PC WORLD

January 1984
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The Personal Computer Magazine for IBM PCs and Compatibles

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Artificial Intelligence

Teaching Computers to Think Like People

Will Microsoft Out-Window Visi/ON?

Annual Index of Articles

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Accounting Systems for your IBM PC
Chatting on CompuServe's CB
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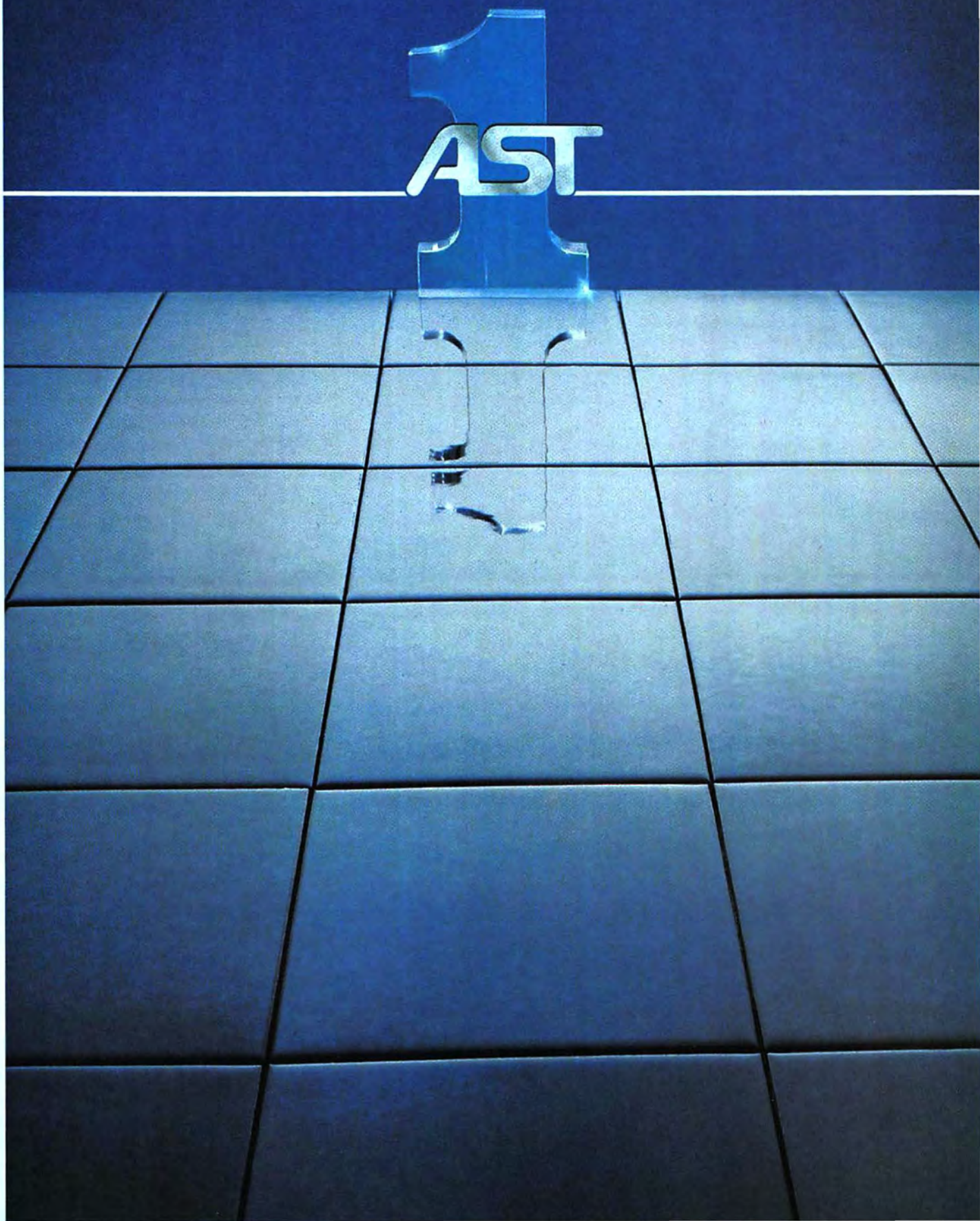
Number One Add-On Products for IBM PC



With an AST Research Multifunction Board, you can realize the full potential of your IBM PC or PC-XT without wasting valuable slot space. By combining your memory and input/output requirements on a single card, you can take advantage of more of the capabilities IBM designed into the PC, while leaving space for future enhancements as they are introduced.

AST Research Multifunction Boards can add the following features to your PC:

- **User Memory from 64K to 512K** — When added to your existing system memory, brings your PC up to its maximum of 640K. This enables you to run larger spreadsheets, create larger in-memory databases, or you can use the additional memory along with the supplied AST SuperPak™ software for print spooling or for simulating floppy drives to increase your PC's throughput.

- **Serial Ports** — By connecting a modem to a serial (async) port, your PC can communicate with other computers over telephone lines. By connecting a serial printer, you can obtain high quality print output. Other serial devices such as a plotter or mouse may also be connected to a serial port. The PC allows for the installation of up to two serial ports.

AST

Number One Add-On Products for IBM PC

• **Parallel Ports** — The parallel port is used for connecting a parallel printer to your PC. A parallel printer typically uses a dot-matrix output which is suitable for high-speed draft quality printouts. The PC allows for the installation of up to three parallel ports.

• **Clock-Calendar** — With the on board battery, the clock-calendar feature will maintain the correct date and time, even when the PC is turned off. This feature eliminates the need for typing in this information each time you power up your computer.

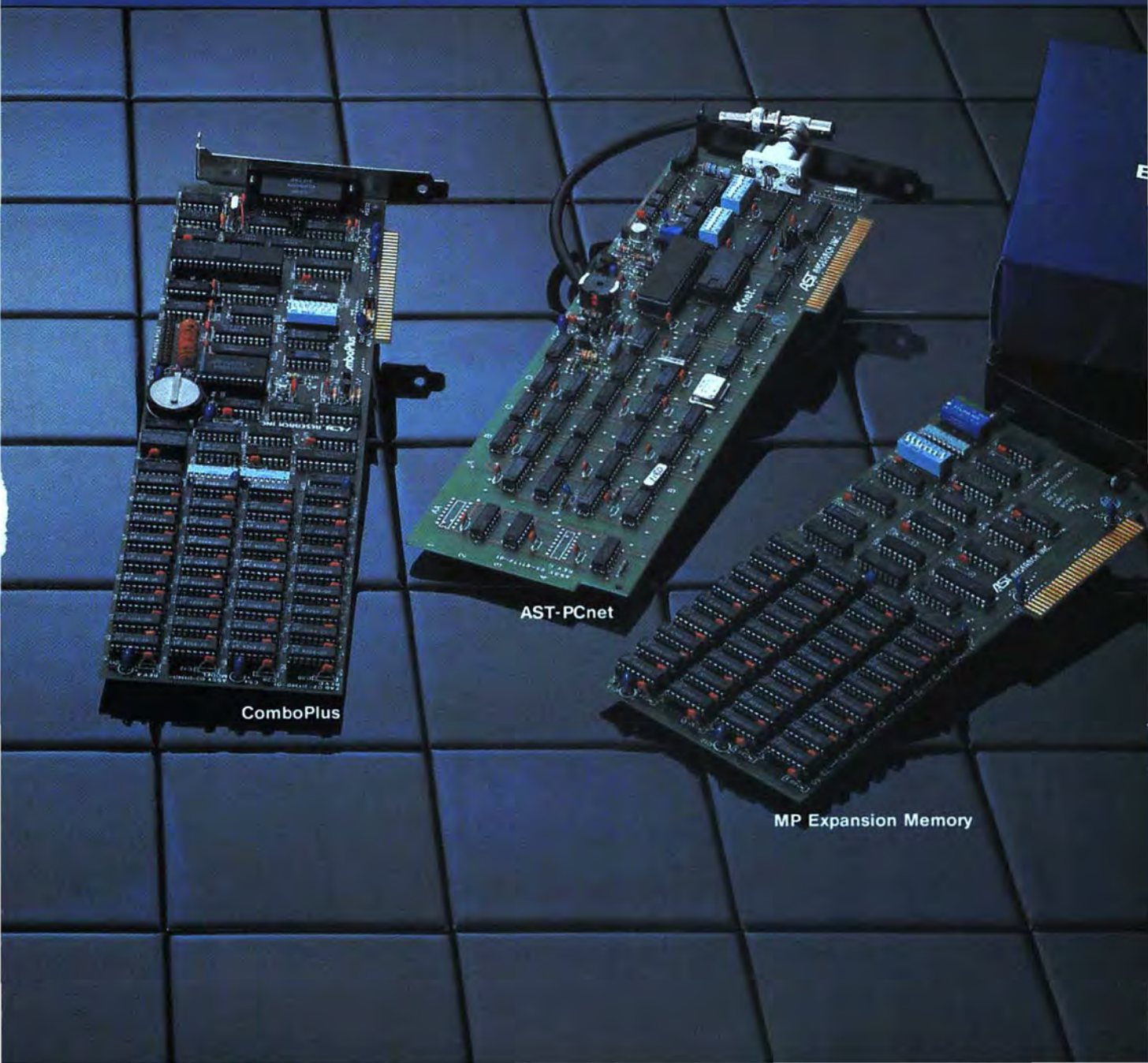
• **Game Adapter** — The game adapter port allows you to connect an IBM-type joystick to your PC so you can play the multitude of arcade-quality games which take full advantage of the PC's graphic capabilities. Or you can use the joystick input for other applications by writing your own programs.

• **SuperPak™** — Every AST Research Multifunction Board comes with an AST SuperPak diskette containing programs for setting and accessing the clock, as well as SuperDrive™ and SuperSpool™, the most powerful RAM disk and print spooler available for PC-DOS. With SuperDrive you can use your PC's memory for simulating one to four floppy drives, from 20K to 360K each. SuperSpool allows you to set aside memory (from 4K to 512K) as a print buffer; SuperSpool sends output to the printer in the background while you execute your program in the foreground. With SuperDrive and SuperSpool, you can significantly improve your PC's operating speed.

• **Proven Compatibility** — All AST Research hardware and software products are 100% compatible with all versions of the PC and PC-XT as well as the Compaq and other PC look-alikes, and are 100% compatible with PC-DOS 1.1 and 2.0.

• **Warranty** — All AST Research products are backed with a one year limited warranty covering parts and labor with an optional paid second year warranty available.

Of course, all AST Research Multifunction Boards come with the **AST "PLUS,"** our unsurpassed reputation for quality, reliabilty, after-the-sale support, and overall design excellence which give our products the best price/performance ratio in the industry!



Optional features may be added by the user at any time by installing an AST Research Upgrade Package.

All products come with extensive documentation as well as all necessary adapter cables.

	MEMORY	Serial Port 1	Serial Port 2	Clock	Printer Port	Game Port	Bus Extension
SixPakPlus	X	X		X	X	X	
MegaPlus II	X	X	X	X	X	X	X
I/O Plus II		X	X	X	X	X	
ComboPlus	X	X		X	X		
MP Expansion	X						

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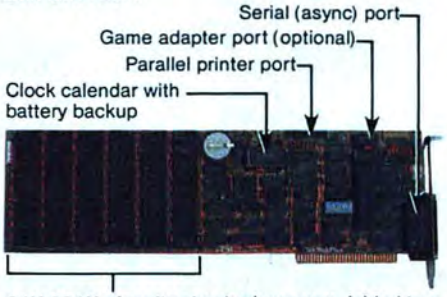
AST-5251 is a product developed by AST Research, Inc. and Software Systems, Inc. of Jefferson City, MO. AST-3780 is a product developed by AST Research, Inc. and Wilmot Systems, Inc.

AST Research Micro-to-Mainframe Communications Products:

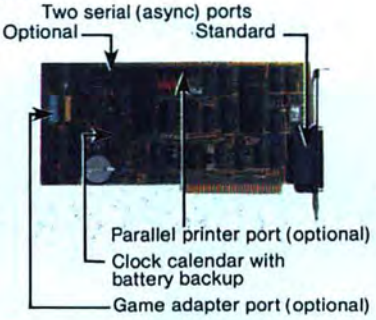
- **AST-SNA** — A family of five products that enable a PC to communicate with a mainframe via the IBM SNA protocol without the use of protocol converters.
- **AST-5251** — An interactive 5251 remote work station emulation package for use with the IBM System 34, 36, or 38.
- **AST-3780** — A hardware/software package which allows an IBM PC to communicate with a mainframe in 2780/3780 bisync protocol.
- **AST-BSC** — A hardware/software package that allows your IBM PC to provide all the features of a 3270 or 2770 terminal in bisync.
- **CC-232** — A programmable card that allows an IBM PC to communicate in async, bisync, SDLC or HDLC protocols.

SixPakPlus™:

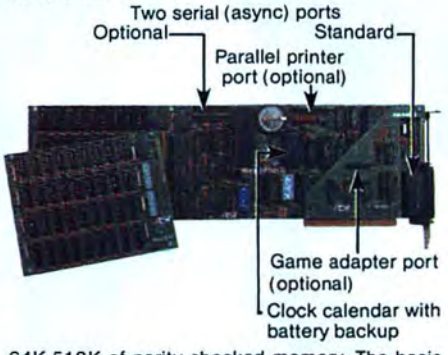


64K-384K of parity checked memory. Added to a PC or XT with a fully populated 256K system board, the SixPakPlus can bring the system memory to 640K, the maximum addressable user memory.

I/O Plus II™:

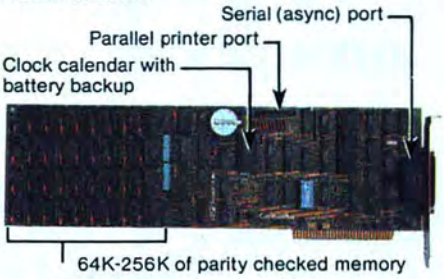


MegaPlus II™:



64K-512K of parity checked memory. The basic card expands to 256K, and with the MegaPak extension expands to an additional 128K or 256K of parity checked memory.

ComboPlus™:



MP Expansion Memory:

AST-PCnet™:

- CSMA/CD 1 Mbps baseband Local Area Network
- Uses standard 75-ohm CATV coaxial cable capable of running up to 7,000 feet
- Interconnects multiple PC's (57,000 addressable limit)
- All PC-compatible disk drives and printers are shareable
- Networked access to mainframes via shared AST-3780
- Users can execute commands remotely on shared PC
- File lock-out
- DOS 1.1 and DOS 2.0 compatible

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New Microsoft® Word. It makes your IBM Personal Computer think it's better than a $10,000 word processor.

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And, when you make changes, paragraphs are automatically reformatted. Flush right, flush left, centered or justified. It even gives you several columns on a page, like a newspaper.

Word forgives and doesn't forget.

There's an "uh-oh" command called Undo. Make a mistake? Or just want to experiment? Hit Undo.

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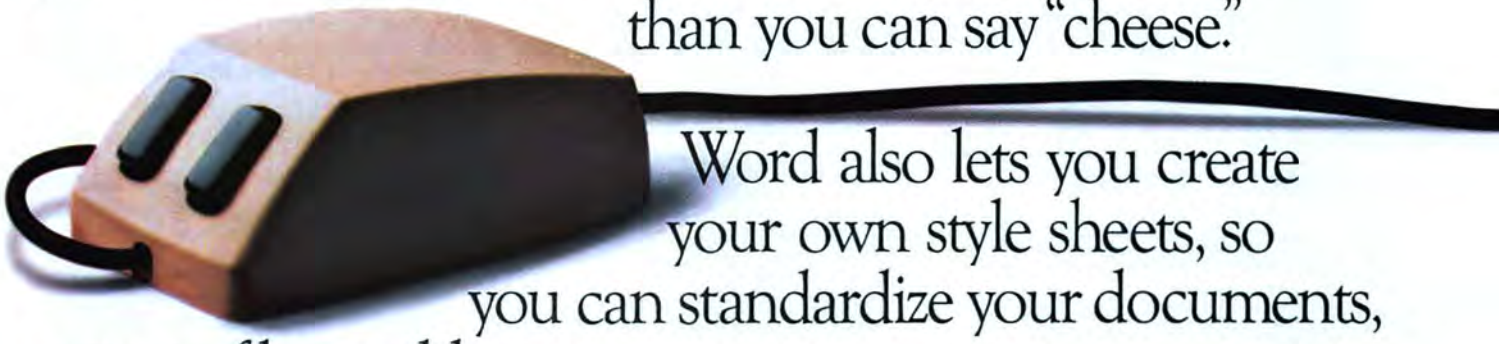
Mouse. Finally.

Word undoes your last change and remembers things the way they were.

Word does windows. Up to eight, to be exact. So you can transfer or edit between eight different documents. Or between eight different pieces of the same document.

Word travels fast.

Word has a Mouse, a handy little critter that lets you move copy, select commands and edit faster than you can say "cheese."



Word also lets you create your own style sheets, so you can standardize your documents, memos, files and letters.

It's not surprising that Microsoft has a way with Word. We designed the MS™-DOS operating system that tells the IBM® PC how to think. And we pioneered the first microcomputer BASIC, the language spoken by nine out of ten micros worldwide.

For a few final words, call 1-800-426-9400 (in Washington State call 206-828-8088) for a free Word brochure and the name of your nearest Microsoft dealer.

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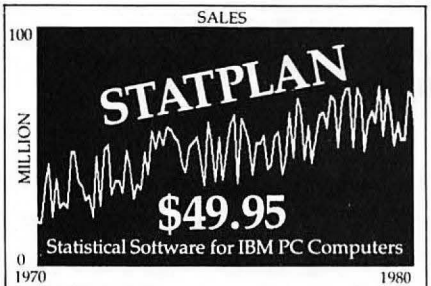

STATPLAN is a comprehensive statistical analysis and planning package for microcomputers available at a fraction of the cost of similar programs.

This is an ideal package for business planning, research and professional analysis and personal use. It is ideal for forecasting time series, determining statistical relationships among variables and projecting or graphing VisiCalc files (it can read and write VisiCalc files).

STATPLAN is easy to use; no computer experience is necessary. It is menu driven and self-explanatory. It is accompanied by a user's manual that will walk the user through the functions and many applications of STATPLAN.

The system features a complement of statistical, forecasting, data base and graphics capabilities contained in the following modules:

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- Data entry, editing, listing
- Data transformation and creation

Graphics for Data Examination
- Cross plots
- Frequency charts
- Graphs of predicted, forecasted and actual data
- Time series plots
- Overlays of several series on the same chart

Model Development and Hypothesis Testing
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- Correlation analysis
- ANOVA
- Residual analysis
- Basis statistics: mean, standard deviation, maximum and minimum values

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- Auto correlation
- Moving averages

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- Curve fitting
- Projections from regression models

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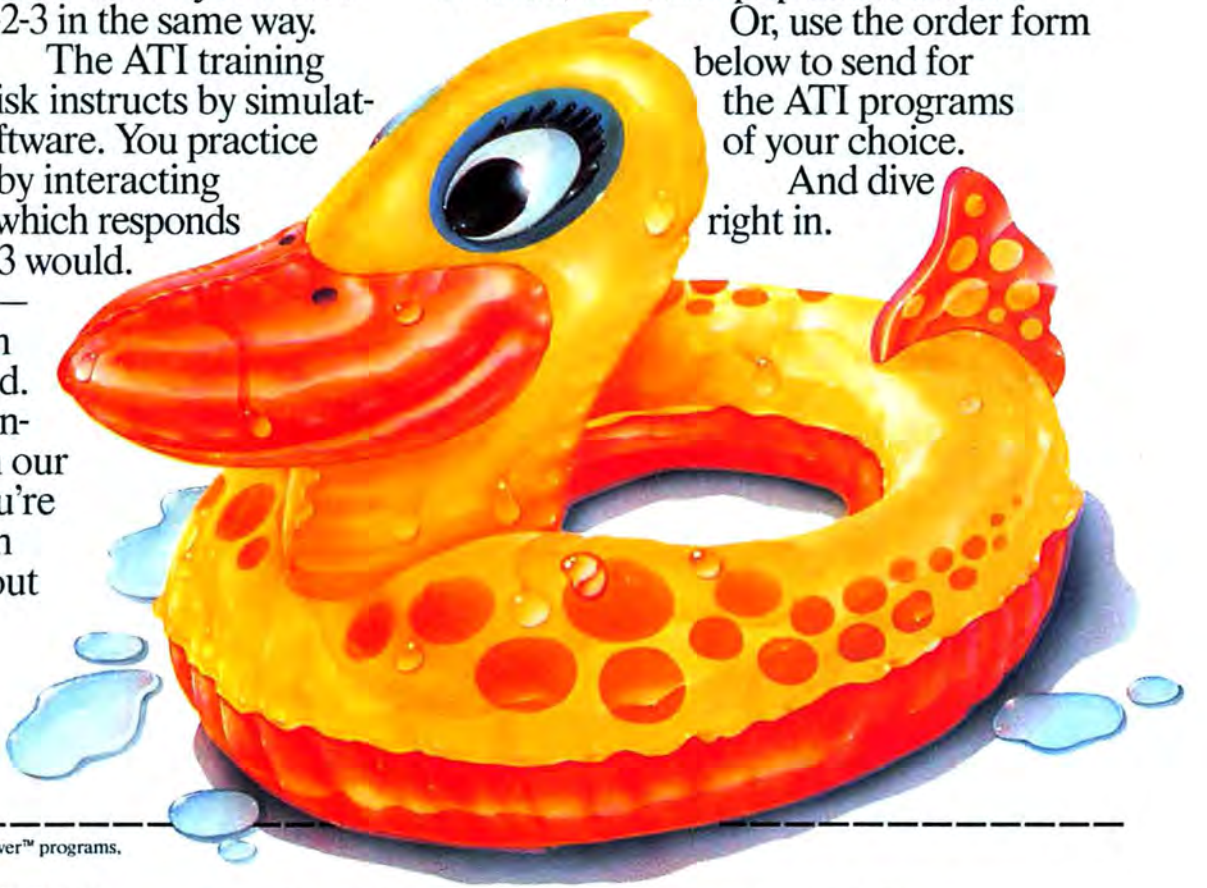

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The Personal Computer Magazine for IBM PCs and Compatibles

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Hello, information.

Or, how the IBM Personal Computer can bring you the world.

Modem shown not supplied by IBM.

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Quadboard now delivers 9 of the most needed PC functions/features. To let you get the most out of your Personal Computer. And help you work better and faster.

EXPANDABLE TO 384K

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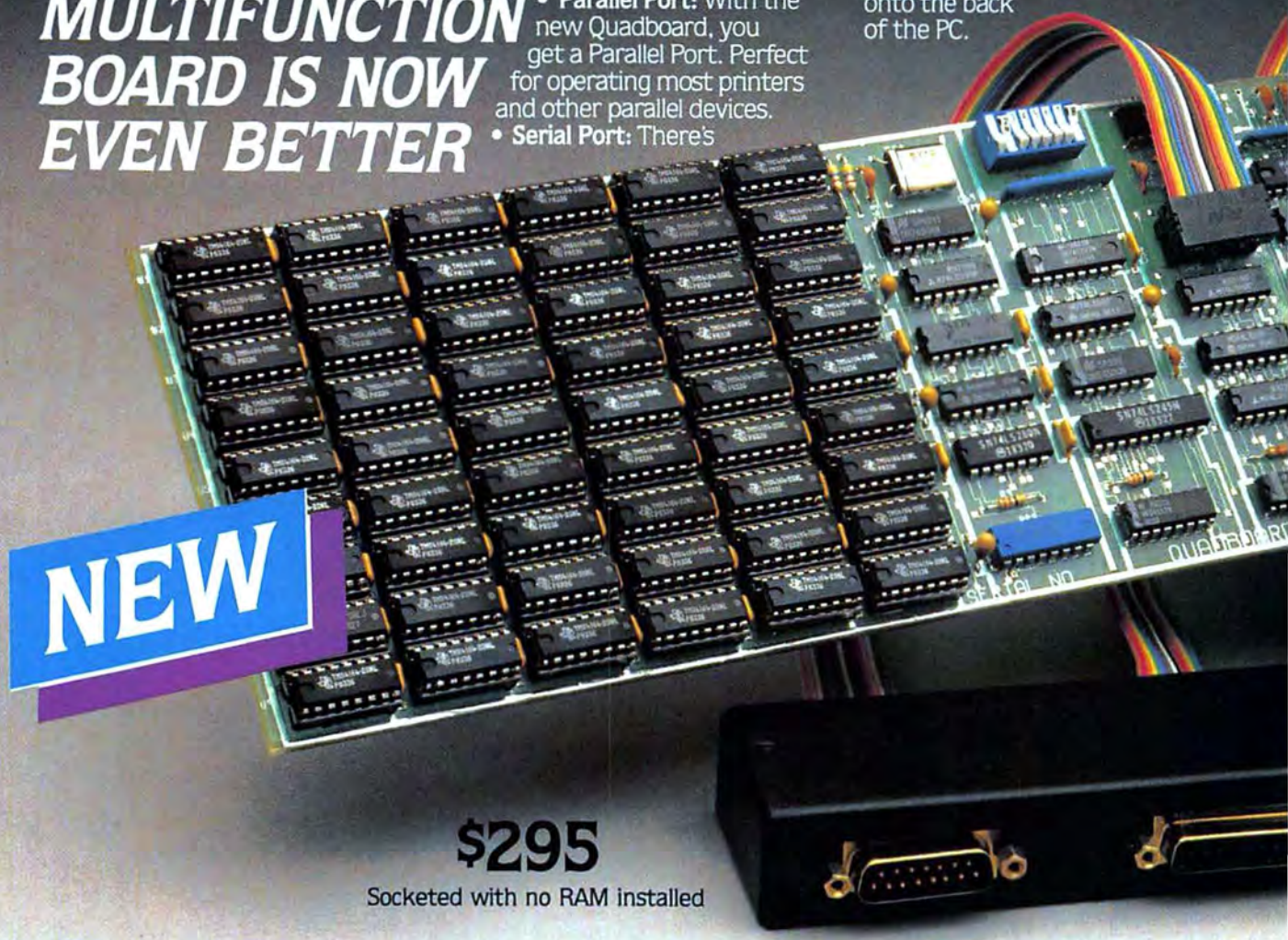
- **Chronograph:** And Quadboard's Chronograph (Real-time clock/calendar) keeps your system's clock up-to-date.
- **Game Port:** The new Quadboard has an IBM compatible Game Port. Plug in a joystick or game paddles, and fire away.
- **I/O Bracket:** Quadboard now comes with a special I/O bracket. Use it to organize your expansion port connectors. Snaps right onto the back of the PC.



$295
Socketed with no RAM installed

QUADBOARD™

• **Expandable to 384K:** The new Quadboard is expandable in 64K increments for up to 384K additional RAM. With full parity checking standard. With the new Quadboard and a fully populated system board, you can take your PC's memory up to the 640K limit.

• **QuadRAM Drive:** Plus, with Quadboard you get advanced QuadMaster Software. Including the QuadRAM Drive program. Use it to set up multiple RAM Drives in Quadboard memory. Solid state drives that let you store and retrieve data quickly and easily. Or take advantage of QuadMaster disk caching. To access frequently used data whenever you need it.

• **MasterSpool:** QuadMaster Software also includes MasterSpool. Use it to set up a software print buffer quickly and easily. This advanced spooler lets you pause at any time, back up or move forward in a file. Choose just the amount of buffer space you need and stop waiting on your printer.

• **Qswap:** Another feature of QuadMaster Software is Qswap. With Qswap change line printers 1 and 2 back and forth, with just a few keystrokes, as often as you like.

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Parallel & Serial Port	Yes	Yes
Clock/ Calendar	Yes	Yes
I/O Bracket	Standard	Optional
Game Port	Standard	Optional
Diagnostic Testing	Yes	Yes
Advanced Spooler	Yes	No
Simple Menu Setup	Yes	No
Disk Cache	Yes	No
LIST PRICE WITH 384K*	$795	$970

*Manufacturer's suggested list price for board with all available features/functions as shown (options included). SixPakPlus is a trademark of AST Research Inc.

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Circle 149 on reader service card

Season's Greetings

AMDEK

David Bunnell

PC 1984

Feelings of horror and fascination are what I remember most about reading George Orwell's *1984*. It seemed to me then that it was very important for us to take actions to prevent Orwell's vision from becoming reality. We should figure out ways to disperse technology into the hands of millions of people, who in turn will find ways to use it to enhance individuality, productivity, and the ability to relate to one another.

It seemed to me that technology should bring people closer together, not alienate them from each other and the very systems they create. Reading Orwell's book gave me a vision that I would someday participate in some development that could result in an outcome totally different from Orwell's conception.

In 1974, when by pure accident I found myself writing technical manuals and doing advertising for a small company in Albuquerque, New Mexico, which had just invented the first personal computer, I was sure that this was the opportunity I was looking for. As director of advertising and then marketing as well as technical writing, I was in a good position to help shape the vision of personal computing. The personal computer, I

was sure then, was the tool that would free us from any threatening Orwellian vise.

From my present perspective, the advent of the personal computer is an important reason that 1984 isn't going to turn out as Orwell predicted, but it certainly is not the only one or even necessarily the main one. Many other technological breakthroughs, including the advances in communications technology, have helped us rebuild the village or family culture links torn asunder by the industrial age.

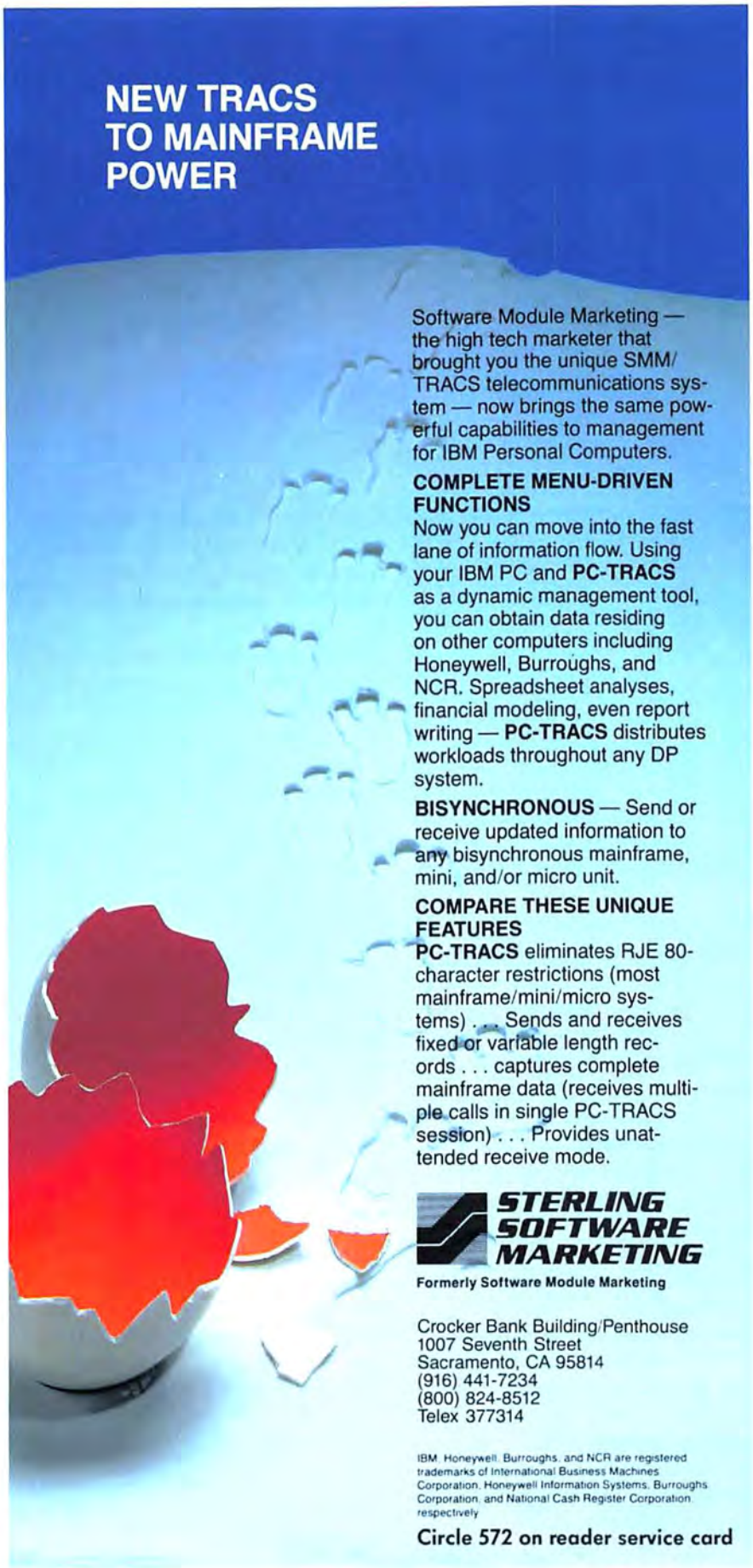
It is important to remember that the PC revolution is by no means over—other battles have yet to be fought. Most important is recognition of the problem of labor displacement. Even with full recovery, it looks like unemployment will remain high. People in the computer business need to understand that this problem affects all of us. People on food stamps, for example, rarely buy software.

Burying our heads in silicon, saying that computers create new jobs and that we have nothing to worry about is not a good plan. Computer people have to realize that automobile workers can't become programmers by simply moving from Detroit to California. And the assembly line jobs will be short-lived as companies increasingly automate their factories.

We need to computerize our educational system and create national computer training programs. For those who can't learn to use computers, we should create training programs for other socially useful work. And we need government-supported day care centers. We will have to do these things sooner or later, so why not before more damage is done?

Many specific technical challenges will have to be addressed in 1984, including finding a way to close the door on software piracy. And the elusive PC office network needs to become a reality.

Many predicted that 1983 would be the year of the mouse. But 1984 will actually be the year of the mouse



David Bunnell

as *Visi/ON*, *Microsoft Windows*, and other "window-mouse" software become a reality.

IBM can be expected to deliver up to 2 million personal computers in 1984, which means that the PC market will effectively triple. While there may be a shakeout among noncompatible personal computer manufacturers and home computer manufacturers, those in the IBM PC third-party hardware and software markets should thrive. For companies in this particular market there will be plenty of business to cover management and marketing mistakes such as those that spelled the demise of Osborne Computer.

By the end of 1984 IBM may sell a whole family of personal computers if they haven't by the time this column is printed. On my list is an IBM portable PC, a super XT with dual processors, the IBM home computer, and a 32-bit scientific engineering machine having both a 68000 chip and an 8088 chip.

Despite the wonderful growth of the PC market, at least two major software companies will see their market shares slip drastically because of an inability to follow up successful, but now outdated, products with new best-sellers. Software Arts, VisiCorp, and MicroPro are examples of companies facing this challenge.

In 1984 we will also see the rise of many new contenders—both hardware and software. There will be at least a dozen new PC compatibles and perhaps as many as 50 new software companies—one of them to be started by Adam Osborne himself. One thing for sure, 1984 won't be like the 1984 I read about in Orwell's book. It will be more of what we've gotten used to in 1983.

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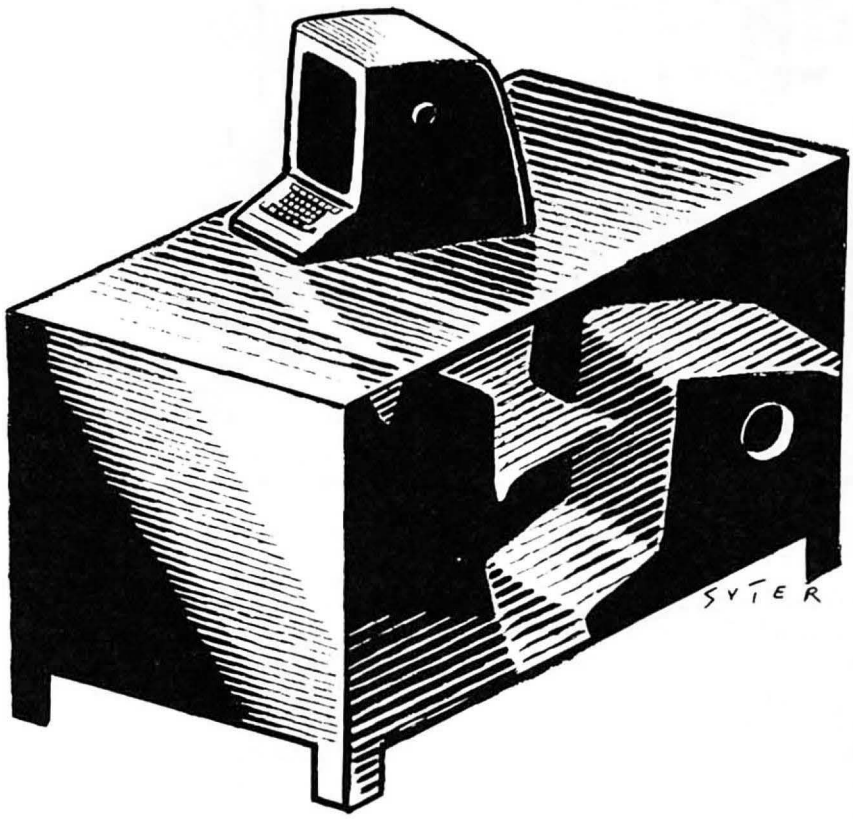
REMark: Jordan Breslow

A Protective Net Full of Holes



You are sitting in front of a video game, eyes fixed on the screen as you numbly drop money into a slot marked R&D. At the starting point of a deadly labyrinth stands your player—a floppy disk with arms, legs, and a head—appropriately labeled Clever Idea. The goal? To safely guide your idea through the maze and eventually turn it into a profitable product. You move it forward into the first section of the maze, Design Phase.

Now the attack begins: your smartest employee starts his own software company and takes your design with him. The janitor finds printouts in the trash and sells them to your deadliest competitor. Somehow you squeeze through with minor injuries, only to enter the Development Phase. An examiner from the Patent Office decides that your product is too obvious to patent. The Copyright Office says that you cannot register your clever idea. Legally unprotected but still struggling, you enter the Marketing Phase. A spy for one of your competitors gets a copy of your beta-test disk, cracks the encryption, duplicates it, and sells it at half your price. The game is over.

Software developers would find the game easier if software programs were readily patentable. A patent gives an inventor the exclusive right to make, use, or sell an invention for 17 years. And unlike copyright and trade-secret law, a patent protects the inventor from someone independently coming up with the same product.

Unfortunately, the courts and the Patent Office have not looked kindly upon software applications. The patent law states that anyone who "invents or discovers any new and useful process...or any new and useful improvement thereof, may obtain a patent...." But is a computer program a process? In a much criticized 1978 decision, the U.S. Supreme Court compared a computer program with a mathematical formula or algorithm and said it could not be patented. The court changed its position in 1981, holding that a program could be patented if it produced some "significant post-solution activity."

Getting a patent is a slow, expensive process. At the end of a two- or three-year wait, the patent may not necessarily be awarded, and the program by that time might be obsolete.

Hayes

Your computer's telephone.

What will counteract NDC 74-0054-60?

Gary: The pedigrees for next week's auction are as follows...

Sold 1000 shares at 33 for net profit of 6000. Richard.

Wouldn't it be great if you could use your IBM®PC to tap into vast resource libraries across the country? To transfer files to your partner, upstate? Or from your broker, down the street?

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Choose your speed; choose your price. The lower-priced Smartmodem 300 is ideal for local data swaps and communicates at 300 bps. For longer distance and larger volumes, Smartmodem 1200 operates at baud rates of 300 or 1200, with a built-in selector that automatically detects transmission speeds.

Both work with rotary dials, Touch-Tone® and key-set systems; connect to most time-sharing systems; and feature an audio speaker.

Smartmodem 1200B is also available as a plug-in board. Developed specifically for the PC, it comes packaged with Hayes' own communications software, Smartcom II.™

Smartcom II. We spent a lot of time developing it, so you can spend less time using it. Smartcom II prompts you in the simple steps required to create, send, receive, display, list, name and re-name files. It even receives data completely unattended—especially helpful when you're sending work from home to the office, or vice versa.

If you need it, there's always "help." This feature explains prompts, messages, etc. to make communicating extra easy.

With Smartcom II, it is. Case in point: Before you communicate with another system, you need to "set up" your computer to match the way the remote system transmits data. With Smartcom II, you do this only once. After that, parameters for 25 different remote systems are stored in a directory on Smartcom II.

Calling or answering a system listed in the directory requires just a few quick keystrokes.

You can store lengthy log-on sequences the same way. Press one key, and Smartcom II automatically connects you to a utility or information service.

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Smartmodem 300, 1200 and 1200B are FCC approved in the U.S. and DOC approved in Canada. All require an IBM PC with minimum 96K bytes of memory; IBM DOS 1.10 or 1.00; one disk drive; and 80-column display.

Smartmodem 1200B. (Includes telephone cable. No serial card or separate power source is needed.)

Smartcom II communications software.

NOTE: Smartmodem 1200B may also be installed in the IBM Personal Computer XT or the Expansion Unit.
In those units, another board installed in the slot to the immediate right of the Smartmodem 1200B may not clear the modem; also, the brackets may not fit properly. If this occurs, the slot to the right of the modem should be left empty.

And, in addition to the IBM PC, Smartcom II is also available for the DEC Rainbow™ 100, Xerox 820-II,™ and Kaypro II™ personal computers.

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REMark

Worse yet, once you apply for a patent, a detailed description of the product is open to public inspection. Few software developers are willing to risk such disclosure for a chance at patent protection.

Copyright protection is cheaper and easier to obtain, but the risks are just as great. A copyright does not grant exclusive right to an idea, just the exclusive right to copy, distribute, and modify a program. It doesn't legally prevent a competitor from writing a program that performs the same functions. A copyrighted program (the first and last 25 pages of source code must be filed) is also open to anyone for inspection—including a competitor.

Copyright law was written long before the era of computers, and though it was modified slightly in 1980 to reflect changes in technology, many issues remain unresolved. Is a program eligible for copyright if it is integrated with a physical object such as a ROM chip or a disk? Can a program and its supporting materials be copyrighted and still be trade secrets?

Though the copyright situation is improving due to recent court decisions and proposals to allow confidential copyright registrations, clever ideas are still vulnerable. So where does the software developer go in search of protection? The interim solution might be trade-secret law. Trade-secret law potentially provides exclusive rights to a clever idea, but there's a catch: the idea must be a legitimate secret—in other words, unknown to the computer industry. Further, it must be kept secret. With careful legal planning, this is possible.

A trade secret is anything kept secret from competitors that gives its owner a competitive edge. Coca Cola's secret formula is such an example. A software developer's trade secrets could be customer lists, programming methods, and in-house programming languages, as well as the programs themselves.

Unfortunately, trade secrets shared with trusted employees often end up in the hands of competitors, particularly when employees leave one firm and join another. A former employee can be restrained from disclosing trade secrets, but only to a certain extent, since the law protects an employee's right to find a new job in the same field.

Trade-secret protection also depends on the developer's ability to prove in court that a system exists to keep a secret a secret. To some extent, it is a game of appearances, but it also makes good sense when confidential information vital to a company's success passes through many hands. On the practical side, such a system involves doing everything from identifying trade secrets to shredding trash. On the legal side, trade-secrecy agreements for employees, consultants, and visitors are essential. In addition, software is often licensed rather than sold outright. If the company does sell the software, it should be made clear that the trade secret is not being sold—a delicate writing task that calls for identifying the trade secret without disclosing it.

What good is secrecy? It legally prevents an idea from being used competitively against its originator. But the protective net has holes. A competitor who independently comes up with the same idea is free to use it and disclose it without fear.

The software industry is fiercely competitive; fortunes are made by selling the right product at the right time. Equally large sums are lost when products are developed and sold without being legally protected. Trade-secret law isn't a perfect safety net, but it may keep that clever idea from getting away.

Jordan Breslow is a partner in the Walnut Creek, California, law firm of Stewart, Stewart, and Breslow, which emphasizes computer and artistic practices law.

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Letters

A Plan Man

In speaking of Warnier-Orr diagrams in his article "Smartmodem Gets Smarter" [*PCW,* Vol. 1, No. 7], Burton Alperson commented on programming with flow charts: "Few experienced programmers bother with them...they are most frequently used as expedient devices to impress management."

Unfortunately, Alperson is probably correct about the "few." However, his use of the words "experienced" and "bother" should not be taken to mean that "real programmers" or professionals are more advanced because they code from scratch.

The flow chart should not be cast aside so lightly. Like Warnier-Orr diagrams, flow charts are genuine design tools that make programming much easier, provided they are language independent and have sufficient but not excessive detail. They also provide documentation for later reference.

While the home computer will undoubtedly give rise to a very computer literate society, I suspect that few will ever learn to develop a program first and then translate it to code. Most will continue to evolve program logic while thrashing about with lines of BASIC or another language.

Dick Russell
Cambridge, Massachusetts

Help from Heathkit

Like Emanuel Donchin [*Letters, PCW,* Vol. 1, No. 7] we have been wrestling with the problem of the missing librarian program ever since we got our PC. Almost two months ago we found a solution. There are versions of MS-DOS available for other machines, and it seems that at least one of these versions comes with the *MS-LIB* program.

A local dealer we know carries the Zenith/Heath Z-100 machines, which operate under a dialect of MS-DOS known as Z-DOS. Z-DOS sells for $150 and not only includes a librarian (which has been working quite nicely on our PC, thank you), but also the Microsoft 8088 Macro Assembler (for which IBM charges $100, although the IBM Assembler documentation is better than Zenith/Heath's), and a number of other nifty programs and files (two double-sided disks full), including assembly language source for the Z-100 BIOS routines. We have barely begun to investigate the relationship of these programs to the PC BIOS.

Anyone who does not have a Zenith/Heath dealer in the neighborhood can order Z-DOS (at the same price) from Heathkit's mail-order catalog.

Lee Wittenberg
Knoxville, Tennessee

Hands On Suggestion

I would like to make a suggestion relative to your *Hands On* articles. It would be of value to those of us who are not experts if each article identified what capability the machine must have to handle the program and what software is necessary. For example, the opening sentence in Dan Rollins' "Ready to Assemble" [*PCW,* Vol. 1, No. 5] gives the impression that the IBM Macro Assembler, LINK, and DEBUG are all provided on the DOS disk, and it is not until the end that the reader finds out that something else is needed. Similarly, the article in the same issue by Rouse and Bugnitz ["Going to Bat with FORTRAN"] never tells the reader that a FORTRAN compiler is necessary nor the RAM size or number of drives needed.

Charles J. Guare
Scotia, New York

Good idea. We'll try to put information about system and software requirements up front in future articles.—Ed.

Doctor PC

I am a physician in private practice and a PC owner. Beginning with the first issue, I have followed your growth with interest. One of my interests is in the application of my computer to my work (anesthesiology). I am referring to the medical/educational aspects and not to office management aspects. Could it be that there are others out there who have similar interests? If so, perhaps you could help all of us get in touch with each other by publishing this letter.

Michael Diamant, M.D.
1199 Summit Rd.
Santa Barbara, CA 93108

We know of four bulletin boards that are either dedicated to medical topics or have medical SIGs. Their numbers are 301/460-0538, in Bethesda, Maryland; 301/371-6271 in Frederick, Maryland; 617/683-2119 in Lawrence, Massachusetts; and 901/276-8196 in Memphis, Tennessee.—Ed.

Letters

More Librarian

I heartily agree with Mr. Donchin [*Letters, PCW,* Vol. 1, No. 7], who states that a librarian is essential to make full use of a compiler. We at Polytron were also frustrated by the lack of a librarian, so we did something about it. Since the beginning of July we have been marketing *PolyLibrarian,* the object module librarian for MS-DOS. We developed *PolyLibrarian* to promote structured programming and decrease development time of software projects.

PolyLibrarian brings the capabilities of mainframe librarians to personal computers and adds features that are not found even in mainframe librarians. Besides being able to create your own libraries, you can examine and modify existing libraries. Three operating modes allow you to use *PolyLibrarian* interactively, create command files for automatic execution, or use *PolyLibrarian* in batch files. You can even use *PolyLibrarian* to decrease the amount of disk space some libraries require.

PolyLibrarian costs $99 and works with any compiler or assembler that uses the IBM PC linker.

Richard C. Kinnaird
President, Polytron Corporation
Hillsboro, Oregon

ProKey for the Disabled

In recent months many magazines devoted to personal computers have printed letters from handicapped persons struggling with keyboards. Our problem (I am disabled myself) is that we can only press one key at a time because of a physical limitation. Any multikey combination such as <Ctrl>-<Break> is impossible.

A solution to this problem is now available for IBM PC users. RoseSoft has produced a special version of their keyboard enhancer, *ProKey,* which "remembers" the <Ctrl>, <Alt> and <Shift> keys until a subsequent (nonshift) key is struck. Thus, any multikey combination can be expressed as a series of single keystrokes.

Because of its importance to handicapped IBM PC users, I hope that you will print this letter to inform your readers about the availability of *ProKey 3.0.* It provides an elegant solution to a problem that has plagued disabled computer users for years. It can be obtained from RoseSoft Inc., P.O. Box 45808, Seattle, WA 98105, 206/524-2350.

Michael Falconer
Madison, Wisconsin

For more hands-on tips with ProKey *read "Macro Mastery" in this issue—Ed.*

P-roponent

All right, I've had enough! Burton Alperson [*REMark, PCW,* Vol. 1, No. 6] says that the author of an unnamed program "made the mistake of implementing the whole program in UCSD p-System." As a result of this "mistake," the program takes 2 minutes to boot and up to 7 minutes to get to where you want to be in the program. Aw, c'mon. That's like spotting a driver on the expressway doing 40 miles an hour and blaming it on General Motors. That Chevy may be slower than a Ferrari, but it sure can go faster than 40. If what Alperson says is true (and I'm sure it is), the fault lies in lousy programming, not in the p-System. I'll bet that I can write a program under DOS that takes just as long to do its thing. Would that be DOS's fault?

As a developer of large applications for the PC and other machines, I have come to the conclusion that there is simply no alternative to the Pascal/p-System combination for large personal computer applications. I challenge anyone to name an operating system that can even approach the capabilities of some current implementations of the p-System.

Can anyone name another OS that allows programmers to develop applications with up to 255 overlays, each running to 40K or so, and run the resulting program in a 128K machine? We're talking about object code programs that would stretch the limits of a 10-megabyte hard disk running on a 128K machine. Yes, you could probably do it in assembler under MS-DOS, but the programmer would be responsible for all the code swapping. The p-System will do it for you automatically.

How about naming an OS that allows the programmer to develop concurrent processes within a high-level language program without ever resorting to assembler subroutines of any kind? Try it in BASIC under MS-DOS some time.

Portability? C is touted as being a portable language, but the fact is that only the source code is portable. P-System programs, if properly written, are portable at the object code level, meaning that you can run a p-System program on a dozen different machines with different processors, without recompiling. That's a big difference; for one thing, it means that users can port the programs, not just the developers.

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Letters

Current implementations of the p-System have I/O redirection that works correctly (as opposed to DOS 2.00's, which doesn't), a fully integrated screen editor-compiler-assembler combination, object code library facilities, 400K formatted diskettes for the PC, and fully automatic print spooling. At least one implementation has complete support for the 8087. The use of the 8087 is transparent to the programmer and the application; the same object program will run on machines with or without the chip. (By the way, the p-System's assembler has supported the 8087 for a year and a half. And not as a set of macros, either.) I could go on.

A lot of people seem to have a problem with loading and execution speed. Yes, I have seen p-System programs that seem to take forever to load. Well, there ain't no free lunch. In loading a very large program the p-System has to do a lot of work to associate all the overlays—to figure out which libraries they are in, which disk drives they're stored on, where on the disk the overlays begin, and so on. This takes some time. I might point out that SofTech Microsystems now provides a utility program that does all this work ahead of time and stores the information on disk along with the program file, dramatically reducing load time.

As far as execution speed goes, p-System programs are slower than assembler programs. So are programs written in every other compiled language. P-System programs are, however, many times faster than BASIC, and well-written p-System offerings will run at speeds that are more than adequate for most purposes. If particular sections of code need a boost in speed, the system offers the option of compiling all or any portion of a program to machine code. This will normally provide excellent results. I might point out that one of my commercial programs, written in Pascal under the p-System, is being successfully sold partly because it is faster than the mainframe time-sharing alternative.

What alternatives exist for the development of major applications? Looking at MS-DOS, you could develop in a number of languages. How about assembler? Not unless you have squads of programmers available or no deadlines to meet. And you have to be willing to do a complete rewrite for every processor you want to run on. C? A nifty language, but the implementations I have seen are very cumbersome in regard to overlay handling; the most popular C system limits you to eight object files at link time. BASIC? You can't be serious. What, then? I'm open to suggestions. I have a feeling that I'll get some.

Incidentally, can anyone name another PC operating system with virtually no known bugs? I thought not.

Christopher Dunford
Columbia, Maryland

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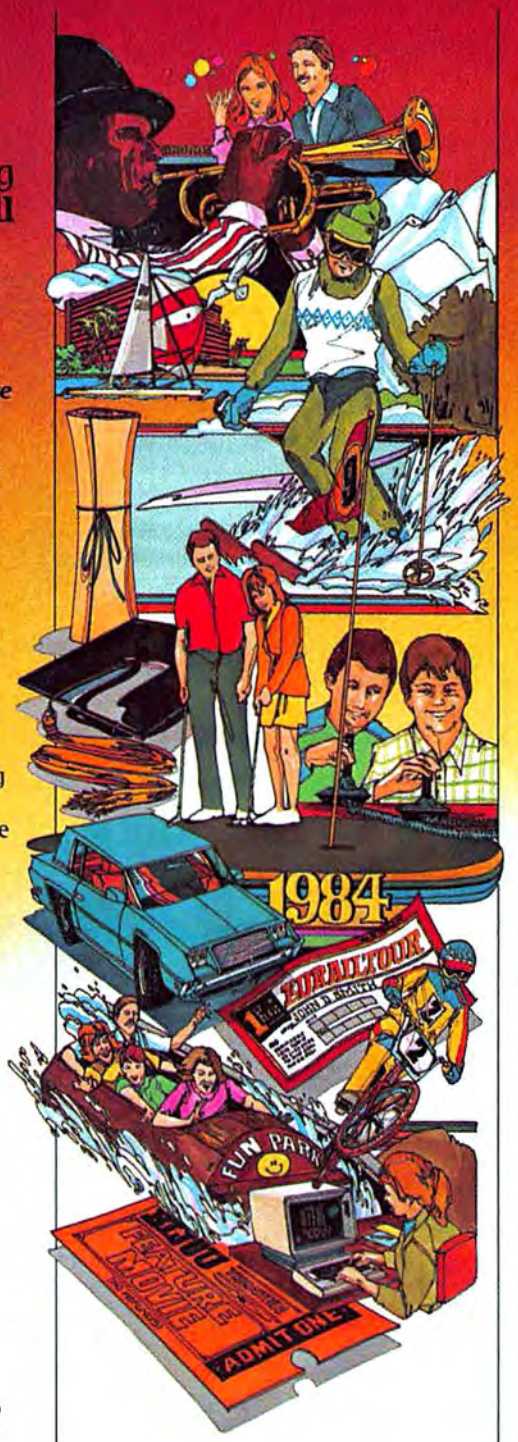

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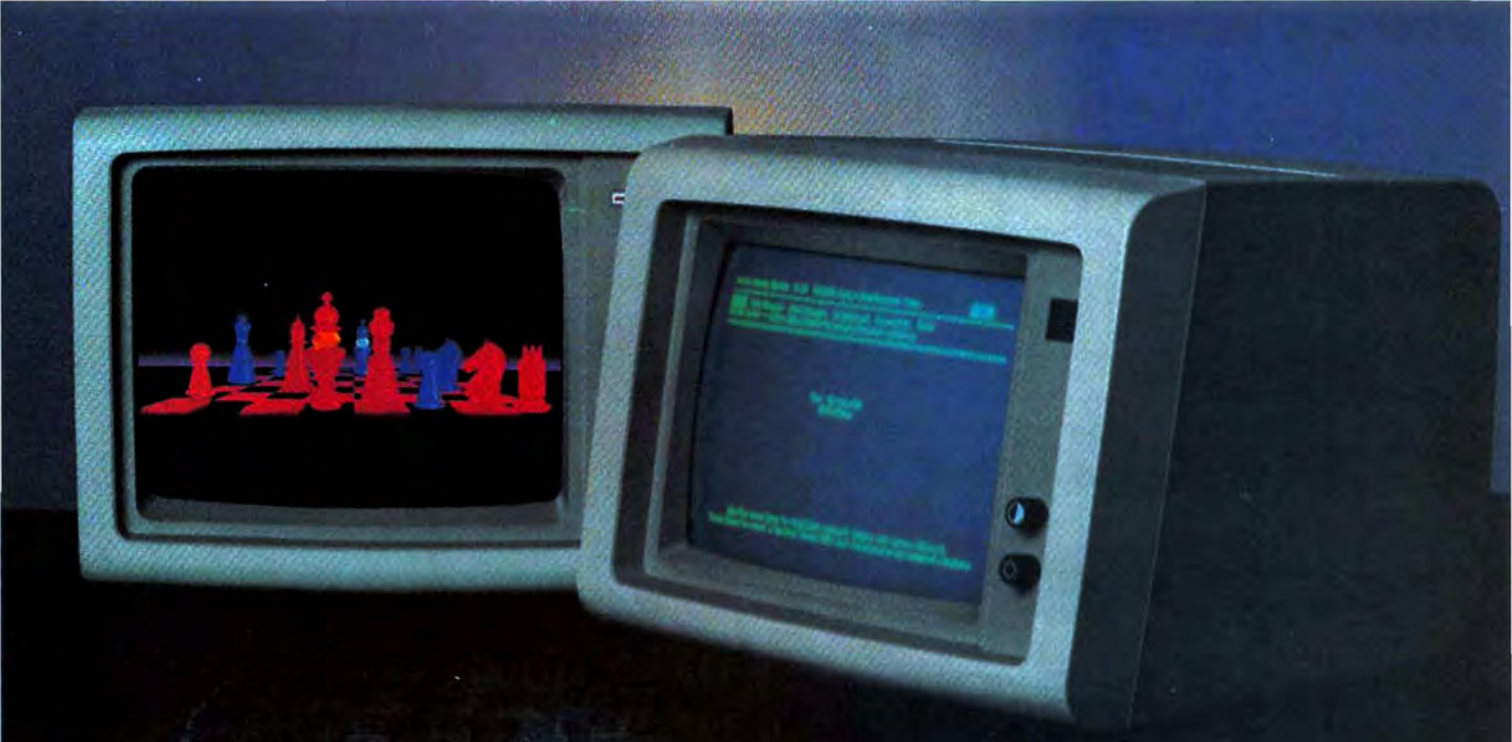

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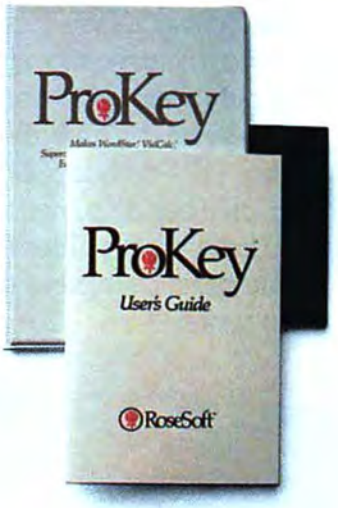

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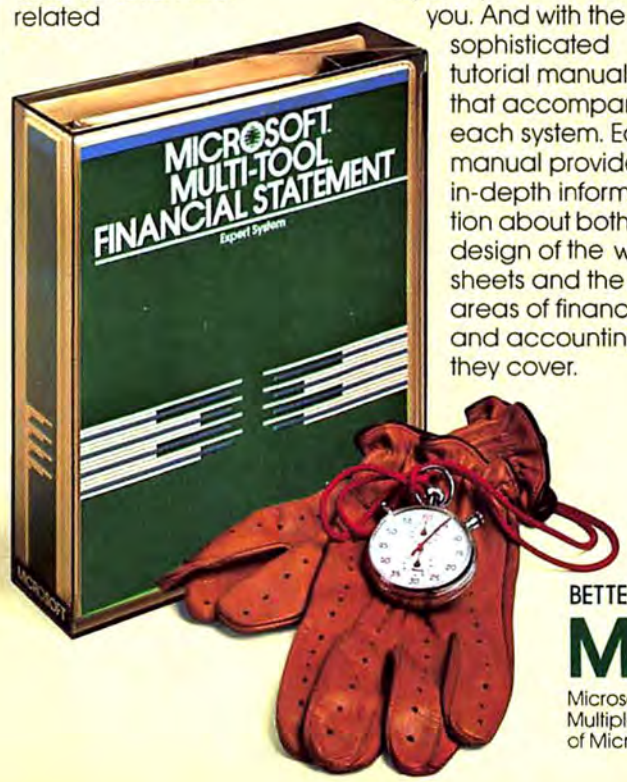

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Playing by the Rules

Michael Ham

The age of truly intelligent, independently thinking "fifth-generation" computers is not yet upon us. But expert systems, a branch of artificial intelligence, have been a part of large-computer applications since the early 1970s and are now finding their way into the PC world. What are expert systems and how do they work?

The roots of artificial intelligence (AI) can be traced to humanity's first yearnings for a mechanical servant, but the academic discipline wasn't created and named until the late 1950s. Many of the problems tackled by AI investigators during the intervening years have proved to be more formidable than was first believed, and progress has been slow. But in the area of expert systems, AI is moving out of academia and into the real world.

An expert system is a computer program that mimics a human expert; using the methods and information acquired and developed by a human expert, an expert system can solve problems, make predictions, suggest possible treatments, and offer advice with a degree of accuracy equal to that of its human counterpart. The cost of expert systems is easily justified for situations in which there are few experts and a great demand, or when the price of the expertise is high.

Examples of expert systems are *MYCIN*, a program that diagnoses meningitis; *CATS-1*, a diesel locomotive repair aid; *PUFF*, a program that diagnoses pulmonary diseases; and *R1*, a program that configures VAX minicomputer installations for Digital Equipment Corporation. Most of these are programmed in LISP and run on mini or mainframe computers. The exception is *CATS-1*, a FORTH-based system currently being used on microcomputers (see "LISP, the Language of Artificial Intelligence").

Though expert systems have been in existence for nearly 20 years, their practical applications are still limited. Some computer scientists criticize AI researchers for devoting time and energy to expert systems when the fundamental problems of AI have yet to be solved. "These programs are exciting," notes Marvin Minsky of MIT, "but most of them are not very deep." Critics like Minsky view the emphasis on expert systems as a distraction that offers short-term, though occasionally dramatic payoffs.

The problems encountered in any one discipline are so numerous and complex that even a computer cannot examine them all. The larger the domain encompassed by an expert system, the more facts and rules it must assimilate. If a system is designed to do too much, its accuracy declines to an unacceptable level. Expert systems work best in narrowly defined situations in which the possibilities are limited and the amount of data used is manageable.

State of the Art

An expert's skill depends largely on the rules he or she derives from experience and existing knowledge. A rule is a statement about the relationship of various facts; some rules are recognized fact, while others fall into an area that is not strictly quantifiable. A human expert often perceives subtle connections among apparently disparate observations that lead to verifiable scientific fact. To the outsider, the human expert appears to rely on intuition or hunches. But this intuitive knowledge, though not easily quantified, can be imparted to the computer in the form of rules. Building an expert system means finding an efficient way to represent these rules.

Of course, it's not all that simple. Does the domain under consideration have any experts? Without them, it's impossible to build an expert system. Is there an expert willing to spend the time to work with the system designers? The word *an* is important. A designer prefers to work with only one expert because some have different rules and methods. Attempting to codify a consistent system based on the views of several experts is likely to end up in frustration and failure.

One exception to this rule was *Prospector,* an expert system that evaluates geological sites for mineral deposits. SRI International, developer of *Prospector,* selected experts who were specialists in different classes of ore deposits. Because of this collective knowledge base, *Prospector* performs better than any single, human expert and, as a case in point, recently predicted the location of a $100 million molybdenum deposit.

Given the domain and the expert, how is the system developed? The first step is building the structure of the system. The key to creating the structure is separating knowledge of the domain as much as possible from the procedures that manipulate the knowledge. If the store of knowledge (known as the knowledge base) is isolated from the programming logic, it can easily be examined, modified, and maintained like any other data structure.

Contemporary expert systems are of several types, partly because the field is so new and innovation is the rule, and partly because the various problems require different approaches. Most expert systems fall into one of three categories: rule-based systems, frame-based systems, and blackboard systems.

Rule-Based Systems

Rule-based systems like *MYCIN* use a knowledge base that consists of rules and facts. It is difficult to anticipate the number of rules an expert system will require. Sometimes the number is surprisingly small, which is disconcerting to a human expert whose professional experience is so briefly summarized. For example, *MYCIN* uses about 450 rules and 1000 facts relating to meningitis infections. *PUFF,* which uses the same structure as *MYCIN* but offers expert diagnosis of pulmonary diseases, needs only about 50 rules. *CATS-1* has nearly 550 rules that cover 50 percent of possible locomotive repair problems. By the end of 1984, *CATS-1* will have 1500 rules, allowing it to diagnose about 80 percent of potential problems.

Facts in *MYCIN* are represented in the form "The <attribute> of <object> is <value> with <certainty factor>." For example, "The type of the infection is bacterial (.6)," or, "The infection of the patient is hospital acquired (.5)."

All the rules are of the form "If *A,* then *B,*" where *A* is a single fact or the conjunction of several facts, and *B* is another fact. For example, in one test run on *MYCIN* the following rules were used: if (1) the stain of the organism is gram positive, and (2) the morphology of the organism is coccus, and (3) the growth conformation of the organism is chains, then the identity of the organism is streptococcus (.7).

> Intuitive knowledge, though not easily quantified, can be imparted to the computer in the form of rules.

Each rule produces the statement in the then part when the statements in the if part are satisfied. A fact is derived (the organism is streptococcus) that can be used with other rules (those for treatment, for example) to derive still another fact ("penicillin is the proper treatment").

In this particular example the human expert who helped design the system assigned the conclusion a certainty of 70 percent. Expert systems typically deal with situations in which the facts and the conclusions are somewhat uncertain. A human expert's strength is the experience that enables him or her to determine the likelihood of an outcome when not all the facts are available. Since the system's conclusion from one rule is often used to trigger another rule to derive additional information about the situation, the system must be able to measure certainty.

The developers of *MYCIN* initially thought that the theory of probability would provide the means of measuring certainty. But probability theory requires too many assumptions. In the previous example you would have to assume that the patient did not have another disease and that the evidence came from several sources—something seldom encountered in real-life situations.

Probability theory would imply that if there is evidence that gives 70 percent probability that an organism is streptococcus, the same evidence will establish that the organism is not streptococcus, with 30 percent probability. A human expert is extremely uncomfortable with this arbitrary approach. The developers of *MYCIN* ultimately determined that measures of confirmation do not in fact act like probabilities.

Confirming Reality

In a real-life situation three separate facts (say, three medical tests) may support the same conclusion (the patient has heart disease) by the same degree of certainty, say 50 percent. According to probability, the patient has a 50-50 chance of having heart disease. But a doctor would be likely to conclude that the chance of heart disease is greater. The evidence in this case is cumulative. Confirmation theory, as it is called, reflects this reality.

Ultimately the *MYCIN* developers found a satisfactory way to combine certainty measures and embodied them in rules. Conclusions with a certainty of less than .2 were ignored, lessening the amount of computation required by the program in running through the rules.

Certainty factors are a necessity, but the power of an expert system still lies in its rules and facts. Experiments in changing the certainty factors from three decimal places of precision to two and to one produced remarkably little change in the output of the program.

Applying the Rules

Rules are applied in expert systems using three common methods: data driven (also known as forward chaining), goal driven (or backward chaining), and the mixed method. Rule-based systems utilize two data bases, one that contains permanent rules and facts and a second that stores conclusions and facts provided by the user.

A data-driven expert system can appear to work by trial and error, asking apparently unrelated questions. The approach is as follows: if there is a rule if *A* then *B* and you know the fact *A*, you get the fact *B*; then if you have a rule if *B* then *C*, you get the fact *C*, and so on.

If a situation occurs in which more than one rule applies, a strategy that decides which rule to use saves time. A data-driven system may seem aimless as it wanders through its set of rules.

A goal-driven system considers only rules that relate to a specific goal. The system attempts to prove a goal by chaining backward through its rules. If *D* is the goal, the system looks for a rule that has *D* as its conclusion. As the program searches backward through its rules, it eventually reaches a rule that has as its if portion a fact that is not the conclusion of any other rule, so it cannot go backward any further. At that point the system turns to the user and asks for relevant facts. If the user cannot supply the information, the system explores other lines of reasoning. Thus a goal-driven system works more like a human expert, picking a hypothesis (the goal) and then attempting to prove it.

The primary advantage of goal-driven systems is that they don't seek information or apply rules that are unrelated to their overall goal. The disadvantage is that users cannot volunteer relevant information about the problem. This can make goal-driven control unacceptable when a rapid response is required.

The mixed method, which uses both data-driven and goal-driven control, lets users volunteer some information that the system uses in pursuit of its goals.

Whichever method is used, an expert system must have a strategy for picking rules when more than one rule applies. To achieve this, some systems have rules about rules. For example, a program might have a rule that states, "If a patient is less than ten days old, rules 31 to 45 do not apply."

Frame-Based Systems

In frame-based systems, knowledge is stored in frames, roughly akin to records, though frames are larger and act more like miniature data bases. Frames comprise slots, which can store a rule, calculation procedures, a pointer to another frame, or other information. Frames are hierarchically ordered and "inherit" properties from frames above them.

Frame-based systems are useful in handling complex situations involving objects and classes of objects.

Blackboard Systems

A blackboard-style expert system takes its knowledge from several knowledge sources embodied as separate data bases and calls in the information it needs with appropriate subroutines. Each knowledge system acts like a separate expert system, and conclusions are sent to a shared data base (the blackboard) that can be viewed and accessed by any data base. The knowledge sources can be rule based or frame based.

Blackboard systems let one knowledge source make use of the conclusions drawn by another knowledge source, even if it is structured differently. Blackboard systems are used when external events arrive at the system sporadically and many levels of knowledge are required.

Auditing the Expert

For moral, ethical, or legal reasons, a professional is unlikely to accept advice or conclusions produced by an expert system unless the logic and chain of reasoning are available for review. Thus an explanation facility is a vital part of any expert system because it enables the system to explain how it reached a certain conclusion or why it is pursuing a given line of inquiry.

The explanation facility is also essential in debugging the system. With such a facility the expert system can provide an audit trail of the logic used to make a decision. A human expert can thus discover whether the system has improperly arrived at a correct result. Errors that go undetected in testing are likely to surface with a vengeance in real-life applications.

A human expert's skill grows as new rules and facts are acquired, each time he or she encounters new problems; an expert system must be capable of similar growth. This means that an expert system's knowledge base must be readily edited, allowing facts and rules to be added, deleted, or altered. Obviously this editing capacity is useful during the system's development, since a human expert can work with the system and bring it along by posing problems, asking for explanations, and correcting errors or adding rules until the results are satisfactory.

> "In the knowledge lies the power" is a fundamental axiom of expert systems.

To maintain consistency in an expert system's knowledge base, the editor should also include checks in the system to ensure that a new rule does not conflict with other rules in the system.

Because human experts have difficulty articulating the rules they use, rules are often added only after the system produces some output that a human expert recognizes as incomplete or incorrect. The human expert can then use the explanation facility to determine what rules were used and then add rules or modify the existing rules to bring the system to the proper conclusion. This process of incremental growth implies that the collection of rules not be rigidly organized. If there is no rigid organization, it is easy to add new rules.

"In the knowledge lies the power" is a fundamental axiom of expert systems. Rewriting the code that allows the expert system to execute its functions does not increase its power or efficiency nearly as much as increasing the knowledge base. Increased performance and reliability in an expert system come from adding to the rules that guide it in its collection and assessment of information.

A good example of this is the *DENDRAL* expert system, which elucidates the chemical structure of complex compounds. For example, in trying to define the structure of the compound $C_{21}H_{44}S_2$, *DENDRAL* pulls in rules from its mathematics knowledge base and discovers that there are 43,867,912 possible structures for the compound. Rules about chemical topology reduce the possibilities to 14,715,814, and adding mass spectrum analysis rules further reduces the possibilities to 1,284,792. Rules from the domain of chemistry reduce the number only slightly—to 1,074,648. But then rules from the knowledge source of nuclear magnetic resonance (the unique magnetic footprint of a molecule) were added, and the possibilities were reduced to one.

LISP, the Language of Expert Systems

Expert systems have been written in languages from FORTRAN to FORTH, but LISP is the most common choice, in part because LISP has long been the language of the AI community.

FORTRAN was originally developed to work with algebraic expressions—a limiting factor for its use with expert systems. An AI programming language must manipulate symbols that represent more than just numbers. The elemental relationship among the symbols is association, and in order to associate symbols, a language that uses lists was needed. LISP (for list processing) was developed in 1958 by John McCarthy, a prominent member of the AI community and the originator of the term *artificial intelligence.*

The elemental symbol in LISP is the *atom,* which is similar to a variable name in traditional programming languages. An atom is named by a character string and can be assigned a value. Some atoms have preassigned values in LISP; for example, T represents true and NIL false. Other atoms' values can be assigned by the programmer. A list is defined as a sequence of elements, each element being either an atom or a list. This definition is recursive, a technique common in LISP. Here is a typical list: (THIS (A B C) IS (A) ((LIST)) ())

The first element is the atom THIS; the second is a list of the three atoms A, B, and C; the third is the atom IS; the fourth is a list of one atom A; the fifth is a list whose only element is a list (of the atom LIST); and the final element, (), is a list with no elements.

Recursive techniques are economical in expression. They do not specify an explicit sequence of steps, but state a definition that unfolds as it is applied. For example, the mathematical factorial function is often defined recursively:

Factorial of N = 1	if N = 1
N*factorial of (N-1)	if N > 1

Applying this definition, the factorial of 4 is expressed as 4*3*2*1 = 24. The definition translates into LISP as:

```
Factorial (N):
(COND ( (EQUAL N 1) 1)
(T (TIMES N (FACTORIAL (DIFFERENCE N
    1)))))
```

The function EQUAL takes two expressions (in the above case, N and 1) and returns T if the values are equal. The function COND takes pairs of expressions and returns the value of the right member of the first pair for which the value of the left member is evaluated as T. In the above routine for the factorial of 4, FACTORIAL calls itself, but each call is for a lesser number (3, then 2, then 1) until the final call occurs, which returns the value of 1.

Recursion is important in AI problem solving because many tasks have recursive structures. In other words, the same solution process that works with a complex problem can be used on a simple version of the problem or on a subset of it. And the solution process can be defined to a certain extent without knowing the elements involved.

Notice that the LISP routine above is a list. LISP programs and data are both structured as lists. Any other structure (such as an array) can be represented as a list. While this may not be efficient (in terms of execution time), AI programs must be able to manipulate data structures of unpredictable size and shape that evolve as an expert system runs. A list structure is flexible enough to allow easy manipulation by a programmer and by the expert system itself.

In the latter case the list data structure makes it possible for one LISP program to process another LISP program as data. LISP programs readily analyze and generate LISP programs; in particular, they modify themselves, which is essential if an expert system is to learn on its own.

Several LISP dialects are currently in use. The predominant dialects are MACLISP, which was written at MIT in 1966, and InterLISP, which dates back to 1967 and is now maintained by the Xerox Palo Alto Research Center. In selecting a LISP dialect, consider whether the expert system chosen runs in it—do not expect to convert programs from one LISP to another.

Internal memory is also important. Some expert system developers advise 1 megabyte as the minimum configuration for running a LISP application. Since a PC's maximum configuration is 640K, any expert system for the PC must be either relatively limited in scope or written in a memory-efficient language such as FORTH. Like LISP, FORTH is interactive and extensible; it accommodates recursion, and it can readily define new data structures. Most importantly, FORTH, like LISP, can modify its own source code.

But LISP applications are possible for the PC. IQLISP is one of the first LISP implementations for the PC; it runs with one disk drive and 128K under DOS 1.10 or 192K under DOS 2.00. The package includes an editor, utilities, debugging support, and structured programming macros. IQLISP is available for $175 from Integral Quality, P.O. Box 31970, Seattle, WA 98103, 206/525-2985.

Two books that are good introductions to LISP are *LISP*, by Winston and Horn (Addison-Wesley, 1981, 430 pages, $17.95) and *The Little LISPer*, by Daniel P. Friedman (Science Research Associates, 1974, 58 pages, $5.95). Winston and Horn take the textbook approach and use MACLISP. Friedman's booklet is a question-and-answer guide that initiates the reader into the basics of LISP and how it works.

Using a broad set of rules, *DENDRAL* is able to avoid considering millions of possibilities and in essence deduces the structure of the molecule.

Testing MYCIN

Before an expert system is put into operation, it must perform at an acceptable level of accuracy. The developers of *MYCIN* decided that they would try for 90 percent accuracy since the program could not be expected to achieve perfect performance in its field of expertise (selecting therapy for patients with meningitis). When the program was complete, ten actual cases of meningitis from hospital records were run through *MYCIN*. The cases were all presented to five infectious disease experts from the Stanford Medical School, a fellow in infectious disease at Stanford, a medical resident, and a medical student working at Stanford on infectious diseases. The

therapies selected by *MYCIN* and the human experts together with the actual therapy given each patient were sent to eight infectious disease experts at other institutions who had published papers on meningitis diagnosis and treatment.

The evaluators rated the prescribed therapies without knowing who (or what) had selected which therapy. In this test, using eight experts' ratings to define "correct," *MYCIN* scored only 69 percent. This was far short of the 90 percent target, but it was also better than any of the human experts, the best of whom scored 68 percent.

> The expert system can provide an audit trail of the logic used to make a decision.

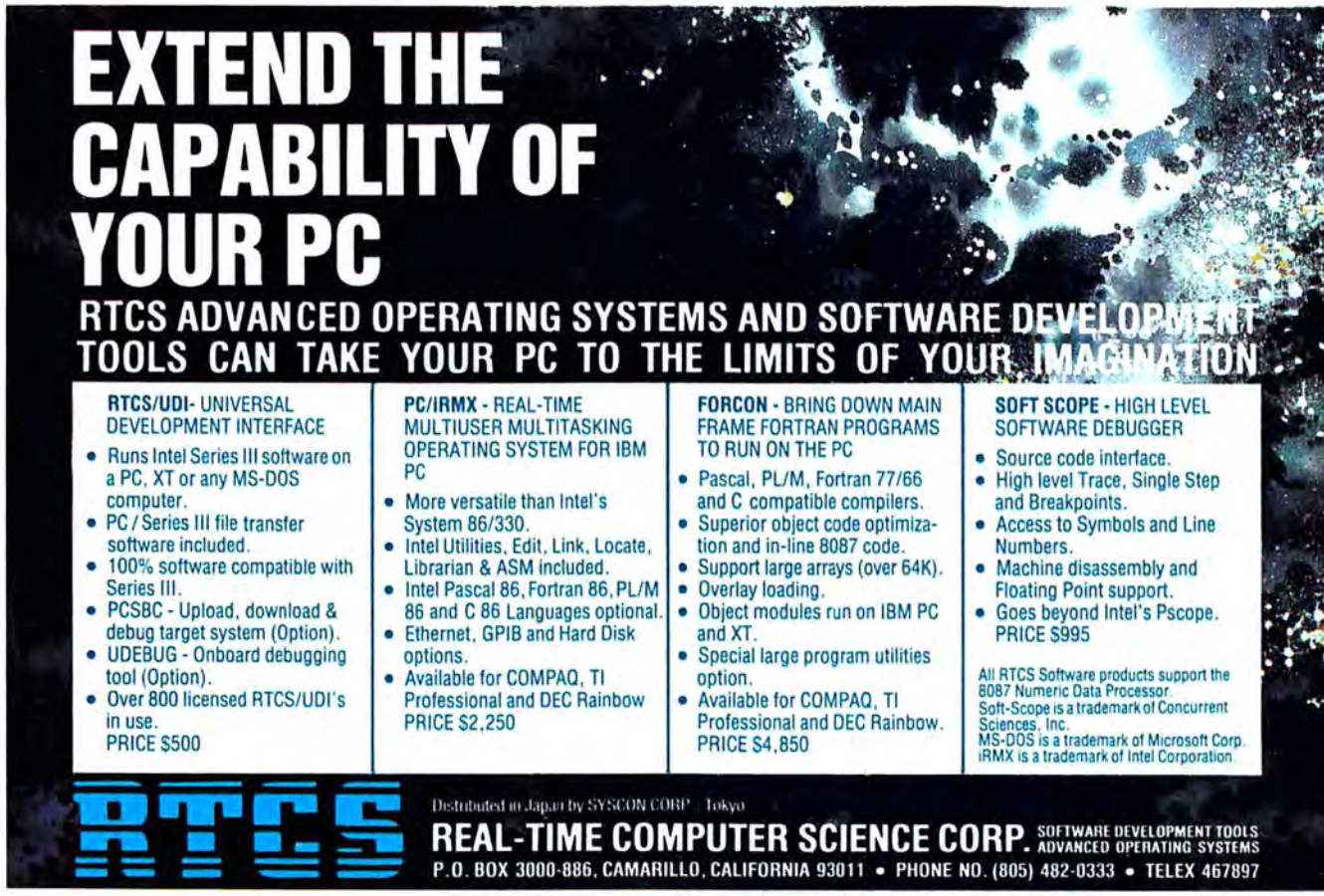
This example illustrates that accuracy standards for an expert system must be well thought out and suggests that a reasonable standard can be obtained by looking at the actual performance level of human experts.

In spite of *MYCIN*'s reliability, it is not commonly used by physicians because its design limits it to a question-and-answer approach to gathering user information. A physician sitting at a terminal might have to spend 50 minutes to arrive at a diagnosis—an unacceptable amount of time in the real-world conditions of a hospital. The usefulness of an expert system is thus measured not only by its results but also by how readily they are obtained.

The consultation model used by *MYCIN* may be best in circumstances in which time is not an important factor. Other models, such as the monitoring model, automatically track information over time (such as instrument readings). When it is necessary to turn to the system, the user needs to provide only a small amount of additional information.

The batch-type expert system is not interactive. Batch systems take their essential data in one gulp and then run until output is ready. *DENDRAL* is an example of a batch system.

A fourth model is used by *ONCOCIN*, a medical expert system that selects therapies for cancer patients. *ONCOCIN* is designed to be an integral part of a hospital's medical record-keeping system. As a physician completes a record form on the computer screen, *ONCOCIN* takes note of the data. By the time the physician reaches the end of the form, *ONCOCIN* has already filled in the treatment section with a suggested therapy,



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Further Reading

The following books provide detailed information on the concepts and systems discussed in this article:

Building Expert Systems. Frederick Hayes-Roth, Donald A. Waterman, and Douglas B. Lenat, eds. Addison-Wesley Publishing Co., Reading, Massachusetts, 1983. 444 pages, $32.50.

Designing for Human-Computer Communication. M. E. Sime and M. J. Coombs, eds. Academic Press, New York, 1983. 338 pages, $48.

The Handbook of Artificial Intelligence (three vols). Avron Barr and Edward A. Feigenbaum, eds., Vols. 1 and 2, 1981; Paul R. Cohen and Edward A. Feigenbaum, eds., Vol. 3, 1982. William Kaufmann, Inc., Los Altos, California. Vol. 1, 409 pages, $30; Vol. 2, 427 pages, $35; Vol. 3, 639 pages, $45; $95 for the set.

which the physician accepts or overrules. The expert system here has been embedded into the normal procedures and routine, so its use is automatic.

Micro Movement

Fitting an expert system into a microcomputer is not easy. In general, internal memory requirements are substantial. A large amount of data, in the form of rules, facts, and source code, must also be stored, dictating the use of a hard disk with any PC-based expert system. Storage requirements will vary with the application and the language in which the expert system is implemented.

Current expert systems are being converted for the PC; *CATS-1,* which is used on Digital PDP-11/23s, will be available for the PC sometime during 1984. As hard disks become less expensive and machine portable, and as efficient languages (such as FORTH) are more widely used, more expert systems are likely to be developed or converted for the PC.

Though it will be a while before computer stores carry expert system software that will advise us on our investments or hobbies, the movement has begun. The era of the truly intelligent computer is still in the distant future, but making your PC smarter is well within sight.

Michael Ham is a programmer currently working on microcomputer-based applications in the area of education support systems.

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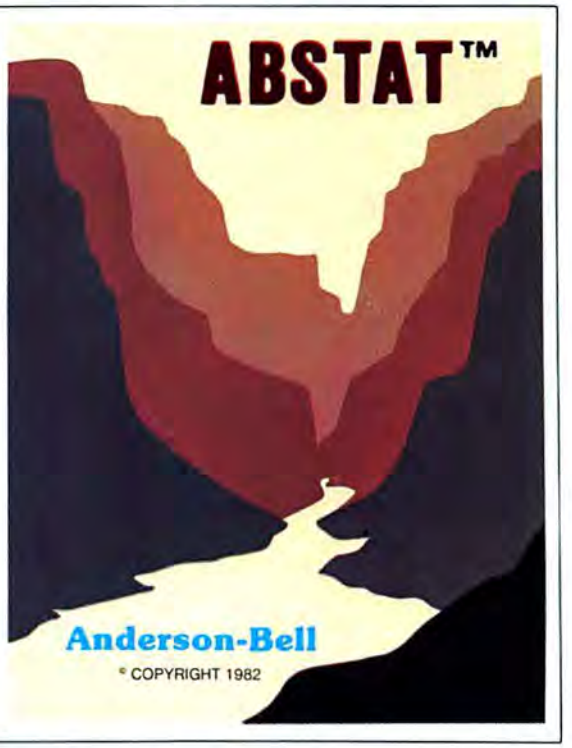

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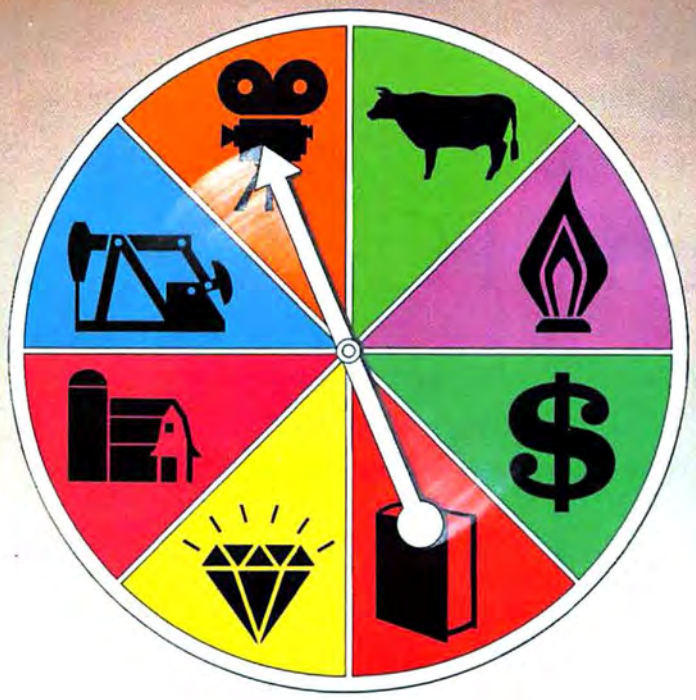

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Mainframe PC

Two powerful variations of the PC introduced by IBM in October 1983 will further enhance its popularity in the offices of corporate America.

D. M. Tucker

Recognizing the very large number of installed 3270 display stations (mainframe terminals) and lookalikes made by other companies, IBM has introduced the 3270 Personal Computer and the Personal Computer XT/370.

The 3270-PC can function concurrently, running four mainframe host applications (as if it were four 3270 terminals), two notepad tasks, and one standard PC-DOS 2.00 task. A notepad window can be used to store simple text (it offers full-screen editing) or as an interim holding area for data being passed among the other applications. The 3270-PC uses a new keyboard (IBM 5171) and a new high-resolution color monitor (IBM 5272).

The XT/370 turns the PC into an almost full-fledged, single-user System/370 capable of executing CMS (Conversational Monitor System) in its own 4-megabyte virtual machine.

Accompanying the hardware is all the software necessary to smooth the integration of these new tools into corporate data processing networks. This includes the *3270-PC Control Program* and the *3270-PC File Transfer Program* for the 3270-PC, and the *VM/PC Licensed Program* for the XT/370.

With these new products IBM has increased the PC's already huge potential for improving productivity. It still remains the responsibility of the user community, of course, to transform that potential into reality.

The 3270-PC

Sporting a dazzling new color monitor, an extended-function keyboard, and sophisticated software, the 3270-PC should soon enjoy the same widespread acceptance as the 3270. The 3270-PC provides an array of configuration possibilities: varying amounts of RAM (from 256K to 320K), auxiliary storage ranging from a single dual-sided disk drive to a 10M fixed disk, and an optional parallel printer adapter board. All models come equipped with the new 5151/5272 Display Adapter, which will support either the familiar 5151 Monochrome Display or the new high-resolution 5272 Color Display. Of course, all models also include the 3270 Adapter, which connects the 3270-PC to either a 3274 Display Control Unit or a 43xx Display/Printer Adapter by coaxial cable. The system unit includes a power supply and an eight-slot motherboard that are almost identical to the standard XT's.

> The XT/370 turns the PC into an almost full-fledged, single-user System/370.

The 5272 Color Display demonstrates remarkable resolution and color brilliance, even though in PC-DOS it is limited to the 256 ASCII characters that can be displayed on the monochrome monitor. In PC mode, the screen displays 25 rows by 80 columns, whereas in 3270 mode only 24 lines are shown. Up to eight colors (including black) can be presented. A tilt-and-swivel base adjusts the position of the monitor for user comfort.

IBM appears to have addressed several of the most common complaints about the PC keyboard with the new 5171 Keyboard. Although it has significantly more keys (122 compared to 83 on the standard PC) this keyboard is well organized and the keytops are clearly labeled. PC local functions are in blue and 3270 functions are in black. For 3270 compatibility, the new keyboard includes 24 program function keys, separate

The 3270-PC's color display uses background and foreground colors to differentiate up to seven application windows.

cursor controls, and PA keys. It should be easy to acclimate to the new keyboard if you're used to the standard PC or a 3270-type terminal.

Another helpful keyboard feature is a keyboard macroprocessor called "autokey," or "keystroke record/play." Like the PC-DOS utilities *Keynote* and *ProKey*, this feature provides a way to store commonly used, long keystroke combinations so that they can be called up by pressing one or two keys. For example, one keystroke could replace an awkward logon sequence. In fact, one key could call a batch file that would dial up the Dow Jones News/Retrieval service under DOS 2.00, download some specified data, log on to a mainframe host application, and transfer the retrieved data to the host application.

An unfortunate note is that because of system timing differences, none of the new boards (color display, new keyboard, or 3270 Adapter) can be used with current PCs or XTs. The 3270-PC can use most of the standard PC add-on hardware except the Monochrome Display Adapter, the Color/Graphics Adapter, and the standard PC keyboard.

As impressive as the new monitor is, it would have been mediocre without the pyrotechnics supplied by the *3270-PC Control Program*. Operating within the framework of PC-DOS 2.00, the *Control Program* enables the user to specify up to seven concurrent tasks. Four of those tasks can be separate, interactive 3270 sessions with a host, two can be local notepad tasks, and one can be a standard PC-DOS 2.00 session.

The 3270-PC keyboard—3270 functions are labeled in black and PC functions in blue.

Most standard PC-DOS applications software (for example, *WordStar* and *1-2-3*) will run on the 3270-PC. Using specially marked keys, the user can define the location, the size, and the background and foreground colors of a display window for each specified task. The applications program assumes that the screen image shown in each window is using the full screen, so you can view the entire contents of a screen by scrolling.

Some applications are actually sensitive to the size of the window. For example, the wraparound format and scrolling functions of the notepad adjust for the size of the window in which it is operating. Windows can overlap each other in whole or in part. A special function key cycles through the ring of tasks, making each task in turn become active and causing its window to overlay all other windows. Prudent use of background and foreground colors will greatly simplify the recognition of tasks.

The *3270-PC File Transfer Program* is based in the host system and enables the user to transfer files from the host to the work station or vice versa. The self-teaching *Helper* disk that comes with the 3270 can also be run on a standard PC under DOS 2.00.

Specially marked function keys aid in transferring data from one task's presentation area to that of another. In addition, these keys enable the user to save and later restore the *screen profile* (i.e., window layout, keystroke recordings, and notepad presentation spaces).

The people most likely to use this new PC will be those who prefer interacting with a responsive personal computer but who must have access to data and programs stored centrally on one or more mainframes. The ability to undertake concurrent activities on up to four mainframes (as many as can be accessed on the network from the single 3274 controller connected to the 3270-PC) and to execute a native PC program can result in substantial time savings.

For example, a financial analyst may initiate one or more relatively long-running processes to retrieve specific data from centrally located data bases. While one retrieval is being performed, subsequent processes can be started on the same or different mainframes. As these retrieval tasks are completed, the analyst can assemble the data from the various sources in one of the notepad areas. When sufficient data has been delivered, the analyst can switch to his or her favorite PC spreadsheet program to manipulate and massage the data, then pass the results back to a mainframe task to be distributed via electronic mail.

One person sure to use the 3270-PC is the applications or systems programmer. While running time-consuming compilations or tests, the programmer can start another 3270 task or switch to PC-DOS to perform some other programming chore. System programmers monitoring operation of the system will be able to do so from the vantage point of up to four 3270s, while at the same time preparing a memo or performing other word processing tasks using PC-DOS. Data being displayed by the 3270 tasks can be saved in one of the notepad areas for later analysis using programs running under PC-DOS. When the programmer's work is complete, resulting data or memoranda can be transmitted to the host for distribution or archival storage.

Most prospective users can improve their productivity by using the

3270-PC as a dual-purpose processor—an on-line 3270 and an off-line PC. Use of more than one 3270 session will require greater organization and forethought by the user as well as multiple user IDs.

Personal Computer XT/370

The thought of having one's own 4-megabyte virtual machine sitting on the desk is enough to excite all but the most jaded VM/CMS user. Virtual memory allows a relatively small storage capacity to substitute for a larger one. Virtual memory is a technique used in larger systems to simulate real storage by swapping segments of programs and data in and out of disk storage as they are required (called *paging*). A "virtual machine" simulates the operation of multiple computing machines, each with its own main memory storage. Under the virtual machine scheme, the contents of the main memory and CPU registers of the multiple CPUs are kept in pages that can be swapped in and out of disk storage.

The thought of having a 4-megabyte virtual machine sitting on the desk is enough to excite all but the most jaded VM/CMS.

The announcement of the XT/370 should have many programmers and other VM/CMS users cheering, because it means desktop access to mainframe compilers, interpreters, editors, text processors, and other program development and documentation tools. In addition, the XT/370 doubles as a 3277 Model 2 display terminal, connecting the user with the mainframe for those tasks that can still best be accomplished on the larger system.

Two models of this important product were introduced, one (model 588) with a 10M fixed disk and the second (model 568) allowing the attachment of two 10M fixed disks housed in a 5161 Expansion Unit. Both models come with 768K of RAM (of which 640K is available in PC mode and 480K in 370 mode), the standard PC keyboard, and one double-sided disk drive and adapter. Either the monochrome monitor (5151) or the color graphics monitor (5153) can optionally be attached using the appropriate adapter. In addition, an XT/370 Option Kit is available to PC XT owners who want to upgrade their systems.

The XT/370 includes three new boards. The first contains the three processors used to implement the 370 instruction set: a standard Motorola 68000, an IBM-customized 68000 to execute common 370 fixed-point data and control instructions, and an Intel 8087 for floating-point operations. The second board provides 512K of RAM. The third board supplies the circuitry for 3277-2 emulation.

The *VM/PC Licensed Program* makes it possible to conduct three concurrent tasks: a local CMS session using commands similar or identical to the VM/SP Release 2 operating system, a task emulating the 3277-2 and linking to the host via a coaxial cable connected to a 3274, and an IBM 3101 terminal emulation task using the optional Asynchronous Communications Adapter and appropriate emulation software. The user selects the active task from among these tasks by using a "hot" key. In addition, VM/PC allows transmission of files between the XT/370 and the host, print spooling of CMS files, and access to host VM/370 files.

Any VM/CMS user should be interested in this new PC. Downloading work to a local work station should improve response time. The multitasking nature of VM/PC enables the host to perform one process while the user manipulates CMS data and programs locally. With a minimum of planning, a user should be able to make quantum jumps in productivity without seriously increasing the work load on the host. ●

D. M. Tucker was a systems engineer with IBM for 17 years. He is currently an independent consultant working in San Francisco.

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Information Systems Group
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Standard Model 2 features plus one 10M fixed disk and adapter, 64K memory expansion (total of 320K), parallel printer adapter
List price: $7180

Items priced separately:
5272 color display monitor $995, 3270-PC Control Program $300, File Transfer Program $600

XT/370
IBM
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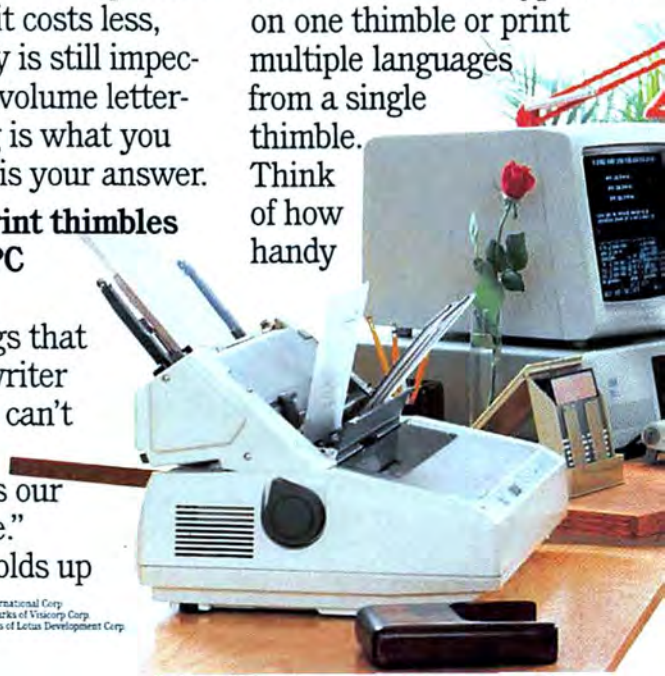

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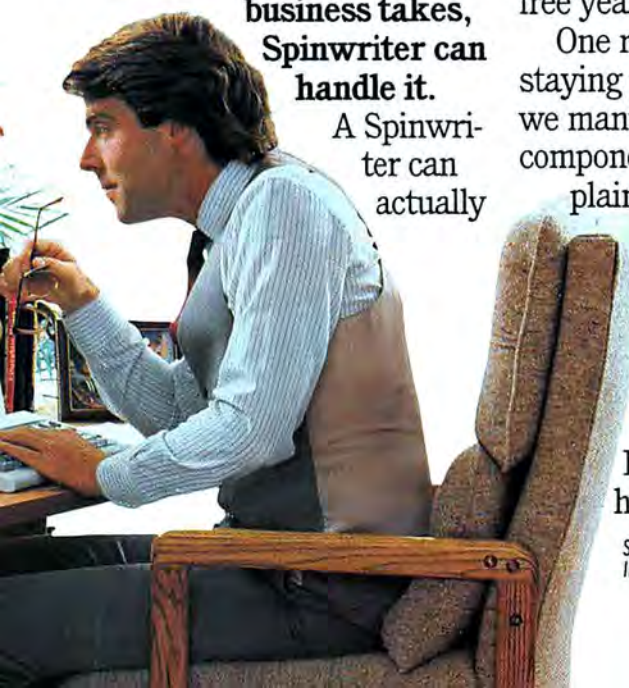

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Microsoft Does Windows

Microsoft's latest product is likely to become the industry standard for advanced user interface.

Steven Cook

Microsoft Windows made quite a stir when it was announced at COMDEX in Las Vegas last November. The program runs popular software using windows and mice and was demonstrated simultaneously by more than a dozen vendors.

Windows and mice have recently become very popular topics in the personal computer industry. Windows because they allow computers to present information in a way that closely resembles the way people work, and mice because they are the best device yet devised for converting human instructions to computer actions. Windows and mice are both the result of research done at Xerox Corporation's Palo Alto Research Center during the early '70s.

Mice are technically known as "pointing devices," because they are used to move the cursor and point to locations on the screen. A mouse is generally about the size of a deck of cards, fits comfortably in one hand, and is designed to rest on the table next to the computer keyboard. When you move the mouse, it sends information to the computer to indicate direction and distance, which the computer translates into cursor movements on the screen. You can point to any location on the screen by moving the mouse around on the table. Most mice have one to three buttons that you can push to execute frequently used commands.

Mice have been available for several years, but their use is not widespread, probably because most popular programs are not designed to take advantage of them. Consumers won't buy mice unless programs use them, and software companies don't want to write the programs unless consumers have mice. Further compounding the problem is the fact that there is no standard way to connect a mouse to a computer. Some mice plug into a serial port, some plug into a game paddle port, and others require a special interface card. Also, different brands of mice send different signals to indicate direction and distance.

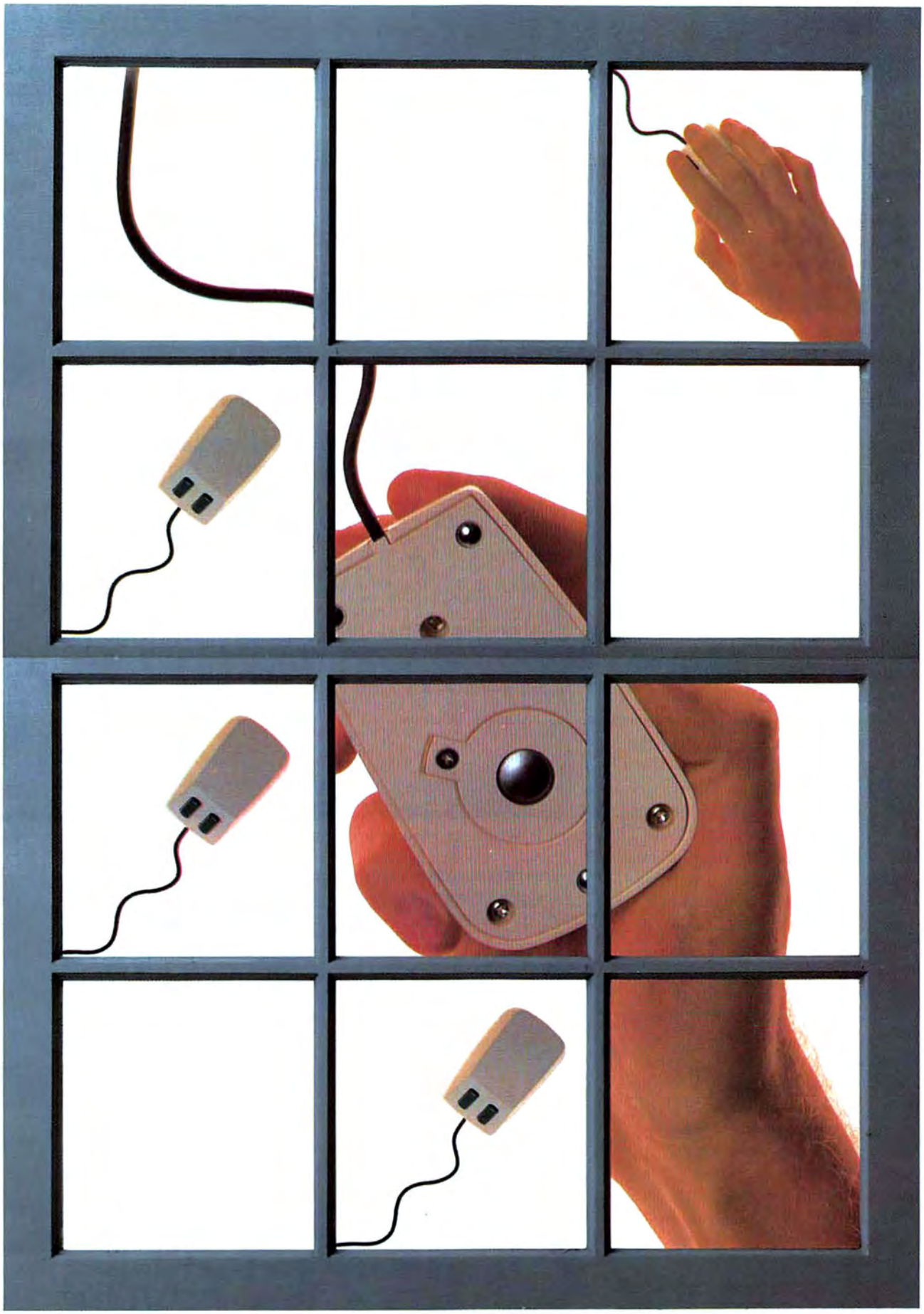
Windows have been used for many years. If you have used *WordStar* or have programmed in BASIC on the IBM PC, you have already seen windows in action. *WordStar* uses separate windows to display command menus and text, and BASIC uses a one-line window at the bottom of the screen to display the values assigned to the function keys. A window is an area of the screen that operates independently from the rest of the screen.

Many spreadsheet programs let users define windows to separate information displayed on the screen. One limitation with these windows is that they can display only information generated by the spreadsheet program. There is no way, for example, to divide the screen into two windows and then use one window to run a separate word processing program.

VisiCorp offers the *Visi/ON* system as a standard software interface that can be used to operate a variety of programs in a mouse and window environment. *Visi/ON* provides true window capabilities that enable users to define different areas of the screen for each program, but it also has several drawbacks. Programs must be specially written to use *Visi/ON*, and the software interface is very complex, requiring a major investment for software companies. *Visi/ON* is also expensive. In addition to its $495 price, the system requires a hard disk drive and at least 256K of memory.

Microsoft Windows

The ideal mouse and window system would be inexpensive, would work with off-the-shelf programs, and would require a minimal amount of disk storage and memory. That is a good description of *Microsoft Windows*. It works with most off-the-shelf software, requires only two floppy disk drives and 192K of memory, and is intended to be sold at low cost or included with DOS when you buy a computer. The product is scheduled for release in April.



State of the Art

Microsoft Windows is an extension of MS-DOS, providing a standard interface to the mouse and the screen in the same way that MS-DOS itself provides a standard interface to disk drives and other devices.

Microsoft divides programs that will work with *Microsoft Windows* into three categories. In the first category are programs that use standard MS-DOS functions to perform all input and output. These programs work well with *Microsoft Windows* and can share the display with similar programs. The second type are those that perform their own screen operations. Most spreadsheet programs fall into this category because the MS-DOS screen functions are too slow to provide the fast changes in the screen display necessary for good performance. *Microsoft Windows* can recognize these programs and allows them to use the entire screen until they terminate.

In the third category are programs that have been designed to operate in conjunction with *Microsoft Windows*. Such programs are portable; the same program can be run on two different machines and can make the best use of each machine's capabilities. *Microsoft Windows* automatically compensates for the differences. These programs also benefit from *Microsoft Windows*' extensive library of special functions such as the ability to pass data between windows.

Functional Description

Unlike other window management systems, *Microsoft Windows* does not have overlapping windows. Instead, it uses a technique called tiling, which arranges windows to fill the screen completely and make the best use of the screen display area. Figure 1 shows three overlapping windows, and Figure 2 shows how tiling arranges three windows to prevent overlap. According to *Microsoft Windows* Product Manager Scott

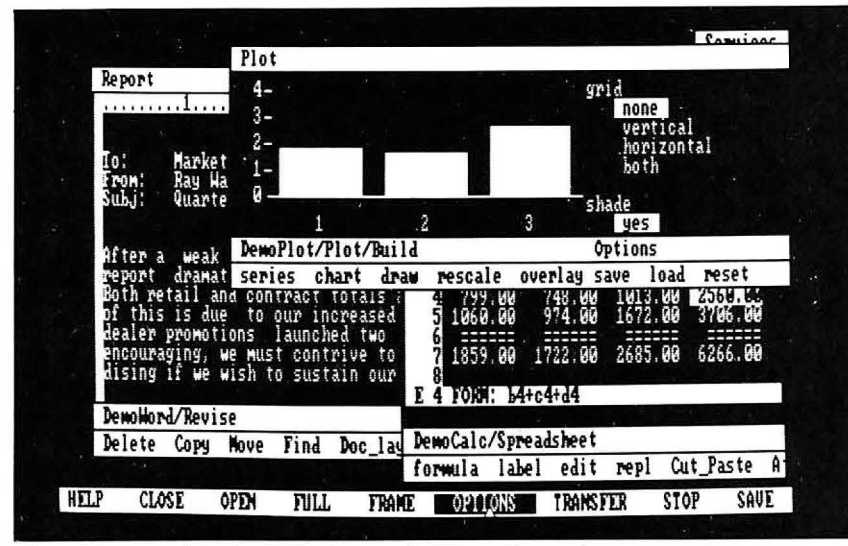


Figure 1: Overlapping windows of a typical window management system

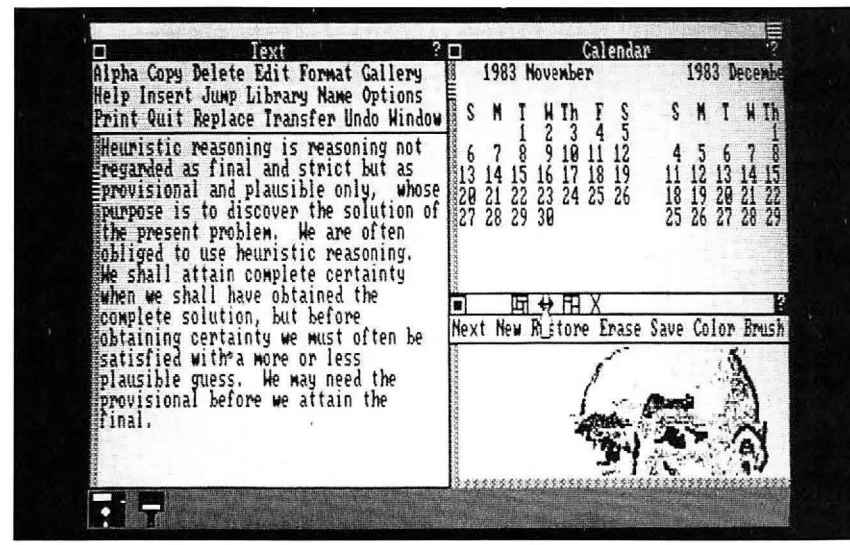


Figure 2: Windows tiled to prevent overlap

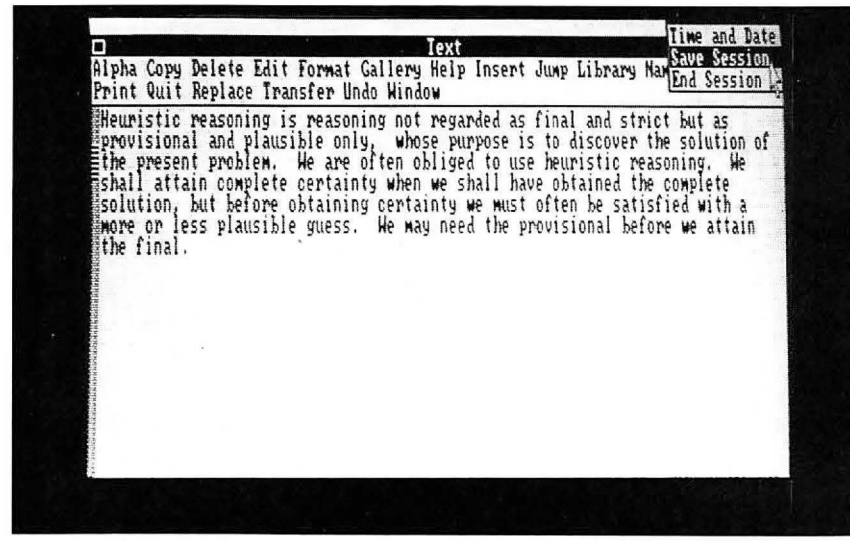


Figure 3: Typical window as displayed by Microsoft Windows

McGregor, research has shown that most users prefer to have windows arranged neatly. *Microsoft Windows*' tiling feature does this automatically, arranging two windows so that each takes up one-half of the screen, or three windows so that each occupies one-third. Of course, the user can change the size and position of any window. *Microsoft Windows* simply makes a guess at correct placement.

Windows in *Microsoft Windows* are normally composed of four parts, as shown in Figure 3. At the top is the caption, which shows the name of the program or file using the window. Below the caption is an optional menu area and below that the window display area. Finally, there are horizontal and vertical scroll bars. Scroll bars allow the user to visualize which portion of the data can be seen through the window. Moving the scroll bars with the mouse changes the contents of the window.

At the left and right edges of the caption are icons, symbolic representations of functions that *Microsoft Windows* can perform. To execute a function you simply move the mouse to position the cursor over the icon and then press a button. Icons are much easier to use than typed commands, and they convey information more rapidly. *Microsoft Windows* can change icons to reflect status graphically. A printer icon, for example, can be flashed on and off to indicate that the printer is out of paper.

Icons that affect the entire display rather than just one window appear at the bottom of the screen. A window-specific icon might enlarge a window to fill the entire screen or move the window to another location. An icon with a screen-wide effect might open a new window or prepare the system to be shut down at the end of the day. One *Microsoft Windows* feature reduces an entire window to an icon that is then displayed at the bottom of the screen. Selecting the icon restores the window to its original form.

In short, *Microsoft Windows* provides a simple, powerful, and inexpensive user interface that works with most popular programs. That alone is enough to guarantee consumer support to make it the de facto standard of the personal computer market.

Hardware manufacturers will also benefit because *Microsoft Windows* uses installable device drivers for the mouse and the video display. Manufacturers will be able to provide a device driver without concern for the programs that the buyer will be using. A manufacturer of a high-resolution color graphics interface, for example, will need to provide a driver that reflects only the display capabilities. All the programs written to use *Microsoft Windows* will automatically adjust to the higher resolution.

Widespread use of *Microsoft Windows* will have many long-term benefits for the entire personal computer industry. *Microsoft Windows* insulates programs from the actual mouse and screen hardware, which means that advances in technology are realized as consumer products much more rapidly. Software companies will need to sell only one version of a program; the *Microsoft Windows* interface for any particular machine will be written by the hardware manufacturer.

Technical Notes

Microsoft intends to modify all their programming languages to support *Microsoft Windows,* and as it gains popularity, you can expect to see more programs designed to take advantage of its special features.

One special feature allows an application program to "register interest" in another program's data. *Microsoft Windows* will inform the first program whenever the data changes. A graphics program, for example, can use this feature to draw a new graph whenever data from a spreadsheet program changes.

Microsoft Windows has a data-passing protocol that allows programs to exchange data in the most efficient manner. Some programs can exchange data in the form of text only; others can support binary data or other protocols that have been defined by the computer industry. *Microsoft Windows* determines the highest protocol the programs have in common and then uses that protocol to pass data between them.

It provides those features passively; that is, it gives programs access to a variety of data concerning the display but does not require them to use or acknowledge that information. Thus, *Microsoft Windows* maintains compatibility with currently available software.

Although Microsoft representatives refused to discuss DOS 3.00, they did indicate that *Microsoft Windows* has been designed to take advantage of the multitasking abilities of that prospective operating system. Under DOS 2.00, you may display several windows, but only one window is active at a time. Multitasking will allow users to run several programs simultaneously; for example, a communications program can run in one window while a word processing program is used in another.

Microsoft Windows should have a lasting effect on the entire personal computer industry. It frees hardware manufacturers to concentrate their efforts on producing the best possible product without regard for maintaining compatibility with any other machine. For software authors it means that programs can be sold to a much wider market, because differences among computers will no longer require time-consuming modifications. For the consumer, *Microsoft Windows* provides tremendous flexibility in the selection and use of personal computers.

Steven Cook is Manager of the Technical Department at PC World.

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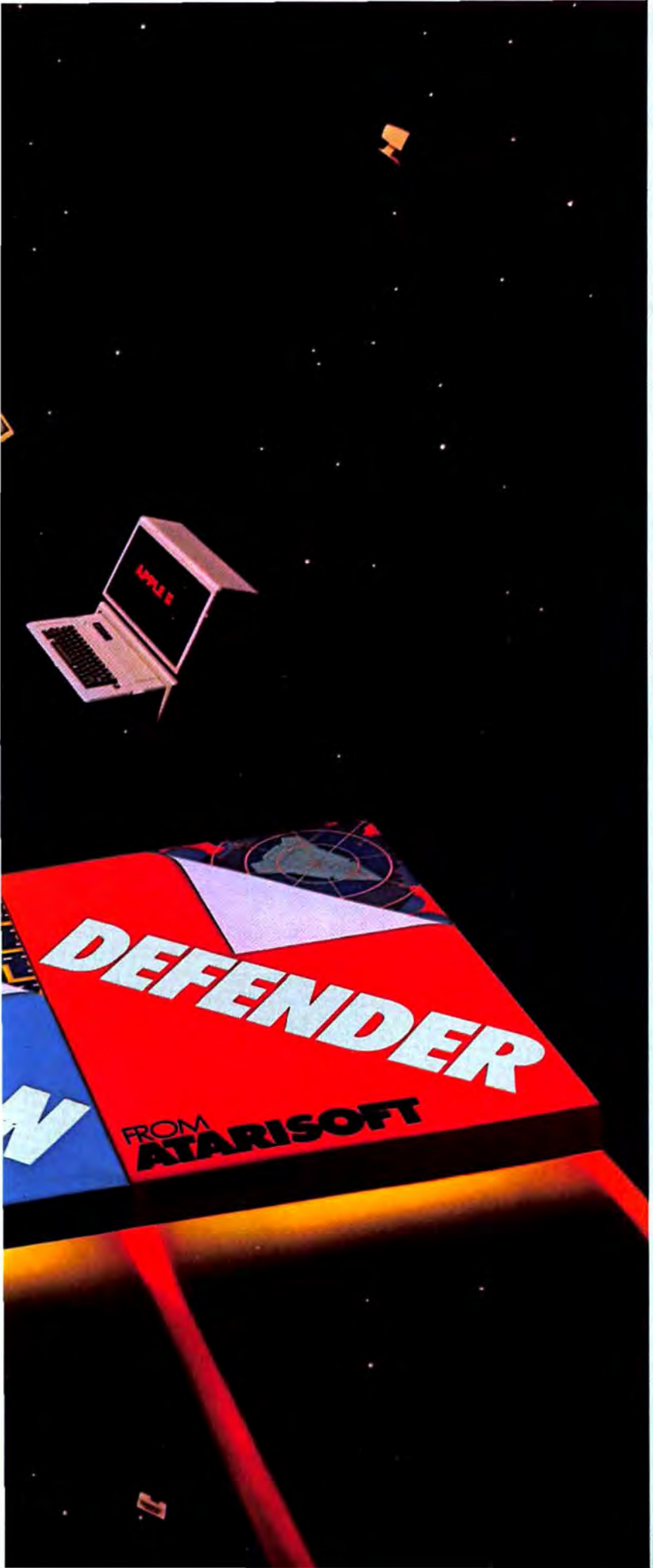

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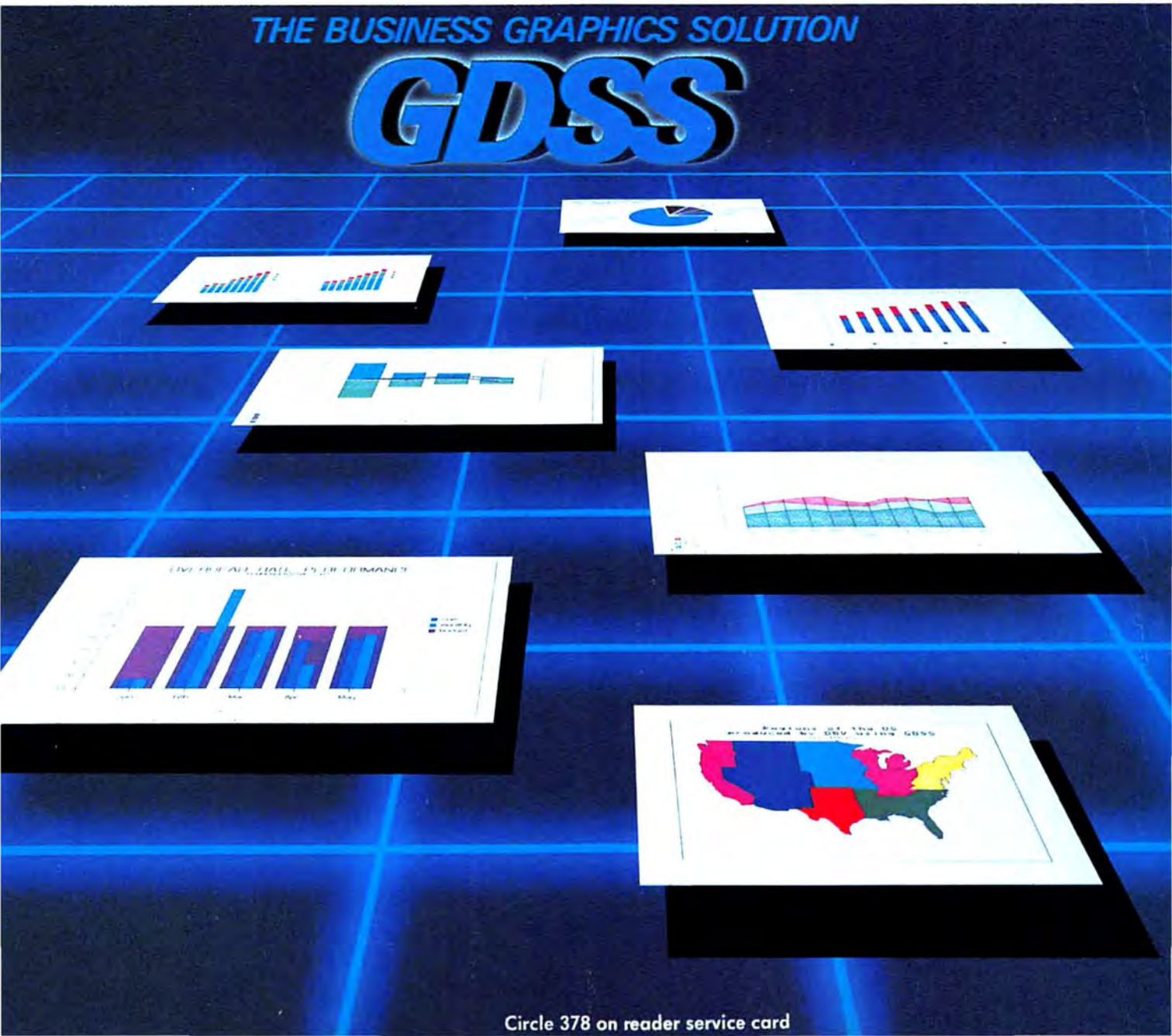

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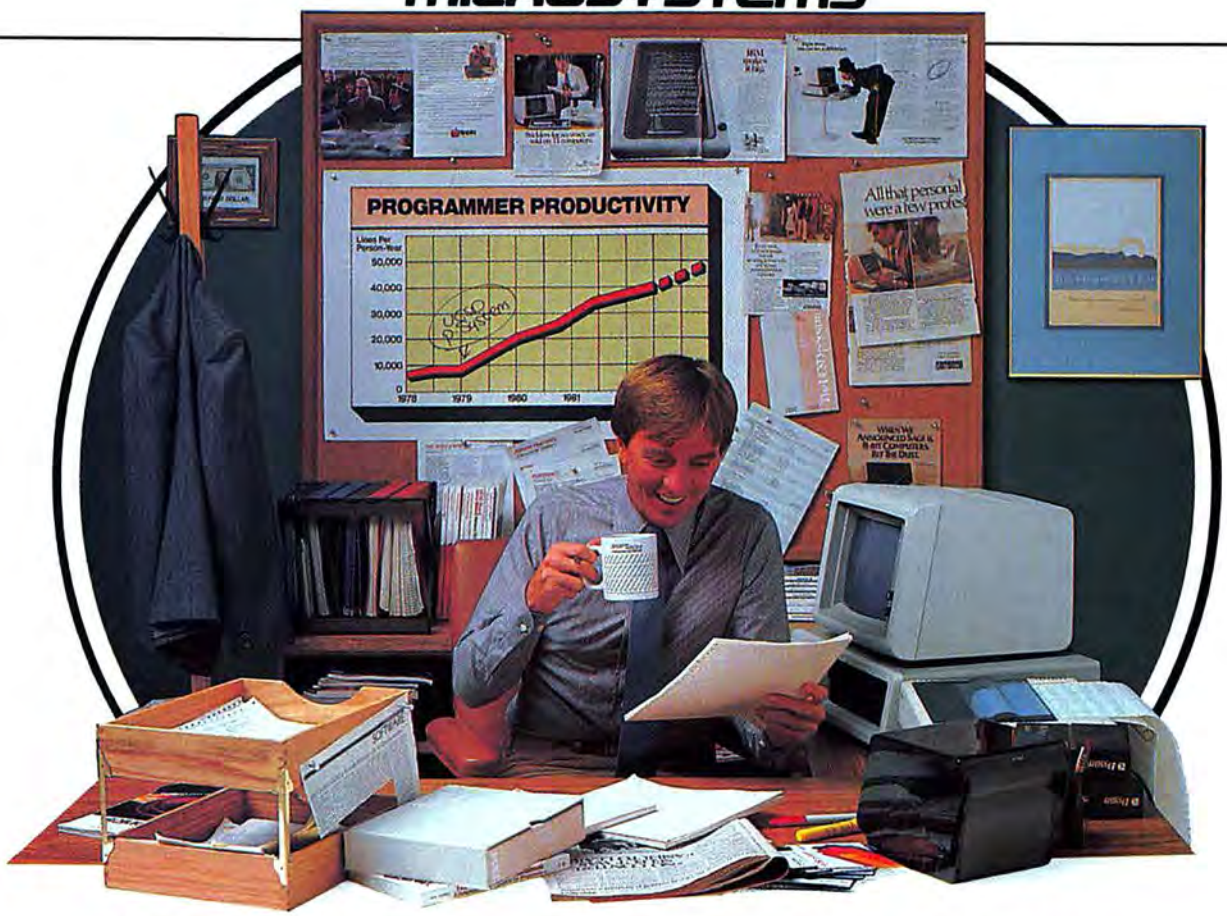

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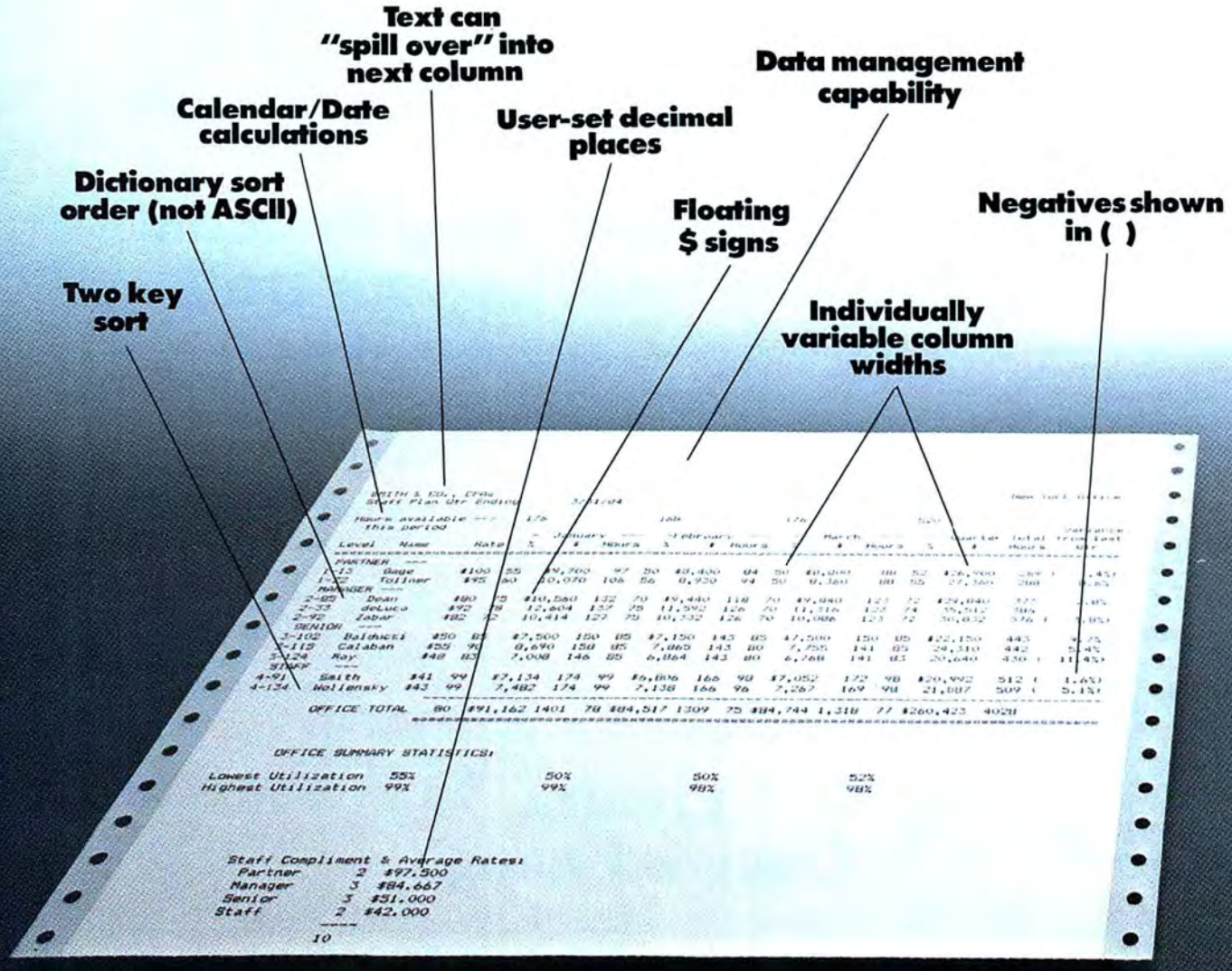

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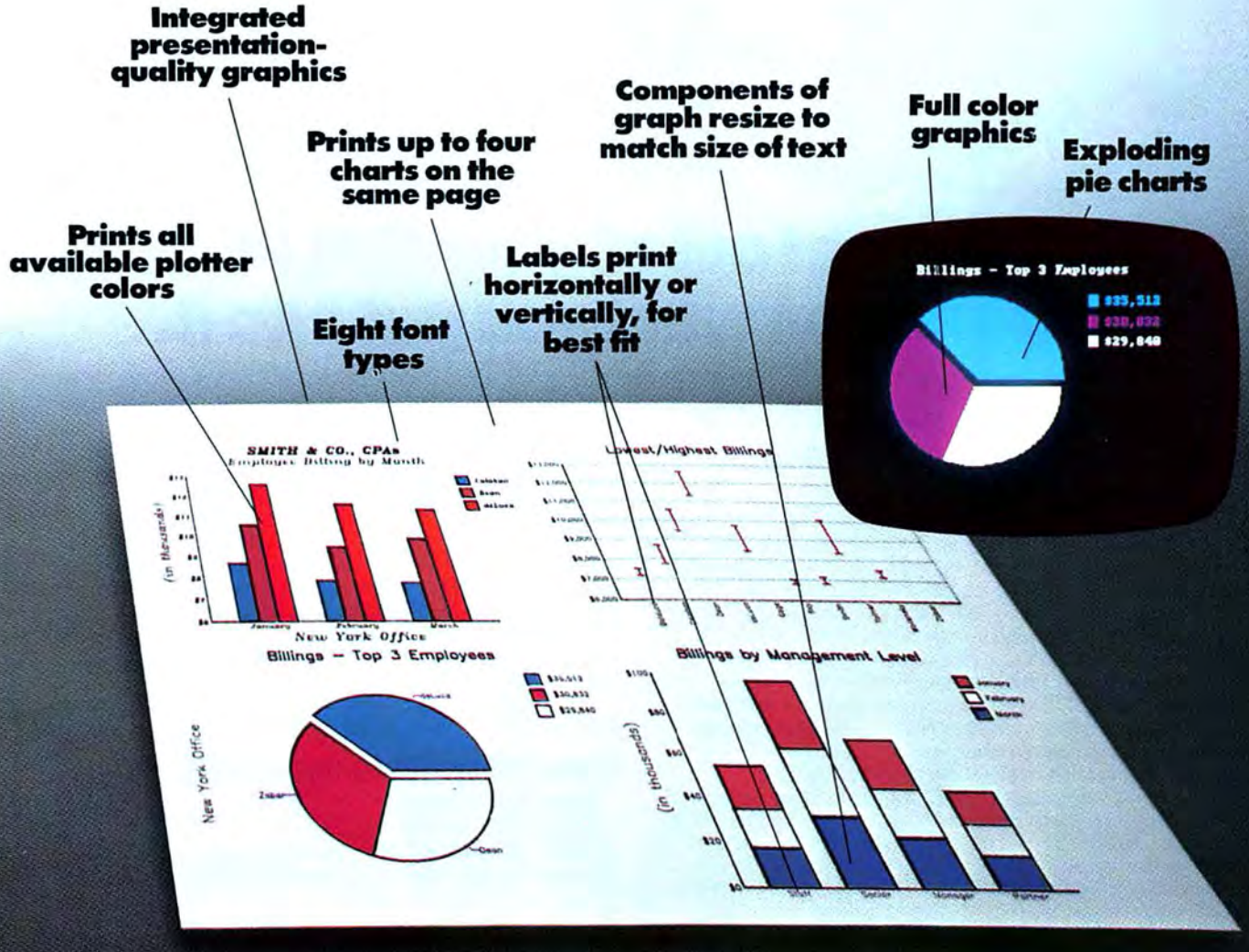

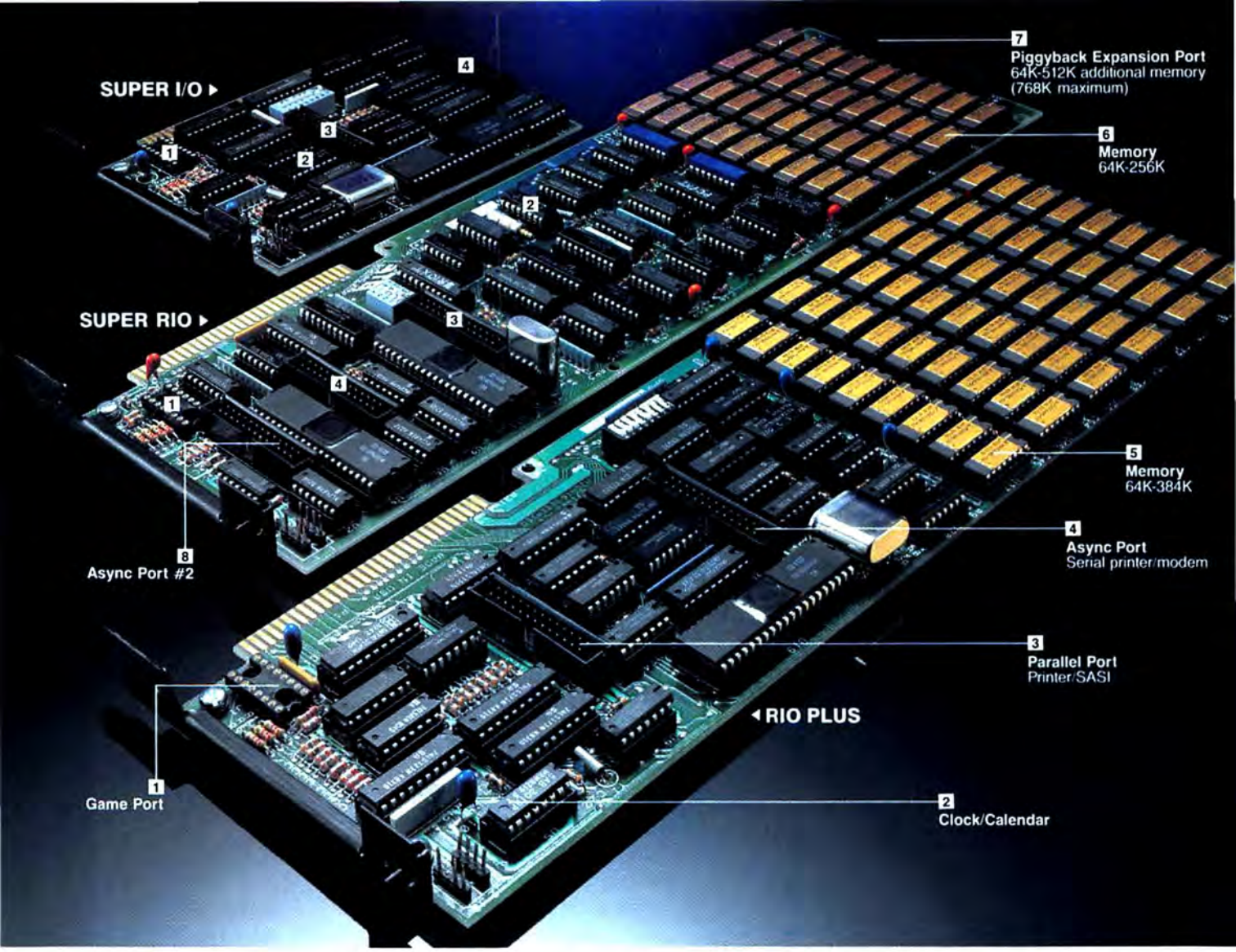

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PC WORLD View

News and notes for the computing community

Miriam Medom

PC World View reports new developments in computer technology, items of interest to all 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.

Grapevine

Powerful Problems

A data processing manager for a major California bank has discovered a problem with the power supply in some IBM XTs. One advertised feature of the XT is a beefier power supply than that originally built into the PC. The intended effect of this improved power supply is to protect the contents of the machine's RAM against data loss from fluctuations in power. In a few cases, however, an apparent defect in the power supply compromises this protection. Worse still, if an XT user has installed a battery backup system to insure that data is not lost in case of an interruption in power, the purpose of that backup system may be defeated if the XT has one of the defective power supplies.

Such power supplies could zap those systems equipped with the least expensive type of battery backup for a computer—one that switches from the computer's power supply to the battery if regular power is interrupted. The switch happens almost instantly—usually within 10 milliseconds. The other type of backup system for power, called an uninterruptible or universal power supply, constantly delivers power to the computer and thus does not require the 10 milliseconds to switch. Obviously the second type of backup system is better, but it costs about $2000, as opposed to the $300 to $600 price of a switching-type backup system. So most people who have a battery backup use the switching type.

Unfortunately, with an unknown number of XTs the computer's own power supply somehow manages to reboot the system before the 10 milliseconds have passed and thus before switching to the backup battery. When the XT reboots, of course, the data in RAM is lost, defeating the whole purpose of the backup system. The data processing manager had this instant-reboot experience with an XT in his office and decided to take no further chances with his employer's valuable data. So he replaced all the bank's XTs with plain old PCs and add-on hard disks.

The moral of the story is that if you're going to buy a switching battery backup for an XT, you'd be wise to try out the combination first. Either bring the XT to the battery backup dealer, or buy the backup on a returnable trial basis. Load some unimportant data into the RAM, and cut the power to the battery backup to see what happens. Good luck!

Big Guns

An industry report predicts that IBM will unveil a new series of high-end mainframe computers in March. Reportedly called the Sierra series of central processing units (CPUs), these processors will be able to compute four times as fast as IBM's current top-of-the-line mainframes, the 3080 series. The Sierras will compute at a rate of 30 million instructions per second (MIPS) as opposed to the 3080's current rate of 7.5 MIPS.

The same industry source also predicts that the Sierra processors will be the predecessors of an even more powerful group of CPUs to be called the Summit series. IBM is not expected to reach the Summit until the end of the decade, however.

Big Blue's News

Old and New Together

To date, IBM has looked to Japanese manufacturers—Epson and NEC—to supply printers for the PC. But now you can have an all-IBM office, because IBM is selling an interface board and a cable that link a PC to

the IBM Electronic Typewriter 65 or 85. The new device costs $345 and can be purchased at IBM Product Centers and Typewriter Marketing Centers. It converts the typewriter into a 15.5-character-per-second printer.

Soft Stuff

As the first move in a growing penetration of the software marketplace, IBM has authorized five California retail software stores to sell the software it publishes. The five stores, members of the Softwaire Centres International chain, are located in Los Angeles, San Diego, Santa Ana, Palo Alto, and Sunnyvale. Other stores in the chain are expected to carry the IBM software in the future, and IBM will screen additional retail software outlets for authorization as dealers.

Bigger Blue Chips

Up the Hudson River from its Manhattan skyscraper and its Westchester County complexes, IBM operates a semiconductor manufacturing plant in East Fishkill, New York. Now the company has announced plans to expand that chip-making facility as well as to build a product-development laboratory on an adjoining site. Currently the plant in East Fishkill occupies 450 acres; if local authorities approve the plan, IBM will buy another 160 acres and build the new lab there. The expanded manufacturing operation will consist of a new 280,000-square-foot building to be constructed on the property already owned by the company. Even without the anticipated expansion, the East Fishkill plant is IBM's biggest chip-producing facility.

Folksy Tales

Good news from the down-home front: it appears that computers have begun to find their niche in American culture. We've recently heard from a friend who visited a one-computer, one-cat, and one-man household; the computer is a PC, and the cat is also PC. Its owner (name not reported) declines to say whether the cat's initials stand for pussycat or personal computer, but he insists that his feline is on the paw-front of technology.

And we've had a letter from our traveling correspondent Gary Bacon, who recently visited his hometown of Helena, Montana. During the visit he found that technology had even reached the Old West. Gary's report:

"There I was, walking up Last Chance Gulch 120 years after gold was discovered, when I came upon an establishment called the Real Food Store. The old brick building seemed like a historical marriage of the gold rush days and the hippie era that spawned in San Francisco. I wandered in and struck up a conversation with the owner, Laughing Water, who is also the proprietor of the Feathered Pipe Ranch. He was working over a small flour mill, grinding the day's supply of fresh grain.

"As we talked, I noticed what appeared to be the back of a video monitor in his small office at the rear of the store. My curiosity got the best of me, and I leaned into the office to see what electronic device he could possibly be harboring in this otherwise organic environment. It was a computer.

"I asked what he was doing with a computer in a natural food store, and he replied that he used it for his accounting and inventory. 'I also have the franchise on this computer,' Laughing Water added. 'Would you like to buy one?'

"Entrepreneurs are where you find them, I guess. Maybe Laughing Water should change his store's name to the Real Food Computer Company."

Microsoft Drops Fees

Microsoft no longer charges programmers royalty fees for distribution of the firm's library files of utilities that support applications created using its compilers. Previously, programmers had to pay $40 per copy (or $2000 annually) if their Compiled BASIC, Business BASIC, or COBOL programs included Microsoft's run-time library of support files. A license to distribute these Microsoft files, however, is still required. We may see more applications written in these popular languages now that distribution entails less red tape (and less green stuff). Current prices for these compilers are BASIC, $395; Business BASIC, $600; and COBOL, $750.

Update

Phoebe Williams

In September's *PC World View* we mentioned that two former MicroPro employees had formed their own software company, Software Farms. We've heard from one of those folks, Phoebe Williams, who advises us that she and partner Bruce Van Natta have changed the company's name to the SoftOffice Company. The firm is located in San Rafael, California. Our comment that the partners were reportedly working on a product to rival VisiCorp's *Visi/ON* and MicroPro's *Starburst* drew this response from Williams: "We'd like to think we're going a step beyond them."

PC Can Phone Home

A nifty new telephone-modem combination that plugs into the PC can find the cheapest route for a long-distance call, carry voice and data simultaneously, and keep track of both voice and data messages. The Communications CoSystem, manufactured by Cygnet Technologies of Sunnyvale, California, is about half the size of the PC's System Unit and features 28 function keys in addition to the 12 standard push-button phone keys.

The CoSystem has a built-in modem, its own Z-80 microprocessor, and 64K of RAM; it is connected to the PC through an RS-232 port. It can store up to 400 names and phone numbers, and its versatile software can sort the address file several ways, require passwords for access to data stored in the system, and send electronic mail to everyone on a designated list. One function may be disabled by many users, though—the telephone can be programmed to beep or blink a light at you when it's time for a crucial appointment.

Cygnet's telephone-cum-computer lists at $1500 with a 300 bps modem or at $2000 with a 1200 bps modem.

Speedy New Compatible

A year-old company, Stearns Computer Systems Corp., has introduced a new computer designed to be compatible with the PC and outperform it as well. The Stearns machine uses Intel's 8086 microprocessor instead of the PC's 8088, which company founder John Stearns claims makes it two-and-a-half times as fast as the PC. The Stearns computer also features a 26th status line on the display—one line more than the PC has.

This new compatible utilizes both the MS-DOS and the Concurrent CP/M operating systems and can be configured with one or two double-sided floppy disk drives or one floppy drive and a 5-, 10-, or 20-megabyte hard disk. Among the programs offered for the Stearns computer are *Multiplan, WordStar, dBASE II,* and accounting software from Open Systems. Prices for the Stearns machine vary from $2495 to $5650.

Programmer Graffiti

PC World technical whiz Steve Cook suggests that if you're interested in leaving your mark for posterity, follow these steps: Insert a disk containing PC-DOS 2.00 into drive A and boot, enter the date and time, and at the A> prompt type

DEBUG RECOVER.COM <Enter>

A new prompt, the hyphen (-), will appear; then type D034E <Enter> and read the text that appears at the right side of the screen. One programmer's immortality.

Mystery Solution

Mel Keeler of Mobile, Alabama, suggests some possible explanations for the hard disk heat-up mystery reported in September's *PC World View*. He writes: "I notice that there is no difference in the problem resolution between the new disk and the old one as long as the old controller card is installed. Warm-up is still required. Yet nothing was said about the results obtained with the new controller card and the old disk. If the new controller card causes a worsening of the problem, it might indicate that the problem does not lie with the disk at all, but rather with one of several other things.

"For instance, some part of the power supply to the card or disk could be breaking down (such as a blocking diode). This problem might be self-correcting after the parts have warmed up sufficiently. Another possibility is the slot for the card—a bent pin or a cold solder joint, something that wouldn't show up for a few months.

"One final suggestion: the old and new disks and controller cards could also be tried in another computer, such as the dealer's. This should confirm or eliminate the devices that are the source of the problem. Good hunting!"

The Foreign Desktop

PCs don't seem to be making it on the Riviera—or in the rest of France. According to one industry report, fewer than 100 PCs were sold in the first five months of the machine's distribution in France. As with the PC in other European countries, software is a big problem: differences in the keyboard character assignment for the French language require extra memory in the PC, and even if extra memory is added to the computer, only relocatable programs will load.

Word processing programs from leading American companies are making inroads in the German PC market, according to one industry report. MicroPro's *WordStar* leads the pack, probably because it was first on the market with a complete German-language version. VisiCorp is playing catch-up with its *VisiWord*, which uses the English-language version and a printed reference guide in German. At least three other word processing programs are slated for German distribution: *Microsoft Word*, Information Unlimited's *EasyWriter II*, and Select Information Systems' *Select*. Now if they can just get those letter quality printers to work with the German PC!

Mystery of the Month

J. H. Keeney of Bellevue, Washington, reports a mystery of one program and many PCs. He reports that a friend of his was given a copy of the program *Personal Investor*, published by PBL Corp. of Wayzata, Minnesota. Finding that he lacked the 128K of RAM necessary to run the program, the friend gave it to Keeney. Although Keeney's computer did have sufficient memory, he could not get the program to load. So he tried to load it on another friend's PC, and this time the program worked perfectly.

The only ostensible difference between these two machines, Keeney points out, was that they contained memory expansion boards from different manufacturers. So the two friends exchanged boards, but the program still would not load on Keeney's machine and would load on his friend's.

"Next we thought about firmware," Keeney continues. "Using DEBUG we found that my friend's ROM was dated 4/24/81 and mine was dated 10/19/81 even though the machines were both bought in May 1982.

"We then tried the program on the machine of another friend, who had also purchased his PC at the same time and had installed a memory expansion board from yet a third manufacturer. It turned out that *Personal Investor* would not load on his PC either. Using DEBUG we found that his ROM was dated 10/19/81.

"At this point we believed that we had found the problem. IBM had obviously done something different to the 10/19/81 ROM. But before firing off a salvo at IBM, we looked into the ROM of a few other computers, with these results:

Computer	ROM date	Program loads
1	10/19/81	No
2	4/24/81	Yes
3	10/19/81	No
4	10/19/81	Yes
5	10/15/82	Yes
6	4/24/81	Yes
7	10/19/81	Yes

"At this point I am baffled and don't know what to try next. I'm intrigued by the challenge and somewhat fearful that other software will not perform on my PC. This is the first software that has given me problems, and I am strongly considering making future purchases contingent on proper loading and operation. Maybe someone else has had a similar problem and can solve this mystery." ⏏

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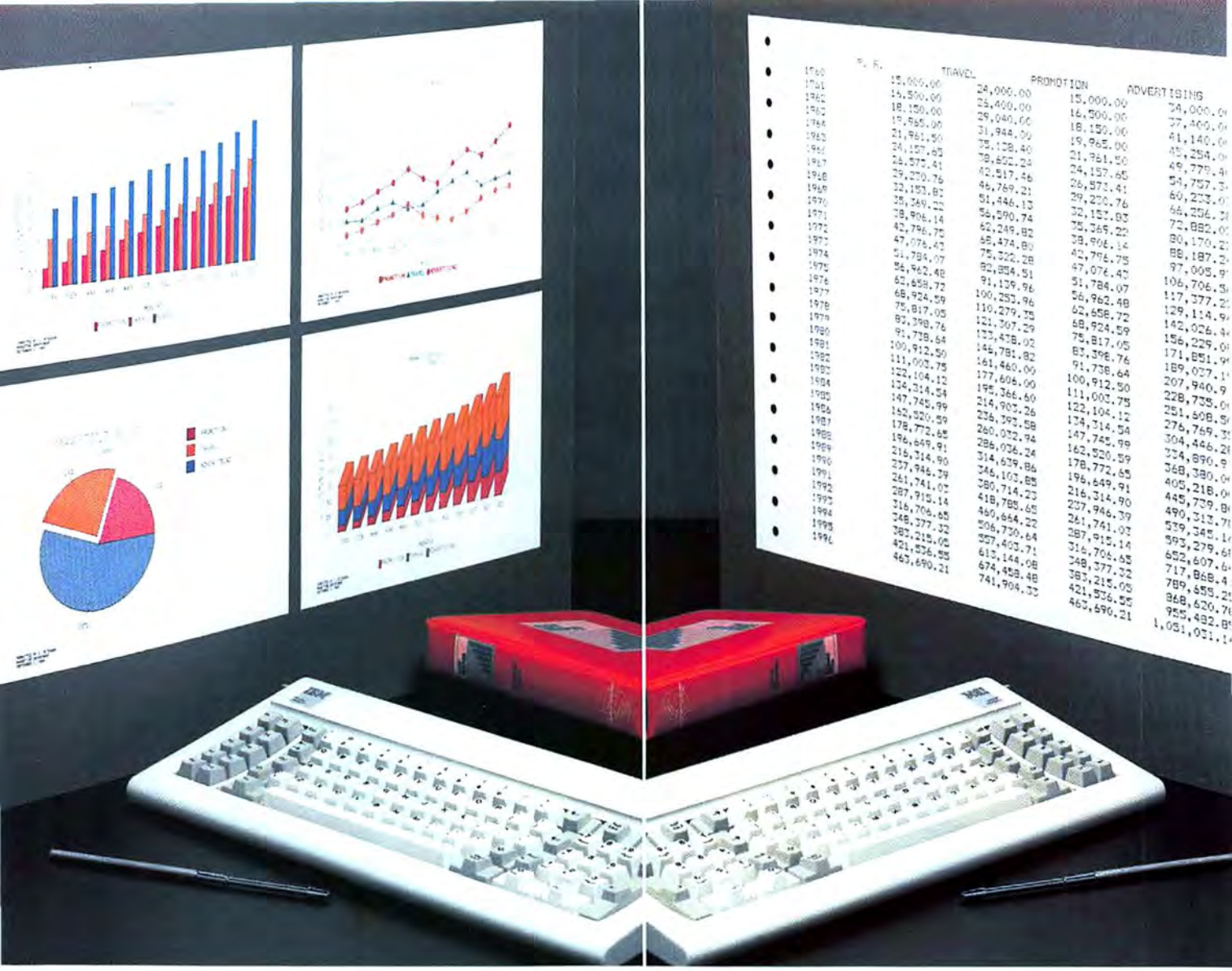

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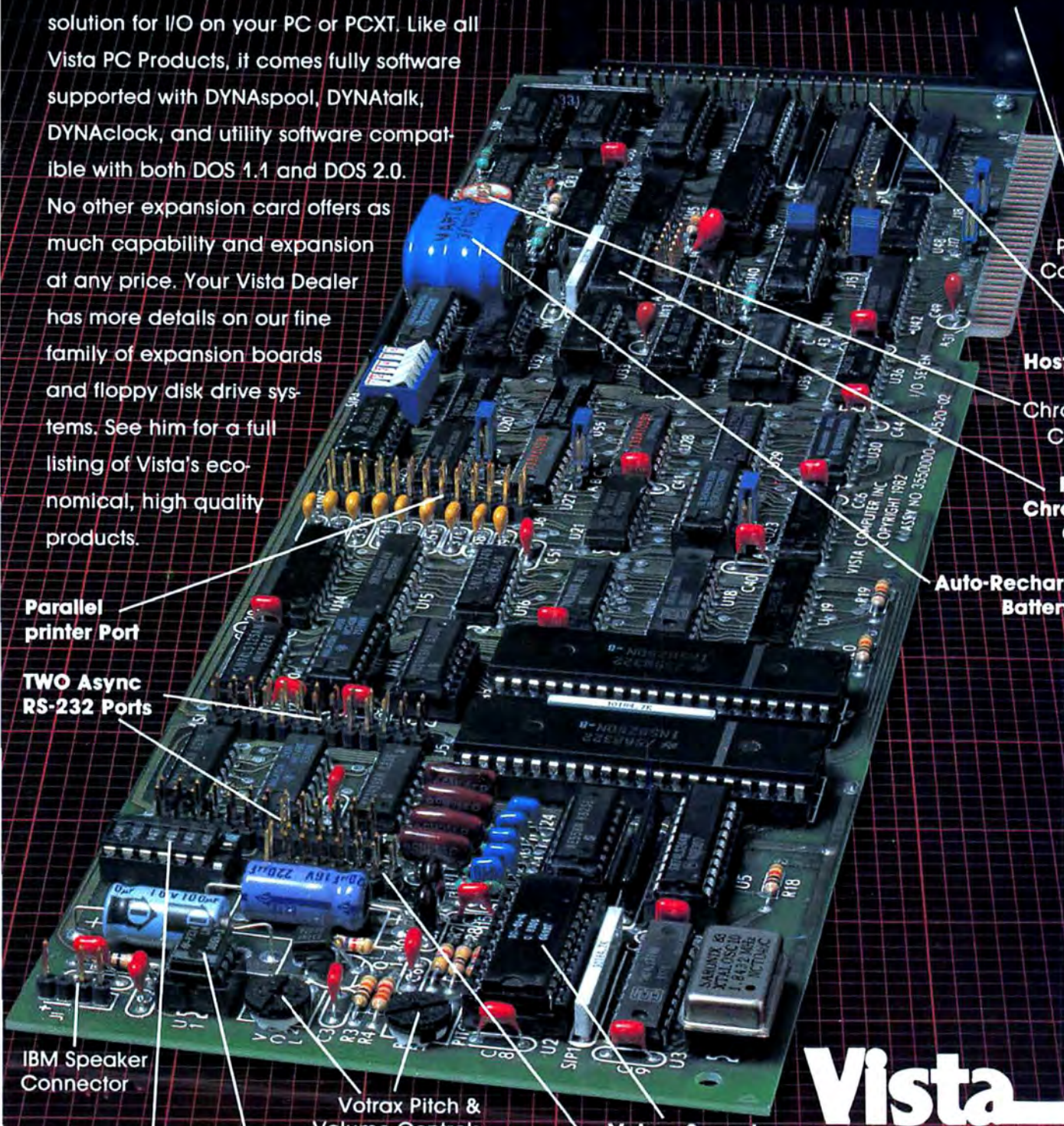

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Accounts Usable

Bill Dauphinais

Running an integrated accounting system that handles everything from accounts receivable to inventory is usually a task for a minicomputer. But such power and programs are within the grasp of the IBM PC and XT. The Software Fitness Program *is one of the first and best minicomputer-based accounting systems to grace the PC—with decidedly positive results.*

When you evaluate a comprehensive accounting system like *The Software Fitness Program* from Open Systems, it pays to ask yourself, "How well does it meet my particular business needs? How does it measure up to comparable packages?" Whether you're automating a manual accounting system or upgrading and expanding an electronic one, it's imperative that you determine what your requirements are and which software will satisfy your needs.

Accompanying this article is a features checklist (Table 1) for each of the seven major accounting categories: sales order entry, accounts receivable, inventory, payroll, accounts payable, job cost, and general ledger. The checklists note features that you should expect to find in basic, intermediate, and advanced accounting packages, and they can be used to measure *The Software Fitness Program* and similar offerings from other software vendors.

Mini to Micro

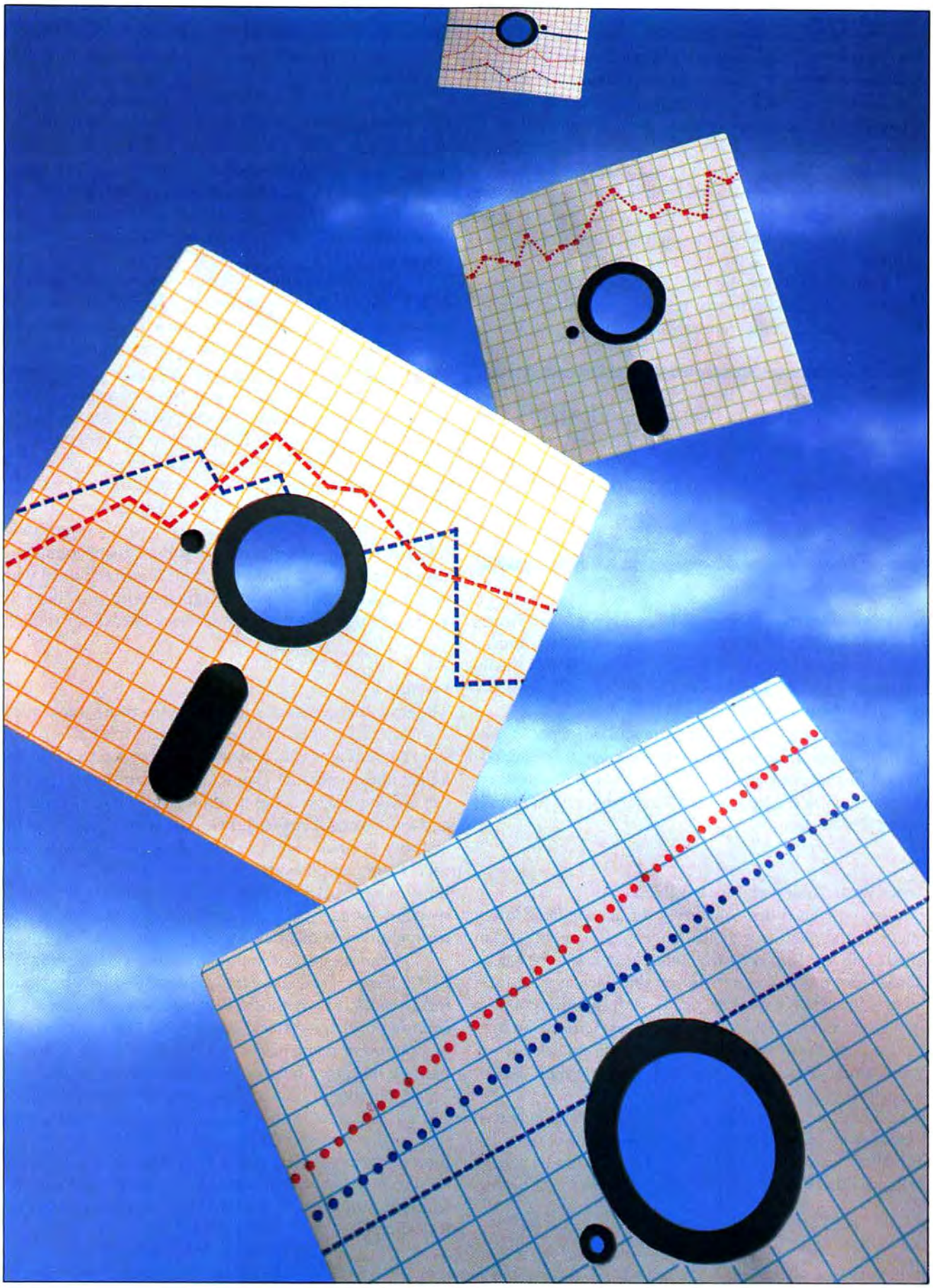
The Software Fitness Program is an interactive, integrated accounting system originally developed in 1976 for minicomputers. The package was adapted in 1978 for microcomputers running under CP/M, CP/M-86, MP/M, and Oasis. Now available for the PC under MS-DOS, *The Software Fitness Program* supports the seven accounting categories listed above. A purchase order system will also be available soon.

Few personal computer accounting packages have been around in any form for seven years, and this system maturity accounts for *The Software Fitness Program*'s impressive capabilities and richness of options. This system will no doubt meet the accounting needs of many businesses far better than some of the newer packages available for the PC. *The Software Fitness Program* has a great deal of "stretch"; it is versatile enough to grow and anticipate future accounting needs.

Unfortunately, the conversion of such a large accounting system (1.6 megabytes of code) is bound to have its problems. The seven accounting packages that comprise *The Software Fitness Program* take up 16 disks, which is a bit unwieldy for a PC. Though each package requires a minimum of 128K, the amount of software alone dictates the use of an XT or a PC with a compatible hard disk to operate *The Software Fitness Program* effectively.

System maturity accounts for *The Software Fitness Program*'s impressive capabilities and richness of options.

Once in the hard disk environment, the system is easy to use and quite flexible. In keeping with its integrated nature, *The Software Fitness Program* automatically passes data to the appropriate packages performing a particular accounting function. Most of the system options are definable (such as General Ledger account num-



bers or terms of sale); thus a company can use *The Software Fitness Program* to do the accounts for several businesses. Each package, with the exception of Sales Order Entry, also functions quite well as a stand-alone system.

Each package is also designed to support multiple users when implemented under multiuser operating systems like Oasis or MP/M. Presumably, PC users of these packages can look forward to multiuser accounting system capability some day.

General Ledger is the only package in the system that produces custom format reports. However, Open Systems sells a separate report writer called *Team Manager* that extracts information from any *Software Fitness Program* file and produces custom reports. *Team Manager* costs an additional $599, but it is well worth the investment since it also reformats accounting files for ready access by programs such as *dBASE II* or *1-2-3*.

> When stock is not on hand, the system suggests other items in inventory that can be substituted in the order.

The Software Fitness Program and other packages in the reports generated by *Team Manager* are designed for a 132-character dot matrix printer, though a smaller printer such as the Epson FX-80 in a compressed print mode can be used.

Sales Order Entry and Receivables

Managing sales orders, analyzing the accumulated information, and relating it to accounts receivable data is handled easily by *The Software Fitness Program*. The Sales Order Entry and Accounts Receivable packages are intimately linked and interface neatly with the Inventory, Job Cost, and General Ledger packages. Orders can be entered and modified; shipment of goods confirmed; cash receipts entered; and invoices, packing slips, and sales history reports printed out.

The Accounts Receivable package tracks funds received from customers on a balance-forward or open-item basis or both. In the balance-forward mode, a single balance due from a customer is maintained on a current and a 30-, 60-, 90-, and 120-day basis. The open-item mode captures and maintains individual invoice balances and requires that cash payments be applied against these individual invoices.

Customer back orders are also tracked, and the system indicates that a follow-up shipment can be made when the goods become available. When stock is not on hand, the system suggests other items in inventory that can be substituted in the order. This option, seldom found in personal computer accounting systems, is useful for industries in which product substitution is a common practice.

The Software Fitness Program offers a fair amount of flexibility in report printing. Ranges for many categories can be specified and reports sorted by category number. For example, an open order report includes any designated range of customer, inventory, or job numbers. All orders can be printed or only those of a specified status, such as new, verified and shipped, already picked, returned, or back order. The program can generate a sales history report by customer, salesperson, job, invoice, product category, inventory, or invoice. Transactions can also be listed in detail or in summary.

Cash flow analysis is made easier with a report that uses aged customer balances to estimate the incoming cash from customer payments. This report, coupled with the system's accounts payable aging report, provides you with information needed for accurate financial planning.

Inventory

The Inventory package simply but effectively tracks the quantity and cost of a company's inventory. Each stocked item is assigned an item number (up to 12 digits long), along with a 25-character description field. Stock can also be assigned a user-defined category, a location, and a price code. For each item, the system maintains the quantity in stock committed to sales orders and purchase orders and computes the remaining quantity. To facilitate the purchase order process, a vendor number can be specified for each item and tied to desired minimum and maximum levels of stock.

The program determines inventory value through LIFO (last in, first out), FIFO (first in, first out) or "moving average cost" methods. Few personal computer accounting packages offer the LIFO and FIFO options, and in a period of rising prices, alternative methods of appraising inventory help when it's time to pay taxes.

A number of basic inventory reports are available (such as price and status listings), as well as management reports that sort and list sales by date of last sale and by descending sales volume. The program also produces an inventory report that indicates how fast an item is selling relative to the quantity on hand (useful in supermarkets, for example).

Inventory Features		Basic	Int.	Adv.	Open Systems
Inventory Data	Basic data: item number; product description; quantity; quantity on hand; unit of measure; unit cost; unit price; month- and year-to-date units sold; sales dollars and cost of goods sold	•	•	•	yes
	Inventory category	•	•	•	yes
	Order point quantity		•	•	yes
	Order quantity		•	•	yes
	Quantities on purchase orders and back orders		•	•	yes
	Last vendor and last cost		•	•	yes
	Inventory location			•	yes
	Multiple prices (with quantity discounts)			•	yes
	Sales unit of measure			•	no
	LIFO or FIFO cost detail			•	yes
	Markup factor			•	no
Processing Features	Uses transactions batch data entry procedures	•	•	•	no
	Special procedures for "physical" inventory adjustments			•	no
	Tracks quantities committed to a sales order		•	•	yes
	Tracks quantities on purchase order		•	•	yes
	Moving average cost	•	•	•	yes
	LIFO or FIFO costing of inventory		•	•	yes
Reports	Price list	•	•	•	yes
	Inventory status list	•	•	•	yes
	Receipts listing	•	•	•	yes
	Sales listing	•	•	•	yes
	"Physical" inventory adjustments listing	•	•	•	yes
	Reorder analysis		•	•	yes
	Inventory management reporting:				
	Basic listing of sales		•	•	yes
	Listing sorted by sales dollar volume			•	yes
	Graphic analysis			•	no
	Slow-moving inventory listing			•	no
	Stock transfer listing			•	no
	"Physical" inventory worksheets			•	no
	Bin or location labels			•	no
	Summary of G/L accounting impact on major transaction reports			•	no

(continues)

Table 1: Standard accounting features checklist

Accounts Receivable Features		Basic	Int.	Adv.	Open Systems
Accounts Receivable Data	Basic data: customer name; address; phone; credit limit; current balance due; month and year-to-date sales; customer type or class; contact; sales rep; normal terms; tax status	•	•	•	yes
	"Ship to" address		•	•	yes
	Aged amounts due from customer		•	•	yes
	Finance charges		•	•	yes
	Last sale date		•	•	yes
	Last invoice; last payment		•	•	no
	Average "time-to-pay"			•	no
Processing Features	Uses transaction batch data entry procedures	•	•	•	no
	Balance forward (single balance per customer)	•	•	•	yes
	Open item		•	•	yes
	Determination of discount due via table lookup		•	•	yes
	Automatic calculation of sales tax		•	•	yes
	Credit memos on account or apply to invoice		•	•	yes
	Automatic application of service/interest charges on overdue accounts			•	yes
	Apply cash payments to:				
	Balance forward (total due)	•	•	•	yes
	A single invoice		•	•	yes
	Multiple invoices		•	•	yes
	Service/interest charges		•	•	yes
	Cash on account		•	•	no
	Automatic processing of recurring invoices			•	no
	User-defined aging periods			•	no
Reports	Invoices	•	•	•	yes
	Customer list	•	•	•	yes
	Invoice, cash receipts, and account adjustment listing	•	•	•	yes
	Trial balance	•	•	•	yes
	"Aged" listing of receivables		•	•	yes
	Customer mailing labels		•	•	yes
	Customer statements		•	•	yes
	Projected cash flow report			•	yes
	Summary of G/L accounting impact on major transaction listings			•	no
	G/L transaction summary		•	•	yes
	Custom format for customer statements			•	no
	Dunning letters			•	no

(continues)

Table 1 *(continued)*

Accounts Payable	Features	Basic	Int.	Adv.	Open Systems
Vendor and Invoice Data	Vendor data: vendor name; address; phone; contact; current amount due; normal terms; month and year-to-date purchases	•	•	•	yes
	Last purchase amount and date		•	•	Date
	Invoice data: amount, account distribution	•	•	•	yes
	Dates:				
	Invoice date	•	•	•	yes
	Due date	•	•	•	yes
	Discount due date			•	yes
	Discount terms		•	•	yes
	Purchase order number		•	•	yes
	Job or project codes			•	yes
Processing Features	Uses transaction batch data entry procedures	•	•	•	no
	Allows user to hold given invoice payment	•	•	•	yes
	User entry of manually prepared payments	•	•	•	yes
	User specification of payment date and starting check number for check printing	•	•	•	yes
	Payment selection:				
	Manual	•	•	•	yes
	Automatic		•	•	yes
	Allows user to preview checks or payments selected; override use		•	•	yes
	Custom check format		•	•	no
	User adjustments to current payables		•	•	yes
	Single-vendor file used for multiple companies			•	no
	Captures and processes job cost data			•	yes
	Captures and processes inventory purchases			•	yes
	Unique voucher number for audit trail			•	no
	Defined aging periods			•	yes
Reports	Vendor master listing	•	•	•	yes
	Invoice and account adjustments registers	•	•	•	yes
	Open item listing	•	•	•	yes
	Selected payments listing		•	•	yes
	Checks and stubs	•	•	•	yes
	Check register	•	•	•	yes
	Prepaid checks listing		•	•	yes
	Aged trial balance		•	•	yes
	Cash requirements summary by week			•	yes
	Purchases journal			•	yes
	1099 forms			•	yes
	G/L transaction summary		•	•	yes
	Summary of G/L accounting impact on major transaction listings			•	no

(continues)

Table 1 ***(continued)***

General Ledger Features		Basic	Int.	Adv.	Open Systems
General Ledger Data	Structure of accounts:				
	Code number length	4	8	10	14
	Assign department code?		•	•	yes
	Assign company code?			•	yes
	Alphanumeric codes		•	•	yes
	Data elements:				
	Months of actual 12	•	•	•	n/a
	13			•	yes
	Year-to-date	•	•	•	yes
	Monthly budget data		•	•	yes
	Prior year—actual monthly data		•	•	yes
	Statistical (nondollar) accounts			•	no
Processing Features	Transaction batch data entry procedures	•	•	•	no
	Multiple-company processing		•	•	yes
	User-defined fiscal months		•	•	yes
	User entry and maintenance of recurring entries; automatic updates		•	•	yes
	Automated closing			•	yes
	Automated consolidation			•	yes
	User entry and maintenance of reversing entries; automatic updates			•	no
	Allows user to process current month prior to closing earlier month(s)		•	•	yes
	Allows ledger to be out of balance	n/a	n/a	n/a	yes
Reports	Chart of accounts	•	•	•	yes
	Transaction journals	•	•	•	yes
	General ledger activity and trial balance	•	•	•	yes
	Basic report writer to develop: Income statement Balance sheet Budget listing Listing of actual vs. budget Listing of actual vs. last year Departmental expense reports		•	•	yes
	Sophisticated report writer to specify content of columns and calculate columnar comparisons (e.g. variance analysis)			•	*

*Team Manager priced separately

(continues)

Table 1 ***(continued)***

Payroll

Most personal-computer-based payroll systems are relatively limited, recording employee number, hours worked, and department. Few tie payroll data into job cost applications. But *The Software Fitness Program* payroll package is quite sophisticated, recording job, project phase, employee department, class, and rate. The system accumulates an activity figure (such as square feet painted or number of valves manufactured) categorized by individual or department. Department, class, and rate information is obtained from a personnel master file that can be overridden. Tips are also recorded (a plus for service organizations or restaurants) and this information is also relayed to job cost reports.

A good payroll package adapts to many pay and deduction situations, an ability that often relies on the use

Sales Order Entry Features		Basic	Int.	Adv.	Open Systems
Customer Product and Shipping Data	Basic data: bill-to name and address; ship-to name and address; credit limit; terms; unit prices; units on hand, on order, and committed; order number; customer purchase order number; shipping instructions, date, and carrier; quantities shipped; sales rep	•	•	•	yes
	Quantities back ordered		•	•	yes
	Taxes, freight, and miscellaneous charges		•	•	yes
	Multiple ship-to addresses per customer			•	yes
	Warehouse location code			•	yes
	Territory			•	no
Processing Features	Automatic check of credit limit and inventory availability	•	•	•	yes
	Interactive confirmation of shipped orders	•	•	•	yes
	Automatic back order when stock is unavailable		•	•	yes
	Commits (reserves) inventory placed on order	•	•	•	yes
	Automatic pricing within the system with override	•	•	•	yes
	Pricing reflects multilevel discounts		•	•	yes
	Sales returns processing	•	•	•	yes
	Automatic calculation of tax	•	•	•	yes
	Automatic calculation of sales commissions			•	no
	Process miscellaneous (noninventoried) items		•	•	yes
	Maintain a standing (blanket) order			•	no
Reports	Shipping or sales order (pick lists)	•	•	•	yes
	Sales order list	•	•	•	yes
	Open order list	•	•	•	yes
	Sales:				
	Sales returns listing	•	•	•	yes
	Sales by customer	•	•	•	yes
	Sales by product	•	•	•	yes
	Sales by salesperson	•	•	•	yes
	Sales by product category		•	•	yes
	Sales tax summary		•	•	no
	Projected cash flow report			•	yes
	Custom forms			•	no
	Order confirmations			•	no

(continues)

Table 1 ***(continued)***

of tables defined in the program. *The Software Fitness Program* Payroll package uses tables extensively for federal and state deductions (federal tables are already stored in the system, but state tables must be added by a dealer or the user), earned income credit, and unemployment compensation. Five additional pay and deduction tables are also available for voluntary deductions (such as union dues or health plans) and miscellaneous pay schedules. Although setting up tables may be a burden, the system is able to grow with your business. However, if you want to minimize the use of tables, you can obtain routines that calculate state and federal income tax withholding from dealers who sell the program.

Job Cost Features		Basic	Int.	Adv.	Open Systems
Job Cost Data	Basic data: job number; description; open date; close date; labor hours; labor dollars; material dollars; overhead dollars; other miscellaneous dollars	•	•	•	yes
	Estimated open/close date		•	•	yes
	Date last billed/billings to date			•	yes
	Units		•	•	yes
	Phase number		•	•	yes
	Overhead rate		•	•	yes
	Overhead allocation basis			•	yes
Processing Features	Overhead allocation of:				
	Material dollars			•	yes
	Labor dollars			•	yes
	Labor hours		•	•	yes
	Processes transfers from/to inventory	•	•	•	yes
	Captures and processes labor distribution and accounts payable data	•	•	•	yes
	Captures cumulative billing data		•	•	yes
	Captures general ledger related data (work-in-progress and finished goods)		•	•	yes
	Actual-to-budget comparisons		•	•	yes
Reports	Job listings	•	•	•	yes
	Cost detail reports	•	•	•	yes
	Job profitability reports	•	•	•	yes
	Billing summary reports		•	•	yes
	Overhead allocation reports		•	•	yes
	Inventory issues report	•	•	•	no
	Inventory deliveries report	•	•	•	no

(continues)

Table 1: ***(continued)***

Data verification (known as the audit trail in accounting) is provided with this package. In addition to edit listing and payroll and check register reports, you can generate the following:

- Summarized withholding reports for the last pay period
- Summarized labor cost reports by department
- Employer state and federal quarterly unemployment tax and withholding reports
- Sick leave and vacation reports
- Employer federal quarterly tax contribution report (Form 941)
- W-2 reports

Accounts Payable

Accounts payable is one accounting application that is well implemented by many vendors, perhaps because the requirements vary so little from one business to another. *The Software Fitness Program*'s Accounts Payable package competently records and manages invoices received and payments made.

One convenience is the use of the "temporary" vendor, in which one-time invoices are run through the system but are not recorded in the Accounts Payable master file. Less sophisticated systems require that all vendors be classified as permanent.

Payroll Features		Basic	Int.	Adv.	Open Systems
Employee Data	Basic data: employee name; address; social security no.; salary or wage rates withholding parameters; hire and termination dates; quarter and year-to-date hours and earnings by type, taxes by type, withholdings by type	•	•	•	yes
	Accrued vacation/sick hours		•	•	yes
	Department number		•	•	yes
	Job or project data			•	yes
	Commission data			•	no
	Personnel or benefits data:				
	Pension plan eligibility and date			•	no
	Beneficiary data			•	no
	Contributions and percent vested			•	no
Processing Features	Uses transaction batch data entry procedures	•	•	•	no
	Allows user to override payroll amounts for special adjustments	•	•	•	yes
	User entry of amounts paid in cash or by "manual" check	•	•	•	yes
	Processes hourly or salaried	•	•	•	yes
	Processes multiple pay frequencies		•		yes
	Captures and processes job cost and labor distribution data			•	yes
	Processes multiple state or local taxes			•	yes
	Custom check formatting			•	no
	Calculates sales commission pay			•	no
Reports	Employee master file listing	•	•	•	yes
	Time card/sheet listing	•	•	•	yes
	Payroll register	•	•	•	yes
	Checks and stubs	•	•	•	yes
	Payroll check register	•	•	•	yes
	Payroll deductions listing by type	•	•	•	yes
	W-2 forms (annually)		•	•	yes
	941 forms (quarterly)		•	•	yes
	G/L transactions summary			•	yes
	Labor distribution by department			•	yes

Table 1: ***(continued)***

The package interfaces with the General Ledger, Inventory, and Job Cost packages, and disbursements are assigned to specific jobs and phases within a job. These disbursements can be assigned to cost codes, designating them as material, equipment, overhead, or other categories. There is even room to record tax and freight costs separately and schedule up to three payments for any invoice.

Job Cost

What separates *The Software Fitness Program* from other accounting systems is its Job Cost package. Job cost management is important for large and small business alike, so they can determine whether a particular job or project is generating enough money to support itself. Almost any business, from manufacturer to software house, can use this financial information.

The Job Cost package is easy to use, since most of the information comes from the Accounts Payable and

Payroll packages automatically. It is sophisticated enough to apply overhead automatically on the basis of labor hours, labor dollars, or material dollars. The package also maintains budgeted and actual costs of labor, material, equipment, overhead, and miscellaneous expenses for any phase of a project. Budgeted and actual labor hours are also compared. Any arbitrary measure of work (i.e., "pieces") is tracked by the system.

Through its interface with billing routines in the Sales Order Entry and Accounts Receivable packages, the Job Cost package keeps track of billing and cost information. Thus, along with job cost reports by categories such as job phase or manager, the package provides both billing summary and job profitability analysis. If you have a business in which estimating the cost of your services is critical, these reports are essential.

General Ledger

General ledger programs, like accounts payable programs, are common and usually well implemented. But Open Systems has done its homework; the General Ledger package has a number of options to keep even the fussiest bookkeeper or accountant happy.

The General Ledger package handles actual, budget, and last-year data and accommodates up to 13 periods within a year. (Many retailers use 13 four-week periods for accounting purposes for year-to-year comparisons of seasonal income.) Chart-of-account numbers can be up to 12 digits long; journal entries to the General Ledger carry both an 8-digit reference number and a 25-character description.

Clearing and closing out accounts at the end of a period or consolidating accounts from several companies is done automatically. When accounts are cleared and closed, costs are allocated to all departments in a company step by step until a more accurate picture of the company's finances emerges. Multiple-company accounts are consolidated in a similar manner.

General Ledger reports are in standard format, though custom income statement and balance sheet reports can be generated. Listings from the General Ledger are sorted and summarized, and they provide an adequate audit trail.

The Dark Side

Every accounting system has its limitations, and *The Software Fitness Program* is no exception. The program uses the Business BASIC II Interpreter, which must be purchased separately. Even on a hard disk, an interpreter is extremely slow, and the time lag can be irksome. Open Systems has recently released a new interpreter, which they claim is twice as fast; if it is, it may be worth the additional expense.

Data entry is also difficult. The program has a formatted data entry screen, but you must type C to indicate that you are changing the data. Once C is entered, the system will receive the appropriate data. While this procedure is fine for maintaining existing data, it is very slow when new information is being entered. <Ctrl>-6 overrides this cumbersome procedure, but it is not mentioned in the documentation.

As noted earlier, most well-designed accounting packages employ a number of tables that encode frequently referenced information such as tax rates and account codes. Tables also define the options a system offers. Maintaining these tables in *The Software Fitness Program* is anything but easy; you are forced to use a general maintenance program for many kinds of tables. The documentation is poor, and a summary listing of table settings is not included. Competing accounting systems often provide programs tailored for each type of table—something that makes the process quick and friendly.

Aside from the documentation for the tables, the system's documentation is thorough and the manuals do a good job of separating installation instructions from operating instructions. However, PC users may object to having to wade through instructions on how to install this system using CP/M, MP/M, and Oasis. Considering the cost of these packages, it would not be unreasonable to expect manuals dedicated to the PC user.

Measuring Up

So how does *The Software Fitness Program* stack up? In spite of its flaws, the program compares very well with other accounting systems and with the features checklist incorporated in this review. Remember, though, that the checklist is only a guide—your requirements may call for a different accounting system. But *The Software Fitness Program* is a good choice if you are looking for a complete set of integrated accounting packages, particularly if you need a fully integrated job cost function. The system will suit many businesses and deserves a high score for completeness and accuracy, if not for elegance of execution.

Bill Daupinais is a CPA and partner in charge of the management advisory services staff for the Sacramento, California, office of Price Waterhouse.

The Software Fitness Program
Open Systems, Inc.
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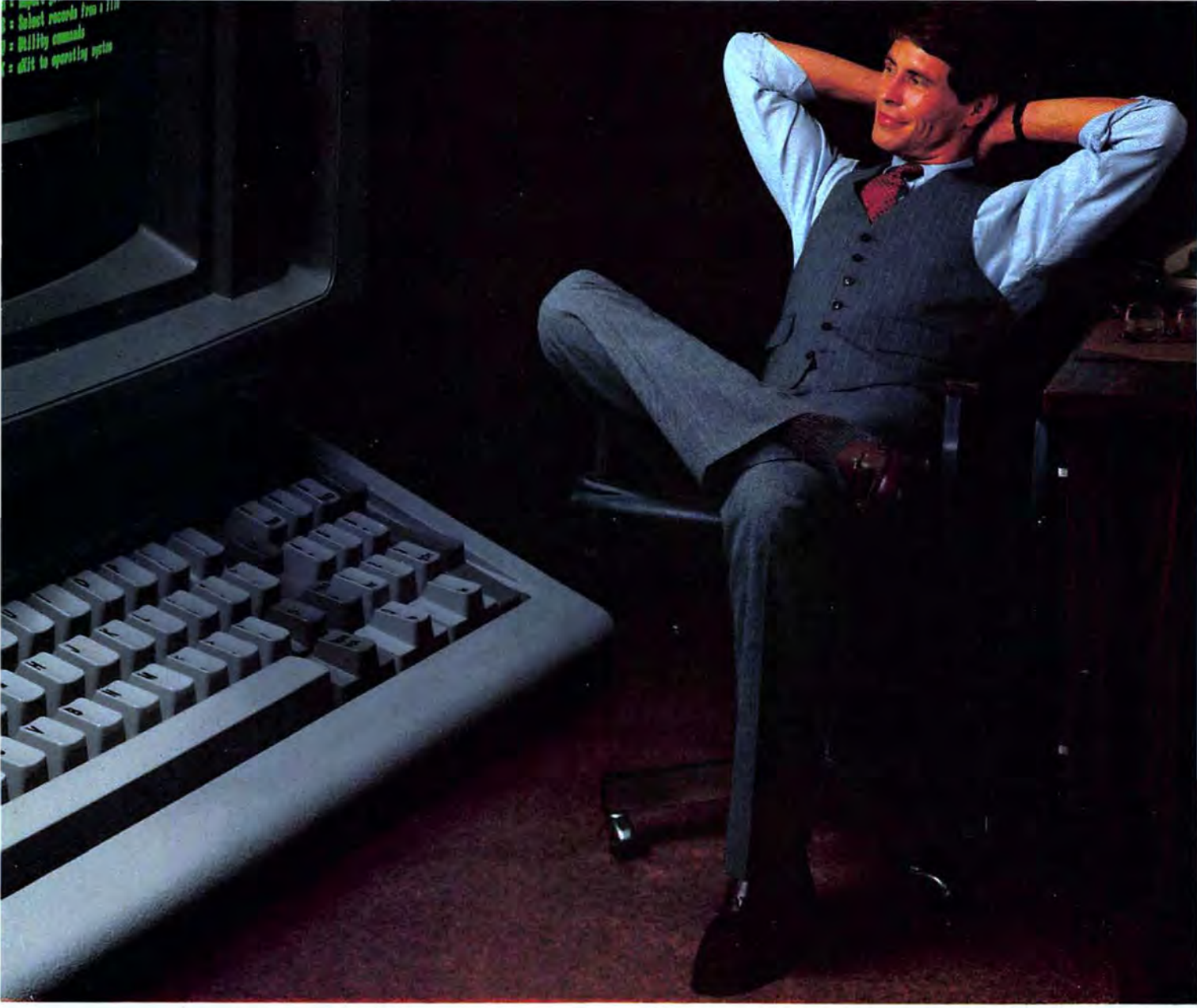

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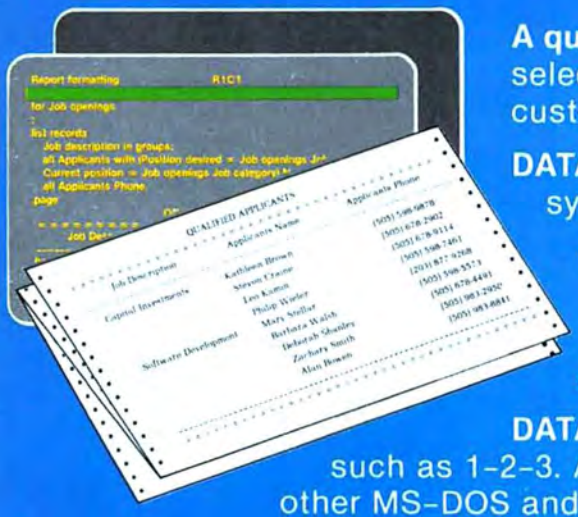

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Write from the Start

Sorcim's first word processing program doesn't break new ground—just old prices.

James Perotti

In a software world overflowing with word processing packages, it's refreshing to find one that delivers what it promises—and for less. Sorcim Corporation, the creator of *SuperCalc,* now offers a full-featured word processor, aptly dubbed *SuperWriter,* for $295. From user manual to final printout, *SuperWriter* more than matches its competitors in ease of use and versatility.

From user manual to final printout, *SuperWriter* more than matches its competitors in ease of use and versatility.

Of course, price and features are only part of the story. Software should be unobtrusive; basic functions such as cursor movement, inserting, deleting, saving, and printing should be designed for simple, almost intuitive use. Prompts should be generous and succinct.

On all points *SuperWriter* presents an extremely good first impression. The user manual and help screens are superb and make the product a pleasure to learn. Included with the software is a small booklet entitled *10 Minutes with SuperWriter,* which gets the novice creating and printing documents from the very beginning. *SuperWriter* uses a lot of menus, but unlike those in *WordStar,* they are easy to find, and each is backed up by a help screen (see Figure 1).

The package is built around a full-screen editor that permits search and replace, manipulations of text blocks, headers and footers, plus a variety of insertions and deletions. *SuperWriter* also includes the *Super SpellGuard* spelling checker, a print spooler (a program that lets you edit one file while another is being printed), a form letter generator, and utilities that document output files. Disk input/output is faster than that of many word processors, and portions of one file (such as a *SuperCalc* file) can be inserted into *SuperWriter* text.

Cursor Movement

SuperWriter lets you position the cursor in the text in several ways. Arrow keys on the numeric keypad are, of course, used for vertical and horizontal movement. The function keys are also preset to move the cursor. <F2> moves it down one screen (20 lines); <F3> moves it up one screen. <F4> scrolls the text down one line, while <Shift>-<F4> scrolls it up one line. You can also get to the top or the bottom of a document by pressing <Ctrl>-T or <Ctrl>-B respectively. Some of these functions could be more easily accessed with <Ctrl>-arrow key combinations, but key definition for cursor use is logical (see Figure 2). For those who have faulty memories, Sorcim provides a set of decals for the keys used in editing.

Inserts

Unlike many word processors, *SuperWriter* does not make use of the <Ins> key. The Insert mode is the default and can be turned on and off using <Ctrl>-O I. As a result, text entered at the cursor does not overwrite existing text, though this selection is available through the insert menu. An Auto-Insert mode is also available that substitutes a new word for an old one while automatically justifying the line. Another useful feature is Page-Insert, which stakes out 20 lines of blank space for large text insertions.

Deletions

SuperWriter's delete functions are very similar to *WordStar*'s. Characters are deleted to the left of the <Del> key; <Ctrl>-G deletes a character at the cursor position.

Function keys are also used: <F10> deletes a word to the right of the cursor, and <F9> deletes a line to the right of the cursor.

SuperWriter duplicates many functions through its numerous menus, and in Edit mode <Esc> D allows you to delete a line (<Esc> D L). Block, line, word, and character deletions are also possible using menu commands.

Operating Speed

You may find yourself entering text faster than *SuperWriter* can display it. The length of a line (as determined by the margin) affects the speed of character display. Text is never lost, but a fast typist might find the lag irritating.

SuperWriter automatically saves a file whenever you leave it. While this is sometimes convenient, it can also slow you down when you are reformatting a file. For example, the Edit mode in *SuperWriter* does not display automatic page breaks; when you print out a document, you may discover that the last line on a page is a subhead. Going back into the text to correct this problem means entering the Edit mode, making the changes, saving the file, and pulling up the main menu and from it the print menu. Printing out the document may show that you have not corrected the problem everywhere in the text. And so the process must be repeated.

SuperWriter's slow disk save and load process makes minor revisions time consuming. You can save some time by printing the text to the screen. In this mode, page breaks are visible, and you can review each page and later enter the document in Edit mode to make corrections.

Advanced Editing Features

The bottom of the screen in the Edit mode displays a status line giving the name of the file, the insert mode being used, and the line and column number of the cursor's location. <Esc> brings forth a number of menus: delete, copy, move, include, find, replace, global formatting, block marker, and save. Pressing the question mark (?) or <F1> displays a help screen that reviews the options available for the menu selected. Pressing any key returns you to the menu.

The following are *SuperWriter*'s advanced editing features:

Search and Replace. SuperWriter can find any string up to 25 characters long, either every time it occurs in a text file or a specified number of times. The Replace command finds a string and replaces it with another. This is often the quickest way to make changes in a file.

Block manipulations. "Cut and paste" is the process of moving a block of text from one location to another, whether it is a paragraph in the file being worked on, another file on the same disk, or one from another disk. The block is marked at the beginning and the end with the <F6> key and a forward slash (/); the cursor is then placed where the text is to be moved. The block of text can also be written to separate file.

```
SuperWriter 1.00                                    IBM-PC     Edit Keys:
EDIT OPERATION:                PRESS:              EDIT OPERATION:          PRESS:
  CURSOR MOVEMENT:                                 :  DELETION:
      up                 Ctrl-E or up arrow        :      character              Ctrl-G or F10s
      down               Ctrl-X or down arrow      :      rest of word           Ctrl-Y or F10
      left               Ctrl-S or left arrow      :      rest of line           Ctrl-N or F9
      right              Ctrl-D or right arrow     :      character left         Del
      next word              Ctrl-F or F5          :  INSERTION:
      back word              Ctrl-A or F5s         :      character (on/off)     Ctrl-O I
      tab right              Tab                   :      paragraph (on/off)     Ctrl-O P
      tab left               Shift Tab             :      block mark             Esc / or F6 /
      left margin            Ctrl-^ or Home        :      new page               Ctrl-P P
      end of line            Ctrl-U                :      Tab                    Esc Tab
  LINE / SCREEN MOVEMENT                           :  ESCAPE Options: (Press Esc):
      top of document        Ctrl-T or F3s         :    C   copy Block or Write block
      end of document        Ctrl-B or F2s         :    D   delete mode     M   move Block
      line forward           Ctrl-Z or F4          :    F   find     (repeat F8, marks F7)
      line backward          Ctrl-W or F4s         :    R   replace  (repeat F8s)
      next screen            Ctrl-C or F2          :    N   Upper/lower-case/Capitalize
      last screen            Ctrl-R or F3          :    I   include another document
  PRINT DIRECTIVES           Ctrl-P                :    G   global: line width and Tabs
  MAIN MENU                  Esc Return            :  EXIT  ESC S save or ESC Z zap workspace

Press any key to continue
```

Figure 1: Edit mode help screen

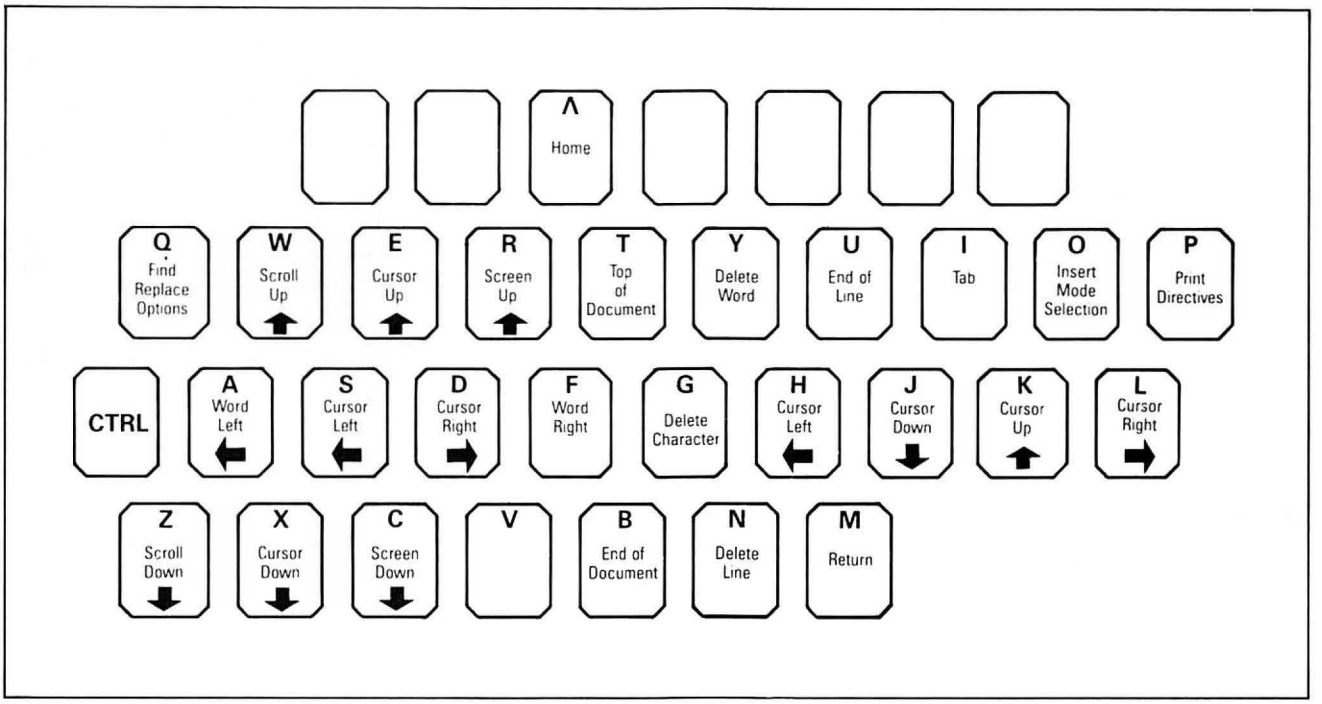


Figure 2: Editing control keys

Include. SuperWriter makes it possible to review one file while editing another. You can call up text in one file, press <Esc>, and return to your place in another file. This feature is handy when you are inserting the same text in a number of documents, particularly when the same commands are used to format a file for printing. Instead of specifying the print format of a document through the print menu, you can embed the commands at the top of a document. These commands can be saved in a file once and later inserted into other files. If you seldom change print formats, this is a real time saver.

Text formatting. One of *SuperWriter*'s quasi-dedicated word processing features is automatic justification of a line or a paragraph when new text is inserted. Changing the margins rewrites each line; words are moved from line to line to fill up the space created. *SuperWriter* also has automatic word wrap.

Formatting the text for printing can be done via the print menu, where margins, page length, number of copies, underlining, boldfacing, centering, and other specifications can be made. Format commands can also be embedded in the text using the backslash key (\). A <Ctrl>-P menu provides the means to boldface, underline, right justify, and insert "ghost" hyphens, subscripts, and superscripts. Most of these commands are easy to use, though the feature that creates headers and footers is not well documented. Embedded commands are not reflected in the print menu and can be overridden with a print menu option.

> *SuperWriter*'s printer driver fails to take full advantage of features offered by the Epson printers.

Printing

Sophisticated editing and formatting features don't count for much if your printed output is limited. *SuperWriter*'s printer driver is adequate, but it fails to take full advantage of the many features offered by the Epson MX-80, FX-80, and RX-80 printers. For example, underlining works with the FX-80 but not the MX-80. Proportional printing available on the FX-80 is beyond *SuperWriter*'s powers, though Sorcim indicates that future versions of *SuperWriter* will take Epson features into account.

The print menu allows you to set or reset the format of the text, send it to the printer or the screen, and save it to disk in either the formatted or unformatted version. Printing to the screen is an uncomplicated and useful way to preview a document. Line numbers are displayed in this mode, so you always know what you're getting when you send a screen to the printer.

Print spooling is a *SuperWriter* feature that allows you to print one file while editing another. Unfortunately,

the PC's multitasking abilities are severely limited, and a spooled file takes much longer to print. *SuperWriter* does not appear to implement this feature well, and printing single sheets (such as separate letters) is difficult since the number of lines specified in the PL command is ignored.

Super SpellGuard

For people who cannot spell or proofread adequately, using a spelling checker is an easy way to catch errors in a long document. *Super SpellGuard* is included with *SuperWriter* and is called from the main menu; a file name is entered and the checker goes to work, comparing every word in the document against its 20,000-word dictionary. Mismatched words are marked in the text and corrected in the Edit mode. The dictionary's small size causes the checker to flag a number of correct words (proper nouns and plurals). You can choose to ignore the word or add it to the dictionary; the dictionary is expandable, and specialized lexicons are easily created. Remember, the more words in the dictionary, the slower *Super SpellGuard* operates, but it is well worth the wait.

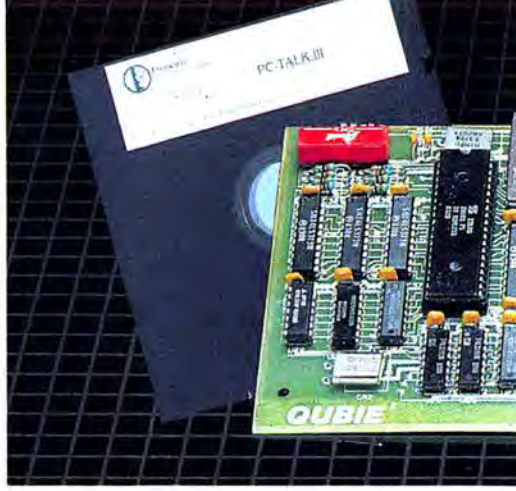
> *SuperWriter*'s Edit mode and spelling checker automatically save an edited file and create a backup of the text.

Disk utilities. *SuperWriter* handles disk operations with finesse. Both the Edit mode and the spelling checker automatically save an edited file and create a backup of the unchanged text. Most importantly, *SuperWriter* can maintain a document's history, noting author, date of creation, modification date, revision number, and limited comments. This may not be valuable to the casual user, but if you revise important documents, a history of changes can often eliminate arguments about who did what and when.

At $295 *SuperWriter* is a great buy. It performs the basics well and includes a number of sophisticated features usually found only in dedicated word processing systems. Sorcim has done a good job on the menus and help screens; they provide information and feedback for every function. The documentation is also top-notch, though the software is so easy to use that documentation is hardly necessary. The more you use it, the more you'll like it.

James Perotti is a professor in the Computer Systems Department of the College of Business Administration at Ohio University. He has written for a number of computer journals.

SuperWriter
Sorcim Corporation
2310 Lundy Ave.
San Jose, CA 95131
408/942-1727
List price: $295
Requirements: 64K, two disk drives



Flip the pages. You see PC modem cards with fewer features advertised for as much as $599. Up until now that's how much it cost to make a modem capable of transmitting at 120 characters per second (1200 baud). It doesn't take a computer to figure out the savings in phone line charges when you communicate four times faster than the 30 character per second modems (300 baud). Now you can have the solution to your communication needs at an affordable price.

SEE HOW THEY WORK

You can image how precise the components have to be to convert tones over a phone line into 120 characters every second. Precision equates to cost. With the advent of the mass market in personal computers the economies of scale drove the costs of manufacture down, but did not effect the precision required. The technology used is called "analog filtering". It is the process of sending (modulating) and receiving (demodulating) tones with perfect pitch. A lot of adjusting, noise suppression, and a little magic is required. Real expensive. Some use lots of chips and filters (known as discrete components). The latest rage is LSI (Large Scale Integration) technology. Which is the same old analog stuff condensed onto fewer chips.

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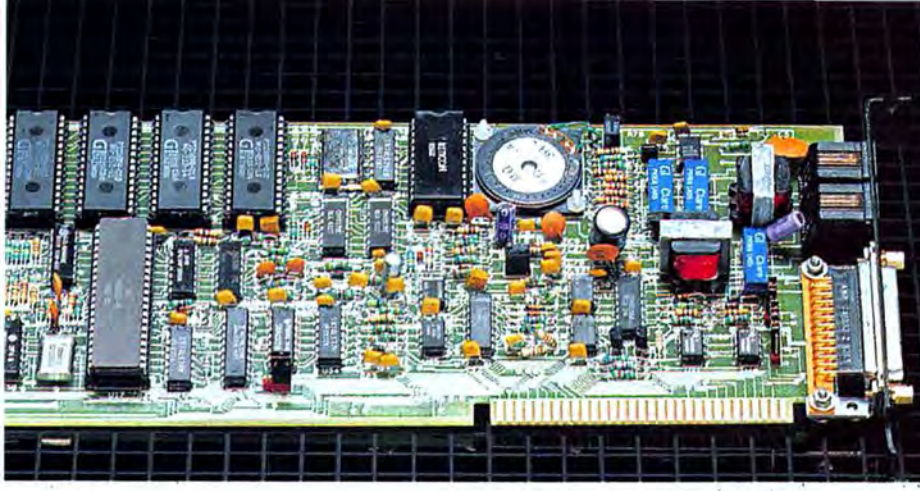
We took a different approach. Through the use of four microprocessors the tones are chopped up digitally and measured millions of times per second, eliminating the need for analog circuity. Two microprocessors do the modulating, two the demodulating. The chips are programmed to emulate the 103 (30 characters per second) or 212 (120 characters per second) standards and determine the correct speed automatically. It's a proven technology that provides outstanding performance. Best of all, it's inexpensive and reliable.



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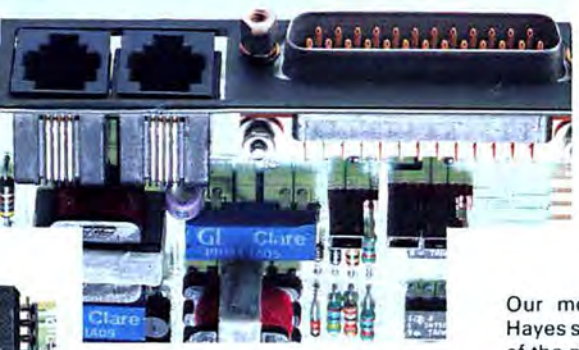
ADVANTAGE #2

Optional external serial port connector



AN ASYCHRONOUS ADVANTAGE

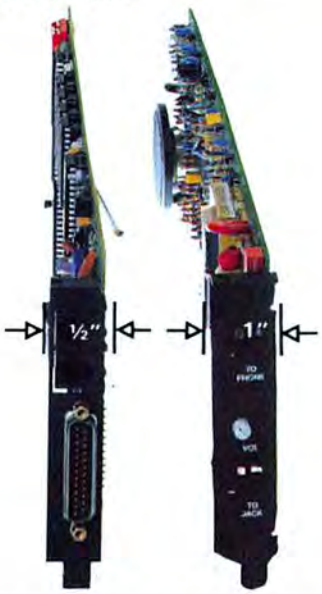
The modem board is addressed in the software as COM1 or COM2 and we have a handy little option you ought to consider. If you would like to use the asynchronous communications port when your modem is not in use, we will add a connector and the necessary circuitry for just $20. This saves you the hundred bucks or so you would spend for another async card and saves a valuable slot. It can be configured as COM1 or COM2 and works just like IBM's does.

THIN IS IN

It plugs into your IBM PC or XT and occupies any one slot since it is just 1/2 of an inch thick. This is made possible by using a special speaker which is just 1/8" tall. Competing brands either use a convential cone type speaker, or they just skip the speaker altogether. Some modems also have large transformers which allow rob valuable space.

ADVANTAGE #3

Just one slot in PC or XT



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Our modem is 100% compatible with the Hayes software commands so you can use any of the popular communications packages like IBM's Asynchronous Communications Support, CrossTalk, Transend, or PC Modem. We go one better than the competition. We **include** PC-TALK III. PC WORLD magazine referred to it as "the benchmark that other PC communications packages are measured against." It stores phone numbers, handles setting the modems characteristics, saves to disk files, transmits from disk files, even binary files. You can program up to forty keys to have things like passwords and log-on information be entered when you hit them. And to make sure data is sent and received accurately, the XMODEM protocol detects errors caused by poor line quality and automatically retransmits the data.

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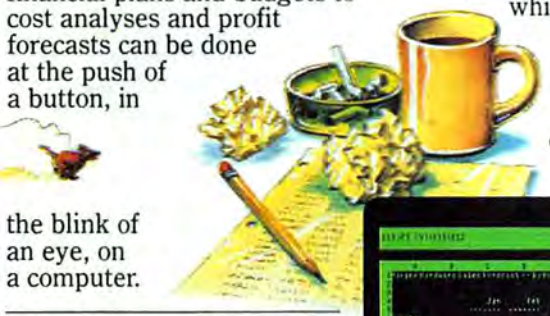

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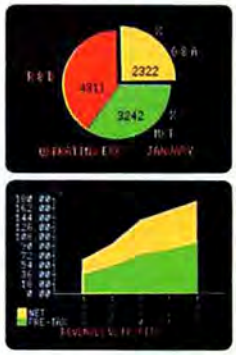

No problem. You simply *trade in* your VisiCalc IV at any VisiCorp dealer. You will receive your *full, original purchase price* as credit towards the new program, minus a nominal charge to cover the new material that accompanies it.*

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And should, by chance, you encounter some "VisiCalc-like" program, ask about *their* trade-in policy. Ask for a side-by-side, feature-by-feature comparison.

Then ask again.

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*Naturally, VisiCalc owners will be welcome to upgrade to VisiCalc IV as well. VisiCalc IV is available for the IBM PC and IBM XT. The words "VisiCalc IV" and "Visi On" are trademarks of VisiCorp, San Jose, California.

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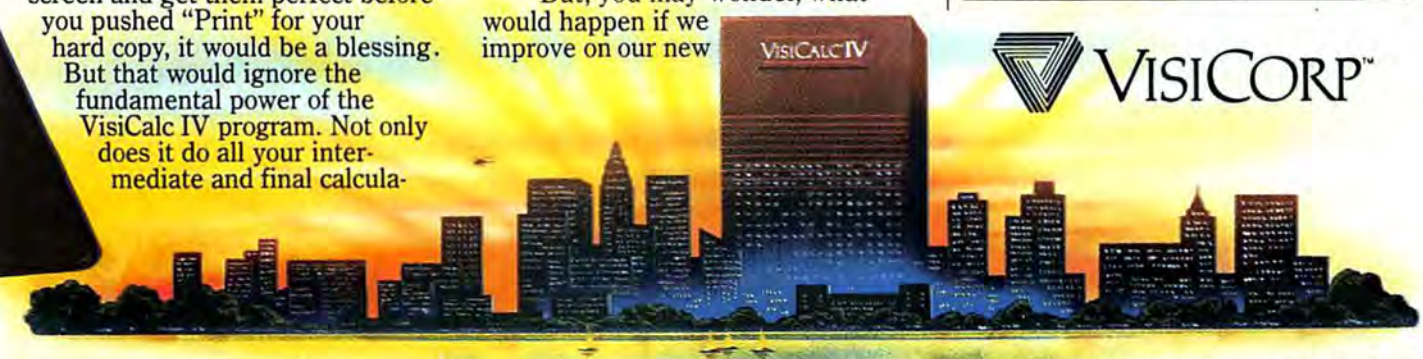


VISICORP™

Circle 598 on reader service card

Delta Drawing

A graphics language that's a work of art

Kip King

Delta Drawing is being touted as a learning program for children and other first-time computer users. Using *Delta Drawing*, children can explore both the worlds of video art and computer programming by creating pictures on a color monitor. But why should kids have all the fun?

Delta Drawing's powerful graphics, rich variety of commands, and ease of use seem destined to appeal to many adults. And, as an inexpensive graphics program with lettering capabilities, *Delta Drawing* may even find its way into business applications.

But *Delta Drawing* is, first of all, fun. Describing *Delta Drawing* as a graphics language does nothing to convey its open-ended possibilities for creativity, discovery, and enjoyment. *Delta Drawing* is so simple that you can easily forget that you are programming a computer. To discover that you have been using nested subprocedures and numeric input commands to create pictures comes as a surprise.

Instant Electronic Art

Getting up to speed with *Delta Drawing* is easy. Within 15 minutes—half an hour at the outside—even a complete novice can draw something on the computer.

Delta Drawing starts by drawing a frame around your screen and placing a delta-shaped (Δ) cursor in its center. The delta, which you control using mostly single-key commands, serves as your drawing instrument. Its point shows you where you're heading, and a dot in its center blinks to tell you where you are.

> *Delta Drawing* is so simple that you can easily forget that you are programming a computer.

Delta Drawing's simple commands can be learned quickly and are easy to remember: D for draw, L to turn left, R to turn right, M to move without drawing, E to erase. Press D four times and the delta draws a line four units long. Press R four times and the delta turns 120 degrees. To draw a triangle, just repeat the two preceding steps three times in sequence.

Adding color to your pictures is as easy as drawing them. Pressing B lets you change the background to any of the eight available colors. Want to draw a line in a different color? Press C (for color). To color in an enclosed shape, place the delta inside it and press F (for fill) while holding down the <Ctrl> key.

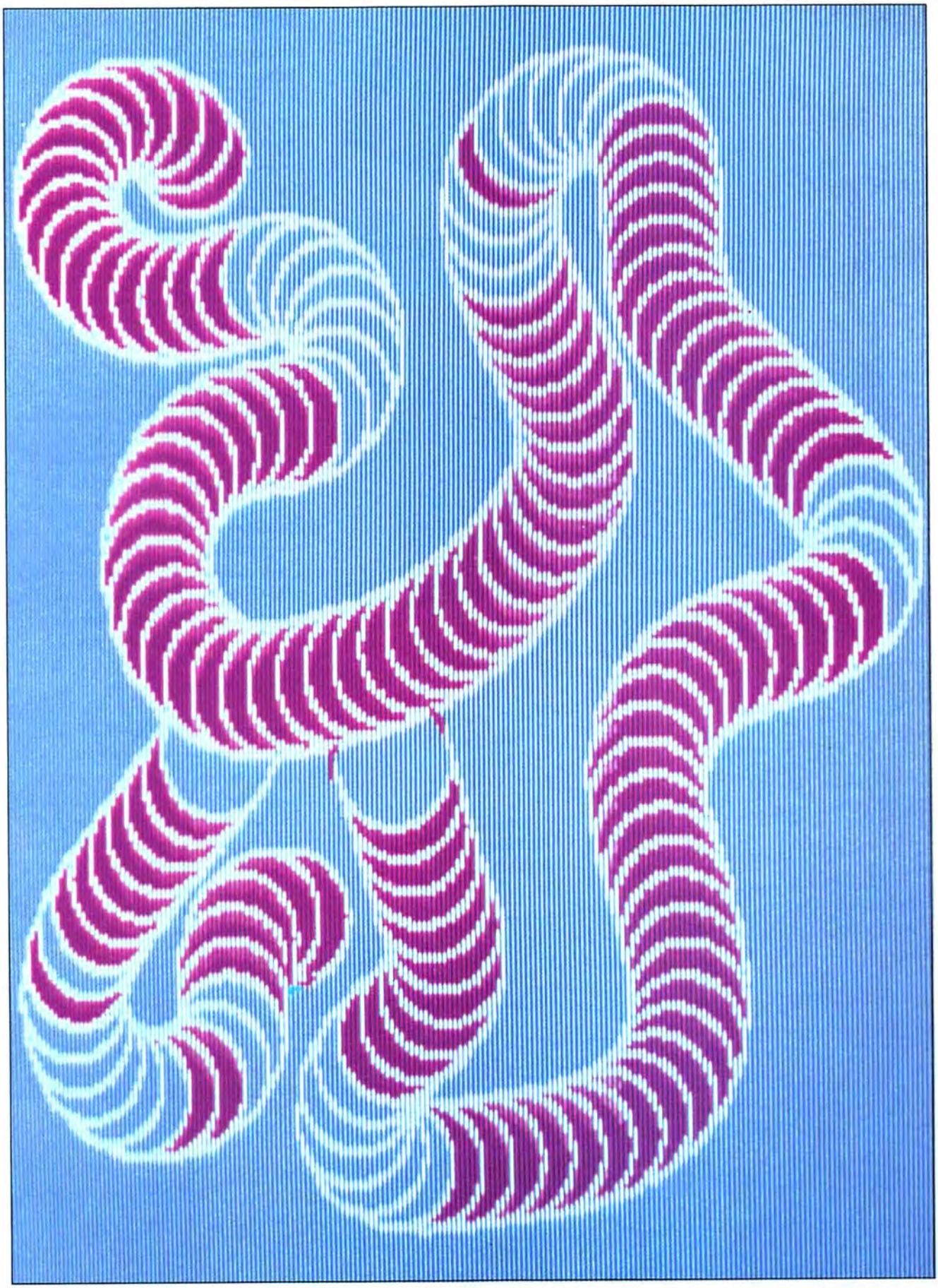
Delta Drawing is even forgiving. Make a mistake or change your mind about that last line you drew? Press E, and *Delta Drawing* erases your last step. There is no such thing as a mistake; you can always undo something you don't like and start over—a feature that goes a long way toward eliminating frustration.

Because *Delta Drawing*'s commands are obvious, children or neophytes can concentrate on the task before them, whether they are constructing a triangle, drawing a park, or creating a program. *Delta Drawing* makes powerful programming concepts simple and intuitive.

Special Effects

Simplicity does not necessarily imply lack of power or sophistication. Once you have mastered *Delta Drawing*'s basic commands you can revel in its wealth of other features before progressing to its programming capabilities.

Commands like Random, Mirror, Reverse, Scroll, Enlarge, Shrink, Squeeze in, Stretch out, Label, and



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Review

Kaleidoscope should satisfy your imagination for some time to come. To transform the computer into an instant Mondrian with an infinitely variable repertoire, use the Random command to fill the screen with random sequences of colored rectangles. Or use the Mirror command to change left turns to right and right turns to left, as if you were drawing while looking in a mirror. Or run everything backward using the Reverse command.

Delta Drawing's scrolling commands enable you to animate your pictures by sliding them up, down, or across the screen. You can sail your boat into the sunset or land your spaceship on an alien world. Using the set of letters and numbers that come with *Delta Drawing*, you can create titles for your works.

But everyone's favorite feature seems to be the Kaleidoscope mode. When you press K the screen divides, and delta-shaped cursors appear in each quadrant. Suddenly you're drawing in a kaleidoscope, with four deltas moving in concert.

Programming without Pain

Delta Drawing's real strength lies not in its pictures, for all their graphic immediacy, but in its ability to demonstrate, almost painlessly, central and often profound programming concepts. By directly relating graphics and text, *Delta Drawing* enables you to see the interplay between a sequence of commands and the picture they generate.

As you draw your picture, *Delta Drawing* keeps track of each keystroke and stores it in a program. At any point you can see your program by pressing T for text mode. In the text mode you can edit your program

with ease, inserting new commands or deleting old ones; *Delta Drawing* automatically keeps everything in the right place.

Soon you discover that you can change your program in text mode and then switch to graphics mode to see your new picture. By alternating between text and graphics, you can quickly alter your artwork.

In this and other ways *Delta Drawing* helps bridge the gap between our intuitive sense of what it means to complete an action and the actual procedure we would use. Many actions that we take for granted—walking in a circle, for example—actually require coordinating a series of individual steps: walk, turn, walk, turn, etc. These hidden subtleties of life become apparent when you try to draw a circle using *Delta Drawing*, something that children do quickly after learning the D (for draw) and R (for right) commands.

With *Delta Drawing* you can explore both the rudiments of procedural logic and more sophisticated notions.

With *Delta Drawing* you can explore both the rudiments of procedural logic and more sophisticated notions. After drawing a tree, for example, you can save it as program 1 and then use it as many times as you want in subsequent programs. To draw a tree in program 5, move the cursor to where you want the tree and press <F1>. For more trees, move the delta and press <F1> again.

Saving and Printing Pictures

Once you are satisfied with your picture, you can store it on a disk or print it on a graphics printer. You can save your work either as a list of commands or as a binary file containing the screen image.

Ordinarily, you would save the drawing program. Later, when you retrieve the program, *Delta Drawing* automatically redraws the picture for you. But storing your picture as a binary file offers a special advantage. Since the binary file format is compatible with BASIC, you can use your drawing in a separate BASIC program as a title page or as part of an adventure story, for example. Storing binary files is expensive, however. Each file occupies roughly 16K on your disk, limiting the number you can use effectively in one program.

If you choose to print your masterpiece, you can do so in large or small format and in color or black and white, depending on your printer. *Delta Drawing* currently supports the IBM graphics printer, the Epson printers with Graftrax, and Integral Data Systems' 460G, 560G, and P-Series printers.

Compared to Logo

As a graphics programming language *Delta Drawing* invites comparison with Logo. Although Logo was also designed for those first encountering a computer, *Delta Drawing* is much simpler and clearer. *Delta Drawing* provides a more accessible introduction to computers and programming concepts, while preparing the ground for more extensive programming languages such as Logo.

Delta Drawing has several features not readily available in Logo such as the Fill command, the single-key

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Review

Erase command, and the ability to switch between the text of the program and the screen image. *Delta Drawing* does not include conditionals, recursion, or the range of mathematical functions in Logo, but then *Delta Drawing* does not attempt to be a complete, formal language. Strictly a graphics language, *Delta Drawing* has limitations. You cannot write an adventure game in it, for example, as you might in Logo.

In School

Of all Spinnaker Software's educational programs, *Delta Drawing* holds the greatest potential for applications in schools. It can be used as an introduction to computers and programming and as a tool for solving a wide range of artistic, logical, mathematical, and geometric problems.

Computer Access Corporation, *Delta Drawing*'s developer, donated copies of the program to IBM's Secondary School Computer Literacy Program, a pilot project involving 88 schools in three states. The project's goal is to discover how best to introduce computers in the classroom. As a learning program *Delta Drawing* offers some unique advantages.

Delta Drawing combines control and creativity. Since you control the delta, you control the pace as well, a crucial point in reassuring those unfamiliar with computers. As a graphics program, *Delta Drawing* offers immediate visual feedback as well as the opportunity for imaginative and constructive play. Finally, since *Delta Drawing* has several levels of complexity, you can approach it on your own level and grow with it as you learn.

Delta Drawing also works well as a tool for investigating problems relating to such things as mathematics and geometry. Experience in the classroom reveals that children respond well when computers are presented in the context of solving a

problem such as, Can we use the computer to draw a square in this corner or to understand what happens when we rotate a hexagon? As yet these possibilities have barely been explored, but they hold great promise.

The Big Picture

We are still learning how best to introduce computers in the classroom and in the home. *Delta Drawing* seems destined to occupy an important role as a child's or even an adult's first program. And because of its easy-to-use and powerful graphics capabilities, *Delta Drawing* will surely find its way into many uses outside the home and the classroom.

It's hard to find fault with a well-conceived program that offers so much variety and range for only $50. *Delta Drawing*'s authors completely rewrote the original Apple version of the program for the IBM PC, making significant improvements in both speed and ease of use. *Delta Drawing*'s biggest limitation—that you can draw in only four colors at once—turns out to be a constraint of IBM's color graphics board and not of the program itself.

As a powerful learning program, *Delta Drawing* is innovative and imaginative. For its price and capabilities, it can't be beat.

Kip King is president of Xerxes Corporation, a Boston firm that designs, develops, and markets financial software for the IBM PC.

Delta Drawing
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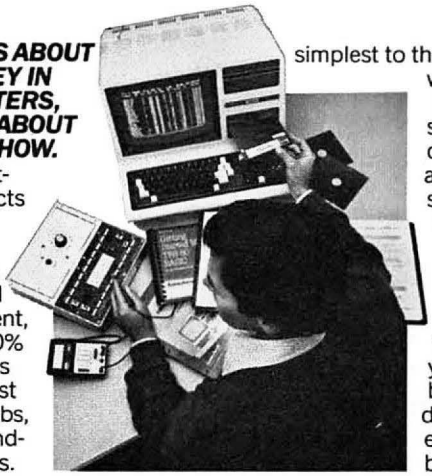

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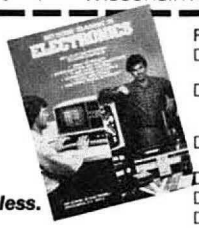

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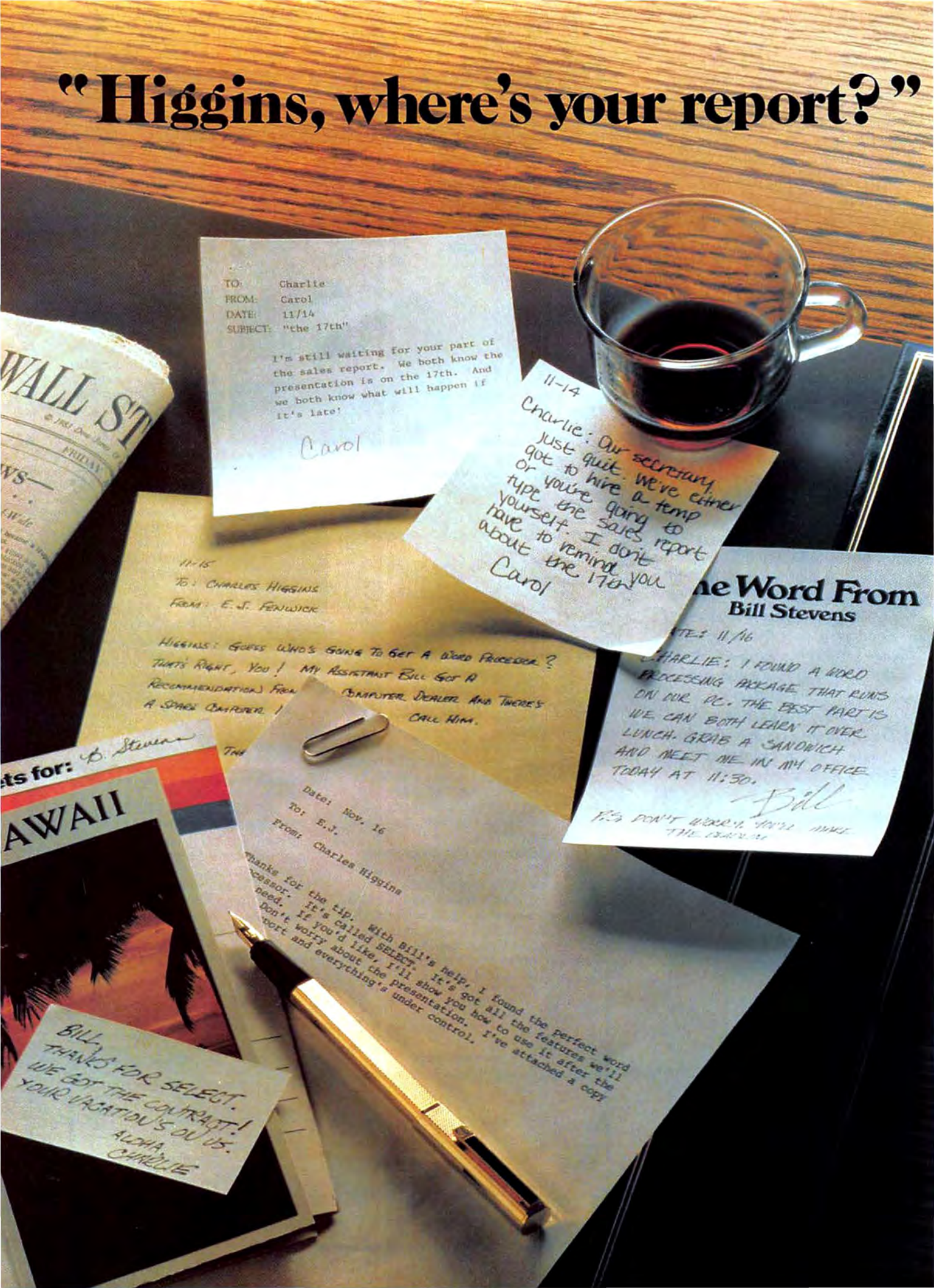

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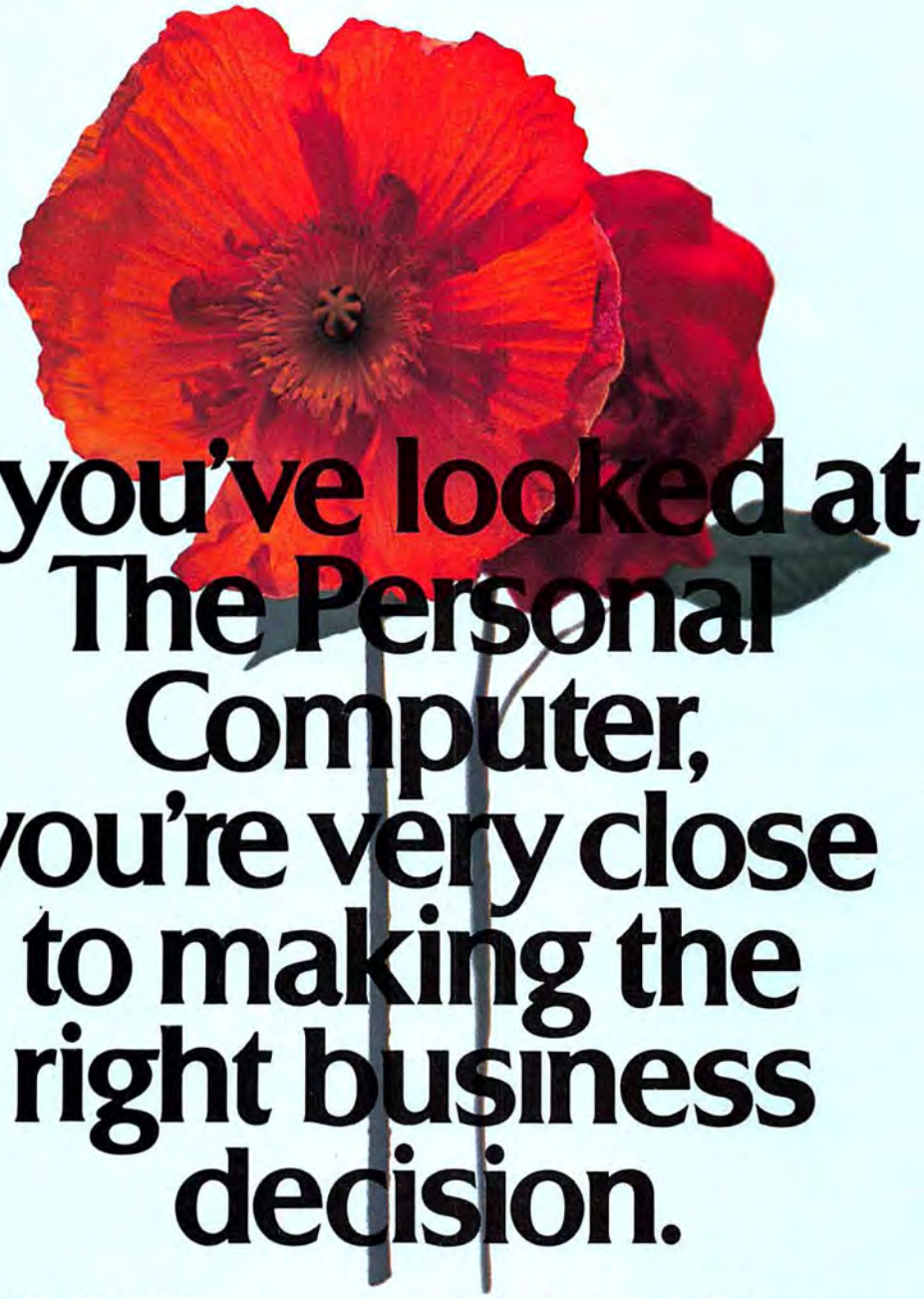

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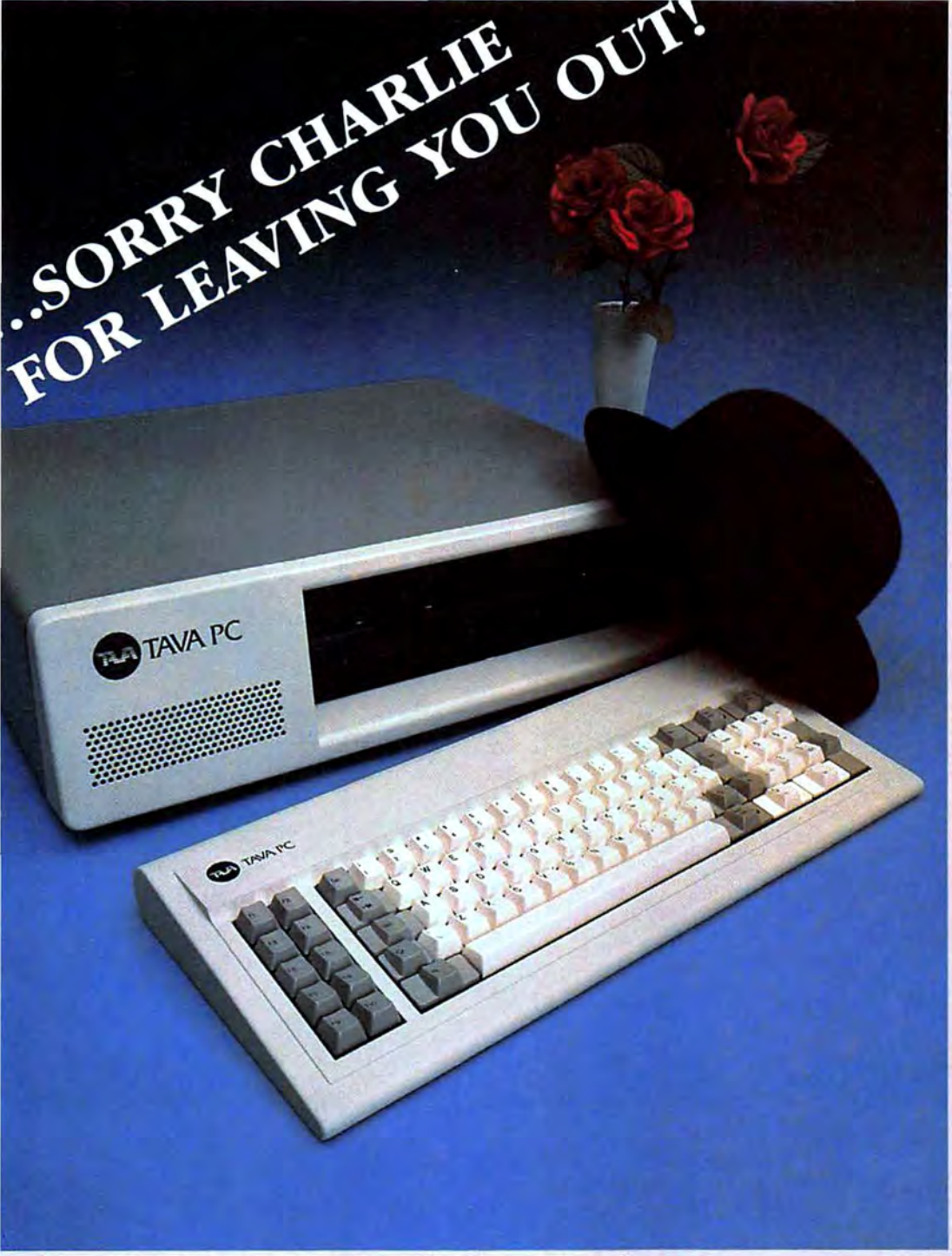

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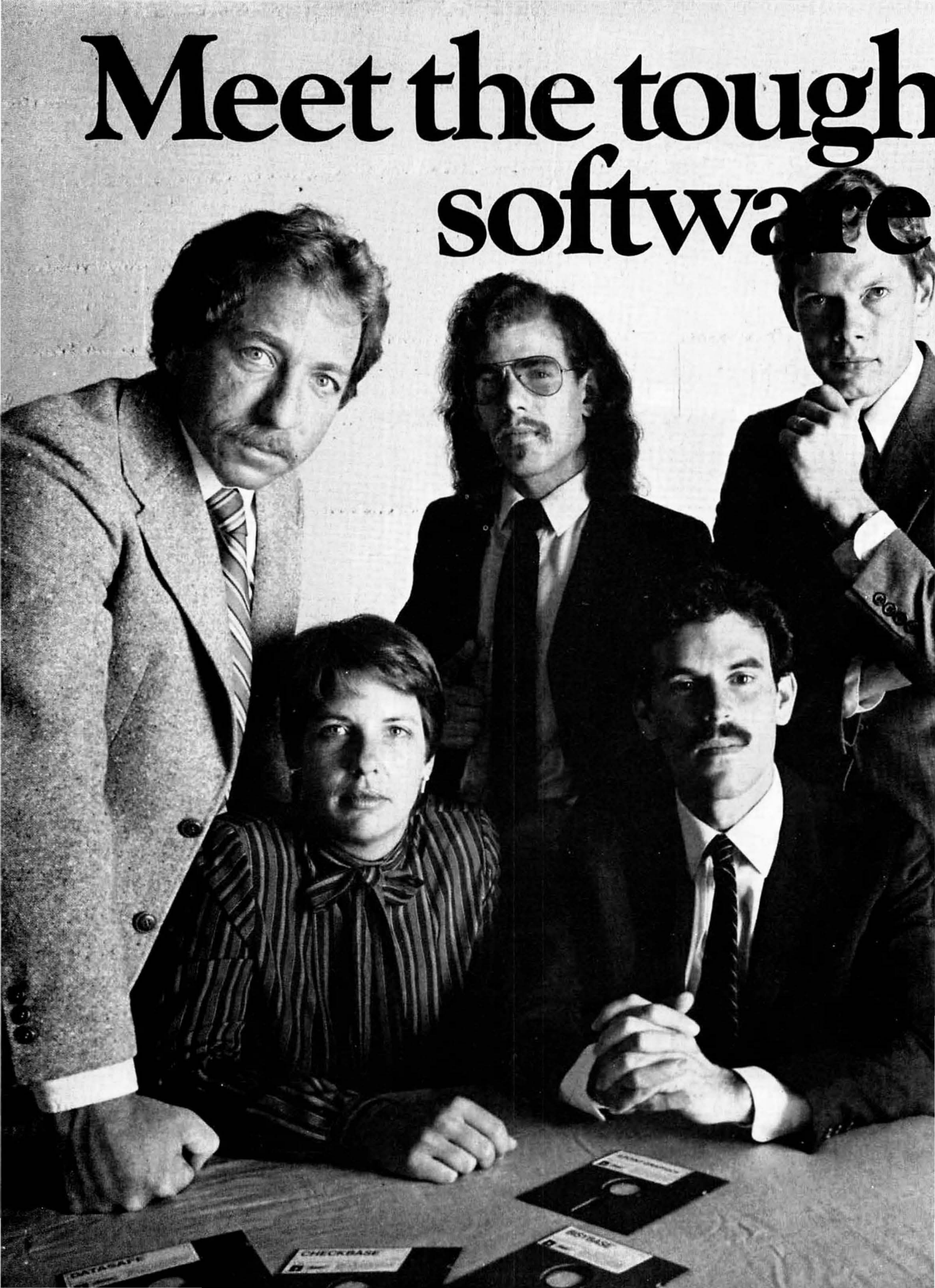

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McGraw-Hill's Handbook

A weighty reference book that doesn't quite fill the scales

Mike Young

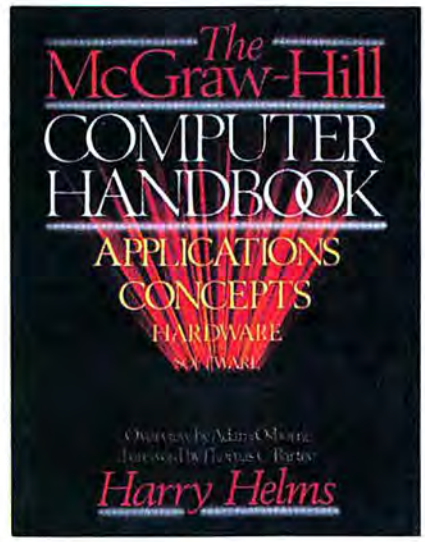
Imagine, a book "offering comprehensive, practical information on the entire computer science field—hardware, software, systems, applications, and theory—*The McGraw-Hill Computer Handbook* presents authoritative answers to virtually any questions that may arise about today's computers" (press release of April 25, 1983).

Even an experienced press-release reader may expect this book to be an indispensable reference volume. Unfortunately, it falls very short of the mark.

I had hoped that this 992-page volume would fill a void on my bookshelf, not to mention my gray matter, with just the information needed to complete my understanding of computing. I wanted a guide to the subjects I think I understand but would like explained just once more. And I wanted to improve some of the explanations I offer to other people. I had hoped that the *Computer Handbook* would also provide me with brief but thorough tutorials on several subjects I've heard of but don't know anything about.

I'll admit that this is a high standard by which to judge any book. But from a book that purports to be a comprehensive handbook and costs $79.50, it is the least I expect.

The book is an adaptation of 15 titles from the McGraw-Hill catalog. The majority of the works are text-



books. Six chapters of new material including high-level languages were written for the handbook. The new material, a total of 58 pages, is disappointing. Apparently the publisher felt obliged to include certain chapter headings such as artificial intelligence and robotics. Lacking its own textbooks on the new subjects, McGraw-Hill seems to have done little research; in a mediocre five pages the book gives only the briefest explanation of the two subjects.

Here's a quick test I conducted to find "authoritative answers to virtually any question." I went looking for some terms used in recent *PC World* advertisements:

SDLC: not in the index.

Local area networks: not in the index.

Asynchronous, bisynchronous: async sent me to a description of *sync* and *async* in designing computer circuits and to a good explanation of serial I/O transfers. *Bisync* is not to be found.

Memory mapping: two references are cited, one referring to a memory map as a by-product of the linking loader and the other providing the hint to keep the map handy when editing programs. I later bumped into the expected material by browsing through the index where it is listed under Direct Memory. Additional information was found by a sequential reading of the index.

I believe that the index is the most important part of a reference book. An ideal index categorizes ideas rather than terms and key words. As the above examples indicate, the *Computer Handbook*'s index is not an ideal index.

Subject Matter

Some chapters of the book are excellent. Chapter 19, "Databases and File-system Organization," is clear and well written. It has enough generality so that the information is universally true beyond the differences among operating systems and computers. This chapter provides what I expected from each chapter. It provides the introductory material necessary to understand data bases and

enough exposure to test our curiosity and encourage further reading.

Chapter 20, "Computer Graphics," includes enough new technologies, such as laser-scan displays, to be fascinating and educational. Chapter 22, "Character Printers," is rich in illustrations that give readers an understanding of the differences among the types, styles, and operations of printers. Like the data base chapter, these two chapters reveal enough information to send the reader to the "adapted" work for more detail.

Some subjects that could have been very useful to *PC World* readers were given short shrift. The survey of computer languages, for instance, held promise but was given shallow treatment. I had hoped for a comparison of the languages I know with those I don't know. The *Computer Handbook* could have included such topics as how a language affects the logic of a program. To give readers criteria for choosing a language for their use, the handbook could have compared features such as structure, ease of maintenance, speed of development, and performance during program execution. Instead, here is a sample of what it offers: "BASIC (Beginner's All-purpose Symbolic Instruction Code) is widely used today in microcomputer systems. BASIC was orginally designed as a teaching language loosely based on FORTRAN and is simple to learn. Its capabilities are limited compared to most other high-level languages, however, and many different, incompatible implementations of the language are in use." Such a description of BASIC is appropriate for a computer dictionary but is unsuited to a survey in a computer handbook.

Chapter 18, "Hardware and Software Documentation," is the most disappointing. Gather two or more users of different computers together in one room and chances are that their only similar complaint will be against documentation. Documentation is an area ripe for improvement, and many books now on the market address the issue, although the handbook refers to none of them. Instead of an insightful examination of the components common to all computing, only five cursory pages are given. How ironic it is that such an important subject is so quickly dismissed.

Because the material is adapted from many sources, the book appears to be assembled rather than edited. Sometimes this is simply annoying. For instance, pages are renumbered with each chapter—section 20-19 begins on page 20-31 and refers to Figure 20-29.

At other times the lack of overall editing amounts to a greater flaw. The style and orientation of each of the chapter authors is very different, and each chapter makes different assumptions about the reader's background. This book attempts to serve the entire computing spectrum, from the tiniest hand-held computers to the largest mainframes. Each author brings his or her own perspective, sometimes to the exclusion of others in the computing community. It was interesting to note that the majority of the mainframe authors included references to microcomputer users in their chapters. The microcomputer chapter authors, however, held a very parochial outlook.

Lower Expectations

For years I have been both a reader and owner of McGraw-Hill handbooks: *Handbook of Business Administration*, *Purchasing Handbook*, *Handbook of Advertising Management*, and *Handbook of Personnel Management and Labor Relations*. They have some common characteristics: they are all thick, expensive, and (until the computer volume) uniform in size. I've found the handbooks useful because they do the following:

- Introduce readers to a subject, giving them the background they need for research.
- Focus readers' thoughts and prime the creative juices, reminding them of what they already know.
- Provide a bibliography for further research.
- Expose readers to the notation and classification of ideas, giving them a framework from which to view further reading. Even if no specific answers are found, readers may then intuit answers and begin to arrange their ideas in an orderly fashion.
- Impress people who are easily awed by thick tomes on a subject.

The *Computer Handbook* does all of that, and as such it is a contribution to readers' libraries. As a general reference, the book offers much background information, but as a ready reference for specific answers it is inadequate.

The role of a handbook is to be general enough to transcend a particular brand of computer or set of uses. A large market exists for a reference handbook tailored to microcomputer users. Adam Obsorne writes in the foreword of this book that the microcomputer world is distinguishing itself from mini and mainframe computers because it provides consumer-oriented products. With consumer products PC users are not required to have the technical background that mini or mainframe users need to have.

PC applications programs insulate us from the bits and bytes of the computer. However, because programs limit us to only the features offered, if we wish to be free of the limitations and create our own applications, we are obliged to broaden our background. This book, even with its flaws, is a beginning. I hope it will encourage the publication of other handbooks.

Mike Young is president of the Heartland Companies, a 10-year-old data base processing service bureau in Berkeley, California.

McGraw-Hill Computer Handbook
Edited by Harry Helms
McGraw-Hill, New York, 1983
992 pages, $79.50

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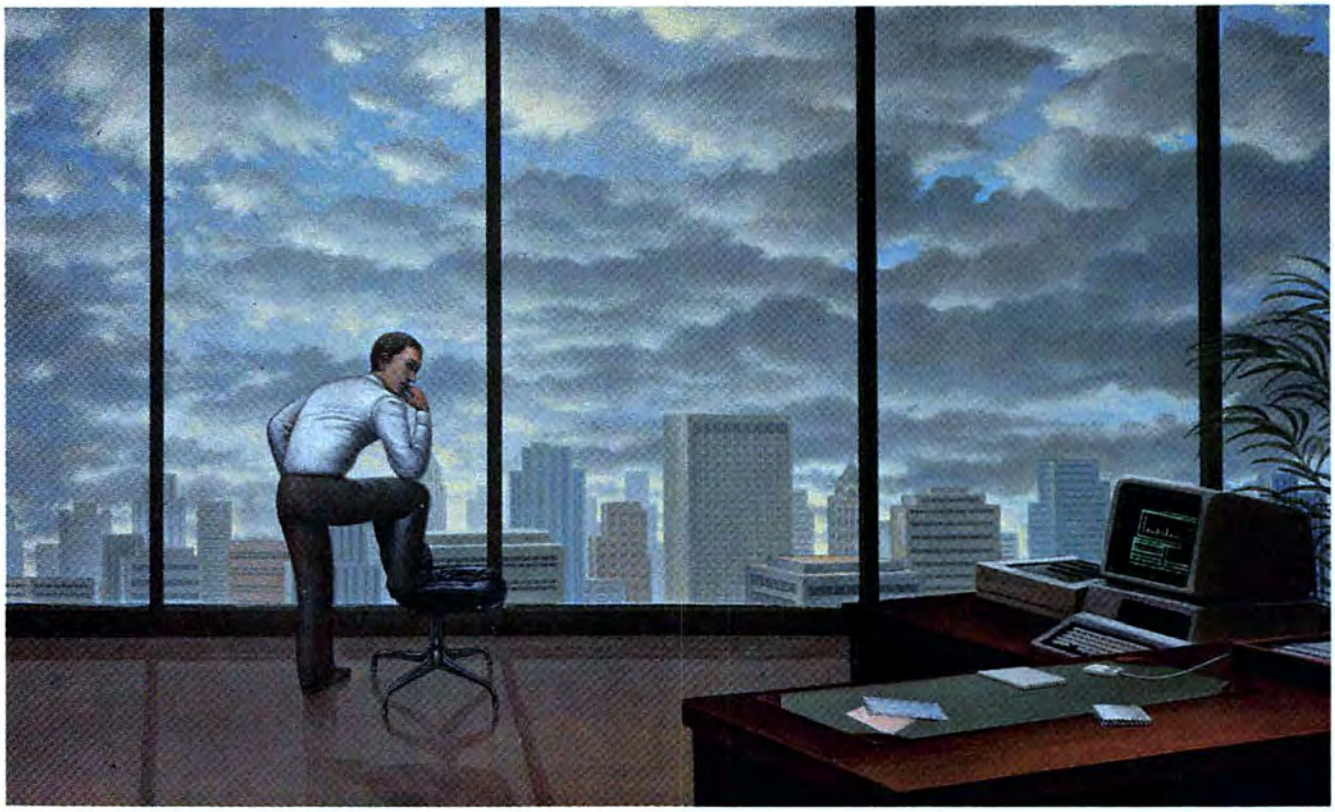

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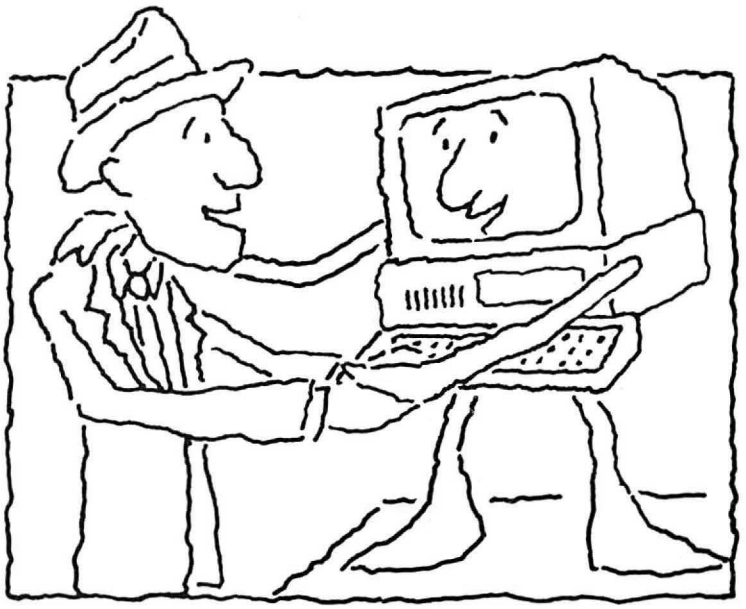

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"Frankly, you couldn't pay me to use this software."

— **Shirley Rogers,** Controller, Cybernetic Data Products, Inc.

Shirley Rogers takes her job as Controller for Cybernetic Data Products very seriously.

So when it came time for her to computerize her firm's accounting procedures, she studied every available software option thoroughly. And we're happy to report that she chose *Legend.*

Fact is, *we* know that *Legend* is the finest accounting software you can run on a microcomputer. Because it has the power and versatility of systems found in Big-8 accounting firms. Even still, we were more than a little curious what it was about the program that most attracted Shirley. So we asked her.

"Cybernetic Data Products is an extremely report-intensive company. So when I went shopping for software, my first criterion was a program that can generate reports—quickly and easily. *Legend* fit the bill perfectly because it allows me to define and create thousands of different types of reports, in detail or in summary form.

"Plus, since I was new to computers, I was after an accounting system that was easy to use and simple to operate. Most of the software I tried was reputed to be 'user-friendly.' In reality, they were impossible to figure out and cumbersome to operate. I had *Legend* up and running in minutes. My hat's off to the folks who wrote the instructions and made the program such a joy to use.

"When you've been doing accounting for years, the last thing you want is to have to learn a different way of doing things to accommodate the software. *Legend,* on the other hand, has adapted perfectly to *my* way of doing things."

The System and its components. The *Legend* system consists of five programs in three modules: General Ledger, Accounts Receivable/Order Processing/Inventory Control, and Accounts Payable... and may be purchased as an entire system or individual modules. Some highlights:

General Ledger

- Maintains period and year-to-date account history.
- Prepares statements by department and cost center location.
- Generates summary and detailed statements.
- Provides fail-safe automatic audit trails.
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Accounts Receivable/Order Processing/Inventory Control

- Analyzes cash flow by net due date and discount date.
- Produces overdue listing in customer or representative sequence.
- Provides sales statistics with previous year comparison.
- Allows individual payment terms for each customer.
- Interfaces to General Ledger.

Accounts Payable

- Automatically flags items to be re-ordered.
- Reports product profitability by previous, current, and year-to-date.
- Allows payment selection by net date and discount date.
- Discount analysis to aid payment selection.
- Provides details of balance, order information, and exceptions. Interfaces to General Ledger. And much more.

Links to your software. As you can see, *Legend* is a complete and highly flexible system that was designed with the features recommended by CPA's. What makes it even more valuable is that, by adding an inexpensive linker, you can provide an interface to software you're already using... like WordStar; Lotus 1, 2, 3; dBase II; and even BASIC.

With all this going for it, it's no wonder that *Legend* is fast becoming the world's most popular accounting software. See it today at finer software dealers or write directly to Base Technology Corporation.

And we'd like to thank Shirley for lending her observations to this ad. Even still, she wanted to have the last word: "You couldn't pay me to use this or any other software. I don't believe in handing out endorsements lightly. But when I find a product that exceeds my expectations in every single respect, I would gladly pay twice the asking price. *Legend* is a bargain!"

Thanks, Shirley. We couldn't have said it better ourselves.

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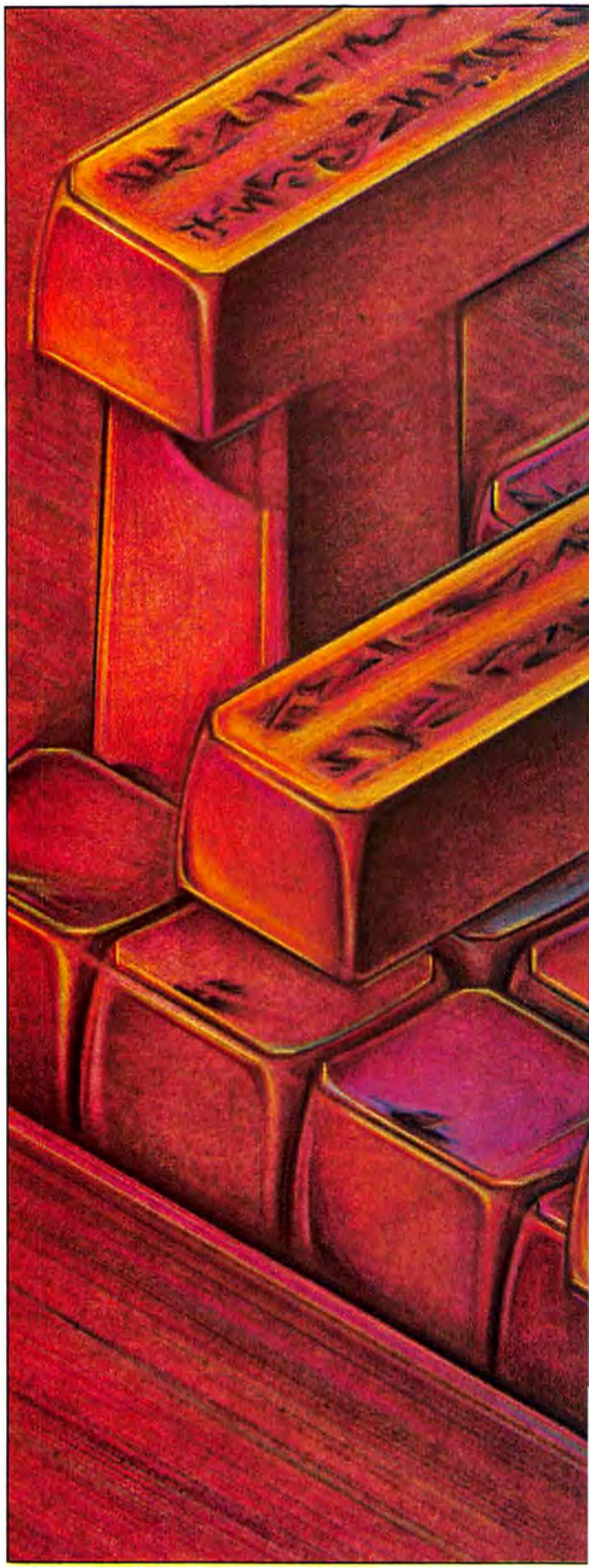
Macro Mastery



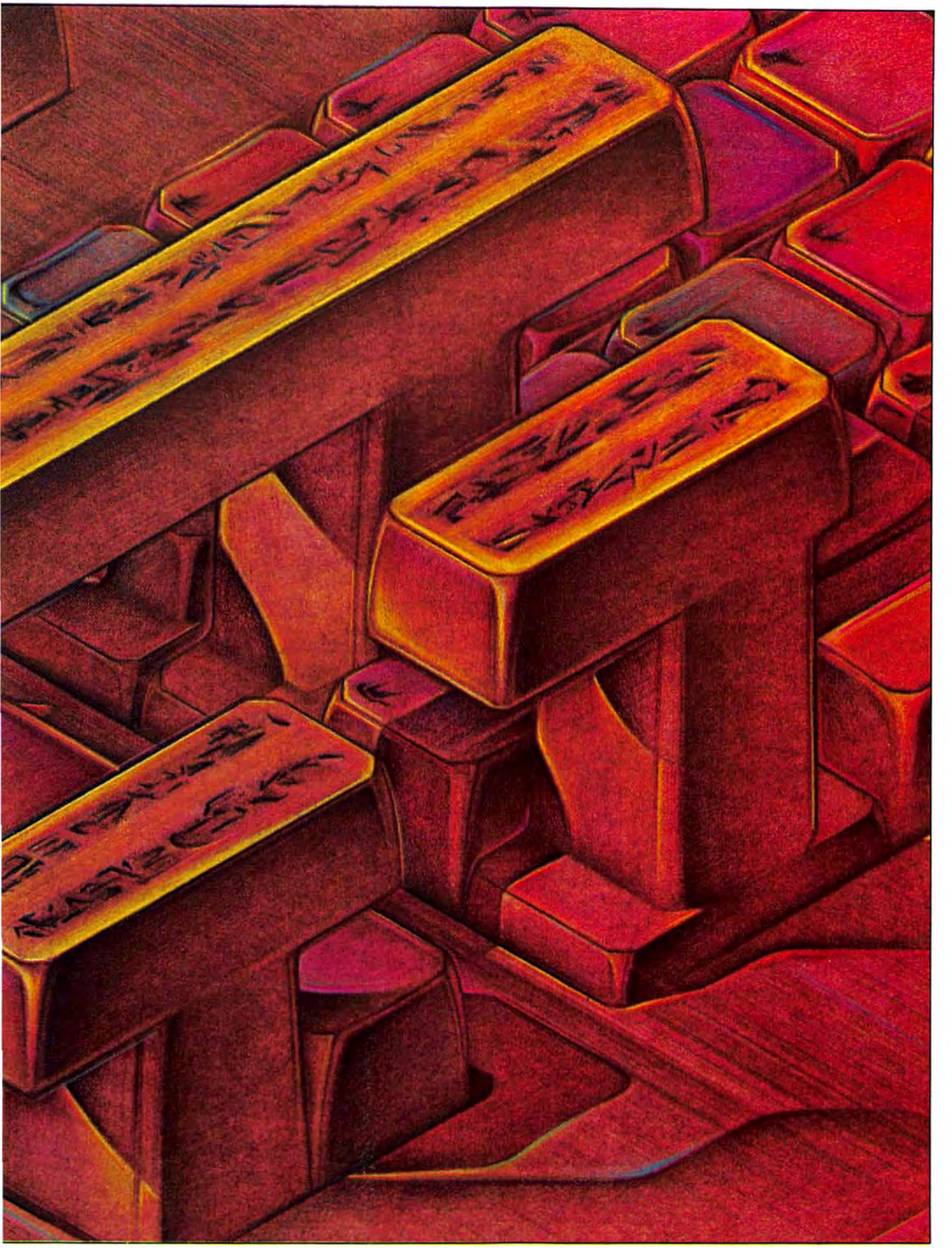
Burton L. Alperson

Macro processors are normally simple keyboard customizers. RoseSoft's ProKey *does much more. With its transparency, flexibility, and reflexive ability to call up nested commands, it is a powerful tool for integrating programs and navigating DOS 2.00.*

Imagine that you have a task that you perform frequently on a computer. Each time you perform it you have to enter a sequence of 20 commands. Each command might require several keystrokes, and there may be minor variations each time you run the sequence. It would be helpful to have the ability to assign the whole sequence to a single key so that all you have to do is strike the key to initiate it. It would be even more helpful if you could make the sequence pause to wait for you to enter any variations.

Imagine that you have purchased an expensive applications program only to find that its syntax is clumsy or inconsistent with all the other programs you use. It might be a word processing program that forces you to delete the character to the left with <Del> and the character at the current cursor location with <Ctrl>-G, or a financial program that requires you to enter the same information repeatedly to enter a single series of checks. It would be helpful to be able to reassign the keys so that the program is consistent with the rest of your programs, or to be able to enter information once and reenter it with a single keystroke whenever necessary.

Imagine that you want to develop a turnkey system so that a person who has minimal computer experience can perform a task that requires the integration of several programs from various authors. It would be helpful to be able to load and run the sequence of programs automatically. It would be even more helpful if you could replace the syntax of the program with menus phrased in the language of the application rather than the computerese of the individual programs.



Hands On

Imagine that you could accomplish all of the above without knowing anything about BASIC, Pascal, C, assembly, or any other programming language.

The operations described above are not items in a wish list for a future super program. They are all straightforward applications of a class of existing programs called macro processors. Macros are simply abbreviations for longer strings of characters or commands.

In the first issue of this magazine I described a program called *Keynote* (see "The PC in a New Key," *PCW*, Vol. 1, No. 1) that could accomplish many of the above tasks. I have since started using an even more powerful alternative, *ProKey*. More than just a keyboard customizer, this program can accomplish every task just described and more. It is easy to use, carefully written, and well documented. After using it heavily for eight months, I am hard pressed to come up with a single serious criticism.

With *ProKey*, assigning a character string to a key is a simple operation. If you want to assign CHKDSK to the <F1> key, you type

<Alt>-= <F1> CHKDSK <Alt>-<hyphen>

<Alt>-= informs *ProKey* that you are beginning a definition; <Alt>-<hyphen> (the <Alt> key pressed in conjunction with the hyphen key) informs *ProKey* that you have finished the definition. The first keystroke after <Alt>-= is the key to which you are assigning the string. Anything you type at this point until you type <Alt>-<hyphen> becomes the string that will be produced by the key you have defined. Up to 137 keys or key combinations may be so defined, and up to 1000 keystrokes can be stored in each key assignment.

A set of key assignments may be saved in a file and reused at any time. *ProKey* is unique in that key assignments can be stored as standard ASCII files. This means that you can easily alter a set of definitions by editing the file with any text editor.

> DOS 2.00 is fertile ground for *ProKey* applications.

The *ProKey* command syntax consists of

PROKEY *FILESPEC*/COMMAND

where COMMAND represents any of six operations. The commands are R (read in a file of definitions), M (merge a file of definitions into the current set), W (save the current definitions in a file), C (clear the current set of definitions from memory), I (install *ProKey* without using definitions in a file), and Q (quit *ProKey*).

If you make a mistake while defining a macro, you can correct it with the <Backspace> key. If you wish to abort the definition or the operation of a macro, press <Ctrl>-<Esc>.

One of the most powerful aspects of *ProKey* and a feature that sets it apart from other macro processors is

MAIN MENU

UTILITIES:		OPERATIONS:	
CHANGE DIRECTORY	F1	MENUS & KEY ASSIGNMENTS:	
PROFESSIONAL EDITOR	Alt-F1	APPLICATIONS MENU	F2
EDLIN	Ctl-F1	MAIN MENU	F8
DIRECTORY	Sft-F1	CLEAR PROKEY	Alt-F8
COPY	F3	CUSTOMIZED BASICA	F7
CHKDSK	Alt-F3		
MOVE FILE TO NEW DIRECT	Ctl-F3	COMPILE A .BAS PROGRAM	Alt-F7
BACK UP HARD DISK	Sft-F3		
		PRINTING: FORM FEED	F4
BURT'S PHONE	F5	PRINTING: QUE A FILE	Sft-F8
BUSINESS PHONE	Alt-F5		
ERMA'S PHONE	Sft-F5	DRIVE IDENTIFIERS:	
		A: F9 B: F10	
PRINTER & DISPLAY SELECTION:		C: Alt-F9 D: Alt-F10	
DISPLAY: MONOCHROME	F6		
DISPLAY: COLOR 80	Alt-F6	EPSON PRINTER OPTIONS:	
DISPLAY: COLOR 40	Ctl-F6	ELITE TYPE	Alt-F4
		CONDENSED TYPE	Ctl-F4
PRINTER: NEC/EPSON SWITCH	Alt-F2	PICA TYPE	Sft-F4

Figure 1: Main Menu (STD.DOC)

its ability to pause during macro execution and wait for keyboard input. Two kinds of input are allowed: fixed and variable fields. Fixed field input means that as soon as a predefined number of characters is received from the keyboard, macro execution will continue. Variable field input means that any number of characters may be entered, and macro execution continues as soon as you press <Enter>. Fixed field input is defined when you delimit the desired number of characters with <Ctrl>-]. Variable field input is defined by using <Ctrl>-<hyphen> as a delimiter.

Another unique and powerful feature of *ProKey* is its capacity for nesting definitions and calling them up as a reflexive operation. You can define a *ProKey* assignment, either from the keyboard or from a file, and instruct *ProKey* to call for that assignment later in the string or from another key assignment. Thus, you might enter information from the keyboard that *ProKey* assigns to the <Backtab> key. If you refer to the <Backtab> key later in a *ProKey* macro, the program will treat <Backtab> as an address and will retrieve the information that has been assigned to <Backtab>.

A Front End for DOS 2.00

DOS 2.00 is fertile ground for *ProKey* applications. Because the operating system is so rich and the syntax so lengthy and convoluted, a menu-driven front end is helpful. Figure 1 shows such a menu. The screen display is simply an ASCII file, STD.DOC, called by the AUTOEXEC.BAT file or the <F8> key. The menu is also displayed by batch files at the conclusion of most operations. (See "One from Column A, One from Column B," *PCW*, Vol. 1, No. 5, to create a menu using an extended graphics set.)

To make the front end easier to use, the menu is divided into activities that seem similar. These personal categories include various utilities, printer and display selection, operations, drive identifiers, and control of some Epson printer options.

The display in Figure 1 is one of two menus in the front end. The second, Applications Menu, is called by the <F2> key (Figure 2). Like the Main Menu, the Applications Menu is divided into logical groupings: word processing, communications, spreadsheet/data base, graphics, money, and food. (The last category contains two mutually exclusive programs that allow me to plan meals and diets.) This menu is another ASCII file called PGMS.DOC.

The *ProKey* implementation of this front end is contained in a file called STD.PRO (Listing 1). Note that the line numbers in the listings are not part of STD.PRO; they are included only for reference purposes.

The <F1> key assignment for changing directories quickly is implemented in lines 73-75 of Listing 1. The syntax begins with <alt=>, the initial delimiter for any *ProKey* assignment. This delimiter is followed by the name of the key to be assigned, <f1> in this case. The key name is then followed by a string, and the sequence is concluded with <alt->, the *ProKey* final delimiter.

The command itself is the DOS command to change directories (CD). *ProKey*'s ability to pause and wait for

```
                        APPLICATIONS MENU

WORD PROCESSING:                          GRAPHICS:
     Alt-A: WORDSTAR with Epson Printer        Alt-M: 1-2-3 GRAPH
     Alt-B: WORDSTAR with NEC Printer          Alt-N: PC CRAYON
     Alt-C: PROOFREADER
     Alt-D: GRAMMATIK                     MONEY:
     Alt-E: Convert Document to ASCII          Alt-O: FINANCIER PERSONAL
     Alt-F: Add to Address File                Alt-P: FINANCIER TAX
     Alt-G: Enter Document from B:
     Alt-H: Enter Document from User Area FOOD:
                                               Alt-Q: COMPUTER CHEF
COMMUNICATIONS:                                Alt-R: DIET MONITOR
     Alt-I: Smartcom II
     Alt-J: PC-TALK III

SPREADSHEET/DATABASE:
     Alt-K: 1-2-3
     Alt-L: DATA BASE MANAGER II

                   PRESS F8 TO RETURN TO MAIN MENU
```

Figure 2: Applications Menu (PGMS.DOC)

keyboard input during macro execution makes it possible to have the function wait for the name of the new directory. This is the purpose of <vfld>...<vfld>, the variable field delimiters. Since directories can have names that differ in length, variable field input was chosen rather than fixed field input. After the name is entered, the function supplies a carriage return (<enter>) and instructs DOS to search for files in the root directory if they are not found in the new directory (PATH \<enter>).

The following are sample *ProKey* definitions I have assigned for my system (see Listing 1). Some may be applicable to your system and habits, especially if you have a hard disk running under DOS 2.00. Some assignments are straightforward and don't require explanations: the assignments to <F2> (lines 77-79) display the Applications Menu; <F8> (lines 96-98) displays the Main Menu, and <Alt>-<F8> (lines 160-161) clears current *ProKey* definitions.

The assignments to <F7> (lines 93-94) and <Alt>-<F7> (lines 151-158) both call batch files. <F7> invokes BASICA with my choice of key assignments rather than IBM's (see "The PC in a New Key," *PCW*, Vol. 1, No. 1, page 158). <Alt>-<F7> calls the file GO.BAT that resides in my Compiler subdirectory and calls up the IBM BASIC Compiler in the configuration that I prefer.

Line 135 allows you to engage the IBM *Professional Editor* by pressing <Alt>-<F1>. PROFEDIT is a batch file consisting of:

```
PROKEY/C
EDIT %1
PROKEY STD.PRO/R
CLS
TYPE \STD.DOC
```

The first line of this file clears all previous *ProKey* assignments. The second brings in the *Professional Editor* with any input file that may have been specified. When activity with this program is completed, the remaining lines restore the standard *ProKey* assignments, clear the screen, and display the Main Menu, which is stored in the root directory.

The other text editor in the system, EDLIN, is engaged in a similar fashion. The only difference is that the second line is `EDLIN %1` . This assignment is made to <Ctrl>-<F1>, which calls a batch file named FILENAME (line 118).

The fast directory command, <Shift>-<F1>, saves several keystrokes. With a hard disk, most directories rapidly accumulate enough files to require more than a single screen display, making the '/P' parameter (which freezes the screen once it is full) a necessity. The *ProKey* assignment in line 104 supplies the parameter as well as the '\' subdirectory prefix. The function then waits for any additional specifications to be added.

The assignments to <F3> (COPY) and <Alt>-<F3> (CHKDSK) in lines 81 and 140 enter these DOS commands rapidly. I've recently made a slight but important change to the hard disk backup command assigned to <Shift>-<F3> in line 107. It originally contained an <enter> statement before <alt-> to invoke the backup command immediately. After hitting <Shift>-<F3> accidentally several times, I decided that it would be safer to require a separate <Enter> keystroke to protect any floppy disk I might have left in drive A. Because the *ProKey* assignments are stored in an ASCII file, it was possible to delete the <enter> statement instead of retyping the entire string.

I frequently move files between subdirectories. After downloading a file while in my communications subdirectory, for example, I may want to edit it in the word processing subdirectory. The assignment to <Ctrl>-<F3> in lines 120-127 quickly accomplishes this transfer. It also illustrates *ProKey*'s reflexive capability.

The <Ctrl>-<F3> routine asks for the name and path of the file to be moved. It then assigns the name and path to <Ctrl>-<PgUp>. (This assignment is transparent in operation. <Ctrl>-<PgUp> simply serves as an address for *ProKey* that contains the name of the file to be moved. The assignment of the destination subdirectory to <Ctrl>-<PgDn> serves a similar purpose.) The periods at the beginning of several of the lines take advantage of an undocumented DOS feature. Periods can be used in place of REM (remark) statements to print a message to the screen during the operation of a batch file. This method allows you to single-space between successive remarks.

In actual operation, <Ctrl>-<F3> clears the screen and prints 'Path and file name for source file:' (lines 120-121). The cursor freezes and waits for input from the keyboard. As soon as this input is received, 'Destination directory: \' is printed on the screen, and the routine waits for additional input (line 122). As soon as the destination directory is entered, the routine copies the file to the destination directory and erases it from the source directory (lines 123-124). The final step is verification that the operation has taken place (lines 125-126).

The <F5> key serves as a fast access key for PHONE.BAS, a program that uses a modem to dial and redial the telephone (see "Smartmodem Gets Smarter," *PCW*, Vol. 1, No. 7). The assignments to <F5>, <Alt>-<F5>, and <Shift>-<F5> are made in lines 87-88, 145-146, and 112-113 respectively. Each of these keys calls up a batch file similar to the following:

```
 1<alt=><alta>BASICA ELITE<enter>
 2 WS-EPSON<enter>
 3 <alt->
 4
 5 <alt=><altb>WS-NEC<enter>
 6 <alt->
 7
 8 <alt=><altc>CD \WP<enter>
 9 PATH \<enter>
10 PROOF <vfld>...<vfld><enter>
11 <alt->
12
13 <alt=><altd>CD \WP<enter>
14 PATH \<enter>
15 GRAM <vfld>...<vfld><enter>
16 <alt->
17
18 <alt=><alte>ASCON<enter>
19 <alt->
20
21 <alt=><altf>BASICA ADDNAMES<enter>
22 <alt->
23
24 <alt=><altg>CLS<enter>
25 . ***=====>  When the cursor gets fat, type the name of the file to<enter>
26 .            transfer (do not use an extension).<enter>
27 COPY B:<vfld>...<vfld>.* \WP<enter>
28 <alt->
29
30 <alt=><alth>CLS<enter>
31 . ***=====>  When the cursor gets fat, enter your name.<enter>
32 . ***=====>  When the cursor gets fat again, enter the name of the file<enter>
33 .<tab><tab> to be transferred (do not use an extension), <enter>
34 .<tab><tab> then press [ENTER].<enter>
35 COPY \WP\<ffld>....<ffld>\<vfld>...<vfld>.* \WP<enter>
36 <alt->
37
38 <alt=><alti>SCOM<enter>
39 <alt->
40
41 <alt=><altj>PC-TALK<enter>
42 <alt->
43
44 <alt=><altk>123<enter>
45 <alt->
46
47 <alt=><altl>DBMII<enter>
48 <alt->
49
50 <alt=><altm>123GRAPH<enter>
51 <alt->
52
53 <alt=><altn>CD \GRAPH<enter>
54 PATH \<enter>
55 CRAYON<enter>
56 <alt->
57
```

(continues)

Listing 1: STD.PRO

```
 58 <alt=><altq>CD \FOOD<enter>
 59 CCHEF<enter>
 60 <alt->
 61
 62 <alt=><altr>CD \FOOD<enter>
 63 DIET<enter>
 64 <alt->
 65
 66 <alt=><home>CLS<enter>
 67 <alt->
 68
 69 <alt=><^pgup><alt->
 70
 71 <alt=><^pgdn>\<alt->
 72
 73 <alt=><f1>CD \<vfld>...<vfld><enter>
 74 PATH \<enter>
 75 <alt->
 76
 77 <alt=><f2>CLS<enter>
 78 TYPE \PGMS.DOC<enter>
 79 <alt->
 80
 81 <alt=><f3>COPY <alt->
 82
 83 <alt=><f4>BASICA FORMFEED<enter>
 84 TYPE \STD.DOC<enter>
 85 <alt->
 86
 87 <alt=><f5>PERS-TEL<enter>
 88 <alt->
 89
 90 <alt=><f6>MODE MONO<enter>
 91 <alt->
 92
 93 <alt=><f7>BAS<enter>
 94 <alt->
 95
 96 <alt=><f8>CLS<enter>
 97 TYPE \STD.DOC<enter>
 98 <alt->
 99
100 <alt=><f9>A:<alt->
101
102 <alt=><f10>B:<alt->
103
104 <alt=><capsf1>DIR /P \<vfld>...<vfld><enter>
105 <alt->
106
107 <alt=><capsf3>BACKUP C:\ A:/S/A/M<alt->
108
109 <alt=><capsf4>BASICA \PICA<enter>
110 <alt->
111
112 <alt=><capsf5>ERMA-TEL<enter>
```

Listing 1 *(continued)*

```
113 <alt->
114
115 <alt=><capsf8>PRINT <vfld>...<vfld><enter>
116 <alt->
117
118 <alt=><ctrlf1>FILENAME <alt->
119
120 <alt=><ctrlf3>cls<enter>
121 .Path and file name for source file: <alt=><^pgup><alt-><enter>
122 .Destination directory: <alt=><^pgdn>\<alt-><enter>
123 COPY <^pgup> <^pgdn><enter>
124 DEL <^pgup><enter>
125 cls<enter>
126 .       <^pgup> has been moved to <^pgdn>.<enter>
127 <alt->
128
129 <alt=><ctrlf4>BASICA \CONDENSE<enter>
130 <alt->
131
132 <alt=><ctrlf6>MODE CO40<enter>
133 <alt->
134
135 <alt=><altf1>PROFEDIT <alt->
136
137 <alt=><altf2>BASICA LPTSWTCH<enter>
138 <alt->
139
140 <alt=><altf3>CHKDSK <alt->
141
142 <alt=><altf4>BASICA \ELITE<enter>
143 <alt->
144
145 <alt=><altf5>BUSN-TEL<enter>
146 <alt->
147
148 <alt=><altf6>MODE CO80<enter>
149 <alt->
150
151 <alt=><altf7>CD \COMPILER<enter>
152 PATH \<enter>
153 CLS<enter>
154 .     Type filename (without extension) if no compiler switches are<enter>
155 .     required.  If switches are needed, press [ENTER] and include<enter>
156 .     them in response to the appropriate compiler prompts.<enter>
157 GO <vfld>...<vfld><enter>
158 <alt->
159
160 <alt=><altf8>PROKEY/C<enter>
161 <alt->
162
163 <alt=><altf9>C:<alt->
164
165 <alt=><altf10>D:<alt->
166
```

Hands On

```
PROKEY/C
FLIP NUM ON
BASICA PHONE-B
PROKEY STD.PRO/R
FLIP NUM OFF
CLS
TYPE \STD.DOC
```

The commands in this file clear all *ProKey* assignments, invoke Tom Foth's *Flip Lock* assembly language program to make the numeric keypad indicate number values rather than cursor movements (see *Star-Dot-Star, PCW,* Vol. 1, No. 4), and then run one of the telephone programs. When you exit from the telephone program, the remaining commands restore the *ProKey* assignments, turn the number keys off, clear the screen, and display the Main Menu.

Output Assignments

Since I have two monitors and two printers in my system, I often need to choose among output devices. The assignments to <F6> (line 90), <Alt>-<F6> (line 148), and <Ctrl>-<F6> (line 132) select monochrome, 80-column color, or 40-column color display respectively.

Selecting a printer is a bit more difficult. Since both printers are configured for parallel output and DOS does not provide a way to switch between LPT1: and LPT2:, I use a BASIC program called *LPTSWTCH,* written by Bob Rice of Micro Personal Consulting, to select a printer. This program, invoked by the *ProKey* assignment to <Alt>-<F2> shown in lines 137-138, consists of:

```
10  DEF SEG = &H40
20  A = PEEK(&H8):B = PEEK(&H9)
30  C = PEEK(&HA):D = PEEK(&HB)
40  POKE &H8,C:POKE &H9,D
50  POKE &HA,A:POKE &HB,B
60  LPT$ = "NEC":IF A = &H78 THEN LPT$ = "EPSON"
70  PRINT "The " + LPT$ + " is now the active printer."
80  SYSTEM
```

The assignments to <F4> (lines 83-85), <Alt>-<F4> (lines 142-143), <Ctrl>-<F4> (lines 129-130), and <Shift>-<F4> (lines 109-110) all invoke short BASIC programs related to printer operations. <F4> invokes a one-line program called FORMFEED:

```
10  LPRINT CHR$(12):SYSTEM
```

This program produces a form feed on both the NEC/SELLUM and the Epson FX-80 printers. The *ProKey* assignment here concludes with a display of the Main Menu.

The assignments to <Alt>-<F4>, <Ctrl>-<F4>, and <Shift>-<F4> control the type style of the Epson FX-80. <Alt>-<F4> causes the Epson to produce elite type by calling the program ELITE.BAS (see Listing 2). Condensed type is produced by the CONDENSE.BAS program invoked by <Ctrl>-<F4> (see Listing 3). Pica type is produced by the PICA.BAS program called by <Shift>-<F4> (see Listing 4). With the exception of ELITE.BAS, these programs should also work for the Epson MX-80, MX-100, and the IBM dot matrix printers.

The remaining assignments in the Main Menu simply save typing effort. <Shift>-<F8> (lines 115-116 in Listing 1) invokes the DOS print queue program. <F9> (line 100), <F10> (line 102), <Alt>-<F9> (line 163), and <Alt>-<F10> (line 165) type the drive identifiers for two floppy disks (A and B) and two hard disks (C and D).

WordStar Simplified

All other assignments in the STD.PRO file (lines 1-67) deal with applications programs. Many of the word processing macros shown in Figure 2 are designed to compensate for *WordStar*'s deficiencies. It is necessary, for example, to keep two versions of *WordStar* on line, each configured to support a different printer, because there is no way to select a printer from within the program. Thus, <Alt>-A (lines 1-3 in Listing 1), after calling a BASIC program to force the Epson printer into elite mode, calls the batch file WS-EPSON.BAT. This batch program then calls a copy of WS.COM (the main *WordStar* program) that has been installed for an IBM Parallel Printer and renamed WS-EPSON.COM. The complete batch program consists of:

```
PROKEY WS.PRO/R
CD \WP
WS-EPSON
CD \
PROKEY STD.PRO/R
CLS
TYPE STD.DOC
```

The first command replaces the *ProKey* standard set with a special set of assignments designed to tame *WordStar*'s syntax (see "The PC in a New Key," *PCW,* Vol. 1, No. 1). Since *WordStar* lacks the capacity to use DOS 2.00 tree-structured directories, the next command moves all operations to a word processing subdirectory (WP) that contains the *WordStar* command files, overlays, and text files. Calling WS-EPSON engages the properly configured command file for word processing operations. At the conclusion of the *WordStar* session, the batch file moves all operations back to the root directory, restores the *ProKey* assignments, clears the screen, and displays the Main Menu. Thanks to *ProKey,* all this is accomplished with a single keystroke.

```
10 ON ERROR GOTO 20:LPRINT CHR$(27);"@";CHR$(27);"M";:SYSTEM
20 KEY OFF:COLOR 15,7:LOCATE 12,10:BEEP
30 PRINT "TURN THE PRINTER ON, DUMMY! Press <Enter> when ready.";
40 BEEP:LINE INPUT D$
50 COLOR 7,0:CLS:RESUME
```

Listing 2: ELITE.BAS

```
10 ON ERROR GOTO 20:LPRINT CHR$(27);"@";CHR$(27);CHR$(15);:SYSTEM
20 KEY OFF:COLOR 15,7:LOCATE 12,10:BEEP
30 PRINT "TURN THE PRINTER ON, DUMMY! Press <Enter> when ready.";
40 BEEP:LINE INPUT D$
50 COLOR 7,0:CLS:RESUME
```

Listing 3: CONDENSE.BAS

```
10 ON ERROR GOTO 20:LPRINT CHR$(27);"@";CHR$(27);"P";:SYSTEM
20 KEY OFF:COLOR 15,7:LOCATE 12,10:BEEP
30 PRINT "TURN THE PRINTER ON, DUMMY! Press <Enter> when ready.";
40 BEEP:LINE INPUT D$
50 COLOR 7,0:CLS:RESUME
```

Listing 4: PICA.BAS

```
10 INPUT "INPUT FILE NAME->";I$
20 INPUT "OUTPUT FILE NAME->";O$
30 OPEN "I",1,I$
40 OPEN "O",2,O$
50 A$=INPUT$(1,1):IF ASC(A$)>127 THEN A$=CHR$(ASC(A$)-128)
60 PRINT #2,A$;
70 IF EOF(1)=O THEN 50
80 CLOSE
90 PRINT "DONE...":BEEP
```

Listing 5: ASCON

```
1000 KEY OFF
1010 OPEN "ADDR.DAT" FOR APPEND AS 1
1020 CLS:PRINT "ENTER '***' TO EXIT PROGRAM AFTER LAST ENTRY."
1030 FOR I=1 TO 5
1040 LOCATE 4+I,1
1050 PRINT "ADDRESS LINE";I;"- ";
1060 LINE INPUT A$(I):IF LEFT$(A$(I),3)="***" THEN 1110
1070 NEXT
1080 LINE INPUT "SALUTATION (Include , or :) - ";A$(6)
1090 WRITE #1,A$(1),A$(2),A$(3),A$(4),A$(5),A$(6)
1100 GOTO 1020
1110 CLOSE
1120 CLS:SYSTEM
```

Listing 6: ADDNAMES.BAS

<Alt>-B (lines 5-6) calls the batch file WS-NEC.BAT. The only difference between this program and WS-EPSON.BAT is that it calls for a different copy of WS.COM that has been installed for an NEC 5510/5520 Spinwriter and renamed WS-NEC.COM.

The assignments to <Alt>-C and <Alt>-D (lines 8-11 and 13-16) go to the word processing subdirectory and engage a spelling checker, *Proofreader*, and a grammar checker, *Grammatik*. Like *WordStar*, these programs cannot make use of tree-structured directories, so all spelling and grammar operations take place in the word processing subdirectory.

The assignment to <Alt>-E (lines 18-19 in Listing 1) resolves another *WordStar* problem. Although the documentation gives the impression that *WordStar* can produce a readable ASCII output file, that is simply not the case. Any attempt to print a *WordStar* document to a file (unless the document was created in nondocument mode) produces character salad. The ASCON program invoked by <Alt>-E makes *WordStar* files readable (see Listing 5).

<Alt>-F (lines 21-22 in Listing 1) invokes a convenient BASIC program for adding names to the *MailMerge* data file ADDR.DAT. This program is called ADDNAMES.BAS (see Listing 6).

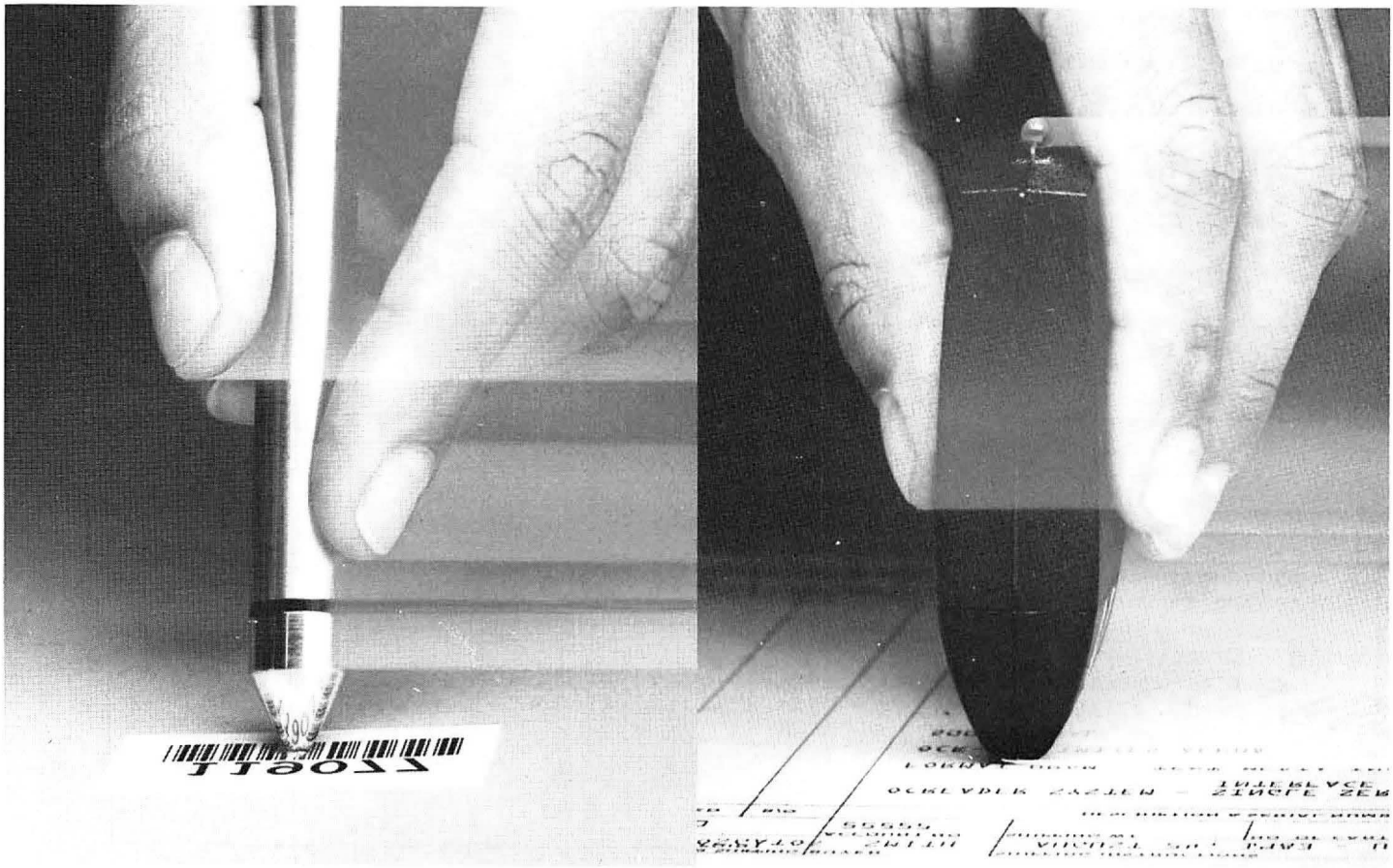
Although my system has hard disks, I use floppies to archive text files. Thus, I frequently want to load a set of files into the word processing subdirectory to modify them. <Alt>-G (lines 24-28 in Listing 1) invokes a simple utility to perform this transfer. The statement in line 25, "When the cursor gets fat...," refers to a helpful *ProKey* feature. Whenever the program is waiting for keyboard input, the cursor automatically grows fat to indicate that nothing will happen until there is appropriate keyboard activity.

The final word processing utility, assigned to <Alt>-H (lines 30-36), brings files from personal user subdirectories into the word processing subdirectory. This routine exists to compensate, again, for *WordStar*'s inability to deal with tree-structured directories.

The routine illustrates another of *ProKey*'s features, the ability to wait for fixed field input from the keyboard. Since both users of my system have names that are four characters long, the *ProKey* macro was set up to continue immediately after receiving the fourth character of the user's name. This fixed field operation is generated by the <ffld> (fixed field) commands in line 35.

When a *ProKey* macro is entered dynamically from the keyboard, <Ctrl>-] produces <ffld> in the string. Line 35 was generated by typing

```
COPY \WP\ <Ctrl>-] Space Space Space Space <Ctrl>-] \
  <Ctrl>-<hyphen> <Ctrl>-<hyphen>.* \WP <Enter>
```



The use of <Ctrl>-] and <Ctrl>-<hyphen> generated the fixed and variable field delimiters in the string.

This use of fixed fields is a relatively trivial application of a powerful function. Other applications include the ability to have one-key responses to menu items (similar to the INKEY$ function in BASIC), multiple-key responses to menu items without the need for a carriage return, and routines that transfer files from electronic to physical disk while in a word processing program.

The assignments in lines 38-64 for <Alt>-I through <Alt>-R call batch files for various applications programs that I use frequently. The assignments to <Alt>-O and <Alt>-T for the personal finance programs have not yet been implemented because their copy-protection schemes prevent using them with a hard disk. They will be updated if and when the programs are revised. The final assignment (lines 66-67) allows me to clear the screen in DOS by striking the <Home> key.

Looking at the Main Menu and the Applications Menu in Figures 1 and 2, it becomes apparent that *ProKey* has integrated close to 50 commands and programs into a single, coherent system. It makes no difference that the software comes from many authors and sources. The *ProKey* front end combined with various batch files simply calls on the programs as needed. There is no need for reference cards and documentation to remember how to engage a program.

The front end described here represents my personal taste. Although bits and pieces of it may be helpful to others, few will want to adopt the complete front end without modification. The beauty of a program like *ProKey* is that you don't have to adopt my system as a whole. You can choose any aspect that you like and then embellish it with your own creations. In addition, the program can work from within many applications programs, allowing you to make and reuse macro definitions at will. *ProKey* helps you turn the PC into a very personal computer.

Burton L. Alperson, Ph.D., is a Contributing Editor for PC World *and a professor in the psychology department at California State University at Los Angeles. He developed the department's first computer programming class in 1975.*

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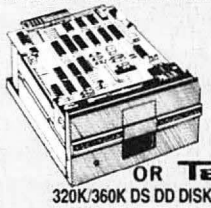

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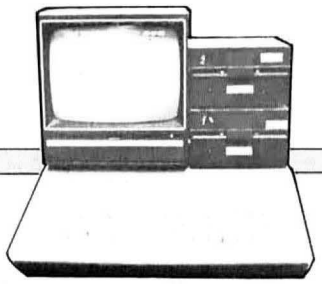

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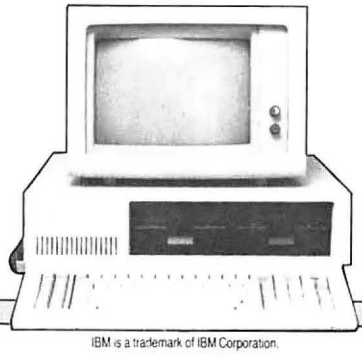

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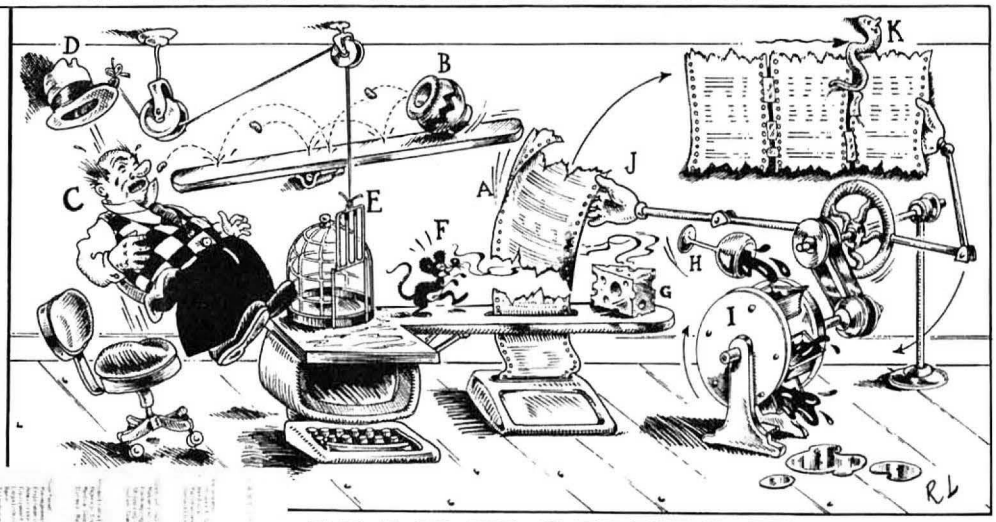

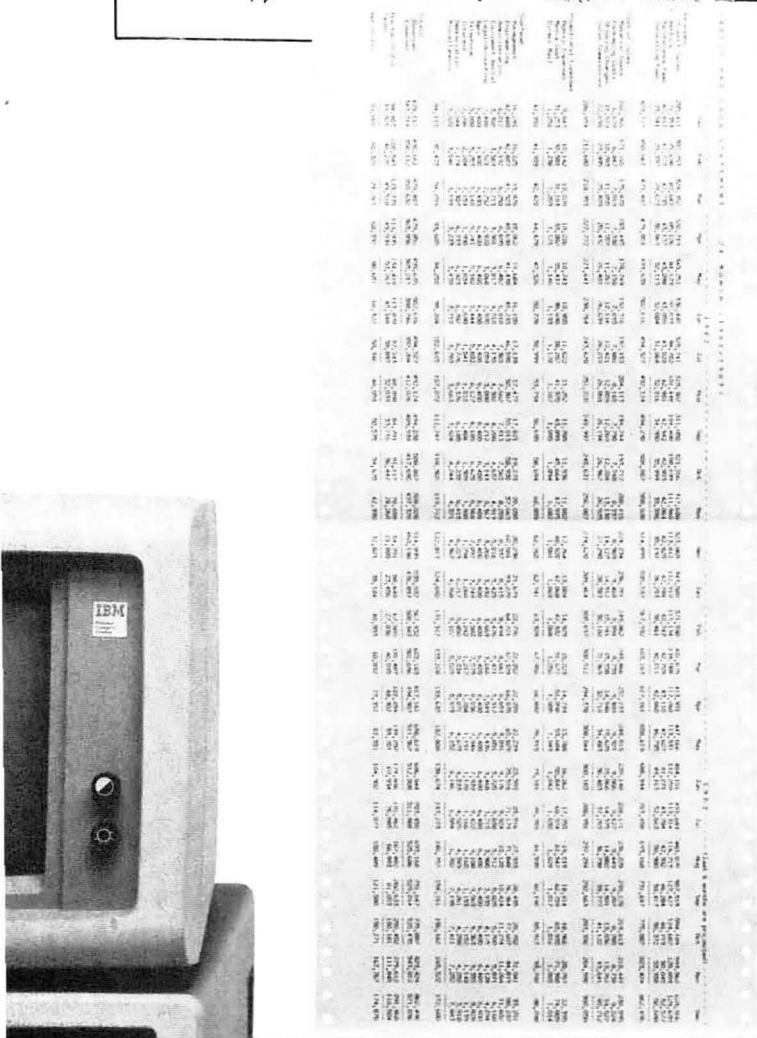

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PCW

Build a PC Power Control

A do-it-yourself project for making a device that turns your PC on at a preset time or in response to the telephone.

Jack Powers

The finished PCPC

If you are serious about using your IBM PC for electronic communication, you may wish you had an automatic way to turn it on and off as required, rather than having to leave it on continuously. The PC Power Control (PCPC) described here, used along with your stand-alone modem and the Tecmar Time Master card, will automatically turn on your PC when calls come in and/or at a preset time and date, very much like the timer on a video recorder. Before the PC turns off, your program can set up the date and time at which it will next turn on.

Using this gear and some simple programs, your PC can turn off until, say, 11 p.m. in order to wait for the lowest telephone rates for outgoing messages. Meanwhile, it will still be available to answer the phone, without heating up your office or running up your power bill, and without human assistance.

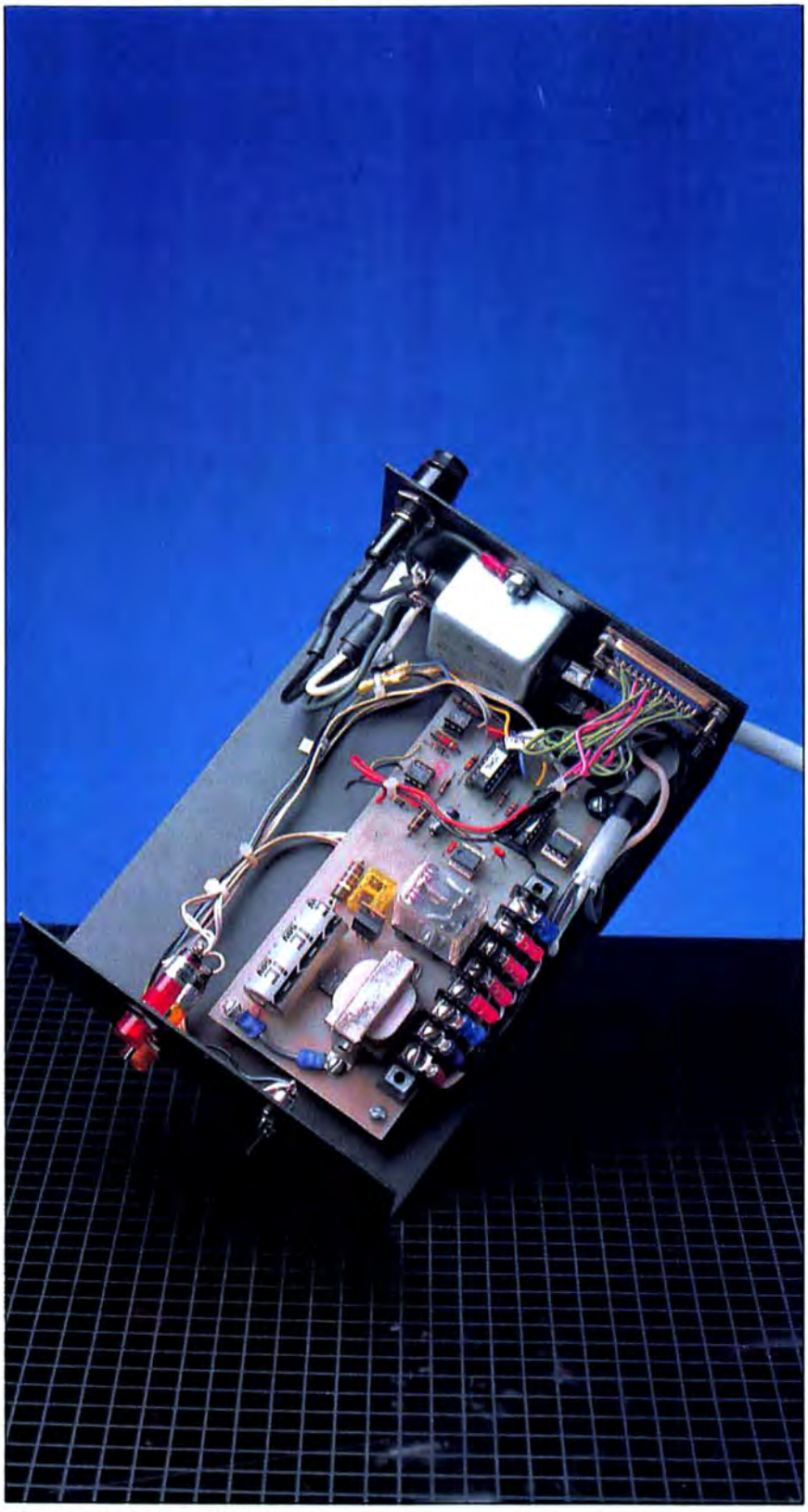
In addition to turning your system on and off as required, the PCPC has a filter for radio frequency interference (RFI) and a varistor to help protect your system from electrical noise and surges from the power line. The logic includes a timer to provide a minimum "off time" of about 5 seconds so that your system may be completely reset when it turns on again.

This article describes the hardware you can build to enable your system to use the Time Master (or another compatible clock card) and available modem signals to turn the PC on and off as required for electronic communication. The prototype was built using Radio Shack parts. Table 1 lists the Radio Shack parts numbers in an effort to minimize time and frustration in finding parts—often the most demanding chore in an electronic project.

Before going any further, I want to emphasize that a device such as the PCPC necessarily deals with hazardous and potentially lethal voltages. If you are not thoroughly familiar with these hazards and the precautions to manage them, you should enlist the help of someone who is when the time comes to plug the PCPC in and test it. The life you save may be your own!

How It Works

The PCPC takes low-level signals from two sources, amplifies them, and uses them to control a heavy-duty relay. The relay switches the power to an outlet strip into which the PC and its accessories are plugged. The power capacity of the PCPC is 500 watts, which should cover most large PC systems and accessories.



The interior of the PCPC

The "alarm clock" input to the PCPC comes from a National Semiconductor MM58167A clock chip specially designed for microprocessor applications. The Tecmar Time Master card, which occupies a slot inside the PC or an expansion enclosure, uses this chip for its timing functions. The chip offers the following features:

- Built-in oscillator circuit for use with an external crystal
- Counters with a resolution of $^1/_{10,000}$ second through one month
- 56 bits of memory with logic to compare the real-time counter with the stored date and time
- Low-power mode, which allows extended operation from a battery when the system is powered off
- Two interrupt outputs, one of which (called -Standby Interrupt) is available when the chip is operating in low-power mode from a battery.

The MM58167A -Standby Interrupt signal (the minus sign means that it is active at the low-voltage level) is available at the rear of the Time Master chassis, where a short coaxial cable connects it to the PCPC. At least one other product for the PC, Sigma Designs' System Support Card and Memory, uses the same chip, making the -Standby Interrupt signal available for controlling external devices. However, the sample program (see Listing 1) will probably need modification to work with products other than the Tecmar Time Master.

To permit response to incoming calls, the RS-232C modem interface is passed through the PCPC, where two of the control signals are "tapped." The PCPC looks like a very short extension to the signal cord between the PC and the modem; it should not interfere with the operation of either in any way. The Ring Indicate signal sets a latch, which drives the power relay; the latch is reset by another signal called Data Terminal Ready (DTR), which is activated by execution of the

BASIC OPEN COMn statement or its equivalent in another language. Before the program raises the DTR signal, it must ensure that the power is kept on by setting the current time in the Time Master compare register.

The RFI filter is a complete subassembly in a metal can with wiring instructions printed on the outside. Additional power-line protection is assured using V1, a metal oxide varistor with a rated response time of 35 nanoseconds. The varistor has a transient current capacity of up to 20 amperes, depending on operating conditions. When combined, these items should provide a measure of insurance against power-line disturbances disrupting your system.

The timer circuit keeps the power off for about 5 seconds each time it is turned off intentionally or accidentally. This guards against "hanging" your system should the phone ring or the Time Master "go off" just after the system was turned off. It should also guard against such hang-ups in most cases of power failure, during which the power may "bounce" on and off several times before it is solid. A miniature relay, wired to close upon loss of main power, resets this timer simply and reliably when required.

Construction

Building the PCPC is a simple task, especially if the actual-size printed-circuit pattern is used (see Figure 1). Construction consists of the following major steps:

1. Obtain the parts, most of which are available from Radio Shack. An etched and drilled copy of the printed circuit board shown in Figure 1 is available (see Table 1). A metal cabinet is suggested (we used a Radio Shack cabinet, adding cooling vents).

2. Inspect the printed circuit board carefully for shorts, especially in the area of the power relay. Note the dotted line on the etched side: this line connects two points that must be joined by a jumper wire on the component side.

Indentifier	Part	Part #
B1	Bridge Rectifier CSB4, 1A@ 50V	276-1161
C1	1 ufd., 50V	272-996
C2	4.7 ufd., 35V	272-1012
C3	1000 ufd., 50V	272-1047
C4	.01 ufd.	272-131
C5, C6	.1 ufd.	272-135
D1, D2	1N914 Diode	276-1144
F1	Fuse, 5A	270-1287
I1, I2	4N31 Opto Isolator	276-133
IC1, IC2	7400 TTL NAND	276-1801
IC3	555 Timer	276-1723
IC4	7805 Voltage Regulator	276-1770
IC5	75446 Driver	276-2530
J1	RCA Phono Jack	274-1575
J2	DB25P (male) Connector	276-1547
J3	DB25S (female) Connector	276-1548
K1	SPDT Relay, 5V coil	275-217B
K2	DPDT Relay, 125V coil, 10A	275-218
PL1, PL2	Pilot lamp, neon	272-705
R1, R2	5.6K ½W	271-031
R3	3.9K ½W	271-029
R4, R5, R10	1K, ½W	271-023
R6, R8, R9	1M, ½W	271-059
R7	150 ohms, 2W	
S1, S2	Switch, SPDT toggle	275-625
S3	Switch, momentary NO	275-1571
T1	Power Transformer, 120V/12V	273-1385
V1	MOV Transient Suppressor	276-570
	Barrier Strip	274-653
	Cabinet 3 1/16 × 8 1/4 × 6 1/8	270-274
	Cable, -Stby Irpt	42-2366
	Fuse Holder	270-364A
	Outlet Strip	61-2620B
	Relay Socket (Optional)	275-220
	RFI Filter, 5A @ 125V	273-100
	Rubber Grommets	64-3025

Note: An etched and drilled printed circuit board for this project is available for $12.95 (CA residents add sales tax) from TAMAC Electronics, 1028 Fleetwood Dr., San Jose, CA 95120. Allow six weeks for delivery.

Table 1: Parts list

3. Mount the components on the bare side of the board, passing their leads or pins through the appropriate holes using Figure 2 as a guide. Solder each lead or pin to the etched pattern with a low-power (25 watts suggested) soldering iron.

A socket for relay K2 may be used if desired; the part number is given in the parts list. Relay contacts wear with use, and a socket will make replacing K2 much easier than unsoldering it from the board.

4. Punch or drill the cabinet to accept the switches, connectors, and cords. Be sure to use rubber grommets or plastic-cable strain-relief bushings where the power cables pass through the cabinet. If you use a metal cabinet, be sure to connect the ground wire in the power cord (it is usually green) to an unpainted piece of the cabinet metal; it is also a good idea to connect it to the mounting

```
10  REM Sample program to test timer chip operation of PC Power Control
20  REM Adapted from Tecmar Time Master Users Guide Example #2
21  REM Use this program to set the Time Master to turn on your PC
22  REM at some later time or date.
23  REM ------------------------------------------------------------------
30  REM FUNCTION TO CONVERT BCD TO DECIMAL:
40  DEF FNTODEC(X)=(X\16)*10 +X MOD 16
50  REM
60  REM FUNCTION TO CONVERT FROM DECIMAL TO BCD:
70  DEF FNTOBCD(X)=(X\10)*6+X
80  REM
110 CLS: BASE= 768 'base address for timer
120 REM Read time and date from board:
130 OUT BASE,2: X= INP(BASE+1): SEC=   FNTODEC(X)
140 OUT BASE,3: X= INP(BASE+1): MIN=   FNTODEC(X)
150 OUT BASE,4: X= INP(BASE+1): HR=    FNTODEC(X)
160 OUT BASE,5: X= INP(BASE+1): DW=    FNTODEC(X)
170 OUT BASE,6: X= INP(BASE+1): DATE=  FNTODEC(X)
180 OUT BASE,7: X= INP(BASE+1): MONTH= FNTODEC(X)
190 REM
200 REM Print time of day and date:
210 CLS: PRINT"Time of day and Date:"
220 ON DW GOSUB 790, 800, 810, 820, 830, 840, 850
230 ON MONTH GOSUB 880,890,900,910,920,930,940,950,960,970,980,990
240 PRINT DW$;", ";MNTH$," ",DATE;", ";HR;":";MIN;":";SEC
250 REM
260 REM Get the time to set into latches:
270 PRINT: PRINT
280 PRINT "Enter the alarm time in response to prompts below."
290 PRINT "Enter carriage return for 'DONT CARE' on any latch."
300 PRINT: PRINT
310 PRINT TAB(10): INPUT "Day of week: ", LDW$:   LDW= VAL(LDW$)
320 PRINT TAB(10): INPUT "Month:       ", LMNTH$: LMNTH= VAL(LMNTH$)
330 PRINT TAB(10): INPUT "Date:        ", LDATE$: LDATE= VAL(LDATE$)
340 PRINT TAB(10): INPUT "Hour:        ", LHOUR$: LHOUR= VAL(LHOUR$)
350 PRINT TAB(10): INPUT "Minute:      ", LMIN$:  LMIN= VAL(LMIN$)
360 PRINT TAB(10): INPUT "Second:      ", LSEC$:  LSEC= VAL(LSEC$)
370 ON LDW GOSUB 790,800,810,820,830,840,850
380 ON LMNTH GOSUB 880,890,900,910,920,930,940,950,960,970,980,990
390 PRINT
400 PRINT "Interrupt will occur: "
410 PRINT TAB(10);:IF LEN(LDW$)=0 THEN PRINT "any day" ELSE PRINT DW$;
420 PRINT ", ";:IF LEN(LMNTH$)=0 THEN PRINT "any month" ELSE PRINT MNTH$;
430 PRINT ", ";:IF LEN(LDATE$)=0 THEN PRINT "any date" ELSE PRINT LDATE$;
440 PRINT ", ";:IF LEN(LHOUR$)=0 THEN PRINT "any hour" ELSE PRINT LHOUR$;
450 PRINT ", ";:IF LEN(LMIN$)=0 THEN PRINT "any minute" ELSE PRINT LMIN$;
460 PRINT ", ";:IF LEN(LSEC$)=0 THEN PRINT "any second" ELSE PRINT LSEC$
470 REM
480 REM Convert data to BCD equivalents. Determine "don't care" locations:
490 IF LEN(LMNTH$)=0 THEN LMNTH=204 ELSE LMNTH= FNTOBCD(LMNTH)
```

Listing 1: Sample program

```
500 IF LEN(LDW$)  =0 THEN LDW  =204 ELSE LDW  = FNTOBCD(LDW)
510 IF LEN(LDATE$)=0 THEN LDATE=204 ELSE LDATE= FNTOBCD(LDATE)
520 IF LEN(LHOUR$)=0 THEN LHOUR=204 ELSE LHOUR= FNTOBCD(LHOUR)
530 IF LEN(LMIN$) =0 THEN LMIN =204 ELSE LMIN = FNTOBCD(LMIN)
540 IF LEN(LSEC$) =0 THEN LSEC =204 ELSE LSEC = FNTOBCD(LSEC)
550 REM
560 REM Set the times and 'dont cares` in the latches:
570 OUT BASE, 15: OUT BASE+1, LMNTH
580 OUT BASE, 13: OUT BASE+1, LDW
590 OUT BASE, 14: OUT BASE+1, LDATE
600 OUT BASE, 12: OUT BASE+1, LHOUR
610 OUT BASE, 11: OUT BASE+1, LMIN
620 OUT BASE, 10: OUT BASE+1, LSEC
630 REM
632 REM Enable standby interrupt:
634 OUT 768, 22      'Select standby interrupt
636 OUT 769, 1
640 REM Enable interrupt on latch alarm:
650 OUT BASE,17      'Reference interrupt control register
660 OUT BASE+1, 1    'select to interrupt on latch alarm
670 OUT BASE, 16     'reference interrupt status register
680 X= INP(BASE+1)   'read it to clear it
690 REM All done... power may be turned off.
740 PRINT: PRINT "Setup complete."
750 PRINT "You may now turn off the PC using S1 on the PC Power Control."
760 SYSTEM
770 REM convert day of week numbers to day names:
780 REM get day of week and month names
790 DW$= "Sunday": RETURN
800 DW$= "Monday": RETURN
810 DW$= "Tuesday": RETURN
820 DW$= "Wednesday": RETURN
830 DW$= "Thursday": RETURN
840 DW$= "Friday": RETURN
850 DW$= "Saturday": RETURN
860 REM
870 REM Convert month numbers to month names:
880 MNTH$= "January": RETURN
890 MNTH$= "Febuary": RETURN
900 MNTH$= "March": RETURN
910 MNTH$= "April": RETURN
920 MNTH$= "May": RETURN
930 MNTH$= "June": RETURN
940 MNTH$= "July": RETURN
950 MNTH$= "August": RETURN
960 MNTH$= "September": RETURN
970 MNTH$= "October": RETURN
980 MNTH$= "November": RETURN
990 MNTH$= "December": RETURN
```

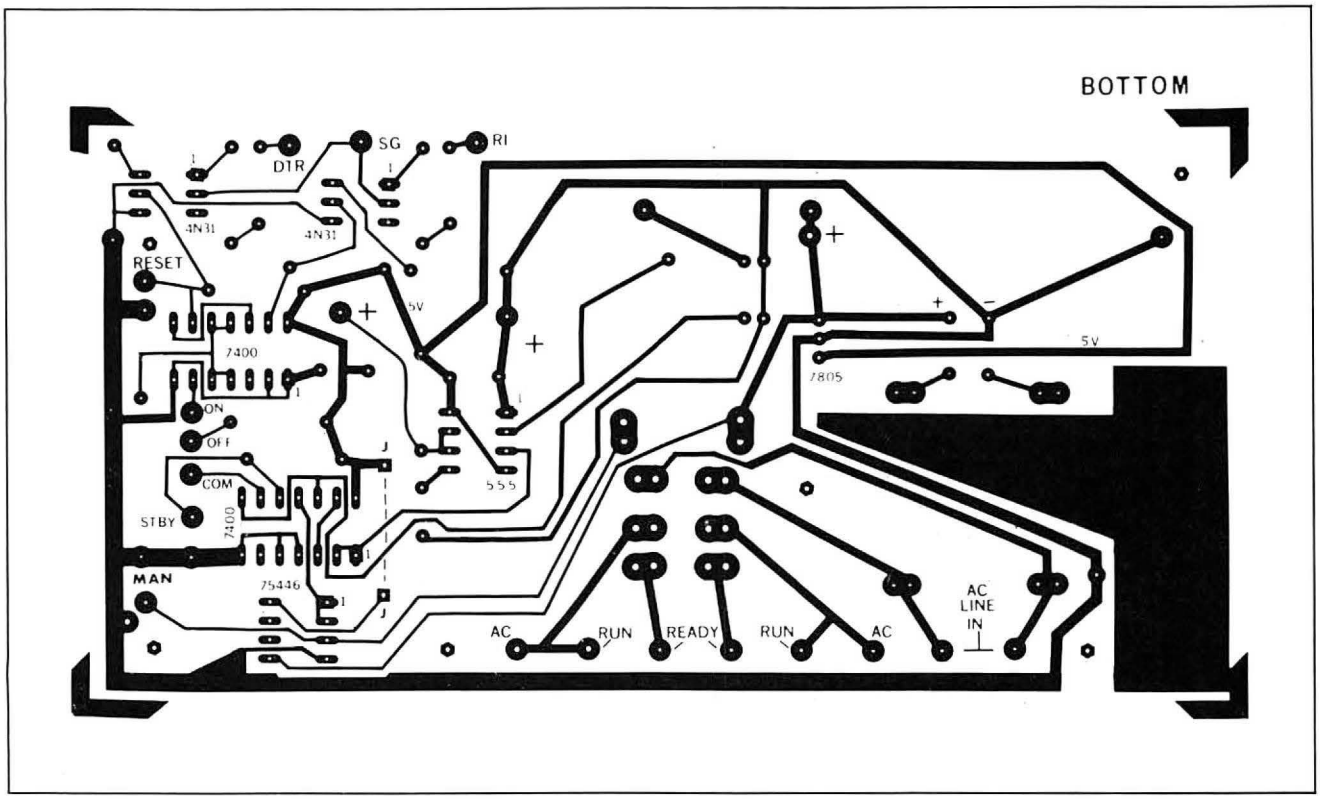


Figure 1: Printed circuit layout

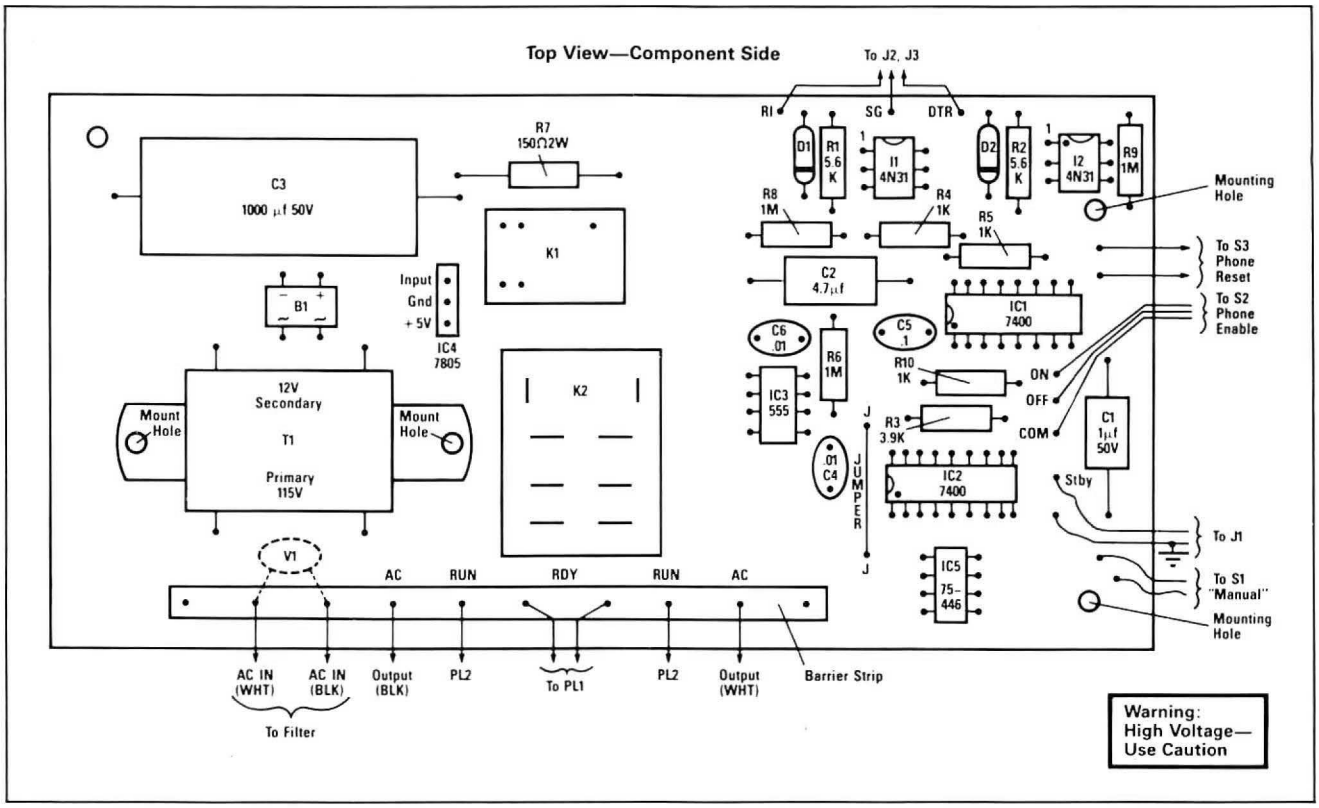


Figure 2: Parts placement diagram

bracket of the power transformer and to the ground tab on the RFI filter.

5. Mount the RFI filter, switches, fuse holder, and connectors in the cabinet, leaving as much room as possible between parts carrying line voltage and those that do not carry it. Interconnect J2 and J3 before mounting them in the cabinet.

6. Mount the circuit board in the cabinet using spacers long enough to allow a generous clearance between the power relay pins (or relay socket pins) and the cabinet. Be careful that the spaces or their screws do not introduce any short circuits.

7. Interconnect the circuit board and the remaining parts using short lengths of wire. Wire carrying line voltage should be heavy enough for the rated load of the unit—500 watts. A convenient source of appropriate wire is the cord of the outlet strip. If you cut it about 1 foot from the outlet strip, you can "steal" short lengths of wire from the cord, and enough will be left to use as the unit's power cord.

Testing

In the interest of safety, before connecting your completed PCPC to your computer or modem, perform the following tests:

1. Measure the resistance between each of the two power prongs on the power cord plug and the cabinet if a metal cabinet was used. The resistance value should be too high to measure with most instruments, leaving the meter at the "infinity" mark.

2. Make a similar measurement between each of the power prongs on the power cord plug and the U-shaped ground prong. The results should be the same as in step 1.

3. Measure the resistance between the power-supply ground and each of the pins of J1 and J2. Again, you should find "infinite" resistance on each pin.

4. If you used a metal cabinet, measure the resistance between an unpainted spot and the U-shaped ground pin on the power cord. The resistance should be zero or very close to zero.

5. Plug the PCPC power cord into a 3-pronged outlet and measure the DC voltage at the -Standby Interrupt input connector, J1. You should find 5 volts or less between the center pin of J1 and its shield (ground).

If any of the above tests fail to give the expected result, stop immediately and correct the problem. Once you are satisfied that there is no threat to you or the system, connect the cables as shown in Figure 3 and test the system for proper operation as described below.

Operation

To turn on your system, flip S1 to the closed position. You should hear a click as the power relay closes, and

Bypassing the RAM Test

Like bigger machines, the PC has logic and memory devoted to making sure that it is working properly. Each time the PC is turned on, code in the BIOS ROM executes diagnostic routines that include a complete test of RAM. This test takes only a few seconds on the smallest machines, but the more RAM you have, the longer it takes.

The RAM test is no trouble if you turn your system on only once a day, but you may not be able to afford the time it takes if you are using the PC to answer the telephone. A delay might lead the caller to give up before your AUTOEXEC.BAT file starts to run.

QUICKON is a product that can be easily installed in the PC (but not in the XT) to bypass this time-consuming test. It consists of a small printed circuit board (about 2 inches square), which is plugged into the PC in place of the BIOS ROM. The ROM, in turn, is plugged into a socket on the QUICKON. The result is that the RAM test code in the ROM is bypassed, cutting the start-up time down to less than 3 seconds.

QUICKON makes no permanent changes to the PC, and it can be removed easily in a few minutes if you want the RAM test function back. Instructions are supplied for installing a switch if desired so that it may be left inside the PC and the switch used to turn it on and off. Some thought must be devoted to the location of the switch, however, as the three wires connecting it to the circuit board are limited to 12 inches in length.

Bypassing data integrity features built into your computer should be considered carefully. If you need the PC to go on line in a hurry from a dead start, QUICKON may be just what you need.

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Security Microsystems Consultants
16 Flagg Pl. #102S
Staten Island, NY 10304
212/667-1019
List price: $49

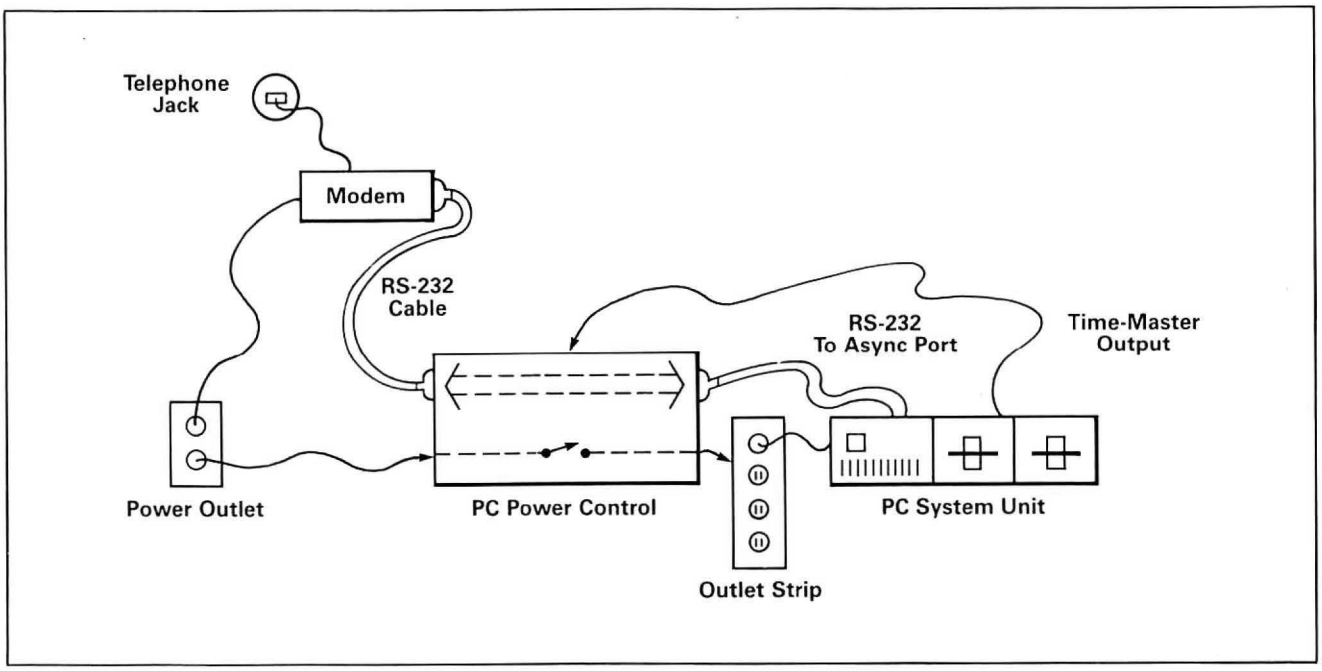

Figure 3: PC system with power control

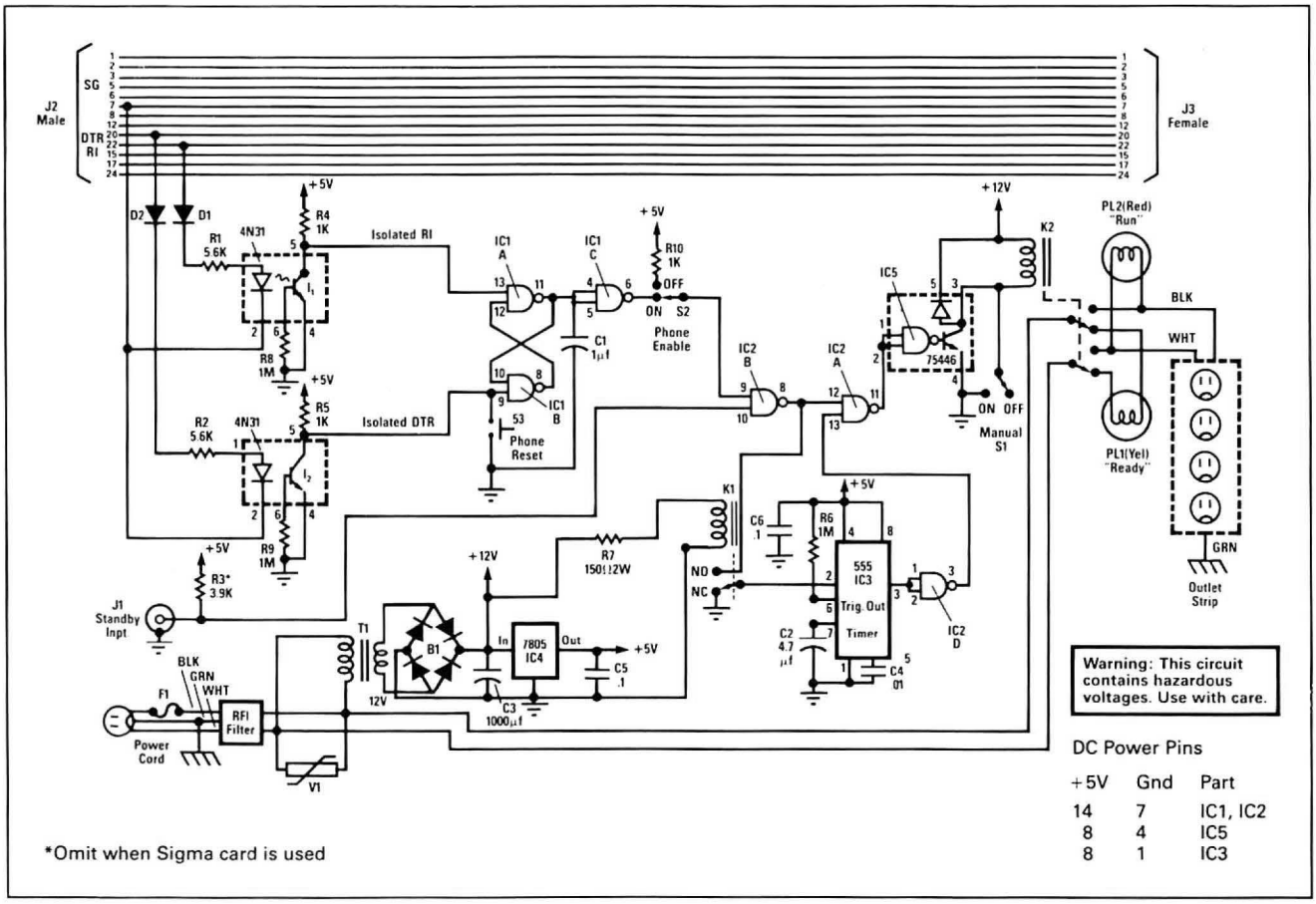

Figure 4: Schematic diagram

everything plugged into the PCPC power strip should turn on. Power should be on whenever S1 is closed, regardless of input from the modem or the MM58167A clock chip.

When S1 is off and your program has prepared the clock chip to turn on the system at a later time, it should turn on at that time just as if you had flipped S1. It should stay on until the program resets the clock chip.

When S1 is off and S2 (Phone Enable) is on, power should turn on whenever the modem indicates that the telephone is ringing (remember, the modem must be running for this to work; don't plug the modem power cord into the outlet strip on the PCPC!). Your program should sense the ring signal over the RS-232C serial port, set up the clock chip to hold the power on, and then answer the phone. After the call has been answered, the clock signal will hold the power on until the call is completed and the clock chip resets as described.

Variations

Figure 4 shows the schematic diagram for the PCPC. After studying the design, you may want to adapt it to your needs. For example, if you need the system to respond to the telephone, the -Standby Interrupt input from the clock chip can be simulated using the motor control relay provided with the PC cassette interface (not available on the XT model).

Similarly, if telephone input is not required, you can omit J2, J3, U2, U3, S2, and the associated wiring by connecting R10 directly to pin 9 of IC1.

I hope you find the PCPC a useful and enjoyable project. It should save you money on power and cooling while giving you the freedom to go about your business without babysitting your PC.

Jack Powers is a communications system programmer for a large research organization in the San Francisco Bay Area.

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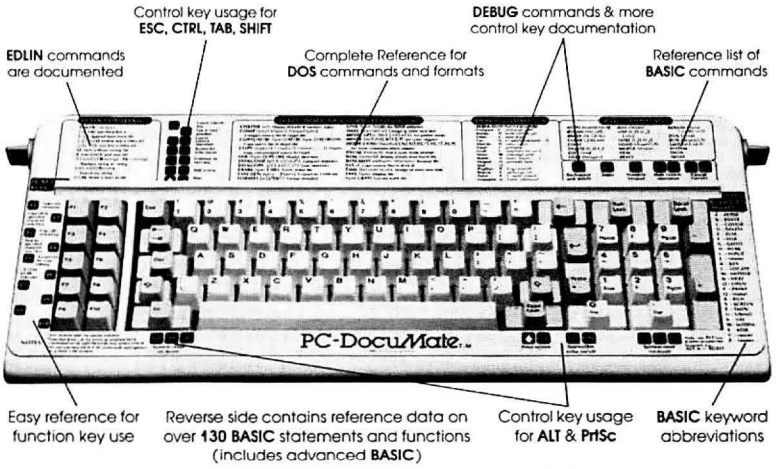

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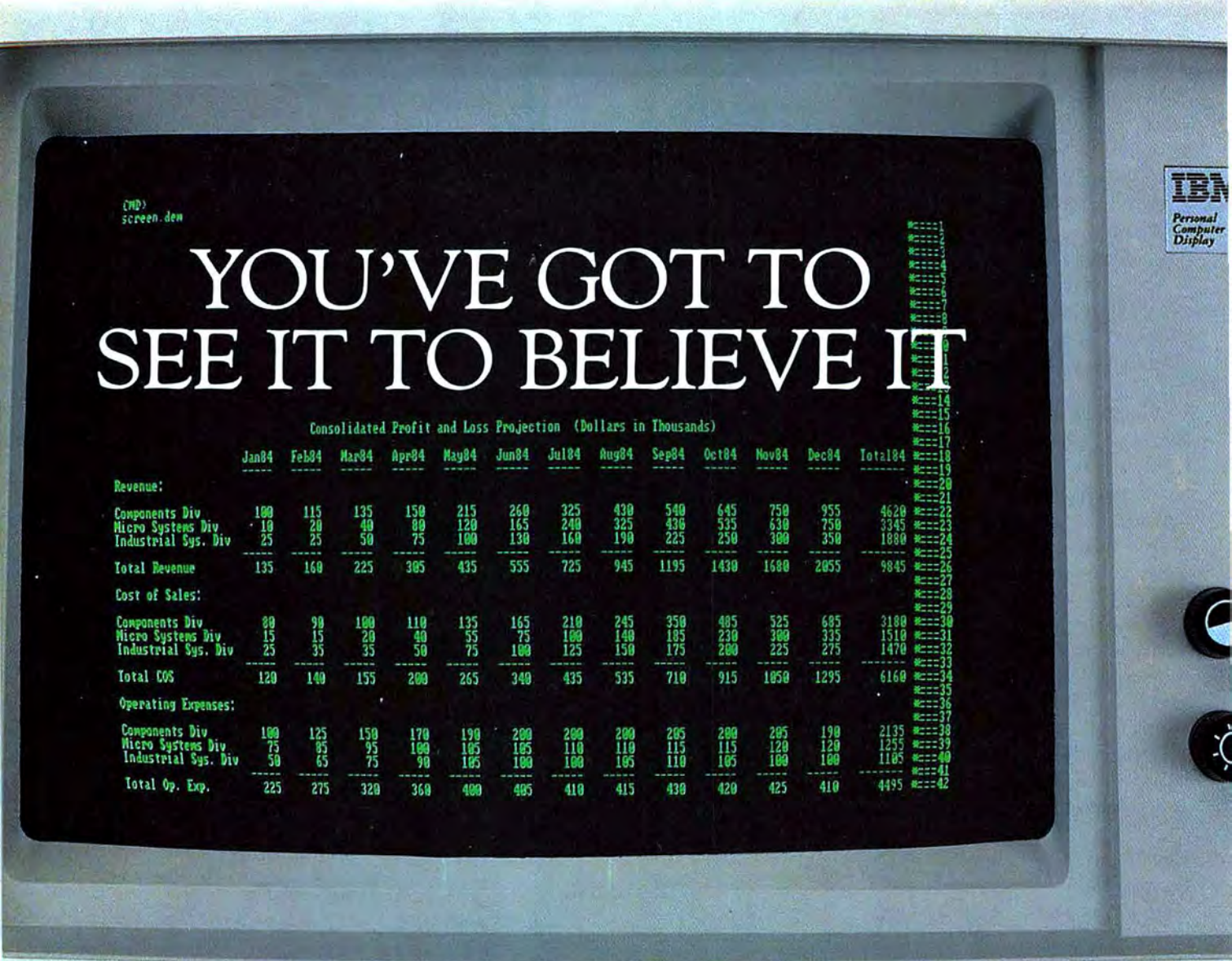

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Micro Systems Div	15	15	20	40	55	75	100	140	185	230	300	335	1510
Industrial Sys. Div	25	35	35	50	75	100	125	150	175	200	225	275	1470
Total COS	120	140	155	200	265	340	435	535	710	915	1050	1295	6160
Operating Expenses:													
Components Div	100	125	150	170	190	200	200	200	205	200	205	190	2135
Micro Systems Div	75	85	95	100	105	105	110	110	115	115	120	120	1255
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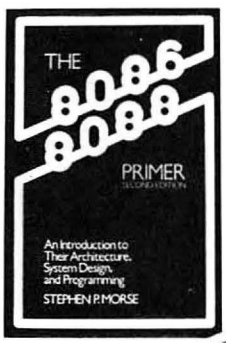

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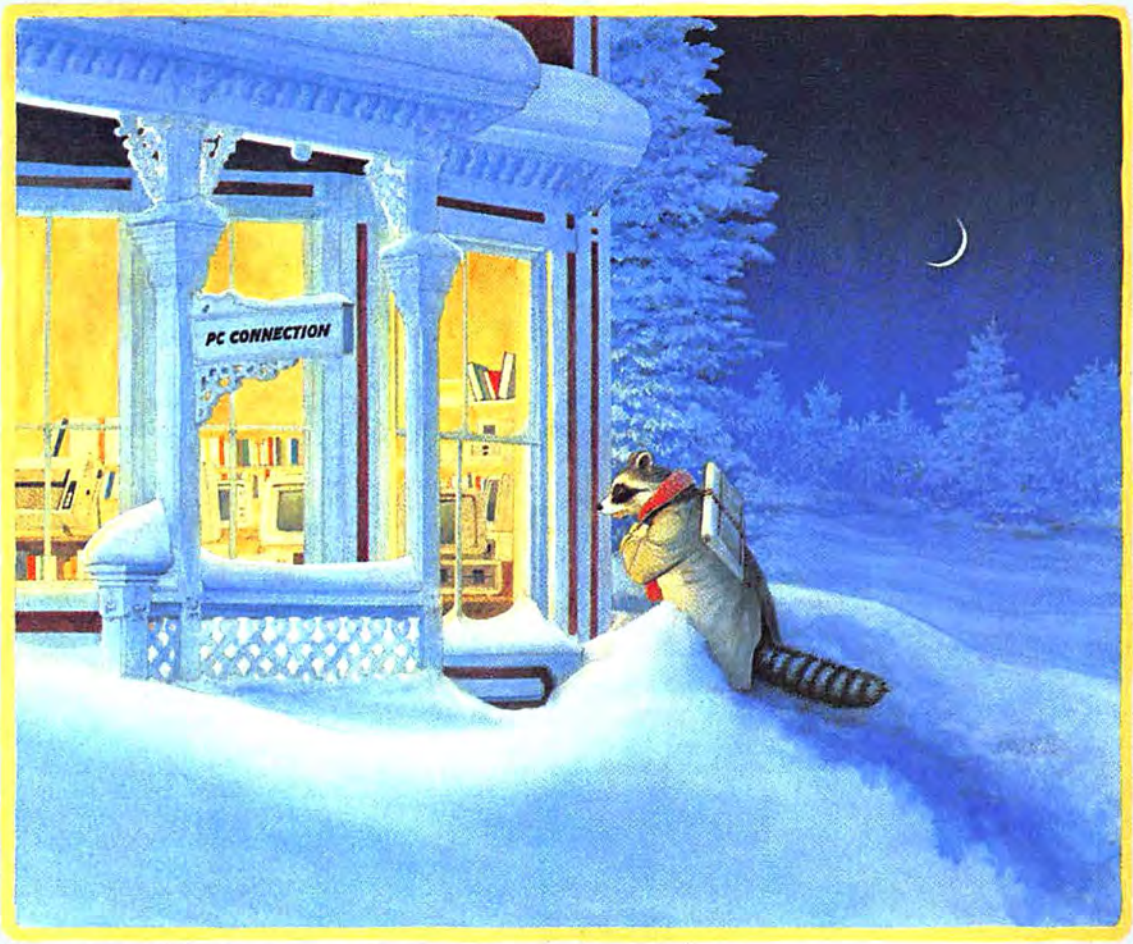

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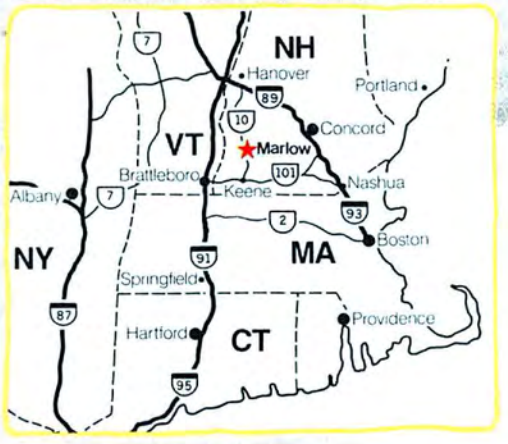

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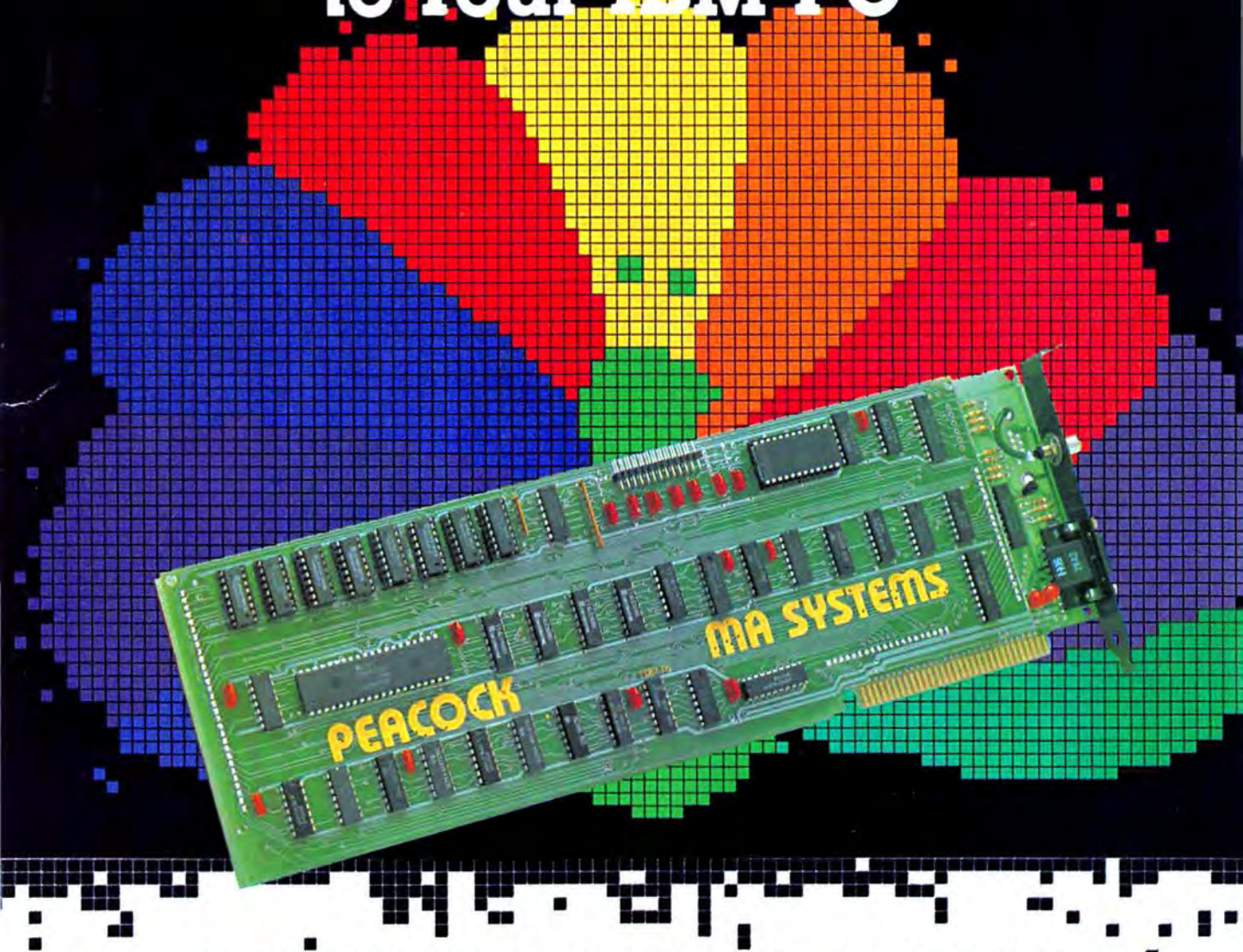

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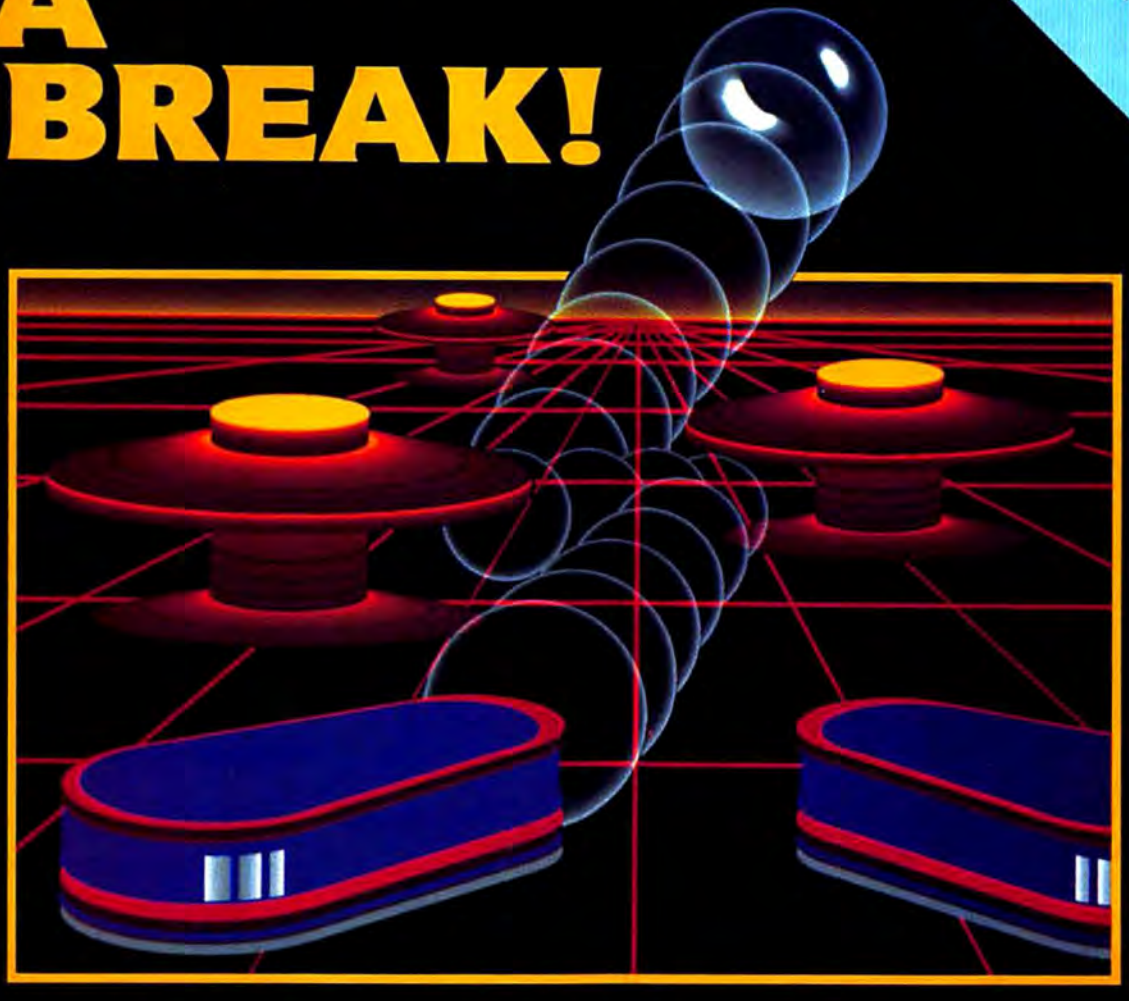

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The Write Stuff

Word processing demands a new set of skills and a new approach to the craft of writing.

Jeremy Joan Hewes

No matter which word processing program you use, there are a number of routines and tips that can help you get the most from your electronic tools. Spelling checkers, grammar aids, and on-line thesauruses may help, but many improvements are possible without using auxiliary software. I've listed 22 word processing tips and divided them into five areas that cover the basic elements of word processing: writing, editing, formatting, printing, and filing.

Writing

Every writer has particular work habits and ways of organizing material to help get words from the brain onto the screen or paper. Writing styles vary, but they can be separated into three general categories: sprint, stride, and fox-trot. Each style is a valid writing technique.

Sprint. If you need to brainstorm on broad topics or overcome writer's block, sprint writing is especially good. When you can't think of anything else to say, start sprinting—writing down anything that pops into your head—as quickly as possible. Writing generates ideas; you'll see a thought on the screen, and related ideas will come to mind—your writer's block will be gone before you realize it.

Sprinting may produce rather breathless copy, wordy sentences, and repetitious passages. If you sprint, you must be a careful, or even brutal, editor of your drafts.

Stride. A somewhat deliberate method, stride writing involves minor editing while you are preparing the initial draft, thereby requiring less extensive revision or cutting at later stages. Stride writing is particularly useful for short pieces that have close deadlines or writing in fixed formats, such as newspaper or magazine columns.

Stride writing does have a potential danger: you think you're finished when the first draft is completed, but that is rarely the case. Even though you have revised the text along the way, you should do a quick edit of the "finished" piece on paper; after all, it's easy to reprint if you want to improve a sentence or add a paragraph.

Fox-trot. This approach is characterized by writing slowly, reworking in progress, and polishing as you go. The fox-trot, like the dance, requires a back-and-forth compositional style. This style is useful for such diverse forms as technical writing, poetry, and precise business letters.

The problem with the fox-trot style may be the opposite of that with stride or sprint. Using the quicker writing styles, you definitely need to edit drafts, but using the fox-trot style, the temptation may be to seek perfection and overedit, possibly draining the life or personality out of a piece. Remember that the objective of any writing style is to get somewhere, even if you take a few steps backward or sideways in the process.

> The screen is a friendly and inviting medium. It seems to coax ideas and words out of me.

The writing style you choose may depend on how comfortable you are with writing and editing on screen. For me the screen is a friendly and inviting medium. It seems to coax ideas and words out of me (out of my fingertips actually), and the fact that I don't have to mess with paper or ribbon or smear ink across the page

---

Adapted from Writing in the Computer Age *by Andrew Fluegelman and Jeremy Joan Hewes.* *Copyright © 1983 by Andrew Fluegelman and Jeremy Joan Hewes and The Headlands Press. Published by Doubleday & Co., Inc.*

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(which always happens if you're left-handed and write longhand) truly makes the task less formidable. I hasten to add, however, that no matter what writing style I use or how much I edit on screen, I also edit each draft on paper.

Some writers may feel more comfortable making all their edits on a printout. This preference depends on how much a writer is affected by CRT eyestrain and on the capabilities of the word processing program. If your word processing program allows you to move quickly around a document and move blocks easily, you may want to edit most of your work on screen.

When you are revising or deleting parts of a draft, save the scraps you take out.

Next time you sit down at the computer to write, watch yourself (or have someone else watch you) and see what style or styles you use. Even if you naturally use one of the three styles, experiment with the others. You could extend your creative horizons and perhaps discover a more productive writing method than you presently use.

The following are some other writing tips that can help make your work more productive:

Outlines. If your subject is complex, work from an outline or a list of ideas. This may sound like obvious advice, but I'm often surprised at how many people work from their thoughts without the benefit of an outline or notes. For most information-intensive writing, such as a software review or a hands-on article about using the PC, you must prepare an outline to determine the most logical sequence for presenting facts. You can even use the outline as part of your first draft; simply use the outline sections as subheads and insert text under each head.

Reverse outlines. Another excellent use of the outlining technique is "after the fact." If you've written a draft that doesn't seem to have a clear sense of direction or tight organization, outline in reverse: go through the draft, writing down the key ideas in each paragraph on a separate sheet of paper. Then consult this outline and put the draft aside. Does the flow of information make sense? Are there holes in your logic? Are you repeating yourself? Have you conveyed the points you meant to make? Reverse outlining will give you a perspective on your writing that few other tricks can.

Fingertip talking. Another device for getting around writer's block is having a conversation with the computer. Ask yourself questions or assume a character's role and create a dialogue via the keyboard and the screen. This technique may be just my personal eccentricity, but I often have mental conversations, and I sometimes transfer that process to the screen, asking myself a question and then answering it. Fingertip talking helps get the creative juices flowing again.

Letter writing. If writing an outline, conversing with the computer, or simply putting down whatever comes to mind doesn't remove your writer's block, try expressing your thoughts in letter form. You can explain concepts or delineate your position without the pressure of trying to create a masterpiece.

Writer Tom Wolfe had an experience that demonstrates the letter-writing technique in action. He was stricken with writer's block when the deadline arrived for his first professional article. An editor at *Esquire* assigned him to write about a Southern California group called the Pump House Gang. Wolfe hung around with the group for a few weeks, took reams of notes, and then locked himself in a motel room to write the article. But nothing came. Finally the deadline arrived; he had amassed a stack of amorphous notes, but no article. In despair, Wolfe wrote his editor a long letter, apologizing profusely for not writing the article. He included his notes in the letter and expressed the hope that some "real writer" could salvage an article from his material. The *Esquire* editor deleted the apologies and published the letter. This was the birth of the New Journalism.

Fresh air. If electronic writing still isn't working for you, give yourself a break; leave the keyboard and take a rest, do some physical or mindless labor, read some good writing to replenish your mental stores, or try writing with another tool such as pen and paper or a typewriter. Chances are you'll be back at the PC in no time.

Editing

Scraps. When you are revising or deleting parts of a draft, save the scraps you take out. You can do this by sending your scraps to a file named EXTRA or something similar; these fragments may be useful elsewhere, or you may change your mind and decide to restore them.

Comparisons. When you are trying to decide whether to leave a portion of text in one spot or move it elsewhere, don't burn your bridges. Try it one way in the current draft and copy the whole file; then move the part in question to its alternate location in the text. Print both versions and compare them to determine which one works better.

Marking symbols. Devise one or more symbols to mark places in the text where you need to do more work. One symbol, <&&>, could designate areas that need rewriting; another, [##], could indicate areas that need supplemental information. Then you can search for those symbols and quickly locate the areas that require attention.

Footnotes. Labeling special parts of the text is also useful for marking key words, footnotes, or other references. If you are using footnotes or citing books for a bibliography, it's also a good idea to write the complete note or citation directly into the text where you refer to it. Thus, you won't have to plow through your source materials days or weeks later when you insert the footnotes and bibliography. This technique is especially suited to word processing since you can mark each note or citation as a block and move it to the end of the text or to a separate file, or search for your symbols at a later time.

Formatting

Stored formats. If your word processing program permits you to store various document formats, make a version of each one that you use regularly. If stored formats are not allowed, make separate files that contain the necessary commands to construct each frequently used format.

A variation of this technique is configuring several versions of your word processing program to alter such options as margins and line spacing. For instance, you could use one version for manuscripts that are double-spaced having, say, a 65-character margin, a second version for manuscripts having 40-character margins, and a third version for single-spaced business letters.

Envelopes. Envelopes require a special printing format because of their odd shape. Make a separate envelope format or file, and insert it at the end of each letter you write. You need only copy the name and address from the heading of the letter into the envelope format portion at the end; the envelope will be printed as the last page of your letter. If you incorporate the envelope as a page in the letter, be sure to signal the printer to pause between pages so that you can insert the envelope.

Samples. Print out samples of all the formats you use for standard documents so you can refer to the commands without entering the actual format files. Also, print a list of any special symbols you use in case you forget what they are. Keep them near the keyboard for easy reference.

For example, I created label formats for two mailing lists, format files for two envelope sizes, and a set of symbols to flag parts of my text needing work. These are all things that I was certain I would remember, but I never do. I'm glad to have the printed reference sheet to remind me.

Search and replace. If you want to change the format of a document, such as beginning paragraphs flush left instead of indenting them, use the search and replace features of your word processing program. To reformat the paragraphs flush left, simply search for the five blank spaces of an indentation and replace them with nothing.

Labeling special parts of the text is also useful for marking key words, footnotes, or other references.

Some word processing programs allow you to search and replace carriage returns. This is useful if you've received a file via telecommunications that has carriage returns at the end of each line. You can search for the carriage return symbol or the ASCII code (13) and replace it with nothing. This procedure creates a file that you can reformat or edit without problems.

Printing

Tape and mark. To decrease the trial-and-error of printing with various stationery and document formats, experiment with the printer until you find the right place to insert each type of paper. Then put a piece of tape or a label on both the printer and the tractor (if you have one), with marks showing where each type of paper should be inserted.

Slipping paper. If you don't have a tractor and the continuous-form paper tends to slide sideways as you print long documents, try taping some stiff paper to the top of the printer so that the paper will move only about 1/2 inch. A styrofoam-filled mailing envelope works well. Another thing that prevents slippage is making sure that the box of paper is lined up squarely under the printer.

Platen care. The printer's platen wears down if you always insert the paper in the same place. You can minimize wear by inserting the paper toward the middle of the platen; use a larger margin or a special print offset command to center the text correctly.

Filing

File IDs. For quick and easy file identification, devise a list of symbols to use as the first character in each file name. The following symbols have saved me a lot of time searching through files:

@ = letter
) = query letter
& = notes for specific project
# = draft manuscript
! = final version of manuscript
> = transcript of interview
(= ideas/notes for future projects
< = journal
$ = invoice

Besides giving you a quick identification tag for each kind of file, these symbols can be used to group similar types of files; this technique might be helpful for archiving or searching for particular documents. Be sure to print out a reference sheet of the

symbols you've chosen, and keep it near the keyboard. Also, be sure to avoid characters that DOS will not recognize in file names or wild-card characters such as ? or *.

Dating. To use dates as part of a file name, adopt a standard system such as one character for the month and two characters for the day; for example, 109 would be January 9th. The last three months of the year can be represented in one character by using the first letter of the month's name—o, n, and d (d08 would be December 8th).

> You can minimize wear by inserting the paper toward the middle of the platen.

Save! If at all possible, assign one of the PC function keys as a "save" key. By using the word processing program's configuration routine or one of the keyboard macro programs (such as *ProKey* or *Keynote*), set up a one-key save-and-resume command. Be sure to press that key every 10 to 15 minutes and whenever the phone or doorbell rings or you are otherwise interrupted. During thunderstorms you should save every 5 minutes.

Even if you're an old hand at word processing, some of these tips should prove useful in your work. Too often it's tempting to fall into writing habits developed during typewriter days—and you may not be taking advantage of the unique qualities of electronic writing. Doubtless you will find plenty of your own methods uniquely suited to your temperament and the capabilities of your word processing program.

Jeremy Joan Hewes is the Editor of PC World Books.

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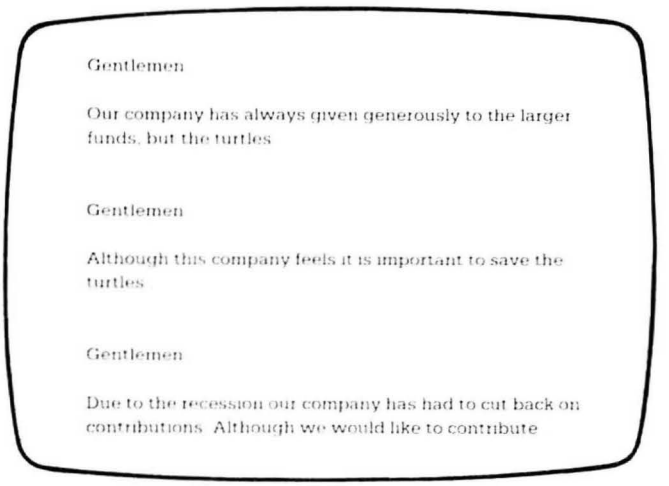

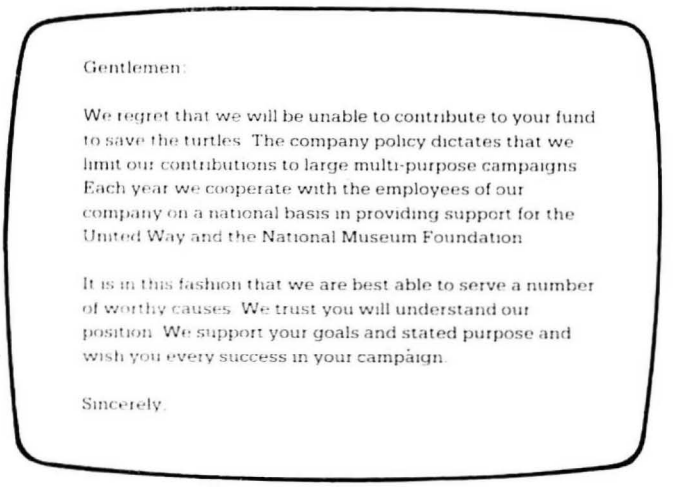

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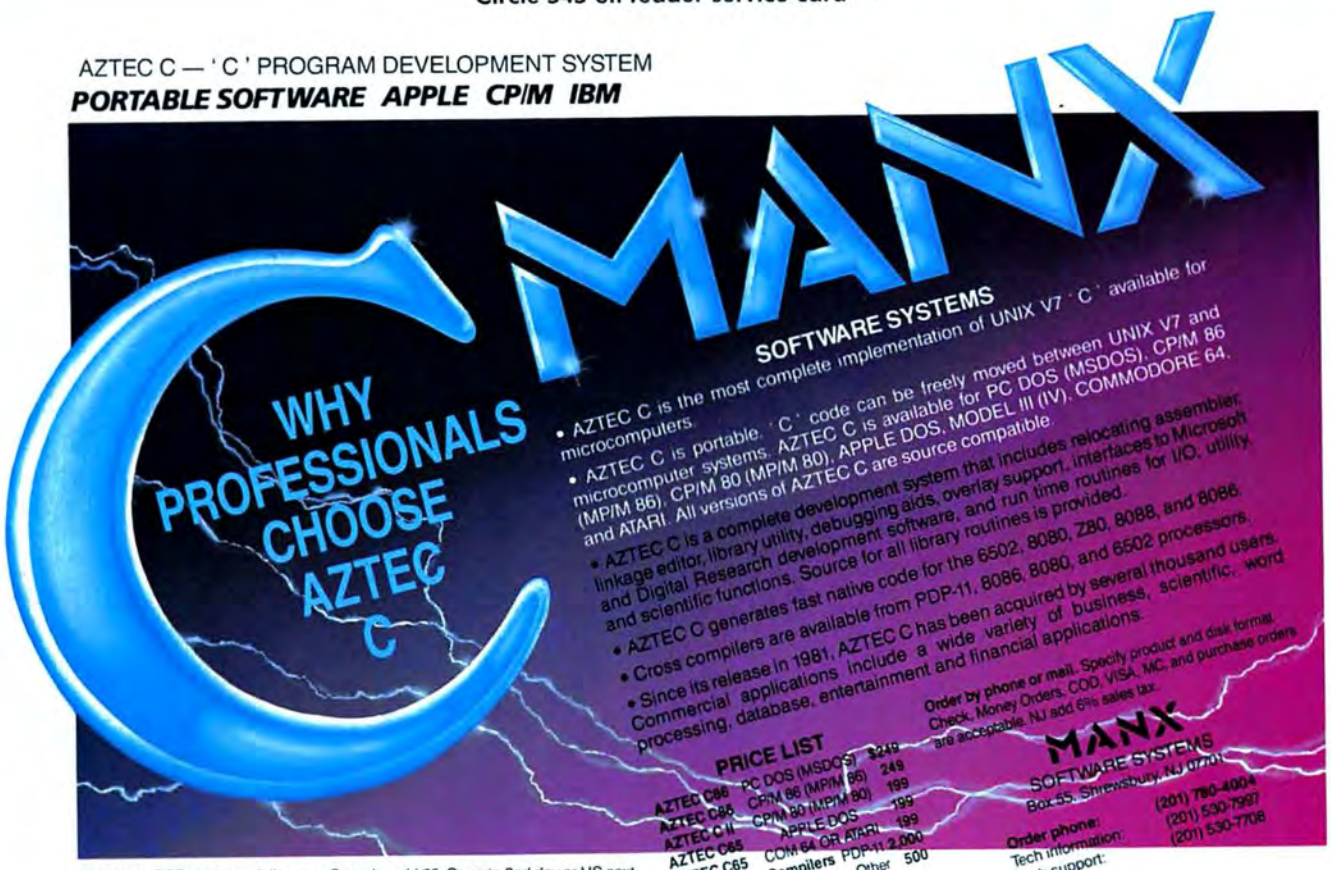

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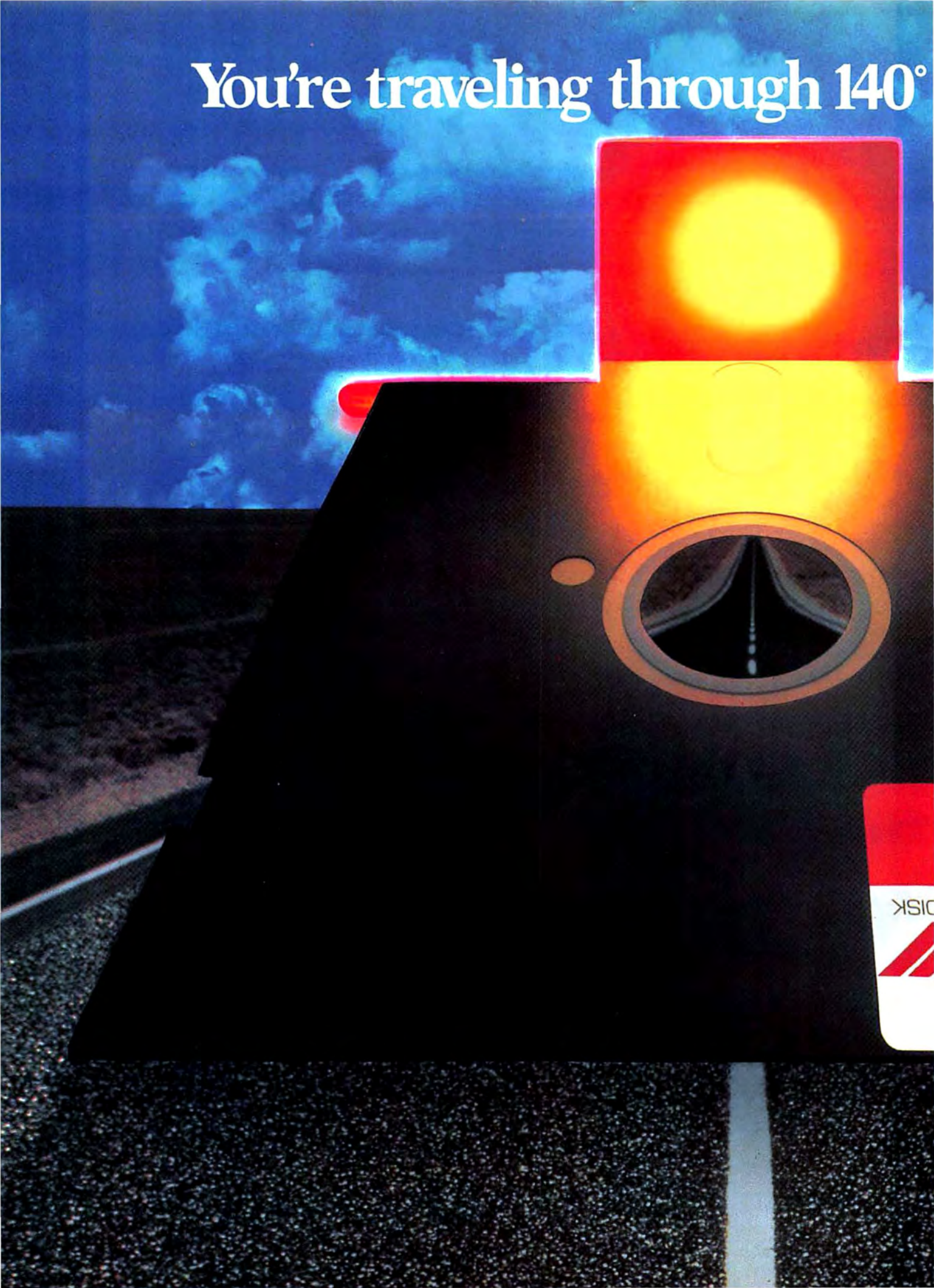
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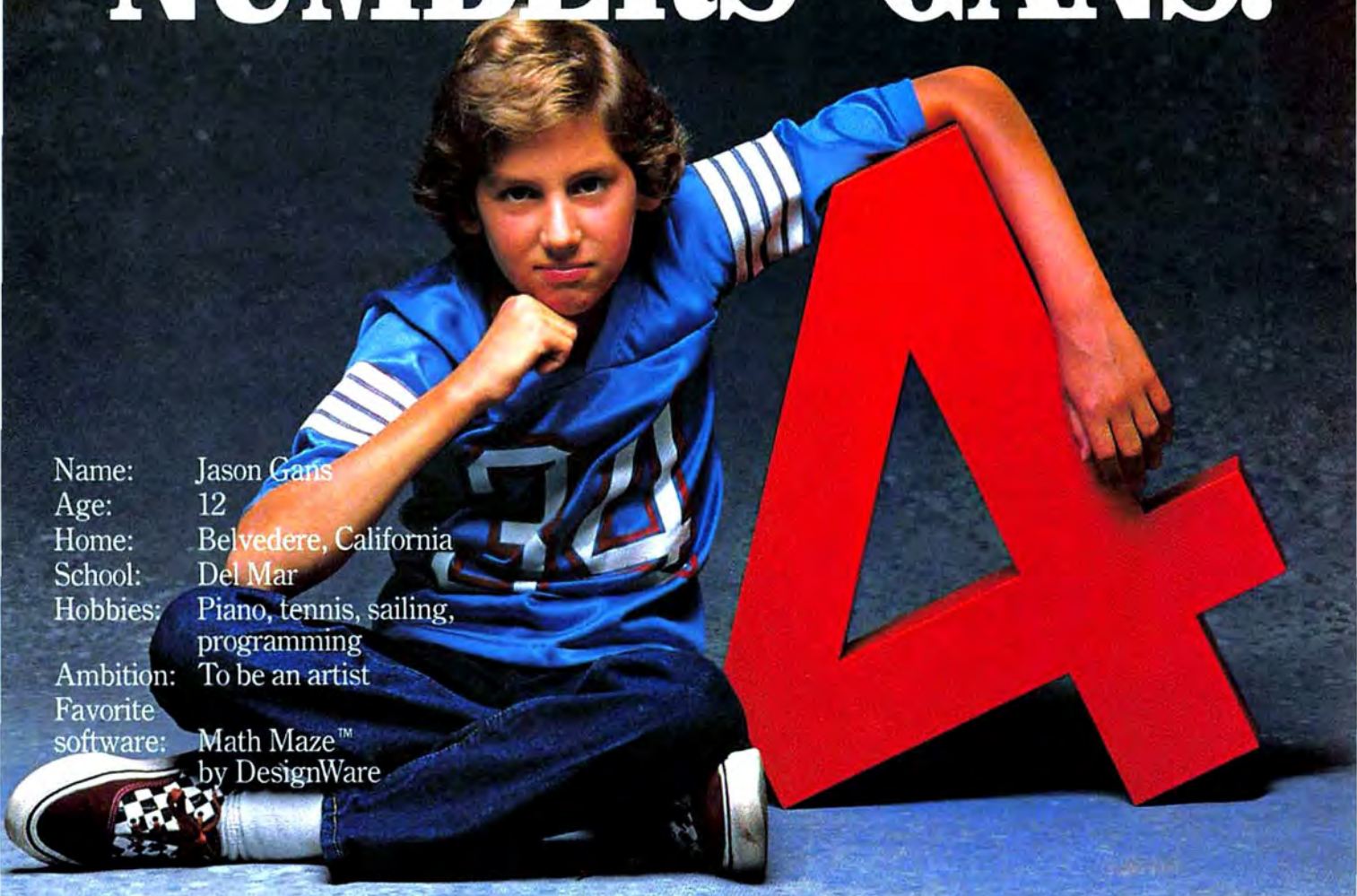

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Fear and Lurking on CB Simulator

Eric Brown

CB conjures up memories of the early seventies, hitching a ride over the Appalachians with a white-crossed trucker, his mouth glued to the microphone as the crazed jargon poured out through the CB radio. It was a mystery how the trucker could discern the voices over the roar of the semi and the static on the radio. Amazingly, the voices understood each other, and as the decade progressed the freewheeling conversations continued to ricochet among an increasing number of colorful handles.

In the eighties a new version of CB is growing in popularity, but now you need a computer, a modem, and a subscription to the on-line services network, CompuServe Information Service (CIS). Instead of delivering a barrage of static, CB Simulator, CompuServe's version of CB, assaults you with an equally confusing jumble of scrolling words as hundreds of people across the United States and Canada type to each other at once.

Real-time communications are growing in popularity at colleges and corporations, on bulletin boards, and in on-line services, both through local networks and telecommunications networks. CompuServe's competitor, The Source, allows private conversations with the mode but does not offer the public forum of CB.

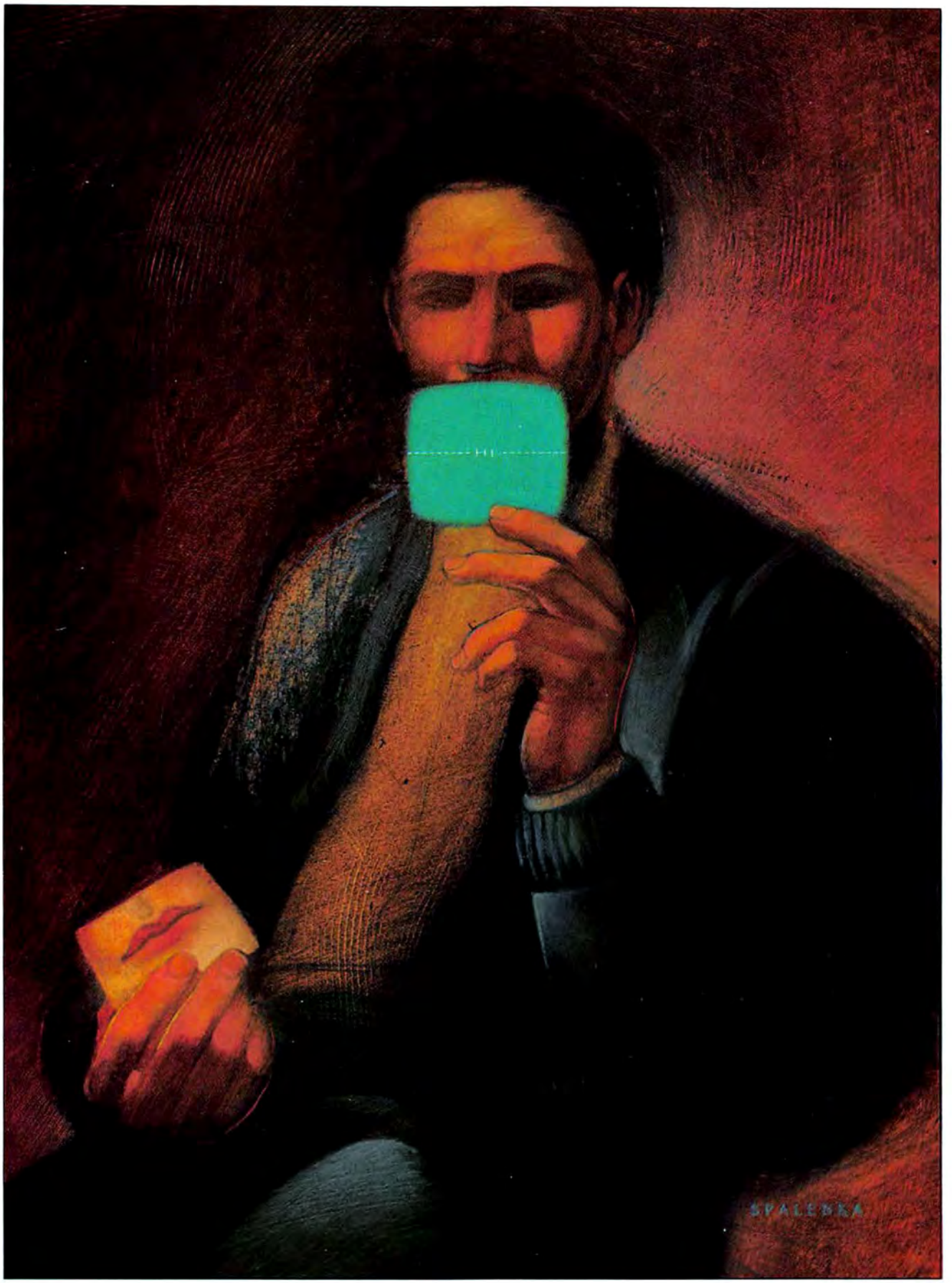
It's Saturday night, and though things are hopping in the outside world, I once again turn to the inside world of CB Simulator. CB can also be accessed during the day, but rates are expensive, and few people log on. I switch on the COMPAQ, turn on the Hayes Smartmodem, dim the lights, and put on some music. *PC-Talk III* in drive A, a data disk in drive B, I boot up, dial in, and log on to CompuServe.

> When I logged onto Channel 1 for the first time, I was utterly confused, intimidated, and for some reason frightened.

The Hayes Smartmodem sings out the phone number and the LEDs slip into the familiar configuration that leads to the on-screen beep and message CONNECT. From now on the meter is running at $6 an hour. I press <Ctrl>-C and type in my user ID. That's my identification and mailbox number no matter where I go in the wilds of CompuServe. Then the password prompt appears, and I type in my secret password.

Once logged on to CIS, I am ushered to the main menu. From there I can voyage anywhere in CompuServe. Following the map in the back of the CompuServe manual, I find I can traverse the menus through either Home Services or Personal Computing to reach the Communications section. And there I find CB. The GO commands, however, are much faster. At any exclamation point prompt you can GO directly to any of the entries on the subject index sent to subscribers. Since listings frequently change, it's a good idea to download the most current on-line listing (GO IND) periodically.

Using the GO commands I can read the latest AP Wire News (GO APV), check the status of my stocks (GO FIN-20), order flowers (GO FTH), settle a bet by perusing the on-line version of *Grolier's Encyclopedia* (GO AAE), check out the latest PC tips and programs at the IBM PC SIG (GO PCS-131), play Real-Time Star Trek against on-line opponents (GO GAM-41), or submit my considerable psychological problems to the infuriatingly understanding computer psychiatrist, Eliza (GO GAM-204). These are only a few of over 500 ser-


SPALEKA

vices provided by CIS, ranging from African weather to the latest pork prices.

Tonight I type GO CB , which takes me on a shortcut to the CB menu (Figure 1). First-time users are advised to investigate Introduction (Option 1) and Etiquette (Option 2). The introduction explains CB and the commands necessary to navigate it. Etiquette explains just that: no nasty language, please, or CIS reserves the right to expel you.

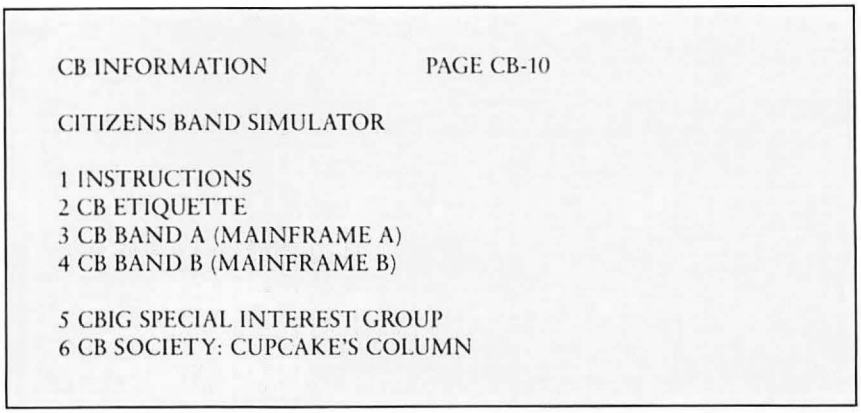


Figure 1: CB menu

A Side Trip to the SIGs

I choose Option 5 to access CBIG, the special interest group for CB users. There you can read the latest bulletins on CB changes and events, participate in an on-line conference (if one is in progress), or read or submit EMAIL (electronic mail) to the SYSOP (system operator) or other CBers.

Exiting CBIG drops me into the Home Services SIGs, which can also be reached by typing GO HOM-50 (see Figure 2). Computer-related SIGS can be reached by typing GO PCS-50 . Most CBers are members of more than one of these clubs, where they can discuss specific topics and issues with people who share their interests.

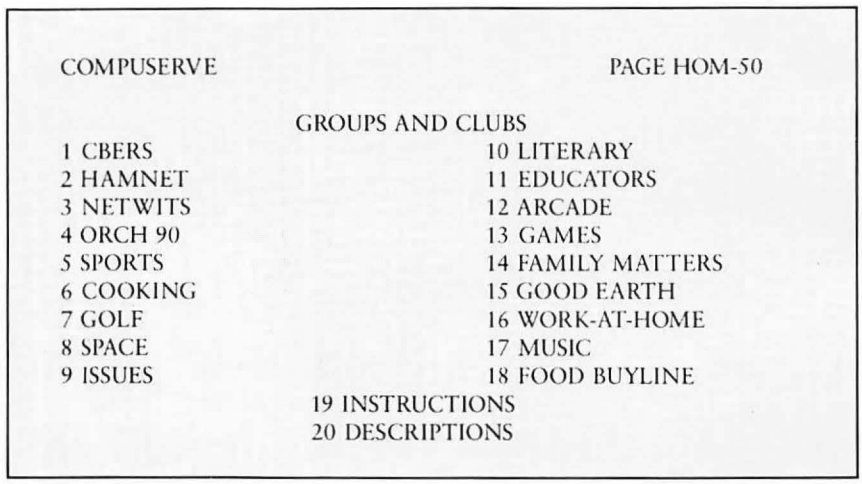


Figure 2: SIG menu

Most SIGs consist of a bulletin board and/or a gossip column; an electronic mailbox; a data base of mail, articles, and programs; and an on-line conference channel. You can enter the on-line conferences at any time, but you'll probably find yourself alone. Check the bulletins for notices and times for upcoming conferences. SIG conferences operate with the same commands as regular CB, but there are usually specialized rules of etiquette to maintain the control and direction of the discussions.

SIGs are a vast world unto themselves, demanding more attention than is possible for one Saturday night. I leave them behind by typing GO CB again, which returns me to the CB menu. I choose Option 3 for CB Band A, the most popular of the two bands. Band B, housed in a new host computer, was added in August because the first host was getting too crowded. After a momentary wait, the system asks me what my handle is. You can change your handle anytime, but I type the handle I've used since I joined CB several months ago: DANGEROUS. The system then flashes a status screen showing how many people are on each of the 36 channels of Band A and then asks what channel I want to start on. I type 1 for Channel 1, the most crowded on CB.

The screen scrolls rapidly, one cryptic message after another, each preceded by the channel number and handle of the typist. The more people typing, the faster the screen scrolls, and with 32 people typing all at once, the messages fly by at a fast and confusing clip.

When I logged onto Channel 1 for the first time, I was utterly confused, intimidated, and for some reason frightened. What was this jargon they were using, and how could you figure out who was talking to whom? And what do you say to someone you know absolutely nothing about?

I start typing. Anything typed (followed by a return) is entered into the flowing text stream preceded by your

```
PREFIX COMMANDS WITH A "/"
/TUN # - TUNES CHANNEL # (1–36)
/TALK # - TALK PRIVATELY W/ JOB #
/MON 1,4 - LISTEN TO EXTRA CHNLS
/UNM 7,3 - UNMONITOR CHANNELS
/STA - TYPE CHANNEL STATUS
/TIM - TYPE TIME, DAY, AND DATE
/UST - USER STATUS TYPEOUT
/UST # - USER STATUS FOR CHN #
/EXI - EXIT CB SIMULATOR
/OFF - EXIT CB AND LOG OFF
/WHO - TYPE PPN OF LAST TALKER
/HAN - CHANGE HANDLE
/SCR XYZ - SCRAMBLE ON KEY "XYZ"
/SMC XYZ - SCR & MONITOR CLEAR
/XCL XYZ - XMT CLEAR; UNSCR RCVR
/UNS - UNSCRAMBLE (BOTH CLEAR)
/SQU ABC - SQUELCH HANDLE "ABC"
/SBU #,# - SQUELCH BY USER ID
/JOB - YOUR JOB #
/HELP - TYPE THIS MESSAGE
```

Figure 3: CB commands

handle. The exception to this is any message preceded by a slash, which the system interprets as a command. Although CB commands are explained in the introduction, you can also type /HELP whenever you need a brief list of commands (see Figure 3). If you're still confused, ask someone. CBers are almost always willing to help out.

The first command to learn is /STA, which indicates the system status: how many people are on which channels. Another important command is /TUN, which allows you to tune to another channel. I soon weary of the madness of Channel 1, so I type /STA , notice there's a more reasonable number of CBers on Channel 7, and switch over by typing /TUN 7 . There the messages scroll more slowly (if still rather incomprehensibly), and I have a chance to pick up the thread of a conversation and join in.

Most people introduce themselves when joining a new channel, so I type HI ALL . A few seconds later, several handles type HI DANGEROUS back to me. On the more crowded stations, there are times when entire screens are filled with greetings and farewells without any real conversations progressing. However, it is friendly to let someone know you're arriving or leaving, especially on the less crowded channels.

Lurkers Abound

Those who do not say hi and bye and in fact say nothing at all are called "lurkers." A lurker can be unnerving, like a cool type at a party who sits back listening superciliously while you ramble on making a fool of yourself. On the other hand, there's no law against lurking, and some CBers enjoy the voyeuristic thrill of eavesdropping. Some lurkers are just shy, while others have simply been drawn away from the screen to talk to somebody in the real world or to go to the fridge. Every CBer is a lurker sometime. As CB SYSOP CHRISDOS says, "Lurking is fun!"

The /USTAT command can be used to ferret out lurkers (see Figure 4). If I want to find out who's talking or lurking on Channel 7, I type /UST 7 . Typing /UST without a channel number provides a complete listing of handles currently on all 36 channels. This is handy for searching for a friend without channel hopping. The /USTAT indicates from left to right: job number, used to set up private talks; user ID, for sending EMAIL to a fellow CBer; NOD, which shows abbreviations of the geographical location of the person; CH, for channel; TLK, which indicates with asterisks which people are in private conversations; and finally the handle. With the list of handles you can address the lurkers by name and bring them into the conversation.

Monitoring other channels using the /MON command is a more acceptable form of lurking. If I want to monitor Channel 8, I type /MON 8 . If I want to monitor Channels 8 and 36 I type /MON 8, 36 . That allows me to read Channels 8 and 36 and still read and type on Channel 7. The monitor function can be confusing, however, as the screen is randomly filled with lines of conversation from various channels. It is difficult enough to decipher conversations from a single channel, let alone several. I usually use /MON to check out other conversations if things are getting boring on the channel I'm on, or to keep tabs on the conversation of a channel I just left. To cancel monitoring, use the /UNM command by typing /UNM 8, 36 . If you want to banish the comments of Channel 36 from the screen, type /UNM 36 . You can monitor only one or two channels at a time.

Hands On

Search for Privacy

There are times during a wild CB party when you want to step out onto the back porch and have a private conversation. One way is to ask somebody to switch to an empty channel with you. Even when Channel 1 is verging on 40 handles, there are usually several empty channels available.

However, finding an empty channel is no assurance of privacy. People often go "channel-hopping," and sometimes CBers roam the channels in gangs. That is often caused by a couple of people on a given channel saying goodbye, which causes a chain reaction as people leave in a panic, believing the channel to be dying out. A "private" conversation on one channel can turn into a raucous party within minutes and vice versa.

Fortunately, CB provides the /TALK mode, which allows you to hold a private conversation off channel. If I wanted to have a private chat with MODEM MAMA, for instance, I would ask for her job number. This number is listed on /USTAT, but it is polite (as well as more convenient) to ask first. If MODEM MAMA wanted to talk to me, she would type /JOB to find out that her number was 179. She would then type it to me, and I would type /TALK 179 . This would cause a message to flash on my screen that MODEM MAMA has been notified, and a message to flash on her screen that DANGEROUS (Job #57) requests a talk with her. Then I'd wait until she typed /TALK 57 , at which point we could talk back and forth in privacy. To return to the channel I would type <Ctrl>-P , a standard break command throughout CIS.

If you want to have a conversation in utmost confidentiality and you can't trust that a certain handle is being used by the individual you're expecting, check his or her ID number on /USTAT or, even faster, type /WHO followed by the handle in question. That will give you the user ID. If you're still in doubt and suspect that an imposter has logged on with your friend's ID, you can use CB's scramble commands. Both people type a predetermined code to ensure a private conversation. See the introduction on the main CB menu for the various commands and procedures necessary to hold a top-secret scrambled conversation.

JOB	USER ID	NOD	CH	TLK	HANDLE
144	70235,433	TOK	7		UNCLE DAVE
157	71076,434	DAY	7		PIXEL
170	70426,231	MIA	7		ERIC DA VIKING
187	74765,1634	TOK	7		KLAATU
196	75315,1037	BOS	7	*	TRON 16
198	75565,642	NRK	7	*	RIDER
210	71725,1741	TOK	7		CENTRAL SCRUTINIZER
214	74055,412	SFA	7		DANGEROUS
224	70346,501	TOR	7		HARVDOG

Figure 4: Sample /USTAT

Jargon and Style

With the basic commands I've described, /STA, /TUN, /UST, /TALK, /MON, /UNM, /WHO, and /EXI (to exit CB), you are equipped to dive into the madness of CB. Start typing and see what happens. Until you hit the <Enter> key, you are free to backspace over your message and retype it until it's perfect. Once the <Enter> key is pressed, however, it's in the public domain, and you have to live with the consequences.

If the channel is crowded, your message will usually appear dissected on screen, but don't worry—on everyone else's screens it will appear in a straight line preceded by your handle. There is an 80-character limit to your message, so if you go past that you'll probably hear a beep, and you should press <Enter>.

However, if you have a long message, there's no reason why you can't keep pressing <Enter> and continue typing. In fact, some users enter dialogue this way for effect, entering only one word or letter per line. Add three dots at the end of the line to indicate that your thought is not yet completed. If you type the series of lines fast enough, there is a good chance that your message will come across as a continuous block on screen. Keep in mind, however, that fellow CBers might take offense at the channel being clogged with your monologue.

Technically, you can upload a block of text onto CB from your buffer, but these dumps are frowned upon and can even lead to your expulsion from CB. If you want to upload some data to someone or discourse at length, use the /TALK mode so you don't clog up the screens of innocent bystanders. Generally, the fewer people on the channel, the more acceptable longer messages are.

Most CB entries are short, and somewhat standardized abbreviations are used to keep from adding to the time lag between the idea popping into your head and the several-second delay before it appears on computer screens across the country. These include R for "are," U for "you," and OIC for "Oh, I see." It is also com-

mon practice to shorten someone's handle to a nickname to speed things along. Don't worry that you're speaking too casually to perfect strangers by giving them nicknames. Everybody is on buddy status the moment they log on to CB. When you're talking to handles like HONEY BUNS and TINKERBELL, it's difficult to be formal. Abbreviations, by the way, are not mandatory; if you're a fast typist, there's no need for them except for the cultish joy of speaking shared jargon.

When you're talking to handles like HONEY BUNS and TINKERBELL, it's difficult to be formal.

Other CB conventions have arisen not so much to speed things along as to help make sense of who's coming and going and who's saying what to whom. The most common convention is three equal signs and a right angle bracket to indicate who you are talking to. If you wanted to talk specifically to DANGEROUS, for example, you would type DANG = = => WHAT KIND OF COMPUTER R U USING? . DANGEROUS would be able to read the question without this signal, but he might not be sure it was for him.

When you have just returned from /TALK or another channel, it is common to type

:::::BACK:::::

and when I've just returned from a lengthy /USTAT, I type

:::::DANGEROUSSTAT:::::

When you are leaving to investigate a SIG you might type

:::::GONE SIGGING:::::

Psychologists tell us that language accounts for only 10 percent of human communication. The rest consists of vocal inflection, body language, eye contact, and smell. The scrolling type of computerized CB is therefore a rather limited medium.

Communication can be increased, however, by using innovative typing styles to take advantage of the keyboard. The odd keys of the computer keyboard take on new significance as CBers strain to express feelings with keys. The angle brackets give a nice, warm, enclosing feeling as friends meet with <<<HUGS>>>, and exclamation marks add sparkles of excitement when a typist offers !!!!!KISSES!!!!!! Mirth is often indicated by "HAHAHA" or "HEHEHE," and extreme boredom is expressed with "ZZZZZZZZ." Since CB dialogue appears like lines of an endless play, it is no surprise that parenthetical stage directions are used to give emphasis. These include such illusionary devices as (soft voice), *BLUSH*, or :::sigh:::.

Common CB Topics

After you've learned the commands and jargon, now what do you say? What are all these people on here for anyway? Think of CB as a large and noisy party, and the channels as various rooms in the house. People log on to CB for many reasons, just as there are many reasons people go to big parties. Some CBers are searching for new friends, contacts, or lovers, whether they meet them later in real life or carry on electronic relationships only. Others are already friends and find that it's cheaper to talk at $6 an hour on a local phone call than it is to call long distance. Others log on out of boredom or a need for conversation with someone they'll never meet again (like talking to a stranger on an airplane). Some join out of curiosity or out of the sheer madcap joy of CB—the mental and digital pyrotechnics of carrying on several conversations at once. As the handle known as R2-D4 said one night, "THERE'S NOTHING GOING ON HERE AND I THRIVE ON MAYHEM."

When you tune to a new channel, you can say hello and then sit back and lurk until someone talks to you. Or you can wait until someone mentions something of interest and then jump in with a comment or question. Common questions include: "Where are you from?" "How old are you?" "What kind of computer do you have?" "M or F?" and "What's your occupation?" Just like at a party, these lines can lead nowhere or to fascinating conversations, depending on your ability or interest in keeping the conversation rolling.

Beyond these opening questions, however, CB conversations can and do go just about anywhere. The weather, music, sports events, and computers are all rather common topics. Some people use CB to sell computer equipment, offer business propositions, or swap the latest phreaking and hacking exploits. Others practice foreign language skills or discuss the news. Several times I've played word salad (free association) on CB, and twice I discussed the topic of death with a handle called GOD. In fact, playing GOD is a common pastime on CB.

Once a man committed suicide by jumping off his computer.

People can create illusions and play games on CB that are impossible elsewhere. Once a man committed suicide by jumping off his computer. He described the event in graphic detail. Another popular game is Thermo-

nuclear War, something of a spinoff on the movie *War Games*; one person asks for likely targets and then destroys entire cities (see Figure 4).

At other times you'll find role-playing games in progress (although online role games are more commonly the province of the Games SIG). Once I entered a channel to find that everyone had taken on the personas of characters in *Star Trek*. An entire impromptu script was played out down to the destruction of the Klingon slime. You can often find members of the Games SIG Dungeons and Dragons playing role games such as the following:

(A7,~KING ARTHUR) I AM ENGLISH ROYALTY.
(A7,THUNDAR) BARBARIAN
(A7,DARIA DANAE) I BE A MIXTURE OF AVARI AND SINDAR.
(A7,SILICON VALLEY GUY) SIGH, GUESS THE DAMN TIME MACHINE WENT NUTS.
(A7,DARIA DANAE) LORD MHORAM = = = > THOU ART SINDAR, AS FAR AS I CAN TELL.
(A7,THANGION!) I BE OF THE RACE OF URMEN, HEROS OF THE ANCIENT WORLD.

As SILICON VALLEY GUY discovered, you can never be sure who you'll be talking to next. The difference between CB and a party is that on CB you are starting with no point of reference from which to launch a conversation except for the handle. And even the handles can change at any time. Using the /HAN command allows you to change your handle as often as you want, giving CBers the excitement of taking on new personas and attitudes. Others take great joy in flushing out the handle changers by frequent /USTATing and by recognizing familiar typing patterns. Most people, however, stick with one handle most of the time. It's hard to make friends when your name keeps changing, and it's nice to be recognized from night to night.

One of the greatest thrills and challenges of CB is carrying on several conversations at once. We have all done this aurally, but the clamoring voices tend to create headaches. On screen, however, multiple conversations are less irritating, though still difficult. They are possible because there is a time lag between question and response. This lag can also cause confusion because a question may be followed by an answer eight lines later. Saving these conversations to disk will allow you to pick out the various threads at leisure. The ability to keep a record of your conversations is one advantage CB has over other communications media.

> With their identities cloaked by a handle and a green screen, people are sometimes willing to be more honest in type.

CompuSex

Most channels on CB are open to everyone. There are only two specialty channels: Channel 33 for gays and Channel 1 for straight adults. Channel 1 is the pickup bar of CB where you can meet members of the opposite sex for later real-life rendezvous or warm up for a session of CompuSex in the /TALK mode.

CompuSex involves anything from mild on-screen flirtations to graphic exchanges of sexual fantasies, seductions, and jointly described lovemaking sessions. The search for the perfect electronic mate on Channel 1 can be both delightful and obnoxious. A quick look at the /USTAT on 1 not only indicates a large number of people in /TALK mode, but also a rogues' gallery of salacious handles such as DR LOVE, SUPERSTUD, PLAYBOY, and NAKED POWER.

A curious sidelight to the game of CompuSex is that the vast majority of CBers are male. And yet nowhere on CB is there an automatic indication of gender. The only thing to go by is the handle and the manner of typing, and often they aren't predictable. Many handles are not gender specific, and there are more than a few transvestite handle changers roaming the channels. Some females choose masculine handles to avoid harassment, and some males choose feminine handles to enjoy the attention.

The attention can sometimes be overwhelming. The appearance of a handle such as LOLA or NASTY NANCY can completely destroy any conversations in progress as the males stumble over each other to get noticed by the lady intruder. The screen is suddenly filled with the plaintive cries, "PLEASE /TALK, LOLA!" and "LOLA = = = > WHAT'S YOUR JOB #?"

Although most CBers are surprisingly friendly, at times a user will erupt into hostile or lewd remarks that you would rather not have to read. In the old days of CB Simulator, the CIS "wizards" heavily monitored the channels and kicked people off the system if they violated the rather rigid censorship code. This led to a rebellion among CB users, and the wizards were banished, leaving the CBers to police themselves.

This self-policing is largely accomplished by using the /SQU (squelch) command. If DANGEROUS is babbling obscenely, simply type /SQU DAN-

```
(A6,DANGEROUS) FIRE THEN
(A6,===LOGAN===) BOOOOOOOOOOOOOM!!!!!!!!!!!!!
(A6,DANGEROUS) THANK YOU. IT'S SO MUCH MORE PEACEFUL DEAD
(A6,ARTHUR DENT) IF YOU CAN`T TAKE THE HEAT OUT OF THE WAR
(A6,===LOGAN===) DESTRUCTION!!!!!!!
(A6,SWORDFISH) >YAWN<
(A6,STAN) CLEARWATER FLORIDA...NEXT TARGET  PER REQUEST!!!!
(A6,DANGEROUS) IT'S A DANGEROUS WORLD
(A6,SWORDFISH) ZZZ
(A6,===LOGAN===) NEXT TARGET?
(A6,RIVER RAT) BYE LOGAN
(A6,ARTHUR DENT) AUBURN ,AL
(A6,===LOGAN===) BYE RR
(A6,SWORDFISH) BYE RIVER RAT
(A6,DANGEROUS) SILICON VALLEY
(A6,===LOGAN===) CLEARWATER FLORIDA
(A6,STAN) NEXT TARGET....LONDON ENGLAND!!!!
(A6,DANGEROUS) NOT THE CLASH!
(A6,===LOGAN===) LAUNCHING NOW!!!!!!!!!!!
(A6,SWORDFISH) SHEESH - BORING!
(A6,RIVER RAT) NO NOT LONDON!!!!!!!!!!!!!!!!!!
(A6,DANGEROUS) SWORDFISH WANTS CREATIVE GAMES
(A6,STAN) NEXT TARGET....SUNNYVALE CALIFORNIA!!!!
(A6,===LOGAN===) LAUNCHING AGAINST CLW FLA!!!!
(A6,===LOGAN===) IMPACT!!!!!!!!!!
(A6,SWORDFISH) SWORDFISH WANTS *NO* GAMES
(A6,STAN) LET'S HAVE MULTIPLE LAUNCHINGS OUT OF TUBES 45 AND 36 AND 78!!!!
(A6,===LOGAN===) BOOOOOOOOOOOM!!!!!!!!!!!!
(A6,DANGEROUS) SWORDFISH WANTS REALITY
(A6,ARTHUR DENT) LETS PLAY CATCH WITH C-3
(A6,===LOGAN===) CLEARWATER IS NO MORE!!!!!!!!!!
(A6,SWORDFISH) NO, JUST NO GAMES. NOT AT $6/HR.
(A6,DANGEROUS) HOW DO YOU PLAY CATCH?
(A6,STAN) WOULD YOU LIKE TO PLAY A NICE GAME OF CHESS/????PROFESSOR?
(A6,===LOGAN===) WAR GAMES TERMINAL WAS DESTROYED!!!!!!!!!!
(A6,RIVER RAT) A STRANGE GAME THE ONLY WAY TO WIN IS NOT TO PLAY
(A6,===LOGAN===) GAME OVER!!!!!!!!!!
(A6,===LOGAN===) RIGHT RR!!!!
(A6,ARTHUR DENT) I LET THE C-3 DRY THEN THROW IT TO YOU
(A6,SWORDFISH) GLAD TO HEAR IT, LOGAN!
(A6,DANGEROUS) WE ALL WON!
(A6,===LOGAN===) YOU SAW?
(A6,STAN) IS THIS A GAME OR IS IT REALITY?
```

Figure 5: Sample CB text—Thermonuclear War

GEROUS and his output will be eradicated from your screen. To remove the squelch type /SQU . If someone is consistently abusive, you can complain to the SYSOP or to CIS in their Feedback section. Although CB is still monitored occasionally by CIS, conversations are not stored. Everything typed in /TALK mode, however, is completely private, and anything goes.

A lot of effort is spent luring people into /TALK, and the first step is establishing gender. Channel 1 is overloaded with the query "M or F?" I was once invited into /TALK mode (which is not always used for CompuSex) and was immediately abandoned when I gave the wrong answer to the "M or F?" question. Many CBers are obsessed with this search for CompuSex. Some are lonely and can't find partners in real life, others are frightened and turned off by the vulnerability of personal encounters. They find CB the perfect vehicle for not only freely indulging in their own

fantasies but also sharing in the fantasies of others. For these people CompuSex is a truly zipless experience. No worries about relationships, pregnancy, disease, or what you'll say to each other in the morning. Also no sex.

Others, however, use CompuSex and on-line flirtations as a stepping stone to telephone calls and real-life affairs. In the five years since CB has been in existence, close friendships and even marriages have developed on line (see "A> I Do," *PCW*, Vol 1., No. 4). An entire subculture has emerged from CB. CUPCAKE's column (on the main CB menu) reports the latest gossip from the regulars and stars of CB. CBers gather in parties both on line and in real life. As computers and modems become more and more common, one is struck by the diversity of personalities on CB: everyone from suburban kids to retired Marines, bohemian poets to Seattle housewives. All have found electronic sanctuary in CB.

Whether getting together over computers represents an ignominious retreat from real life or a bold step into a new world depends on the user. Despite the common fear of laying out your life and opinions for all to see on screen, dealing face to face with someone is often more frightening. There is safety in the invisibility of CB, a safety that leads to the playing of games and the indulgence in fantasies one could never get away with in person. And yet this same screen barrier can also lead to honesty. Some people express themselves better in writing than in speech. With their identities cloaked by a handle and a green screen, people are sometimes willing to be more honest in type.

In an on-line interview I asked CHRISDOS, SYSOP of CB Simulator, how CB has changed since he first logged on three years ago. "In the beginning it was all hackers," typed

CHRISDOS, "because they were the only ones who could ever find their way here. Then people with home computers started showing up, and we had housewives, students, and business people. Now we seem to be in a period of children."

When I mentioned the element of fear in using CB, CHRISDOS objected: "What fear? On the contrary—end of fear. I am living proof. Pam and I and a bunch of others. I was in New York, she in Chicago. We ran a long-distance relationship on CB. I now have moved to Chicago. CB has let us grow into the real world."

As for the future of CB: "Anytime you make it simple for a vast amount of people to communicate, people will do it. CB will grow. It's like a child now. Some people will drop by, say hello and disappear forever. Some will stay and have a good time. Some will get hooked bad. But then again, it's all fun."

Before I leave CB I take a quick spin around the channels, lurking for awhile and then tuning on. Finally, I exit to the main menu, choose Option 4, and enter the lonely expanses of Band B, which is still fairly empty after several months in operation. I find a fellow all alone, muttering to himself and drawing a picture of a face with his keyboard. "That's me," he says. "Looking good," I say and then sign /OFF. Wow...4 hours and 12 minutes.

I lift my sore body from the chair and stare about the room with glazed, radiation-soaked eyes. The real world appears slightly askew, and I feel as if I've just returned from another planet.

Eric Brown is Assistant Editor at PC World. *He is also the author of* The Alvarez Trail, *a travel book on South America.*

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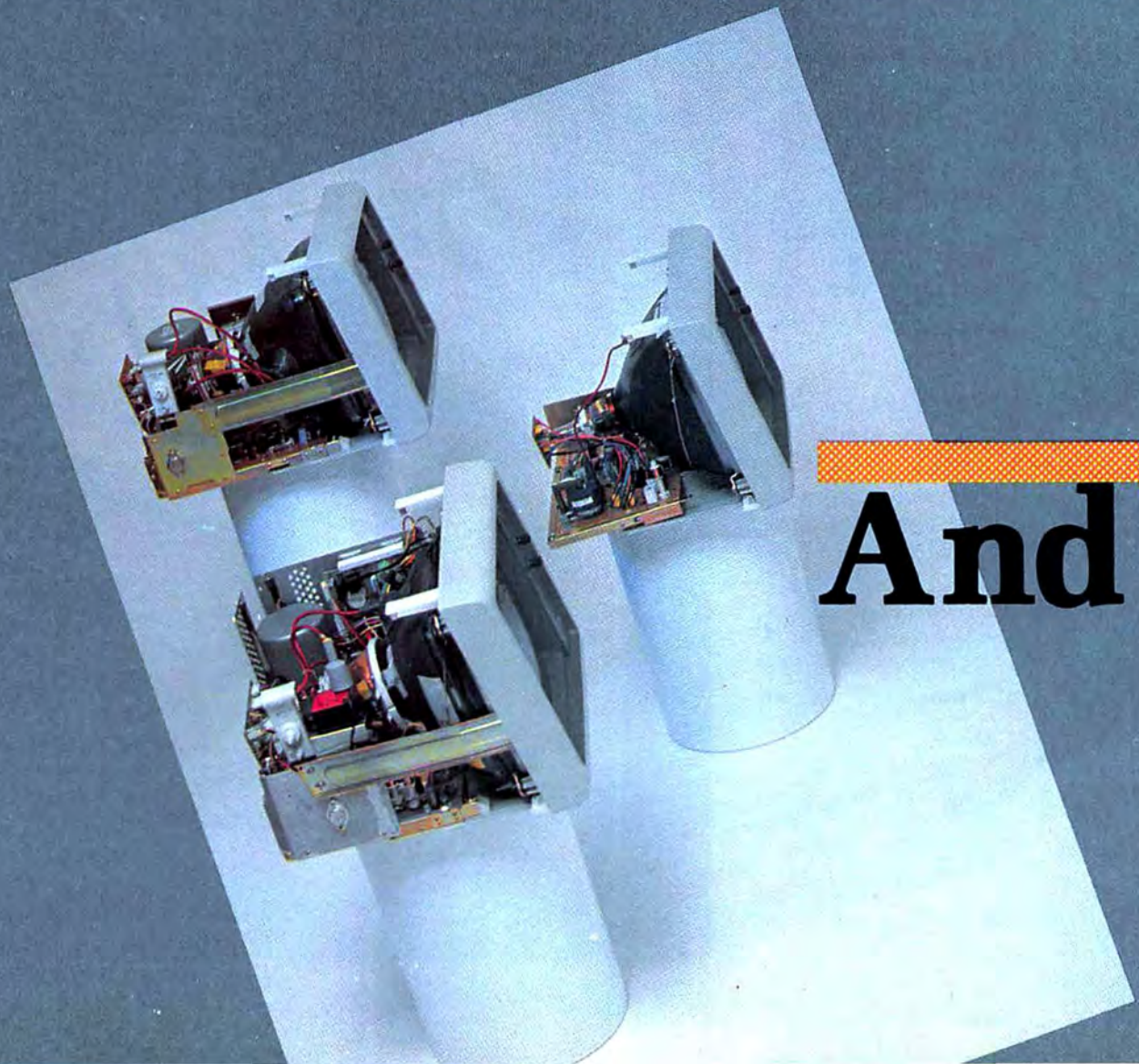

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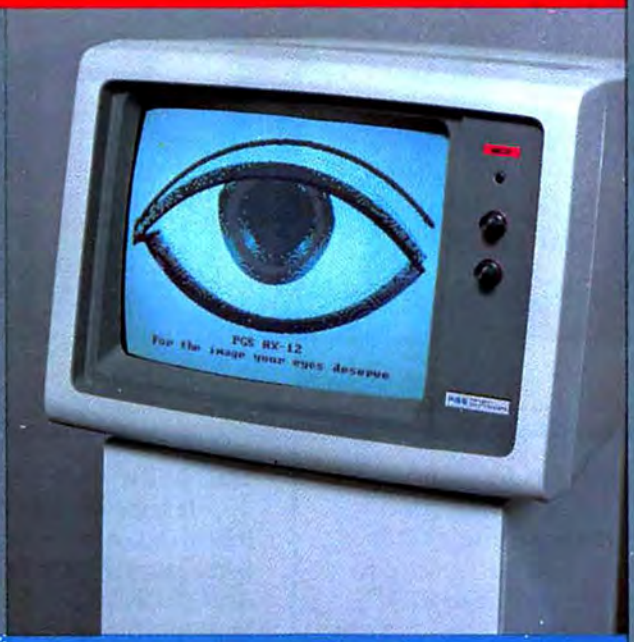

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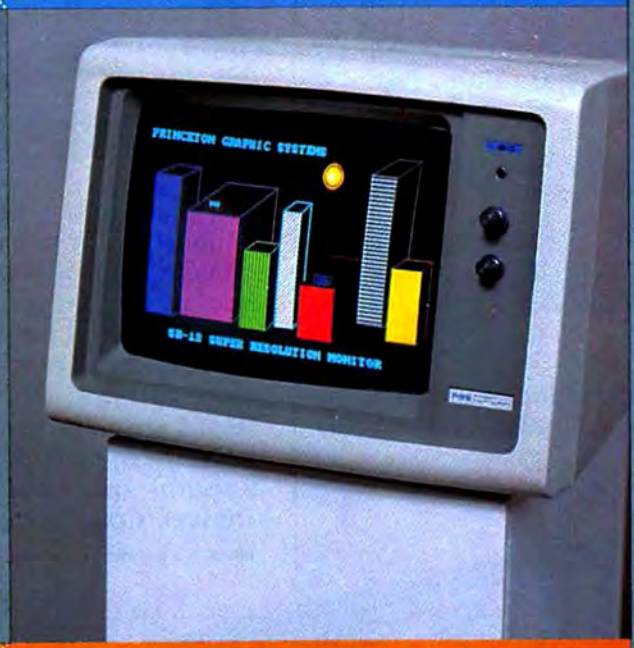

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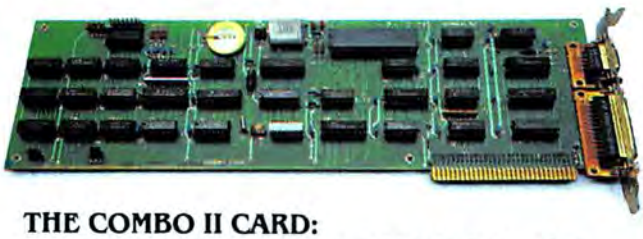

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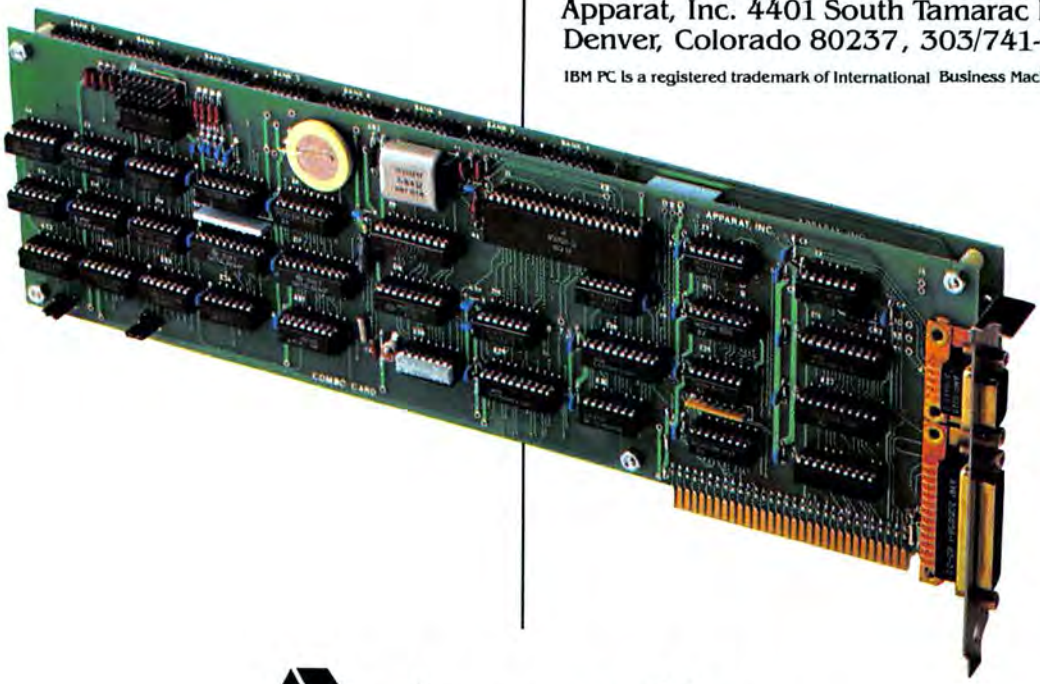

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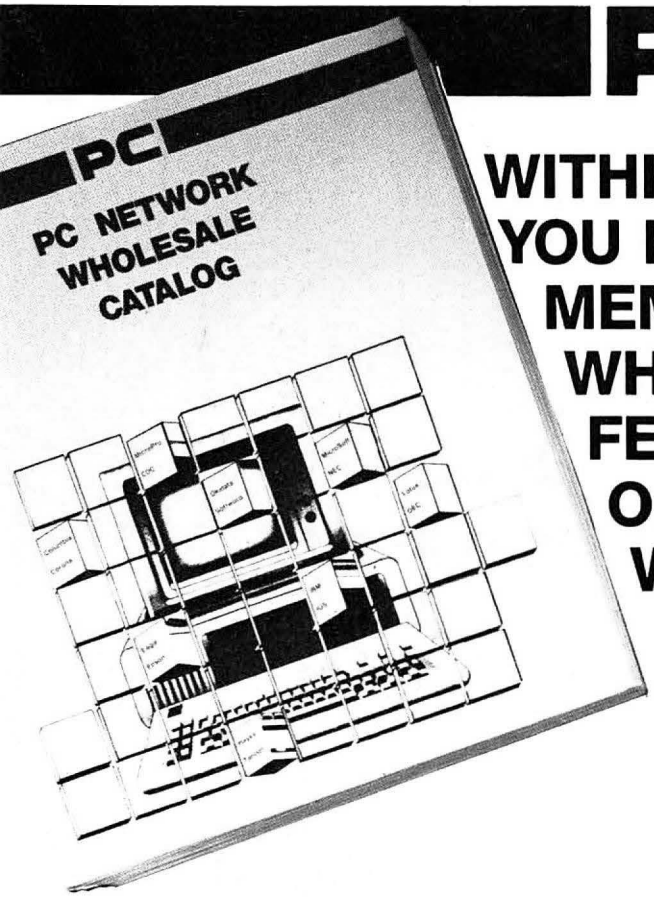

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The Help Screen

PC World offers answers and advice at every level.

Karl Koessel

This month we offer a BASIC routine to derive the day of the week from the date set on the PC's internal clock/calendar. We also discuss the relationship between string variables and BASIC's free memory and the related subject of "string garbage." We also learn how to create a worksheet file that can be read by a word processing program.

Computer Dating

Q. How can I get the PC to tell me the day of the week associated with the date entered in BASIC?

Michael D. Lucchesi
Chicago, Illinois

A. The PC's internal clock/calendar may be set by the DOS command DATE or in BASIC by assigning a value to the reserved variable DATE$. In both cases slashes or hyphens must separate the date you enter into month, day, and year. Year values from 80 through 99 are assumed to be 1980 through 1999. The PC will accept only dates from 1-1-1980 to 12-31-2099 and also checks for invalid dates such as 13-32-1979 or 2-29-1985.

The value returned by BASIC's reserved variable DATE$ is always 13 characters long. Single-digit month and day values are prefixed with a zero, year values always have 4 characters, and dashes are always used for separators. Entering a statement such as `DATE$="1-1/84"` will set DATE$ to 01-01-1984. An attempt to set DATE$ with an improper format (e.g., 1,1,84) or an invalid date will generate an 'Illegal function call' error message.

The short program in Listing 1 allows DATE$ to be reset (or retained) and then prints the corresponding day of the week followed by the 13-character DATE$.

The DATE$ function is used to ensure that the date entered is valid. Because DATE$ is a reserved variable, it may not be used as an INPUT variable (line 30). Instead, the program uses DTE$ as the INPUT variable, and if DTE$ is not null, it will attempt in line 50 to set DATE$ equal to DTE$. (If DTE$ is null, the current DATE$ is retained.) If line 50

> The PC will accept dates from 1-1-1980 to 12-31-2099.

generates an error because DTE$ is not an acceptable DATE$, the error trap (enabled in line 10) will allow you to try again.

When you type in the program, be careful not to confuse the variables DAY$(), DAY$, DAY, DAYNUM, DATE$, and DTE$. Also, the backslash character (\), which denotes integer division, appears three times in line 260. Do not use the forward slash (/) by accident.

Maybe you don't want to reset DATE$ and are simply curious to know the day of the week for any Gregorian date. In this case, I suggest that you consult *Some Common BASIC Programs, IBM Personal Computer Edition* (OSBORNE/McGraw-Hill, 1982). This collection of 76 programs that perform a variety of practical tasks includes a day of the week program that can tell you whether 2-29-2100 is a valid date or calculate the day you were born.

Losing Its Memory

Q. The INKEY$ variable is very useful, but I noticed that free memory decreases each time INKEY$ is used. Can you tell me why the following example using INKEY$ decreases free memory 1 byte at a time as keys are pressed?

```
10  CLS:CLEAR
20  A$=INKEY$
30  LOCATE 1,1
40  PRINT "Free memory=";FRE(0)
50  GOTO 20
```

I also noticed that when zero was reached, free memory jumped up to its original size, as if it had replenished itself.

Raymond H. Fink
Chardon, Ohio

A. In order to assign a value to a new string variable, BASIC creates a variable pointer. This pointer contains the variable's name, a code indicating its type (string), its length, and two bytes whose values "point" to the address in memory of the first byte of the variable's string value. Often the string already exists somewhere in memory, and the pointer is set to point to this location.

If the string must be constructed from other values or input from

```
9 '**** This program sets DATE$ and prints DAY$ (day of the week) ****
10 ON ERROR GOTO 100              'Trap attempts to set an invalid DATE$
20 CLS
30 INPUT ;"Enter DATE$: ",DTE$
40 IF DTE$="" THEN PRINT DATE$;:GOTO 60
50 DATE$=DTE$
60 GOSUB 200                      'Calculate day of the week from DATE$
70 PRINT " is "DAY$"."," DATE$="DATE$
80 END                            'Program completed

99  '***** Error trap to handle attempts to set an invalid DATE$ *****
100 IF ERR=5 AND ERL=50 THEN PRINT " is an invalid DATE$.":RESUME 30
110 STOP                          'Any other ERR or ERL stops program

199 '*** Subroutine to calculate DAY$ (day of the week) from DATE$ ***
200 DAY$(0)="Mon":DAY$(1)="Tues":DAY$(2)="Wednes"
210 DAY$(3)="Thurs":DAY$(4)="Fri":DAY$(5)="Sat":DAY$(6)="Sun"
220 MONTH=VAL(LEFT$(DATE$,2))
230 DAY=VAL(MID$(DATE$,4,2))
240 YEAR=VAL(RIGHT$(DATE$,4))
250 IF MONTH<3 THEN MONTH=MONTH+12:YEAR=YEAR-1
260 DAYNUM=DAY+2*MONTH+INT(.6*(MONTH+1))+YEAR+YEAR\4-YEAR\100+YEAR\400
270 DAY$=DAY$(DAYNUM MOD 7)+"day"
280 RETURN
```

Listing 1

somewhere other than memory (e.g., from the keyboard), the new value is placed in free memory and the pointer is set to point to that location. This operation decreases the amount of free memory by the number of bytes needed to store the new string and occurs every time a new string value is input or constructed. In the case of your program, the decrease is 1 byte (a single character string) at a time.

Memory locations containing unused string data are no longer needed, but they are not considered free. New data will not be placed in these bytes; they have become dead space, called "string garbage." As a program continues to manipulate string values, free memory becomes filled with bytes of data intermixed with string garbage.

Eventually, BASIC runs out of free memory and must take a little time out from whatever it is doing to move the current data into one group, allowing the remaining memory to again be considered free. This process is known as garbage collection, or housecleaning.

For your simple program, housecleaning happens in the blink of an eye, and free memory is again restored. Some programs do a lot of string manipulation and badly fragment data memory with pieces of useful data and garbage. In such cases, housecleaning may take an annoying amount of time.

Garbage Collection Delays

Q. I have written a fairly complex inventory program in BASIC using a random access file with a key (index) file held in memory for fast access. The program comprises about 41K of code when saved in BASIC's tokenized format. I'm quite happy with the program's performance except that it takes too many timeouts for string garbage collecting. These lapses often take 8 to 10 seconds—an

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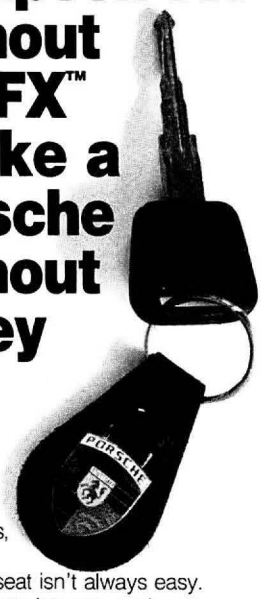

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The Help Screen

eternity when you are waiting for the screen to catch up with you. What techniques can I use to minimize the frequency and duration of these lapses? For example, would it help to figure out a way to keep the length of most string variables constant?

Bob Palmer
Englewood, Colorado

A. Another reader has the same problem....

Q. HELP! I love BASIC. I don't want to use any other language! But, I've got the garbage collection blues: 3 to 5 minutes of emptiness while BASIC collects its garbage. How can I speed up this garbage collection?

R. Harris
Stamford, Connecticut

A. Unfortunately, keeping the length of string variables constant will not minimize the frequency nor the duration of housecleaning lapses. Reducing the length and number of string variables and string manipulations will create less garbage but probably reduce the program's friendliness and/or its special features.

The program offered by Mr. Fink uses the BASIC function FRE, which returns the amount of free memory. The zero within the parenthesis is known as a dummy argument—its value is not used by the function. The dummy argument may be a number, a numeric variable, a string, or a string variable. Now, while the value of the argument has no effect on the function, the type of argument does. If the argument is a string, e.g., FRE(""), BASIC will perform housecleaning before returning the amount of free memory. So, although we cannot speed up housecleaning, we can do it more often, before there is a large amount of garbage. If you do it often, it will happen so fast that you won't notice the lapse.

VisiCalc to WordStar

Q. I am doing some accounting work for 77 condominium owners using VisiCalc 1.10. *The monthly revenue and expenses for each owner are different. At the end of the year I plan to send a letter and tax information to each owner using* WordStar/MailMerge, *but I have been unable to find a way to transfer data from* VisiCalc *to* WordStar.

Is there a method that transfers data from VisiCalc *to* WordStar?

L. B. Edwards
Sunriver, Oregon

A. The *VisiCalc* command /PF sends any portion of a worksheet to any device. When directed to a disk drive, the suffix .PRF is appended to the file name that you assign. This file is different from .VC and .DIF files. It contains only the appearance of the worksheet, titles, labels, and values but does not contain the formulas used to derive the worksheet's values, and therefore it cannot be read by *VisiCalc*. But it can be read by your word processor. For further information check your *VisiCalc* manual's index under .PRF.

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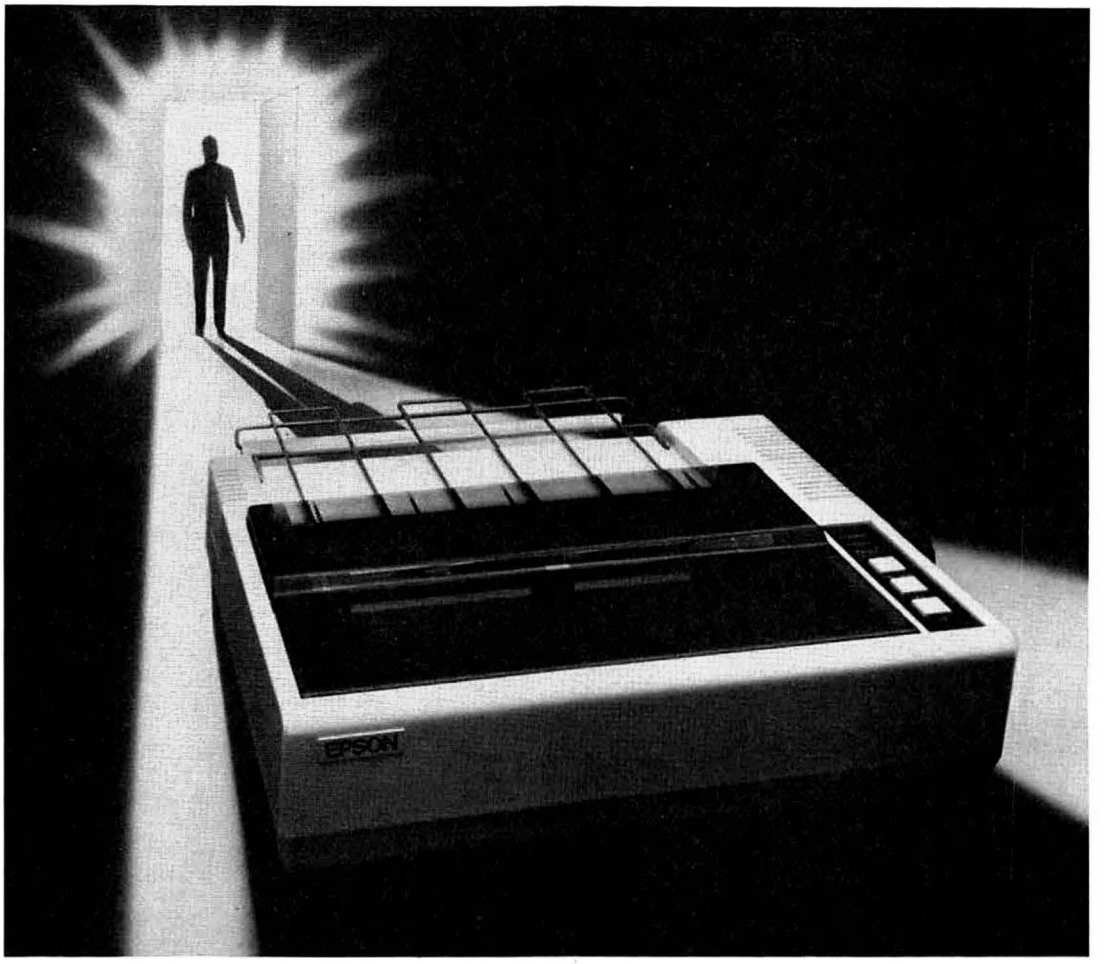

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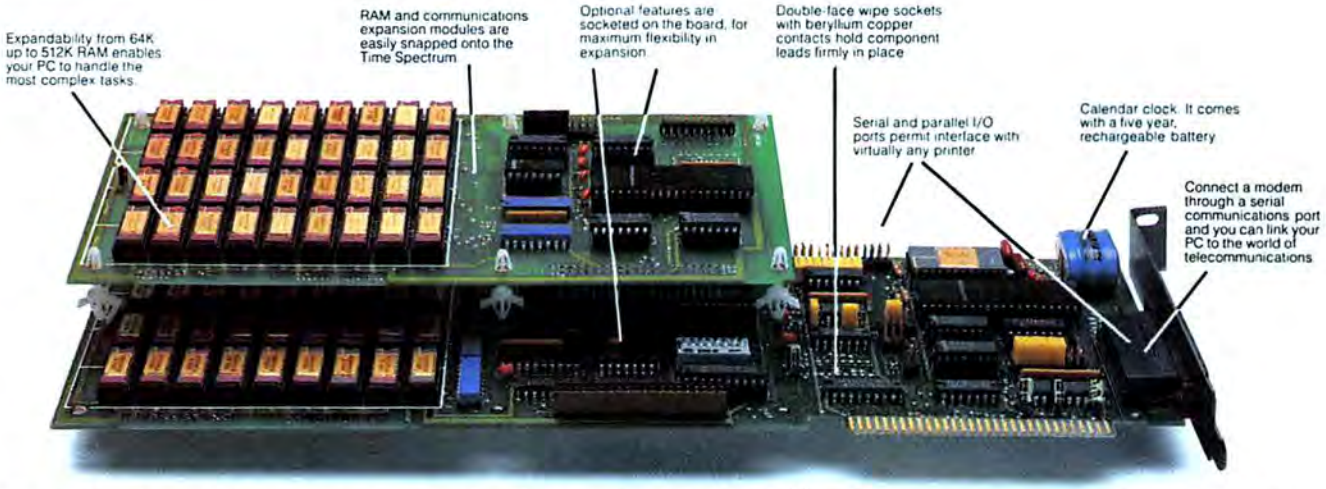

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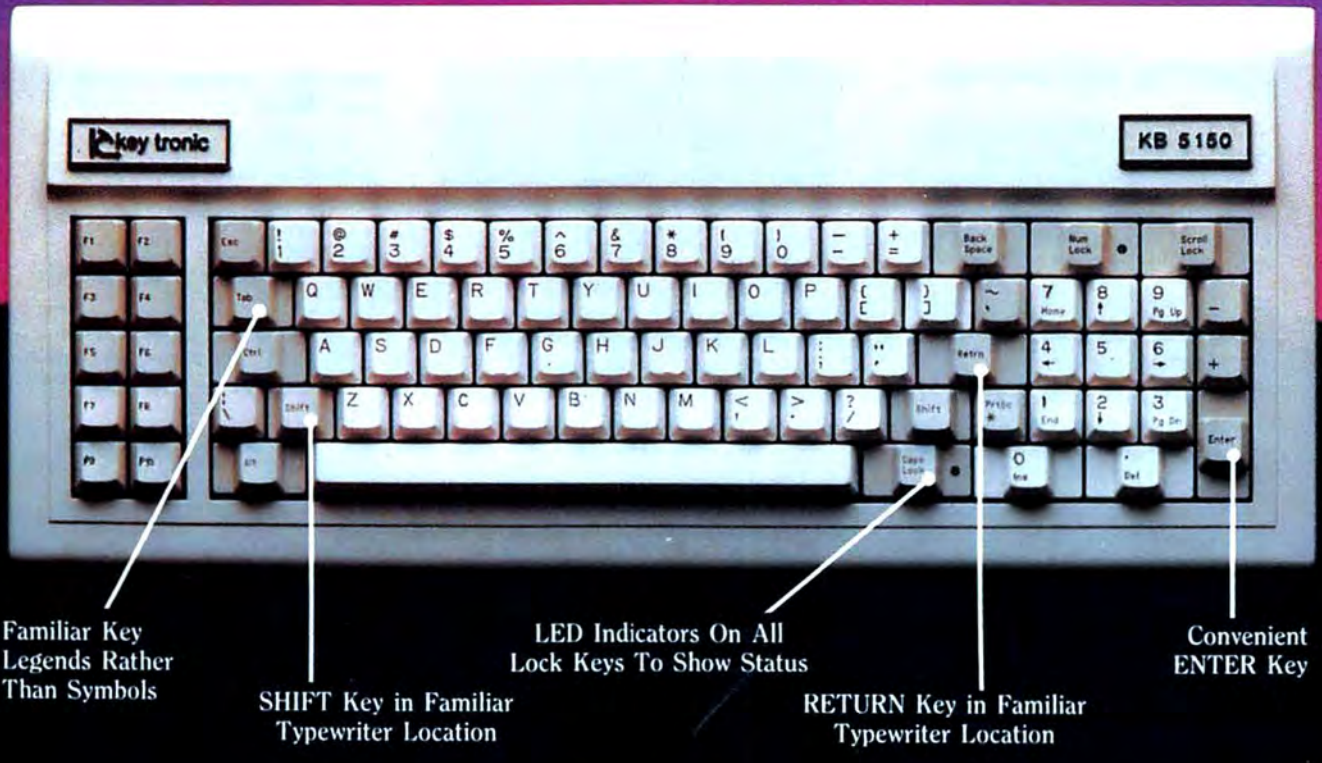

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. Star-Dot-Star

A global exchange of personal computer discoveries

Edited by Karl Koessel and Art Wilcox

Star-Dot-Star continues to be a fascinating forum for the exchange of ideas, tips, and information about events for the IBM PC and its peripherals. Like conversations in open-air markets, the column is molded by a variety of contributions, which are discussed, edited, sometimes enlarged in scope, and sometimes honed down. This month we combined two similar items to make one larger, more effective program (see "Automatic Data Statements"). Both contributors will, of course, be paid for their efforts. We attempt to be equitable and astute, but if we occasionally stumble, your corrections and advice are welcome. This month we include a patch that saves 12K of system memory when you are using DISKCOPY, a clock timer for BASIC 1.1, a union for *WordStar* and the NEC 350, and a better way to SORT with *dBASE II*. Keep the information flowing.

Our lead item is the above-mentioned marriage of two similar submissions received about the same time. They addressed converting a machine code subroutine into sequential values within BASIC DATA lines (thus allowing a BASIC program to recreate the machine code). Each letter was accompanied by a BASIC program with exceptional features, and rather than choose one and lose the contribution of the other, we merged the programs to create MEM2DATA (see listing by that name). To help explain MEM2DATA, we also merged the letters from our contributors, Donald G. Gau of Houston, Texas, and Albert C. Liu of Cambridge, Massachusetts.

Automatic DATA Statements

Appendix C of the *IBM BASIC Reference Manual* describes one method of accessing machine language subroutines from Interpreted BASIC programs. By using BLOAD, machine code can be loaded into high memory where it can't be accidentally clobbered by BASIC. However, this technique has disadvantages because the "safe" BLOADing point is dependent on the amount of system memory, the presence of resident DOS extensions (such as RAM disks or print spoolers), and even the version of DOS used. Thus, programs that use BLOAD to load machine language subroutines must either sacrifice some portability or make conservative (and inefficient) assumptions about the system on which they are running.

MEM2DATA and the demonstrator program Demo (see listing by that name) offer one way to get around this problem. MEM2DATA is a short BASIC program that converts code already in memory to a series of DATA statements, which you can then merge into a program. Demo demonstrates how to use the DATA statements to recreate the machine code subroutine with an array and then call the subroutine.

To use MEM2DATA you should first assemble your subroutine and link it with the /high option. This labels the .EXE file for relocation into high memory. Next, use DEBUG to load your subroutine, and use the R command to display the PC's registers. The registers you are interested in are CS, the segment location of your subroutine; IP, the offset of your subroutine; and CX, the length of your subroutine. Write down these values and use Q to exit DEBUG.

Now go into BASIC and run MEM2DATA. Give the hex values you recorded for CS, IP, and CX in response to the prompts and the desired line number (in decimal form) for the first DATA statement. The program then prints a series of DATA statements of up to 16 values each on the screen, incrementing each line number by 1. When the program stops, the user <Home>s the cursor and presses the <Enter> key for each DATA statement. These DATA statements will now be contained in the MEM2DATA program.

If more than 20 lines (320 bytes) of data are needed, the program will list the input parameters for the next run. The user then runs the program and performs the <Home> <Enter> <Enter> as many times as necessary to obtain all the DATA statements.

When the full length of the subroutine has been converted, the program deletes lines 100-400 (so make sure you save MEM2DATA before you run it!). Then simply renumber the DATA statements (if so desired) and save the listing as an ASCII file to be merged with the BASIC program being developed. Running MEM2DATA for the machine language subroutine on page C-12 of the BASIC manual creates the output shown in lines 65000-65001 of the Demo listing.

The subroutine in lines 10000-10050 of Demo pokes the DATA values (that make up the machine language subroutine) into an appropriately sized integer array. Lines 11000-11030 contain the subroutine that executes the machine language subroutine now recreated safely within BASIC's DATA segment.

```
100 '
110 '      MEM2DATA - dumps memory into BASIC data statements
120 '
130 '      This program was created by merging submissions from
140 '                Donald G. Gau and Albert C. Liu
150 DEFINT I-K
160 DEF FNVL(A$)=VAL("&H"+A$)
170 INPUT "SEGMENT IN HEX : ",SG$
180 INPUT "OFFSET IN HEX  : ",OF$
190 INPUT "LENGTH IN HEX  : ",BS$
200 INPUT "STARTING LINE NUMBER IN DECIMAL : ",LN
210 IF LN-400<0 THEN PRINT "MUST BE > 400":GOTO 200
220 CLS : DEF SEG=FNVL(SG$)
230 OF=FNVL(OF$) : BS=FNVL(BS$)
240 IF BS>320 THEN K=1:BS2=BS:BS=320 ELSE K=0
250 FOR I=0 TO (BS-1)/16
260   PRINT LN+I;"DATA ";
270   FOR J=0 TO 15
280     IF J+16*I>=BS THEN 310
290     P$=STR$(PEEK(OF+J+16*I))
300     PRINT RIGHT$(P$,LEN(P$)-1)+",";
310   NEXT J
320   PRINT CHR$(29)+" "
330 NEXT I
340 IF K THEN ELSE DELETE 100-390
350 PRINT "FOR THE NEXT RUN USE: DATA SEGMENT = ";SG$
360 PRINT SPC(22)"OFFSET       = ";HEX$(OF+320)
370 PRINT SPC(22)"LENGTH       = ";HEX$(BS2-320)
380 PRINT SPC(22)"LINE NUMBER  = ";LN+20
390 LOCATE 21,1
400 END
```

MEM2DATA

A couple of tricky points should be observed. As shown in lines 10-20 in the Demo listing, before the integer array can be used it must be dimensioned to contain half as many elements (rounding up to the nearest integer) as the number of DATA values to be read into the array. And the first element of the array must be assigned a dummy value (line 30) before using VARPTR (line 10030). Also, the assembly language routine must be fully relocatable, not just to an arbitrary segment but also to an arbitrary offset. This means that you cannot reference data locations within the subroutine itself—you should use explicitly defined variables within BASIC's DATA segment for temporary storage if necessary. JUMPs and CALLs are okay as long as they are assembled as relative branches. Finally, you should always calculate SUBRT, the location of the subroutine, right before you CALL it since string manipulations elsewhere in your program can shift the location of the integer array.

Fast Boot

The program MORERAM.COM is for owners of PCs with more than 64K who hate to wait forever for their machines to boot up. To create the file MORERAM.COM, type in the BASIC program MORERAM.BAS (see listing by that name). Check it for typos, SAVE a copy, and RUN the program. MORERAM.BAS will write the file MORERAM.COM onto the disk in the default drive.

```
10 NDV=22                          'The number of DATA values to read
20 DIM XP%(NDV\2)                  'Dimension array to contain code
30 XP%(0)=0                        'Initialize the array for VARPTR
40 GOSUB 10000                     'Poke DATA values in array XP%()
100 A%=1:B%=2:C%=0                 'Set values for mach. lang. subrt.
110 GOSUB 11000                    'Find and call mach. lang. subrt.
120 PRINT C%                       'PRINT output of mach. lang. subrt.
900 END
9999  'Subroutine to READ and POKE DATA values into array XP%()
10000 DEF SEG
10010 FOR I=1 TO NDV
10020   READ J
10030   POKE VARPTR(XP%(0))-1+I,J
10040 NEXT I
10050 RETURN
10999 'Find and CALL machine language subroutine stored in XP%()
11000 DEF SEG
11010 SUBRT=VARPTR(XP%(0))
11020 CALL SUBRT (A%,B%,C%)
11030 RETURN
64998 'DATA values created by MEM2DATA from object code of the
64999 'assembly listing on page C-12 of the BASIC manual
65000 DATA 85,139,236,139, 118,10,139,4,139,118,8,3,4,139,126,6
65001 DATA 137,5,93,202,6,0
```

DEMO

Now set the DIP switches on the PC's motherboard to 64K so the computer will boot up quickly. When you need more than 64K of memory, type MORERAM <Enter> at the DOS A> prompt. The system will boot up again with all actual memory resident in your PC.

Roy Fan
Fullerton, California

Editor's note: Sometimes MORERAM will not work correctly when other programs or utilities reside in memory above the first 64K segment. When we tried MORERAM after installing an emulated drive, our PC locked up and would not reset. Additionally, many programs we use require more than 64K of memory. You can still have the time-saving benefits of MORERAM without suffering the inconveniences mentioned above if MORERAM is the first command of an AUTOEXEC.BAT file that you use to boot up your PC.

Greasing the Pipe

Pipes in DOS 2.00, such as SORT and MORE, are useful but slow because any intermediate output is written to the default disk drive. If you have an emulated disk on your PC, the COMMAND.COM patch described below will route intermediate output (%PIPE*x*.$$$) to your emulated (electronic) disk (drive C in the example), resulting in a great increase in speed. The patch replaces an ADD instruction used in computing the default drive with a MOV instruction that inserts the desired drive letter.

First, copy COMMAND.COM from a DOS 2.00 disk to another disk so you can patch the copy, not the original. Assuming that the disk to be patched is in drive B and DEBUG is on the disk in drive A, issue the following commands (your typed input is underscored; remember to press <Enter> at the end of each line input):

```
A> DEBUG B:COMMAND.COM
-D 1869 L2
xxxx:1869 04 41
-F 1869 L2 B0 "C"
-W
Writing 4500 bytes
-Q
```

```
100 DEFINT A-Z : SUM=0
110 OPEN "MORERAM.COM" AS 1 LEN=1 : FIELD #1, 1 AS A$
120 FOR A=1 TO 50 : READ B: LSET A$=CHR$(B): PUT #1, A: SUM=SUM+B: NEXT
130 IF SUM=5726 THEN PRINT "MORERAM.COM created." ELSE PRINT "Data Error!"
140 CLOSE 1 : END
200 DATA &H31,&HC0,&HE6,&HA0,&H8B,&H1E,&H02,&H00,&H8E,&HC3,&H31,&HFF
210 DATA &HB9,&H00,&H80,&HF3,&HAB,&H26,&H39,&H06,&H00,&H00,&H75,&H0A
220 DATA &H81,&HC3,&H00,&H10,&H81,&HFB,&H00,&HA0,&H75,&HE6,&HB1,&H06
230 DATA &HD3,&HEB,&H8E,&HD8,&H89,&H1E,&H13,&H04,&HB0,&H80,&HE6,&HA0
240 DATA &HCD,&H19
```

MORERAM.BAS

The C above indicates drive C. You may, of course, designate a different emulated drive. Now, with the patched disk in drive A, reboot the system and "install" your emulated drive. For a comparison, try the following, using both the standard and patched version with a large disk directory: DIR¦SORT¦MORE

Larry Bradley
Orleans, Ontario

Editor's note: Be sure to set up your emulated disk drive before using the pipes SORT or MORE under the patched version of COMMAND.-COM. Otherwise, the new COMMAND.COM tries to write the sorted directory to a nonexistent drive and then issues the 'Not ready reading drive C' prompt. At this point the system will not abort; a system reset is necessary.

Catching COMMAND.COM

After using DISKCOPY on a two-drive system, I was annoyed that I had to reinsert a COMMAND.COM disk in drive A before doing any other work. I have 295K of memory available and see no reason for the 12K transient part of COMMAND.COM to be overwritten. Two passes of the copy function would still be needed to complete the DISKCOPY whether I had 295K or 283K.

The following change to the DOS 2.00 DISKCOPY command causes it to use 12K less than the total available storage to make a copy. DEBUG DISKCOPY.COM and list the area to be patched using the Unassemble subcommand as follows (your typed input is underscored; remember to press <Enter> at the end of each line input):

```
A>DEBUG DISKCOPY.COM
-U 2CC L B
xxxx:02CC 3D0200    CMP     AX,002
xxxx:02CF 7305      JNB     02D6
xxxx:02D1 E85603    CALL    062A
xxxx:02D4 CD20      INT     20
xxxx:02D6 A2A301    MOV     [01A3],AL
```

Then, using the Assemble subcommand, type the following and respond to each prompt with the underscored data:

```
-A 2CC
xxxx:02CC DEC AX
xxxx:02CD DEC AX
xxxx:02CE DEC AX
xxxx:02CF NOP
xxxx:02D0 NOP
xxxx:02D1 NOP
xxxx:02D2 NOP
xxxx:02D3 NOP
xxxx:02D4 NOP
xxxx:02D5 NOP
xxxx:02D6 <Enter>
```

Confirm the change with another Unassemble subcommand as follows:

```
-U 2CC L B
xxxx:02CC 48      DEC     AX
xxxx:02CD 48      DEC     AX
xxxx:02CE 48      DEC     AX
xxxx:02CF 90      NOP     AX
xxxx:02D0 90      NOP
xxxx:02D1 90      NOP
xxxx:02D2 90      NOP
xxxx:02D3 90      NOP
xxxx:02D4 90      NOP
xxxx:02D5 90      NOP
xxxx:02D6 A2A301  MOV     [01A3],AL
```

Then use the Write subcommand to replace the program:

```
-W
Writing 098C bytes
```

And quit:

```
-Q
```

DISKCOPY.COM will no longer require COMMAND.COM in the default drive in order to return to the system.

Betty Roy
Poughkeepsie, New York

Making 'Em Pause

I have seen several published BASIC programs in which an empty FOR...NEXT loop has been used to produce a pause in the program. A typical piece of code looks like this:

```
FOR I = 1 to 1500 : NEXT
```

If you know BASIC instruction times, you can calculate a value for the loop counter that produces an appropriate pause. Alternatively, you can plug in a number and time what happens. Either of these exercises is time consuming. They are also fruitless if you subsequently compile your BASIC program; watch your painfully programmed, user-friendly messages flash on the screen for a tenth of the time they did on the BASIC Interpreter version!

Below are six BASIC statements that produce a predictable pause, whether you use the BASIC Interpreter or Compiled BASIC. Forget about instruction speeds; the internal clock is the best pause calculator you have at your disposal. By changing the value of PAUSE% in the code below, the parent program will pause for as little as 1 second or as long as 59 seconds. The example code below produces a pause of 5 seconds.

```
10  PAUSE% = 5
20  SECS% = VAL(RIGHT$(TIME$,2))
30  ENOUGH% = (SECS% + PAUSE%)
      MOD 60
40  WHILE SECS% <> ENOUGH%
50  SECS% = VAL(RIGHT$(TIME$,2))
60  WEND
```

Forget about instruction speeds; the internal clock is the best pause calculator you have at your disposal.

If for some reason you need the program to pause for longer than 59 seconds, put this code in a FOR...NEXT loop.

Graham Pearson
Houston, Texas

BASIC 1.1 Timer

One problem with BASIC 1.1's TIME$ statement is that it counts only full seconds. In writing programs, you will often need a timing function that can slice a second into smaller pieces. BASIC 2.0 has added a TIMER function that returns the time in hundredths of a second. The accompanying program adds that facility to BASIC 1.1.

When the PC is first powered up, it starts keeping time and assumes that the time it woke up was midnight. DOS then keeps track of time by counting timer "ticks" since midnight. All versions of DOS ask for the correct time and, if given it, adjust the PC's clock accordingly; some add-on boards with calendar/clock chips set the time automatically. The new time is converted into ticks since midnight and stored that way, and the count is updated with every tick.

The timer ticks occur approximately 18.2 times per second. Hence the DOS timekeeping has, at best, a resolution of about 1/18th of a second (plus or minus 55 milliseconds). That is still a lot better than whole seconds.

The *IBM PC Technical Reference* manual tells us that DOS uses 4 bytes to store its count of timer ticks. We can PEEK at these locations to get the count, and that is exactly what is done in line 1000 of the accompanying BASIC program, TIMER.BAS (see listing by that name). However, only 3 bytes are PEEKed because the highest byte is always zero. DOS resets its count to zero at system midnight, so the highest number of ticks, 1800B0 hex, fits in 3 bytes.

Once we have the number of ticks, we can convert them to seconds. The function FNTR!(T!) in line 310 does the conversion, rounding off the figure to two decimal places. More places would be meaningless considering the resolution of the PC's clock.

When timing an event, we usually want to know how long it lasted—the elapsed time. The function FNET$(T1!,T2!) in line 320 takes the starting and ending tick counts, cal-

culates the elapsed time, converts it to seconds, formats the result as a string with no leading blanks, and provides a couple of frills. The CHR$(249) replaces the period with a centered dot, the way many people prefer to represent the decimal point. This may, of course, be changed back to a period, CHR$(46), or if you are European to a comma, CHR$(44). This function, modified to eliminate the seconds conversion, would be nice to use even with BASIC 2.00's TIMER function.

The rest of the program is simply a demonstration of how to use these facilities. Lines 410 to 510 time the timer function itself, demonstrating that it is much faster than the system clock. Since the resolution of the timer function is much higher than that of the system clock, using it should not affect the accuracy of timing. Lines 550 to 650 measure the time of two empty FOR...NEXT loops to show the speed difference between using an integer and a single-precision variable as a loop counter.

One final caveat: if you are doing your timing when you should really be in bed, remember that DOS resets its tick counter at midnight. The program makes no allowance for this, so avoid timing an event that starts before and ends after the witching hour.

Jehangir Gazdar
R. R. Shroff
Bombay, India

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```
100 '*************************************************************************
110 '*                                                                       *
120 '*                            TIMER.BAS                                  *
130 '*                                                                       *
140 '*     A program to demonstrate the use of a subroutine and a            *
150 '*     defined function to simulate the TIMER function of                *
160 '*     BASIC release 2.0.                                                *
170 '*                                                                       *
180 '*     Another defined function may be called to provide the             *
190 '*     elapsed time in seconds between two events.  This function,       *
200 '*     modified to eliminate the conversion to seconds, is also          *
210 '*     useful with the TIMER function of BASIC 2.0.                      *
220 '*                                                                       *
230 '*     R. R. Shroff                          Revised Aug 27 1983         *
240 '*          &                                                            *
250 '*     Jehangir Gazdar                                                   *
260 '*                                                                       *
270 '*************************************************************************
280 '
290 '          define functions
300 '
310 DEF FNTR!(T!)=FIX(T!*5.49255+.5)/100
320 DEF FNET$(T1!,T2!)=MID$(STR$(FIX(FIX((T2!-T1!)*5.49255)/100)),2)+
    CHR$(249)+RIGHT$(STR$(FIX((T2!-T1!)*5.49255+.5)+100),2)+" "+CHR$(241)+
    "0"+CHR$(249)+"06 seconds"
330 '
340 CLS : KEY OFF
350 GOSUB 1000
360 PRINT "Timer ticks since system midnight =" TICK!
370 PRINT "Seconds since system midnight     =" FNTR!(TICK!)
380 '
390 '          check execution time of 'tick' subroutine
```

TIMER.BAS

dBASE II SORT Magic

When using *dBASE II* you may prefer the SORT command over the INDEX command because the former performs a physical rewrite of the data file, while the latter merely sorts an index file that contains pointers to the records in the data file. Unfortunately, the SORT command allows only one key field to be specified, whereas the INDEX command allows up to seven key fields.

What we would like to do is the following:

```
USE <oldfile>
SORT ON <field_1 + field_2 + ... +
  field_n> TO <newfile>
USE <newfile>
```

However, this form of SORT is not legal in *dBASE II*. The *dBASE II* manual suggests that sorting on several key fields be accomplished by cascading sorts. The most minor key is sorted first, then the next most minor key, and so on through the major key. This is an awkward and time-consuming solution at best.

The following sequence of commands performs the desired task in a much more straightforward manner:

```
USE <oldfile>
INDEX ON <field_1 + field_2 + ... +
  field_n> TO <tempfile>
COPY TO <newfile>
USE <newfile>
DELETE FILE <tempfile.ndx>
```

The only limitation to using the INDEX command is that descending sorts are not supported as they are with the SORT command.

Gary Kinsman
Chatsworth, California

```
400 '
410 LOCATE 6,1 : PRINT "Checking execution speed of 'tick' subroutine:-"
420 GOSUB 1000 : START!=TICK!
430 FOR I% = 1 TO 100
440 GOSUB 1000
450 NEXT : FIN! = TICK!
460 ELAPSED! = FIN! - START!
470 PRINT: PRINT "100 iterations took"; ELAPSED!; "timer ticks."
480 PRINT "Execution speed of subroutine is"; ELAPSED!/100 ; "ticks."
490 COLOR 15 : PRINT "The subroutine, even in a loop, is";
    INT(100/ELAPSED!); "times"
500 PRINT "faster than system timer resolution."
510 COLOR 7 : PRINT: PRINT
520 '
530 '           demonstrates use of FNET$
540 '
550 PRINT "Timing 5000 passes through an empty FOR...NEXT loop:-"
560 COLOR 15 : LOCATE 16,33 : PRINT "Elapsed Time
570 GOSUB 1000 : START!=TICK!
580 FOR I% = 1 TO 5000 : NEXT
590 GOSUB 1000
600 PRINT : PRINT "Integer counter ..... " FNET$(START!,TICK!)
610 GOSUB 1000 : START! = TICK!
620 FOR I! = 1 TO 5000 : NEXT
630 GOSUB 1000
640 PRINT "Single precision counter ... " FNET$(START!,TICK!)
650 COLOR 7 : PRINT : END
660 '
670 '           subroutine to get current timer tick
680 '
1000 DEF SEG=64:TICK!=PEEK(108)+PEEK(109)*256+PEEK(110)*65536!:
     DEF SEG:RETURN
```

NEC Sheet-Feeder Aid

Here is a patch that allows *WordStar* to interface with the cut-sheet feeder option of the NEC 3550 printer. Enter the underscored values below (remember to press <Enter> at the end of each line of input):

```
A>DEBUG WS.COM
-D 79D 7A6
xxxx:079D 03 1B 3D
xxxx:07A0 00 00 00 00 00 00 00
-E 079D 09 1B 3D 1B 44 1B 00 09 1B 4D
-W
-Q
```

This patch causes *WordStar* to establish a tab at column 27 (specified by the second 1B above), tab the printer to that column, and set the left margin there. Address 079D is *WordStar*'s PSINIT address (printer initialize) and contains information that *WordStar* will send to the printer whenever it starts to print. This patch moves the printhead over the page before it is fed by the feeder. The second 1B may have to be adjusted to an appropriate HEX value to work on your system.

Jim Glass
Sherman Oaks, California

---

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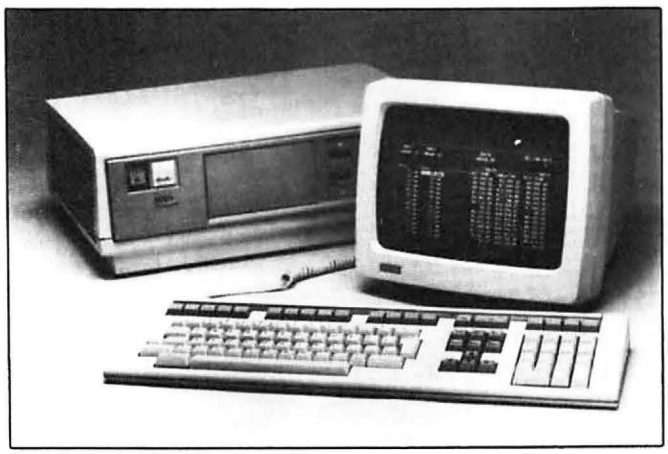

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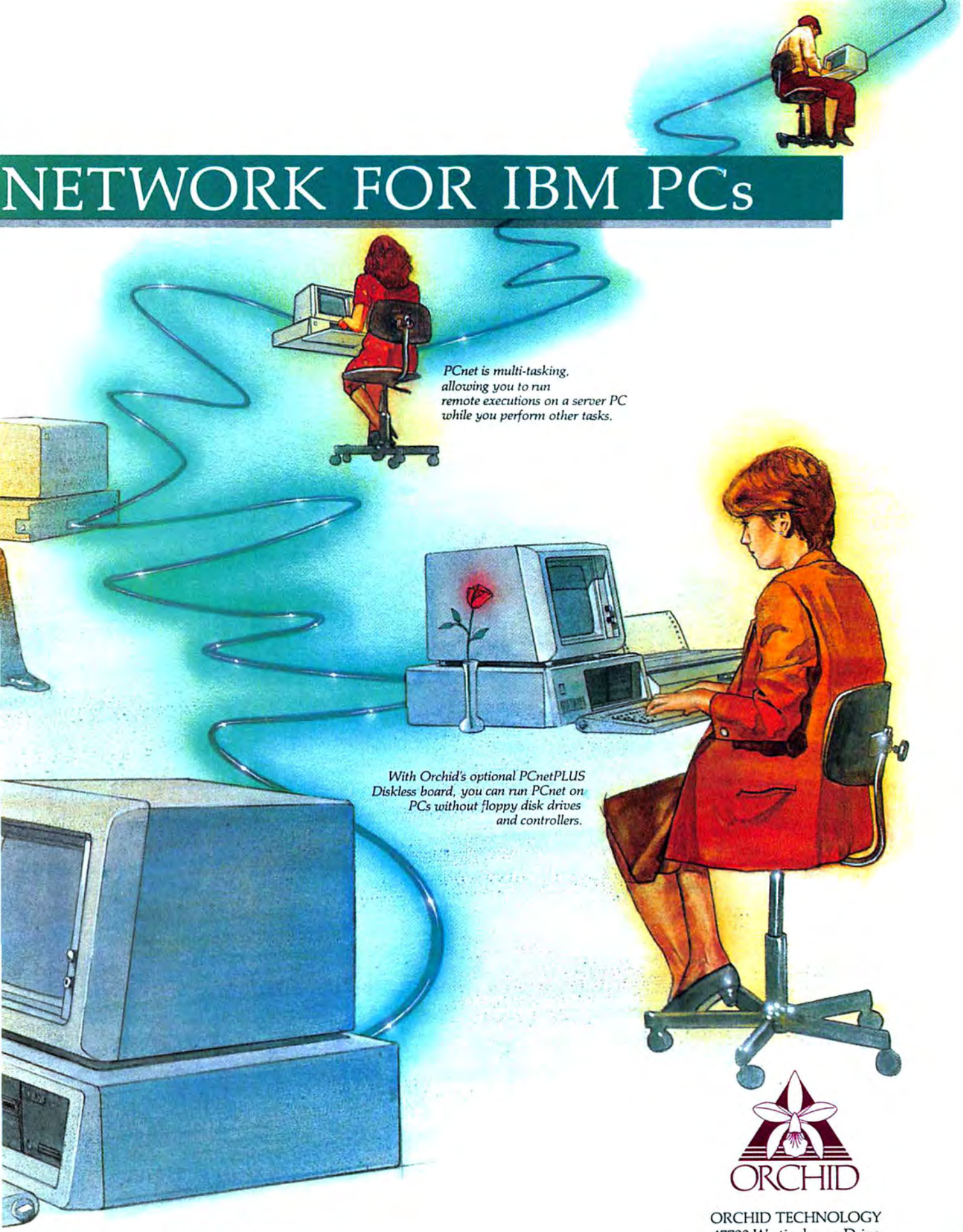

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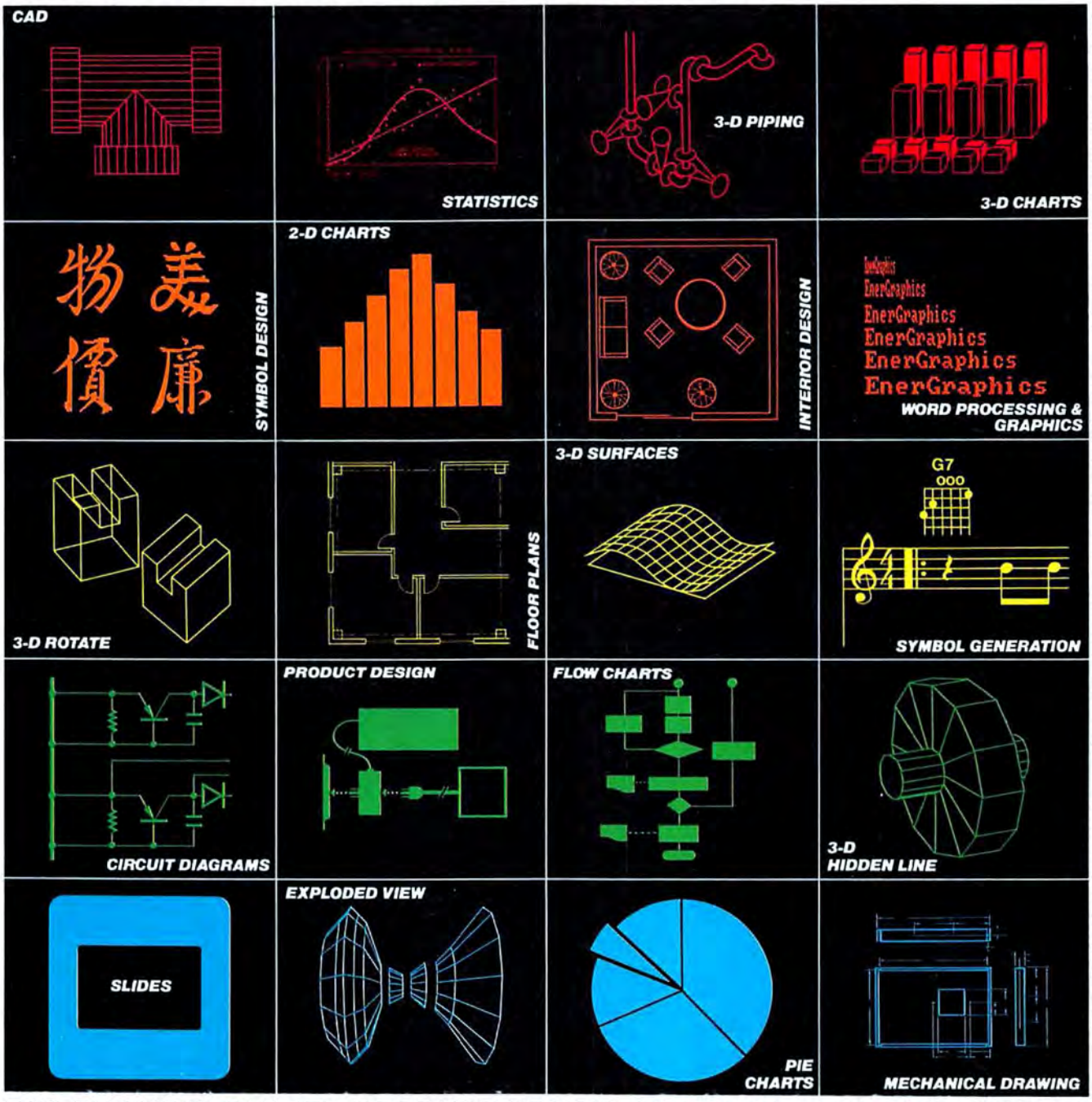

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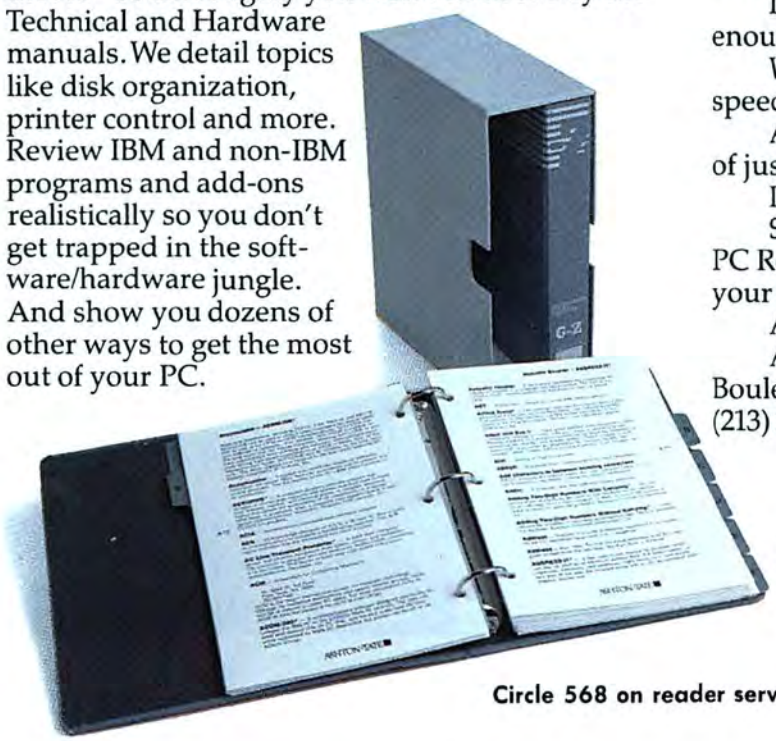

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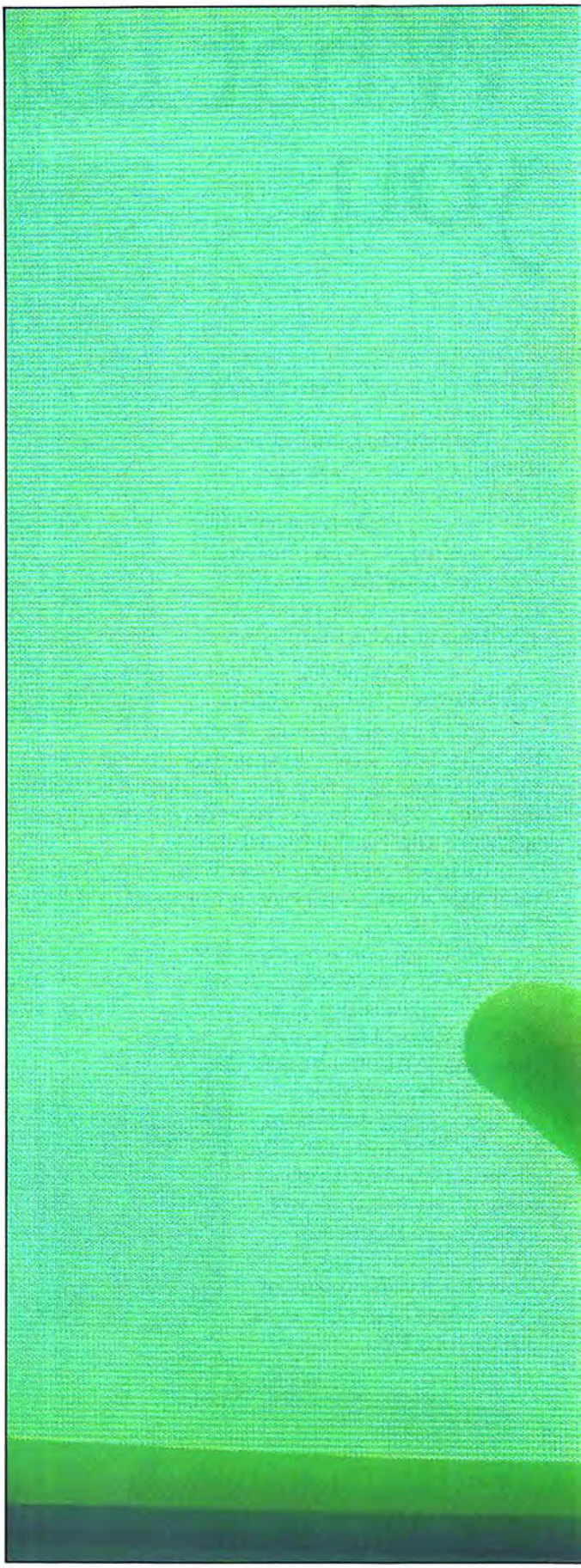
The Radiation Question

Susan Mauk

In most people's minds the phrase "radiation hazard" probably calls up images of cooling towers or mushroom clouds. But the bland-looking boxes on our desks are also a source of a variety of types of radiation. While a definitive statement about the dangers of using a video display terminal (VDT) is impossible at present, this article describes the problem, outlines the controversy, and examines some of the current research on the health effects of radiation from VDTs.



Operators of VDTs have been the single largest source of health complaints registered with the National Institute of Occupational Safety and Health (NIOSH) during the past few years. This is not surprising considering that an estimated 10 million people work with VDTs, and a new VDT is installed every 13 seconds. Health officials and research scientists have been quick to recognize and make recommendations to alleviate many of the problems associated with long hours spent in front of VDTs—eyestrain, back and neck aches, wrist pain, and headaches (see "Ergonomics Is Good Business," *PCW*, Vol. 1, No. 10). But what about radiation hazards? Do they exist, and what risks do IBM PCs present?

Those questions are by no means resolved. Information on the subject is steadily growing, however, and a look at some possible VDT-related health cases and the studies they've generated may help us assess the odds.

Community

Cases

Ten confirmed clusters of pregnancy problems—miscarriages and birth defects—have occurred among VDT operators in the United States and Canada during the past three years. The most recently tallied cluster occurred among clerks in the accounting department of Surrey Memorial Hospital in Vancouver, British Columbia. Of seven pregnancies, there were three miscarriages, one infant with a clubfoot and in need of eye surgery, one infant with bronchitis, one premature birth, and one normal birth. In addition to the ten confirmed clusters, a newsletter put out by the National Association of Office Workers notes that "reports of at least five to ten other abnormal pregnancy 'clusters' among VDT users are as yet unconfirmed. Others undoubtedly go unreported."

Radiation-induced cataracts have been reported among VDT operators in their twenties and thirties. The first were two *New York Times* copy editors in 1977. Other cases followed among copy editors, clerical employees, air traffic controllers, programmers, and typesetters. According to Bob DeMatteo of the Ontario Public Service Employees Union, "All of these cataracts were diagnosed as occurring on the posterior portion of the lens capsule, a sign of radiant energy damage. The victims were too young to have developed common aging cataracts, and none had any medical preconditions to explain the occurrence. Their work histories did not reveal exposure to radiant energy other than the use of VDTs."

Facial rashes among VDT operators have been reported in the United States, Canada, the United Kingdom, and Norway. These rashes are experienced as a slight reddening of the skin accompanied by a featherlike sensation running across the face. The redness usually disappears a few hours after leaving work and reoccurs when work with VDTs is resumed.

Other complaints that some attribute to radiation emissions are chronic headaches, dizziness, sleep disturbances, and impaired memory and concentration.

Establishment View

On the other side of the controversy from those who view VDTs as health hazards are NIOSH, the Food and Drug Administration, the Environmental Protection Agency (EPA), and Bell Laboratories. All conducted investigations that yielded statements echoed by the Committee on Man and Radiation, a division of the Institute of Electrical and Electronics Engineers: "There is no cause for concern regarding hazards associated with emissions of ionizing (X-ray) and nonionizing (low-frequency) radiation from video display terminals."

In the words of David Sliney, chief of the Laser Branch of the U.S. Environmental Hygiene Agency and a member of the National Research Council (NRC) Panel on the Impact of Video Viewing, "It's always advisable to question in matters of health, but what people don't fully recognize is that the radiation problem is probably a red herring. VDTs don't emit any more radiation than a TV set or many other household electronic products. The levels of emission are extremely low. Specialists in epidemiology...have concluded that the miscarriage and cataract clusters are merely statistical quirks.

"When you look at all the studies that have been conducted to examine all forms of radiation, you find that VDT emissions are way below background radiation

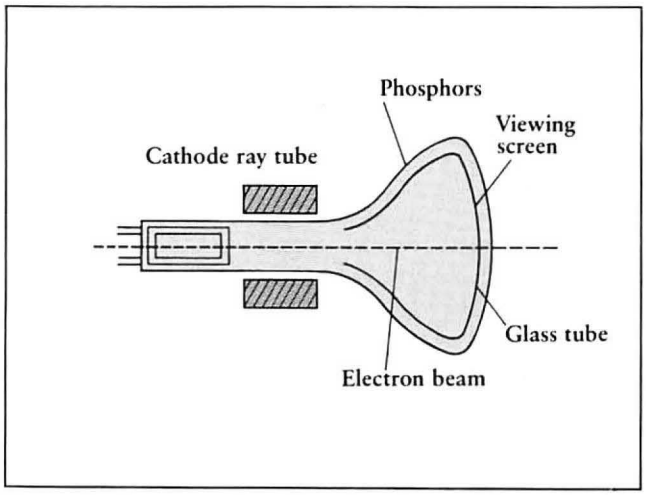


Figure 1: Cutaway view showing the workings of a VDT

[radiation occurring naturally in the environment]. If you fly from California to Baltimore, you are exposed to quite a dose of X rays....No one seems too concerned about that. Why single out VDTs?

"There's radiation in concrete and granite buildings, in the food you eat, in sunlight....One can always legitimately ask, 'Won't a VDT constitute some incremental addition to that?' Yes, it will, but an increment of $\frac{1}{1000}$ is really lost in the noise. If you spend an extra hour out in the sun or 20 minutes leaning against a concrete wall, that's going to overwhelm any exposure you get from your VDT. It's a waste of time and money to explore the radiation issue. We should be spending it instead on new furniture and display designs and on working out break times to reduce the strain and stress experienced with VDT use."

So should we be concerned or not? The cautious among us recall that saccharin, contraceptive pills, DES, and thalidomide were all at one time pronounced boons

to humankind that carried no appreciable risks. And certainly there were delayed responses to the ecological impact of mercury, PCBs, and asbestos, to name a few. Whom do we believe?

If you're not an electronics whiz, the first step in making some kind of determination of the danger is to grasp the basics of the electromagnetic spectrum as it relates to VDTs.

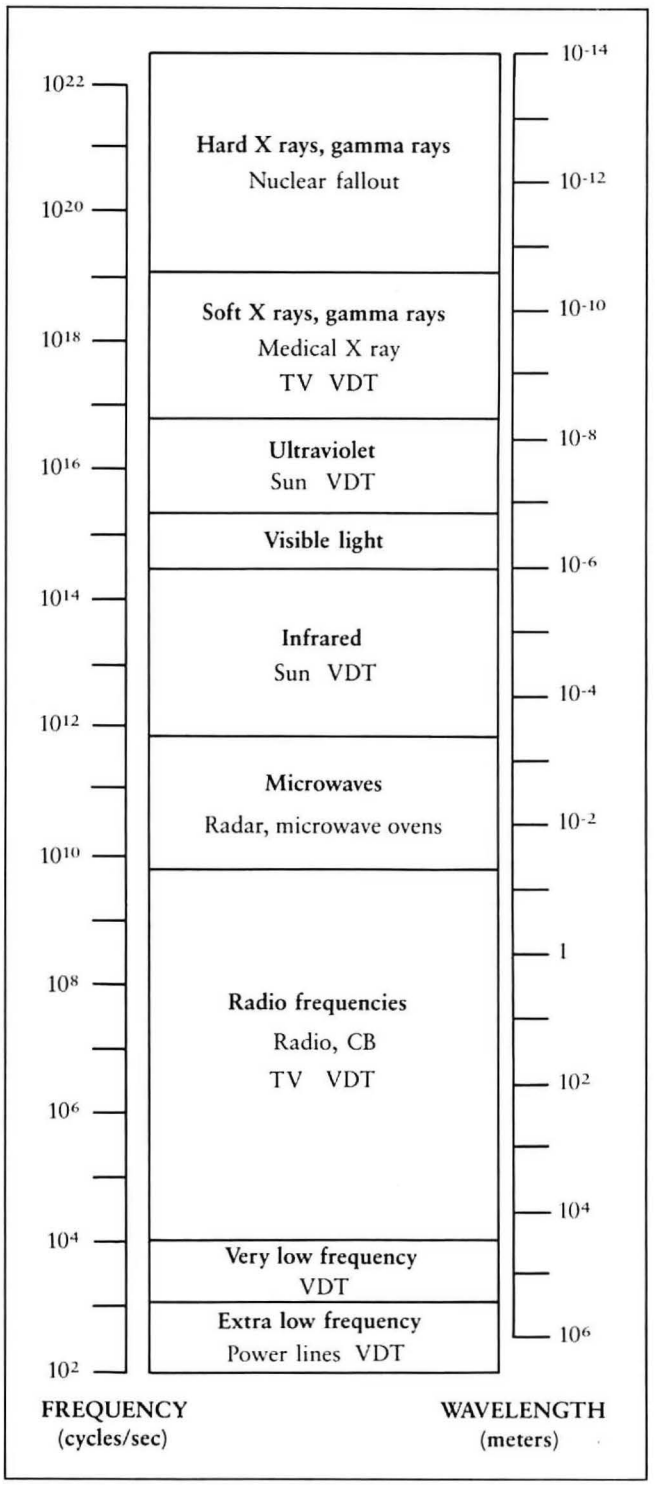


Figure 2: The electromagnetic spectrum

Inside a VDT

A VDT produces its screen image by means of an electron beam that scans horizontally, causing phosphors on the inside of the screen to glow (see Figure 1). As the beam moves back and forth across the screen, it goes on and off thousands of times each second in response to signals from the computer. That produces the patterns of glowing dots we see on the screen.

VDTs are designed to produce visible radiation, but in the process of producing light they generate several other types of electromagnetic radiation as well. Radiation is the emission of energy in the form of waves or particles. The amount of energy in an electromagnetic wave depends on its frequency (or wavelength). The higher the frequency (the shorter the wavelength), the greater the energy.

The VDT's electron beam produces X rays. The activated screen phosphors produce optical light, which includes visible light as well as ultraviolet (UV, usually associated with sunburns and skin cancer) and infrared (IR, commonly used for radiant heat treatments of sore muscles). The electrical components that cause the beam to scan produce static electricity and various kinds of radio waves including radio frequency (RF), very low frequency (VLF), and extremely low frequency (ELF) radiation.

X-radiation

X rays and gamma radiation have high frequencies (see Figure 2) and contain enough energy to strip electrons off atoms and produce chemical alterations in molecules. This process is called ionization, which is why X and gamma radiation are known as ionizing radiation. Hiroshima is still teaching us the mutative power of gamma radiation. X rays have long been associated with cancer, cataracts, sterilization, miscarriages, and birth defects.

In VDTs, X rays are produced by high-speed electrons that originate in the cathode ray tube and bombard the inside of the screen. These X rays have relatively low energy (long wavelengths, low frequency) and hence are called "soft" X rays. The consensus is that for the most part the soft X rays are absorbed by the glass VDT screen. IBM reports that its tests show no measurable levels of X rays from either the IBM monochrome or color monitor.

Studies by both NIOSH and the Bureau of Radiological Health (BRH) show that manufacturing defects, machine failure, improper maintenance, and faults in the high power supply have caused X rays to be released by some models of VDTs. The majority of those models were recalled for modification; the remainder were not

permitted onto United States markets. But Bob DeMatteo, author of "The Hazards of VDTs," published by the Ontario Public Service Employees Union, cautions that not every machine coming off the assembly line is tested for radiation emissions.

In answer to the assertion that there's "no evidence" for any danger comes the reply that there has not been sufficient research.

Optical Radiation

Moving down the electromagnetic spectrum, we come to the first category of nonionizing radiation—optical radiation. Although some evidence indicates that nonionizing radiation can alter the behavior of cells, producing cataracts, cancer, and even genetic damage, it is called nonionizing because it does not have sufficient energy to alter atoms.

Ultraviolet, visible light, and infrared radiation are all forms of optical radiation produced by VDTs. When the phosphors lining the VDT screen are irradiated by the beam of electrons, they emit ultraviolet and infrared rays. As with X rays, most of the optical rays are absorbed by the glass screen. In 1981, BRH measured optical radiation from VDTs and found that the overall intensities at maximum brightness were well within present occupational standards.

Unfortunately, what seems like a clear pronouncement of safety on at least one issue is muddied by the assertion by labor union representatives that the standards deal only with acute effects and not with effects from chronic exposure at lower levels. This dilemma lies at the heart of the health effects controversy: in answer to the assertion that there's "no evidence" for any danger comes the reply that there has not been sufficient research. Little is known about the long-term effects of low levels of nonionizing radiation.

Radio Frequency Radiation

Most tests of VDTs show no detectable levels of radio frequency radiation. In 1981, however, NIOSH and BRH measured high intensities (over 1000 volts per meter) in the radio frequency range from several VDT models, especially near the transformers in the back. NIOSH later discredited the high readings, suggesting that they were caused by "capacitive coupling"—electrical interaction between the test meter and the high-voltage transformer. Even so, NIOSH recommended the installation of a grounded metal shield, preferably made of cold-rolled steel, around the transformer of plastic-cabinet VDTs. (Scientists with the BRH and the U.S. House of Representatives' Committee on Science and Technology maintain that the high readings measured by NIOSH and BRH were caused by very low frequency radiation.)

Where does IBM stand on shielding? According to an IBM spokesperson, "Both the power supply and the switch transistor are enclosed in protective metal shielding. Additionally, there's a line filter inside this enclosure to prevent RF emissions from going back out through the power cord. There is also another metal shield where the cord connects to the power supply. The horizontal output transformer contains a built-in rectifier that converts the high-voltage output to direct current [DC] containing no RF emissions. The inside of the plastic cabinet is painted with a conductive metallic paint so that any stray signals are caught before leaving the cabinet."

Very Low Frequency Radiation

Most of the nonionizing radiation emitted by VDTs occurs in the very low frequency range. Inside the VDT a high-voltage circuit accelerates the electrons that strike the inside of the screen by pulsing high voltage on and off 15,000 to 20,000 times a second. That creates a pulsed electromagnetic field of very low frequency radiation. A study conducted more than 20 years ago by scientists at the Canadian Centre for Occupational Health and Safety showed that pulsed fields are more biologically harmful than continuous waves. More recently, the July 1982 issue of *The Proceedings of the National Academy of Sciences* noted that low-energy electromagnetic fields pulsed at low frequencies significantly influence the growth of cells.

Very few measurements of VLF radiation from VDTs have been made. Reliable meters are both expensive and complicated. However, in investigating the cluster of abnormal pregnancies at Surrey Memorial Hospital, Dr. Hari Sharma of the University of Waterloo in Ontario, Canada, found what he termed "very high power densities" of VLF radiation. An informal survey of seven other British Columbia hospitals found an unexpectedly high incidence of pregnancy problems among clerks using the same type of plastic-cased VDTs as those used by the clerks at Surrey. Counting the Surrey operators, only 5 normal births occurred out of 17 pregnancies. Dr. Sharma recommends shielding the VDTs' flyback transformers. Another Canadian researcher found that VLF emissions are substantially reduced if the insides of plastic-cased terminals are lined with copper foil that is then grounded.

Unlike the Soviet Union and some countries in Eastern Europe, the United States has no standards for exposure to VLF radiation. Most of our leading scientists

in the field believe that these frequencies are not biologically harmful. However, BRH states that "research information on bioeffects for frequency ranges 15 to 125 kHz (VLF) is lacking, so empirical estimates of injury are not possible."

Extremely Low Frequency Radiation

VDTs give off some extremely low frequencies (around 60 Hz, or 60 wave cycles per second). This range is about the same as the frequencies of the electrical fields around high-voltage power lines. When the flow of electricity travels through a power line, the space around the wire is filled with energy radiating outward in very long waves. Similar waves are produced in VDTs and other appliances that have high-voltage components.

In November 1982 three research scientists with Canada's Health and Welfare Radiation Protection Bureau concluded that "on the basis of the available scientific data" electromagnetic emissions at extremely low frequencies from VDTs "are extremely unlikely to be of any health significance." The three scientists—M.A. Stuchly, D.W. Lecuyer, and R.D. Mann—added that "the ELF emissions from VDTs are at least 1000 times less than the magnetic densities that were shown to cause potentially hazardous biological effects."

David Eisen, The Newspaper Guild's director of research and information, points out, however, that the researchers dealt almost exclusively with frequencies of 60 Hz and above, whereas research in the Soviet Union and Eastern Europe suggests that hazards such as birth defects, miscarriage, and premature birth are more likely to occur with exposure to emissions below 60 Hz. Delegates at the Guild's July 1982 convention called for immediate bioeffects research on the low-frequency radiation emitted by VDTs in both the VLF and the ELF bands. "This research is happening," says Eisen, "but far too slowly."

Other Harmful Emissions

In addition to electromagnetic radiation in its various forms, VDTs produce a number of other potentially harmful emissions, including electrostatic fields, ultrasound, and PCBs.

Static electric fields are buildups of stationary electrons; they do not radiate energy in the form of waves. We've all experienced such static electric fields in the "static cling" we feel when our clothes come out of the dryer or the shock we get when we touch a doorknob after crossing a nylon carpet.

The high voltage of VDT transformers can generate electrically charged fields. Depending on the air humidity level, the buildup in the vicinity of the VDT operator

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can be as great as 10,000 volts per meter. This static field produces an exchange of ions between the operator and the screen, with negative ions attracted to the screen and positive ions attracted to the operator.

Three Scandinavian researchers—W.C. Olsen in "Electric Field Enhanced Aerosol Exposure in Visual Display Unit Environments," and V. Linden and S. Rolfsen in "Video Computer Terminal and Occupational Dermatitis"—suggest that facial rashes may be caused by a buildup of static charge, either because the hair follicles are agitated or because pollutants are being attracted to the operator's face.

Laboratory studies of the ion exchange process indicate that depletion of negative ions can have an effect on body metabolism. One such study showed high mortality rates in the offspring of rats raised in a negative-ion-depleted environment. "The Proceedings of the International Conference on Office Work and New Technology" included the view that the electrostatic fields constitute an environmental stressor because of the metabolic changes they can produce.

Sound waves above 20 kilohertz (20,000 cycles per second) are produced as a mechanical response to the alternating voltage in VDT transformers. The only data to date on health effects of ultrasound relate to its use as a diagnostic tool to detect fetal abnormalities. BRH Director John Villforth listed potential risks as increased fetal activity, delayed neural motor response, and reduced birth weight. As with low-frequency radiation, the effects of long-term exposure are as yet unknown.

PCBs, or polychlorinated biphenyls, are extremely dangerous organic chemicals that have been banned from production in this country since 1977 but are still present in the insulation coatings of some older-model VDT transformers and capacitors. If these parts fail, blow up, or are serviced, PCBs can leak, and anyone in the area may suffer serious health damage, including respiratory and vision problems, reproductive damage, and cancer. One office in Oslo, Norway, was found to have levels of PCBs 50 to 80 times greater than the levels found outdoors. VDTs were the only possible source identified. Since 1977, as a corporate policy IBM has not used PCBs in capacitors or transformers.

Synergy

What happens if you throw all the possible VDT hazards into the same pot? Research shows that low-level radiation can increase the permeability of cell membranes, thereby increasing the effects of a variety of drugs. A similar phenomenon occurs when heat packs are applied to cancer patients undergoing X-ray therapy: thermal radiation activates the cells, intensifying the effect of X rays on living tissue. The question arises, therefore, whether ultraviolet, infrared, and radio-frequency radiation emitted from VDTs heats tissues in the same way, enhancing the effects of low-level X-radiation. Are there combined effects?

Again, most scientists maintain that because the increments involved are so small, "the chance that there's any connection with health complaints," as David Sliney puts it, "is extremely remote." Dr. Karel Marha of The Canadian Centre for Occupational Health and Safety, however, is more cautious: "All these fields are known to produce some biological effects. The complex evaluation of all possible factors including combinations of different fields and all other hygienic...factors near VDTs has not been done."

Statistical Quirks?

Many of the studies being conducted in response to VDT complaints are designed to determine whether a problem really exists. Dr. Nancy Binkin, epidemiologist at the Center for Disease Control (CDC), refers to reported birth anomalies as "expected-unexpected" clusters; that is, given a sufficiently large number of offices in which women of child-bearing age work, with or without

> 'If you spend an extra hour out in the sun or 20 minutes leaning against a concrete wall, that's going to overwhelm any exposure you get from your VDT.'

VDTs, the chances are high that a few offices will have a high rate of adverse pregnancy outcomes. A study conducted by the Family Planning Evaluation Division of the Center for Health Promotion and Education in May 1981 showed no association between exposure to VDTs and the 8 out of 12 pregnancies that resulted in spontaneous abortion or neonatal death among workers at Sears Roebuck & Co. in Dallas, Texas.

A similar argument is made concerning the apparently high incidence of cataracts among VDT operators. With 400,000 people requiring cataract operations every year in this country, the reasoning goes that it is not surprising that a good many of those patients happen to be among the millions who work with computers. The NIOSH Task Force on Vision and Technology found "no significant association between VDT use...and the prevalence of eye abnormalities, including cataracts." The Task Force made no mention of the distinction between the "normal" aging cataracts and radiant energy cata-

racts, although Dr. Milton Zaret, a well-known New York ophthalmologist who specializes in nonionizing radiation effects, presented slides of ten cases that he is convinced are radiant energy cataracts caused by VDTs. Ophthalmologists at Johns Hopkins University dismissed his evidence as "anecdotal" and unconvincing.

Studies in Progress

Although NIOSH says that VDTs are unlikely to represent a reproduction hazard, it has initiated a study that will follow 6000 women through their pregnancies and assess whether VDT workers have an abnormal rate of spontaneous abortions and birth defects. One area that the study will investigate is stress. For example, if the boss has a daily worker productivity record at his or her fingertips on the master computer, will the resulting anxiety contribute to adverse pregnancy outcomes?

A similar study is under way in Montreal, Canada, where the Occupational Health and Safety Research Institute is following approximately 50,000 pregnancies. Also in progress is a five-year NIOSH study to determine whether any visual deterioration has occurred among 100 of its own employees working on VDTs.

Although the Canadian Radiation Protection Bureau concluded its VDT testing for ELF and VLF radiation with the assessment that there is no cause for concern, independent laboratories worldwide continue to conduct research on these types of radiation.

The International Picture

It's clear that the United States is moving more slowly than some countries on the VDT emissions question. The Newspaper Guild's David Eisen says, "Canada is conducting more studies [than the United States], both through the Canadian Labor Congress and the Ontario Task Force. Our locals in both countries are certainly concerned about the issue, but in general, there seems to be a higher level of concern among Canadian unions—perhaps because there have been more confirmed birth defect and miscarriage clusters there than here."

Bell Canada is one of several Canadian unions that has won hourly rest breaks, regular eye examinations, and alternate work without loss of pay, seniority, or benefits for pregnant VDT employees. The Ontario Task Force on the Possible Hazards of Visual Display Units recommends the same policies, adding that where alternative work is not available, a pregnant VDT operator should be entitled to benefits under the Workman's Compensation Act for the duration of her pregnancy, with the difference in wages made up by her employer. They also advise a maximum of 5 hours per day at the terminal.

In Norway a standard has been proposed (and is reportedly already in effect in many companies) that limits VDT users to 4 hours a day at the tube. And in Sweden the telephone company has instituted a 2-hours-on, 2-hours-off rotation schedule for VDT operators.

There are currently no federal standards for exposure to radio frequency and microwave radiation. The de facto standard, a set of guidelines published by the American National Standards Institute, a private, nonprofit organization, allows exposures several orders of magnitude higher than Russian standards. (In general, Warsaw Pact countries set standards based on a principal that any level of biological change ought to be precluded, whereas western countries tend to accept levels of exposure that might result in noninjurious biological change.) The EPA is working on a set of exposure guidelines, but no one is sure when they will go into effect.

On the other hand, in answer to the question of whether United States standards are too low to offer workers real protection, Dr. M.M. Weiss of Bell Laboratories said, "Radiation levels detected from VDTs...are a good deal less than even the most conservative exposure standard in effect anywhere in the world."

Conclusion

Long-term exposure? Synergistic effects? No one seems to have the answer. We do know that IBM PCs conform to—in fact, exceed—measures believed to eliminate any known radiation hazard. Beyond that, we can sit well back from our monitors, use shielding if we're working in a space where other computers are in use, take a break every hour or so, and make sure our VDTs have regular machine maintenance.

Any controversy that involves our health and on which the experts are polarized is unsettling. One point of consensus is that in our leap of faith into the computer age some disturbing gaps in radiation bioeffects research have been largely ignored. The fact remains that we've arrived, and it's highly unlikely that we're going to turn back now. The computer industry, moving at its usual breakneck pace, already has alternative monitors for us. Plasma screens offer some hope; however, since they use ionized gases, we may not be escaping the risk of radiation emissions. Another promising option is the liquid crystal display common in wristwatches and calculators. Using LCD monitors would reduce radiation risks simply by greatly reducing voltage.

If we're careful not to trade one potential hazard for another, the difficult question of whether cathode-ray VDTs are bad for us may become moot before long.

Susan Mauk is a freelance writer based in Northern California who specializes in science and health.

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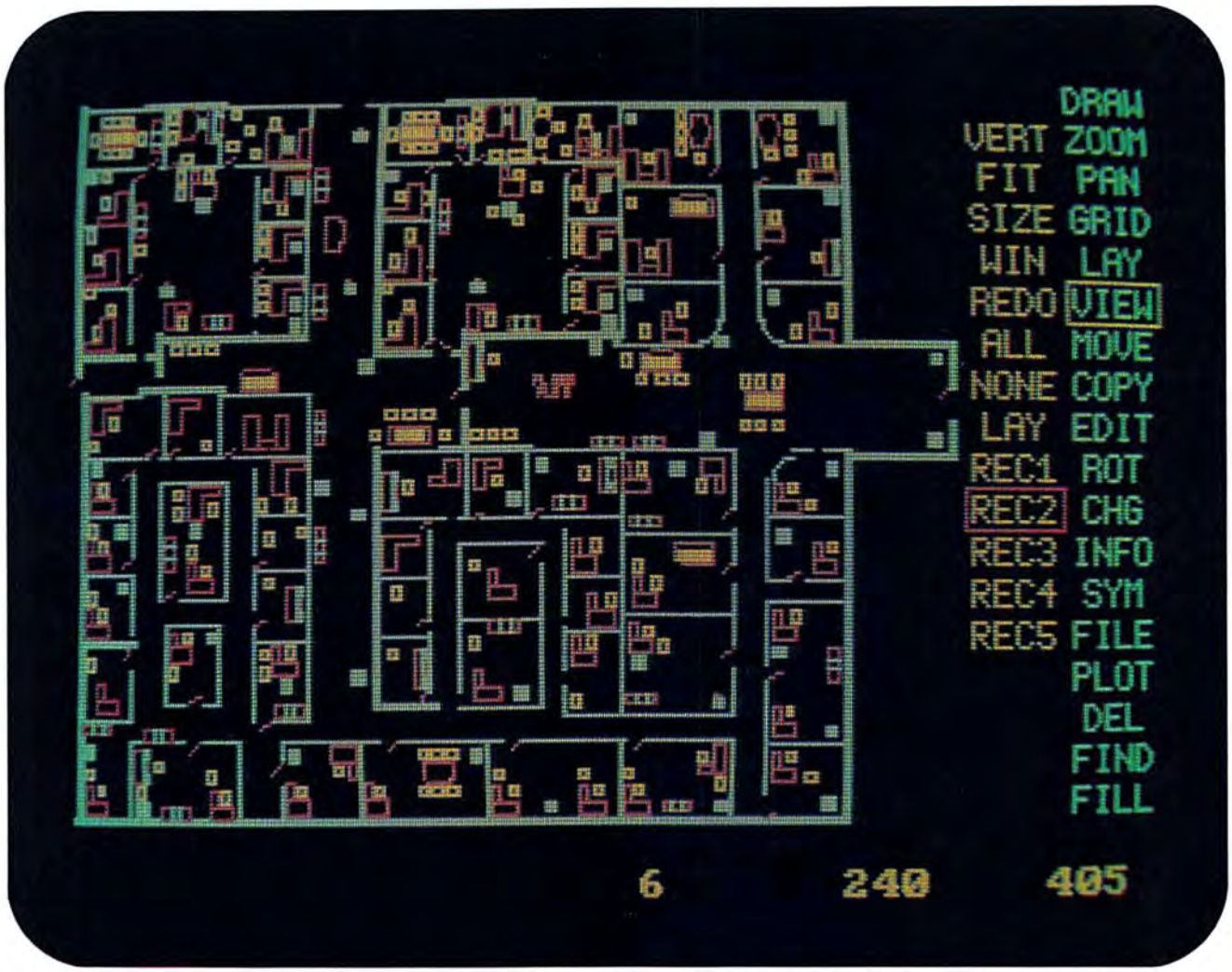

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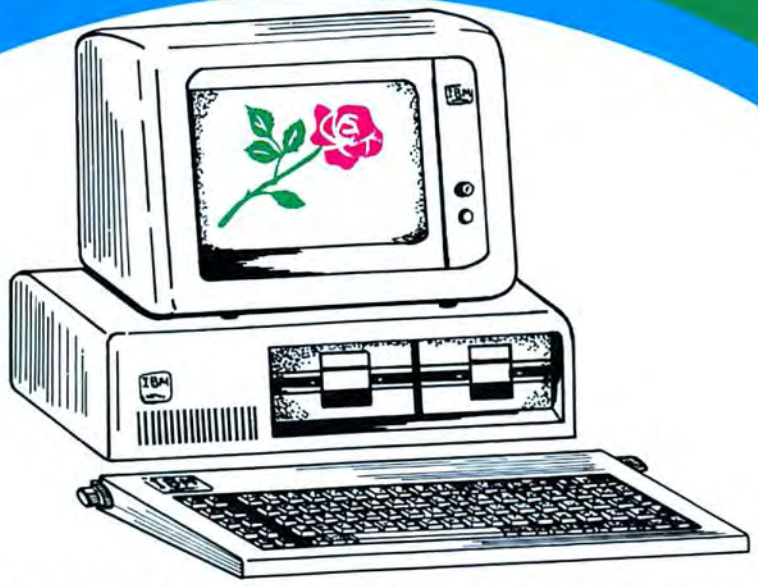

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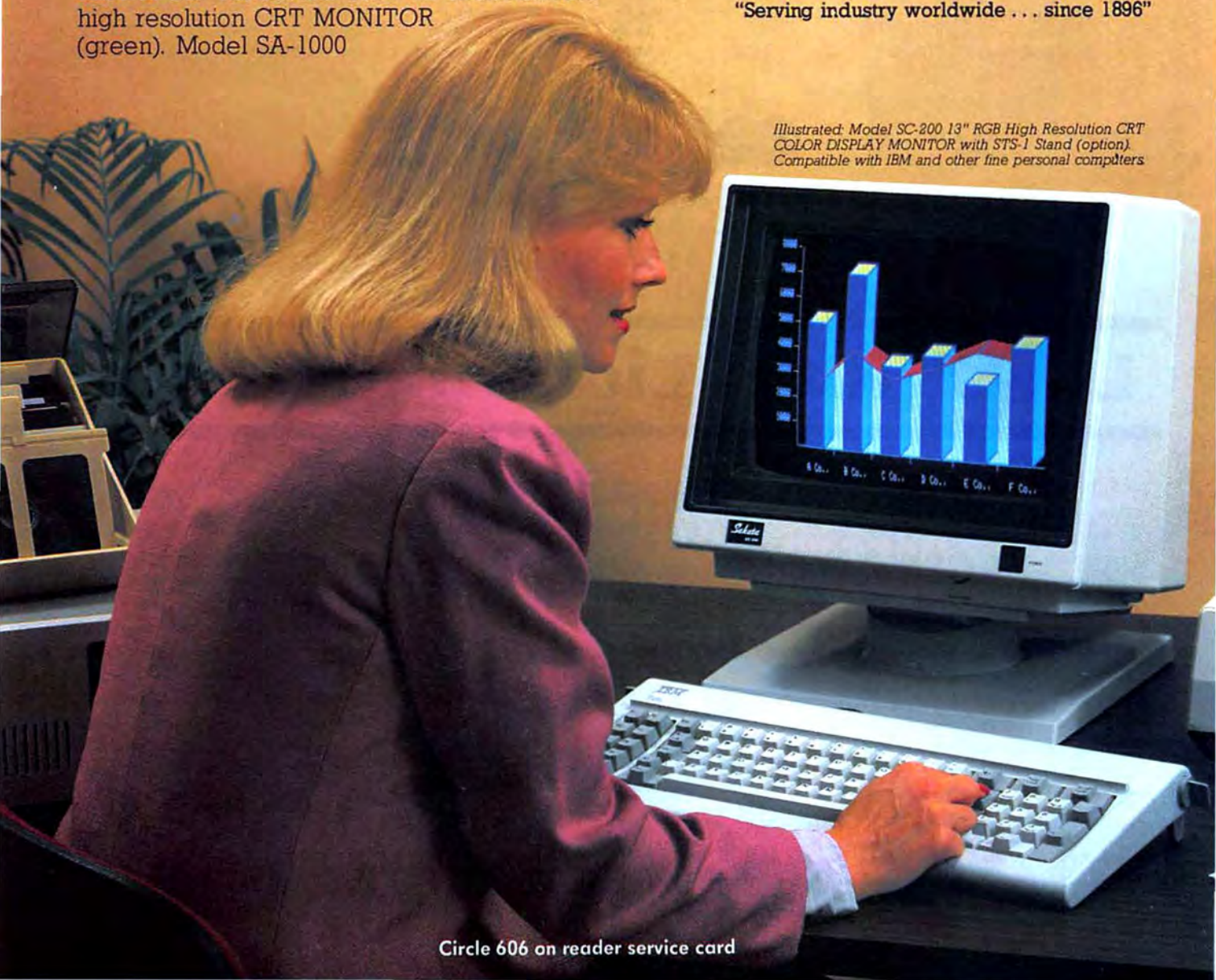

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The Electronic University

Education by modem becomes a reality with TeleLearning's educational network.

Lisa B. Stahr

In 1970 Alvin Toffler predicted in *Future Shock* (Bantam Books, 1970) that in years to come "a good deal of education will take place in the student's own room...at hours of his own choosing...free of the restrictions and unpleasantness that dogged him in the lockstep classroom." In 1983 TeleLearning Systems of San Francisco turned Toffler's prediction into a reality.

TeleLearning's educational telecommunications network combines computers and personalized education to allow students located anywhere to take any of 177 courses offered via the network. The only requirement is that TeleLearning students have access to a computer with a minimum of 64K and communications capability.

This pioneering academic network, announced in September in Washington, D.C., is the culmination of many months of work by TeleLearning's staff of engineers. The team is led by Chairman Ron Gordon, inventor of the hand-held computer and pocket language translator and former chief executive officer of Atari.

As other company employees conducted a nationwide search for university professors who were interested in teaching for the Electronic University, Gordon's team of engineers created an operating system that handles input from a wide variety of computers and software. They also developed end user software that is easy to use and adaptable to several types of personal computers.

> The Electronic University combines computers and personalized education.

To ensure that students who have even the most limited computer knowledge can use the network, TeleLearning's engineers eliminated the machine protocols, commands, and logon sequences normally required for communicating with a host computer from a remote location. These protocols were instead included in the operating system software that controls the network from TeleLearning's mainframe in Maryland. All the student has to do is slip the supplied software disk into a disk drive and turn on the machine.

Electronic Enrollment

Electronic University software is available at bookstores, computer stores, and department and specialty stores. The software commands the computer to dial a local Telenet or Tymnet number automatically via a standard 300 bps modem or through the Knowledge Module, a modem available from TeleLearning at extra cost. Once connected to the TeleLearning computers, the student's software automatically logs him or her onto the system without any human intervention. The responding TeleLearning host computer answers with a digitized photographic image of the student's instructor and a menu that enables the student to register for a course, read a lecture, receive a message or an assignment from the instructor, or send a message or a completed assignment back to the instructor.

A typical student's session might include receiving a study assignment, downloading an instructor's lecture, taking an on-line test, and responding to an instructor's question and then asking another question. Students' messages are sent automati-

cally to the instructor, or if the network has problems, they are saved and sent later. The average lag time for these electronic mail interchanges is 48 hours. If a student has problems with the TeleLearning system, he or she may contact a counselor at the company's San Francisco headquarters 24 hours a day, seven days a week, either by computer or by calling a toll-free telephone number.

Eighty percent of the lessons provide some form of electronic communication with an instructor. Instructors can take advantage of the interactive capabilities of the network by highlighting lecture notes in inverse video and providing feedback during testing. For instance, if a student selects an incorrect option in a multiple-choice question, a message might appear to indicate a page number in an assigned book that would help the student choose the correct answer.

Some courses provide a "live-chat" mode that enables students to conduct real-time dialogues with instructors during specified office hours. This live-chat service, however, costs more money and is dependent on the instructors' schedules.

Courses a la Computer

Once the initial package is purchased, students can sign up for as many courses as they want. Individual course fees depend on the instructor's hourly charges and range from $35 to $150 per hour. The initial offering of 177 classes includes conventional academic instruction in math, science, foreign languages, law, anthropology, and finance. The more unusual courses range from marine biology and the history of dance to Chinese cooking and investing in art prints. Courses for children are also provided, including classes for handicapped and gifted children. The company also offers computer literacy classes designed to teach novices about their particular computers. TeleLearning expects to offer more than 500 courses by the beginning of 1984, drawing on instructors from universities, colleges, technical schools, primary schools, and trade associations.

TeleLearning's educational network also enables companies having geographically dispersed facilities to train employees and customers effectively. Besides enrolling employees in courses already available on the network, corporations can purchase a miniature clone of the TeleLearning network and software and adapt it to their needs. These custom-tailored courses might involve teaching employees about corporate procedures and management techniques or informing customers about new products and services.

Generic Education

TeleLearning was forced to stretch some state-of-the-art limits to create its system. The Knowledge Module, for example, is a sophisticated communications device in the guise of a simple 300 bps auto-dial modem.

"The Knowledge Module is vehicle dependent in some ways," explains TeleLearning's vice-president of Product Marketing, Al Campassi. "The Module for the Commodore 64 needs to be more intelligent than the Module for the IBM PC, for example, so the Module works with different computers in slightly different ways."

The TeleLearning staff also developed a unique architecture for their operating system software. The instructors, all accredited professors at major universities, follow a special format in setting up a student's lesson; the type of computer that the instructor or the student uses is irrelevant to the lesson format. Once the lesson is telecommunicated to TeleLearning Systems, an editor checks its format and inputs it into an IBM PC to be reformatted into an ASCII file with special commands. That file can then be read by the Electronic University software that runs on an IBM PC, an Apple II+, or a Commodore 64.

"We have two kinds of working programs," says Campassi. "*The Translator,* which we use at TeleLearning, takes the instructor's word processed files and turns them into special ASCII files, and the *Runtime* programs then run the ASCII files on Apples, PCs, and Commodores."

Like the Knowledge Module, the *Runtime* programs are made specifically for different computers. Each course, therefore, can be created generically; the lessons are tailored to the personal computer by the student's *Runtime* program, which takes into account the computer's graphics capability, screen size, amount of memory, and memory mapping.

> TeleLearning expects to offer more than 500 courses by the beginning of 1984.

"The *Runtime* program has to find a way to make a particular machine behave in the same manner as all the other machines when it gets the ASCII file," adds Campassi. "And that takes a subtle piece of programming."

This subtle programming enables the *Runtime* package to call native subroutines out of each student's computer. Campassi explains that the PC version of *Runtime,* for example, calls up some native IBM programming to run graphics on the PC.

New Ways of Thinking

In the future, TeleLearning hopes to offer Master Classes—remote postgraduate seminars. Campassi speculates that the instructors will pose questions or problems or make statements to which Master Class stu-

dents will respond. Based on these responses, the instructor will pose another question or make another statement to which the students will again respond. Decision-making theorists find that three iterations of this process usually results in a consensus. Campassi believes that Master Classes will create a new kind of thinking unlike traditional thought processes.

These Master Classes demand a new mental approach, as does the entire electronic university concept. Learning by computer, according to Campassi, forces students to think differently, and the decisions students will come to are going to be different from the ones they would reach in a traditional classroom environment.

"We can emulate the economy over time, for example, on a graph and then change it right before the student's eyes," Campassi explains. "But watching that graph develop into another graph evokes a completely different thought process than just seeing one graph and then another."

Campassi's vision seems to support Toffler's prediction that education in the future will diversify thinking. And TeleLearning's Electronic University may go far beyond freeing the student from the lockstep classroom.

Lisa B. Stahr is a freelance writer who is currently working on a book about communications for PC World Books.

The Electronic University
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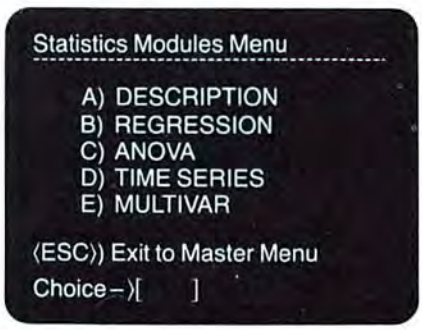

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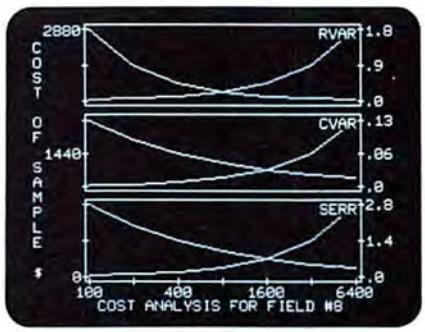

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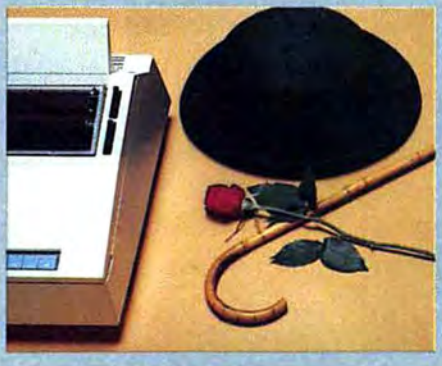

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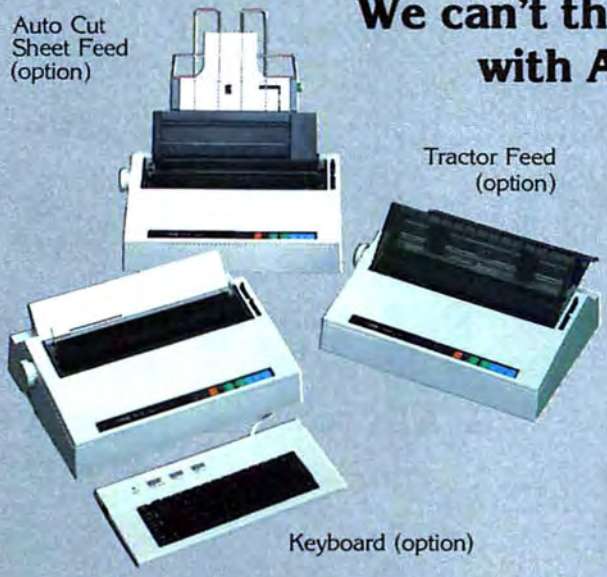

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BBS Watch

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Les Cowan

BBS Watch presents the news, information, and gossip that we find on the bulletin boards—the news that you are making.

CONNECT...

Barrister bulletin. Call-a-Lawyer is a 24-hour bulletin board in Phoenix, Arizona (602/275-6644). Why it's called Call-a-Lawyer is not clear; I didn't find any legal items on it—so, sue me.

However, I did find an ornithological drama on the wire: "Parrot cage for sale: 36 inches high, 18 inches in diameter, wrought-iron cage with stand. Regularly $150. Sell $75. Needs slight welding." And if you see a disoriented, bionic parrot flying around...

More?

If a human answers, hang up. The Aardwolf Express (415/651-4147), Fremont, California's, 24-hour BBS, bills itself as "the Friendly System." Aardwolf offers a $39 search service for college financial aid, movie reviews, and recipes—Chick Pea Croquettes, Baked Codfish with Lemon, Easy Beef Soup, Chicken Cavalfiore, and Scramble 'n' Spinach. Is computer cuisine too haute to handle?

Another Aardwolf feature is reader opinion polls. Which one of our nation's freedoms is most important to you?

Freedom of religion	16%
Right to bear arms	9%
Freedom of speech	58%
Freedom of assembly	9%
Right to a fair trial	7%

(Yes, I know that only adds up to 99 percent. Did 1 percent vote for the freedom not to vote?)

Which do you think is more important?

Beauty	6%
Personality	94%

How much do you think an individual can affect local government?

A lot	24%
A fair amount	24%
A little	46%
Not at all	6%

Can we deduce from this survey that people in San Lorenzo are slightly political, have great personalities, and talk a lot?

Aardwolf also offers a copyrighted information service with tips on playing promotional sweepstakes—the kind mailed by publishing houses. So, if you want to be an instant winner of a Mercedes, a new house, and 20 zillion U.S. dollars, read the hints about using postage meters to stamp your envelopes and where to get official entry blanks.

More?

^S to suspend. Down in Augusta, Georgia (404/733-3461), callers are talking about the new Telenet number. According to regular caller Michael Rivner, a BBS survey favoring the communication system was one of the reasons Telenet decided to install a number in the area.

Also in Augusta young Eddie Sperr has inaugurated a conference on the same BBS for people aged 15 and younger. Gosh, I remember when 30 was the cutoff age for those who could be trusted. Eddie checks in with this joke: What do you get when you cross an Apple][with a Commodore 64? Give up? An Apple][][][

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More?
Wds to lv by. The 24-hour Hattiesburg, Mississippi, BBS (601/264-2361) has a gripe against management. Its Krazy Korner Module (entirely too kewt) has amusing write-ups satirizing ruthless management, but don't read them if you object to slightly lewd acronyms.

More?
Hey, Brudda. Checking in from the Aloha State is a 24-hour conference tree BBS (808/487-2001). Like all conference tree bulletin boards, the messages are arranged in a branching structure. A main menu lists topic conferences, and within each conference submenus list subtopics. Each message from a caller has a "parent" message one level up in the hierarchy, and any message may have one or more submessages. The only trouble I have with conference trees is losing track of where I am in the conference structure. The expression "out on a limb" often comes to mind as I connect with a conference using my trunk line.

This BBS's menu of conferences is admirably varied. Topics include eateries for the next time you're in Oahu and you want to know where the natives dine, movies, computer security, and adventure games. The conference on computer security includes a long article from the *New York Times* about the infamous group of Milwaukee hackers who infiltrated the Sloan Kettering Medical Center computer. And you thought folks in Hawaii spent all their time lazing on the beaches.

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This BBS also has book and software reviews and a conference on artificial intelligence that includes various articles downloaded from news wires or written by bulletin board contributors.

More?
SIGs here and there:

408/475-7101	Nuclear arms reduction
612/227-0307	FORTH
512/578-6297	Civilian space enterprises
415/928-0641	Amateur radio, space

More?
Bits and pieces. A 24-hour Phoenix, Arizona, BBS (602/931-1829) has a conference on elementary education that should be of interest to teachers and parents. Reading and counting games, reviews of books for toddlers, and suggestions for classroom projects are some of the topics.

The 24-hour Pittsburgh, Pennsylvania, BBS (412/822-7176) owned and operated by Ed Dehart and Fred Kitman claims to be Pittsburgh's oldest full-time bulletin board, on line since September 7, 1980. Can anyone out there in Steel Town beat that? Note: the Pittsburgh BBS was started to let contributors electronically upload articles for the local computer club newsletter.

NO CARRIER...

Les Cowan is a freelance journalist, technical writer, and sometime programmer based in San Francisco.

IBM PC Bulletin Boards

Following is a partial listing of the IBM PC bulletin boards on-line in the United States and Canada. The list is updated as we receive information about new bulletin boards.

201/783-6976
Source: ST7057
NY PC Users Group
SYSOP: Donald David
24 hrs, 300/1200

202/362-2707
Washington, D.C.
SYSOP: Mike Todd
24 hrs, novice special interest group, 300

203/289-6321
East Hartford, Connecticut
SYSOP: Scott Maentz
6 p.m. to 9 a.m. Mon to Sat, all day Sun, download & upload, messages, 300/1200

203/521-1991
Hartford, Connecticut
SYSOP: John O'Boyle
10 p.m. to 5:30 p.m. Mon to Fri, evenings Sat & Sun, download & upload, messages, 300/1200
(Passwd = IBMPC)

203/966-8869
New Canaan, Connecticut
SYSOP: Whit Wynat
24 hrs, download & upload, messages, 300

(continues)

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dBASE II	389	700
WordStar	267	495
Multiplan	178	275

- **SELECTIONS:** Any quality software for brand name computers. Members to decide best-seller list by very frequent polling: 40-50% off. All others at cost plus 5-10%
- **SHIPPING:** Normally 48 hours after payment clears
- **SUPPORT:** Technical hot-line
- **NEWSLETTERS:** Tips & "how-to" by consultants
- **HARDWARE:** Buy at wholesale plus 5-10% (or $15 minimum service charge)
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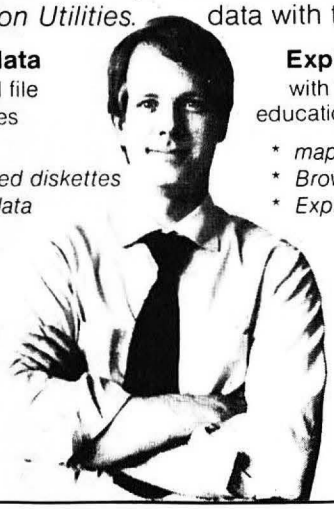

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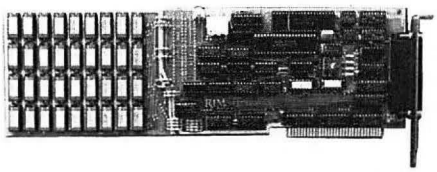

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Circle 561 on reader service card

BBS Watch

213/371-8825
Culver City, California
SYSOP: Marc Schoenberg
24 hrs, download & upload, messages, 300/1200

213/390-3239
Source: TCG147
Santa Monica, California
SYSOP: Marc Schoenberg
24 hrs, download & upload, 10M disk, 300/1200

213/390-4182
Santa Monica, California
SYSOP: Marc Schoenberg
24 hrs, download & upload, messages, 300/1200

213/649-1489
Culver City, California
SYSOP: George Peck
24 hrs, download & upload, messages, 300/1200

214/223-0983
Dallas/Ft. Worth, Texas
SYSOP: Mark Collard
24 hrs, download & upload, messages, 300/1200

215/439-5696
Allentown, Pennsylvania
SYSOP: Glenn Wesley
24 hrs, download & upload, messages, 300/1200

219/255-8803
South Bend, Indiana
SYSOP: Rich Granbeck
24 hrs, download & upload (Xmodem), messages, 300/1200

301/251-6293
Gaithersburg, Maryland
SYSOP: Larry Jordan
24 hrs, communications info (Xmodem), messages, 300/1200
(Passwd = IBMPC)

301/371-6271
Frederick, Maryland
SYSOP: Gary Horwith
18 hrs, download & upload (Xmodem), messages, 300

301/424-5817
Potomac, Maryland
SYSOP: Doug Thompson
24 hrs, upload newspaper articles, 300/1200

301/460-0538
Bethesda, Maryland
SYSOP: Ramona Landberg
24 hrs, download & upload, 300/1200
(Passwd = IBMPC)

301/948-9143
Gaithersburg, Maryland
SYSOP: Jim Frye
24 hrs, local buying info, download & upload (Xmodem), 300

301/949-8848
Rockville, Maryland
SYSOP: Rich Schinnell
24 hrs, download & upload, 300/1200
(Passwd = IBMPC)

303/690-4566
Denver, Colorado
SYSOP: Chris Carson
24 hrs, download & upload

303/973-9338
Denver, Colorado
SYSOP: Oscar Barlow
7 a.m. to 11 p.m., download & upload, messages, 300/1200

312/267-2066
Chicago, Illinois
SYSOP: Dave Jeschke
24 hrs, messages, 300/1200
(Passwd = IBMPC)

312/376-7598
Chicago, Illinois
SYSOP: Pete Coniceak
24 hrs, download & upload, messages, 300

312/396-1022
Chicago, Illinois
SYSOP: Tom Speaker
7 p.m. to 9 a.m. Mon to Sat, 7 p.m. Sat to 9 a.m. Mon, download & upload, messages, 300/1200

312/882-4227
Chicago, Illinois
SYSOP: Gene Plantz
24 hrs, download & upload, messages, 300/1200

312/944-4847
Chicago, Illinois
SYSOP: Bob Dew
24 hrs, download & upload, messages, 300/1200

319/332-7648
Quad Cities PC Users Group
Bettendorf, Iowa
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319/363-3314
Cedar Rapids, Iowa
SYSOP: Ben Blackstock
24 hrs, download & upload, messages, 300/1200

404/252-9438
Atlanta, Georgia
SYSOP: Rod Roark
24 hrs, download & upload, messages

404/634-5731
Atlanta, Georgia
SYSOP: Randy Bullard
24 hrs, download & upload, messages, 300/1200

404/926-8411
Atlanta, Georgia
SYSOP: Ken Shackelford
10 p.m. Mon to 3 p.m. Fri, 10 p.m. Fri to noon Sat, download & upload, messages, 300

415/481-0252
San Lorenzo, California
SYSOP: Terry Taylor
24 hrs, download & upload (Xmodem), messages, 300

415/845-9462
Berkeley, California
SYSOP: John Carmichael
24 hrs, 300
(Passwd = GUEST)

415/861-5733
San Francisco, California
SYSOP: Harry Logan
24 hrs, download & upload, messages, 300/1200

415/937-0156
Walnut Creek, California
SYSOP: Wes Meier
24 hrs, messages (Xmodem), 300/1200

416/499-7023
Toronto, Ontario
SYSOP: Doug Peel
24 hrs, download & upload, messages, 300/1200
(Passwd = IBMPC)

513/874-9609
Cincinnati, Ohio
SYSOP: John Harrington
24 hrs, download & upload, messages, 300/1200

516/944-6712
Source: ST6368
Long Island, New York
24 hrs, download & upload, messages, 300

602/742-5187
Tucson, Arizona
SYSOP: Bill Crider
6 p.m. to 10 a.m. Mon to Sat, 2 p.m. to midnight Sat, all day Sun, download & upload, messages, 300/1200

608/262-4939
Madison, Wisconsin
PC Users Group
SYSOP: Read Gilgen
5 p.m. to 8 a.m. weekdays, 5 p.m. Fri to 8 a.m. Mon, download & upload, messages, 300

617/353-9312
Boston Computer Society
SYSOP: Brian Hess
5:30 p.m. to 9 a.m. Mon to Fri, all day Sat & Sun, download & upload, messages, 300

701/293-5973
Fargo, North Dakota
SYSOP: Loren Jones
24 hrs, download & upload, messages, 300/1200

703/425-7229
Springfield, Virginia
SYSOP: Bob Blackwell
24 hrs, download & upload, 300/1200
(Passwd = IBMPC)

703/522-4513
Vienna, Virginia
SYSOP: Paul McKnight
24 hrs, download & upload, 300
(Passwd = IBMPC)

703/560-7803
Vienna, Virginia
ABBS with IBM PC Conference
24 hrs, download & upload, messages, 300

703/560-0979
Annandale, Virginia
SYSOP: Wes Merchant
Download, messages, bulletins, 300

703/680-5220
Dale City, Virginia
Dale City Info Exchange
SYSOP: Tim Mullins
24 hrs, news, new product reviews—all PCs, 300

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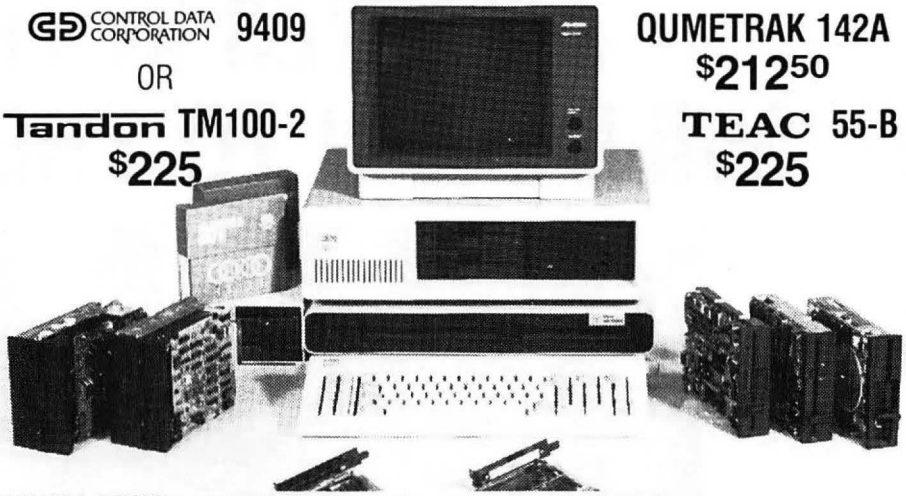

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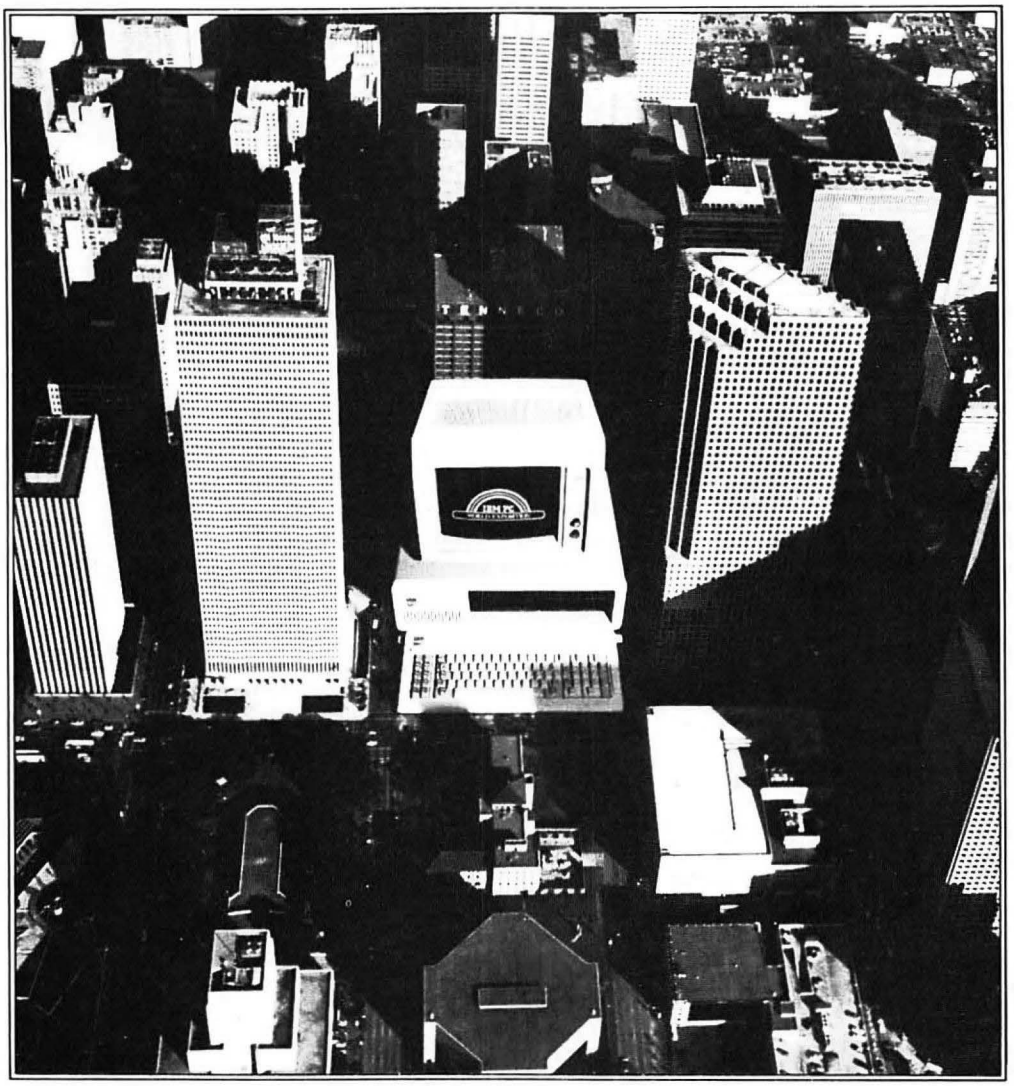

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Circle 485 on reader service card

703/978-9592
Fairfax, Virginia
SYSOP: Don Withrow
24 hrs, download & upload, tips, 300/1200
(Passwd = IBMPC)

704/365-4311
Charlotte, North Carolina
SYSOP: Charles McCurry
24 hrs, download & upload, messages

714/631-4021
Orange County, California
24 hrs, download & upload, messages, 300/1200

714/637-2094
Orange County, California
24 hrs, download & upload, messages, 300/1200

716/836-6964
Buffalo, New York
SYSOP: Bob Taylor
9 p.m. to 9 a.m. Tu, W, Th, F; 6 p.m. Sat to 9 a.m. Tu; download & upload, messages, 300

803/548-0900
Fort Mill, South Carolina
SYSOP: Bill Taylor
24 hrs, download & upload, 300/1200

806/353-7484
Amarillo, Texas
SYSOP: Dorn Stickle
6 p.m. to 8 a.m. Mon to Sat, all day Sun, download & upload (Xmodem), messages, 300

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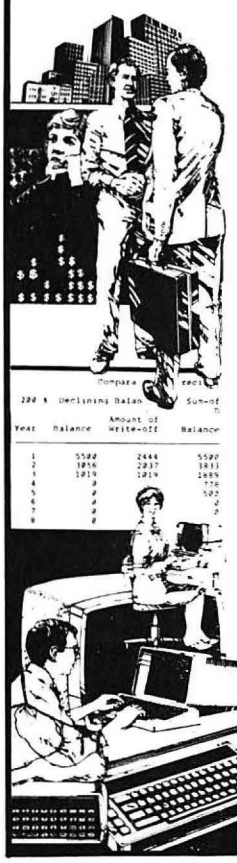

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BBS of the Month

This month we are featuring the Bethesda, Maryland, BBS (301/460-0538). One of its public domain programs, FC, is reprinted below. FC compares two versions of a BASIC program and creates a file that contains only the differences between the two versions. The program in the third file can then be merged (using the BASIC MERGE command) with the original program to recreate the modified version of the program.

```
10 INPUT "Enter original file name-",IF1$:OPEN IF1$ FOR INPUT  AS 1
20 INPUT "Enter modified file name-",IF2$:OPEN IF2$ FOR INPUT  AS 2
30 INPUT "Enter   change file name-",OF$: OPEN OF$  FOR OUTPUT AS 3
40 GOSUB 500:GOSUB 700
50 IF N1=N2 THEN IF L1$=L2$ THEN 40 ELSE PRINT #3,L2$:GOTO 40
60 IF N1>N2 THEN PRINT #3,L2$: GOSUB 700: GOTO 50
70 PRINT #3,N1
80 GOSUB 500: GOTO 50
500 IF EOF(1) THEN 600
510 LINE INPUT #1,L1$: N1=VAL(L1$): RETURN
600 IF NOT EOF(2) THEN PRINT #3,L2$
610 WHILE NOT EOF(2)
620 LINE INPUT #2,L2$:PRINT #3,L2$
630 WEND
640 GOTO 900
700 IF EOF(2) THEN 800
710 LINE INPUT #2,L2$: N2=VAL(L2$): RETURN
800 PRINT #3,N1
810 WHILE NOT EOF(1)
820 LINE INPUT #1,L1$: N2=VAL(L1$):PRINT #3,N1
830 WEND
900 CLOSE:PRINT "End of scan"
910 END
```

As good as Goldstein

Clearly, Larry Joel Goldstein, the author, has demonstrated his value by teaching both students and businessmen how to make the most of their personal computers. This updated and expanded version of the classic introductory book for the IBM PC is written in an easy-to-read, self-study format. It has become a best seller because it has been worth its weight in Goldstein to over 100,000 readers, time and time again.

The revised edition includes two new chapters on BASIC programming. They stress both the importance of structuring and planning programs and important debugging information. Additions to previous chapters include new information on graphics and games and expanded information on random access files.

The author, Dr. Larry Joel Goldstein, is presently a professor of mathematics at the University of Maryland at College Park. Involved in the design and application of computers since 1958, Goldstein is known for his straightforward writing style which makes learning technical subjects easier for thousands of readers. Co-author Martin Goldstein is currently the president of Goldstein Associates, a consulting firm in West Palm Beach, Florida.

Dr. Goldstein has proven to be a prolific author, having written many books and created specialty software for the computer. And, the professor has won numerous awards for his teaching. That teaching glitters in all of his efforts.

IBM PC: An Introduction to the Operating System, BASIC Programming and Applications, Revised and Enlarged

Larry Joel Goldstein, Martin Goldstein 1984/392pp/ISBN 0-89303-530-0/D 5300-1/$17.95

Among the Goldstein volumes that will gild your library are:

"Advanced BASIC And Beyond for the IBM PC: Programming and Applications" 1983/400pp/paper/ISBN 0-89303-24-3/D3243-5/$19.95

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SOFTWARE

"The Graphics Generator: Business and Technical Applications for the IBM Personal Computer," Version 1.06/1983/2 diskettes with documentation.
ISBN 0-89303-266-2/D2662-7/$95.00

These and other books and software by Dr. Larry Joel Goldstein are published by The Brady Co., a Division of Prentice-Hall. They are available at the finest retail bookstores and computer dealers, nationwide. Or, call toll free 800 638-0220 for information.

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Authoritative

The authority, Peter Norton, takes a stand on the Microsoft Disk Operating system and has created a compendium of information on DOS unavailable elsewhere. Over sixty computers use MS-DOS or a related version, so this book will serve as a welcome reference for the PC at home or in the office.

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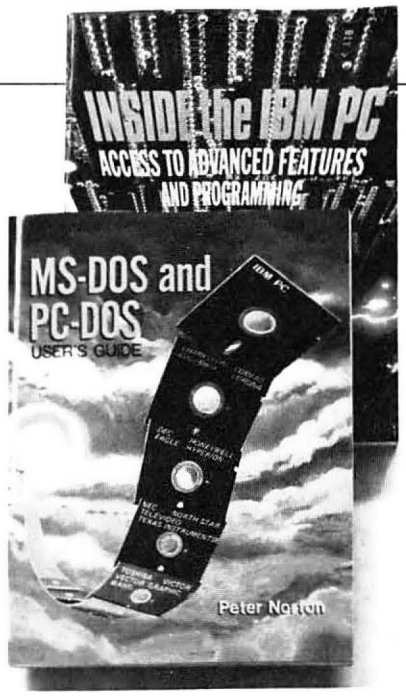
Peter Norton has earned his reputation as the authority on the IBM PC resulting from years in the field, articles in major magazines, lectures, interviews and consulting work. The expertise gleaned by Norton appears within the pages of his two books and benefits the reader and his PC.



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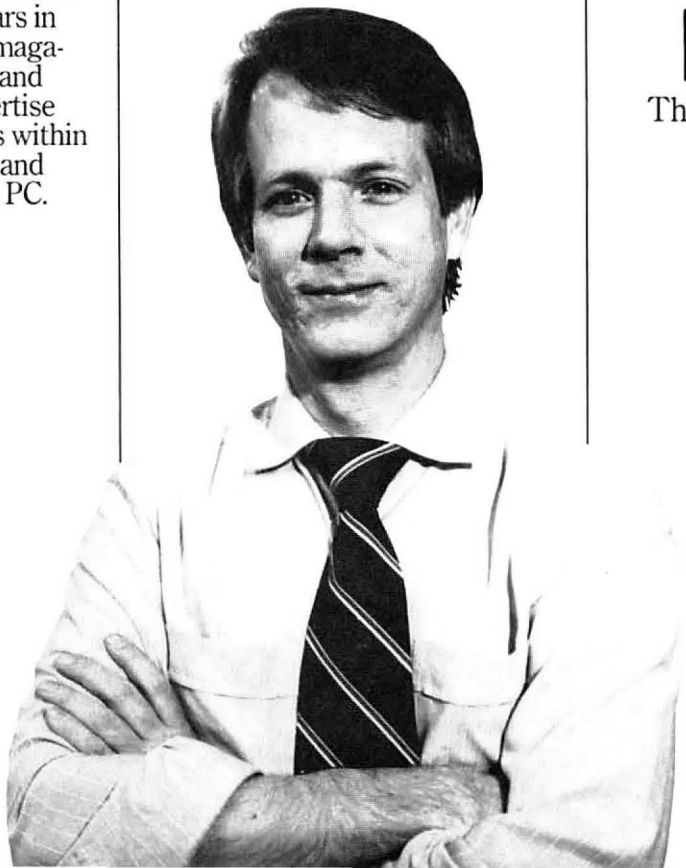

The book that has become the final companion to the machine, "Inside the IBM PC: Access to Advanced Features and Programming" illuminates the inner workings of the machine while demonstrating how both beginning and advanced programmers can take advantage of the many features offered by the PC. Norton also explains how the ROM is allocated for BASIC and BIOS. He explores the RAM for functions like the monochrome and color monitor displays and shows how the assembler can be integrated into Pascal and BASIC to access more power from the IBM PC.

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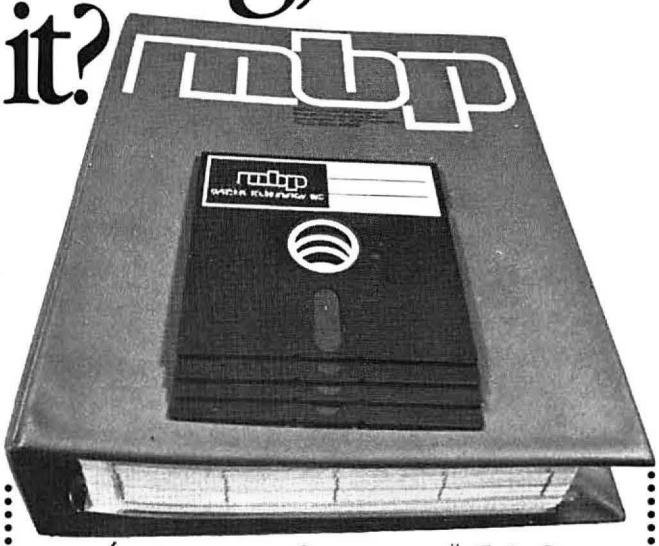

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World Events

A calendar of regional, national, and international events

Edited by Eric Brown

World Events lists computer-related conferences, conventions, workshops, camps, symposiums, trade fairs, and shows. If you know of an upcoming event, we'd like to hear about it.

January 7-10
Consumer Electronics Show
Las Vegas Convention Center and Annex, Riviera, Sahara, and Hilton
The largest electronics show in America, with displays of computers and other electronic devices, games, and machines.
Consumer Electronics Shows
303 E. Wacker Dr. #945
Chicago, IL 60601
312/861-1040

January 19-21
Data West
Pasadena Convention Center
Pasadena, California
A computer conference and exposition offering a series of workshops and seminars and presenting hardware and software for business and personal use.
Information Processing Group
13135 Ventura Blvd. #300
Studio City, CA 91604
213/792-5111

January 30 to February 1
Microprocessors—Tools for Production and Inventory Management
Hilton Riviera Hotel
Palm Springs, California
A specialty seminar on the topics of microprocessor hardware, software, business planning, and manufacturing.
American Production and Inventory Control Society
500 W. Annandale Rd.
Falls Church, VA 22046
800/368-3402, 703/237-8344

January 30 to February 2
Communication Networks '84
National Convention Center
Washington, D.C.
A telecommunications conference and exposition that has been in existence for six years. Conference topics include PCs in the network environment, voice and data systems, satellite communications, and the deregulation of AT&T.
Communication Networks '84
Box 880
375 Cochituate Rd.
Framingham, MA 01701
617/879-0700

February 3-5
National Software Show East
Miami Beach Convention Center
Miami Beach
A microcomputer software show for the trade. Exhibitors include microcomputer manufacturers, diskette copier manufacturers, distributors, review publications, and magnetic media suppliers.
Raging Bear Productions
21 Tamal Vista #175
Corte Madera, CA 94925
800/732-2300, 415/924-1194

February 7-9
Cadcon West
San Francisco Civic Auditorium
San Francisco
An exposition that will include 100 exhibitors of computer-aided design technology.
Morgan-Grampian Expositions Group
2 Park Ave.
New York, NY 10016
212/340-9780

February 14-16
Computer Science Conference
Franklin Plaza Hotel
Philadelphia
A conference on computer sciences that addresses the following topics: computer-integrated factories, small computer systems, and ethical and social implications of computers. The conference also includes the 12th Annual Computer Science Employment Register, which matches computer scientists and data processing specialists with potential employers.
Association for Computing Machinery
11 W. 42nd St.
New York, NY 10036
212/869-7440, 412/624-6475 for Employment Register

February 15-16
B.C. Computer & Office Automation Show
Hyatt Regency
Vancouver, British Columbia
A general trade show and conference of computer hardware and software and other office automation equipment.
Industrial Trade Shows of Canada
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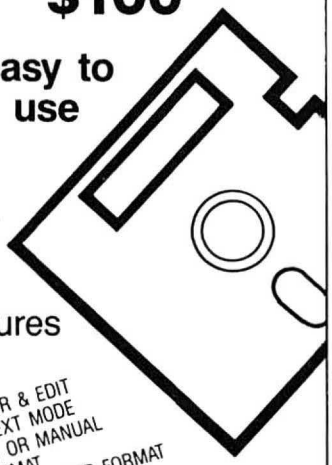

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American Federation of Information Processing Societies, Inc.
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703/620-8926

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Softcon
Superdome
New Orleans
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Northeast Expositions
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Chestnut Hill, MA 01267
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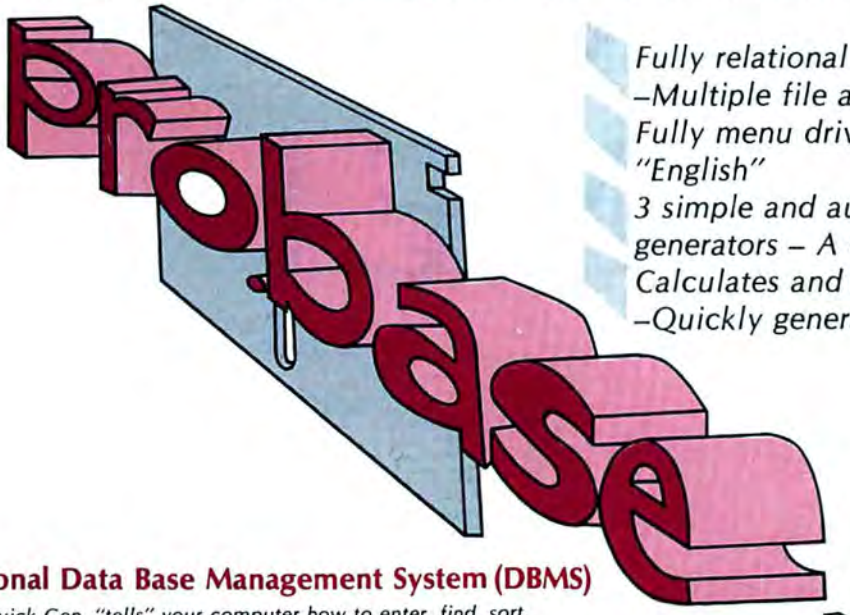

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PC WORLD INDEX VOLUME 1

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	Cook, Steven & Karl Koessel	5	52	S	**Drawing with Curves** Conography, a new angle on computer graphics.
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	Moore, Edwin T.	7	120	R	**Stretching VisiCalc** *StretchCalc* challenges *1-2-3* for spreadbase supremacy.
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	Norton, Peter	4	190	H	**Inside the PC Keyboard** The IBM PC keyboard is actually a small computer in itself.

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	BASIC Highlights	6	255	Displays all BASIC programs on specified disk and runs them from a menu.
	BASIC Key Lines	1	264	Display 25th (key) line when running BASIC program from DOS.
	BASIC Parms	8	260	How a compiled BASIC program can access PC-DOS command line parameters.
	BASIC Print Screen	1	264	Routine to allow use of DOS Print Screen function with BASIC.
	BASIC Reboot	7	273	One-line BASIC program that causes the PC to execute a power-on reboot.
	BASIC Unprotect	7	270	How to access BASIC programs saved with the ,p (protect) option.
	BSAVE Patch	10	287	Two patches from IBM that correct a problem with BASIC's BSAVE.
	Batch File Filer	8	264	A DOS 2.00 batch file that searches text file for particular words.
	Bug Hunt	4	313	Errors in the BASIC VAL function.
	Capital Conversion	5	260	Convert files that are in all capitals to capitals with lowercase.
	CrashBug	10	291	An error in the conversion of numeric values for PRINT USING statements.
	Ctrl-Break Resume	5	259	Restart the scrolling of a listing after <Ctrl>-<ScrollLock> stops it.
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	Faster Searches	8	262	How to speed up time-consuming *WordStar* tasks like Search and Replace.
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	WordStar and DOS 2.00	6	250	Batch file to improve *WordStar*'s effectiveness when used with DOS 2.00.

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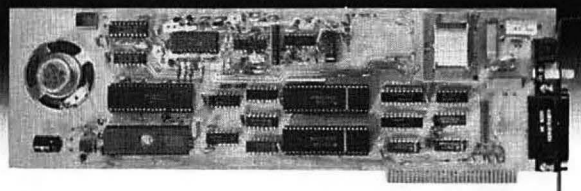

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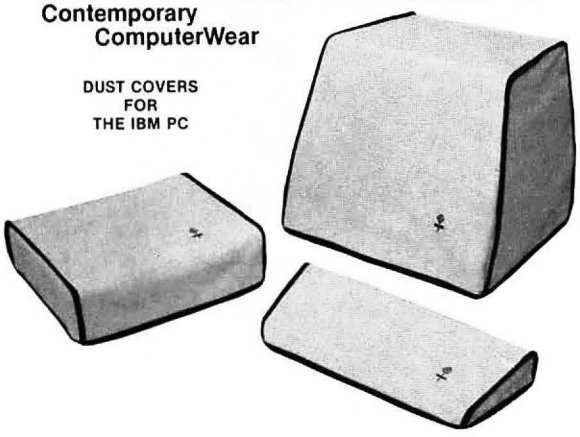

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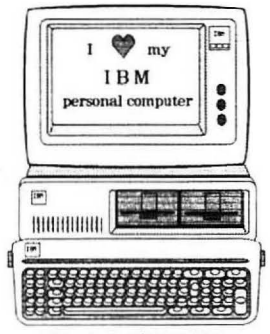

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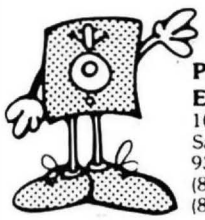

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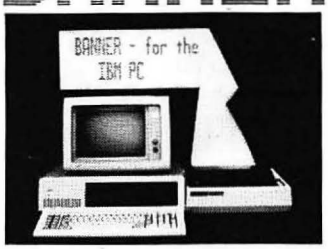

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Stop locking up your disks! The most secure cryptographic system known, the RSA public-key system, is now available for the IBM PC. Crypt Master encrypts confidential disk files for the ultimate in data security. Ensure the privacy of your electronic mail. (See display ad this issue.) *Digital Signature, 5453 S. Woodlawn, Chicago, IL 60615, 312/324-6533*

Data Management

RESQ-Ultimate DBMS
The only system that makes it fast & easy to design & create your forms & reports right on the screen! Calculates, reads, searches, sorts faster than other systems tested; interfaces w/ word processing programs. With plain English manual, help screens, & password protection. $395. *Key Software Inc., 2350 E. Devon Ave. #138, Des Plaines, IL 60018, 312/298-3610*

The DataFiler
Put the power of your IBM PC to work on your various lists w/our easy to use menu-driven DataFiler program. A time saver, information organizer, & a good investment. $225. Generate personalized form letters using The DataFiler, Merge 'n Print ($149), & your word processing program. Mailing label programs available, $95. *MBS Software, 12729 NE Hassalo St., Portland, OR 97230, 503/761-4137, 503/256-0130*

Data Design
Managing office information is now easy with Data Design, the first database management system designed specifically for the IBM PC. Data Design supports multiple user-defined data tables and input/output forms. Indexes are maintained automatically and sorting is never required. Examples included. $225. *Insoft, P.O. Box 19208, Portland, OR 97219, 503/244-4181*

Super★List Manager
A general purpose list management system. Contains a structured DBMS and a "what you see is what you get" word processor. Print personalized letters, postcards & labels. Select data for reports/letters & labels using any field. Sort on any field. Req. 128K 2dd. Eval. Disk avail. $295. Visa/MC/MO. *Pinnacle Software Systems, Inc., P.O. Box 1220, Fort Collins, CO 80522, 303/224-5061*

Data Security

Crypt-It
Protect your important sensitive business data from unauthorized use & disclosure with Crypt-It, a data security program offering billions of password possibilities. Written in PC-DOS BASIC, it can be easily adapted to your own format. $49.95 plus $2 shipping. Charge cards welcome. AZ residents add 5% tax. *Secure Data, P.O. Box 23990, Tempe, AZ 85282, 602/966-4010*

Development

PC-Screen
Interactive/function key driven screen formatter lets you Create/File/Display/List/Test screens. A screen is a DOS file. Screen interface lets you Display screens/read-write data/reset data field(s) and much more via calls. Supports MS Pascal/Assem./COBOL/C/FORTRAN/Comp BASIC. $199. Demo disk $35. *OmniSoft Associates, 6917 12th Ave., Brooklyn, NY 11228, 212/748-5763*

Message File Facility
Full screen/function key driven Message Editor allows the creation/updating/listing of message (templates for reports) files. Your program gets linked to the Message Interface to get the messages with variable data insertion. Supports MS Pascal/Assembler/COBOL/Comp. BASIC, $39.95 + other facilities. *OmniSoft Associates, 6917 12th Ave., Brooklyn, NY 11228, 212/748-5763*

Edit

AmeriSoft™ Edit Tool
Editor for Professionals:
*Multifile/Multiwindow
*Full horz/vertical scroll
*Search wildcarding
*Undo multiple changes
*Command lang.-build new commands
*On line help *Key macros
*Command stack *Hex editing
*Edit in place *Demo disk
*Support hotline $69 thru 1/84—list $175
AmeriSoft, 345 S. McDowell #410, Petaluma, CA 94952, 707/778-8594, 707/762-0640

Educational

Professor DOS
Interactive, self-paced tutorial program designed to teach new PC users important PC concepts, including DOS. Simulates DOS operations, allowing you to freely experiment. Uses graphic images, sound, animation and color to help you learn smarter, faster, easier. Available at fine dealers. $59.95. *Individual Software, Inc., 1163-I Chess Dr., Foster City, CA 94404, 415/341-6116*

PC Pal*PC Tutor 1.1/2.0
PC Pal introduces the user to the keyboard, spreadsheet, word processing, BASIC & the computer hardware, $39.95. PC Tutor enables users to get rid of all the confusing instruction manuals. Learn to use MS-DOS 1.1 or MS-DOS 2.0 by doing. $59.95. Available for COMPAQ, PC, Texas Instruments Pro., Lang & others. *Comprehensive Software, 2316 Artesia Blvd., Ste. B, Redondo Beach, CA 90278, 213/318-2561*

PC/Pilot
Language for education and training. By MicroPi, the source of PILOT on the other major personal computers. Meets Common PILOT standard. Extensions for color, graphics, user fonts, windows, files and video disk/tape control. Includes EZ editor. Lic: $100 single, $550 multiple. *Washington Computer Services, 3028 Silvern Lane, Bellingham, WA 98226, 206/734-8248*

Hebrew Scribe
Type Hebrew with your IBM PC or XT. Makes Hebrew school homework more fun. Satisfaction guaranteed or your money back. Makes a great gift! Requires color/graphics adapter. (For optional hardcopy, included screendump requires Epson printer.) Call, ask for Gary Rosen. To order send $29.95 to: *Gamma Productions, 817 10th St. #102, Santa Monica, CA 90403, 213/451-9507*

The Instructor
A self-paced tutorial program that teaches first-time users how to interact with the PC. Designed to be the first serious software run by new users of all ages. Uses graphics, sound and color to create friendly interaction. See your local retailer. $44.95. *Individual Software, Inc., 1163-I Chess Dr., Foster City, CA 94404, 415/341-6116*

Tutorial Set
Creative graphics combined with unique interactive lessons on DOS commands and concepts, keyboard operations, and Edlin, make this training the most effective, enjoyable way to learn IBM PC and XT operations. Teaches DOS 1.1 and 2.0. Requires 64KB, DOS, monochrome or color display, 1 diskette drive. $94.95. *Individual Software, Inc., 1163-I Chess Dr., Foster City, CA 94404, 415/341-6116*

The Teacher's Language
TexaSoft, Inc. introduces a new state-of-the-art Computer Assisted Learning Language—CALL. Featured is an authoring system which allows the computer novice to create tutorials and computer monitored tests. Grading capabilities included. CALL language uses features of the IBM PC such as sound and color. *TexaSoft, Inc., One Energy Square #660, Dallas, TX 75206, 214/369-0795*

Engineering

Structural Design
Quick, versatile, interactive structural programs - beams, columns & frames of any material efficiently analyzed & designed. Extremely friendly input/output with COLOR graphics options. Specify PC configuration and send $25 for demonstration disk to: $c^2\ b^2$ - *software design, 763 27th Ave., San Francisco, CA 94121, 415/751-1337*

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Linear Programming, Statistics. Graphics, Perspectives, Contours. Math Packages, Linear and Differential Equations. Clear manuals and examples. *Computer Software Technology, P.O. Box 896, Lomita, CA 90717, 213/377-7681*

Process Engineering

16 Menu selected programs for equipment selection and evaluation, fluid flow, heat transfer. Friendly format includes single screen input/output form, online help, unit conversions, and error trapping. Copy results to printer or disk. Save/recall input. Complete documentation. Send for brochure. *Engineering Software, Inc., 2000 Washington St., Wilmington, DE 19802, 302/571-9575*

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Electric Ledger

Easy to use checking program for personal or small business accounts. Easy data entry, menu driven, great at tax time, searches, sorts & totals to any keyword, balances checkbook, reconciles bank statement, computes mortgage loan, compound amount & more. 2dd, 80 col. $39.95. Visa/MC & CODs. *Datacon, 2311 W. 5700 S., Roy, UT 84067, 801/773-8080*

Micro/Prophit

PC version of PROPHIT II, the world's most widely used time-sharing modeling system. Handles spreadsheets up to 9,000 lines by 120 columns. Includes what-if, goal-seeking, full consolidation, financial functions, projection techniques, and graphics. Ready-to-use applications & consulting available. *VIA Computer, 7177 Construction Ct., San Diego, CA 92121, 619/578-5356*

IRA Money Maker

How to Get the Dollars Growing in Your IRA. Opportunity for More Retirement Income easily explained. You learn about interest rates, mutual funds and Your IRA. What was once known only to a few can now by Yours. IRA Money Maker, ONLY $29.95. IBM PC 64K, Specify Color or B/W, 320K DSDD, Printer. *Knowledge Reach Associates, Inc., P.O. Box 3407, New York, NY 10185, 212/942-4692*

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available. If you have a new product or program but lack financial resources, we can help. We specialize in funding newly developed products. We've helped others, we can help you, too. Send a copy of your business plan and capital requirements—in strictest confidence—to: *Monarch Venture Fund, 1720 S. Amphlett Blvd. #120, San Mateo, CA 94402, 415/345-5700*

Account Management

Powerful filing and data retrieval program. Creates and manages data base for bank accounts. Also useful for detailed travel expense reports. Converts currencies to normalize. No programming knowledge is required, control by function keys. Requires IBM PC, 96K, PC-DOS, 2dd, 80 column display, printer. $120 + $2 s/h. *GJM Enterprises, Inc., 813 Colony Circle, Lancaster, PA 17601, 717/299-9663*

Pro Tax/Forecaster

Individuals & professional preparers can see the tax consequences of financial decisions by merely changing a line on the return. Select 1983 to quickly estimate a return before preparing it or to check it after preparation. Select 1984 for tax planning & to figure estimated tax. For 64K, 2dd. *Micromatic Programming Co., Cedar Corners Station, P.O. Box 16735, Stanford, CT 06905, 203/968-0933*

EZdBASE

Easiest yet most sophisticated screen program & file generator ever to support dBASE II on the PC. Simply type screen as you want it to appear w/up to 64 fields—256 characters. Highlight, underscore & reverse video. EZdBASE creates dBASE II program files in sec. $95 + $5 s/h. Mention *PC World*, save 10%. Satisfaction gtd. *Automated Office Systems, 11 Palace Green Place, Atlanta, GA 30318, 404/351-8358*

Taxation

1982 individual tax program for extensions and 1983 interview sheets, $100. 1983 Federal tax program, $500 ($100/each per state available). 1983 Federal and available State tax planner, $200. *Pencil Pushers United, Inc., Dept. PCW, 25 S. Greeley Ave., Chappaqua, NY 10514, 914/238-9600*

Games

Tiào Ch'i

Play the Chinese Checker Champion! Any mix of up to six live/computer players at 3 skill levels. A game the whole family can play or if you think you're good, try taking on 5 computer opponents. Sharp color graphics, music & sound effects. Simulated graphics for green screen. Reqs. 64K, 1d. $24.95 ph order: *Micro-Classics, 315 W. Grand Ave., El Segundo, CA 90245, 213/322-6888*

Sfinks PC Chess Program

Awesome! The number 1 chess game for the TRS-80 is finally available for your IBM PC. Complete with all the user friendly features, color and monochrome graphics, Sfinks PC is unsurpassed. 64K disk, only $49.95 plus $2 shipping. MC/Visa. FL residents add 5% sales tax. *William Fink, 1105 N. Main, Ste. 24-B, Gainesville, FL 32601, 904/377-4847*

Classic Games

15 classic computer games are being offered on disk in Game-Pak #1. The games include Wumpus, Hangman, Craps, Slot Machine, Hamurabi, Tic-Tac-Toe, Roulette and more. Games are keyboard operational. 1dd & Color graphics board required. The cost for Game-Pak #1 is $38.95 + $2 shipping to: *Dandy Line, Dept. GP1, P.O. Box 701, Leominster, MA 01453, 617/534-6960*

Educational Games

WordTrix

Fast and challenging word game that pits you against the computer. Both you and the PC find words in a random grid of letters, but the computer—with its built-in dictionary and multiple levels of play—is a formidable opponent! 1st in TRIX series of educational games. $34.95. *Insoft, P.O. Box 19208, Portland, OR 97219, 503/244-4181*

QuoTrix

Following a trail of clues using crossword puzzles, trivia questions, foreign word translation and other word games, players try to guess a famous quote by piecing together each discovered word. Several hundred quotes to tackle! 2nd in TRIX series of educational games. $34.95. *Insoft, P.O. Box 19208, Portland, OR 97219, 503/244-4181*

The Oneliner

Guess letters of the Oneliner to decipher the hidden message. 1 to 4 players may compete for points in 5 selectable categories: 1) Historical quotes 2) Biblical quotes 3) Modern books, authors & titles 4) Classical books, authors & titles 5) Musicals, authors & titles. Hundreds of Oneliners provide continuing challenge, competition & fun. 64K, Monochrome, $29. *Logical Games, Inc., 4509 Martinwood Dr., Haymarket, VA 22069, 703/754-4548*

Dedux

Play this fun, challenging deductive reasoning game AND learn to write your own computer game using the SOURCE CODE from DEDUX as a model. (Yes, commented BASIC source code is included.) $20 plus $2 s/h. Three levels of difficulty. Ages 10 to adult. Specify monochrome or color graphics. *RemRol Computer Services, Inc., 215 Brighton Ave., Boston, MA 02134, 617/783-1982*

Genealogy

Family Reunion

Keeps track of living relatives as well as genealogical data. Produces address labels, birthday lists, pedigree charts, family group sheets and more. Includes User's Manual & Sample Data Disk. Price $99.95. Requires PC-DOS, 2 drives, 64K and PC printer capabilities. Visa/MC/COD/Dealers. Add $4 s/h. *Personal Software Company, P.O. Box 776, Salt Lake City, UT 84110, 801/277-3174*

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Ultradraw™ Graphics

An extensive 2-D geometry creation package for engineers, architects, graphic artists & slide makers requiring precision graphics. Ultradraw™ features auto-dimensioning, variable text hgt/wdt, grids, graphics merge, parts & symbol libraries, multiple rotate, duplicate mirror & line fonts. Retail $195. Intro. offer $149. *Ultragraphics™ Systems, 1100 South Main, Racine, WI 53403, 414/633-7381*

Grafmatic:Fortran/Pascal

4 packs in 1! Other sources have 1•text/graphics; pixels/line/paints but GRAFMATIC follows thru w/2•2D interactive 3•2D plots (contour too!) 4•3D plots & solid models (hidden line removal for realism) 100 pg. manual makes it easy! $95. For text-graphics only try GRAFMATIC JR. $29. Call for a personal response. *Micro Compatibles, 11443 Oak Leaf Dr. Dept.W, Silver Spring, MD 20901, 301/593-0683*

Micro Sketch

Not your standard sketching program, but a high resolution graphics tool. Create regular geometric shapes & more: lines, curves (any angle), save/load screens via disk, superimpose screens, no programming! Uses function keys & cursor. Assorted background screens. Requires PC or MS-DOS & graphics adapter. $35. *WareSoft, P.O. Box 70234, Marietta, GA 30007-0234, 404/952-7331 after 7 e.s.t.*

PC-Title/PC-Projector

Create full color, professional text for slides, screen displays, flyers. Use the IBM as an electronic projector to produce manual or automatic "slide shows." Add full graphics with PCcrayon. PC-Title/PC-Projector—$49.95. PCcrayon—$44.95. Mention this ad & get all 3 programs for $79.90 + tax. Visa/MC. *PC Resources, Inc., 620 Hobart Terrace, Santa Clara, CA 95051, 408/243-4169*

Colography™

This color graphics editor for IBM PC/XT lets you create color images on the screen with ease. It can be used by anyone for business, education, programming, design & art. Your next software update is FREE! Requires IBM PC/XT, 128K, IBM color board. 1 floppy or hard disk. $99.95. Call/write for more details. *Cactus Software, Inc., P.O. Box 880, Peoria, AZ 85345, 602/242-7953*

Health

Master-Control Diet

This physician-designed diet and exercise program allows you to set your weight-loss goals and monitor your progress instantaneously. Entering foods eaten and exercise performed provides you with summaries of your caloric intake and expenditure, eating habits and more. Diet guidebook included. $69.95. *HealthWare, 1504 Leander Rd., Georgetown, TX 78626, 512/863-6910*

Home Management

Coupon Clipper

There's probably a gold mine of unused food coupons in your home! Complete system for maximizing your micro by utilizing creative system approach to maintain and track coupons. This package will pay for itself. Uses MS-DOS/BASIC. Send $35 to: *Sensible Systems, P.O. Box 2961, Richardson, TX 75083*

Teli/Solar

A tool to aid homeowners in making intelligent decisions about energy-related home improvements and investments. It can be used to determine hot water usage & cost, home heat loss, solar collector sizing, investment payback, & areas to concentrate on to reduce energy usage. ($50) 128K, color adapter. *Tesseract Enterprises Ltd., P.O. Box 25966, Colorado Springs, CO 80936, 303/594-6199*

Video Tape Tracker

This ready-to-run program is just what you need to manage your video library. It stores up to 1,500 titles/file, prints numbered labels, lists in tape or title sequence, searches by tape/title/performer, and is very fast and easy to use. Needs 64K PC with one disk. Just $39.95. Check, MC, Visa. *ProSoft, Dept.N, 7248 Bellaire Ave., North Hollywood, CA 91605, 213/764-3131, 800/824-7888, oper. 577*

Recipe Chef/PC

Bring the chef of the house into the computer age. Find favorite recipes fast! Pro system to create & maintain an automated recipe library. Features full-screen presentations, files/retrieves across 46 categories. Print for grocer/kitchen. Track wines! Impress guests! Great gift! 64K (96K DOS V2). $45, chk/MO. *Recipe Chef, P.O. Box 7547, Flushing, NY 11352, 212/539-6580*

Info Retrieval

Retrieve-ALL™

Enables you to search your data easily and efficiently. Any text data created with all popular IBM PC-DOS or MS-DOS software can be added, as is, on a unique disk file. Enter any word or sentence and all matched records will be displayed or transferred to other software. $350, demo $35. *Zargar, 60 West 75th St., New York, NY 10023, 212/580-2609*

Insurance

Safeware

If your computer is important to you, insure it! SAFEWARE provides full replacement of hardware, media and purchased software. As little as $35 a year covers: fire, theft, power surges, earthquake, water damage, auto accident. Call 8 to 8 Mon. thru Sat. *Safeware, The Insurance Agency Inc., 2929 N. High St., Columbus, OH 43202. P.O. Box 02211, Columbus, OH 43202. 800/848-3469 (Nat), 614/262-0559 (OH)*

Languages

FORTH-32

Use up to one megabyte of memory for programming or data! Complete Development System includes a Symbolic Debugger, Structured Decompiler, Full 8088 Assembler, Editors, Graphics. Our 480 page manual is the best! $195. Fully compatible software and 8087 Floating Point Extensions. $95. Call today toll free. *Quest Research, Inc., 303 Williams Ave., Huntsville, AL 35801, 800/558-8088, 205/533-9405 (AL)*

MetaBASIC

A powerful language preprocessor which enables structured program development in BASIC. Lets you create true CALLable subprograms (with argument lists). Other features: multi-line IF statement, array initialization, simple file I/O using records, source code compression, and more. DOS 1.1 & 2.0. $75. *Software 128, 363 Walden Street, Concord, MA 01742, 617/369-6400*

Language Interpreters

BI-280/BI-286

BASIC interpreter that runs programs written in BASIC Four Corporation's Business BASIC II, a popular language used extensively at the minicomputer level. Built-in ISAM manager gives fast, keyed access to data files. *Control-C Software, Inc., 6441 SW Canyon Court, Portland, OR 97221, 503/297-7153*

Mailing Programs

Budget★Label

Low-cost mailing label system. 16 fields with 8 user-defined profiles. Sort/select on any field. Up to 4 levels of selection. Print lables (up to 4 across), Post Cards (both sides), Rolodex cards, address master & phone directory. Sort/select 1000 records in 10 min. Req. 64K 1dd. $29.95. Visa/MC/MO. *Budget Programs, Inc., 2517 W. Vine St., Fort Collins, CO 80521, 303/482-4778*

VOLKS-Mailer Plus

- Works with your Volkswriter!
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- Easy to Learn
- NO MANUAL REQUIRED!
- PLUS Built in Calc Function

$47.50 + $2 s/h. MC/Visa. *SoftMarc, 132 Central Way #3, Kirkland, WA 98033, 206/453-2262*

E-COM Software

Now you can transmit Postal Service E-COM letters directly from your microcomputer. CO-MAIL is available for IBM PC, Apple, TRS, and CP/M compatibles. Complete software package supports all E-COM options, auto-dial or manual modems. Also includes E-COM certification materials. *ICA Systems, Inc., P.O. Box 57165, Washington, DC 20037, 703/620-5835*

Manufacturing

Twin Oaks MRP-II

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- Purchasing
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- Master Sched'g
- Phys Inventory
- Std Costing
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Twin Oaks, 2650 Colfax N., Minneapolis, MN 55411, 612/588-2685

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Mature & classic on-line, net change, MATERIAL REQUIREMENTS PLANNING. Modular, fast, simple, easy, flexible, and cost effective. Integrates with financial accounting. Runs on PC-DOS 2.0, 256K hard disk, stand-alone or networked. Includes H-BOMM, H-BUY, H-STORE, H-MAKE, H-PLAN. *Helmsman Systems, Inc., 1030 S. Winchester #205, San Jose, CA 95128,408/246-8300*

Twin Oaks Churchmouse

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- All for $1395

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Medical

Threshold

Medical office management software featuring automatic insurance preparation w/teleprocessing to Blue Shield & Medicare, unattended statement processing, total security w/audit trails, statistical information, complete inquiry & management reports & on-line help. List $5,500. *Physicians Practice Management, Inc., 1810 S. Lynhurst Ste.Q, Indianapolis, IN 46241, 317/248-0357, 800/792-3525 (IN), 800/428-3515 (Nat)*

POS/1™ Version 4.0

Medical billing: Produces statements, ins. forms, aging, revenue analysis w/Bar Graphs. Multiple doctors, insurances. Day sheets, recall notices, referring doctors, audit trails. Online update, access by account#/name. Customizable procedure/diag. codes; menu-driven; help screens. DOS 128Kb. $2200. *Chen Information Systems, Inc., 1499 Bayshore Hwy. #205, Burlingame, CA 94010, 415/692-4358*

Operating Systems

Development Sys. Tools

Operating System Development Tools Universal Development Interface and iRMX86 implementations for PC-DOS/MS-DOS based systems. A complete family of Development Tools. See display ad this issue. *RTCS/Real-Time Computer Science Corp., P.O. Box 3000-886, Camarillo, CA 93010, 805/482-0333*

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MailMan

Given a weight, the MailMan program will compute first, priority, third, parcel, express (airport, addressee, post office), foreign surface, air, express, packet, printed, parcel post (air and surface), as well as registered, certified, insured, special delivery and handling. UPS. $35 or $5 for demo disk. *Polyglot Productions, P.O. Box 668, Cambridge, MA 02238, 617/491-3541, Telex 4993935*

Product Directory

PC/XT Product Directory

Comprehensive listing of over 4000 separate products in printed or diskette form. Contains an actual description of each product, its requirements & price, plus vendor name & address. Charts & tables comparing products, multiple indexes, a glossary of terms, & more. Updates avail. $10 + $1 s/h. *Computer Information Collective, P.O. Box 10998 #363, Austin, TX 78766*

Productivity

Organization Map™

A powerful management tool for the IBM PC that improves organizational productivity and enhances the management of human resources. Includes an organization analysis program as well as a human resource information system. Demonstration disk $35. *Pacesetter Software, P.O. Box 5270 Dept. A, Princeton, NJ 08540, 609/737-8351*

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What Next? You probably need a publisher. We have the financial, marketing & supplementary technical, manufacturing & distribution resources to get your program into the marketplace & keep it there. Send a description of your program—in strictest confidence to: *Monarch Technical Publishing, 1720 S. Amphlett Blvd. #120, San Mateo, CA 94402, 415/345-5700*

Real Estate

Real Estate Software

Programs available include Property Management, Loan Amortization, Depreciation/ACRS, Tax Deferred Exchange, Property Sales Analysis, Home Purchase, Loan Sales/Purchase, Income Property Analysis, APR Analysis, Construction Cost/Profit and Property Listings/comparables. Charge cards accepted. *Realty Software Co., 1926 S. Pacific Coast Hwy. #229, Redondo Beach, CA 90277, 213/372-9419*

Property Management

Software for owners of apartments, mini-storage, single family, condos, marinas, shopping centers and office complexes. Provides instant cash flow analysis, prints cash flow report, records expenditures on each unit, prints summary of operations report and accumulates cost for tax purposes. *Tomar Productions, P.O. Box 740871, Dallas, TX 75374, 214/363-3059*

Superval
Designed for valuation & analysis of leased income producing real estate through DCF forecasts (5-50 years). Plain English prompting with multiple choice menus. Requires 128K for IBM PC & micros running MS-DOS; 64K for micros running CP/M-80. Price-$1,495; demo package-$50. Visa/MC/AMEX. *Real Estate Applications Software, Inc., (REASINC), 29 Manor Road, Smithtown, NY 11787, 800/645-4660, 516/360-8833*

Rental Management

Video Tape Library Mstr.
Complete pkg. for video tape rental store. Controls tapes, VCRS, club members/non-members. Menu/interactive screens, club expiry. Deposit/late chg. acctng., online/interactive tape check in/out, tape & customer rental stats. Reports: Delq. tapes, mail labels, top 100 rentals, many tape and customer lists & more. *Applied Computer Techniques, 990 Atherton Dr., Salt Lake City, UT 84107, 801/262-2800*

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First complete report writer for PCs. Adds new meaning to "easy to use." Takes VisiCalc, 1-2-3 or other DIF results & produces presentation ready reports. Works with IBM PC, PC-XT, DOS, 128K, 28 different printers: Epsons, Okidatas, Prowriters plus letter quality printers. Only $199. (MA res. add 5%.) Visa/MC. *Solutions By Example, Inc., Box 307, New Town Branch, Boston, MA 02258, 617/244-5880*

Reservation

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A menu-driven reservations system for destination resorts. Features include: reservations display board (in color), reservations booking and control, occupancy and management reports, unit file maintenance, and much more. Requires 128K, 2-320K drives, 80 column, DOS. Only $850. Demo disk with doc. $50. *Hansen Management Systems, Inc., P.O. Box 688, Kihei, Maui, HI 96753, 808/879-9943*

Scientific

muMATH-83™
Infinite precision rational arithmetic plus automatic formula manipulation. Includes exact integration, differentiation, limits, matrices, vector calcus, infinite series Laplace transforms and the solution of algebraic or differential equations: $300. Also muLISP: $250. *The Soft Warehouse, P.O. Box 11174, Honolulu, HI 96828*

Sort

Opt-Tech•Sort/Merge
Extremely fast Sort/Merge program for the IBM PC. Can sort or merge multiple files containing fixed or variable length records. Run as a DOS command or call from BASIC, plus many other features. Compare before you buy any other. Write or call for more info. $75. *Opt-Tech Data Processing, P.O. Box 2167, Humble, TX 77347, 713/454-7428*

PC-DOS Sort/Merge
Fast flexible system to sort or merge multiple files on multiple fields. With optional work disk assignment & automatic response batch file, record or record address type sort, more. Runs as DOS command. Technical details available on request. Introductory price $39.50. Ist year maintenance included. *Young Research, Mezzanine, Old Glass Works Bldg., 1115 Third St., San Rafael, CA 94901*

Statistics

Statistician's Mace
Easy to use program calculates descriptive stats, multiple regression, correlations, several ANOVAs, nonparametric tests, and other statistics used by scientists, business researchers, engineers. Accepts keyboard or disk file input. Requires 128K, PC-DOS or MS-DOS, 1 disk. Price $195. Evaluation version $30. *Mace, Inc., 2313 Center Ave., Madison, WI 53704, 608/241-4566*

MathTab™/MathStat™
Statistical software systems for microcomputers that support data management, documentation, descriptive statistics, crosstabs, frequency/breakdowns, regression, ANOVA, logit, probit, and much more. Can enter data from ASCII files, use direct data entry or link from a DBMS. Dealer inquiries welcome. *Mathematica Policy Research, P.O. Box 2393, Princeton, NJ 08540, 609/799-2600, X2246*

Stock Market

Stock Portfolio Reporter
Provides up-to-the minute information on key parts of investor's stock account. Market price updates by DOW JONES; easy link to Hayes Smartmodem. Sort by P/E, gain/loss, yield or any item in SPR's 8 useful reports. Friendly menu displays & manual. Requires 128K, 2dd. Demo disk avail. $279. Visa/MC welcome. *Micro Investment Systems, Inc., P.O. Box 8599, Atlanta, GA 30306, 404/892-3194*

Stock Mizer
Ideal technical analysis & portfolio mgmt. tool for the small investor or club. Displays bar & line graphs of prices, volumes, moving averages, oscillators, & price-vol indices. Allows multi-graph overlays. Manually input daily data in minutes. Req's 64K, disk, color card, PC-DOS. Visa/MC. $29.95. *A & G Sales, 4171 Irvin Cir N., Lake Elmo, MN 55042, 612/770-1373*

Risk/Reward Analyzer
You Don't have to be Baffled by Options! Designed for novice to expert! Beginning to complicated strategies. You input at different strike prices; allows tailoring & ratio hedging; total graphic picture shows $ Invested vs $ Reward; Multiple/time strategies—You set Trend. $10 Demo, $195 Program. *Golden Enterprises, P.O. Box 445, San Ramon, CA 94583, 415/838-0906*

Stock-Aid...
STOCK-AID will organize and manage your stock portfolio simply and efficiently. It lets you track your stock's performance, record buys and sells figuring REAL capital gains and losses—including commission, and it allows you to enter trial data to plan your investment strategy. Definitely a quality investment tool. 64K, 1dd, $89.95. *Cadillac Software Systems, Inc., P.O. Box 150, East Lansing, MI 48823, 517/351-1125*

Systems

Multiuser PC-DOS
MultiLink turns PC-DOS into an efficient multi-user multitasking operating system. Additional users are supported by attaching inexpensive CRT terminals or modems to serial ports on the PC, and can run normal applications designed for PC-DOS. Includes host communications software for public dial-in. *Software Link, Inc., 6700 23-B Roswell Rd., Atlanta, GA 30328, 404/255-1254*

Tax

1040PLAN™
Tax planning template for Lotus 1-2-3. Includes tax changes for 1983, 1984 & new Alternative Minimum Tax. Flexible, up to 4 different alternatives can be computed at once. Easy to use. Follows IRS forms & includes 1040 sch. A,B,C,D,E,G,W,& SE forms 2119, 2441, 3468, & 6251. An Update, if needed, sold at cost to registered owners in Jan 84. Req. 256K $45 *William A. Permar, CPA, 1125 Sunnyhills Rd. Dept. PCW, Oakland, CA 94610, 415/451-7090*

Tax Aide (Preparers)

Do '83 tax returns on your IBM PC. Forms 1040 schedule A,B,D,G & W; NYSIT201 (continuous forms available) Fed package $89; State add $20. Phone asst. provided. Also get real estate investment analysis. Gives 5-yr. projection on property purchased for rental or personal use. Package $75. Call for info. *Tax Aide, 445 Main St., Hackensack, NJ 07401, 201/343-0007*

Templates

1-2-3 Templates

Unique Application Templates Teaches Lotus Usage Thru Practical Applications
#1 1983 Fed. Tax Calculator
#2 Personal Acctg. System
$29.95 ea. Both on 1dd $50. 30 day money back guarantee. *Easy-As. . . Inc., 36 S. Charles St. #402, Baltimore, MD 21201, 301/539-5540*

Terminal Emulation

TEPRO 4010

TEPRO 4010, a software package, permits the IBM PC owner with graphics and communication capability to emulate the TEKTRONIX 4010 terminal. It offers alphanumeric, graphics, file transfer, and hard copy when connected to a host system. Price: $400. For further information and details, call: *Technological Systems Group, 3852 Foxford Dr., Atlanta, GA 30340, 404/939-3526*

Tools

FSE/PC

THE Full Screen Editor for programmers that combines the best features of SPF, FSE, CMS and ICCF. Exceptionally FAST. Maximum file size 32K records. Minimum 128K, 80 column screen, 1dd. Insert, delete, merge, etc. Introductory price $79 with 30 day money back guarantee if not satisfied. TRY IT! MC/Visa welcome. *Data Processing Development Corp., 909 N. Mayfair Rd., Milwaukee, WI 53220, 414/778-1175*

dBASE Programmer Aid

Save time in Debugging—restructure dBASE II programs with automatic indentations, If-Endif/Do-Enddo checking, and helpful lines down the page from If's to Endif's and Do's to Enddo's. Send $25 to: *CPU Corporation, 2350 North Belt #180, Houston, TX 77032, 713/987-0234*

Pascal and C TOOLS

TOOLS includes full string use, screen handling, graphics, and a general BIOS gate. TOOLS2 supports all DOS 2.0 functions, including program chaining. VIEW MANAGER screens are painted with a Screen Painter and stored in the Screen Database. Source code is provided. TOOLS $125, TOOLS2 $100, VIEW MANAGER $275. *Blaise Computing Inc., 1609 Acton St., Berkeley, CA 94702, 415/524-6603*

One-Key Step-Scroll

BASIC PROGRAMMERS: Tired of keying LIST xxxx - xxxx? Routine will step up, down or reLIST with one key. Two 40-80 col windows, toggles mono-color. Active after RUN, edit. No change to DOS, BASIC or user memory. Other: displays disk files, memory, variables, and sorted directory. RENUM enhancement. Diskette $20. *IRC Associates, Dept. W, 125 Sherrfield Dr., Ste. X9, Saginaw, MI 48603, 517/792-2156*

Trading

Legally Trade Software

SOFTRADERS™ matches users wanting to exchange original disks and documentation. We offer unlimited trading opportunities thru worldwide network with quarterly directories & monthly updates. Call now or send system description, titles of programs you have & want plus return postage. You get results! *Softraders International, 1610 Shomaker Dr., Murphysboro, IL 62966, 618/687-4799*

Utilities

Peeks 'n Pokes for the PC

A customer told us "Peeks 'n Pokes is the best bargain in *PC World*." We think you'll agree! Discover how to access and modify the status of the PC. Perform DOS and BIOS function calls from BASIC or Pascal. Learn how to find more Peeks 'n Pokes and much more. Disk (58 programs) and manual $30 + $2.50 shipping. MC/Visa. *Data Base Decisions, 14 Bonnie Lane, Atlanta, GA 30328, 404/256-3860*

Backup Program

Copy 11 PC copies protected and unprotected software without modifying data and verifies the disks it creates. Available memory is fully utilized to minimize diskette duplication time. In addition, Copy 11 PC includes a drive speed utility that can pinpoint drive problems. See our ad in this issue! $39.95. Add $2 s/h. *Central Point Software, P.O. Box 19730 #203, Portland, OR 97219, 503/244-5782*

XT & DOS 2.0 Users

DOS shell—enhances DOS 2.0. Features: Creates a user-friendly "shell" surrounding your system/Automates commands/Organizes programs & data by menus/Online help at all levels/Utilizes function keys. Includes: disk archive, data search & more. Extensive manual makes sense of DOS 2.0. Disk and manual: $70. *XTC Software, P.O. Box 902, Santa Barbara, CA 93102, 805/967-7837*

Expand Prowriter I/II

(or NEC 8023) PRINT SCREEN—an assembly language screen dump for text and graphics, $35. PRINT CHARACTERS—an assembly language program that allows the user to print any character but printer control codes, $35. Prices include an extensive manual (with source code) plus shipping. Not copy protected. *Soft & Friendly, Route 2, Box 65, Solsberry, IN 47459, 812/825-7384*

PC Padlock

Unique encryption scheme protects EXE-COM programs from running after unauthorized duplication. Copy programs such as COPYPC will not copy after running this easy to use program on your products disk. Protect your software investment & valuable marketplace. Works with all DOS versions. Ask about our DATA PADLOCK. $99. Visa/MC. *Glenco Engineering, 3920 Ridge Ave., Arlington Heights, IL 60004, 312/537-4200*

PC File Compare

Compare disk files & get meaningful results. See the difference when a non-compare occurs. PC File Compare displays actual records that fail to compare, not just the offset into the files. Compares files of different lengths, individual files, or allows specification of Global filename characters. $50. NJ add 6%. MC/Visa. *ErgoSoft, P.O. Box 454, Oakhurst, NJ 07755, 201/493-8352*

The Inside Track

Another bargain! Give your programs speed and control. Read files as fast as DOS, display data faster, load programs faster, control memory use, run any program from your program, copy-protect your disks and much more. Fold-out memory map too! Disk (61 programs) and manual $45 + $2.50 shipping. MC/Visa. *Data Base Decisions, 14 Bonnie Lane, Atlanta, GA 30328, 404/256-3860*

Fortran File Extraction

PC-XTRACT™ is a software utility for FORTRAN programmers that scans a single (and potentially large) program source code file and creates individual source code files of the MAIN PROGRAM and each SUBROUTINE, FUNCTION and BLOCKDATA. $49 including documentation. CA residents add 6%. *StratCom Systems, Inc., 1010 Turqoise St. #242, San Diego, CA 92109, 619/488-2262*

PC Disk ID
Eliminate the need under PC-DOS 2.0 to reformat disks in order to add, change or delete volume labels. Prints sorted list of files (including hidden files) from disk directory to labels or to a listing. Also allows recovery of files erased inadvertently. Requires PC-DOS 2.0, 1 disk. $30. MC/Visa *ErgoSoft, P.O. Box 454, Oakhurst, NJ 07755, 201/493-8352*

CopyWrite
CopyWrite backs up all IBM PC software. No exceptions. CopyWrite needs an IBM PC or XT, 48K bytes and one diskette drive, but can use more memory or another drive. CopyWrite is revised monthly, to keep up with the latest in copy protection, and comes with a trade-in offer. Price: $50 U.S. funds. *Quaid Software Products, 620 Jarvis St. #2412, Toronto, Ontario, M4Y 2R8 Canada, 416/961-8243*

Object Module Librarian
PolyLibrarian creates libraries from object files. The linker will then select only the modules required for execution. Add, delete, extract, replace & rename modules. Create, examine, reorganize & optimize libraries. Works with any compiler or assembler using the MS-DOS linker. $99 with manual. *Polytron Corp., P.O. Box 787, Del. Sta. 3-205, Hillsboro, OR 97123, 800/547-4000 Dept. 205*

C. View
A tool for software developers. Can be used to quickly develop spreadsheets, custom data entry, editors, etc. Supports windowing, multiple views in memory, extensive edits. Includes a view editor. No royalties. Interfaces: C, Pascal, BASIC. Requires 128K. Price $195. *Aragorn, Inc., P.O. Box 337, Warren, MI 48090, 313/731-2780*

Press'N'Plot
A color graphics screen capture & print facility for the IBM PC & Integral Data Systems PRISM printer which is invoked by pressing SHIFT-PrtSc. PRESS'N'PLOT lets you capture (and/or save) an image & perform various functions to compose the image for printing. List Price: $149. *American Programmers Guild, Ltd., 55 Mill Plain 17-5, Danbury, CT 06810, 203/794-0396*

Word Processing

SuperStar™
Attention WordStar™ users! SuperStar brings you color & customized default parameters. You select foreground & background colors (or reverse video). Select the default parameters you want from the menu. WordStar will remember & use your customized parameters each time it is booted. $29.95. *Relational Solutions, Inc., 8723 Woodleigh Dr., Houston, TX 77083, 713/530-4161*

Fontastic™
If you want to SHOUT on paper, here is THE ANSWER! A word processing text customizer. Print your text in many provided font styles or easily create your own! Add special emphasis like italics, bold and underlined, and much more. Requires IBM PC, DOS, 128K, WP or Editor, and dot matrix printer. $125. *IHS Systems, 4718 Meridian Ave. #211, San Jose, CA 95118, 408/265-5503*

Science Foreign Business
Text Editor. 384 characters w. super/subscripts all printable & visible on monitor. Writes full screen in 0.2 sec. Intelligent input interpreter. Command processor speaks English & forgives mistakes. Instant, simple text-block operations. Uses 256KB RAM. Comprehensive package. $150 to $400. *Pelada Informatica, 562 Johnson St., Kingston, K7L-2A1, Canada, 613/549-1747, Source STP892*

Hebrew Word Processor
Largo Computing of Israel and TexaSoft, Inc. introduce the VersaText Hebrew Word Processor and Database System for the IBM PC. Hebrew and English can be entered in the same document. Hebrew character generator chips for the IBM PC and for Epson printers are provided. US distribution by TexaSoft, Inc. *TexaSoft, Inc., One Energy Square, #660, Dallas, TX 75206, 214/369-0795*

Typesetting
Cimarron
Cimarron offers top quality, overnight service, and a savings of ½ to ⅓ on typesetting costs for text jobs such as newsletters, directories, catalogs and books. Compugraphic typesetting equipment. Contact us via EMAIL or BBS. *Cimarron Graphics, P.O. Box 12593, Dallas, TX 75225, DATA BBS - 214/691-5092 (Hostcomm), CompuServe EMAIL 70130,161*

PC World Directory *is a comprehensive listing, by category, of products and services for the IBM PC, lookalikes, and compatibles. It provides rapid access to the burgeoning PC marketplace for both readers and advertisers.*

FORMAT: The standard format includes a product ID, a 300-character descriptive ad, and company name, address, and telephone number.

Advertisers may choose among categories already being used or may create their own. Display advertisers can cross-reference their current ad to the PC World Directory *for increased exposure at low cost.*

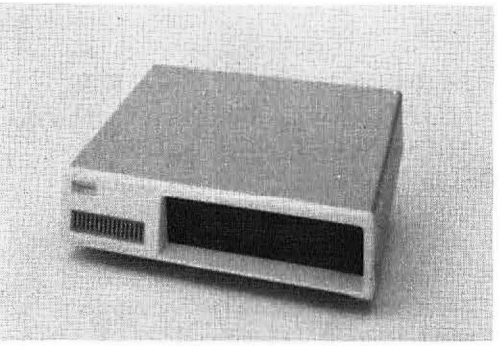
RATES: Listings are accepted for 3-time consecutive insertions at a rate of $420 ($140 per issue). We are now offering a 6x insertion, 15% discount contract for a total of $714 ($119 per issue). Listings must be prepaid (except for established display advertisers) upon submission of ad copy. Checks, money orders, VISA, and MasterCard are acceptable.

DEADLINE: For space reservation deadlines, contact a PC World Directory *sales representative at 415/861-3861. Please send copy and prepayment to:* PC World Directory, *555 De Haro Street, San Francisco, CA 94107.*

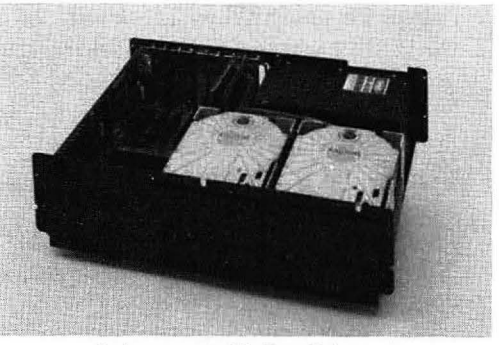
See you next issue!

SIGMA DESIGNS:

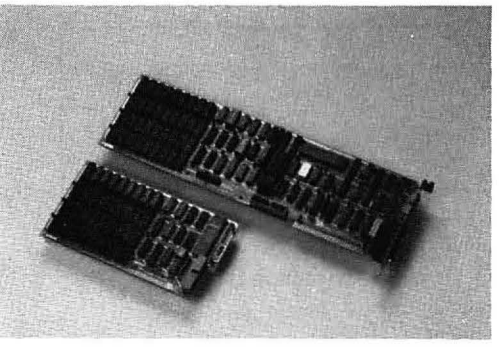
Your Full Line IBM PC Expansion Products Supplier



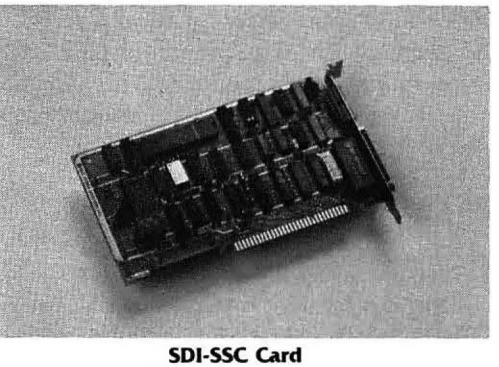
Expansion Chassis/Winchester Disk Subsystem



Subsystem with Two Drives



SDI-ESC + Memory & Stack Board



SDI-SSC Card

The Sigma Expansion Chassis/ Winchester Disk Subsystem:

- Consists of an expansion chassis, one or two Winchester disk drives, and software running under DOS 1.1 & 2.0.
- The Chassis' Expansion Board allows up to 9 add-on function cards, and features a heavy-duty 100W switching power supply.
- When operating under DOS 2.0, the SDI Winchester software can access either one(1) or two(2) 5, 10, 15, and 34 MB 5¼" Winchester disk drives.
- The subsystem is supplied as an Expansion Chassis only, Expansion Chassis with one drive, or with two disk drives.
- Other features include a super quiet fan, shielded interface cable, Driver and Receiver Logic cards to buffer all signals between PC and subsystem, and easy installation.

More Value For Your Dollars:

- **Expansion Chassis (Only)** $795.00

• Subsystem w/ One Drive		• Second Drive	
5 MB	$2095.00	5 MB	$ 895.00
10 MB	2295.00	10 MB	1095.00
15 MB	2495.00	15 MB	1295.00
34 MB	3295.00	34 MB	2095.00

The Sigma family of add-on cards:

- SDI-ESC + Memory: Socketed memory up to 512K (with Stack Board), RS-232 async. port, parallel printer port, clock/calendar, game adapter. Extra async. port when used with Stack Board. $395.00 at 64KB.
- SDI-SSC: Same as above, but without memory. The perfect addition to your new 256K PC or XT! Retails at $265.00. Call your dealer for additional products and price information.

ONE YEAR WARRANTY • DEALER INQUIRIES WELCOME

SIGMA DESIGNS, INC.

2990 Scott Blvd • Santa Clara, CA 95050 • (408) 496-0536 • TELEX: 171240

Circle 169 on reader service card

Just Announced

The wide world of PC products

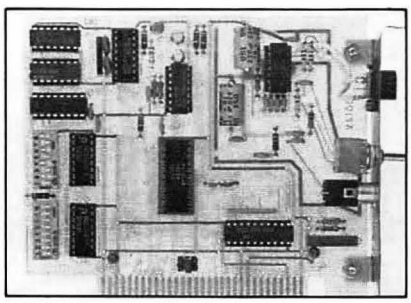
Edited by Anna Bunker

In the fast-paced personal computer marketplace, *Just Announced* acts as an alert service to keep you abreast of the latest developments in IBM PC and compatible technology. Information for this department is provided by manufacturers; these write-ups are not reviews. Many of these descriptions will be followed up by reviews in future issues.

Hardware

Boards

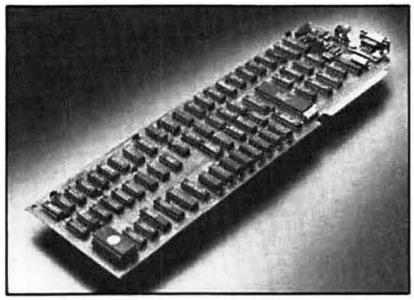
MSI-VS01
A voice synthesizer board packaged with a BASIC program that allows the user to produce voice messages with simple command sequences. It uses any full-length slot on the IBM PC or XT. The board features 64



MSI-VS01 voice synthesizer card, Microcomputer Systems,

phoneme codes that allow the user to build an unlimited vocabulary. A dictionary of phoneme combinations for 1400 words is included. An on-board 4-watt audio amplifier provides direct connection with a standard 8-ohm speaker. List price: $175. Microcomputer Systems, Inc., 1814 Ryder Dr., Baton Rouge, LA 70808, 504/769-2154.

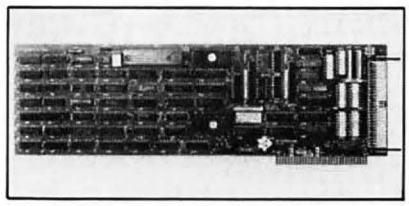
Color/Graphics Adapter
A color graphics board for the Eagle PC, the Eagle 1600 series, and the IBM PC. It provides both a low-resolution all-points-addressable color graphics mode and a high-resolution alphanumeric monochrome mode. The color mode features 16 foreground and 8 background colors. List price: $295. Eagle Computer, 983 University Ave., Bldg. C, Los Gatos, CA 95030, 408/395-5005.



Color/Graphics Adapter, Eagle

MasterGraphics
A graphics adapter package that animates graphics displays at a speed of up to 60 screens per second. The adapter uses one full-length slot. The package includes interrupt logic and dual display buffers that produce smooth animation; MasterPalette, the adapter that offers the user 4096 colors; and a graphics application program for designing a custom character set. An optional Dual Display Kit provides interfaces for both monochrome and color displays. The MasterGraphics utility software includes subroutines for Interpreted BASIC, Pascal, and FORTRAN. The system is compatible with PC-DOS and CP/M software, and all IBM PC and XT hardware. List price: $579, Dual Display Kit $75. MicroGraphics Technology Corporation, 1820 McCarthy Blvd., Milpitas, CA 95035, 408/996-8423 ext. 421.

Maverick SMD PC-80
A rigid disk controller that supports SMD and SMD-compatible high-performance disk drives. The Maverick occupies a single full-length slot in the IBM PC chassis. SMD disk drives accommodate 8-inch or larger disks. The Maverick supports two SMD disk drives. Each disk drive provides 16 to 800 megabytes of storage with a throughput rate three to four times faster than the standard Winchester disk. List price: $1895. Interphase Corporation, 2925 Merrell Rd., Dallas, TX 75229, 214/350-9000.



Maverick SMD PC-80 rigid disk controller, Interphase

68000 Micro Card with RM/COS
A 68000 coprocessor board packaged with RM/COS, a multitasking operating system developed by Ryan-McFarland for COBOL applications. The board provides either 256K or 512K of memory, paged memory management, and memory protection. It increases system execution speed by using the 68000 CPU for central processing and the 8088 as an I/O processor. The combination board/operating system supports up to four users. The board does not interfere with PC-DOS applications.

List price: with 256K $2495, with 512K $2995. Sritek Incorporated, 10230 Brecksville Rd., Cleveland, OH 44141, 216/526-9433. Ryan-McFarland Corporation, 609 Deep Valley Dr., Rolling Hills Estates, CA 90274, 213/541-4828.

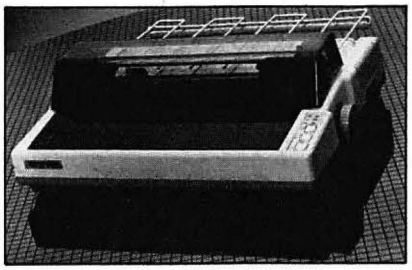
Displays

XL-13
A color CRT monitor packaged with a bit-mapped graphics board that together create a high-resolution, 640- by 480-pixel display. It features onboard graphics primitives that allow the user to execute graphics with one-step commands. The board/monitor combination is designed for CAD/CAM applications, energy management, and business graphics. List price: $3495. Colorgraphic Communications Corporation, P.O. Box 80448, Atlanta, GA 30366, 404/455-3921.

Printers

DTC Style Writer
A daisy wheel printer that features a 35K buffer memory, two-color and bidirectional printing, and graphics capabilities. The DTC Style Writer has a parallel port interface. The printer provides multiple copies without reloading the buffer and pauses to allow paper, print wheel, or ribbon changes. It supports boldface, super- and subscripting, automatic underline, doublestrike, and proportional spacing. The DTC Style Writer prints 13 cps and comes with the standard 96-character daisy print wheel. Options include 17 print fonts, a 67K buffer memory, a tractor feed for continuous paper, and a bidirectional cut-sheet feeder. List price: $899. Data Terminals and Communications, 590 Division St., Campbell, CA 95008, 408/378-1112.

The Riteman
A dot matrix printer that weighs 11 pounds and fits into a briefcase. It requires a Centronics parallel port. An RS-232C serial interface with 300 to 9600 bps is optional. The printer features three character sets: an ASCII 96 character, an italic 96 character, and a block-graphic 32 character. It produces correspondence-quality print at 120 cps. List price: $499. Inforunner, 1621 Stanford St., Santa Monica, CA 90404, 213/453-8731.



Riteman dot matrix printer for the briefcase, Inforunner

Miscellaneous

Engineering Workstation
An engineering work station that includes a reconfigured IBM XT with an 8087, a high-resolution graphics board, a 1024- by 768-pixel color monitor, a digitized drawing tablet, and integrated CAD software. The user can design his or her own integrated circuits and printed circuit boards. The work station can be used as a stand-alone component or incorporated into an Ethernet local area network. List price: $30,000. Chancellor Computer Corporation, 1305 Grandview Dr., South San Francisco, CA 94080, 415/872-2346.

Engineering Workstation, Chancellor Computer

System Software

Languages

Professional BASIC
A 16-bit language in two versions: the scientific version for the monochrome monitor and a graphics version for the color monitor. The scientific version requires 128K and one disk drive; the graphics version requires 192K and one disk drive. Professional BASIC accesses all available memory. It is compatible with IBM BASIC and will run BASIC programs. It allows the programmer to label program lines with names. Subroutines are called and GOTOs are performed with the label instead of a line number.

Upon completion the user can view a listing of the running program and a listing of the variables simultaneously on a split screen. The language features a character-by-character syntax-checking system that eliminates syntax errors, and an error analysis system that analyzes the entire program and automatically displays the problem lines. Professional BASIC allows the user to cross-reference variables and set conditions. List price: scientific version $200, graphics version $300. Morgan Computing Co., Inc., 10400 N. Central Expwy. #210, Dallas, TX 75231, 214/739-5895.

Waterloo Logo
A full implementation of the Logo language that features over 140 primitives, 12-digit floating point arithmetic, extended turtle graphics, music, painting, list processing, and a full-screen editor. It requires 128K, one disk drive, and a color graphics board. An interface to PC-DOS is provided. List price: $180. Waterloo Microsystems Inc., 175 Columbia St. W, Waterloo, Ontario, N2L 3B6 Canada, 519/884-3141.

Utilities

DBX
A Pascal data base applications generator. It requires 64K and one disk drive. The package includes the object and the source code for *DBX;* a demonstration data base that calls *DBX* to store, retrieve, or delete entries; and a diagnostics program that calls *DBX* to display all current input and output information. The demonstration data base can be used as is to manage bibliographies, glossaries, and inventory catalogs. List price: $49.95 plus $3 for shipping. Pascal & Associates, 135 E. Rosemary St., Chapel Hill, NC 27514, 919/942-1411.

Screen Saver +
A collection of preventive maintenance programs for the IBM PC that requires 64K and one disk drive. *Screen Saver* protects the display screen from phosphor burning by automatically blanking the display after a period of time, programmed by the user, when no keyboard activity has taken place. The screen is saved and recalled by pressing the space bar. *Screen Saver* can be used with both color and monochrome monitors.

Data Guard records the amount of time a disk has been used and tells the user when a disk should be discarded. *Screen Saver +* also includes a memory test. List price: $19.95. Logical Systems Corporation, Rt. 1 Box 253, St. Michael, MN 55376, 612/497-3861.

Applications Software

Accounting and Inventory

The Champion
An integrated accounting package written in *dBASE II* that includes five stand-alone modules: Accounts Payable, Purchase Order, Inventory, Payroll, and Accounts Receivable. It requires 64K and two disk drives. *The Champion* comes with a 16-bit run-time version of *dBASE II.* It features a built-in auditing function that allows the user to separate transactions into ten journals and ledgers, trace transactions, and keep all changes, corrections, and deletions on file. Lost data can be recovered with *The Champion*'s recovery program. Reports can be generated on screen or as hard copy. List price: $495 per module. Data Base Research Corporation, 66 S. Van Gordon #155, Lakewood, CO 80228, 303/987-2588.

Basic Accounting System
A double-entry bookkeeping system of over 30 modules that produces a balance sheet, an income statement, and a statement of owner's equity. The program requires 128K, two disk drives, and a printer and is written in Compiled BASIC. The system gives the choice of closing by month, quarter, or year. Up to 300 accounts are allowed in the chart of accounts, 750 journal entries for each accounting period, and 1500 separate account references if more than two accounts appear per entry. Each journal entry has a serial number within the current year for ease of audit.

Basic Accounting System personalizes financial reports with an individual, family, or company name heading the printouts. In addition to the three principal financial reports, the program provides summaries of individual account activity and current balance. The system prints general journal and ledger listings at the time of closing. *Basic Accounting System* includes a program for depreciation schedules and utilities for data file maintenance and printing, tabbing, and appending text files built with the EDLIN editor. List price: $119. Fox Custom Systems, P.O. Box 161, Hendersonville, TN 37075, 615/822-6266.

THE INTEGRATED ACCOUNTING SYSTEM

MAXI ACCOUNTANT

Maxi Accountant - Designed to handle the business needs of tomorrow — "Today", and you don't have to be an accountant to use it.

Features include:

Fully integrated modules -thirteen major programs contained within Maxi Accountant interact with one another allowing minimal disk handling or runs on any hard drive

Extensive reporting capabilities

Comprehensive, easy to use documentation - including tutorial

Technical support

Accounts Payable

- Check writing with automatic posting to Vendors and Bank Account
- Enter A/P invoices with automatic posting to inventory and purchase orders
- Supports partial payments, Aged A/P balances, and Earned discounts
- Monthly Check, Deposit and Petty cash register
- Complete Audit Trail
- Detailed Vendor Activity and Cash Requirements Report
- Uses same commercially available check forms as payroll
- Provides bank statement reconciliation

Payroll

- Weekly, Biweekly, Bimonthly, Monthly pay periods
- Complete QTR and YTD Pay Journal records
- Handles hourly, salaried and commission pay
- Sales commissions by percentage or dollar amount
- Only requires input of hours worked
- Automatic calculation of regular and overtime pay and all deductions
- 941A Quarterly State Report
- W-2 Forms printing
- Federal and all State Tax Tables
- Personnel information file
- Uses same commercially available check forms as Accounts Payable
- Comprehensive YTD information printed on employee check stub

Accounts Receivable/ Order Entry

- Alphabetical and numerical sorting of customers
- 500 customers and up to 3000 transactions per 320k diskette (Unlimited number of diskettes allowed)
- Extensive customer information file
- Flags Credit limits and overdue balances
- Invoices from sales orders support backordering system
- Invoices for point-of-sale
- Multiple Price discounts and Sales tax rates
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- Supports special sales packages (bill-of-material)
- Supplies telephone number and contact name for overdue accounts
- Detailed transaction Audit trail
- Customer Activity Report
- Open Item Balance Forward
- Calculates Sales Commissions for payroll module
- Allows Sales of assets
- Allows sales of non-inventory services

General Ledger

- Chart of accounts
- Itemized monthly Journal transactions
- Asset depreciation, Complete G/L Reports, Daily Journal, Trial Balance, Operating Statement and Balance Sheet
- Supports up to 9 separate Profit Centers

Inventory Control

- Provides ON LINE information to all other modules
- Purchase orders with review or automatic ordering mode
- Complete backordering system included
- 25 items per bill-of-material
- 1500 stock items per 320K diskette with automatic advancement to next diskette
- Complete Vendor information file
- Calculates reorder quantities and displays lead times
- Physical inventory using average cost method adjustments
- Reports in inventory module include: Complete Inventory Report, Sales Analysis, Reorder Report, Purchase Order listing, Sales Package listing, Summary, and Labels

Maxi Accountant is designed for MS-DOS systems, including IBM PC and XT, Zenith Z-100, Victor 9000, Texas Instruments PC, Columbia, Compaq, Hyperion, Corona, Eagle PC, and Rainbow 100.

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Business Management

Business Planning Tool (BPT)
A financial forecasting and budgeting worksheet with built-in formulas and formats. It requires 128K and one disk drive. Data can be entered with the keyboard or extracted from *The Peachtree General Ledger* with Sofstar's *Peachtree Connection*. Data is entered once and is then automatically posted to each month in a 12-month worksheet. Worksheets can be updated, allowing the user to preview future budgets or business plans. Data can be displayed in bar graph format on the screen. Graphs can be created with the function arrow keys, allowing the user to perform financial forecasting in graph form. With *BPT* the user can create preformatted spreadsheet templates that are compatible with *VisiCalc*, *Multiplan*, or *1-2-3*. List price: $195. Sofstar, Inc., 13935 U.S. Highway #1, Juno Beach, FL 33408, 305/627-5511.

Pertmaster
A program that allows users to manage multiple-activity projects. It requires 128K, two disk drives, and a 132-column printer. *Pertmaster* uses two traditional methods of evaluating projects: the Project Evaluation and Review Technique and the Critical Path Analysis Method. It can manage a project having up to 1500 activities with up to 29 resources per activity. The program is able to update the entire project in less than 10 seconds. Project data can be displayed in bar chart format on screen and printed copy. List price: $695. Westminster Software, Inc., 3000 Sand Hill Rd., Bldg. 4, #245, Menlo Park, CA 94025, 415/854-1400.

Job Specific

Superval
A real estate investment analysis program designed for real estate appraisers, owners, managers, and consultants that can make cash flow projections for up to 50 years. The program requires 128K and one disk drive (two are recommended). The program handles multiple-lease, multiple-property, and multiple-mortgages analyses. *Superval* automatically calculates re-leasing with leasing commissions, tenant improvement costs, new escalations, and percentage rents. Reports can show investment assumptions, investment yield components, return on investment, and cash flow. Reports can be prepared in dollars, dollars per square foot, foreign currency, or other scales defined by investors. List price: $1495. Real Estate Applications Software, Inc., 12 Manor Rd., Smithtown, NY 11787, 800/645-4660, 516/360-8833 in New York.

Communications

Soft-Switch
A communications program that transfers word processing files to an IBM or IBM-compatible mainframe for archiving, translating, and forwarding to other word processors. It requires *MultiMate*, an RS-232C serial port, and a modem. Files can be translated into several word processing formats, including those of the IBM Displaywriter, the Wang, the NBI 3000, the NBI Oasis, and the Xerox 860. Files can be retrieved from archives by author, title, number, date, keyword, or phrase. List price: mainframe software $20,000, each translator $5000, IBM PC software $150. Integrated Technologies, Inc., 200 N. Warner Rd., King of Prussia, PA 19406, 215/768-9330.

BLAST
Blocked Asynchronous Transmission (BLAST) is a communications program that allows binary and text files to be transferred among a wide range of microcomputers, minicomputers, and mainframes. It requires 64K, one disk drive, an asynchronous modem, and an RS-232C serial port. Its full-duplex asynchronous protocol allows files to be transferred via telephone lines in both directions simultaneously. *BLAST* can be incorporated into local area networks. List price: $250. Communications Research Group, Inc., 8939 Jefferson Hwy., Baton Rouge, LA 70809, 504/923-0888.

Data Management

Magictable
A menu-driven data management program that can store up to 32,766 records with up to 512 characters per record. It requires 64K and one disk drive. The program can retrieve records by comparison, by range, or by a string of characters. Data may be displayed as a multiple-record table or an individual record format. Values can be added, subtracted, multiplied, or divided between columns. Totals, averages, and the minimum and maximum numbers in a field are automatically displayed. New columns can be inserted. Records can be sorted alphabetically or numerically. List price: $159. Presta Digital, 10 Bridge St., P.O. Box 7192, Lowell, MA 01852, 617/458-4070.

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A program that can be used to create files, enter and retrieve data, print reports, and create statements, mailing labels, reference cards, and form letters. It requires 64K and one disk drive. Up to ten fields per file can be used for selecting and sorting. Screen and hard copy formats are user definable. Formulas may be incorporated for calculated fields. The user can define two files to be connected and switch easily between the two. List price: $190. Software Options, Inc., P.O. Box 5150, Vallejo, CA 94591, 707/557-1691.

Deduction and Reasoning

Think Tank
A program that organizes ideas into outlines. It requires 256K and two disk drives. The outlines can be compressed, displaying major headings only, or expanded for detail. *Think Tank* can be used to develop a project that can be modified as it evolves. It can be used to brainstorm, plan lessons, or keep track of appointment and to-do lists. List price: $150. Living Videotext, Inc., 450 San Antonio Rd. #56, Palo Alto, CA 94306, 415/857-0511.

Educational

InfoStar Training Programs
Two tutorials on MicroPro's *DataStar* and *ReportStar* written in assembly language. They require 64K and one disk drive. Each program includes two disks and a 50-page manual with exercises. The tutorials are designed to be used by the beginner, but the more advanced user will appreciate the explanations of principal procedures, including how to construct logical statements. They are self-paced but quickly executed since they are written in assembly language. Sample applications show how *DataStar* and *ReportStar* can be applied to sales analysis, research, billing, transaction processing, and recording tax deductions. List price: $59.95 per tutorial. Witech Corporation, 763 Vallejo Way, Sacramento, CA 95818, 916/441-7772.

SAT Analogies Package
Three educational programs designed to help high school students prepare for college entrance and scholastic achievement exams. All programs require 64K and one disk drive. The formats simulate SAT exams, and the programs cover vocabulary, analogies, and mathematics. Students receive immediate feedback and an explanation for every incorrect answer. List price: $200 each. Microphys Programs, 1737 W. 2nd St., Brooklyn, NY 11223, 212/375-5151.

Edubas III
The third in a series of BASIC tutorials. It requires 64K, one disk drive, and a color graphics board. *Edubas III* covers all the new features that IBM BASIC 2.0 offers, including the tree-structured directory; new graphics functions; and DRAW, POINT, PAINT, and LINE options. List price: $50. Europro, Inc., 129 Saratoga, Petaluma, CA 94952, 707/763-9700.

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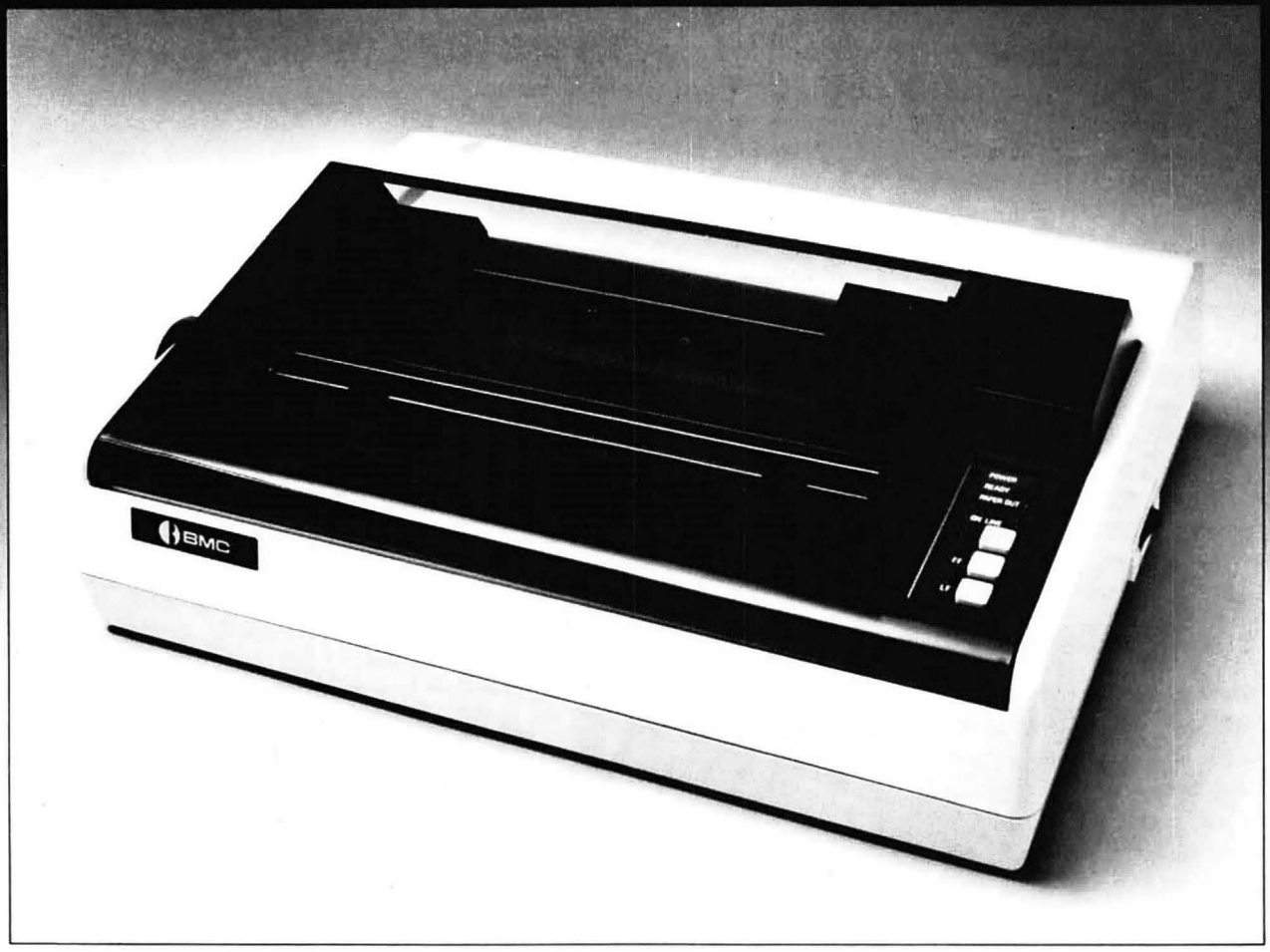

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Entertainment

Sfinks PC Chess Program

A one-person game that displays a chessboard and chessmen on either a color or monochrome monitor. It requires 64K and one disk drive. The game is designed for beginning to expert chess players. The program features a problem mode that allows the player to set up a chess problem and continue to the end of the game. It also features different play levels, a dual chess clock, optional printer output, and an optional audio signal. Games that are in progress can be saved and restored. The program can offer the player move suggestions. *Sfinks PC* observes United States Chess Federation rules of play, including castling, en passant, and underpromotion. The user can select a timed response. Thirty-two book openings are included. List price: $49.95 plus $2 for shipping. William Fink, 1105 N. Main #24B, Gainesville, FL 32601, 904/377-4847.

J. Baxter Newgate's Cryptic Crossword

A telecommunicated crossword puzzle of puns and anagrams available on The Source. The game gives players instant access to the answers and allows them to challenge the author. The puzzle can be completed on screen or printed out. Players choose from several skill levels. It differs from the traditional newspaper crossword puzzle in that it offers cryptic clues that test the reader's wits instead of knowledge. The answers come complete with explanations. Each crossword puzzle costs approximately 25 cents on evenings and weekends and slightly more during business hours. Megalo Media, GPO Box 2340, New York, NY 10001, 212/594-4184, 212/861-8048.

Graphics

Grafox

A business color graphics package that displays any standard IBM BASIC or DIF data in bar, pie, or line format. It requires 96K, two disk drives, and a color graphics board. *Grafox* can read, select, sort, average, total, and chart data drawn from DIF data bases. It can graph up to four data base fields and plot up to three graphs simultaneously, allowing users to compare data base fields. The program can graph calculated values such as sales minus cost, revenue divided by profit, or number of sales divided by earnings. *Grafox* is compatible with IBM BASIC, *VisiCalc, SuperCalc, WordStar, InfoStar,* and *TIM*. Hard copy can be produced on the HP 7470A two-pen plotter and several popular printers. List price: $295. Fox & Geller, Inc., 604 Market St., Elmwood Park, NJ 07407, 201/794-8883, Telex: 968948.

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Geograf
A graphics utility program with 14 BASIC subroutines that allows users who have minimal programming experience to produce business, science, and engineering plots and graphs on a pen plotter. It requires 64K and one disk drive. With *Geograf* the user can scale the plot, draw and label axes, plot data points with a choice of symbols, plot data with a choice of line types, and draw circles. The program is compatible with Hewlett-Packard, IBM, and Watanabe plotters. List price: $250. Geocomp Corporation, Graphic Sales Division, 342 Sudbury Rd., Concord, MA 01742, 617/369-8304, Telex: 466193.

StarBurst
A program that integrates MicroPro's applications software—*WordStar, MailMerge, SpellStar, DataStar,* and *ReportStar*—as well as other standard software such as *VisiCalc, SuperCalc, dBASE II,* or *1-2-3* into a menu-driven system designed to automate business environments. It requires 96K and two disk drives. Additional memory is required for the programs chosen to run with *StarBurst*. Tasks are incorporated into a *StarBurst* menu by the system builder with a text editor and presented to the operator as choices. If the operator chooses to do a customer mailing, for instance, *StarBurst* automatically calls up *MailMerge*. Help screens can be incorporated into the menus. List price: $195. MicroPro International Corporation, 33 San Pablo Ave., San Rafael, CA 94903, 415/499-1200.

Word Processing

Paperwork
A program that allows users to write documents or letters and create a mailing list address data base that can be automatically merged into letters. It requires 128K, two disk drives, and IBM's BASRUN.EXE, which the manufacturer will distribute with the program for an additional $20. *Paperwork* edits text by either line or screen. Features include dynamic tab, margin setting, word wrap, boldfacing, and underlining. A set of embedded text commands allows headings, subheadings, and line spacing. List price: $69.95. Harris Microcomputers, Inc., 2560 N. 560 E, Provo, UT 84604, 801/373-1605.

Publications

Micro Software Distributors
A directory for publishers seeking new markets that includes 167 software resale companies. Each distributor is described in a full-page listing with details on the kind of software the company purchases, what it pays, the marketing rights it obtains, whom it sells to, and how much support it provides. The sourcebook includes advice on how to submit a proposal. List price: $95. Software Research Co., P.O. Box 9524, Drawer 306, Washington, DC 20016, 202/364-8700.

Reference Encyclopedia
Reference Encyclopedia for the IBM Personal Computer is a 1000-page sourcebook by Gary and Karen Phillips, written for both novice and experienced users. The encyclopedia includes computer terms, functions, programming tips, product descriptions, and vendor contracts. Listings are alphabetized, indexed, and cross-referenced. Material for the encyclopedia was gathered from manuals, electronic bulletin boards, publications, and books. The encyclopedia comes in two volumes packaged in three-ring, tabulated binders. List price: $69.95. Ashton-Tate, 10150 W. Jefferson Blvd., Culver City, CA 90230, 213/204-5570, Telex: 669984.

Mentor
An on-disk computer magazine for IBM PC and compatible users. The on-disk magazine requires a system with 64K and one double-sided disk drive. The magazine concentrates on routines that work with applications software such as *dBASE II, VisiCalc, 1-2-3,* and *WordStar.* Standard magazine format articles appear on screen, but most are introductions and documentation for the included programs. The magazine's disk format permits manufacturers to include self-running demos of their products. List price: $99 for six issues, single issues $19.97. Mentor Computer Services, 1362 Pacific Ave., Santa Cruz, CA 95061, editorial office 408/425-8520, subscriptions 800/227-3900, 800/632-2122 in California.

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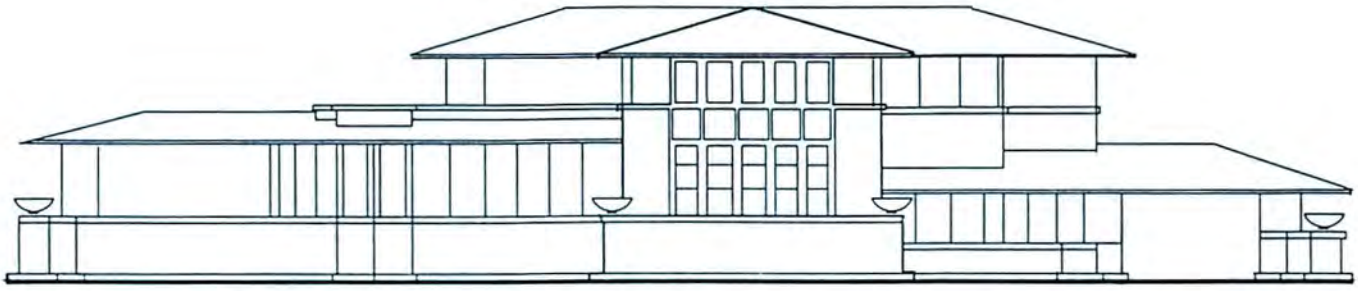

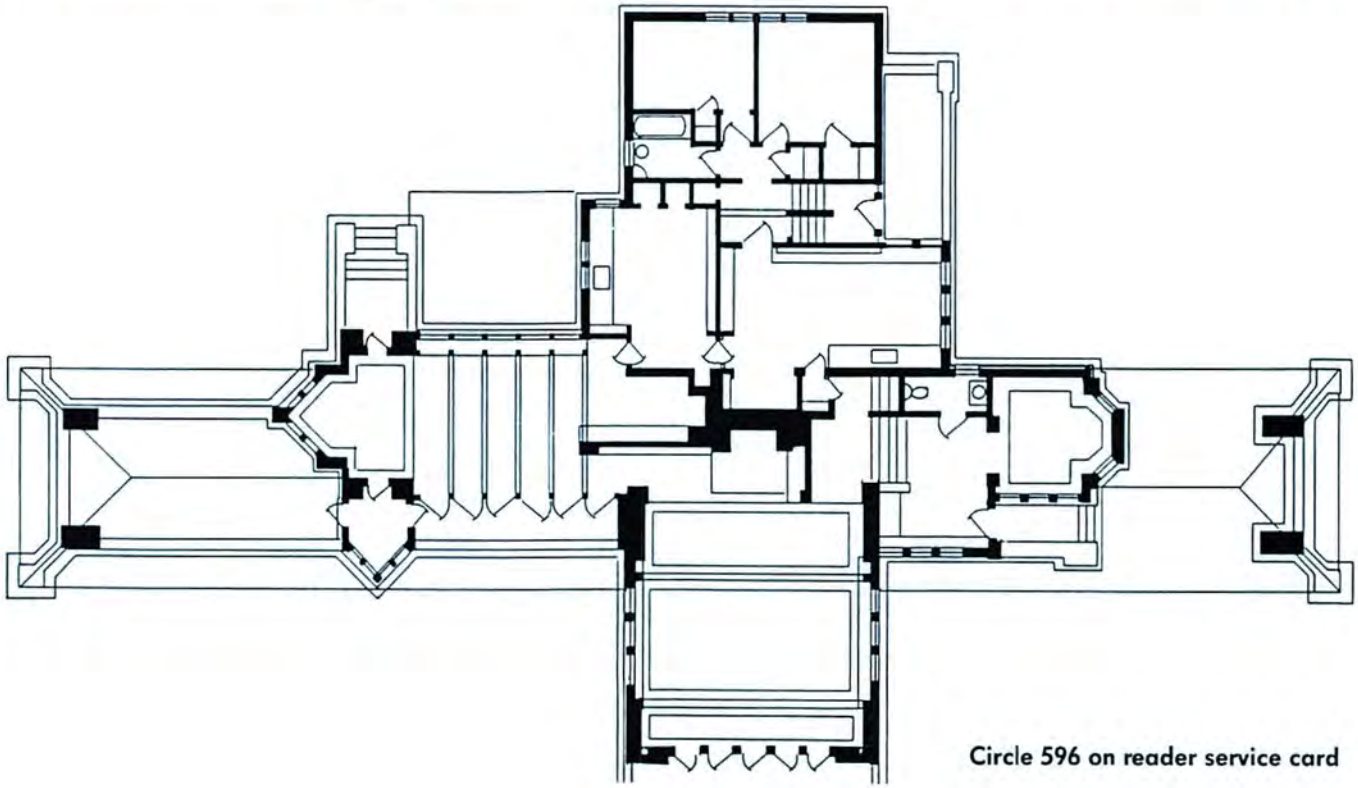

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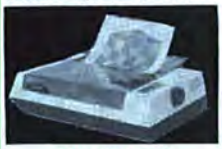

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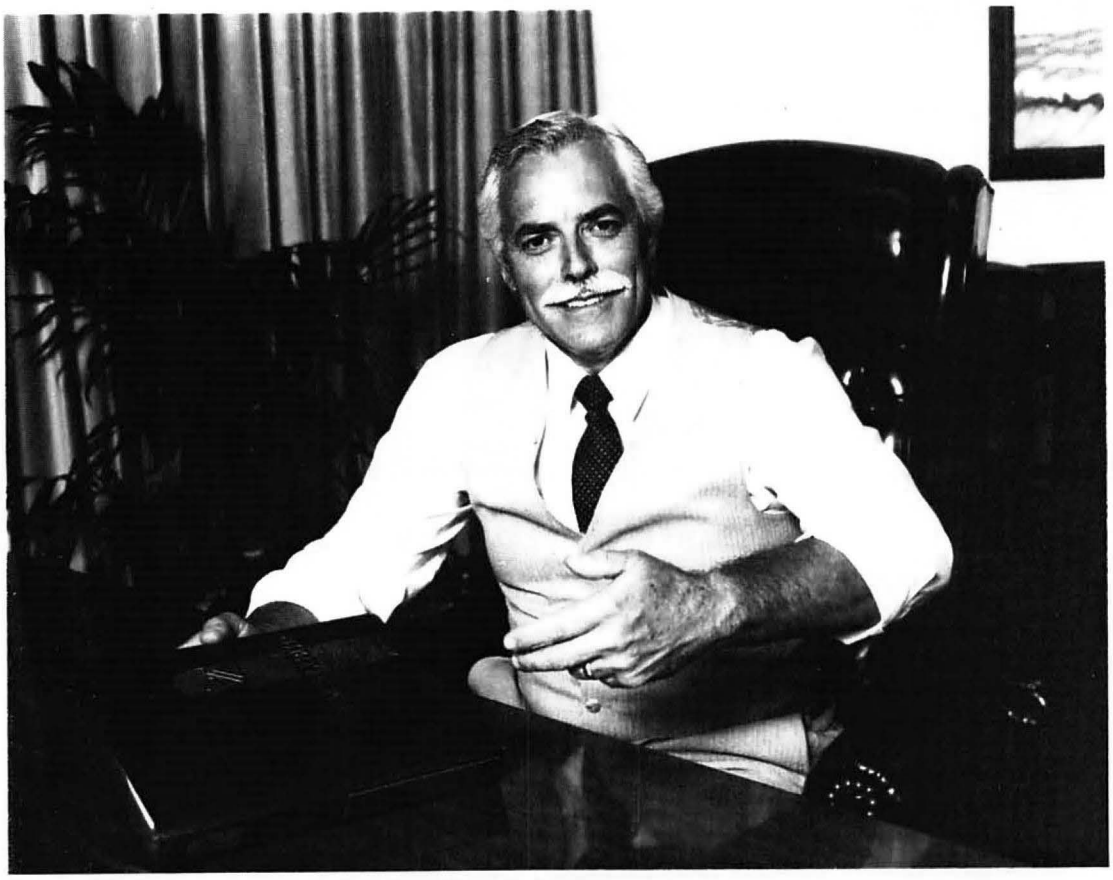

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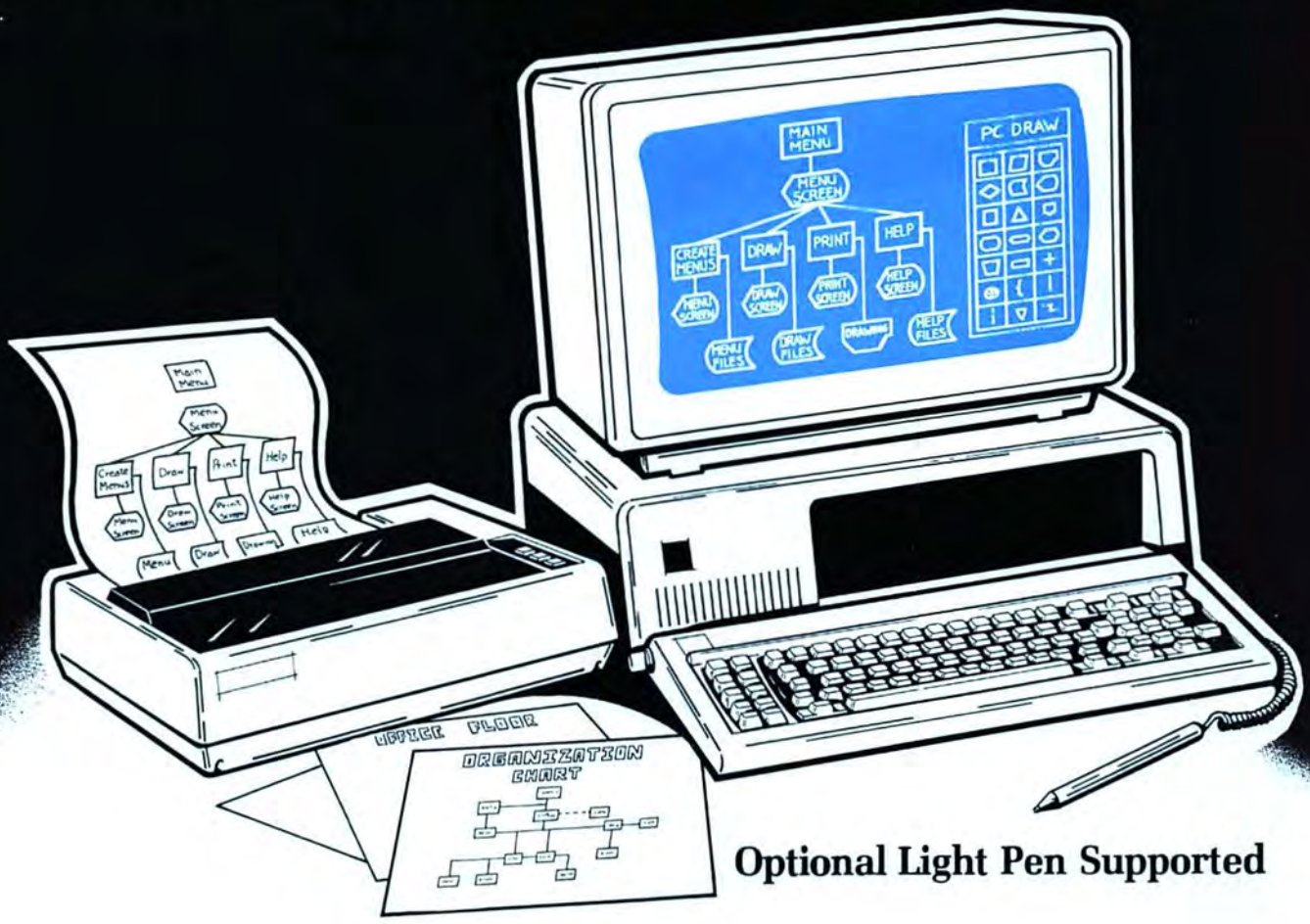

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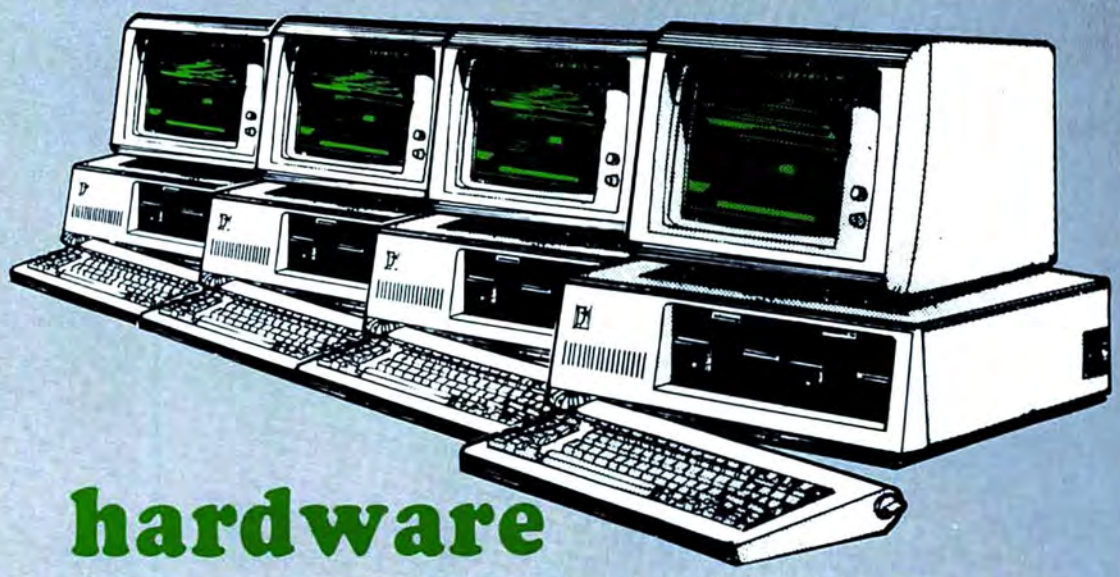

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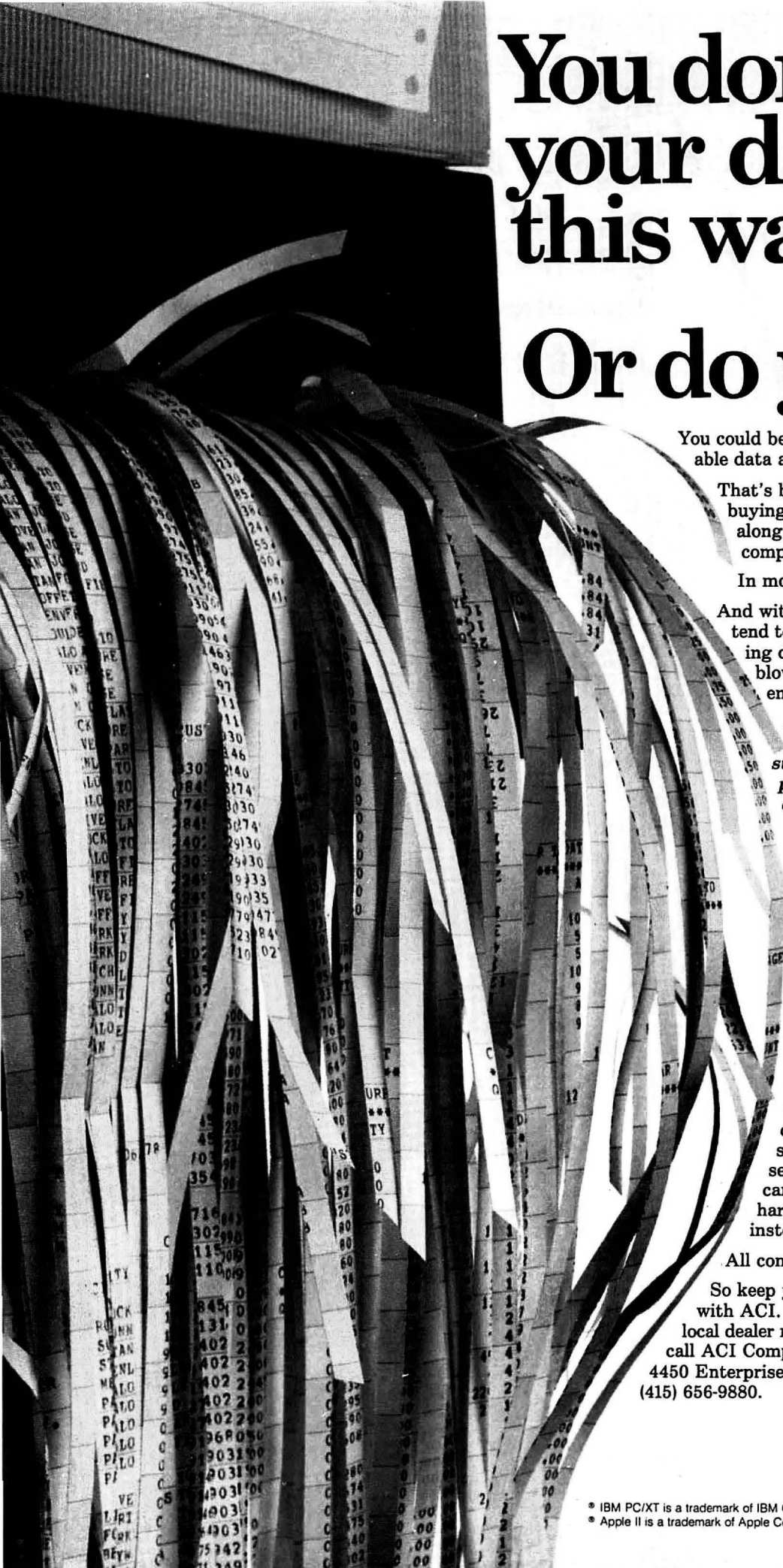

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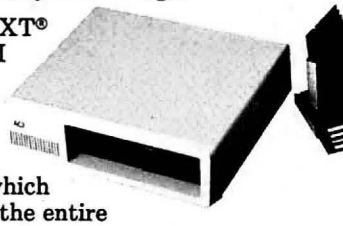

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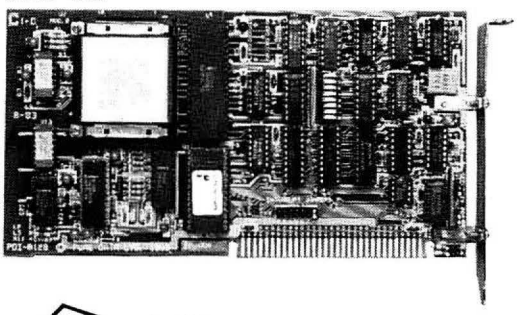

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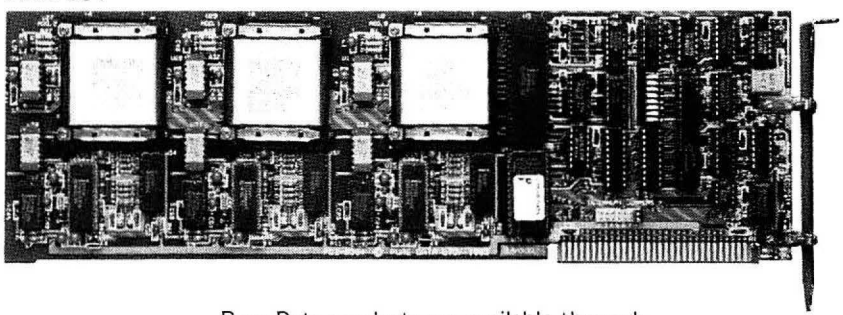

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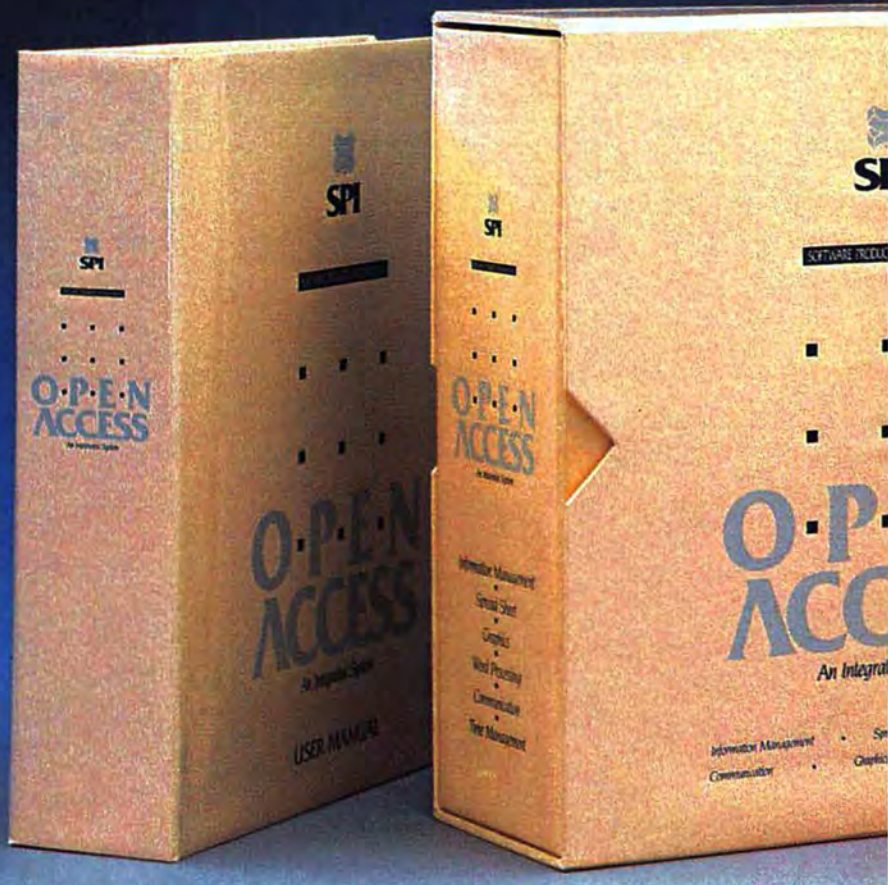

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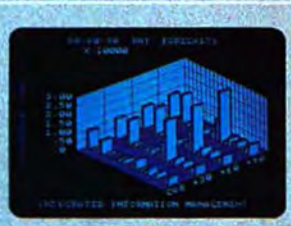

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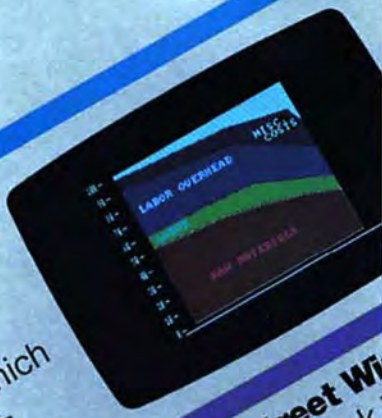

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