico, California.



What Makes Modems Run?

Translating digital signals to analog and vice versa, the modem acts as a mediator between the PC and the outside world. Yet today's "intelligent" modems can do much more.

Larry Jordan

 In the world of data communications, terminals and computers often need to "talk" to each other using human-voice-frequency signals. To use standard telephone lines, a device called a modem must be installed between the terminal or the computer and the telephone system. The modem is the final link between a digital-based device (terminal or computer) and the analog-based telephone system. Without such a device, data communications would not be the booming business it is today, and the PC owner would be deprived of one of the computer's most useful applications.

In the simplest terms, on the transmitting end a modem converts binary (on or off) electrical signals from a terminal or a computer into voice-frequency signals that can be sent over the public telephone system. On the receiving end a modem converts voice-frequency signals transmitted through the telephone system into binary electrical signals that are forwarded to a terminal or a computer. In specialized cases a modem may also receive signals that are transmitted directly to a serial printer.

As shown in Figure 1, modems modulate digital signals (square wave signals carrying information based on a series of digits that are either 1, for "on," or 0, for "off") into analog signals (oscillating signals that carry information based on the variations in amplitude—strength—or frequency of the signal wave) and demodulate analog signals into digital signals. Hence the name *modem*: modulator-demodulator.

Modems are used to produce signals compatible with telephone equipment. The equipment used in the telephone system requires that digital signals from the computer be converted to analog signals for transmission. Without a modem, telephone system amplifiers and filters would alter digital square wave signals into unrecognizable garbage by the time they reached another computer across town.

Another limitation imposed by the quality of public telephone equipment is the rate at which data can be transferred. Most of the modems owned by IBM PC users operate at 1200 bits per second (bps) or less. Data transfer rates as high as 9600 bps can be achieved using the same telephone equipment, but modems providing that capability are significantly more complex and expensive than those operating at lower rates.

Modems can be categorized according to speed, protocols, features, and intelligence (e.g., automation of answering and dialing functions or capacity for storage of dialing directory). They can also be differentiated by housing design: they may be designed to stand alone or to fit in an expansion slot inside the PC's system unit.

Modem Speeds and Protocols

The speed of a modem is determined by the maximum rate at which it can transmit or receive data. That rate is measured in either bits per second or baud. Bits per second is the number of binary digits (0s and 1s) transferred per second, whereas baud is the number of signal events transmitted per second. They differ whenever digital signals are superimposed onto analog signals, resulting in each signal event carrying two or more binary bits.

The classification of modems by speed is as follows: 600 bps or less is considered low speed; 1200 bps to 9600 bps is medium speed; and over 9600 is high speed. High-speed modems require specially installed data communications lines such as the fiber optics networks that are now beginning to appear.

The most common communications device used in personal computer configurations is the Bell 103-compatible low-speed modem. Bell 103 is a communications standard (or protocol) for modulation and demodulation of data signals. Communication at 1200 bps generally uses either the Bell 212A or Racal-Vadic protocol. Almost every modem manufacturer produces Bell 103 modems, but the less expensive models do not support auto-dial and auto-answer and cannot be used to store telephone numbers. Expensive models can be used to auto-dial telephone numbers stored in disk files or in the modem's own memory. Some of the Bell 103 modems can also be set up with

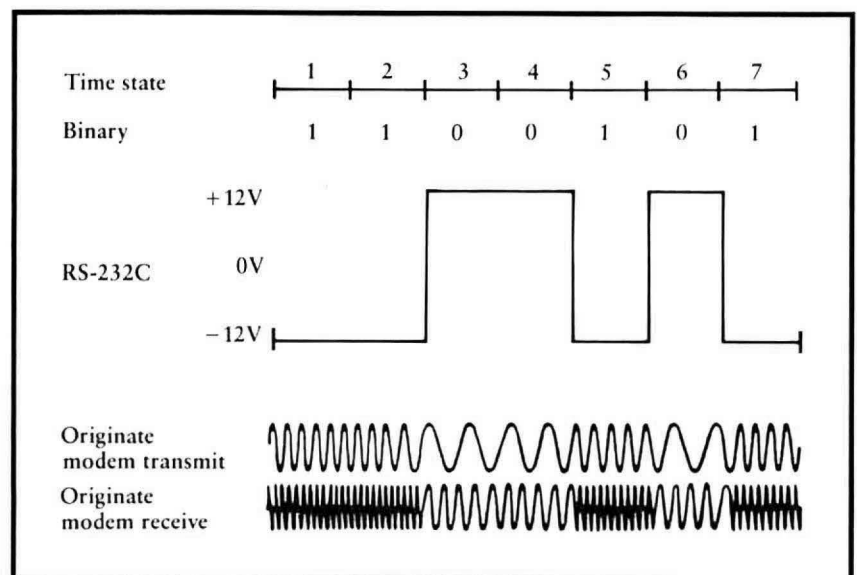
host software for unattended auto-answer operation; the Hayes Smartmodem is a good example of this type of modem.

Frequency Modulation

The distinguishing characteristic of the Bell 103 modem is the way it handles transmitted and received data. The originate and answer modes for Bell 103 modems are controlled through frequency shifting. The modem that initiates a communications link is set to the originate mode, and the remote modem that responds and completes the communications link is set to the answer mode. The answer-mode receive frequencies are the same as the originate-mode transmit frequencies. By the same token, the originate-mode receive frequencies are the same as the answer-mode transmit frequencies. The configuration of transmit and receive frequencies means that one modem must be in the answer mode and the other in the originate mode for the communications link to be properly established.

Frequency modulation carries information in variations of the time periods between "peaks" in a signal wave. The wave describes the strength of a signal. The more often the signal is at its highest strength, or peak, the higher the frequency. When digital (on or off) information is translated to frequency-modulated signals, one frequency value indicates an "off" condition (or 0 bit) while a different frequency is used for an "on" condition (or 1 bit).

Figure 1: Binary signal frequency modulation. To transmit data, a modem modulates digital square wave signals sent from the PC through the RS-232C serial port and converts them to oscillating analog signals. A similar process converts analog wave signals to digital signals when receiving data.



Bell 103-compatible modems may be configured as originate only, answer only, or originate/answer. If you don't plan to have your modem answer an incoming call from another computer or terminal, you do not need answer-mode capability. But most modems available today provide both modes.

Low-speed modems are excellent for applications that require a great deal of conversation-mode communications or small file transfers. The maximum continuous transfer rate at 300 bps is 30 characters per second (cps), which translates into approximately 300 words per minute—faster than any typist. Another advantage of 300-bps communications is that many people can comfortably read text that scrolls by on the screen at that speed. A final benefit is that some on-line information services charge less for 300-bps service than for higher speeds.

Medium- and High-Speed Modems

For applications that involve frequent transfers of large files or the clustering of input from several terminals, low-speed modems are not a good choice. It takes approximately 1 minute to transfer 2000 bytes of text at 300 bps, which translates to 30 minutes of connect time to transfer a 60K file. Transferring several 60K files results in the computer being dedicated to communications for a significant period of time. If the communications software does not provide batch-mode or multiple-file transfer options, operator support is required during the entire session. For applications of this type, most businesses and an increasing number of individuals choose medium-speed modems.

Most medium-speed modems operate at 1200 bps, but compatibility with other systems varies with the make and the model. Some new 1200-bps modems operate in only half-duplex, limiting the information systems they can be used to access. For example, The Source cannot be accessed by anything but a full-duplex modem. Other modems offer compatibility with either Bell 212A or Racal-Vadic protocol. The more expensive medium-speed modems are compatible with both Bell 212A and Racal-Vadic, and some so-called triple modems support Bell 103, Bell 212A, and Racal-Vadic protocols.

Medium-speed modems differ in several ways from low-speed modems. Instead of shifting frequencies, as is done under the Bell 103 protocol, these modems use a technique called phase shifting, illustrated

in Figure 2. Phase modulation, or phase-shift keying, maintains a constant frequency throughout transmission but changes the starting point. The signal transmission always starts at a neutral midpoint, but a

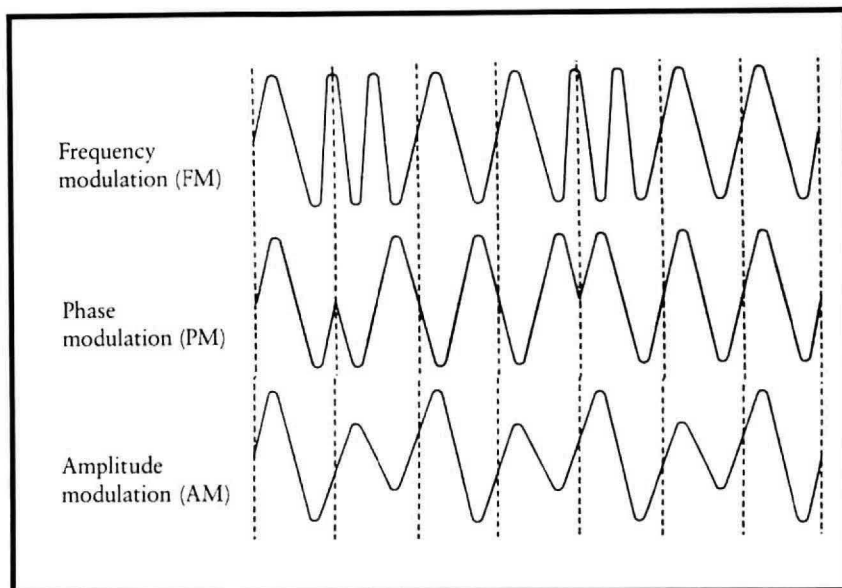
Without a modem, telephone system amplifiers and filters would alter digital square wave signals into unrecognizable garbage by the time they reached another computer across town.

shift changes the direction of a signal moving toward either a positive "peak" or a negative "trough." When digital information is translated to phase-shift keying, a 1, or "on," bit is indicated by no deviation or phase change (a 0-degree shift) while a 0, or "off," bit is designated as a 180-degree shift.

The Bell 212A and Racal-Vadic protocols both use phase shifting to increase data throughput, but the signal frequency used as a basis for the phase shifting is different for the two. Therefore, the protocols are not compatible, and the same modem protocol has to be used at both ends of a 1200-bps communications link, adding another level of complexity to going from 300 bps to 1200 bps. Fortunately, most information services offer both Bell 212A and Racal-Vadic compatibility, so PC users can achieve 1200-bps communication without purchasing an expensive dual-mode modem.

Modems that operate at speeds above 1200 bps use more sophisticated electrical-signal manipulation to achieve those rates while staying within the frequency limits imposed by public telephone equipment. Figure 2 illustrates a technique called phase amplitude modulation, a combination of phase shifting and amplitude modulation. It is used in the design of 9600-bps modems that are used mostly for main-frame communications. Modems that operate at 9600 bps are now dropping in price and becoming avail-

Figure 2: Three digital modulation methods for transmitting digital data over analog phone lines. Frequency modulation is used for 300-bps modems, phase modulation is used for 1200 bps, and amplitude modulation is necessary for communications at higher speeds (4800 bps or 9600 bps).



able for the IBM PC. However, these modems are usually not worth the price unless you frequently telecommunicate with mainframes or transfer long files.

Modem Features

Besides classification by speed and protocol, modems are often classified by features or level of intelligence. The following explanation of modem features should help you perform your investigation. Keep in mind that many modem features can be used only if your communications software supports them.

Help Command. Many new modems provide command help files. To get that help the user simply enters an H or the word Help while interactively conversing with the modem from the PC keyboard. The help files are usually brief explanations of frequently used functions and commands.

Command Modes. Because of the dominance of the Hayes Smartmodem in the personal computer community, many intelligent modems provide a Hayes Smartmodem-compatible command mode. This mode allows the user to run communications software specifically designed for the Smartmodem. Besides the Hayes mode, some modems also have a unique command mode designed by the modem manufacturer. Switching between the two modes is usually performed by issuing a short command sequence to the modem. The Hayes mode is characterized by an 'OK' response to commands (when the verbal re-

sponse mode is in effect) and the manufacturer-specific mode is characterized by some other character prompt such as '\$' or '<'. The Hayes mode requires a carriage return at the end of a command to initiate its execution, whereas vendor-specific commands may begin execution after a single letter or number is entered at the keyboard.

Command Recognition. Some modems require a specific speed (bps) and parity configuration to recognize commands; others will accept commands regardless of the communications parameters. Modems that accept several configurations often must be either reset through software commands or placed in a dormant mode before a new set of parameters can be used. Others provide an external reset button or an off/on switch that will reset most or all of the parameters. Stand-alone modems can easily be switched off and then back on, but some expansion board modems that fit inside the PC require that the computer be turned off for a power-off reset of the modem.

Command Abort. After a dialing command has been issued to an intelligent modem, you can usually stop the call before it is completed by sending the modem an abort command. Most modems interpret the carriage return or a pair of carriage returns as an abort command. This abort signal interrupts the execution of any modem command before a call is completed and returns the modem to command mode.

Quit Command. Intelligent modems may allow a user to turn the internal monitor programs off with a quit command. This type of modem may also go into dormant mode automatically after a fixed number of minutes of keyboard inactivity. The mo-

dem then remains in a quiet or dormant mode until it receives several carriage returns. This dormant state may be required for data transfer rate (bps) or parity changes. After you change the communications parameters and press the carriage return, the modem senses the new communications parameters and is activated with a matched set of parameters. The modem will usually report its operating speed when the monitor program is reactivated.

This design may also allow the user to specify a longer period of inactivity (or "no activity") or to specify that the monitor never go into the dormant mode. This is a desirable feature if the modem is used frequently with the same host system or with several host systems that have the same communications parameters.

Manual Dial. Modems that provide their own dialing directory also allow the user to dial a telephone number manually from the PC keyboard. The command typically starts with either an ATD or a D followed by the telephone number and a carriage return. The modem may also allow a batch-mode call using special telephone number dialing prefix and suffix character strings. For example, a telephone number may have to be preceded by a '<' and followed by a '>' before the modem will dial the number. The manual dial and batch-mode dial commands can be used in communications software packages to dial phone numbers from directories stored on disk.

Dialing Directory. A modem dialing directory allows a user to store frequently used telephone numbers. A number can be dialed from the directory by keyboard selection of a menu number that corresponds to the telephone number. Dialing directories usually allow the user to store 20 to 60 characters with each number to describe the host system accessed by the number. Some directories are stored in nonvolatile bubble memory; alternatively, a battery backup is provided that allows the user to disconnect the modem from its power supply for several days without losing the stored numbers.

Name Selection Redialing. Modems that provide dialing directories may allow the user to select a host system to dial simply by typing the host's name. After the user enters a name from the PC keyboard,

the modem searches the dialing directory and dials the associated telephone number if the name is found. This feature may also allow input of only part of the name to activate the automatic dialing of the appropriate number.

Dial Tones. Modem dialing commands usually include a selection of pulse or touch-tone dialing. The dialing signals transmitted to the telephone system are the type specified by the dialing prefix command. Some modems allow the dial type to change during the dialing sequence to match the telephone equipment in use. This feature may also include a secondary dial-tone wait command. Dial-tone wait commands cause the dialing sequence to pause until a secondary dial tone is detected.

Some intelligent modems not only wait for a secondary dial tone during a dialing sequence, but also sense and switch between touch-tone and pulse dialing to match the telephone system being used. Usually this type of modem also provides a blind dialing mode. Blind dialing allows the modem to dial

Some PBX telephone systems use nonstandard tones that certain modems will interpret as a dead line. Blind dialing is the only way to get around the problem.

when a dial tone is supposed to be present but none is detected. Some PBX telephone systems use nonstandard tones that certain modems will interpret as a dead line. Blind dialing is the only way to get around the problem.

Last Number Redial. Some modems enable the user to redial the last number called by entering one number or letter at the computer keyboard. This capability can be used by a communications software package to redial a number several times without having to store the number in the computer's memory.

Repeat Dialing. Some modems can redial a telephone number a predetermined number of times. When you enter a numeral after a redial command, the modem dials repeatedly until the connection is made or until it has made the specified number of attempts.

Number Linking. Number linking enables the user to specify at least one other telephone number that should be dialed if the first number is busy or does not answer. This is an excellent feature for use with mainframe systems that have more than one access line or with bulletin board systems that are frequently busy. A number-linking feature also allows the user to establish a chain of numbers to be dialed in sequence. The last number in the sequence may often be linked back to the first number in the sequence so that a continuous polling of telephone numbers is possible. Number linking can be used to redial one number an unlimited number of times by specifying the original number dialed as the linked number. This can sometimes be used to get around the FCC requirement that an auto-dialer not repeat a dial more than 15 times. (In Canada the limit is 10.)

A number-linking feature, like an auto-dial feature, should provide an optional alarm to indicate a completed telephone connection. This feature should also permit the alarm to be disabled when it is not needed or desired.

Directory Modification. Modem dialing directories should be designed for easy modification of names and telephone numbers. A single command should be able to clear either selected entries or all directory entries. The clear-all-entries command should require confirmation. Another modem command may allow the user to list all or selected entries in the directory.

Auto-Answer. Many intelligent modems offer control of the number of telephone rings that should occur before a call is answered in an automatic answer mode. For example, the command `ATS0=5` causes a Hayes Smartmodem to answer a call on the fifth ring. These same modems normally allow a user to force them to answer the telephone whether or not a call is coming in. Connecting two computers directly via two modems without going through the telephone system requires a forced answer. By placing a short length of telephone cable between two Smartmodems, you can connect two computers for file transfers by executing a force-to-answer (ATA) command on one modem and a force-to-dial (ATD) command on the other modem. You can also use the force-to-answer feature when a single line is used for voice and data communications and the data communications call is dialed manually on a normal telephone.

Busy Mode. The busy command provided by modems enables a user to take the phone "off the hook" for a while. This command is useful for bulletin board operators who want to use the system temporarily for other applications but want the system to appear busy to callers. The busy command can also be used on a voice line to keep calls from coming in for a period of time. Through software control the telephone could be made to appear busy for certain time periods each day.

A number-linking feature allows the user to establish a chain of numbers to be dialed in sequence. The last number in the sequence may often be linked back to the first number.

Protocol Detect and Switch. The auto-answer mode of some modems automatically detects the protocol of an incoming call and switches its own protocol to match that of the caller. Typical protocols are Bell 103, Bell 113, and Bell 212A, but some of the more expensive modems also include the Racal-Vadic protocol. The protocol switch between Bell 103/113 (300 bps) and Bell 212A or Racal-Vadic (1200 bps) also requires a data speed switch. If a modem does not provide detect and switch capabilities, these operations can usually be accomplished through software control.

Set Answerback String. Modems can be programmed to transmit a particular sequence of identification characters immediately after originating or answering a call. Typical built-in answerback registers (reserved areas of internal memory) hold between 16 and 32 characters and are used to identify the modem, terminal, or computer work station to a remote computer. The answerback string feature saves the user from keying in a password or a logon code every time a call is placed to the system.

Set Backspace Character. Some host computers require the selection of a special character to be interpreted as a backspace. The ASCII character equivalent of a Control-H (ASCII value 8) is normally the default backspace delete character, but some systems use the ASCII DEL character (ASCII value 127) as a backspace delete also. The set backspace command programs the modem to accept a character other than a Control-H as a backspace.

Set Attention Character. Modems usually have on-line and off-line operating modes. The modem is in an interactive-command mode while off line and in a "transparent" transmit and receive mode while on line. In the off-line mode, the modem will respond to commands, but after a call is made and the telephone is answered on the remote end, the modem automatically switches to the on-line mode. In the on-line mode, the modem will not recognize modem commands.

To get the modem to go off line so that it will respond to keyboard commands, several "attention" characters must be sent to the modem. The modem usually comes with a default attention character (for example, the '+' is the default attention character for the Hayes Smartmodem), but that character can be redefined. This feature is useful for bulletin board software developers because it allows them to have the attention character redefined before each caller enters the system. Without a redefinition of the attention character, system saboteurs could cause the bulletin board to "lock up" by issuing the modem attention command during a communication session.

Set Disconnect Character. Some modems allow a user to specify a special character string that will cause the modem to sever the connection and drop the carrier signal (go "on hook") when a call is completed. The carrier signal is the unaltered signal that is constantly transmitted and received whenever a modem connection is established between two computer devices. When information is transmitted, it alters the carrier. This signal encoding is sometimes described as having the information superimposed, or "riding," on the carrier signal.

The character string usually consists of two or more characters that must be sent to the modem sequentially from the local terminal. Characters received from the remote terminal or computer will not produce the same results. This is a useful capability when the modem is used to call a host system that

leaves the carrier connected long after a log-off command has been received. The carrier signal must be dropped and the local modem returned to an "on hook" status before the local system can make another call.

Modem Register Contents. Communications software packages must sometimes query the contents of a modem's internal memory registers to detect and modify the contents of the registers or to detect those changes in register contents that act as signals to initiate software functions. A modem should provide commands that allow a software package to both query and modify the contents of its registers. This is particularly useful in bulletin board software design because such parameters as the speed (bps), parity, and number of data bits must be detected when the modem answers an incoming call.

Modem Switches. Some communications software packages require that special signals be either present or absent between the computer and a modem for the program to function properly. For example, *PC-Talk III* requires that switch 1 (Data Terminal Ready) on the stand-alone Hayes Smartmodem be in the down position for communications parameters to be changed while on line with a host system. If switch 1 is up, the carrier and the connection with the remote computer are lost during the parameter change. Modems must allow these signals to be set through either software control or manual switch control. The ideal design would allow manual and software changes.

Built-In Self-Tests. Built-in self-test features allow a modem to be tested as a stand-alone device or in conjunction with a similarly equipped remote modem. The tests verify the modem's ability to send and receive data accurately. The three types of test modes are the analog loop-back self-test, the digital loop-back self-test, and the remote digital loop self-test.

The analog loop-back self-test verifies the operation of a local modem as a stand-alone unit. Data is sent from the self-test circuit through the modem's transmitter. The transmitter output is routed back into the modem's receiver, which then routes the data back to the self-test circuit. The self-test circuit compares transmitted patterns to received patterns and signals whether there are any errors.

The digital loop-back self-test verifies the operation of a remote modem. With the help of the remote modem operator (to change switch positions on the remote modem), data is sent from the local modem and looped through the receiver and the transmitter of the remote modem. When the data is received back at the local modem, it is compared with the original transmitted data. If errors are detected,

A board-mounted modem is a logical choice for the owner of an IBM PC-compatible portable who wants to minimize the number of gadgets to be carried along.

the modem notifies the local user. The remote digital loop self-test is identical to the digital loop-back self-test except that it can be performed without remote operator assistance.

Stand-Alone or Board-Mounted. Many modem vendors have introduced new modems designed to be installed in a PC expansion slot. Although they perform essentially the same functions, the stand-alone model and the expansion board design each has specific advantages and disadvantages.

A board-mounted modem is a logical choice for the owner of an IBM PC-compatible portable who wants to minimize the number of gadgets to be carried along with the computer. People who own a PC XT or a PC with an expansion chassis might also select a board-mounted modem, since those computers have additional expansion slots available and larger heat-removal capacity than the PC. People who want a complete communications hardware package that requires no external cables, boxes, and power supplies might also want a board-mounted modem.

Board-mounted modems must have some method to communicate dialing information to the PC user, such as the number being dialed, whether dialing has been completed, and whether a connection has been made to a remote system. Some board modems use either the PC speaker or one located on the modem board to help the user understand what is taking place after a call has been initiated. The user can hear the telephone dialing and the results of the call. Other modems use screen messages to indicate the status of a call.

A stand-alone modem is a good choice for people who use several computers and terminals, all of which require a modem for communication with other devices. This type of modem is easily moved from one device to another. A stand-alone modem is also a good choice for communications software developers and bulletin board operators.

Stand-alone or board-mounted, a modem can open up the world of computer communications. Despite the extensive range of features described here, most modems are designed to run transparently; that is, the end user probably won't spend much time or effort controlling or operating the modem. ●

Larry Jordan is a freelance writer who manages power plant start-up engineers for the NUS Corporation. He coauthored the book Communications and Networking for the IBM PC, published by The Brady Company (Bowie, Maryland, 1983).

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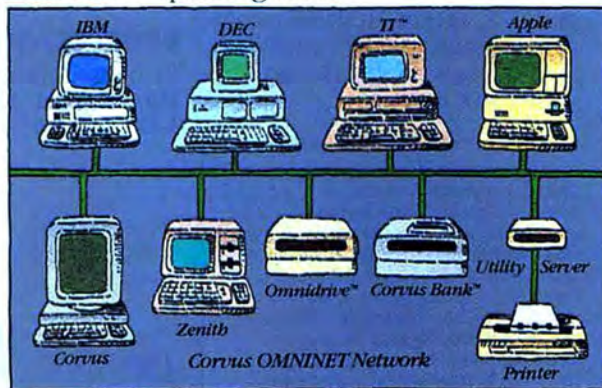
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The Communicators

Telecommunications can broaden your horizons and connect your computer to the outside world. A look at the most important features of communications programs will help you select the package that's right for you.

Larry Jordan

When my IBM PC was delivered in February 1982, I selected a communications software package easily. The only two available were COMM.BAS, which came on the PC-DOS disk, and the *IBM Asynchronous Communications Support* package. I did not know much about personal computer communications at the time, but the thought of being able to operate the office mainframe from my house intrigued me. Without knowing

what I was getting into, I immediately purchased the *IBM Asynchronous Communications Support* package, a Hayes Smartmodem, and an asynchronous communications board. After putting all the pieces together and making several awkward attempts to communicate with the office Prime computer, I really started rolling. I could use my modem to converse with the Prime, and the modem would dutifully follow my every whim. I could also churn out hundreds of lines of FORTRAN without going anywhere except to the refrigerator for a soda. I felt I had all I would ever need for communications.

Then I discovered electronic bulletin boards. The first time I called a local bulletin board I learned that my communications software was not quite as capable as I had thought. There were software patches (a fancy word for software enhancements or error corrections) and games available

on the board, but I had no way of capturing the program listings as they scrolled by on my monitor.

By talking with friends I learned that I needed software that would transform my IBM PC into a smart terminal with the ability to send and receive disk files. The *IBM Asynchronous Communications Support* package was supposed to provide that capability, but it had many limitations. After several futile attempts at modifying the IBM package, I gave up and started adding enhancements to the COMM.BAS program. At about that time I received my first copy of a communications package called *PC-Talk*. Not only did this package give me the smart-terminal capabilities I needed, but it also included excellent documentation and easy-to-follow source code.

Since those early days of PC communications, many powerful smart-terminal communications programs have been released for the PC. Some were initially designed for CP/M-based computers

and have been converted to operate under PC-DOS; other new packages have been written specifically for the IBM PC. Due to the large number of communications programs currently available, it is more difficult than ever to choose.

As with any software package, no single communications program is likely to satisfy all wants and needs. The best one can hope for is to find a package that provides most of the essential features and some additional nonessential but desirable features.

Although business and personal applications of communications software are often different, some common capabilities are required by both. Business and personal applications usually require sending and receiving disk files and communicating in terminal or conversation mode. Many business applications require sending longer files than would normally be sent in personal telecommunications. The remainder of this article discusses the common capabilities to look for in these two types of software.

Basic Communications Features

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.

Xmodem protocol file transfer. The Xmodem protocol performs 99.6 percent error-free error detection on transferred blocks of data and automatically retransmits er-

roneous 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. Although Xmodem is the most widely used error-checking scheme, other protocols, such as Columbia University's Kermit and Microcom's Microcom Network-

numbers. Numbers that are buried in command or batch files are often inconvenient to locate.

Automatic dialing. Information services and bulletin boards are frequently busy. Most communications packages can automatically redial the last number dialed. However, some packages can also redial a number until a connection

By talking with friends I learned that I needed software that would transform my IBM PC into a smart terminal with the ability to send and receive disk files.

ing Protocol, are gaining ground. Keep in mind that both the transmitting and the receiving computers must use the same protocol.

XON/XOFF handshaking. During telecommunications at rates greater than 300 bits per second (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 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

is made. In some cases the software provides an alarm signal when the connection is finally established. Another option for automatic dialing allows you to set up a dialing sequence on your directory. You can instruct the modem to call one number after another until a connection is 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 (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 have 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 at a time) and full-duplex (bidirectional) communication modes (see Figure 1). Most information services and bulletin board systems operate in full-duplex mode, but other systems may operate in half-duplex mode. When operating in half-duplex mode, either the program or the modem must display outgoing data on your screen. This feature is called local copy (see Figure 2).

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 data transmission speed in bps, parity type, number

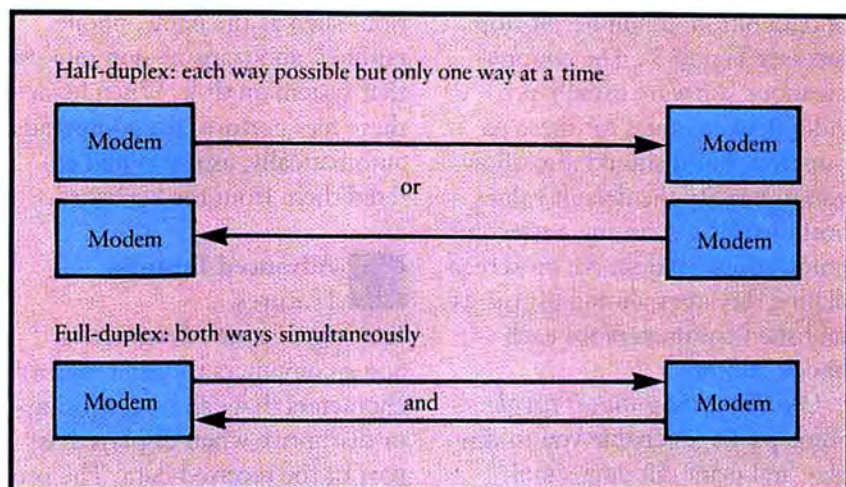


Figure 1: Data communications modes

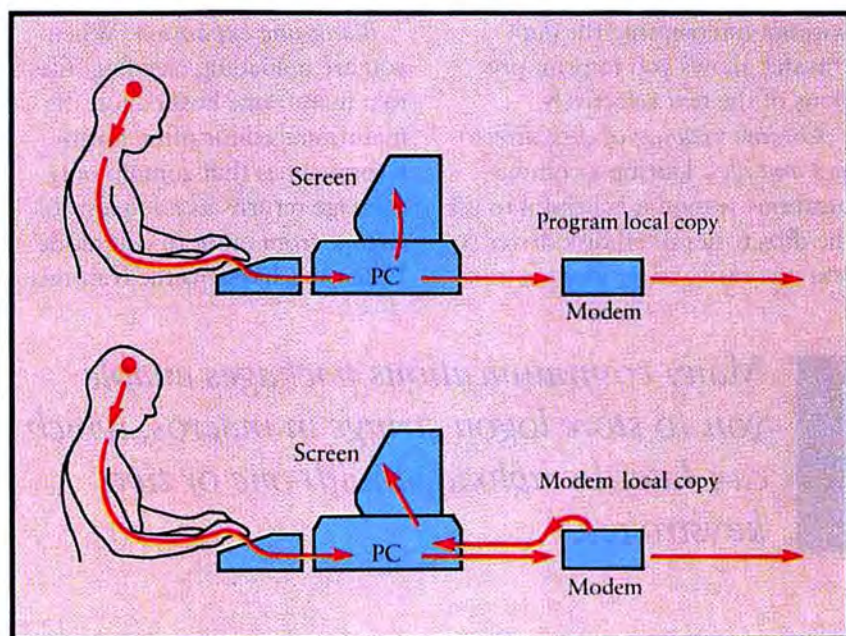


Figure 2: Program local copy versus modem local copy

of data bits, and number of stop bits (see Figure 3). 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 trans-

mission—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.

■ Advanced Business Features

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

Blank-line expansion. When you are 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 transmis-

sion, 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-frequency signal can be a useful feature.

Many communications packages enable you to store logon strings in macros, which can later be uploaded with one or two keystrokes.

fer or make sure that the file name for received text is not currently in use. Some 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 informa-

tion 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 line-

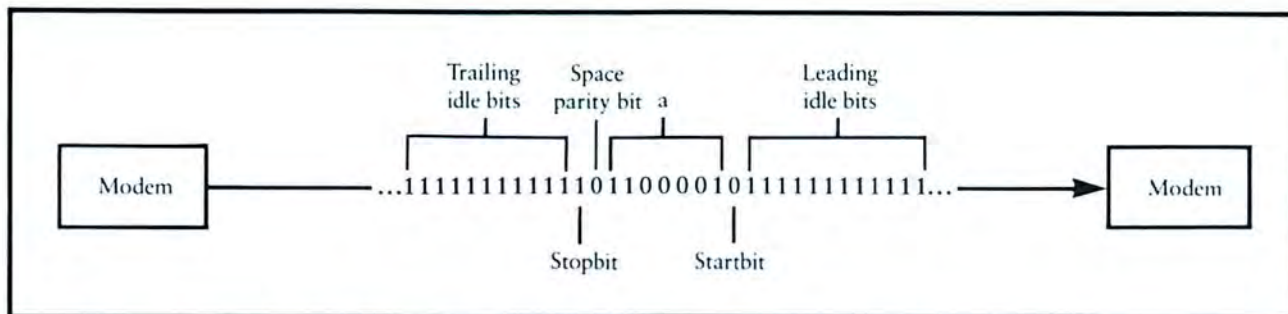


Figure 3: Configuration of bitstream for binary "a"

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.

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 to execute at a time when telephone costs are low.

Remote takeover and operation. Some communications packages allow users to call in from a remote computer and control the main computer as if they were sitting in front of it. To perform this function both systems must be using the same communications software.

Terminal emulation. As PC-to-mainframe communication increases, 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 communication 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.

Help and Documentation

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.


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. ☸

Larry Jordan is a freelance writer and consultant for NUS Corporation. He coauthored the book Communications and Networking for the IBM PC, published by The Robert J. Brady Company (Bowie, Maryland, 1983).

The Boom in Business Graphics

“Let us in no way minimize the opportunity, or the danger, involved. The 30 minutes an executive spends on his feet formally presenting his latest project to corporate superiors are simply and absolutely the most important 30 minutes of that or any other managerial season.”—Walter Kiechel III, *Fortune* magazine

David L. Wilcox

 The importance of business presentations led to the production of more than 557 million slides for those events in 1983, more than twice as many as in 1978. In 1983 computers generated 16 million of those slides, up from only 300,000 in 1978 (Hope Reports, Inc., Rochester, New York). The pattern is clear: businesspeople are discovering that graphics are a quick and efficient way to communicate. The written word is often the only effective way to relate complex information, but reading or listening to words is a slow process. The mind is capable of grasping information much faster than the average person can speak. What's more, the mind retains a visual representation of data with greater accuracy and for a

longer period of time than it does a written equivalent. Try an experiment on yourself. Read the paragraph in Figure 1. How long does it take you to comprehend the significance of the data? Now look at Figure 2, a graphic representation of the same data; instantly the trend is clear.

With reams of computer printouts full of data to present, today's business professional is crippled without the use of conceptual shortcuts. But many professionals who would benefit from computer graphics don't take advantage of them, finding the field confusing, riddled as it is with jargon like *resolution*, *pixels*, and *raster scan*. For someone who needs to evaluate microcomputer-based graphics for his or her organization, the best approach is to read the literature and learn the jargon. However, the technology barrier can be sidestepped by finding the answers to some basic questions.

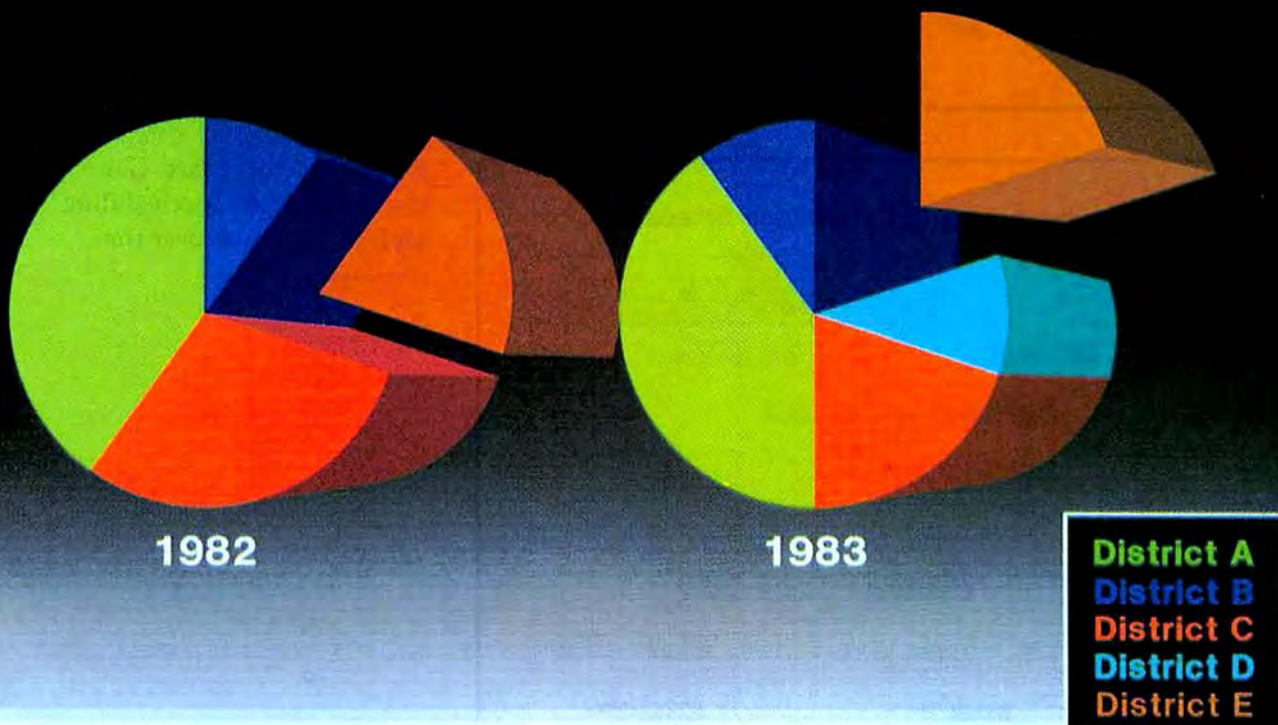
Why Use Graphics?

Computer graphics can be used in a variety of ways, from artistic expression to computer-aided design and manufacturing. However, the dominant use of computer graphics is for representing data in a readily understandable visual format. Data representation can be used for a wide spectrum of applications. For example, stock analysts and brokers can use computer graphics to view changes in stock price and volume charts from a central data base, and a soft drink company can use them to present sales and advertising plans for a new soda to its bottlers (see Figure 3).

Exploded pie charts. By dissecting and exploding pieces of the visual pie, you can focus the viewer's attention on the point you want to make.

Created using Graphwriter. Source: Frost and Sullivan, Inc.

MARKET SEGMENTATION



Compuco's After Tax Operating Income was between \$235 and \$300 million in the first 2 quarters of 1981 prior to the acquisition of Flodata. Since then quarterly income from Compuco's traditional business has declined steadily to a level just over \$100 million in the 3rd quarter of 1982. With quarterly income ranging between \$140 and \$240 million, Flodata has more than doubled Compuco's After Tax Operating Income during the first three quarters of 1982.

Figure 1: Text chart. Compare the time it takes to read and understand this paragraph with the time it takes to comprehend the message in Figure 2.

Created using Graphwriter

THE FLODATA ACQUISITION RESCUED COMPUCO PROFITS

After Tax Operating Income in Millions

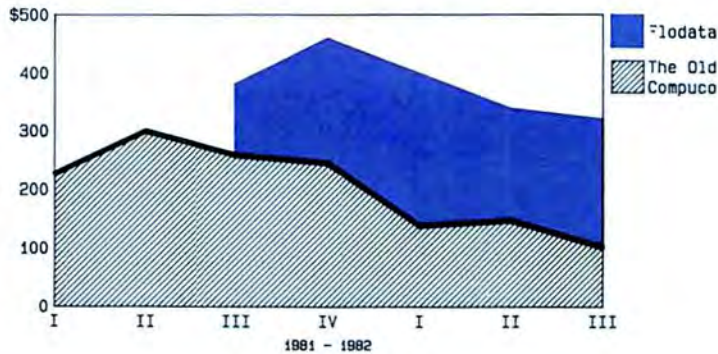


Figure 2: Multiple area graph. The message is the same as in Figure 1, but the trend can be comprehended in a fraction of the time.

Created using Graphwriter

Advertising and Promotion Schedule

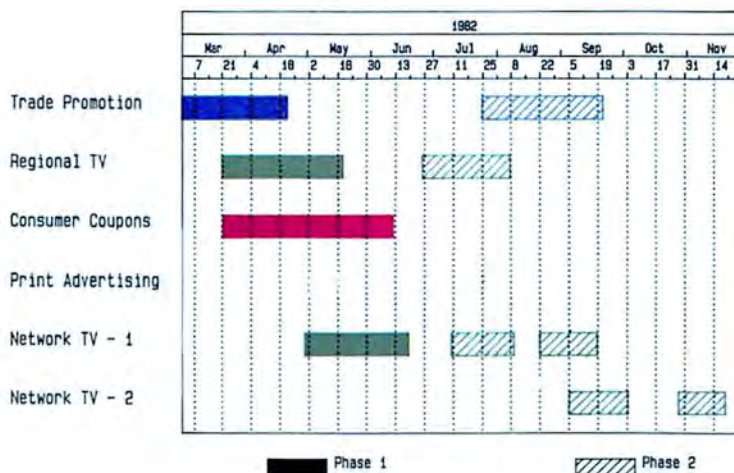


Figure 3: Gantt chart. Gantt charts are used for scheduling multiple activities over time.

Created using Graphwriter

The verbs used in these two examples—*view* in the first and *present* in the second—indicate two fundamentally different requirements for data representation. In the case of the brokerage house, the objective is to use computer graphics as a window into large volumes of data, as an aid to the viewer in extracting information. Due to the widespread use of spreadsheets and data base management applications, this type of graphics—analytical—is generally the most prevalent kind of graphics application for PC users.

The soft drink company, on the other hand, is using presentation graphics to communicate a series of messages to an audience. Although often classified together, analytical graphics and presentation graphics place different demands on a graphics system. Understanding those demands and the extent to which PCs in your organization will be used to do each kind of application is a good starting point for evaluating graphics hardware and software.

What Graphics Are Needed?

Since the news media has long recognized the value of graphics, most of us are familiar with bar charts, pie charts, and line charts. These three types compose a core group of graphs that will suffice for most analysis applications. The ability to create these chart types can be linked directly to a data base management system (DBMS) or to a spreadsheet in an integrated package such as 1-2-3, and the wave of integration currently sweeping the software business will result in the addition of basic analysis graphics capabilities to most spreadsheet and DBMS packages.

In contrast, business graphics prepared for presentation use a wider range of graph types. While a single pie chart may be adequate for analysis, presentation of that analysis often requires multiple pies with proportional sizing, slices that are highlighted or “exploded,” and the ability to rotate graphics to a desired position. Some graphics programs enable you to present charts in a three-dimensional format. These customizing features are the domain of presentation, not analysis, graphics software.

Figure 4 identifies the chart types most common in a presentation environment. The two most frequently used chart types—line and vertical bar graphs—are predominantly used to show data over time. Non-time-oriented data (such as that shown in Figure 4) is most frequently shown by horizontal bars.

The verbs view and present indicate two fundamentally different requirements for data representation.

Note that several nonanalytical formats, such as organization charts and Gantt scheduling charts (for example, the chart in Figure 3) appear lower on the list in Figure 4. Although they are not as commonly used as other formats, they are unique and have no substitute; many presentations cannot be prepared without them.

Figure 4 does not include the most frequently used format—the text or word chart. The intensive use of text in presentations is a factor often overlooked in selecting a computer graphics system for presentations. Many presentations would also benefit from the use of a freehand drawing capability. Although this area is not easily converted to a computerized application, some freehand graphics programs like those developed for Apple Computer’s Lisa and Macintosh are becoming available for the PC and will be added to business graphics products in the near future.

How Do I Select a Graphics Package?

Defining the audience for your graphics is probably the most important step in deciding which system to choose and how much money you should spend. Failure to address this question thoroughly can invalidate your investment. First decide whether you need analysis graphics, presentation graphics, or both. Then identify those systems that offer the necessary charting and text capabilities.

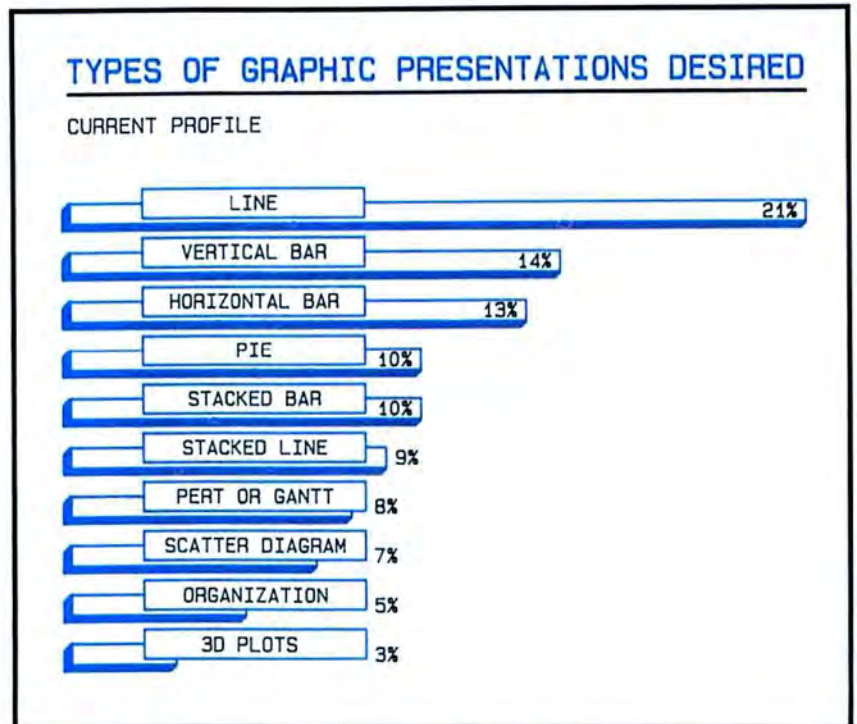


Figure 4: Horizontal bar chart. Line, bar, and pie charts make up the majority of graph types used in presentations.

Created using Gengraphics Series 10000

You should also consider who will be using the system. If you have only yourself to consider, the process is easy—buy what you want. In the typical office, however, presentations are prepared by a subordinate for review by the author and his or her peers and su-

For analytical graphics the ability to import data from other application programs is key.

periors. If there will be more than one user, you should show samples from various graphics systems to key users. Even if you make the final purchasing decision alone, employees and co-workers can offer valuable opinions and point out problems you might have missed. Show screen displays and hard copy output to those who will use the system for analysis graphics and show hard copy output and color slides to those who will frequently give presentations.

In addition to securing the endorsements of users, make sure the packages you are evaluating offer the necessary output options. Output options include slides, transparencies, paper (hard copy), horizontal and vertical plots, oversize output, multiple charts per page, integrated text and graphics, and color. Most systems do not create all of those charts equally well, and some not at all, so a list of your priorities is helpful.

To encourage everyone in your organization to use a graphics program, you will probably want to buy software with a menu-driven approach and on-screen help. Creating a simple graph should not require the use of a manual. A couple of products on the market provide fill-in-the-blanks input forms that can be used to guide an operator through the production of a chart.

Editing, storing, and retrieving charts should be simple, and the program should be flexible. You should be able to move quickly to any graphic or text element and make changes. If all data entry must be completed before a change can be made, the time needed for corrections increases dramatically, and so does the probability of error.

One irritating problem with most graphics software is the limited number of characters allowed for text and legends. The presenter should not be forced to use abbreviations that need to be explained verbally. Each chart should include sufficient information to stand on its own.

When refining or updating a graph, you will frequently need to make changes in the size, the color, and the location of the text. While analytical systems typically offer little or no flexibility in these respects, these customization features are becoming more common on presentation systems. The most sophisticated systems on the market today can automatically adjust the layout of the text and graph areas. The ability to preview the graph on screen is another important feature, and the ability to produce a fast hard-copy proof is useful, especially if an author is not producing his or her own charts.

Documentation for a graphics package should include a catalog of available charts. System capabilities should be communicated by pictures, not prose. If your graphics package does not include a chart book, make one and give copies to every presenter. All the system's users should understand what the system can and cannot do before a presentation is prepared.

Where Will the Data Come From?

For analytical graphics the ability to import data from other application programs is key. Select an integrated program or one that can accept data from the spreadsheet or data base that you are currently using. However, for presentation graphics, which frequently integrate data residing in different data bases and noncomputer sources, quality and capability generally outweigh data compatibility considerations. Presentation graphics usually incorporate less data and more text than do graphics used for analysis. It is usually faster to type in additional text than to search through and import parts of an external data base.

Nonetheless, the ability to import data from frequently used data bases is an important consideration, especially if you plan to use the same program for analysis and presentation. If the program supports the popular .DIF file format, it can be used with a number of programs, including *VisiCalc* and *1-2-3*. Some programs can also read popular mainframe formats such as FORTRAN flat files. A multiple-window operating environment, which enables powerful stand-alone programs to interact with each other, may be the best solution for developing presentation graphics from a variety of sources.

The Demonstration

Once you have answered the basic questions outlined here, you should be able to narrow your choices to a few graphics packages that suit your needs. At that point nothing substitutes for a hands-on demonstration of the packages that you are considering. Some salespeople will offer you a "canned" demonstration of the system, but you should also insist on a chance to sit down yourself and actually produce a chart. Have samples of some commonly used charts available so you can reproduce them using the system. Critical shortcomings and potential problems that may have been overlooked will quickly surface. Make sure the hardware and software configuration you are testing is comparable to the one you have budgeted for; hardware can make a difference in the quality of the output.


High-quality graphics software and peripherals can bring benefits the first day. By carefully selecting a package that addresses your requirements, you can ensure that when it's time for your 30-minute presentation, your software won't add to the stage fright, but will reduce it. ●

David L. Wilcox is vice president of sales at Graphic Communications, Inc., in Waltham, Massachusetts.

Cooking Up a Batch File

A batch file for the PC is like a recipe. In a few simple steps, you can whip up a file of DOS commands that automatically execute in a sequence you specify. Quick, easy, and error free—if you use the right ingredients.

David Arnold and Seth Novogrodsky

 A batch file is a text file of one or more DOS commands and contains the file-name extension .BAT. Any DOS command, including those that call application programs, can be used in a batch file. To execute the commands contained in a batch file, type the file's name without the extension. Batch files that contain only internal DOS commands such as COPY, DIR, and B: can be run from any disk or drive. But to use batch files that call external DOS commands such as FORMAT, CHKDSK, and COMP or call application programs such as *WordStar*, *dBASE*, and *1-2-3* (using the program mnemonics WS, dBASE, and 123 respectively), the command files called must be in the drive specified (or assumed as the default) by the batch file command. That is also true for any external command issued from the keyboard at the DOS prompt. For example, FORMAT.COM must be in drive B: when you (or a batch file) give the command

B:FORMAT A:. Batch file commands, however, execute as soon as the previous batch file command is done. Thus, if DOS finds a command file missing, it will display the message 'File not found', and the batch file will continue with its next command, producing unexpected results.

You can create a batch file using the COPY CON: *filename* command (which is shorthand for *copy from the console*, or keyboard, to the specified file) or a text editor such as EDLIN. This article assumes that you are using DOS 2.00 or a later version. The ECHO and IF commands will not work properly with earlier versions.

AUTOEXEC.BAT is a special batch file that executes automatically when you power up the system or reset it by pressing <Ctrl>-<Alt>-. It is just like any other batch file, however, in that it may be executed from DOS at any time by typing **AUTOEXEC**. Many software packages include AUTOEXEC.BAT files to assist you in running an application.

Stopping a Batch File

Occasionally, you may want to halt the execution of an AUTOEXEC.BAT file or some other batch file. As with most DOS operations, you can usually stop the execution of a batch file by pressing <Ctrl>-<Break>. This aborts the current operation, and the message 'Terminate batch job (Y/N)?' is displayed. You must decide whether to abort the batch instructions entirely or continue with the remaining operations.



To prepare for the following batch file experiments, first power up the system with the original DOS disk in drive A:, and format a new disk in drive B: with the command **FORMAT B:/S** <Enter>. Next copy CHKDSK.COM to the disk in drive B: by typing **COPY CHKDSK.COM B:** <Enter>. Then replace the DOS disk with the DOS Supplemental Programs Disk (the other disk in the back of the DOS manual), and copy all the BASIC programs from that disk onto the disk in drive B: by typing **COPY *.BAS B:** <Enter>. Now change the default drive to B: by typing **B:** <Enter>. As with all DOS commands, you may type the commands in uppercase, lowercase, or both.

Experimenting with batch files is the best way to discover how you can take advantage of them. For example, you might want to make copies of all the BASIC programs on a given disk. Such a precaution might prove useful in the event that a program is inadvertently erased or the disk develops a defective sector. You can type **COPY *.BAS *.BA2** <Enter> to do this, but rather than typing this cumbersome command each time you want to make copies of your BASIC programs, you can type it into a batch file only once and then use that batch file to perform the operation. At the B> prompt, type the following (notice that <Enter> is pressed at the end of each line):

```

COPY CON: DUPLIC.BAT <Enter>
COPY *.BAS *.BA2 <F6> <Enter>
  
```


Hints From the Help Screen

The gallery of *Help Screen* queries contains an explanation of how a batch file tests for an empty DOS variable.

Q. I developed a "no frills" on-line help system for people in my office who are reluctant to use the DOS manual. It consists of several ASCII files, each containing up to a full screen of information on a particular command. These screens are called up via a batch file called HELP.BAT.

The ASCII files themselves are straightforward. Each has been given the name of the corresponding command and the extension .HLP; for example, COPY.HLP gives information about the COPY command.

HELP.BAT is also straightforward. Its only instruction (other than coloring the screen to identify a "help" screen) is TYPE %1.HLP. HELP.BAT works fine except that I don't like the way users must call HELP.HLP, which tells how to use the help facility. Typing HELP HELP works, but I would like to get the same result by just typing HELP. I tried IF %1 = "" and IF %1 = " ", but neither worked.

*Leo Lefkowitz
Houston, Texas*

A. Only two minor errors stand in your way. First, a batch file conditional test (the IF command) for string equivalency is requested by the use of two equal signs. Second, batch files use the space, not the quotation mark (as does BASIC), to delimit a string. So how do we represent an empty string and avoid the syntax error generated when the double equal signs are followed by a blank? The answer lies in the way DOS concatenates strings and DOS string variables (%0, %1, %2, etc.). Simply add a dummy character (for example, the x in the second line of the following listing) to both sides of the double equal signs. And always place the DOS string variable on the right side of the double equal signs. 'IF x = %1x' is only true when the DOS string variable %1 is empty. The listing that follows demonstrates the techniques you want for HELP.BAT:

```
if exist %1.hlp goto does
if x = %1x goto help
echo Help unavailable for %1
goto end
:does
type %1.hlp
goto end
:help
type help.hlp
:end
```


To create a batch file in this way, begin with the COPY CON: command. The batch file ends with <F6> <Enter> or <Ctrl>-Z <Enter> (which appears as '^Z'). COPY CON: tells DOS that the following keyboard (console) data should be copied into

Rather than typing a cumbersome command each time you want to make copies of your BASIC programs, you can type it into a batch file only once and then use that batch file to perform the operation.

the file named on the right (DUPLIC.BAT). The function key <F6> tells DOS that you are finished typing in the batch file.

To execute the batch file, type **DUPLIC** <Enter>. Note that the entire command appears on the screen as if you had typed in each character yourself. By displaying a directory of drive B: (**DIR B:** <Enter>), you can see that your batch file has made a copy of all the BASIC files and has given each a new extension (.BA2).

Batch files are useful for combining several commands into one. The next batch file displays a wide directory (DIR /W) and a disk status report (CHKDSK) with a single command. Type

COPY CON: DIRCHK.BAT <Enter>

DIR /W <Enter>

CHKDSK <F6> <Enter>

To execute this batch file, just type **DIRCHK** <Enter>.

An AUTOEXEC.BAT file can be used to initiate the use of a program automatically whenever the computer is turned on or rebooted. You can create a batch file that will automatically prompt you for the date and time, change the default to B:, and load WordStar from drive A:. To create this file, type

COPY CON: AUTOEXEC.BAT <Enter>

DATE <Enter>

TIME <Enter>

B: <Enter>

A:WS <F6> <Enter>

```
B>dirchk2 *.com

B>dir *.com/w

Volume in drive B has no label
Directory of B:\

COMMAND  COM      CHKDSK      COM
          2 File(s)      224256 bytes free

B>chkdsk *.com

362496 bytes total disk space
 22528 bytes in 2 hidden files
115712 bytes in 30 user files
224256 bytes available on disk

262144 bytes total memory
237568 bytes free

All specified file(s) are contiguous.

B>
```

Figure 1: DIRCHK2.BAT display using replaceable parameters

Replaceable Parameters

Many DOS commands are used with mandatory or optional parameters. The parameters are generally used to indicate disk drive designators or the names of files. Because the parameters will probably be different each time a batch file is executed, you will need to specify replaceable parameters (also called DOS variables) within the batch file, instead of actual parameters. Replaceable parameters are indicated by a percent sign preceding any single-digit number (%0, %1, and so on up to %9). When the batch file is executed, %0 is replaced by the DOS command itself (that is, the name of the batch file), %1 is replaced by the first parameter specified on the command line after the name of the batch file, %2 by the second parameter specified, and so forth.

Replaceable parameters make batch commands more flexible. For example, in the DIRCHK.BAT file shown, there is no way to designate a disk drive or a specific file. To create DIRCHK2.BAT, a file that uses a replaceable parameter, type


```
COPY CON: DIRCHK2.BAT < Enter >
DIR %1 /W < Enter >
CHKDSK %1 < F6 > < Enter >
```

With such a parameter, you can execute the DIRCHK2 command in a number of ways. Typing **DIRCHK2 A: < Enter >** asks for a directory and a CHKDSK (check disk) of drive A:. Typing **DIRCHK2 *.COM < Enter >** asks for a directory of all files having the .COM extension on drive B: (the default drive) and a CHKDSK of the specified files on drive B: (see Figure 1). By using replaceable parameters and asking for different variables during the execution of a batch file, you can achieve countless variations.

Subcommands

Four subcommands (ECHO, REM, PAUSE, and IF) enable the computer to communicate with you during batch file execution. By using the ECHO, REM, and PAUSE subcommands liberally within batch files, you become more aware of what the computer is doing while a batch file is executing.

ECHO. You may want to suspend the automatic display of DOS commands so the screen will not be cluttered. The ECHO subcommand can stop and start the automatic display of DOS commands as they are being executed from a batch file.

To disable automatic display, place an ECHO OFF command at the beginning of the batch file. Note that the ECHO OFF command is displayed as it is executed, although the commands following it are not. At any time you can determine whether ECHO is on or off simply by typing **ECHO < Enter >** from the DOS prompt. Normally ECHO is on.

ECHO can also be used to display messages while a batch file that has stopped displaying its commands is executing. To do this, put an ECHO command in the batch file, followed by the message (on the same line). For example, type

```
COPY CON: DIRCHK3.BAT < Enter >
ECHO OFF < Enter >
ECHO * DIRECTORY & STATUS REPORT * < Enter >
DIR %1 /W < Enter >
CHKDSK %1 < F6 > < Enter >
```

As usual, you can run the batch file by typing **DIRCHK3**, and you can indicate the appropriate disk drive as an optional replaceable parameter, as in **DIRCHK3 A:**.

REM. You may want to include remarks in a batch file. Although you can display comments with the ECHO subcommand, you may want to include general comments about the purpose of the batch file by using the REM subcommand (REM stands for *re-mark*). The REM subcommand consists of 'REM' followed by a space and a comment (on the same line). Remarks can be up to 123 characters long. Unless the ECHO feature is turned off, the remarks (along with 'REM') will be displayed on the screen while the batch file is being executed. To demonstrate these features type:

```
COPY CON: REMARK.BAT < Enter >
REM This is a sample batch file that demonstrates the REM
< Enter >
REM command. These REMarks will be displayed when
< Enter >
REM this batch file is executed. < Enter >
ECHO OFF < Enter >
REM This remark will not be displayed. < F6 > < Enter >
```

By using the ECHO, REM, and PAUSE subcommands liberally within batch files, you become more aware of what the computer is doing while a batch file is executing.

Now type **REMARK** and press <Enter> to run the batch file. The ECHO OFF command stops the display of DOS commands so that the text of the remark that follows is not shown.

PAUSE. The PAUSE subcommand halts the execution of a batch file and displays the message 'Strike any key when ready ...'. At this point you must press any character key (including the <Enter> key, the <Esc> key, or the <Space> bar) to resume execution of the batch file. The PAUSE subcommand can be used to produce another variation of the DIRCHK batch file. To try this out, type the following:

COPY *.*

The gallery of *Star-Dot-Star* queries contains a tip on how to use a RAM disk to speed the execution of a batch file and reduce wear and tear at the same time.

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 against excessive wear.

As shown in the following listing, my AUTOEXEC.BAT files create a disk emulator, copy a batch file containing the remainder of the start-up commands into the RAM disk, and then transfer execution to that file.

```
echo off
ramdisk c: > nul
copy continue.bat c: > nul
c:continue
```

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 last command shown in the following batch file causes a secondary copy of the DOS command processor (COMMAND.COM) to take control and to receive its input from the disk file CONTINUE.SPL instead of from the keyboard.

```
echo off
ramdisk c: > nul
copy command.com c: > nul
copy continue.spl c: > nul
c:command < c:continue.spl
```

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.


```
COPY CON: DIRCHK4.BAT < Enter >
ECHO OFF < Enter >
ECHO * DIRECTORY & STATUS REPORT * < Enter >
DIR %1 /W < Enter >
ECHO * Status report coming up * < Enter >
PAUSE < Enter >
CHKDSK %1 < F6 > < Enter >
```

IF. Using the IF subcommand, you can write a batch file that performs certain operations only if specified conditions are met. You can also base the

An AUTOEXEC.BAT file can be used to initiate the use of a program automatically whenever the computer is turned on or rebooted.

conditional execution of a DOS command on the value of a replaceable parameter. (See the sidebar “Hints from the Help Screen” for an example of how to have the IF subcommand test for an empty replaceable parameter.)

The following batch file displays the directory entry of a file specified by the first parameter (%1) no matter what second parameter is specified. And if an optional second parameter (%2) has the value of T, the contents of the designated file (%1) will also be displayed on screen. Type

```
COPY CON: DIRTYP.BAT < Enter >
DIR %1 < Enter >
IF x%2==xT TYPE %1 < F6 > < Enter >
```

To display the directory entry of COMM.BAS, and the file’s contents, type **DIRTYP COMM.BAS T** < Enter > .

Just as a baker must determine whether all the ingredients are available before starting to make a cake, you may want a batch file to determine whether a file exists before the batch file performs a certain DOS operation. The IF command allows you to make the execution of a DOS command dependent upon the existence of a specified file. For example, you can create a batch file that will display the directory listing for a file. Type

```
COPY CON: CHKFILE.BAT < Enter >
ECHO OFF < Enter >
ECHO This file helps prevent duplication of file names.
< Enter >
IF EXIST %1 DIR %1 < F6 > < Enter >
```

You can test this batch file by typing **CHKFILE COMM.BAS** < Enter > . Now try executing the command with a file not on the disk. For example, type **CHKFILE NEWNAME** < Enter > .

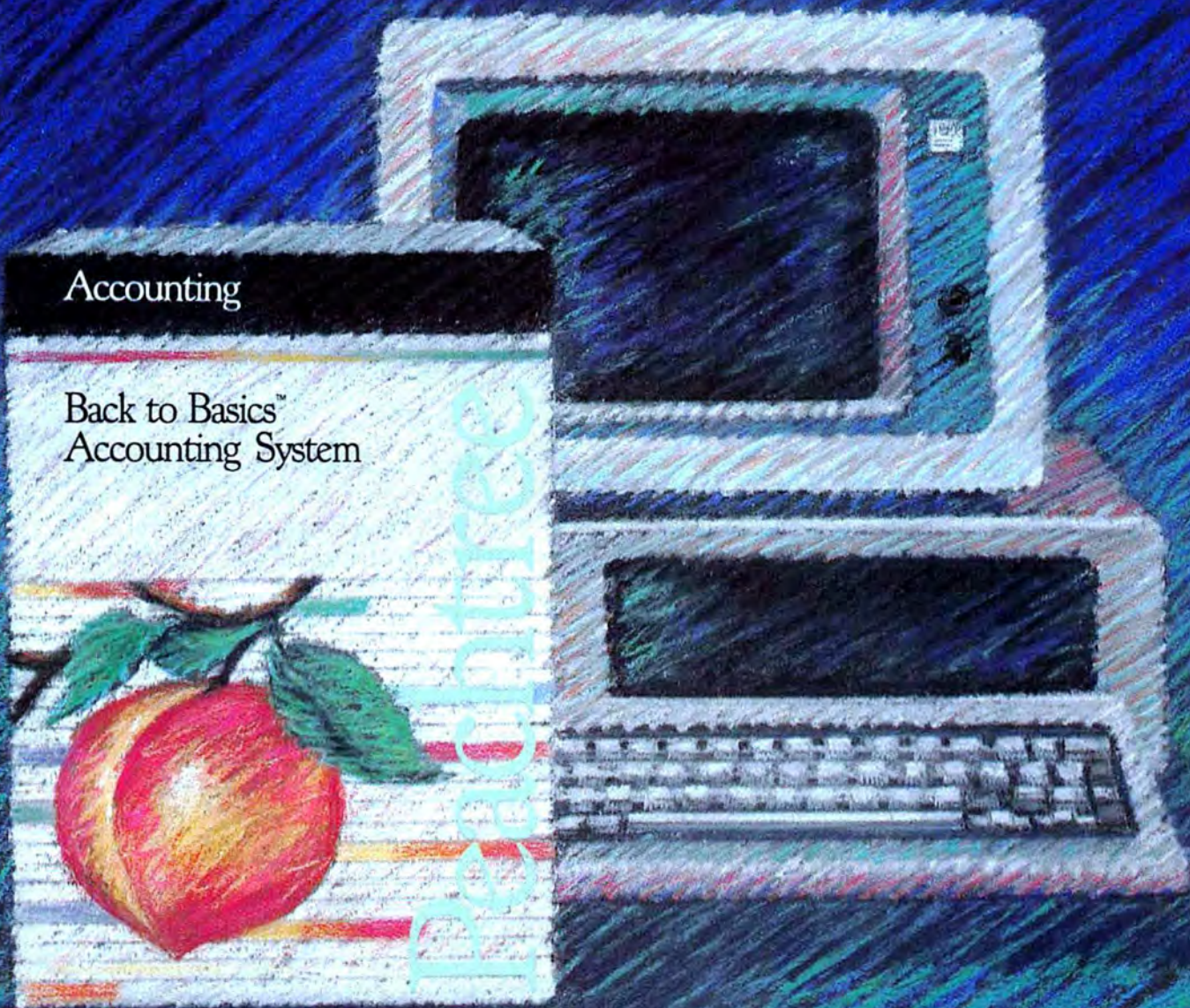
You can negate the condition in an IF command by typing NOT immediately after IF. You might want to replace the last line in CHKFILE.BAT with **IF NOT EXIST %1 ECHO File %1 does not exist**. This command will check the disk’s contents to see if the named file exists. If the file doesn’t exist, a message on the screen will say so.

Because any DOS command can be executed in a batch file, you can have your computer perform a series of complex operations while you sit back and watch. (See the sidebar “COPY *.*” for a tip on using a RAM drive to speed the execution of a long batch file.) You needn’t be an experienced programmer to start cooking up batch files. Try your hand—and bon appetit. ●

David Arnold is a professor of sociology at Sonoma State University in Rohnert Park, California. He teaches a course on computers and society and has written a book about the IBM PCjr, published by Holt, Rinehart and Winston. Seth Novogrodsky is a Contributing Editor to PC World Books.

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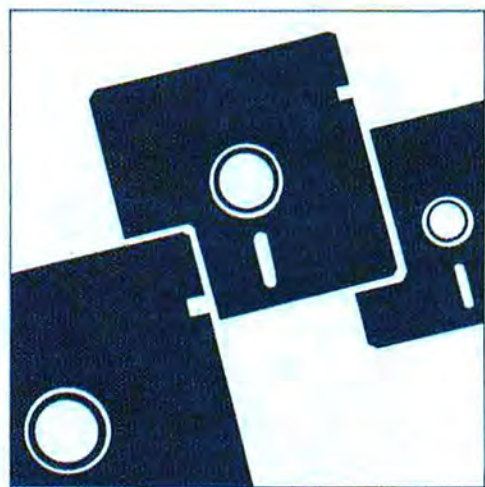
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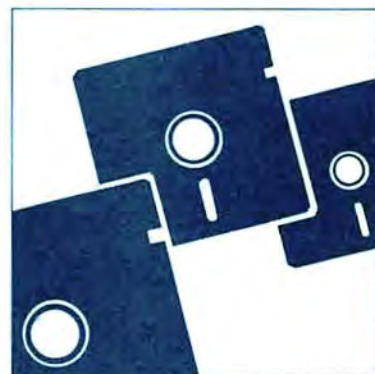
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CD or CHDIR (Change Directory)
CHKDSK (Check Disk)
CLS (Clear Screen)
COMP (Compare Files)

ACTIVE

BACKUP d:[path][filename[.ext]] d:[/S] [/M] [/A] [/D:mm-dd-yy]
d: - the hard disk drive that you wish the backup to be performed on
path - the path to the sub-directory you wish to
... More ...

BACKUP

PURPOSE Used to back up one or more files from a hard disk to diskettes

EXAMPLES:

BACKUP C:\ A: /S

Causes all files on drive C to be backed up to drive A.

... More ...

BACKUP

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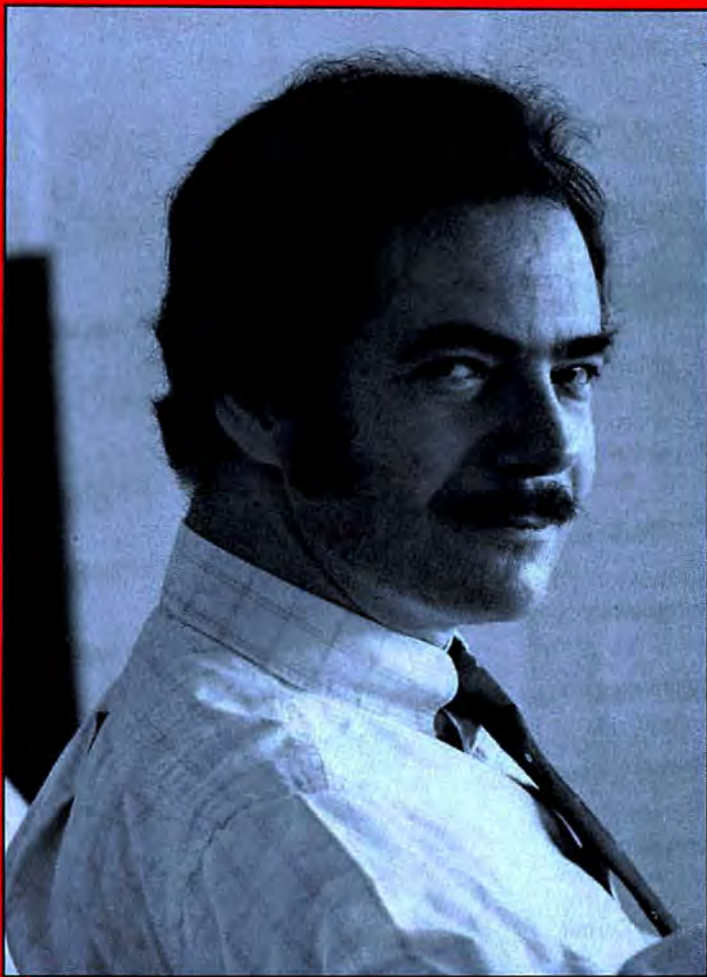


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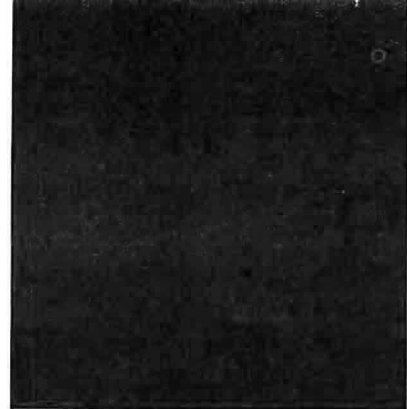
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..*

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This month: a translate routine in BASIC, a program to update the system clock, and a tip for using Turbo Pascal

Edited by Steven Cook

Reader Richard McQuillan of Oakland, California, reports that as an authorized service technician he has received numerous warnings from IBM regarding the use of the SHIPDISK.COM program on the XT Diagnostics disk. Although the technique presented by Guy Zumpetta ("Parking Problem," *.*., PCW, January 1985) involves loading a special version of COMMAND.COM and therefore may be safe to use, it has not been endorsed by IBM. Mr. McQuillan recommends against using SHIPDISK.COM except as described in the *Guide to Operations* manual.

Several readers have written after testing a patch to prevent FORMAT.COM from operating on hard disks ("Format Fix," *.*., PCW, Vol 2, No. 12) and finding that the patched program does not halt when instructed to format disks in drives other than A: and B:. Rest assured that the patch works. DOS knows which drives are hard disk drives and which are not. The patch allows formatting of floppy disks in any drive, but it will stop any attempt to format a hard disk.

Parlez-Vous Anything?

In the course of developing software for the PC, I've encountered several situations that called for a translate function. Such a function is an intrinsic part of most high-level languages, but it is absent from BASIC. After some thought I devised the function shown in line 10 of XLATE.BAS.

The function looks very complicated—almost impossible to interpret—but if you study it closely you'll see that it performs a lookup-and-translate operation.

The FNXLATE\$ function can be used for a wide variety of translation tasks, such as changing lowercase to uppercase, single characters to multiple characters, decimals to fractions, and month numbers to month names.

Note that when the source list entries are longer than 1 character, you may need to place a character between each of them to prevent false matches. In lines 70 and 90 a space is used for that purpose.

Remember to enter the function as one unbroken line. For each line, press <Enter> only after typing the final character, that is, only prior to typing lines that begin with 20, 30, 40, and so on.

*Walt Muncaster
Deatsville, Alabama*

Date to Remember

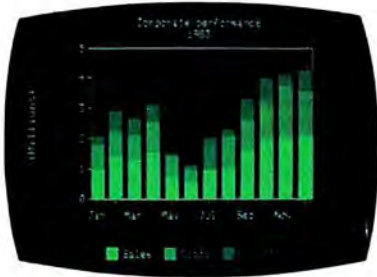
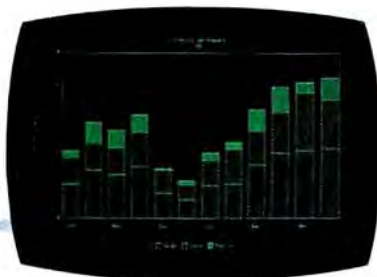
I have no clock/calendar in my PC, and I find it annoying to have to enter the same date several times a day. To alleviate the problem I have written the program DATENOW.COM. The program has two functions. One is to read the date from the disk file A:\DATE.DAT, and the other, invoked by the command DATENOW U, is to update the date on disk (only an uppercase U will activate the update mode).

Place the lines shown in DATEN.BAT in an AUTO-EXEC.BAT file. Each time the computer is started with that file, it will read the date from the DATE.DAT file, allow you to confirm or correct it, then store the revised date. If the date is correct,

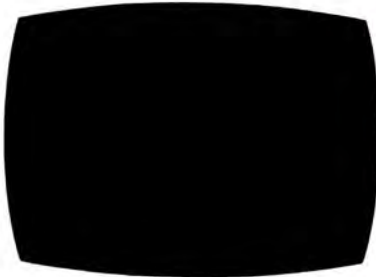
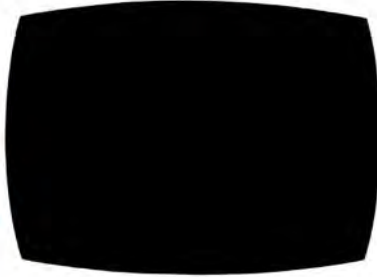
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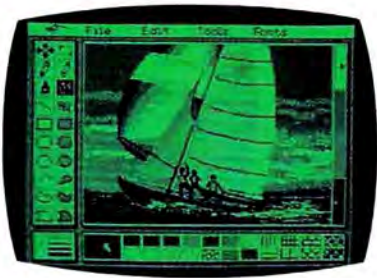
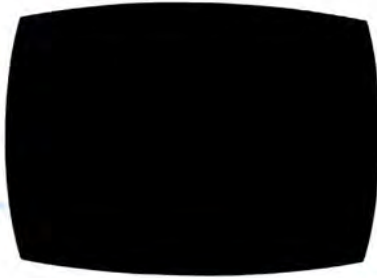
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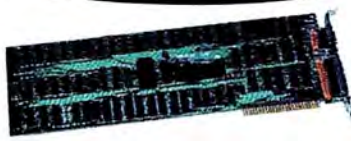
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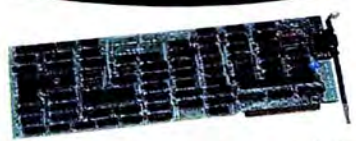
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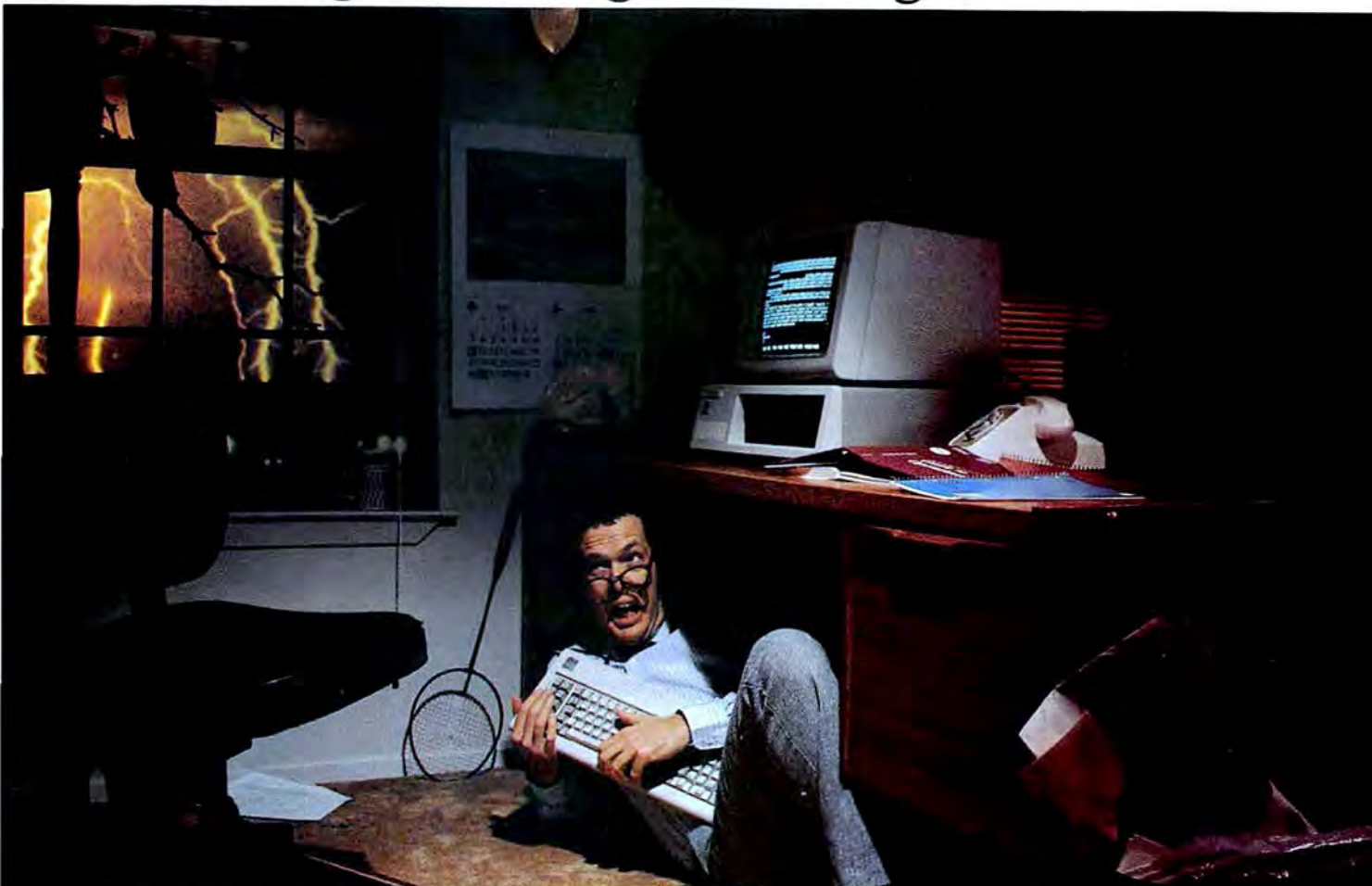
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XLATE.BAS: A translation function in BASIC

```

10 DEF FNXLATE$(S$,T$,A$,S,T)=MID$(T$,((-(T=1)*(-(S=1)*
INSTR(S$,A$))-((S<>1)*(INSTR(S$,A$)\S+1))))-(T<>1)*
(((-(S=1)*INSTR(S$,A$))-((S<>1)*(INSTR(S$,A$)\S+1)))-1)*
T+1)))-(INSTR(S$,A$)>0))-(INSTR(S$,A$)=0)*255,T)
20 ' Line 30 demonstrates lowercase to uppercase translation
30 UPPER.CHAR$=FNXLATE$("abcdefghijklmnopqrstuvwxyz",
"ABCDEFGHIJKLMNOPQRSTUVWXYZ",LOWER.CHAR$,1,1)
40 ' Line 50 demonstrates single to multiple character conversion
50 N$=FNXLATE$("123456789","ONE TWO THREEFOUR FIVE
SIX SEVENEIGHTNINE ",N$,1,5)
60 ' Line 70 demonstrates converting decimals to fractions
70 FRACTION$=FNXLATE$(".125 .250 .375 .500 .625 .750 .875",
"1/81/43/81/25/83/47/8",DECIMAL.ENTERED$,5,3)
80 ' Lines 90-110 demonstrate translating month numbers to month names
90 MONTH.NOS$="01 02 03 04 05 06 07 08 09 10 11 12"
100 MONTH.WORDS$="January February March April May
June July August SeptemberOctober November December "
110 MONTH.NAMES$=FNXLATE$(MONTH.NOS$,MONTH.WORDS$,LEFT$(DATE$,2),3,9)
120 '
200 ' The syntax and rules for using the function are as follows:
210 '
220 ' RESULTS$=FNXLATE$(SOURCE$,TARGET$,ARGUMENT$,SOURCELEN,TARGETLEN)
230 ' Where:
240 ' SOURCE$ is the list of entries to be scanned.
250 ' TARGET$ is the list of values to be returned.
260 ' ARGUMENT$ is the value to match.
270 ' SOURCELEN is the length of each entry in SOURCE$
280 ' ( 0 < SOURCELEN < 255 )
290 ' TARGETLEN is the length of each entry in TARGET$
300 ' ( 0 < TARGETLEN < 255 )
310 '
320 ' A null value is returned if no match is found for ARGUMENT$
999 END

```

XLATE.BAS: A translation function in BASIC

```

dat enow
date
dat enow U

```

DATEN.BAT: Add these lines to AUTOEXEC.BAT to employ DATENOW.COM.

as it will be for an entire day once you correct it, you need only press <Enter> to accept the current value.

The program requires DOS 2.00 or a later version and sets errorlevel if an error occurs. If you want to store the DATE.DAT file on drive C:, change the last three values in DATA line 6 (line 1060) from 41, -1, and 12 to 43, -1, and 22.

Garrett Wollman
Burlington, Vermont

Editor's note: To create DATENOW.COM, load BASIC, then type in and RUN the lines shown in DATENOW.BAS. You may wish to save lines 10-180 separately. They will be useful in creating a variety of programs that will appear in this column.

Turbo Trick

When a program written in Turbo Pascal ends, DOS must reload the COMMAND.COM file into memory. If DOS cannot find the file, it



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```

10 DEFINT A-Z:CLS:KEY OFF:DEF FNHEX(X$)=VAL("&h"+X$)
20 LOCATE 3,1:PRINT "X-Maker":READ F$
30 LOCATE 5,1,1:PRINT "Now testing for data errors...please wait";
40 SUM=0:READ LN:IF LN<0 THEN 80
50 READ H$:IF VAL(H$)<0 THEN 70
60 SUM=(SUM+FNHEX(H$))*2:SUM=(SUM\256)+(SUM MOD 256):GOTO 50
70 READ CKSUM$:IF SUM=FNHEX(CKSUM$) THEN 40 ELSE GOTO 170
80 RESTORE:CLS:LOCATE 3,1:PRINT "X-Maker":READ F$
90 LOCATE 5,1,1:PRINT "Press any key to create ";F$;": ";
100 A$=INPUT$(1):PRINT:IF A$=CHR$(27) THEN END
110 LOCATE 6,1:PRINT "Working...";
120 OPEN F$ AS #1 LEN=1:FIELD #1,1 AS BX$
130 READ LN:IF LN<0 THEN 160
140 READ H$:IF VAL(H$)<0 THEN READ CKSUM$:GOTO 130
150 LSET BX$=CHR$(FNHEX(H$)):PUT #1:GOTO 140
160 CLOSE:PRINT:PRINT F$;" has now been created.":END
170 PRINT:PRINT "Error in DATA line";STR$(LN);". ";
180 PRINT "Check your work.":BEEP:END
1000 DATA "a:datenow.com"
1010 DATA 1,BB,82,00,8A,0F,80,F9,55,75,03,E8,5E,00,BA,5F,01,-1,28
1020 DATA 2,B8,00,3D,CD,21,72,3E,A3,59,01,8B,1E,59,01,BA,5B,-1,67
1030 DATA 3,01,B9,04,00,B4,3F,CD,21,72,2B,0B,CD,74,27,8B,1E,-1,6B
1040 DATA 4,59,01,B4,3E,CD,21,72,1D,8A,2E,5B,01,8A,0E,5C,01,-1,DD
1050 DATA 5,8A,36,5D,01,8A,16,5E,01,B4,2B,CD,21,3C,FF,75,03,-1,73
1060 DATA 6,B8,0F,00,CD,20,B4,4C,CD,21,00,00,00,00,00,41,-1,12
1070 DATA 7,3A,5C,44,41,54,45,2E,44,41,54,00,B4,2A,CD,21,88,-1,FA
1080 DATA 8,2E,5B,01,88,0E,5C,01,88,36,5D,01,88,16,5E,01,BA,-1,0A
1090 DATA 9,5F,01,B8,00,3C,B9,20,00,CD,21,72,18,BA,5B,01,B9,-1,1C
1100 DATA 10,04,00,8B,D8,B8,00,40,CD,21,72,09,B8,00,3E,CD,21,-1,49
1110 DATA 11,72,02,CD,20,B8,00,4C,CD,21,00,00,00,00,00,00,-1,64
1120 DATA -1

```

DATENOW.BAS: Program X-MAKER.BAS configured to create DATENOW.COM

displays the message 'Insert COMMAND.COM disk in drive A: and strike any key when ready'. This can be annoying to experienced users and baffling to novices.


Fortunately, there is a simple way to prevent the problem. Before you compile the Turbo Pascal program, select item A from the

Options menu to change the maximum amount of dynamic memory. Change the default value of 4000 (hex) paragraphs, which is 256K, to 400 (hex), which is 16K. Unless your program deals with huge dynamic variables or array parameters, it will run properly, and DOS won't need to reload COMMAND.COM afterward.

Michael Covington
Athens, Georgia

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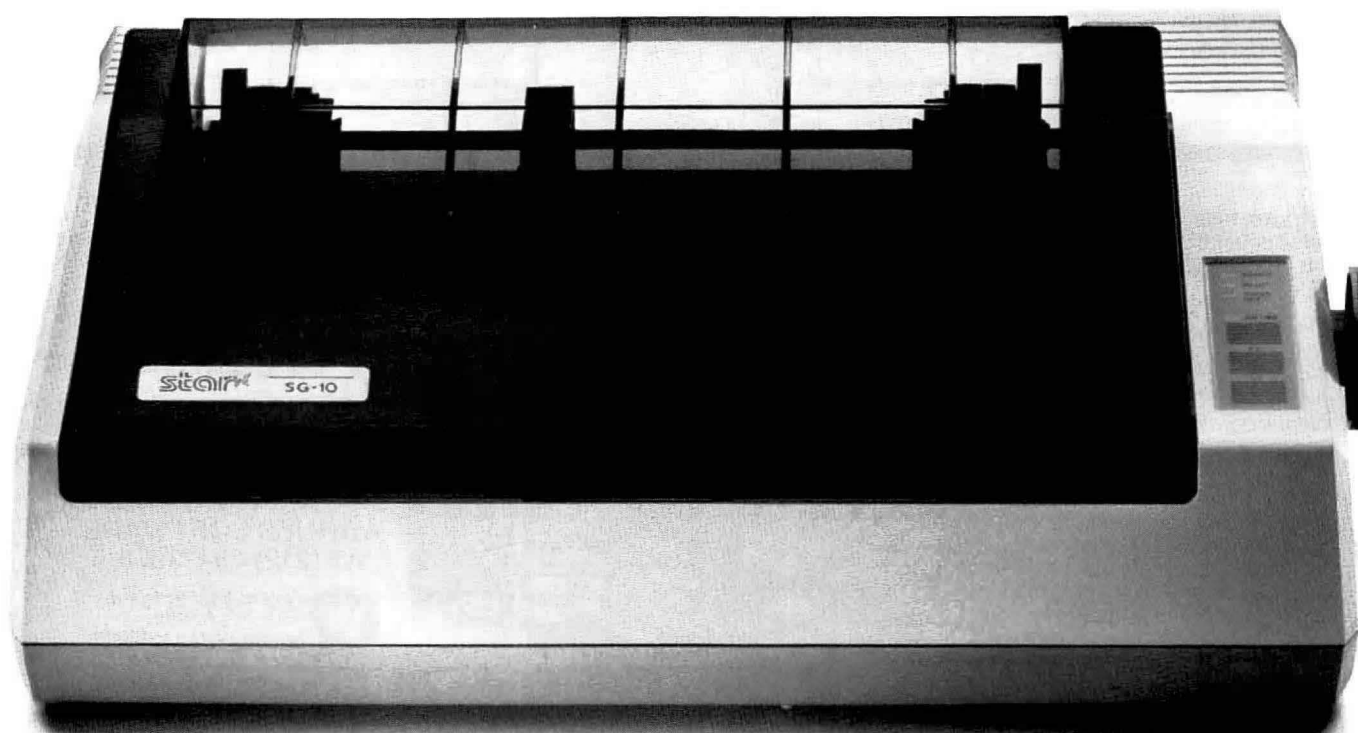
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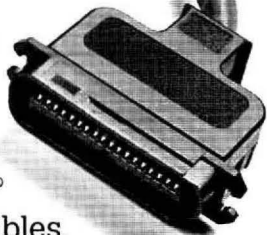
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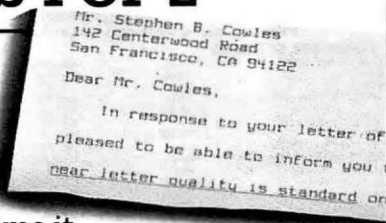
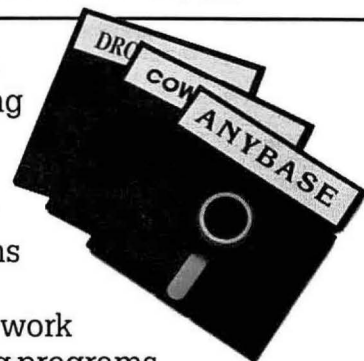
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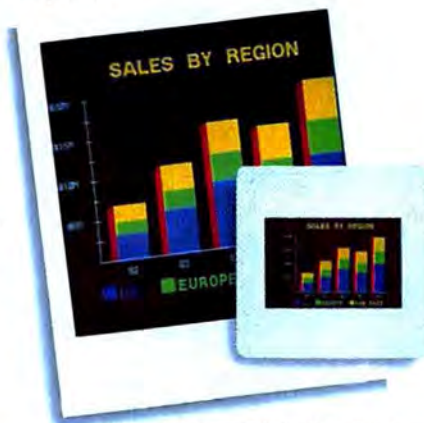
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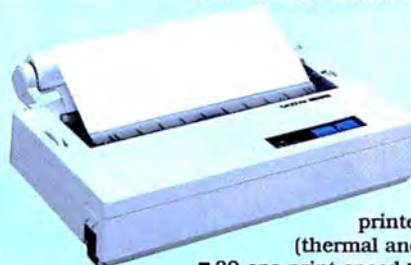
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Just Announced

A selection of new PC products

Featured this month:
an analytical data base
manager, a dot matrix
color printer, an inter-
nal modem, two com-
puters, and a project
management program

Wes Nihei

Hardware

Computers

Ericsson PC

Question: What international telecommunications giant recently jumped into the PC-compatibles arena? Advance one square if you answered "Ericsson," the Swedish equivalent of AT&T. With the 16-bit, 8088-based Ericsson PC (EPC), the company adds a desktop computer to its line of telecommunications workstation products. The EPC features a 12-inch amber monitor that supports medium (320- by 200-pixel), high (640- by 200-pixel), and extra-high (both 320- by 400- and 640- by 400-pixel) resolution graphics. Text mode resolution is 720 by 400 pixels. The large character matrix (9 by 16 compared to 8 by 14 for the PC) improves on the PC's text mode resolution.

Except for its microchips and floppy drives, the computer is manufactured entirely in Sweden and reflects its Scandinavian origin with functional but stylish ergonomics. With its two 360K half-height floppy disk drives mounted one on top of the other, the EPC's footprint is smaller than the PC's. The tan shell houses 256K of RAM expandable to 640K, a serial port, a parallel port, and six expansion slots. In operation the EPC is virtually silent.

The keyboard mimics the IBM PC's layout but has a larger <Enter> key; double-sized <Shift>, <Ctrl>, <Tab>, and <Backspace> keys; and <NumLock> and <CapsLock> lights. Ericsson has added an ex-

tra <Enter> key to the right side of the numeric keypad, which is a boon to those familiar with a 10-key calculator.

The system comes with MS-DOS 2.11 and GW BASIC. Available options include a 10MB internal hard disk, a color monitor, a color graphics board, a multifunction board with 128K or 384K of



Ericsson PC, Ericsson

RAM, a real-time clock, and a serial port. List price: with two disk drives and a monochrome monitor \$3295.

Ericsson, Inc.
Greenwich Office Park 1
Greenwich, CT 06836
203/661-1666

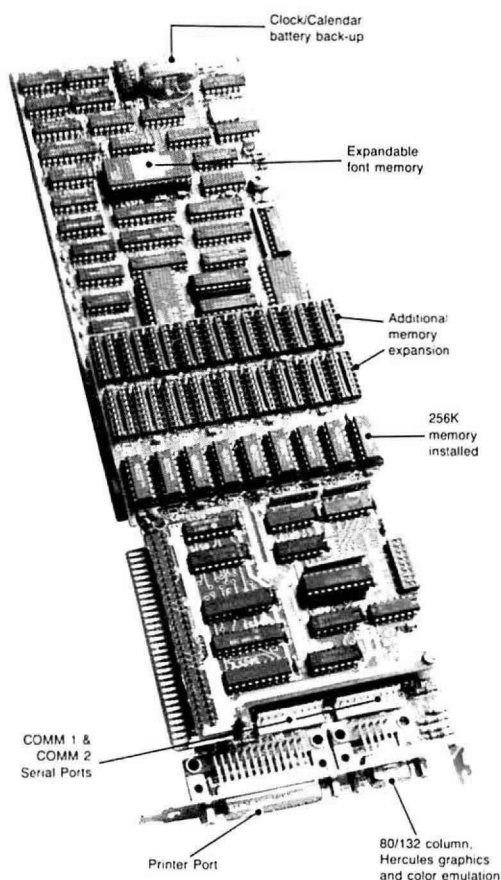
Kaypro 16

The 16-bit transportable Kaypro 16 falls right in line with Kaypro's budget-conscious, utilitarian approach. By offering its first PC compatible with an internal hard disk and a full complement of software for \$3295, Kaypro has carved a niche in the small-business market between the

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Encased in one of Kaypro's distinctively spartan metal shells, the 8088-based machine contains a 10MB hard disk and one 360K half-height floppy disk drive. It comes equipped with 256K of RAM expandable to 640K and a BIOS written by Phoenix Software Associates that carries Phoenix's guarantee of PC com-



Kaypro 16, Kaypro

patibility. The 35-pound unit has an internal 9-inch green display, a detachable keyboard with a PC layout, a color graphics board, a serial port, and a parallel port, but only one expansion slot—a potential drawback.

Bundled software consists of five MicroPro International products, including *WordStar* and *MailMerge*, and a package of on-line tutorials for each MicroPro product. Kaypro has dressed up the entire MicroPro family with an easy-to-use menu. Also included are MS-DOS 2.11, GW BASIC, and *Mite*, a telecom-

munications program from Mycroft Labs. List price: \$3295.

Kaypro Corp.
533 Stevens Ave.
Solana Beach, CA 92075
619/481-4300

Modems

UltraLink

UltraLink is a 300/1200-bps internal modem that allows simultaneous conversation and data transmission on a single telephone line. To activate UltraLink, you simply pick up the telephone receiver or push the external button attached to the modem. Without exiting the application program you're using, you can send a screen to another UltraLink-equipped PC, discuss (but not edit) the data, and return to the program where you left off.

UltraLink maintains its own communications software in 64K of on-board RAM and comes with its own power supply, so it makes no demands on system memory or power. The modem has a 100-name directory, an unattended scheduling function that sends files at a predesignated time with the PC turned on, and an optional Nite Owl feature that transmits data after the PC is turned off. UltraLink programs the ten PC function keys for single-key operation; the <F1> key displays help screens. List price: \$895, Nite Owl \$189.

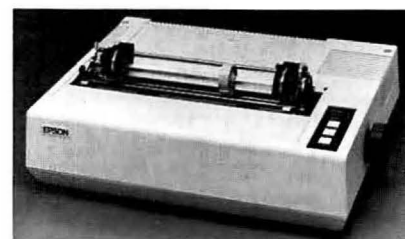
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Printers

Epson JX-80

Seven-color printing and Epson's proven reliability make the JX-80 (the company's first color model) an attractive addition to the popular dot matrix printer family. Essentially the FX-80 workhorse dressed up with color, the JX-80, priced at \$799, may be the best value in its class on the market.

The printer uses a cassette with a 1-inch ribbon striped black, magenta, cyan, and yellow and overprints two colors to produce green, orange, and violet. The JX-80 boasts 160 cps for draft printing and 80 cps for near-letter-quality printing. Graphics resolution is 240 by 216 dots per inch. A



Epson JX-80, Epson America

parallel port with a 2K buffer is standard. Options include a serial port with either a 2K or 32K buffer and a parallel port with a 32K buffer. List price: \$799. Epson America, Inc.
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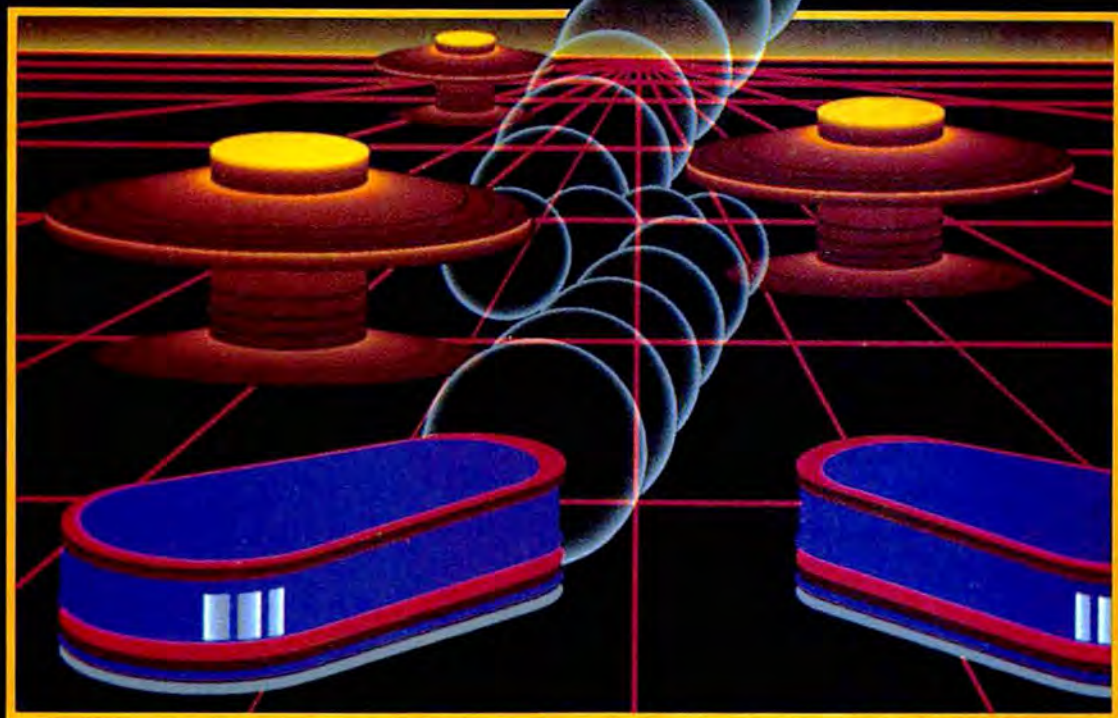
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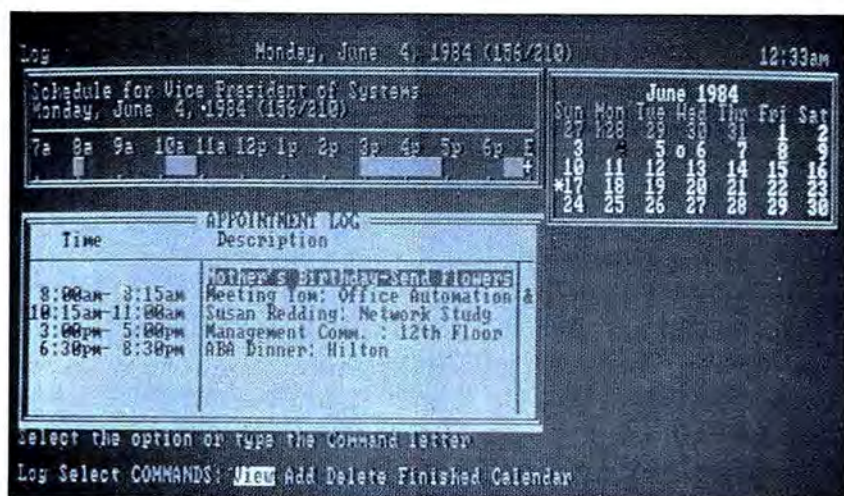
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Time Manager function, Higgins, Conetic Systems

egrated functions that organize the administrative chores any good AA would handle.

The *Higgins* Time Manager function displays in two windows a monthly calendar that highlights important days and a horizontal bar graph that indicates meetings throughout the day in hourly time slots. A third window either lists that day's activities or displays one of the program's other functions.

The Directory function lists addresses and telephone numbers. When used with a modem, *Higgins* automatically dials a tele-

watch. Tickler Reminder provides a visual nudge or an audio alarm for important events. Scratch Pad holds notes, and Expense Report records outlays by project.

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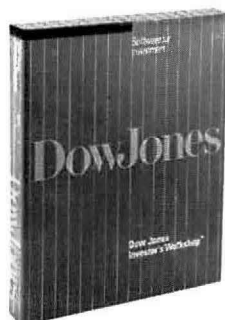
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Ask about **ZeroDisk** to run copy-protected software from a hard disk.

Higgins's comprehensive keyword system cross-references and lists all keyword-related information in each function, as well as in hard disk files created with other DOS 2.00 application programs such as 1-2-3 and *WordStar*. For all functions, context-sensitive help screens are a keystroke away. *Higgins* comes in single-user and LAN versions. List price: \$395. Requirements: 256K, DOS 2.00, hard disk.

Conetic Systems Inc.
1800 S.W. First Ave. #180
Portland, OR 97201
503/227-0645

Qwiknet

Anyone unfamiliar with project management, especially on the PC, will benefit from *Qwiknet's* simplicity. Packaged with a mouse, the program is designed to access most operating functions, pull-down menus, and help screens at the press of a button. A helpful menu on every screen shows the appropriate mouse-operated functions. The keyboard is reserved for data entry, or if you prefer, it can replace the mouse entirely.

Unlike most project management programs, *Qwiknet* makes extensive use of windows, which can be repositioned around the screen or layered on top of one another. You can move freely between windows to enter or edit project information. The program saves your changes in the size, location, and color coding (with a color monitor) of windows.

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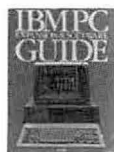
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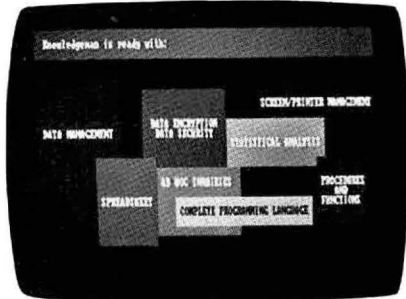
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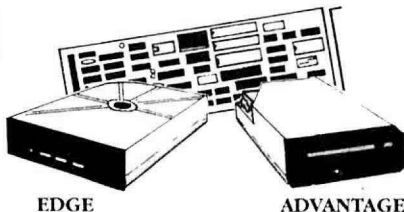
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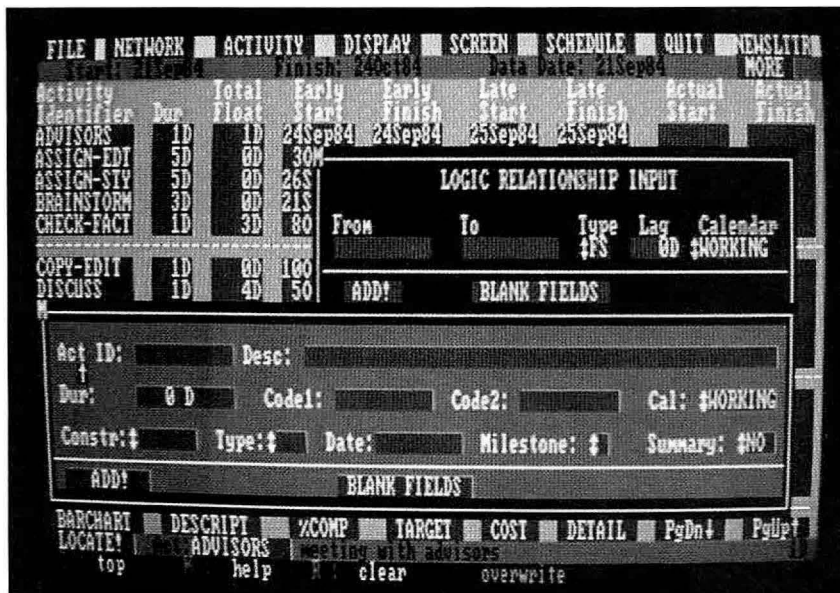
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Qwiknet, Project Software & Development

Qwiknet uses both Gantt and CPM (critical path method) techniques to track schedules, resources, and costs. The program prints 21 standard reports, including bar charts and resource histograms. Printers supported include the IBM Graphics Display Printer, the Epson FX-100, and Okidata's models 84, 92, and 93. List price: \$895. Requirements: 384K, two disk drives, DOS 2.00, parallel port, serial port.

Project Software & Development,
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14 Story St.
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617/661-1444

Data Management

Reflex

Reflex occupies a realm somewhere between spreadsheets and data base managers, blending desirable qualities of both for easier data analysis. The program is un-

usual in that it presents data in five formats, or "views": Form, List, Graph, Crosstab, and Report. Up to three views can share the screen, showing different perspectives of the same information.

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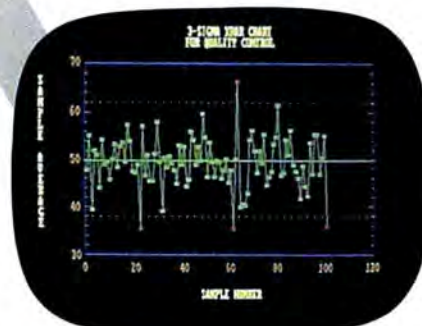
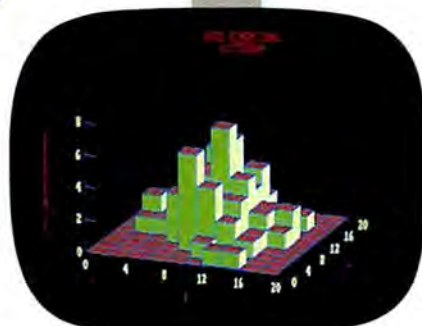
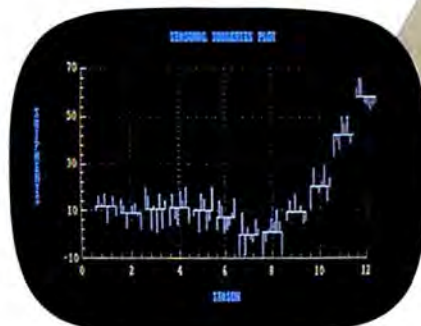
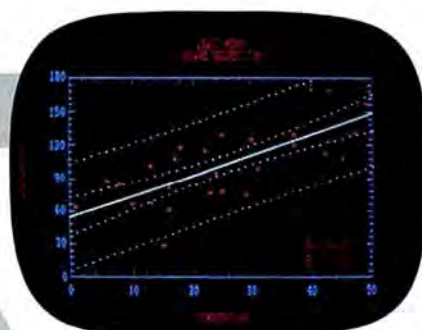


Date Loaded: 03/01/85 Data Editor Maximum Rows: 100 Number of Columns: 9

Row	X	Y	samples	samples	stdevs	stdevs
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3	32.8	1882	1	18.3	2.725	14470
4	38.4	2070	1	18.0	2.721	11870
5	36.1	1882	1	18.1	2.746	19470
6	18.9	3352	1	18.2	3.026	66070
7	18.4	2770	1	18.4	2.282	14270
8	20.2	2770	1	18.5	2.212	17270
9	18.2	3618	1	18.1	2.922	31370
10	20.5	3150	1	18.2	4.351	78070
11	20.2	2960	1	18.0	5.784	12870
12	20.1	2322	1	18.1	7.292	27770
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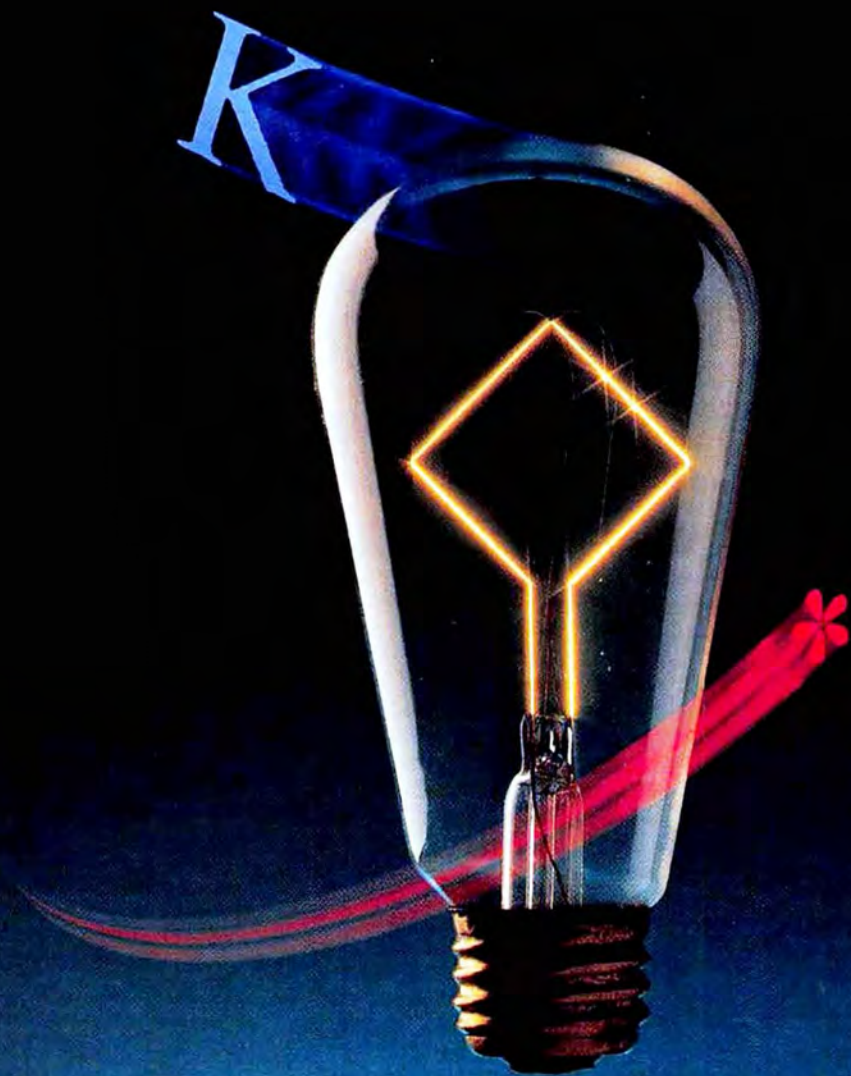
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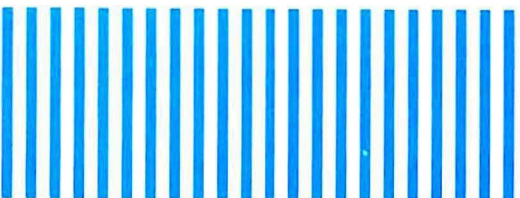
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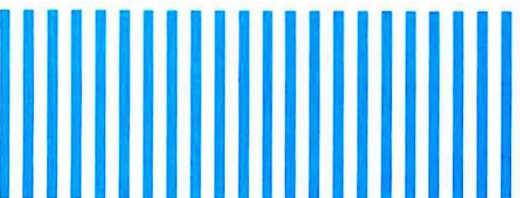
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Crosstab view, Reflex, Analytica

and with one keystroke the representative form or list appears in an adjacent window. The Crosstab view provides a numeric cross-tabulation that summarizes data (for example, total sales for each region by month). Cross-tabs are usually found only in statistics packages; *Reflex* is the first data base or spreadsheet program to offer this feature. The Report view produces customized reports with user-defined specifications that may include calculated fields. Once you create a report, *Reflex* can save the format and reprint it after you enter new data—useful, for example, in a monthly sales report.

Both the *Reflex* program and the data base are resident in RAM, which increases sort speed but limits the size of the data base.

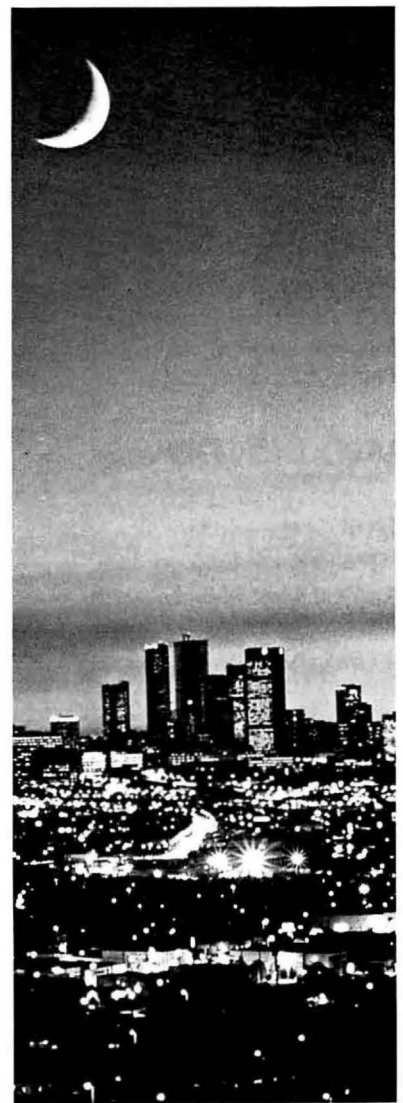
Pull-down menus and context-sensitive help messages are available throughout the program. *Reflex* imports DIF and ASCII files and data created with 1-2-3, any *pfs*: program, or *dBASE II*; and it exports text in ASCII format. *Reflex* supports a range of printers and plotters for output of all five views. List price: \$495. Requirements: 384K, two disk drives, DOS 2.00, graphics board.

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A COMPARISON OF THE MOST POPULAR PRODUCTS

	PolyWindows Desk	Sidekick	Spotlight
ROLODEX-TYPE FILES			
Variable Card Size	YES	NO Files	NO
Multiple Card Decks	YES (1-10)	NO Files	YES
Number Cards Per Deck	RAM Limit	NO Files	500 Max.
Max. Characters Per Card	969	NO Files	480
Search	YES	NO Files	YES
Auto Alphabetize	YES	NO Files	YES
Print Card	YES	NO Files	YES
Print Deck	YES	NO Files	YES
CALENDAR			
Daily Notes	YES	NO	NO
Mark Important Days	YES	NO	NO
Date Range	1752-2099	1901-2099	1901-2099
APPOINTMENT BOOKS			
Multiple Appt. Books	YES (1-10)	NO	NO
"Things To Do" List	YES	NO	NO
Print Appointment Book	YES	YES	YES
ALARM CLOCK			
Display Time	YES	NO Alarms	YES
Hourly Chimes	YES/Optional	NO Alarms	NO
Time Format	AM / PM	NO Alarms	AM / PM
Display Alarm Message	YES	NO Alarms	NO
Number of Alarms	9	NO Alarms	Many
CALCULATOR			
On-Screen Tape	YES/Optional	NO	NO
Printing Tape	YES/Optional	NO	NO
Percentage Function	YES	NO	YES
Display With Commas	YES/Optional	NO	NO
Floating/Fixed Decimals	YES/Both	Fixed	Floating
Memory	YES	YES	YES
Insert Result in Work	YES	YES	YES
Max. Display Digits	15	18	12
Display Number > Above	YES/Exponential	NO	NO
Scientific Notation	YES	NO	NO
Binary/Hexadecimal	NO	YES	NO
NOTEPAD			
Multiple Documents	YES (1-10)	NO	NO
Word Wrap	YES	NO	YES
Merge Files	YES	NO	NO
Change Margins	YES	NO	NO
Variable File Size	YES	YES	NO
File Size Limit	64K	50K	4.4K
Variable Window Size	YES	YES	NO
Print Document	YES	YES	YES
Print Window Only	YES	YES	YES
Undelete Key(s)	YES	YES	NO
Cut & Paste Screen Text	NO (Note 1)	Import Only	NO
KEYBOARD ENHANCER			
Number Keys Redefined	YES Up to 60	NO/Not Avail.	NO/Not Avail.
Total Keystrokes	YES 2500	NO/Not Avail.	NO/Not Avail.
GENERAL CHARACTERISTICS			
100% Memory Resident	YES	NO	NO
Minimum Memory Used	35,500	61,300	77,200
Typical Memory Used	50,000-75,000	61,300	77,200
On-Line Help	YES	YES	YES
Moveable Windows	YES	YES	NO
Redefine Colors	YES	YES	YES
Expandable/Add Functions	YES	NO	NO
Can Remove Functions	YES	NO	NO
Integrated Interface	Excellent	Good	Good
Visual Appeal	Excellent	Fair	Poor
Speed	Very Fast	Fast	Slow
ADD-ON FUNCTIONS			
Auto Dialer	NO (Note 2)	YES	YES
DOS Functions	NO (Note 1)	NO	YES
Game	YES	NO	NO
ASCII Chart	NO	YES	NO
COST - PROTECTED	\$49.95	\$54.95	\$149.95
COST - UNPROTECTED	\$84.95	\$84.95	NO/Not Avail.

Note 1: "PolyWindows DOS" add-on available soon at extra cost to add cut & paste and many additional functions.

Note 2: "PolyWindows Phone" add-on available soon at extra cost to add auto-dial, phone log, cost computation, etc.

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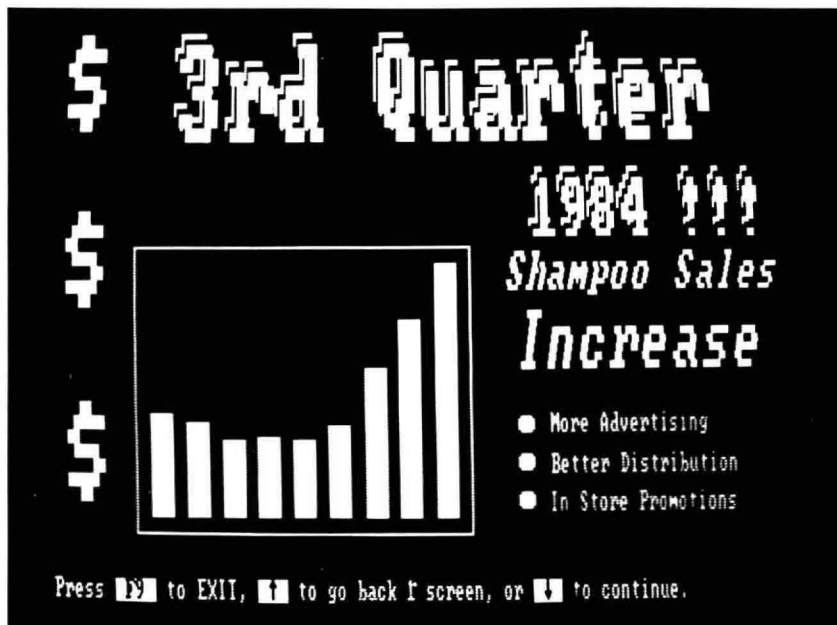
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Presentation! function, Ability, Xanaro Technologies

more typical data base management, spreadsheet, graphics, word processing, and telecommunications functions. Presentation! is on a separate disk.

Library serves as a DOS shell for eight DOS commands and also lets you swap program disks in order to work with other application programs without exiting *Ability*. Library displays a table of contents that lists the files created by each integrated function as well as by other programs. Presentation! lets you create an on-screen slide show (for which a color

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PC Magazine
November 27, 1984

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November 1984

monitor is required) by choosing from a selection of 20 icons, 7 letter sizes with one font, 25 musical tunes such as "Happy Birthday," and 8 movie-like transition effects. These features can be combined with graphs, text, or a spreadsheet.

Ability has other attractions as well. As with any well-integrated program, it updates all functions when changes are made in one. In the data base function, *Ability* limits the number of records by the amount of disk storage rather than unused RAM (unlike the methods used by *Symphony* or *Framework*). You can add or de-

lete fields at any time. The graph function creates line graphs, vertical and horizontal bar charts, and regular and exploded pie charts. The communications function features data encryption for security as well as DEC VT52 and VT100 terminal emulation. The word processor's cut-and-paste feature lets you combine text with data from the other functions for use in a printed report. List price: \$495. Requirements: 256K, two disk drives; color graphics board and color monitor for Presentation!.

Xanaro Technologies, Inc.
321 Bloor St. E #815
Toronto, Ontario
Canada M4W 1G9
416/927-8369

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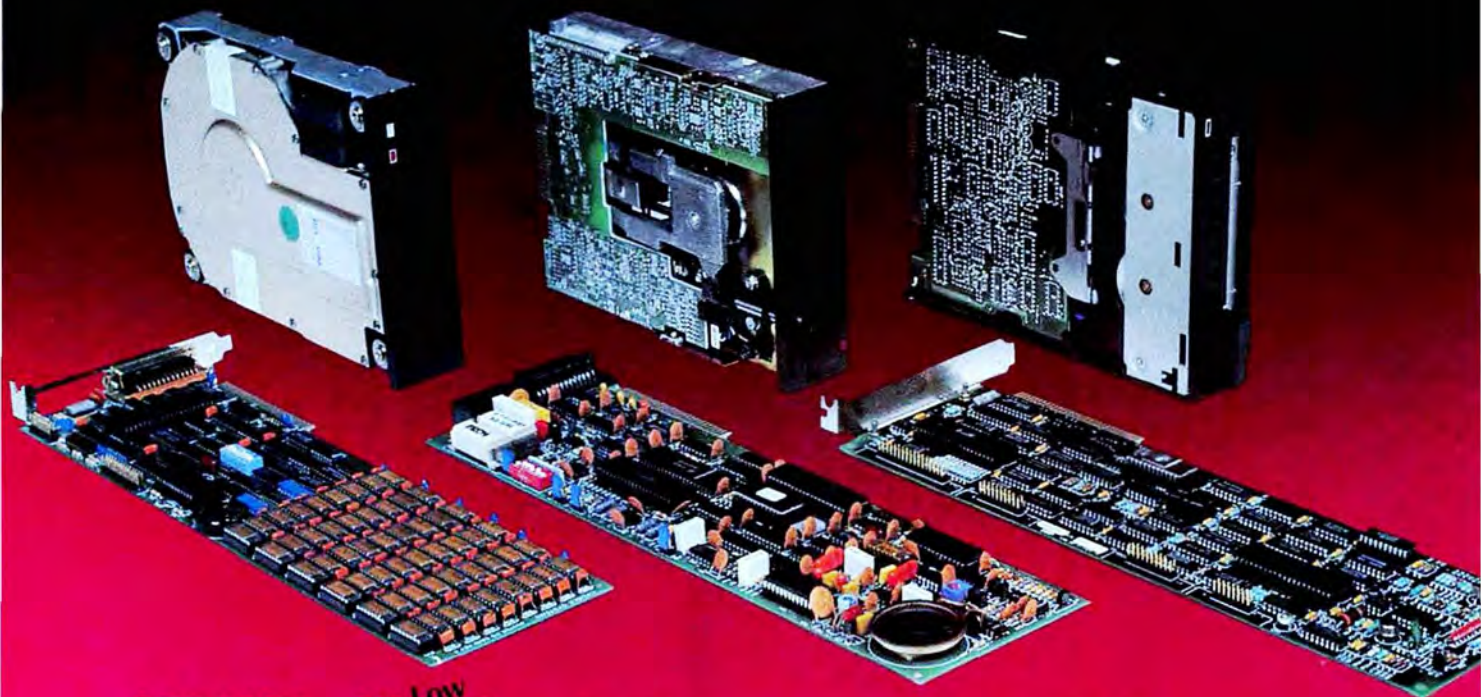
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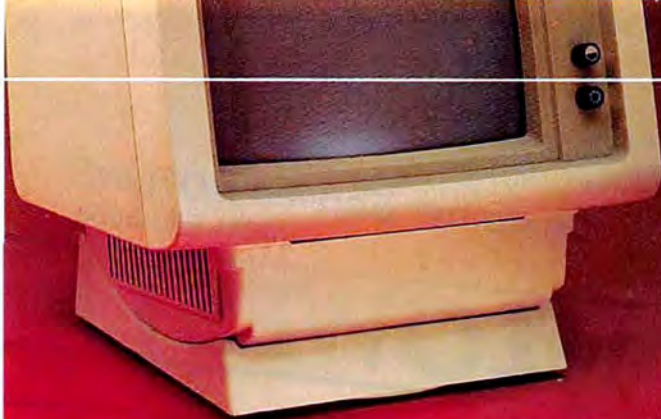
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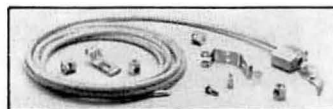
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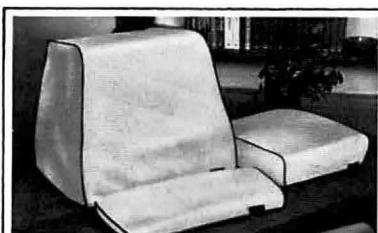
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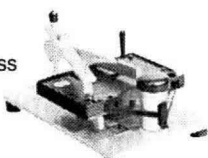
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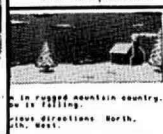
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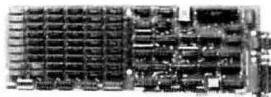
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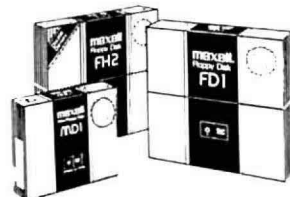
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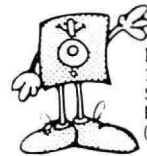
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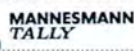
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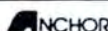
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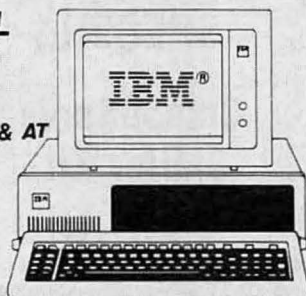
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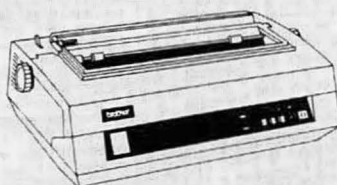
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Centronics to Centronics \$20
RS232 Serial (Specify) \$16
Columbia to Par \$28
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AST 6 Pak - w/384K \$419
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SA455L	129	112	102
TANDON			
TM100-1A	119	115	109
TM100-2A DS/DD 360K			
5" Full Size	149	145	140
TEAC FD55B DS/DD 360K	129	120	110
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I*U*CO is the best thing to happen to personal computing since the personal computer.

I*U*CO is an idea whose time has come.

I*U*CO is the International Union of Computer Owners, an organization designed to protect the interests of computer owners and users against those who would take their money...and then deliver less than they promised.

Here's an overview of some of the vital services I*U*CO provides:

1. Access to the lowest priced, reputable vendor for nearly every computer related need; and,
2. Protection from the rip-off artists, vaporware specialists, false advertisers and other creepy, crawly creatures who have been attracted to the computer industry by the scent of your money; and,
3. Constantly updated information on software and hardware releases, bug reports, fixes and other data individually tailored to your needs through I*U*CO's exclusive Computer Registry; and,
4. Finally, a chance to get even with those characters out there who promise a lot, take your money and then deliver less than they promised.

I*U*CO: a lynch mob with a purpose.

Every computer owner has been ripped off at least once.

Or maybe a dozen times might be a more appropriate number.

In any event, we've all been victimized by the computer industry.

And it wasn't accidental: today's computer industry is filled with hypesters, rip-off artists, vaporware specialists and others whose sole function in life is to part you from your money...while delivering less than you bargained for.

The rip-off might have been a computer that wasn't quite as "compatible" as claimed. Or a computer that didn't quite get delivered at the same time as the "hundreds" of new programs that would support it.

Or it might have been a software package that didn't quite live up to its advertising hype. Possibly, you've been had by a software manufacturer who continuously upgrades their software...charging you a pretty penny for an updated version that simply gets rid of the bugs that shouldn't have been there in the first place.

In a few cases, it might even have been a vendor who took your money...and never quite got around to delivering what you paid for.

In any event, owning a computer has been an open invitation to getting ripped-off in one way or another.

Until now.

I*U*CO means protection.

I*U*CO subscribes to some very ancient wisdom: in numbers, there is strength.

Labor unions learned it a long time ago.

An individual worker had no bargaining power. All the workers in a factory, however, have a lot of muscle.

Automobile owners learned it early on. The American Automobile Association was originally organized to bring motorists together in order to lobby for new roads and highways.

Even the computer industry has learned it: computer manufacturers, software publishers and others in the industry have now banded together in order to get legislative approval for their meaningless "disclaimers" and to restrict your right to copy the software you've purchased.

I*U*CO is designed to be what every collective organization is: a means to protect the special interests of its members.

And, in this case, the members are the victims...the people who own and use personal computers.

The people who, until now, have been powerless.

First of all, I*U*CO means low prices.

The first benefit an I*U*CO member gets is the opportunity to save money.

Lots of it.

I*U*CO maintains a database of every mail-order advertisement that appears in the major computer magazines.

When you want the lowest price on something, just

(electronically) mail your shopping list to I*U*CO.

Within a day, you'll get the three lowest and most recently quoted prices...and, quite possibly, some still lower prices that haven't been published at all.

I*U*CO protects you.

Of course, buying mail order can get you more than low prices.

It can also get you a lot of problems in delivery.

So, along with the low price quotation, you also get I*U*CO member evaluations and reports about the vendor...and, to make sure that you'll be happy with the product, a bibliography of reviews, articles and letters to the editor about the product or service you want to buy!

In short, as an I*U*CO member, you not only find the lowest price...but you might also find out that you don't really want to spend the money in the first place!

These are the first steps in I*U*CO's program:

1. Getting you the lowest possible prices.
2. Giving you an assessment of the potential vendor.
3. Providing information on the actual use value of the product. (An awful lot of products sound better in their advertising than they are in reality. That's why so few companies offer a money-back guaranty.)

Continuing protection from I*U*CO: the Computer Registry.

As an I*U*CO member, you can become part of our exclusive Computer Registry.

You simply register the appropriate information about all the hardware, software and peripherals you own with I*U*CO.

Then, as updates are announced, problems are discovered, fixes released and so on, you automatically get this information.

No more finding out a year after the fact that the current version of your program is 3.14...not the Version 1.7 program you've been using. Likewise, you might find out that the mysterious system error messages you've been getting aren't just your problem, but rather wide spread.

(As a personal note, this I*U*CO service is invaluable. In the early days of personal computers, hardware, software and peripheral manufacturers used to be pretty good about sharing information.

Today, they're not.

In the last few weeks, I personally have learned: a) my Macintosh 512K Upgrade is defective and won't work with MacPaint under certain circumstances; b) the ROMS in my Anadex printer have been upgraded; c) the ROMS in my IOMEGA Bernoulli box have been upgraded; d) MicroPro eliminated the copy protection on my version of Wordstar 2000 Plus; e) MicroPro had a bug in InfoStar for more than 18 months...and didn't tell anyone.

I*U*CO membership would have avoided these unpleasant surprises.)

With I*U*CO, you get the information you need on an individualized basis...and you get it fast.

You don't have to tear your hair out wondering about a problem. You might even find out about the problem before you encounter it!

I*U*CO: the iron fist.

The best part of I*U*CO has been saved for last.

Yes, I*U*CO will get you lower prices and will give you solid information about the integrity and usefulness of products and vendors.

But, more importantly, your membership in I*U*CO gives you the power of belonging to a community...a community of computer owners and users who need to protect their rights.

For instance, a group of software publishers recently managed to get the Louisiana legislature to pass a law "legalizing" the non-warranties they provide with their software. (You know, "this software is sold without any representations that it will work".)

I*U*CO will fight that kind of nonsense by lobbying against it.

Likewise, when a company...even a major company...announces vaporware, I*U*CO will use the same tools to fight back...to prevent publishers and dealers from getting us all aglow about a new machine or a new piece of software that won't be delivered for months. (For instance, how many people would have bought the Macintosh a year ago had they known that the "hundreds" of programs to be "shortly available" simply didn't exist?)

Finally, when the situation demands it, I*U*CO will be ready to sue. For example, what do you do in a situation where you run out and buy Wordstar 2000 Plus...only to find out later that its files are not compatible with the original Wordstar? (If you read the advertising, it doesn't say a word about it. You find out after you've laid your dollars on the table!)

There's a lot more to the I*U*CO story.

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Volkswriter Deluxe	285	159	57	Real Word/MBSI	695	399	139	Cobol (MicroSoft)	700	459	140
Volkswriter Scientific	495	349	99	In House Accountant	180	129	38	FORTRAN (MicroSoft)	350	239	70
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WordStar	375	198	75	Norton Util. 3.0 (NEW)	100	59	20	Macro Assembler 1.27	100	69	20
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WordStar Propak	495	259	99	Sidekick (Borland)	85	59	17				
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dBASE II	495	279	99	Lotus 1-2-3 (jr.)	495	319	99	C Food Smorgasbord	150	109	30
dB Compiler	750	599	150	FRAMEWORK	700	359	140	Lattice C Sprite	175	129	35
Quick Report	295	159	59	Open Access (NEW)	695	399	139	Lattice dBC	250	199	50
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In other words, when people buy a more expensive diskette, they aren't necessarily buying higher quality. The extra money might be going toward flashier advertising, snazzier packaging or simply higher profits.

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Now this discovery posed a dilemma: how to cut the price of diskettes without lowering the quality.

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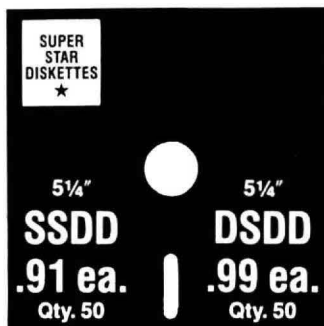
Trouble is, most of them aren't manufacturers. Rather they are fabricators or marketers, taking other company's components, possibly doing one or more steps of the processing themselves and pasting their labels on the finished product.

The new Eastman Kodak diskettes, for example, are one of these. So are IBM 5 1/4" diskettes. Same for DYSAN, Polaroid and many, many other familiar diskette brand names. Each of these diskettes is manufactured in whole or in part by another company!

So, we decided to act just like the big guys. That's how we would cut diskette prices...without lowering the quality.

We would go out and find smaller companies to manufacture a diskette to our specifications...specifications which are higher than most...and simply create our own "name brand" diskette.

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We found that there are several manufacturers who don't give a hoot about the consumer market for their diskettes. They don't spend millions of dollars in advertising trying to get you, the computer user, to use their diskettes.

Instead, they concentrate their efforts on turning out the highest quality diskettes they can...because they sell them to the software publishers, computer manufacturers and other folks who (in turn) put their name on them...and sell them for much higher prices to you!

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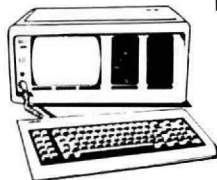
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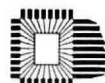
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You'll applaud the versatility.

Maestro's parallel port and serial port handle all the peripherals you're likely to need. The serial port's built-in connectors eliminate costly cable converters for maximum savings.

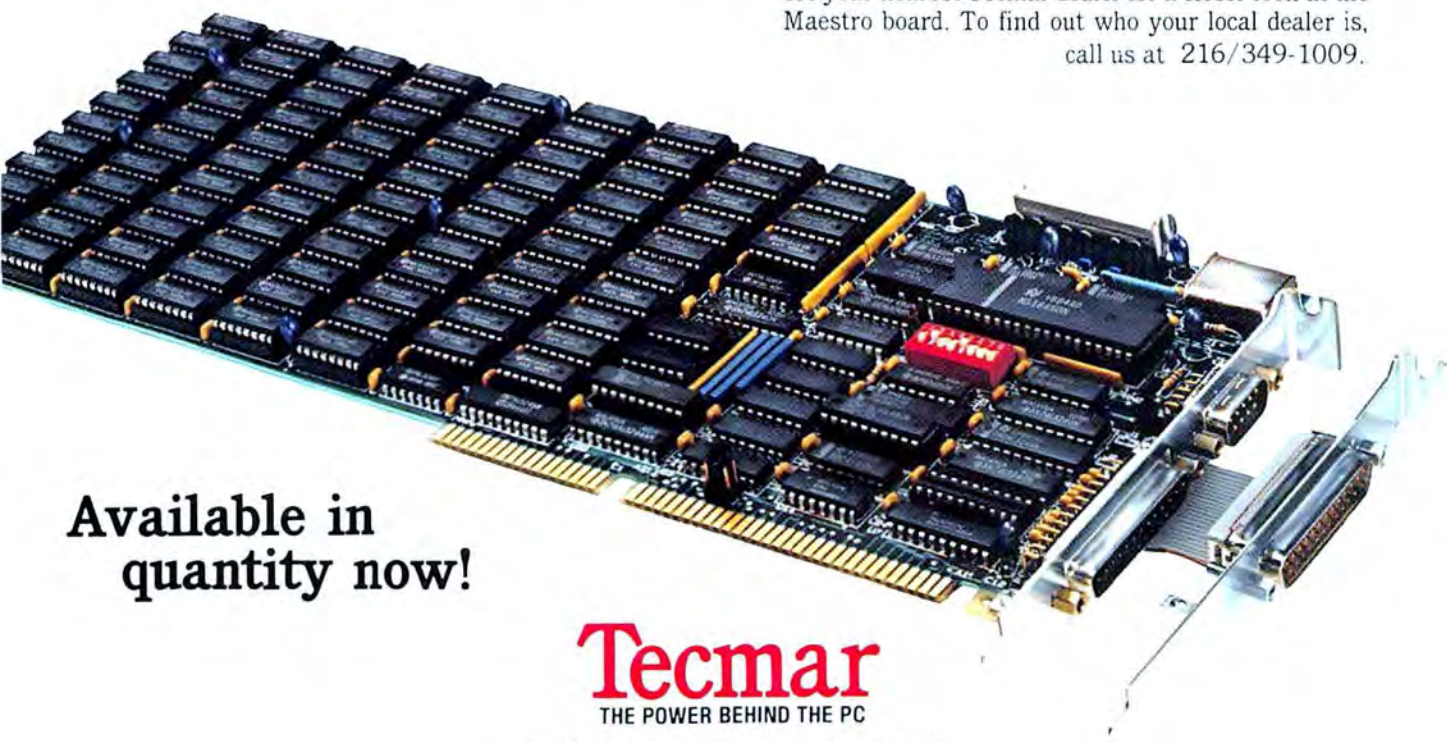
Maestro comes with a valuable accompaniment.

To increase its value to you even more, every Maestro board comes with a complimentary Treasure ChestTM of software. The 24 business productivity programs include a calculator, a security system, memo pad, electronic address book, calendar, and hardware diagnostics.

With Tecmar, you can always expect an encore.

Tecmar developed the very first peripherals for the very first IBM PC. We've been building our expertise, our product line and our reputation for service ever since.

If you like the sound of all this, we suggest you see your nearest Tecmar dealer for a closer look at the Maestro board. To find out who your local dealer is, call us at 216/349-1009.



Available in
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THE POWER BEHIND THE PC

6225 Cochran Road, Solon, Ohio 44139

Circle 190 on reader service card

Ven-Tel's Half Card™ modem is in all the best computers. Here's why...

Ven-Tel gives you lots of reasons to buy our Half Card™ modem for your IBM PC or compatible. The Half Card™ is a complete system that lets you communicate with other PCs, mainframes, and databases effortlessly. It includes Crosstalk-XVI® software. It's reliable. It's got all of the features you want. And it's a good value.

Do You Own One of These Computers?

Chances are you do. And if you're thinking of buying a modem, consider the Half Card™. Because of its small size, the Half Card™ fits in more computers, including all of the models we've listed here. The Half Card™ is small, so it fits in short slots or long. That means you can save your long slots for other expansion uses.

Effortless Communication

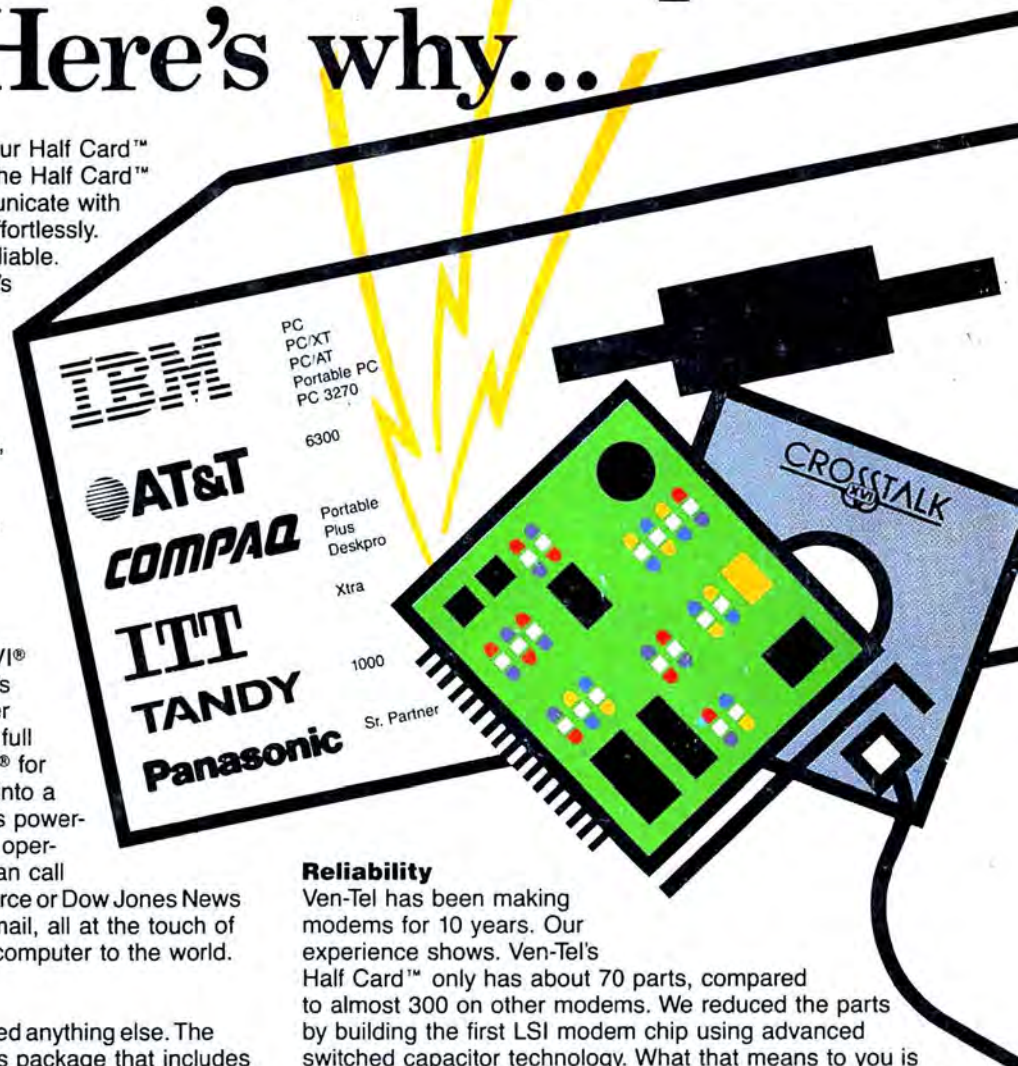
Each Half Card™ comes with Crosstalk-XVI® communications software, by Microstuf. It's the easiest to use, whether you're a beginner or an old hand, and the most powerful. A full on-line help menu makes using Crosstalk® for the first time a snap. It can turn your PC into a terminal on a mainframe computer with its powerful terminal emulation feature. It will even operate your PC when you're not there. You can call into an information service such as The Source or Dow Jones News Retrieval, or transfer files and electronic mail, all at the touch of a button. The Half Card™ connects your computer to the world. Effortlessly.

More Modem for Your Money

When you buy the Half Card™ you don't need anything else. The Half Card™ is a complete communications package that includes a full-featured modem and the best known software on the market. Complete easy-to-understand instructions with full technical support on installation and use. And a very competitive price. The Half Card™ with Crosstalk-XVI® software, retails for only \$549.

Features

- 1200/300 baud auto-dial, auto-answer.
- Uses the industry standard "AT" command set.
- Runs with virtually all communications software, including Smartcom II and PC Talk III and integrated packages such as Symphony and Framework.
- Includes Crosstalk-XVI® software.
- On-board speaker and extra phone jack for easy switching from voice to data mode.
- Selective tone or pulse dialing; full or half duplex.
- Automatic answer on any ring.
- True ring or busy signal detection.



Reliability

Ven-Tel has been making modems for 10 years. Our experience shows. Ven-Tel's Half Card™ only has about 70 parts, compared to almost 300 on other modems. We reduced the parts by building the first LSI modem chip using advanced switched capacitor technology. What that means to you is greater reliability and lower power consumption, so you can load up your PC with expansion boards and not worry about heat or power problems. And we back the Half Card™ with a full two-year warranty on parts and labor.

You Can Buy the Half Card™ Anywhere

You can get the Half Card™ at ComputerLand, Businessland, the Genra Group, Entré Computer Centers, Macy's Computer Stores and other fine dealers nationwide. Also from Ven-Tel: the 1200 Plus™, an external modem and the PC Modem 1200™, an IBM internal with V.22 international capability.



Effortless Communication

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