Become an Expert Planner
Take Control of Your Spreadsheet

Trading Stocks from Your Desktop

- **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!

ComboPlus

AST-PCnet

MP Expansion Memory

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						

PCnet is a registered trademark of Orchid Technology, Inc. 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.

ANCEMENT PRODUCTS FOR THE IBM PERSONAL COMPUTER

AST RESEARCH INC. Irvine, California 92714

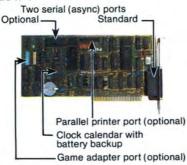**AST** RESEARCH INC. MADE IN U.S.A.
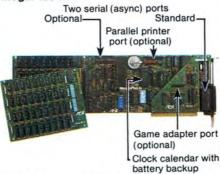
SuperPak
Utility Programs
Version #

SixPakPlus™:

Serial (async) port
Game adapter port (optional)
Parallel printer port
Clock calendar with battery backup

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™:

Two serial (async) ports
Optional
Standard

Parallel printer port (optional)
Clock calendar with battery backup
Game adapter port (optional)

MegaPlus II™:

Two serial (async) ports
Optional
Standard
Parallel printer port (optional)

Game adapter port (optional)
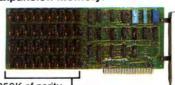Clock calendar with battery backup

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™:

Serial (async) port
Parallel printer port
Clock calendar with battery backup

64K-256K of parity checked memory

MP Expansion Memory:

64K-256K of parity checked 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
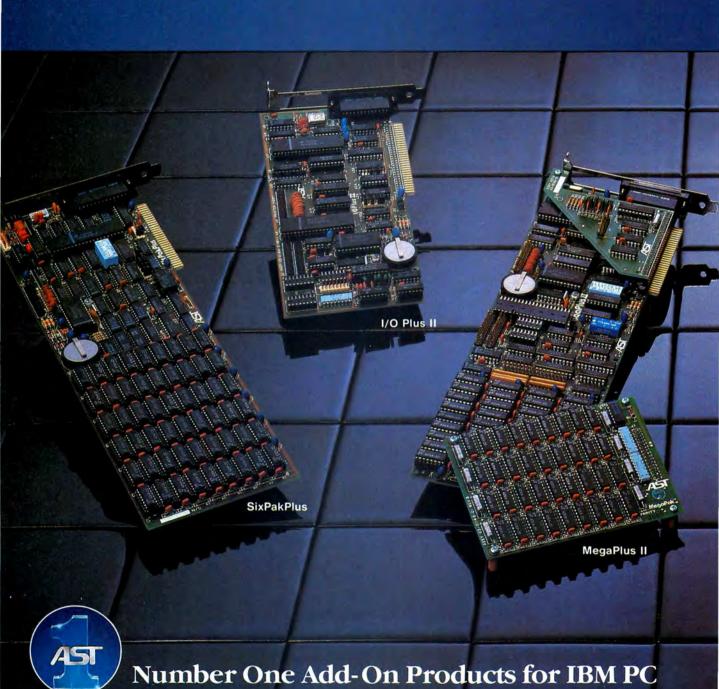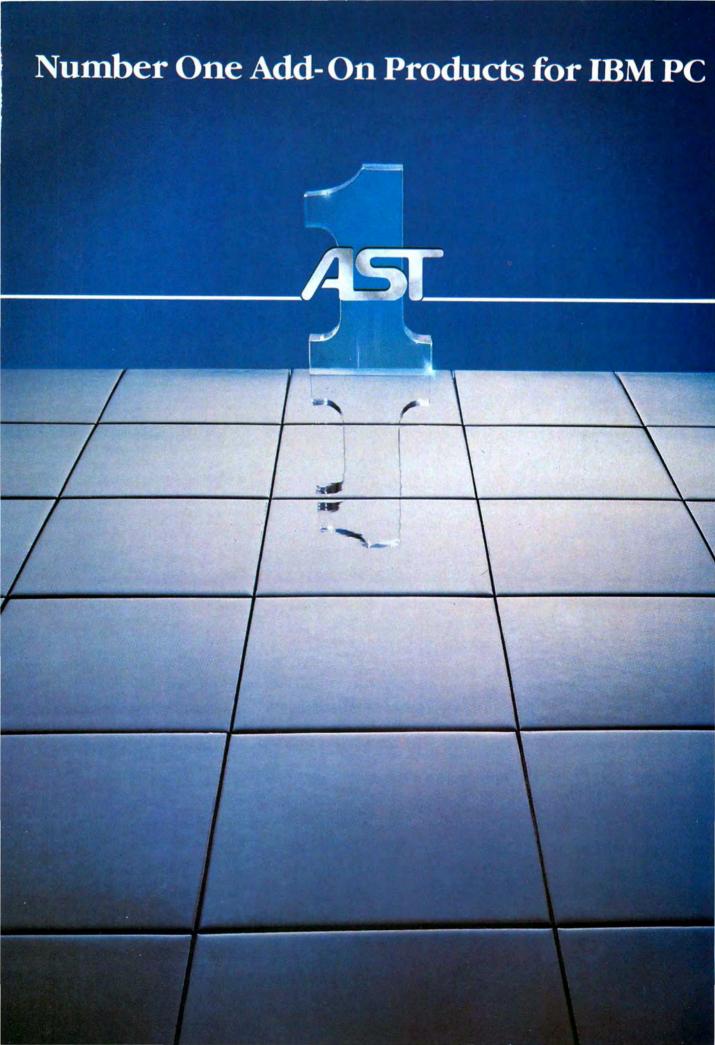• File lock-out
• DOS 1.1 and DOS 2.0 compatible

AST RESEARCH INC.
Irvine, California
(714) 540-1333 • (714) 863-1333
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Circle 18 on reader service card

Number One Add-On Products for IBM PC

Undo.Windows.

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

With Microsoft Word, what you see on the screen is what you get on the paper. So it's easy to spot mistakes. **Boldface**, <u>underline</u>, and *italics* look like this, not this: ∧Bboldface∧B, ∧Sunderline∧S, ∧Iitalics∧I.

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.

Microsoft is a registered trademark and
MS is a trademark of Microsoft Corporation.

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.

MICROSOFT.
The High Performance Software

No one else is using this simple method to teach you Lotus 1-2-3.

You didn't learn to swim by reading about it. You took the plunge. With a little extra support at first, 'til you could stay afloat on your own.

ATI's training software teaches you Lotus 1-2-3 in the same way.

The ATI training disk instructs by simulating the actual software. You practice each command by interacting with the screen, which responds just as Lotus 1-2-3 would.

It's faster—and easier—than any other method. Once you've learned the skills with our helping hand you're ready to swim on your own. Without sinking.

The ATI Training Power package for Lotus 1-2-3, with disk and handbook, is available at your computer dealer. Along with our line of training programs, based on the same simulation method, for other popular software.

Or, use the order form below to send for the ATI programs of your choice. And dive right in.

PC WORLD

The Personal Computer Magazine for IBM PCs and Compatibles

March 1984

March 1984

⊜ Hands On

Notice to Readers

As a service to our readers, *PC World*
features a Reader Service Inquiry card in
each issue. This card can be used to get
additional information about products
advertised in *PC World*. To use the card,
simply circle the Reader Service Number
of the products you're interested in and
mail in the card—no postage is necessary.
The information you want will be mailed
to you by the product manufacturers. For
your convenience, Reader Service Num-
bers are listed in the Products and Adver-
tisers Indexes, grouped according to type
of product and manufacturer.

⊜ Community

Departments

PC World Directory

Indexes

How you can tell

They're both IBM Personal Computers. And they're the same. Only different.

The system that's on the left is the ideal solution for a person who wants to be creative, efficient and improve his or her personal productivity.

So is the other one.

The system on the left incorporates the quality, the reliability and the technological excellence that have made IBM a computer leader for over 30 years.

So does the other one.

So which is which? Simple.

On the left is the IBM Personal Computer, starting with 64KB of user memory (expandable to 640KB) and two optional 5¼" diskette drives. It can easily satisfy your computing needs at the office, at home or in school. With 5 expansion slots, it gives you room to grow. (You can even make it function like the computer shown on the right by adding an expansion unit that houses one or two 10-million-character fixed disk drives.)
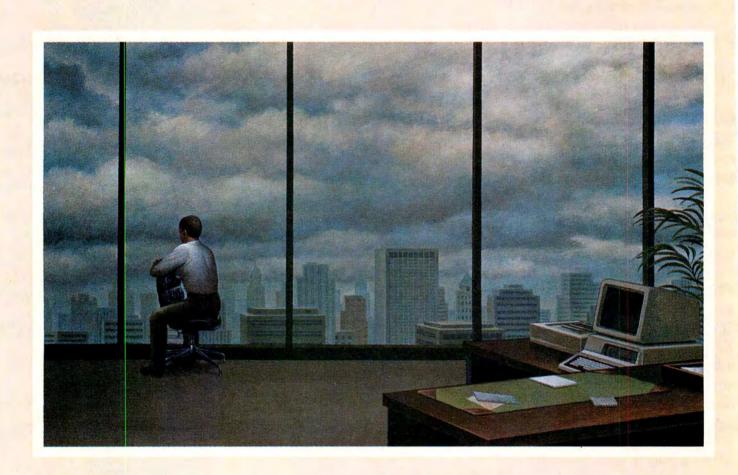
This system can run most of the same software and accept most of the same IBM hardware as the computer on the right. And its price/performance is nothing less than remarkable.

The IBM Personal Computer

which is which.

On the right is the IBM Personal Computer XT, starting with 128KB of user memory (expandable to 640KB), a 5¼" 360KB diskette drive *plus* a standard 10-million-character fixed disk drive that's *already* built in.

For a businessperson with heavyweight data requirements, the XT packs a lot of power, because it can store the facts, figures, names and numbers you need to know.

(Instead of going from diskette to diskette, you can have up to 5,000 pages of text or up to 100,000 names and addresses conveniently stored in one place.)

And by adding an expansion unit with a *second* 10-megabyte fixed disk drive, you get even more high-volume capacity from the system. XT can run most of the same software and accept most of the same IBM hardware as the computer on the left. And its price/performance is nothing less than remarkable.

But for you to choose, there's a lot left (or right) to learn about both members of this growing family. Visit your authorized IBM Personal Computer dealer. To learn where, call 800-447-4700. In Alaska or Hawaii, 800-447-0890.

And see which tool for modern times is right (or left) for you. **IBM**®

The IBM Personal Computer XT

It promised to take the work out of work.

The personal computer courted you with endless promises. It would do your job faster, make life easier, send you home happier. It would do the heavy lifting, you would do the heavy thinking.
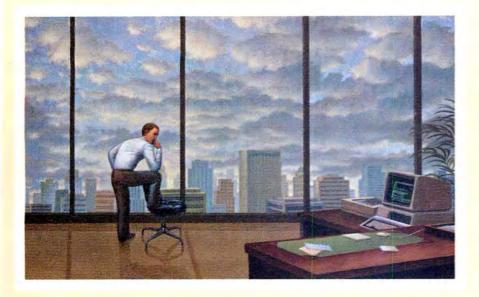
Alas, reality fell short of the dream.

The computer refused to do things the way *you* like to do them. Refused to juggle lots of jobs at once. Refused to move swiftly from project to project. Refused, even, to understand simple English.

And _then_. Each software program took days, weeks (sometimes classes) to learn. There was no way for individual programs to talk to each other. No way to take data from _here_ and transfer it to _there_.

The machine that promised to be your partner in a new era of productivity has behaved like a renegade two year old.

Enter Visi On.*™ *Suddenly and without warning, your personal computer becomes everything you actually bought it to be.

Visi On is a completely new generation of business software that does what no computer or program has ever done. It makes the personal computer work harder, work easier, and work more sensibly.

How? By *managing* the computer. By making it work the way *you* are accustomed to working.

Think of Visi On as a "boss" who instructs the computer on how to deal with the specific applications you want to work with: Visi On Calc,™ Visi On Word,™ Visi On Graph,™ and Visi On Query.™ Since all these applications work for the same boss, they all work the same way. Learn to use one, and you've essentially learned to use them all.

Visi On makes each application the best you ever worked with, no matter which you're using. Never have individual applications performed more efficiently, more easily, or more powerfully.

Moreover, the strength of each application is actually boosted when you *combine* them.

Indeed, Visi On demonstrates its true genius whenever you want to do a number of things at once. Before now, going from a database to a spreadsheet to business graphics on a computer required rifling through a stack of different program disks and a bookcase full of instruction books.

Now, with Visi On, *each application can talk to the other.* You're free to transfer words, numbers, formulas, even entire charts, from one place to another. Noodle, fix, futz. No fumbling floppy disks. No forgetting instructions. Just analyze, experiment, refine, decide, and move forward.

Applications appear on the screen as windows, representing workspaces. To open a window, you point a hand-held pointer called a "mouse." Two buttons on the mouse control your options.

It's simple to learn, and even easier to use. There are only a few basic commands, and they remain in sight at all times.

Should you see a problem, point your mouse at it and press a button. Having anticipated the question you were going to ask, the Help window opens and presents the most probable answer.

There. Your computer has become a sweetheart; as cooperative, as productive as it promised it could be.

Freeing you to think about lunch.

Visi On works on the IBM® Personal Computer, and indeed, most computers. Including the one you now own and aren't speaking to.

And since it's open-ended, you're free to add applications such as our new communications system, which will allow you to transfer information between other personal computers, local networks, outside databases, and your company's mainframe computer.

Rumored, reviewed, tested, heralded, and much anticipated, Visi On is now *here.* See your Authorized VisiCorp Dealer or sales rep for a demonstration and information on our comprehensive support program. And note one more way we ensure that your investment is never at risk: Receive your original purchase price (minus a new materials charge) for any VisiCorp software you now have, in trade for its Visi On equivalent.
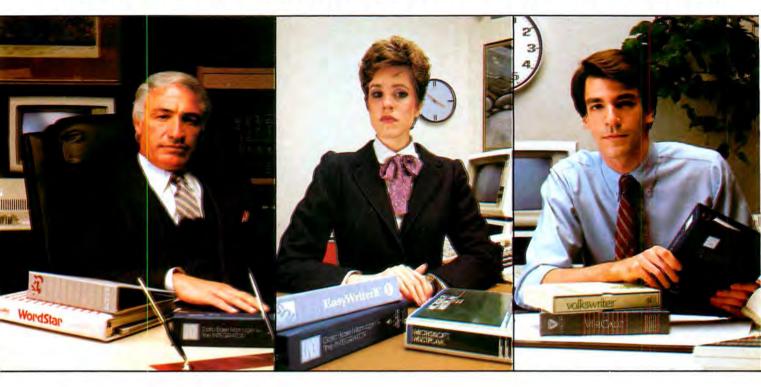
You see, you're buying Visi On from VisiCorp, the leading maker of business software. No one makes more useful, more powerful software, either (just ask over a million people now using VisiCalc®). And no one supports it better.

Finally, your computer will be everything you always wanted it to be. Visi On will never let it be anything less.

Circle 598 on reader service card

David Bunnell

De Facto Standards in the PC Jungle

About the only things that are standard for personal computers are the physical characteristics of some of their parts. The Intel 8088 microprocessor chip, which serves as the brain for most PCs, is identical from machine to machine. The 5¼-inch floppy disk is standard, but the method by which it stores data is not.

Why can't a *WordStar* file created on an Osborne computer disk be called up from *WordStar* on a PC? Why do the disks on Radio Shack's new Model 2000 hold twice as much data as the identical disks on my IBM PC? There are rationales for these absurdities, yet the more you look at computers the sillier they seem.

For example, whenever I use my Radio Shack Model 100 lap computer, I try to delete a character with a <Ctrl>-G. That *WordStar* command deletes a character on my PC and my fingers tell me it should do the same thing with the 100. And if I start word processing after I use my spreadsheet program, I frequently attempt to begin the command sequence for saving a file by hitting the slash key. The slash merely has to be erased, but it is damn irritating.

In the PC jungle we don't have real standards. No one brand—from IBM PC to Eagle PC, Corona PC, or Compaq PC—is exactly like another. Yet compared to the personal computer's

primitive versions, they are similar enough to be declared "de facto standards" by industry gurus.

The IBM PC, and more specifically its underlying operating system software, has inspired the creation of such a huge base of applications software that many other computers have been designed to run the same programs.

Thus the Radio Shack Model 2000 runs such programs as *Multiplan*, *Microsoft Word*, *MultiMate*, *dBASE II*, *PFS File*, and *PFS Write*, which in many cases are exactly the same programs you can run on your PC—whether it is an IBM or a so-called IBM PC compatible.

In the strictest sense of the word, there is no such thing as an IBM "compatible." A truly compatible

personal computer could only be engineered by copying the IBM PC's read-only memory (ROM)—a uniquely programmed (and proprietary) memory chip that resides inside the PC.

An alternative for the word "compatible" might be "imitation." However, as the Radio Shack Model 2000's improved performance and memory storage capacity demonstrate, you can go beyond imitation. Hewlett-Packard's personal computer, with its touch-sensitive screen and 3½-inch rigid disks (so much for the standard disk), is more than flattery for Big Blue.

Instead of talking about compatibility or de facto standards we should throw in the towel and call this dominant class of computers "IBM standard personal computers."

And we should give them a simple definition that allows for great variety. I propose the following one: An IBM standard personal computer is a personal computer that runs a substantial number of IBM PC applications programs.

For the most part, this means programs that run under Microsoft's MS-DOS operating system, which many IBM PC owners know as PC-DOS. However, IBM standard personal computers are by no means

David Bunnell

limited to this operating system—there are several others and more are coming.

Since your experience with a personal computer is largely a function of its software, the scope of *PC World* is expanding far beyond IBM's borders. We have reviewed at least eight IBM standard personal computers in recent issues and we'll soon be looking at many more. Interestingly, of the eight, four were from IBM—the XT, the XT/370, the PC/370, and

> A broad variety of personal computers more or less run the same software.

the PCjr. What is emerging is a broad variety of personal computers that more or less run the same software. By the end of 1984, there will be about 5 million machines in this category. And that number will at least double in 1985.

With all these IBM standard personal computers, the classic chicken and egg marketing problem is solved (i.e., before you can sell records people have to have record players). Best-selling software will take on the characteristics of hit records, and as volume increases, prices will tumble. Eventually, there will be more than a million programs that run on the IBM PC and its IBM standard cousins. Even though some IBM standard personal computers are not standard enough for my taste, I welcome this development wholeheartedly. It means the real potential of personal computing will finally be realized. ◉

People are going for Friday!™ like there's no tomorrow.

Friday! is the new electronic file handling system that has become an instant best-seller because it's so revolutionary.

Within two weeks, it broke into the Top 20 on the sales chart of Softsel, one of the country's leading computer software distributors.

And it's now well on its way to the top.

The Friday! phenomenon is simple.

Friday! uses simple menus and talks to you in plain English, so almost anybody can use it.

It's great for sales and commissions, clients and portfolios, mailing lists and labels, invoices, inventories, paychecks, reports and more. And it works with other microcomputer software like 1-2-3™ and dBASE II® (our own advanced database management system).

It comes with a complete, step-by-step tutorial, but you can set up an "electronic file" without even looking at the manual, then use it at the touch of a few keys.

Friday! finds any filed information in seconds. Computes totals, subtotals, commissions, etc. Prints form letters and mailing labels. Gives you quick reports from all or part of a file with a few keystrokes. Or if you need a special report for your bank or board of directors, just "paint" the format on your screen, then have Friday! do all the work.
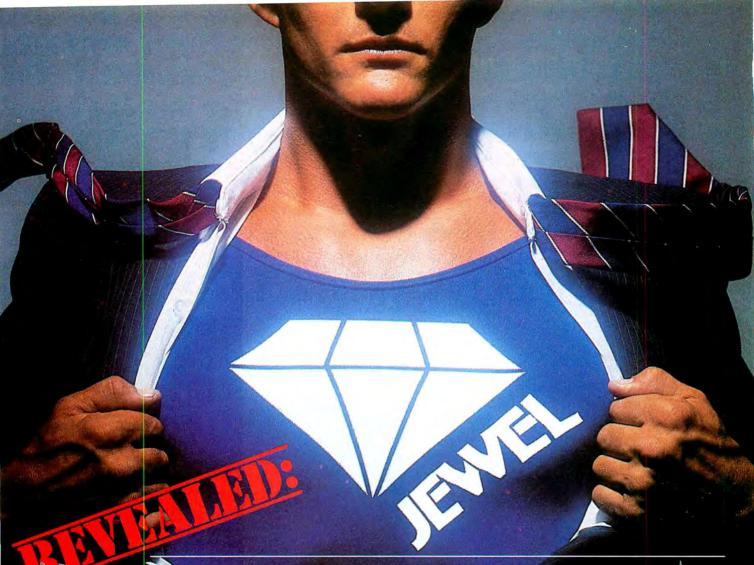
And while Friday! does more than file handling systems selling for as much as $495, it's yours for just $295 (suggested retail price)!

For more information, contact Ashton-Tate, 10150 West Jefferson Boulevard, Culver City, CA 90230. (800) 437-4329 ext. 205. In Colorado, (303) 799-4900. In the U.K., call (0908) 568866.

Or for the name of your nearest dealer, just call 1-800-4-FRIDAY, ext. 205.

ASHTON·TATE

Circle 569 on reader service card

REMark: Walter Cooke

The War Games of Computer Security

The old Chinese proverb "May you live in interesting times" does not mean "Have a nice day," but refers to the warring states period of history in that country. Today the computer revolution has brought us interesting times, full of excitement as well as conflict. A new kind of war is being fought; unlike most, which leave paths of destruction, the war against computer criminals often takes place on the invisible pathways of telephone wires and computer circuits.

The movie *War Games* has done more to promote both computer education and abuse than all the magazine articles and computer security seminars. While most people leave the theater saying, "So that's how they do it," others conjure up visions of breaking into CIA computers with a modem and an auto-dial program. Though the possibility of a home "hacker" wreaking havoc with a NORAD computer is remote, the fact remains that any computer hooked up to public access telephone lines is vulnerable to attack.

Though Hollywood films celebrate the computer hacker, the image must be balanced against the reality of computer access problems confronting many companies. Fear of *War Games* imitators is changing the attitude of many formerly complacent

data processing managers and security specialists, compelling them to clamp down on free and easy access to their computers and corporate data. For many PC users who have computers hooked up to phone lines in the den or the office, such movie fiction strikes uncomfortably close to home. Little is funny about having your private correspondence electronically ripped open and read by a hacker who has broken into your system.

Newsweek magazine headlined the adventures of Neal Patrick and his 414 gang of teenage computer hackers who dialed in to 60 computer systems, ostensibly to browse through information. Since they did not invade systems with the intent to steal or destroy, the press fell in love with the computer-age Robin Hood and his underaged band of merry

men. SRI International researcher Geoffrey Goodfellow went so far as to say that they merely "misdirected" their creative energies toward "the dark side of the force."

The era of the hacker, like that of the highwayman, will soon be consigned to the past. Within the next ten years, hackers will find that reaching out and touching someone will be expensive and traceable once telephone companies begin using Local Measured Service (LMS). LMS is the generic term for data collection and billing based on both local and long-distance telephone calls. With a time, cost, and originating phone number recorded for every call, hackers will lose free, anonymous access to the telephone network.

⫻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?

It's possible. All you need is a modem, to connect your computer to others. Down the hall. Or thousands of miles away.

Hayes Smartmodem. Think of it as your computer's telephone. Hayes Smartmodem 300,™ and the faster Smartmodem 1200,™ allow you to communicate over ordinary phone lines.

But any modem will send and receive data. Smartmodems also

dial, answer and disconnect calls. Automatically. And without going through the telephone receiver, making them far superior to acoustic coupler modems.

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.

⦿ Hayes®

Smartcom II communications software.

REMark

Meanwhile, time and money are being invested in hardware and software controls. But limiting unauthorized computer access solves only part of the problem. It is important to remember that computers don't commit crimes—people do.

Many people turning on to computers are young, eager, and bright; they fit the profile of desirable employees—or typical computer criminals. When you add to the horde of hackers on the outside the dishonest computer professionals working from the inside, the problem of security becomes acute.

Teenage hackers differ from their adult counterparts. Hackers break

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> Professional computer abuse almost always involves an insider who has proper authorization to use a computer system.

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into computers mostly for fun and to impress peers. Professional computer abuse almost always involves an insider who has proper authorization to use a computer system. In one company an employee who had access to the computer pension management system created a fictitious employee. She subsequently had the computer "kill" the bogus person. The pension benefits were then activated and funneled into her bank account. In this and other cases the computer is seen as a faceless extension of big business that can be manipulated with minimal personal risk.

Those who work with computers for a living see controls as road blocks. To get things done more

quickly, even security-conscious people try to get around frustrating controls. But taking shortcuts eventually weakens our individual privacy and democratic computer access because it forces security experts to invoke even stricter controls. Security specialists use deterrents such as background checks, site visits, and the threat of prosecution to provide the necessary controls over computer assets while allowing the maximum freedom of computer use. Deterrents do not eliminate computer users' rights; they ensure that those who use the computer illegally will be caught and prosecuted.

If deterrents are to be successful in the workplace, computer security personnel and practices must be visible. Security representatives might make unannounced visits to computer work areas and make users aware that their individual participation is vital if security measures are to succeed. Computer managers need a guide for improving security that provides commonsense advice on such things as software backups, audits, passwords, data encryption, and proper storage and destruction of printouts and computer media. When user education in computer security becomes the accepted norm, the commonsense rules that protect a company's data will also be perceived as protecting the privacy and security of the workers themselves.

No matter how much security and awareness increase, there will always be some computer abuse. The computer has opened up an unexpected road to new freedoms. Let's make sure that the professional and amateur electronic highwaymen don't shut it down. ≋

Walter Cooke is a computer security specialist with the British Columbia Telephone Company in Vancouver.

QUADJET™ BY

Quadram's new Quadjet ink jet printer is the ideal choice for your color graphics hard copy. It can take all your ideas and put them down on paper. So things like business, scientific and engineering applications are all of a sudden clearer and more meaningful.

Colors to tempt the palette.
With Quadjet you can color your charts, graphs and diagrams black, red, green, yellow, cyan,

blue or magenta. Use all seven of them together, or in any combination. The color scheme is up to you.

Of course, Quadjet prints text as well as graphics, including standard and enlarged characters. With a maximum graphics resolution of 640 dots/line, your projects are printed crisply and clearly every time.

Quadjet fits in.
Quadjet is small and portable so you can put it

just where you want it. Don't worry about the noise. State-of-the-art ink jet technology makes printing whisper quiet.

Quadjet uses disposable ink cartridges that are a snap to change. Just pop the old one out and the new one in. You'll find that each one prints about 4 million characters. As for paper, any 8½" sheet will do, whether it's form fed, sheet fed or some other kind.

OUTSTANDING COLOR GRAPHICS AT AN INCREDIBLY AFFORDABLE PRICE.

$895.00
Suggested Retail

QUADRAM™

A word about compatibility.
A standard centronics parallel interface makes Quadjet

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compatible with your IBM PC, XT or Apple computer. And if you have Quadram's Quadlink that allows you to use Apple software with your IBM PC, Quadjet can work that way too.

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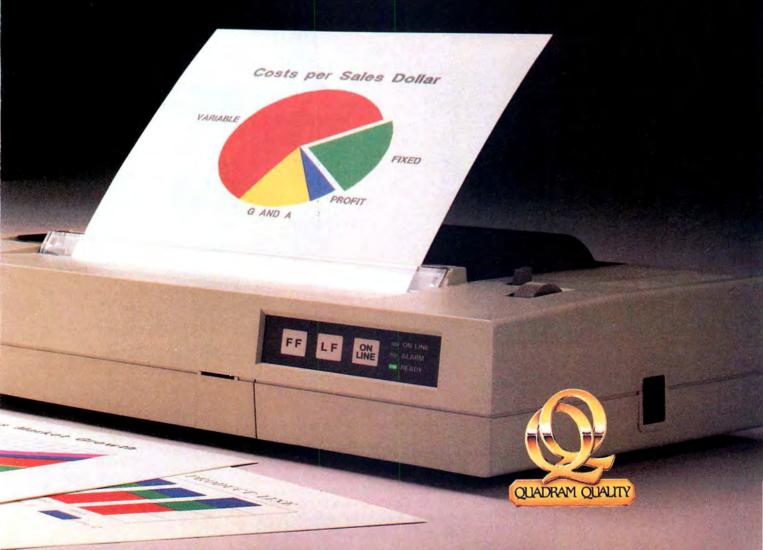## INTERQUADRAM In Europe

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Letters

Standards Practices

Paul Scholbert's letter [*PCW*, Vol. 1, No. 8] asking "Where does IBM get the right to be the standard?" deserves comment. With few exceptions, "standards" in the American free market system are industry standards that are followed only when competing companies believe it is in their economic interest to do so. Mr. Scholberg's own example of phonograph records is a good one. If the industry had always conformed to a standard, we would still be using 78 rpm records. The 33⅓ rpm LP disc was not introduced through a standard, but as a risky venture in search of profits. The fact that LP records are now standard was achieved through market forces, not by a committee.

Manufacturers and software developers seek "IBM compatibility" today because IBM has been successful in convincing large numbers of users that they have the best value, and so a large market exists. It is still too early to predict that IBM will be standard in the long run, but some sort of standard will eventually emerge. When we do see a standard, it will not be because anyone cares if "they are implementing things correctly," but because the standard maximizes profits for the entrepreneur. The consumer always gets what he wants, whether or not it is good for him.

Burks A. Smith
Shawnee Mission, Kansas

Ha Ha

Recently, I decided to abandon my Apple-based system and buy an IBM PC XT. My first step in making the IBM transition involved obtaining information concerning the UCSD p-System (for which I have developed a large library of software). Although the sales representative was unfamiliar with the concept of an operating system, he was kind enough to send me IBM's "Software Fact Sheet" and a price list. Within this fact sheet there is some fine print concerning the p-System that I would like to bring to the attention of your readers: "Neither the program nor its data files can be stored on a fixed disk."

Incredible! Here's a big and powerful corporation with a sense of humor. Imagine if GM had the guts to include some jokes of this caliber in their sales literature—for instance, "The optional MZD Turbo engine works only in the neutral gear." Three cheers for IBM!

Now, I've got to remember where I stored that literature on the Sage IV...

James P. Reed
Denver, Colorado

PC Paradox

In the old days (two years ago), we used to write non-letter-perfect reports with a typewriter; calculate our finances with a calculator, a pencil, and the back of an envelope; and store our records haphazardly in a file cabinet. Now we have a PC and assorted word processing, spreadsheet, and data management software and can do these chores in a fraction of the time they used to take.

But do we have more time now? Emphatically no!

The time we've saved, plus a whole lot more, is now spent going to PC user group meetings, reading a huge stack of PC publications (*PC World* being the first and foremost, of course), showing guests how our computer works, advising friends on what they should buy, evaluating software, going to PC trade shows, making the rounds of computer stores, talking PC to anyone interested, arguing with each other over which word processing software is better, and fighting over whose turn it is to use the PC.

Our calculations (performed with an au courant integrated software package) indicate that by getting rid of the computer and sharpening a few pencils, we could save 15 hours a week.

Naomi and Howard Karten
Randolph, Maryland

More Hardware Hooks

I believe you might look further into Chris Rivers' idea of hardware IDs for PCs [*PCW*, *Letters*, Vol. 1, No. 8]. If software cannot tell where it is running, it can never tell a buyer from a pirate. Software is too intangible to track easily, but it can be tied to a unique physical object, a hardware key, which we do know how to control.

For example, several firms offer disk "fingerprinting," in which a software-readable serial number is permanently zapped on the disk. Protected software runs only when the original diskette (the key) is in place. VisiCorp is considering protecting their investment in *Visi/ON* with a serial number in its mouse. Some vendors' software comes with a black box to be daisy chained off an RS-232C or printer port. Details vary, but the pattern is the same: tie the software to a unique hardware key and then control that key.

If a hardware key per program is too much hassle, then Chris's idea is the next step—attach the key to the

Letters

computer for all software from all vendors to use. You and Chris pointed out two problems: how do you enable a vendor's "generic" program for a specific machine's key, and what do you do if the authorized machine goes down.

One possibility for enabling (and there are many) is to include an enabling program with the product. The vendor's disk can be copied, but it either cannot be run or can be run in demo mode only. The buyer calls a toll-free number, gives the serial numbers for the disk and his key, and gets an "enabling code." The enabling program uses this code to make a copy of the product that can be copied and installed on any disk but will run on a machine with one particular key.

The machine's key should not be permanently installed. It should be movable by the buyer without special tools, in case of emergencies. The software is not tied to a machine; it is tied to a specific hardware key, wherever that key may be. Vendors should not care where their software is as long as they sell one copy for every copy in use.

The point is not to stop piracy, but to reduce it to tolerable levels. Many ordinary users claim that they must break copy-protection schemes to make backups and that they must pirate copies to get a try-before-buy demo. The hardware-key approach can at least remove those two pressures to pirate.

We cannot stop determined software pirates from disabling the checks, but I would not sell determined software authors short either. Given a solid hook such as a unique serial number in memory, I believe we would see major improvements in software protection with a decrease in annoyance to legitimate buyers by such things as copy protection.

Merrill Cornish
Austin, Texas

That Ominous Bulge

Today I received your 1983-1984 *Annual Software Review* in the mail. I went straight for that ominous bulge in the center of the volume and was extremely surprised to find a disk carefully packed in the magazine.

I immediately used the demonstration disk, and it worked so well that I would seriously consider purchasing the package.

The staff at Microsoft deserve a standing ovation for *Microsoft Word* and what appears to be its potential. I say this based on my experience in the information systems field, having developed packages for large-scale computers and been involved in package selection. It is extremely difficult to design and develop an applications package that will run smoothly when it is simply dropped into the hands of a user. My compliments to the chef.

My other compliment is to both Microsoft and *PC World*. I am pleased to see two organizations embarking on this type of marketing effort. What you have done is greater than the success of either a good software package or a good periodical. With the wide variety of software, covering all types of applications, configurations, etc., this type of marketing effort helps simplify choosing the proper software in a timely and, for all of us users, a very cost-effective manner.

I sincerely hope that you consider your experiment a success. I do. Regardless of how many subscribers buy *Microsoft Word*, you have provided a service to the user community.

I have only one regret. The first time I typed this letter was with *Microsoft Word*, only to find out, as a demo, that PRINT did not work. You realize this forced me to stumble through my existing, sometimes cumbersome, but best-selling word processing package.

James R. Dockery
Kinnelon, New Jersey

ROM Lobotomy

The issue of software backup and copy protection has been addressed innumerable times in *PC World* and other publications. There is another issue, dissimilar yet related, that poses a far greater problem for the IBM PC user. The matter I refer to is backup support for the firmware located in the PC ROM.

The programs that reside there, BIOS and major portions of IBM/Microsoft BASIC, are essential parts of the IBM PC. There are several 8088/8086-based microcomputer systems that are, to varying degrees, hardware and software compatible with the IBM PC. What makes the IBM PC unique, however, are the programs that reside in the system board's ROM. However unlikely a ROM failure might be, such a dysfunction is the computer equivalent of a lobotomy; the rest of the body is left intact, but key portions of the "personality" are gone.

Such is the case with my IBM PC, still in its infancy at slightly over 9 months of age. One of the ROM

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chips containing parts of BASIC failed, and I have discovered, much to my dismay, that the only "support" I can get from IBM is to purchase a new motherboard. Never mind that the failed ROM is socketed, not soldered, to an otherwise fully functioning motherboard. Take no heed of the fact that I successfully isolated the problem with the use of a friend's PC through careful, systematic ROM chip swapping. Ignore the slight oversight of my salesman in neglecting to inform me that an extended service warranty and agreements were available provided that I purchased the extended coverage during the original warranty period. No, none of this matters except the price tag for the motherboard—over $800 after labor and shipping charges are added. Quite a ripoff when you consider that the replaceable, failed component surely doesn't cost more than $25.

Frankly, I fail to see the difference between replacing a damaged, copy-protected diskette and replacing a defective ROM. Yet IBM maintains that the ROM chips are unavailable due to the "proprietary nature of their contents." Did it ever occur to anyone at IBM that their precious ROMs can be easily duplicated by anyone who has made the modest investment in the necessary equipment, widely advertised in many popular computer magazines? (Equipment, I might add, that can be purchased, in many cases, for significantly less than a new motherboard.) If they really believed that the contents of those ROMs were so precious, why not solder them into the motherboard? At least that way firmware pirates would have to risk destroying the ROMs and the motherboard, outcomes that might prove to be effective deterrents. As it

is, a legitimate user (like me) cannot even swap his defective ROMs for replacement parts directly with IBM, through a dealer or by any other means.

End users have the right to protect their investment, and it is in the best interests of manufacturers, IBM included, to have such a goal. When all is said and done, I may well have to pay over 35 percent of my system unit's original price to restore full functionality to my PC, and this in less than a year's time. If IBM doesn't wake up to the realities of the retail marketplace (other computer manufacturers take note as well), the American microcomputer industry may well join Detroit in playing second team to more responsive interests in Japan.

My advice to other users for the meantime is to damn the copyright and duplicate your ROMs—before it's too late.

Lawrence D. Baca
South Lake Tahoe, California

We contacted IBM, and a company spokesperson confirmed that the ROM chip you describe is not a "field-replaceable unit." He suggested you contact the IBM Personal Computer Customer Relations Department in Boca Raton. The number is 305/998-6048.—Ed

Counter Point

I was very interested by Burton Alperson's comparison of *Microsoft Word*, *VisiWord*, and *WordStar* in "War of the Words" [*PCW*, Vol. 1, No. 8]. It is usually difficult to assess the strengths and weaknesses of comparable word processing packages; salesmen and sales literature are not

much help. His article gives a nice "real world," head-to-head comparison of these three products.

Unfortunately, Mr. Alperson violated an important principle of statistics in simply summing the number of keystrokes for each package and implying that this gives a meaningful comparison among them. The percentages stated in this way are meaningless. They could be altered drastically by such a simple change in his test as deleting and then undeleting an entire paragraph instead of just one sentence. Had he chosen to boldface and underline one word rather than an entire sentence, *Visi-Word* would have fared much better than it did against *WordStar* in his final analysis.

Another problem I had with his analysis of the mouse version of *Microsoft Word* is that he equates one mouse operation with one keystroke. I realize that this is the year of the mouse, but I'm not sure mice are as revolutionary as the marketing people would have us believe. I am a touch typist, and I don't think going back to one-handed hunt-and-peck typing while my other hand works the mouse is going to make my life much easier.

Paul D. Ferguson
Salt Lake City, Utah

PC Talk Tip

In Volume 1, Number 8 ["The Modem Market"] Larry Jordan states that the carrier is lost every time he attempts to change communication parameters when connected to the Hayes 1200B Smartmodem (board mounted). In my experience, it is easy to change parameters when using *PC-Talk III*. You must first set up dummy entries in the dialing directory, two for each baud rate at which

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Letters

you plan to operate. One could be labeled ASCII DUMMY. The other could be called XMODEM DUMMY. The first would have standard communications parameters. The second would have the 8 bits, no parity, and 1 stop bit so often used in Christensen (Xmodem) protocol transfers.

To go from one set of parameters to the other, all you need to do is issue the standard Hayes command of three + characters in a row. After the OK from Hayes, dial the dummy entry with the right parameters. The same procedure with the other dummy would set the screen back to ASCII after the Xmodem transfer.

Ronald M. Sawey
San Marcos, Texas

ASCOM Facts

Larry Jordan's review, "The Communicators," in Volume 1, Number 5 gave your readers a less than fair impression of DMA's *ASCOM*. In the first place, Mr. Jordan never contacted DMA to request the latest version or to see if improvements had been made. The current version of *ASCOM* has been available for over a year and the version reviewed was even older.

In light of his more favorable comments toward products released as late as March 1983, we wish to at least correct the factual errors and most misleading impressions presented in the review. Fact 1: *ASCOM* supports the public domain protocol Xmodem and has done so since June 1982. Fact 2: *ASCOM* supports MARK parity, which does allow you to select 7 data bits without specifying even or odd parity. *ASCOM* can be and is used with machines that set the parity bit to one or zero. Fact 3:

ASCOM contains a Delay command for use under the CR/LF protocol that allows for user specified delay between lines.

ASCOM's batch mode provides a very simple way to access frequently called numbers and remote systems. Mr. Jordan suggests that this facility can be used "if you have good programming skills," yet anyone who can use word processing software can create a file. The "batch" file consists solely of commands like BAUD 1200 and DIAL 2126877115, which must be user specified in any versatile communications program. The name of this "batch file" and others become the "dialing directory" Mr. Jordan claims *ASCOM* does not provide. What could be more simple than automatically accessing your time-sharing network by typing ASCOM NETWORK (or any other name you choose to call the file)?

Howard Radin
President, Dynamic
Microprocessor Associates
New York, New York

I am disappointed to hear that the version of ASCOM *I reviewed in Volume 1, Number 5 of* PC World *was not the current version available at the time of the review. In keeping with my policies and those of* PC World, *when I started the review in February 1983, we contacted all IBM PC communications software vendors to request the latest version of each package. When I contacted Westico of Norwalk, Connecticut, to request a copy of* ASCOM, *I was told that the version available was the same version I reviewed in October 1982 for my local user group. So instead of obtaining a new copy of* ASCOM, *I used the results of the October 1982 review.—Larry Jordan*
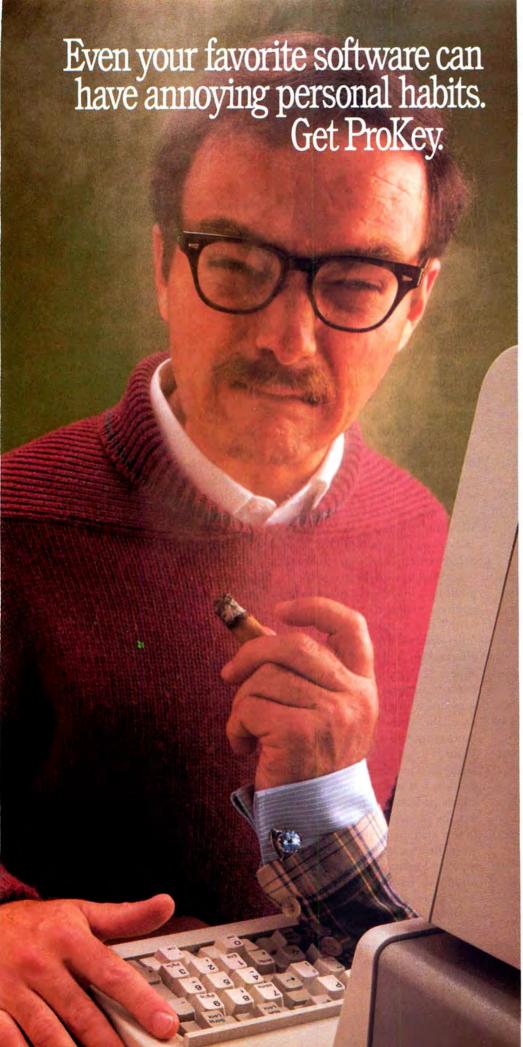
Footnote Note

In my article "Fancy Footwork" [*PCW*, Vol. 1, No. 8] I attributed a power to Satellite Software International's *WordPerfect* that it does not have. The current version of this program cannot split footnotes between pages. According to a company spokesperson, this feature will be included in the next release of the program. My suggested method for producing documents with double-spaced text and single-spaced footnotes using *Footnote* was also garbled. Before recombining your text and note files with *Footnote*, you first have to double-space your text file using *WordStar*'s <Ctrl>-O S 2 <Ctrl>-Q Q B command.

Joshua B. Freeman
New York, New York

Multi Mix-up

Recently, I was shopping for a new computer. IBM PC and IBM look-alikes were very high on my list of preferences, so I took great interest in your review of the *MultiMate* word processing system ["The PC's Perfect Mate," *PCW*, Vol. 1, No. 6]. After some consultation with a local dealer to make sure the package would support a Diablo 620 daisy wheel printer, I purchased a Corona computer, which includes *MultiMate*, and the Diablo.

The review of *MultiMate* was very accurate in the area of editing features, but fell far short of acceptable in its treatment of printers and print quality. My biggest disappointment was in the area of proportional spacing support. I was led to believe that *MultiMate* supports proportional spacing with right justification by Figure 7 of the review, which ap-

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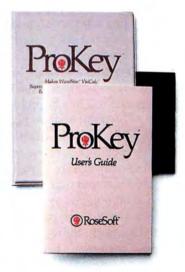
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To run ProKey, you'll need an IBM Personal Computer or workalike DOS (any version, including 2.0), and 64K of RAM (WordStar requires 96K).

WordStar, VisiCalc and dBase II are trademarks, respectively, of Micro Pro, Visicorp and Ashton-Tate.

Circle 162 on reader service card

Letters

peared on page 123. The plate clearly shows the feature "Proportional spacing," and at the top the words "Reproduced by permission of Soft-Word Systems" might make me think that it is from a screen dump of the print screen or was supplied by Soft-Word. Proportional spacing support is a very important and expensive feature and figured heavily in my choice of a system.

After buying the Corona I found that not only was proportional spacing unavailable, the word processor could not even produce boldface with the Diablo! In fact, the printer is treated much like a teletype, and right justification is generated by adding extra spaces between words, a very unattractive and cheap way of treating text. So much for $1200 worth of high-quality printer. True, underlining, superscript, and subscript are supported, as well as variable pitch selection. For me, though, the most used features are boldface, underline, and proportional spacing.

A special toll-free help phone number for SoftWord Systems is provided, so I called and asked why my *MultiMate* didn't have the proportional spacing feature shown in the review. I was told that it would be offered as an upgrade by the second quarter of next year, but no explanation was offered for the misleading figure in the review. I asked what the cost of the upgrade would be, and rather than telling me about the free upgrade policy mentioned in the review, the company rep told me that no price was available as yet. During this whole process I had flashbacks of similar treatment at the hands of Osborne Computer Corporation, in-cluding literally dozens of unfilled promises of upgrades and enhancements to supplied software.

The issue of print quality with *MultiMate* is a vital one. A word processor that is used with a daisy wheel printer should produce top quality print, an area where *Multi-Mate* will fail with many of the higher quality printers it attempts to support. *MultiMate* fails so badly with the Diablo 620 that I was forced to get *WordStar*. As much as I prefer the power of *MultiMate* in writing a document, *WordStar* wins hands down in the print department. It produces very attractive, microjustified print with boldface and underlining, as well as true superscript and subscript. The only shortcoming of *WordStar* print compared to that of *MultiMate* is its inability to imbed printer control codes directly in text.

I do not want to be accused of pointing a finger without some suggestions on how to correct a problem. While it may be suggested that other printers will allow more special effects, I think that I have a right to expect $1700 worth of word processing software and printer to perform standard word processing features, especially when the word processor claims to support the printer. Soft-Word Systems needs to work on this problem. That can be done by adding printing features that fully utilize the advanced features of incremental-spacing printers like the Diablo 620. In this area, regardless of the daisy wheel printer, *WordStar* will produce superior-looking justified text, and *MultiMate* has no excuse. Also, I don't know who was responsible for the misleading print spooler menu in the review, but I feel that I am owed a copy of the proportional spacing version of *MultiMate* when it is re-leased. Until then, I guess I'll just have to use *WordStar* and put *Multi-Mate* up on the shelf and see if Soft-Word lives up to its big upgrade promises.
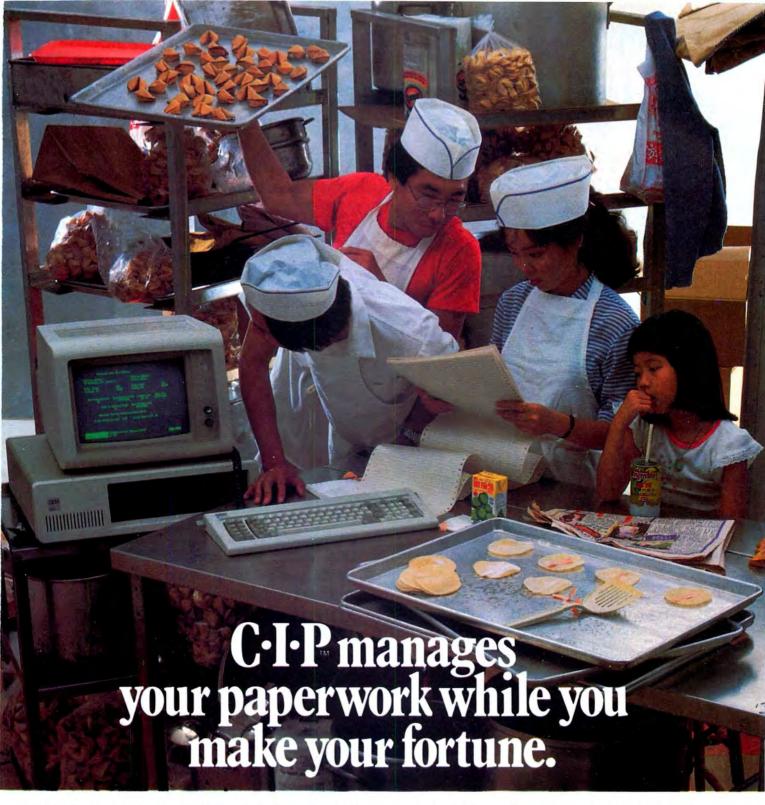
Randall J. Shafer
Pontiac, Michigan

The people at SoftWord Systems say that the reason proportional spacing is listed as a menu option in the material we used for Figure 7 is because it was to be a feature of their current release. When the proportional spacing capability was dropped from the program, apparently no one remembered to change the literature. Soft-Word Systems confirms that proportional spacing will be offered in an upgrade, but they cannot say when.

The free upgrade policy described in the review still stands. However, it applies only to people who buy Mul-tiMate separately.—Ed.

Samna Update

In "Play It Again, Samna" (PCW, Vol. 2, No. 2) Merrily Shinyeda mentioned that the Samna Word II *word processor lacked a mail-merge program. Since that review went to press, Samna has shipped an update (version 1.1) that includes mail-merge capability as well as limited graphics for designing forms.—Ed.*

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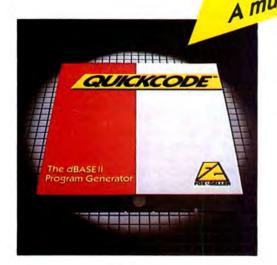
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The Help Screen

PC World offers answers and advice at every level.

Karl Koessel

This month we have corrections to two past articles, "A Tandy New Peripheral" and "We Interrupt This Program." Then there are questions on the annual maintenance cost of the IBM PC, the location to where a volume label is written when the /V option is chosen for the DOS 2.00 command FORMAT, and the implementation of DOS 2.00's ability to trap definable keys.

"A Tandy New Peripheral" by Richard A. Brown, which appeared in the October 1983 issue (Vol. 1, No. 7), has excited many of our readers. Unfortunately, several errors slipped in unnoticed, and the instructions to perform uploading and downloading between the Radio Shack Model 100 and the IBM PC were rendered virtually unintelligible. But thanks to Kenniston W. Lord, Jr., a reader in Winchendon, Massachusetts, step-by-step instructions, including the communications protocols for both machines, are reproduced in Figures 1 and 2. To use them you must first connect the serial port of the Model 100 to the serial port of the PC using a Radio Shack null modem and an RS-232C cable.

Testing these procedures revealed a few peculiarities. A double carriage-return/linefeed sequence contained in a Model 100 text file that is being copied to the PC will erroneously be considered the end of the file and the copying will halt. This sequence is created when the <Enter> key on the Model 100 is struck two or more times in succession. Replace such sequences with a single carriage return/linefeed and the PC will copy the entire Model 100 text file.

Model 100	IBM PC
1. Move cursor to TELCOM and press <Enter>.	
2. Press <F3> (Stat). Type 57N1D, 10 pps and press <Enter>.	
	3. Type MODE COM1:12,N,7,1 and press <Enter>.
4. Press <F4> (Term).	
5. Press <F3> (Up) and then <Enter>. Computer: File to Upload? Type in the file name and press <Enter>. Computer: Width: Don't press <Enter> yet.	
	6. Type COPY AUX SWAP.TXT and press <Enter>.
7. Press <Enter>. The copy takes place.	File(s) copied message appears when done.
8. Press <F8> (Bye).	
9. Computer: DISCONNECT? Press Y and then <Enter>.	
10. Press <F8> (Menu).	

Figure 1: Transfers data from the Radio Shack Model 100 to the IBM PC

Occasionally the COPY command will return an AUX error. Simply press A (for abort), <F3> (to rewrite the command), and then <Enter>. Repeat, if necessary, until the error message does not appear, and then proceed with the transfer.

Note also that for communications from the PC to the Model 100 the transmission speed is reduced to 600 bps (bits per second) because the Model 100 drops characters at higher speeds. Some machines may be able to handle the 1200 bps rate.

Although these procedures enable you to transfer files from one machine to the other, they suffer from the limitations just cited. Many readers pointed out that using a commu-

The Help Screen

Figure 2: Transfers data from the IBM PC to the Radio Shack Model 100

nications program such as *PC-Talk* simplifies the transfer and removes the limitations. We apologize for any inconvenience to our readers.

We have also received corrections from Stuart Greenberg, the author of "We Interrupt This Program," which also appeared in the October issue. The following is a list of the known bugs to date:

Missing percents. Several variables used in the Screen Slinger subroutine (lines 49101 through 49116) are missing the percents needed to indicate that they are integers. The affected variables are SS.SRNCNT%, SS.BASE%, and SS.SRNNUM% in lines 49104, 49105, 49106, 49107, 49115, and 49116. There are 12 missing percents total.

Missing line. Line 49100 was inadvertently omitted from the Screen Slinger subroutine. It was a REMark line containing the name of the routine (i.e., 49100 REM Screen Slinger Subroutine). The line is necessary because it is referenced when the program GOSUBs the routine.

Duplicate lines. Lines 50007, 50018, and 50019 in Listing 4 are duplicates and should be omitted. Leaving these lines in the program causes no problems, however.

Register usage. The second paragraph in the second column on page 202 states that "the sample program uses the BX register for intermediate storage, but any unused register would have done just as well." In actuality, the BX register must be used for this purpose.

Addressing problem. Due to the method used to store strings in Microsoft BASIC, a string may be moved in memory at any time. The statement in lines 50013 and 50014 should be duplicated immediately before the CALL statement in line 50021 to be sure that BM.ENTRY points to the BMOVE subroutine.

Again, our apologies for any inconvenience that these errors may have caused.

Maintenance Costs

Q. We own a Micom 2002 word processor that has two heads. The annual maintenance is $2000. We are contemplating replacing the Micom 2002 with an IBM PC at a cost of $4000, utilizing Microsoft Word and a mouse. Do you have data that estimates the annual maintenance costs

for an IBM PC? We expect we could amortize the $4000 PC quickly with the maintenance savings.
   Donald W. Nelson
   Wayzata, Minnesota

A.   Every IBM PC and XT purchased from an authorized dealer is under warranty for 90 days. IBM Product Centers offer a Warranty Extension Maintenance program (nine-month term) and an Annual Maintenance program. If you enroll in the Warranty Extension program before the initial 90-day warranty expires, you will not be charged the $96 per hour (4/10 hour minimum charge) maintenance qualification inspection fee.

   The costs for these programs vary according to four types of service (on-site, pick-up/delivery, carry-in, and mail-in) and which devices in your particular system you wish to cover (e.g., the system unit, a monochrome monitor, a dot matrix printer, etc.). IBM will not cover or repair any third-party (non-IBM) devices such as memory chips, expansion boards, or printers. In fact, your system will not be serviced at all until all such devices are removed.

   Currently, the price of IBM's Annual Maintenance program for carry-in service of a $4000 PC system is probably around $250 per year (as mentioned above, the actual price depends on what devices are covered). Considering the initial 90-day warranty and the annual $1750 savings in maintenance costs of the PC over the Micom 2002, you will fully recover both the PC's purchase price and its maintenance costs in approximately two years.

   Also, many authorized dealers have their own maintenance programs. Check out their offerings as well as your local IBM Products Center's to find the program that best suits your needs.

Volume Labels

Q.   *Because I had been having difficulty with my disk drives reading DOS 2.00's new nine-sector format, I decided to format all my disks with the eight-sector option and since have had no problems. However, I do have a question about DOS 2.00's volume labels.*

> IBM will not cover or repair any third-party (non-IBM) devices such as memory chips, expansion boards, or printers.

In the documentation about the command FORMAT the DOS 2.00 manual says that the volume parameter /V cannot be used with the sector parameter /8. I have tried this, and I get the error message 'Parameters not compatible—Format failure'. However if I specify that I also want the system files on the disk by typing FORMAT B:/S /8 /V I do not get an error message and am prompted to enter a volume label.

   There appears to be no problem using FORMAT with these parameters. The disk can be read and its files listed with its volume label. However, I wonder, is there really a place for the volume label on an eight-sector disk, or is it being written in an area that is likely to cause trouble later on?
   Charles W. Therrien
   Lexington, Massachusetts

A.   Your "solution" whereby you format your disks with eight sectors rather than nine leads me to believe that your disk drives are not spinning at the correct speed. Because a disk drive spins at a set speed, DOS 2.00 reads and writes about 111 percent faster than DOS 1.00 or 1.10 so that nine 512-byte "blocks" (sectors) of data may be written in the same time span (one spin) that DOS 1.00 or 1.10 would write eight 512-byte "blocks" (sectors). Your disk drives' speed may be incorrect by an amount not crucial to the performance of DOS 1.00 or 1.10 but enough to inhibit the proper performance of DOS 2.00. A product such as the *Disk Drive Analyzer* by Verbatim will test your drives' performance.

   You need not worry about a volume label on eight-sector disks being written to an area that will later cause trouble. A volume label is written in the directory as though it were a file name. (You can see it listed as such if you list the file directory with the DIR command, under DOS 1.10, of one of your volume-labeled eight-sector disks. Notice the period inserted between the eighth and ninth character of the volume label.)

Key Trapping
Q.   *I've been writing many BASIC programs and am baffled by <Ctrl>-<Break>. This key com-*

The Help Screen

```
 10 REM     Set trap for <Ctrl>-<Break>
 20 KEY 15,CHR$(&H4)+CHR$(70)
 30 ON KEY(15) GOSUB 1000
 40 KEY(15) ON
 50 REM     The trap has been set
100 REM     Main portion of program
110 CLS
120 COLOR 0,7
130 CLS
140 COLOR 7,0
150 GOTO 110
999  REM Trap points to line 1000
1000 BEEP
1010 LOCATE 12,1
1020 PRINT "Please, do NOT try to ";
1030 PRINT "interrupt this program."
1040 FOR PAUSE=1 TO 1000:NEXT
1050 RETURN
```

Listing 1: BREAKTRP

bination is a big nuisance when you are trying to keep a program from being stopped abruptly. I've looked through the BASIC 2.0 manual and have found no information on how to trap <Ctrl>-<Break>. Do you have any advice?
Matt Brown
Loveland, Colorado

A.   Advanced BASIC programs may trap any or all of the ten function keys and the four cursor keys. Key trapping, in all current versions of Advanced BASIC (BASICA 1.0, 1.1, and 2.0), is accomplished by means of the ON KEY(n) and KEY(n) statements, where n is a number from 1 to 14. Each number is predefined to represent one of the function or cursor keys.

Advanced BASIC 2.0 allows the trapping of six additional definable keys. This allows programs to trap any <Ctrl>, <Shift>, or super-shift key, including the <Ctrl>-<Break> combination. Trapping definable keys is accomplished in the same manner as trapping the function and cursor keys (i.e., by using the ON KEY(n) and KEY(n) statements, where n is a number from 15 to 20). However, the key combination to be trapped must first be defined by a KEY statement.

When used for this purpose, the KEY statement has the syntax:
KEY *n*,CHR$(*shift*) + chr$(*scan code*)
where *n* is a numeric expression from 15 to 20, and *shift* is a numeric value that corresponds to the hex value for the latched keys. The hex values for each key are:

<CapsLock>	&H40
<NumLock>	&H20
<Alt>	&H08
<Ctrl>	&H04
<Shift>	&H01, &H02, &H03

Key trapping does not differentiate left and right <Shift> keys; therefore any of the three <Shift> values above will denote a <Shift> key. Also, you may add multiple-shift states together (e.g., a *shift* value of &H04 plus &H08 denotes the <Ctrl> and <Alt> keys held down together).

Scan code is a number in the range of 1 to 83 that identifies the key to be trapped. See the BASIC 2.0 manual, Appendix K, "Keyboard Diagram and Scan Codes," for a complete table of scan codes and their associated key positions.

A sample program demonstrating the trapping of <Ctrl>-<Break> is included at the end of the description of the ON KEY(n) statement in the BASIC 2.0 manual. Another example, BREAKTRP, is shown here in Listing 1. Reading the manual's descriptions of the three KEY statements will inform you that a trap for <Ctrl>-A is not a trap for <Ctrl>-<Shift>-A. So although BREAKTRP may not be stopped by <Ctrl>-<Break>, you can break out of the program with <Ctrl>-<Shift>-<Break>. ⬡

Do you have any questions concerning the IBM PC or the new compatibles? Send them to The Help Screen, PC World, 555 De Haro St., San Francisco, CA 94107.

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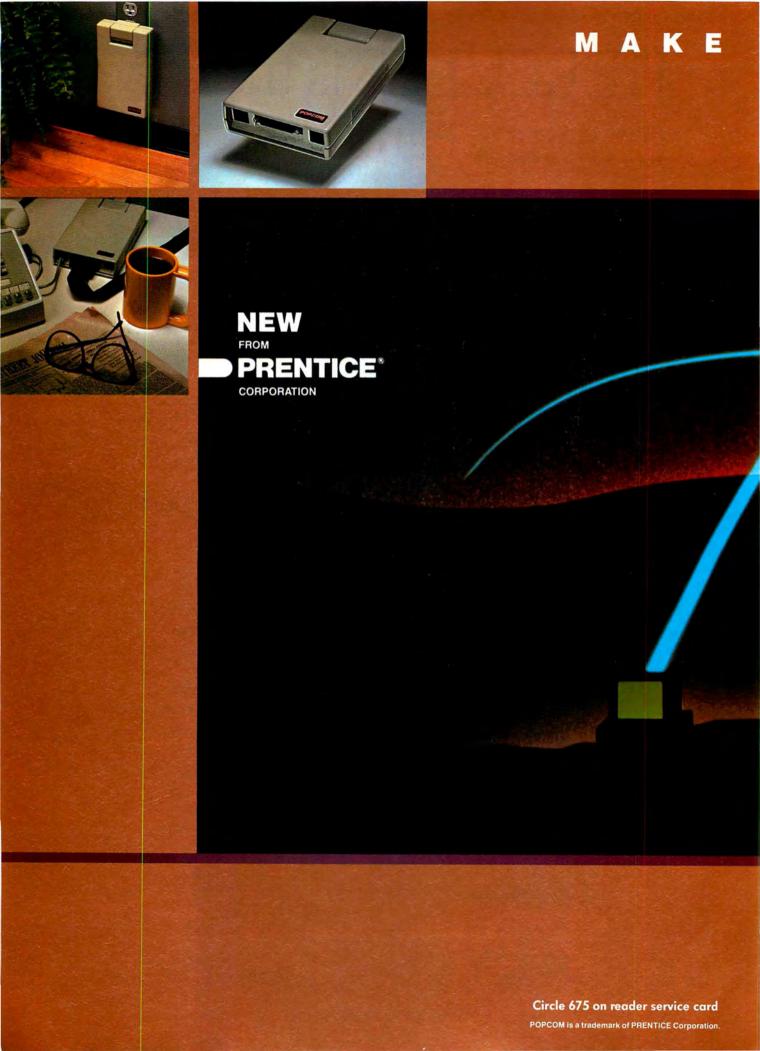
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PC W🌐RLD View

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

Late Rumors

On the old theory of saving the best for last, we've recently heard a rumor about the PCjr (alias Peanut) that is intriguing even after the fact. Despite all the talk of manufacturing delays, confused instructions in microprocessors, and similar goof-ups, one industry insider reports that the PCjr was ready to roll last May 15th.

Apparently some of the people who developed parts of the PCjr system were given prototypes early in 1983, used them for a few weeks to complete their phase of the project, and then bundled up these infant versions of the computer for shipment back to IBM. All this was supposed to have happened by late April, according to our source, and PCjr should have made its debut later that spring. Of course, everyone's best guess as to the reason for Junior's delayed arrival is that Senior was just selling too well to be bothered.

Bits, Bytes, and Boats

With the annual rites of fall COMDEX and the winter Consumer Electronics Show behind us, a cruise in the Caribbean seems just the thing to warm up the old circuits. At least that's what one Miami firm believes. Latcom, Inc., which sponsors conferences in Latin America and the Caribbean, has arranged a love boat tour that's also a computer show. In late February and early March, Cunard's *Countess* passenger liner will visit tropical islands with a cargo of computers and salespeople. The idea is to stimulate the already-booming computer sales in the region by bringing this traveling computer fair to potential dealers, distributors, and users. Present plans are for the *Countess* to call at ports in Venezuela, Barbados, Martinique, St. Thomas, and Trinidad; one of the stops originally planned—Grenada— had to be canceled.

Time Is Money

We've often wondered if software publishers read their reviews and respond to the critics' concerns and suggestions. In most instances, it's hard to tell whether a review has stimulated changes in a program, but Contributing Editor Andy Williams has noticed an interesting development that may fit into the "reviewer gets results" category.

In this case, however, the results don't seem to be an improvement in the program. Andy reviewed *The Market Analyzer* by Dow Jones (*PCW*, Vol. 1, No. 8) and discussed its use with Dow Jones News/Retrieval, the dial-up information service operated by the same company. His review gave readers a valuable tip about using the News/Retrieval service: if they didn't want to wait while the service transmitted a long menu or a screenful of headlines, they could type a question mark at any point and the transmission would stop. Then they could type a system command, press the <Enter> key, and begin the next operation.

Since users pay for the service according to their connect time, they are being charged to look at the menu or a screenful of headlines when they may have found the item they need at the top of the list. So the question mark saved users time and money. But just after Andy's review was published, he discovered that the question mark no longer worked; it wouldn't interrupt transmission, and he couldn't find any way to stop the rolling menus and headlines until they'd run their course.

He called the News/Retrieval customer service office (an 800 number given to subscribers) and was told that the question mark had been disabled, but that a new signal—<Ctrl>-X—would serve the same purpose. He couldn't determine from his conversation with the Dow Jones people whether the change in signals was a response to his article or merely a curious coincidence—but Andy did report that the customer service folks were uniformly helpful and knowledgeable about the company's services and products.

So if you've been trying to use a question mark to shorten the wait and save money on the Dow Jones data base, change that character to a <Ctrl>-X and you'll be in the interrupt business again.

CompuNest?

The phrase *hands on* may have achieved double-entendre status by now if the combination of singles weekends and computer instruction has caught on. Correspondent Rick Alber reports that love and comput-

ers may be blossoming together in rural New York State, and he has sent an advertisement from the *New Yorker* magazine to prove his point.

The ad is headlined "Eat, sleep and breathe computer for two intensive days and nights. You'll leave a changed person." It shows a PC with the sun on one side and the moon on the other, implying, perhaps, that you'll have nothing but the computer for company during these intensive days and nights.

But another photo shows two upscale couples draped over a grand piano, smiling in response to whatever tinkling melody their host is playing. The caption reads: "Take the evening off from bits, bytes, and RAMs." Apparently, opportunities for intimacy will include more than the computer.

Rick points out a few idiosyncracies in this new social phenomenon. The $895 price for 14 hours with a PC probably sets a new record for highest hourly rate ($64) for computer instruction, and strangely, the ad refers to the computer only as the "IBM 5150"—never as the IBM PC or plain PC. Our guess is that if the potential customers knew they'd be getting a PC (even though there's a photo in the ad), they might save their $895 and use one at the office.
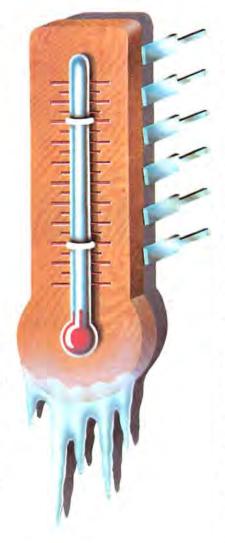
We were intrigued with this new wrinkle in computer training, though, and spoke with Sally Dininny, who is coordinating these Computer Immersion Weekends. She notes that when we called, about a week before the first event, she had 21 people registered for the weekend

and another 15 signed up for a future program. Although the programs are held in Westchester County, outside New York City, she's had inquiries from people in North Carolina, Tennessee, California, Maine, and Vermont. She plans to continue the events through 1984. More information is available from Sally Dininny, Arrowwood of Westchester, Anderson Hill Road, Rye Brooke, NY 10573, 914/939-5500 ext. 7849.

Big Blue's News
Junction Junked

IBM led the field in research on the Josephson junction, a spectacularly fast type of integrated circuit. The Josephson circuit is not silicon-based but is made of superconductive metal, such as niobium, which has no resistance to electric current when cooled to -273 degrees centigrade. When kept in an environment of liquid helium to achieve this cold state, a package of Josephson circuitry the size of a basketball could outpace any mainframe now made.

But after ten years of research, which included the work of 115 scientists and cost $220 million, IBM has scrapped the Josephson junction. The scientists found that maintaining the supercold temperatures around the circuits was difficult, and there were no practical ways to integrate the Josephson circuits and their helium baths into a computer system. Although several Japanese firms are continuing research on this technology, both Sperry Corporation and Bell Labs have also given up their Josephson projects.

Boca Builds

One obvious measure of the PC's success—and the PCjr's prospects—is the growth of the IBM compound in Boca Raton, Florida. As of late last year, the corporation owned some 600 acres of land in Boca Raton, and its offices and manufacturing facilities occupied a sprawling 6.3 million square feet of space. Still in need of elbow room, however, IBM has begun construction of four new build-

ings that will house administrative offices; these structures will add another 625,000 square feet to the PC family's domain.

Great Graphics

A new graphics system recently introduced by IBM produces images of near photo quality on a display screen. The system, unromantically named the 5080, consists of a 19-inch monitor, a graphics tablet, and either a mouse-style cursor control device or a stylus for freehand drawing. This new system can display as many as 256 hues or an equal number of shades of gray and has more than 1 million addressable points.

The 5080 graphics system is designed for use by engineers and scientists; it can be linked to another IBM graphics system, the 3250, with minor modifications. The base price of the 5080 system is approximately $20,000 with a monochrome display that shows four shades of gray, a graphics tablet with stylus, a keyboard, and a processor unit. With a 16-color monitor, the system costs about $25,000.

Security Close at Hand

With all the data pirates around these days, many companies are looking for sure ways to secure the sensitive and vital information they store on computers. Fingermatrix of White Plains, New York, may have a solution for some of these problems. For companies that use IBM 3270 termi-

nals with their computer systems, Fingermatrix offers its Personal Touch Verification System 327—a gadget that identifies users by their fingerprints. The device can be ordered so that it inspects one finger or two, and users can specify the number of people who will have access to the terminals and the levels of data security involved.

The Fingermatrix system takes about 3 seconds to identify a fingerprint or reject one it doesn't recognize. If one finger is used for identification, the rejection error rate is less than 2 percent, the company reports; if two fingers are used for identification, the rate drops to 0.5 percent.

Do-It-Yourself Desk

With the cost of specialized computer furniture (or any furniture) rising fast, Carl and Becky Haeberle have a practical alternative to offer. They publish a 40-page book that provides detailed plans and instructions for building a versatile desk that is designed to hold a computer, a monitor, a keyboard, and a printer, with extra shelves for paper, disk storage, and manuals.

This genuinely low-cost desk measures 4 feet high by 3½ feet wide by 1½ feet deep and has pull-out shelves for the keyboard and the printer. It can be built for as little as $100, depending on the type of plywood used; the desk is planned so that it can be built from two standard pieces of plywood, each 4 feet by 8 feet by ¾ inch. Although some modifications may be required for printers

larger than the Epson, the adjustable shelves and flexible design of this desk make it workable for most people's needs.

The Haeberles offer step-by-step guidance, from choosing materials to operating tools (a sabre saw is needed for cutting the plywood). Their manual is friendly and thorough, and if you have some woodworking experience or can enlist a friend who does, this desk could be a money-saving project. The instruction book is available for $8 from CKB Projects, 28 Gould St., San Francisco, CA 94124.

Carl, Becky, and their $100 workstation

Mea Culpa

In *PC World View* for November (Vol. 1, No. 8) we noted that some computer manufacturers had offered the *Volkswriter* word processing program from Lifetree Software instead of *Perfect Writer* from Perfect Software because *Perfect Writer* was late in becoming available on 16-bit computers. We've subsequently learned that although Columbia Data Systems did offer *Volkswriter* with its Multi Personal Computer (a PC compatible) before *Perfect Writer* was released, all buyers of the Columbia machine also received a coupon that entitled them to a copy of *Perfect Writer*.

According to a spokesperson for Perfect Software, the delay in *Perfect Writer*'s release was only about six weeks, and Columbia buyers are now receiving that software with the machine. In addition, we noted that *Volkswriter* was being supplied with

the Dot computer from Computer Devices, but in that case it's not replacing *Perfect Writer,* because Perfect Software had never arranged to supply the program with the Dot.

Data Free Oklahoma

The Oklahoma outrage reported in November's *PC World View* should have ended by now. In response to the protests of hundreds of people who use their computers at home, Southwestern Bell has proposed lifting its $50 per month charge for individuals who connect their computers to the phone lines by modem. This data surcharge was always intended for businesses, and when the rule was instituted in the 1960s, few individuals were linking micros with telephone lines.

The apparent hero of this story is Robert Braver of Norman, Oklahoma, who first protested the modem charge on his phone bill. Braver enlisted other computer users in his cause, and many user groups organized letter-writing campaigns to get the rule changed.

Southwestern Bell has decided that its customers will not be charged for using modems or other telephone accessories after January 1 of this year. Although the David-and-Goliath nature of the situation probably helped influence this decision, the phone company says that its move was made in response to the deregulation and break-up of the larger Bell system.

Data Free USA

There's a new service that should appeal to information junkies who are also tightwads. A newsletter called the *Computer Data Report* highlights numerous sources of free information, much of it on computer data bases. For example, the U.S. Naval Observatory has 64 data files that can be reached by modem. They provide such information as times of sunrise, sunset, and moonrise on any day at any point on earth, as well as the direction and distance between any two points on earth—in both statute and nautical miles. To get the on-line numbers for this free service, contact Minram Miranian, U.S. Naval Observatory, Time Service Division, Washington, DC 20390, 202/653-1507.

For a copy of the newsletter, contact Information USA, 12400 Beall Mt. Rd., Potomac, MD 20854, 301/983-8220. This company will also locate specialized data bases for customers and provide reports and analyses of data to businesses. The staff of Information USA will even do a half-hour of free research for any potential customer, but only on Mondays.

Electronic Levity

Laurence C. Smith of Albuquerque, New Mexico, reveals one of the ironies of computer-age literature with the following exercise in spelling and verse:

"I have a spelling checker
It came with my PC;
It plainly marks for my revue
Mistakes I might not see.
I've run this poem threw it,
I'm sure your pleased to no
Its letter perfect, in its way,
My checker told me so."
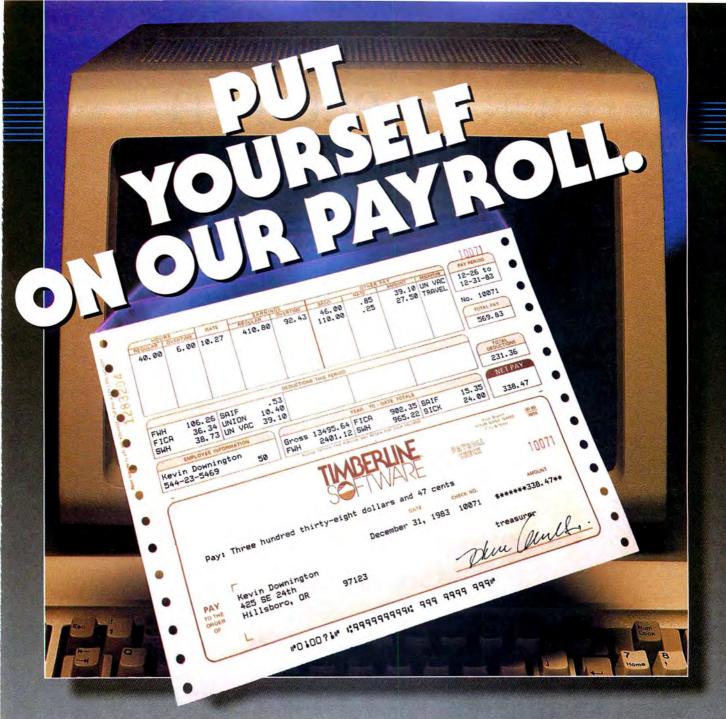
Contributing Editor Larry Magid has uncovered an amusing new product that lampoons a software bestseller. It's *InvisiCalc,* also known as the pet rock of the computer industry. This product resembles a floppy disk and reportedly operates on any make of computer or toaster.

The *InvisiCalc* manual takes a devil-may-care attitude toward disk handling, suggesting that users "pile on the food—it works just like a paper plate." The manual also makes a candid statement about the product, stating that it is absolutely useless. In addition to a thoroughly accurate manual and a program that doubles as a paper plate, *InvisiCalc* has the best disk label around: "Why ask what if…when you can ask, who cares?"

InvisiCalc is made by CE Software of Des Moines, Iowa, and distributed by Computer Greetings, 2661 Lakeview Dr., San Leandro, CA 94577, 415/483-8482. It costs $5.98. ≜

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

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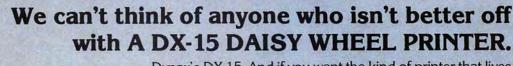
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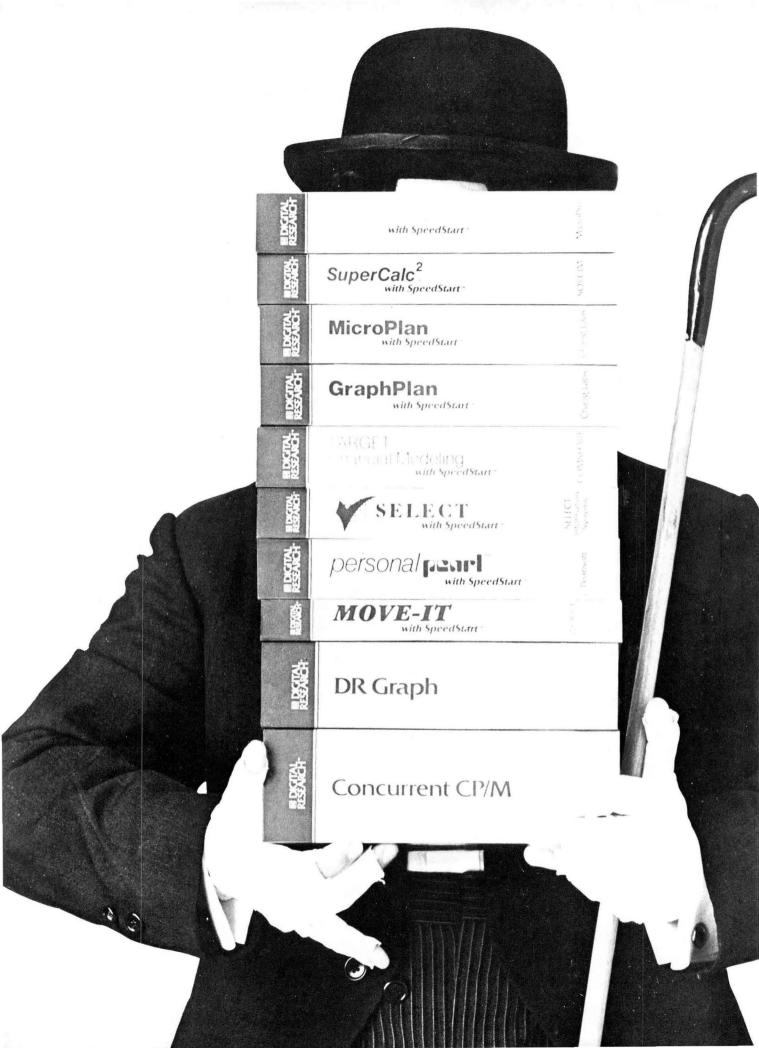
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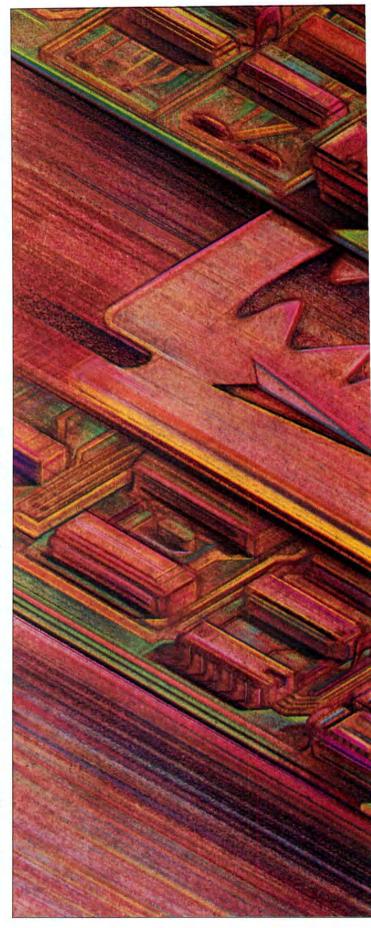
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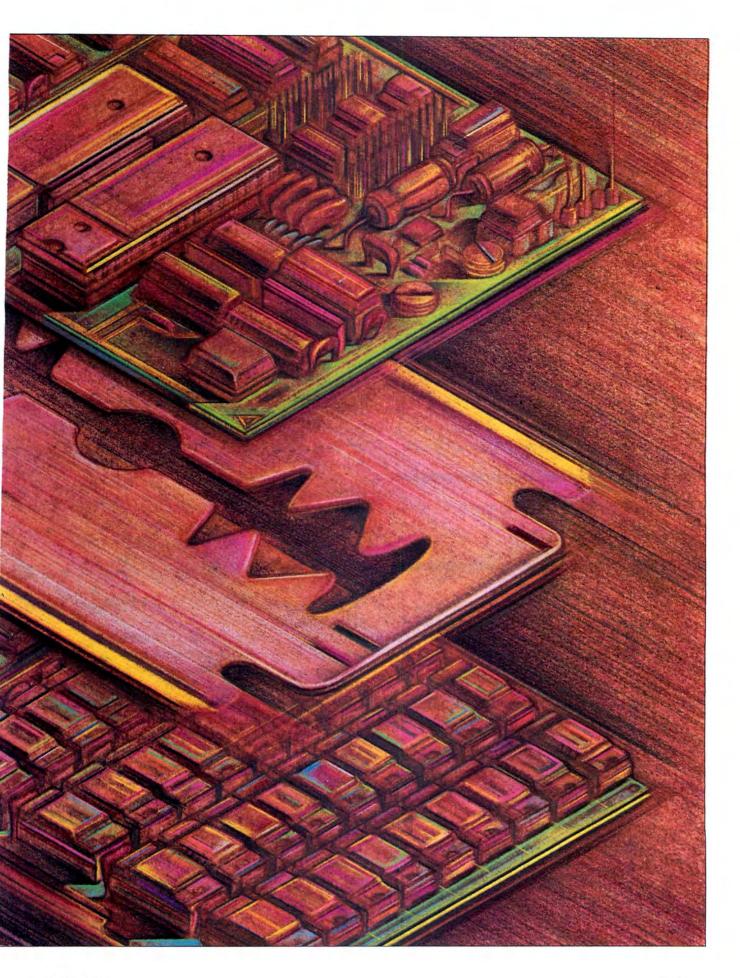
As microprocessors continue to drop in price, they will no doubt find their way into personal computers in increasing numbers, making true multitasking possible. Occam is a language that anticipates that trend.

With the increasing availability of inexpensive microprocessors, leading engineers are beginning to look at personal computers in a new light. The same forces that caused the cost of calculators and digital watches to drop are already bringing us computers-on-a-card, microprocessors that fit onto a board and slot in the back of a PC to provide a special function. As more processors are added to a computer, its ability to simultaneously perform a number of complex tasks increases. This trend toward more processors is not only changing the way personal computers are designed, but is altering how we think about programming and programming languages.

Most personal computers, including the PC, are single-processor units. Though a microprocessor such as the PC's 8088 can be carved up to handle several different tasks simultaneously, resulting program execution is slow. Sectioning the processor is done in the programming, a process that is complex, time consuming, and bug prone.

Occam is a high-level language designed to simplify programming when multiple tasks and (potentially) multiple processors are involved. Thus, a programmer can more easily deal with both simultaneous and sequential operations. An Occam program is also machine independent and does not have to be altered to run on a different personal computer with different processors. Unlike other "portable" languages such as C and FORTH, Occam does not rely on assembly language modules to handle I/O and data passing; instead, the user writes these functions in Occam.

⬟ State of the Art

Occam was developed by Inmos Corporation for its Transputer family of 16- and 32-bit multifunction microprocessors. The name comes from "Occam's razor," a bit of wisdom offered by 14th century scholar Sir William of Ockham, advising us to select the simpler theory whenever we have a choice. Simplicity is an integral part of Occam's design.

Processes and Processors

Programs in languages such as BASIC and FORTRAN act as if they own the computer, tying up most of its resources and sharing little with the operating system. If any sharing is done (under an operating system like Concurrent CP/M-86), there is little intertask cooperation. This type of sequential operation is adequate for many business programs, but other applications require a different view of the computing environment.

An electronic telephone exchange is one application that requires a different view. One or several processors may be handling numerous phone calls in various stages of completion. In this kind of situation, Occam's multitasking facilities simplify a job that would be quite difficult to perform with a conventional high-level language.

Simplicity is an integral part of Occam's design.

In this example a single telephone call is a task or basic unit of work. When a single processor handles several tasks, it is called multiprogramming. Many older systems are multiprogrammed to some extent, even if this only involves overlapping I/O operations for a single program. At the far end of the scale, multiple processors sharing tasks is called multiprocessing. Occam is based on the concept of processes (units of computation) and is designed to break a programming problem into a natural group of tasks, regardless of the number of processors available. These tasks can execute at the same time, alternately, or sequentially, depending on the system.

Program Structure

High-level languages remove the programmer from the intricacies of machine-level programming, but the format of the code is usually rigid and program execution is sequential. Program modules may deal with different tasks, but they are all solidly linked to one another in the structure of the program. Occam works in a more natural way; the format is more flexible and sections of code performing different tasks are independent of one another, much as data are in a relational data base.

The building block in an Occam program is the process, which can be a statement, module, or entire program. Processes in Occam can run simultaneously, and the most basic ones deal with input, output, and the assignment of variables. All other elements of Occam are constructed from these basic processes.

The input and output processes pass information and synchronize the individual sections of code. Data is passed from one process to another through named objects called channels. An input process waits until a message (signified by the question mark) is sent on the channel it names. For example, a home security program might wait for an event on channel "alarm," storing the data (which might be a number identifying a door that has been opened) as:

alarm ? door.num

The output process is written using an exclamation point. A program line that signals an alarm for door number 3 might look like:

alarm ! 3

The last building block in Occam is the assignment statement, which assigns a value to a variable. An assignment of the value 8 to the variable x is written as x: = 8 .

Variable names in Occam must be declared, as they are in Pascal. Declarations are available for channels, constants, formal parameters in subroutines, process names, and variables. Also, arrays (known as vectors) of channels and variables may be declared. Vectors are one-dimensional arrays, and subscripts range from zero to one less than the size of the vector.

Notation

One of Occam's novel features is the use of indentation to indicate the grouping of statements. Programmers have long used indentation to make code more readable, but the Occam compiler uses the position of a line of code in relation to surrounding code to determine program structure. This is particularly useful when compound statements are built using Occam's basic elements.

Expressions in Occam are written much like those in other languages. Symbols for arithmetic operators are the same, though logical operators used in bit value manipulation are written using these symbols:

and	/\
or	\/
exclusive or	><
not	NOT

Comments in Occam are preceded by a double hyphen and cause the remainder of a program line to be ignored by the compiler. A double hyphen in the leftmost two nonblank positions will cause an entire line to be treated as a comment. Comments may be included to the right of an executable code on the same line. By convention, comments are indented to correspond with the code being described.

Occam is a concurrent, control-structured language—therein lies its versatility.

Occam does not differentiate between uppercase and lowercase letters (except within character constants), but by convention, key words are written in uppercase and variable names in lowercase. Variable names may contain one or more periods as separators to make them more readable.

Combining Basic Elements

To quote an old saying, time is nature's way of keeping everything from happening at once. Though Occam is something of a free-form language in terms of format, its control structure is disciplined. A language in which everything happens simultaneously wouldn't be appropriate or useful. Occam permits grouping and ordering of input, output, and assignment processes so that execution priorities are established. Occam key words SEQ, ALT, and PAR reflect this grouping and ordering of statements that are executed sequentially, alternately, or in parallel.

A sequential process takes the form of the SEQ key word followed by the component processes, each on a new line, all at an extra level of indentation. For example, a sequential process that includes the definition of a variable, x, and two channels, c1 and c2, is expressed as:

```
CHAN c1, c2:        --Declare channels
    VAR x:          --Declare x local
    SEQ             --Sequential:
        c1 ? x      --read x from c1
        c2 ! x*x    --write x**2 to c2
```

In this example, the sequential process will wait for another process to send a value to channel c1. Only then will it write the square of the value to channel c2.

The alternative process is useful when several channels are monitored for a message or when messages from several channels are merged onto one channel. For exam-ple, messages from channels c1 and c2 are merged onto channel c3; the WHILE TRUE clause causes the indented code below to be repeatedly selected for execution, much like a DO FOREVER or DO SOMETIMES clause:

```
WHILE TRUE          --Repeat forever
    VAR x:          --x is a local var.
    ALT             --select only 1 of
        c1 ? x      --receive a message
        c3 ! x      --write to c3
        c2 ? x      --or receive a message
        c3 ! x      --write to c3
```

Where simultaneous (that is, parallel) execution of process is explicitly desired, the PAR key word is used. On a number-crunching array processor, all the elements of a large vector might be set to zero with the following code, in effect creating a process for each element:

```
VAR array [1000]:       --Declare
PAR i = [0 FOR 1000]    --Parallel
    array[i]: = 0       --Assignment
```

The 'i = [0 FOR 1000]' notation is used to indicate replication of the paralleled assignment process, which assigns a zero value to a vector element. Most important, vectors in Occam are not limited to data; they can be composed of processes as well.

The IF clause in Occam acts like the CASE statement in other languages. IF is a conditional process that executes only the statements contained within the first component whose conditional expression is true, such as

```
IF
    i = 1           --if true, then
        out1 ! x    --do this (only)
    i = 2           --else if this is true
        out2 ! x    --do this (only)
    i = 3           --else if this is true
        out3 ! x    --do this (only)
```

Tea and Time

Listing 1 illustrates a main controller routine from an Occam program for an imaginary combination tea maker and talking alarm clock. Aside from waking you up with a cup of tea and the current time, the appliance produces a cup of tea upon demand if you press the proper button. The tea timer is part of the controller routine and runs simultaneously with other functions.

When tea is to be made (that is, when a message is sent down the button channel), a message is sent to the timer. One of the channels polled by the controller rou-

```
     -- This program is excerpted and adapted from a sample program provided
     -- on the Occam Evaluation Kit diskette.

     PROC Controller (CHAN button, speaker, brewer, brewing, started, stop) =
     -- This declares the procedure and its parameters, which are channels.

     VAR request, brewing, running, hours, minutes, seconds,
         start.brewing.time :
     -- This declares the variables.

     CHAN start.timing, finished.timing, timer.stop :
     -- This declares 3 more channels internal to the Controller procedure.

       PROC Tea.timer (CHAN input, output, stop) =
       -- Tea.timer is an internal procedure, with 3 formal parameters.
         VAR finish.brewing.time, running :
         -- These are variables internal to Tea.timer.
         SEQ
            running := TRUE -- Set a flag to remember timer is running.
            WHILE running
              ALT -- Wait for any input on either input or stop channels.
                input ? ANY
                -- Wait for anything on the input channel;
                   finish.brewing.time:= NOW + (15 * ticks.per.sec)
                   -- Calculate the stop time from Occam's clock + brew time.
                stop ? ANY
                -- Wait for anything on the stop channel.
                   running:= FALSE
                WAIT NOW AFTER finish.brewing.time
                  IF
                     running AND brewing
                        SEQ
                           output ! ANY : -- Indicate brewing is done.
     SEQ
        running:= TRUE
        PAR -- Do the following in parallel:
           Tea.timer (start.timing, finished.timing, timer.stop)
              -- This line invokes the Tea.timer procedure defined earlier.
```

Listing 1: Occam tea brewer and alarm clock controller

tine is a return channel from the timer, which sends a message indicating that the tea has been brewed. The controller routine also polls a channel from the alarm; when a message is received on this channel, a "good morning" message is sent to the speech synthesizer. This program incorporates many of Occam's features and demonstrates how they might be used in more sophisticated control applications.

The complete tea/alarm clock program runs almost ten pages and consists of 15 procedures (PROCs), which are, for the most part, simply utility routines. The following are other procedures not included in Listing 1: "Clock.Ticking" involves two processes running in tandem. The first watches the clock, updating the time display every second; the second receives a message from and sends a message to any other part of the program that requires the current time. "Tea.Brewer" receives messages from the controller and either heats water or dispenses hot water on request. "Speech.Synthesizer" waits for a command and wakes up the sleeper with a spoken greeting such as "good morning" or "tea made."

Fitting Occam In

One clue to Occam's future role in computing is discovered by examining what was left out of the language. Occam is not nearly as rich in data structures and data types as in control structures. There is nothing in Occam
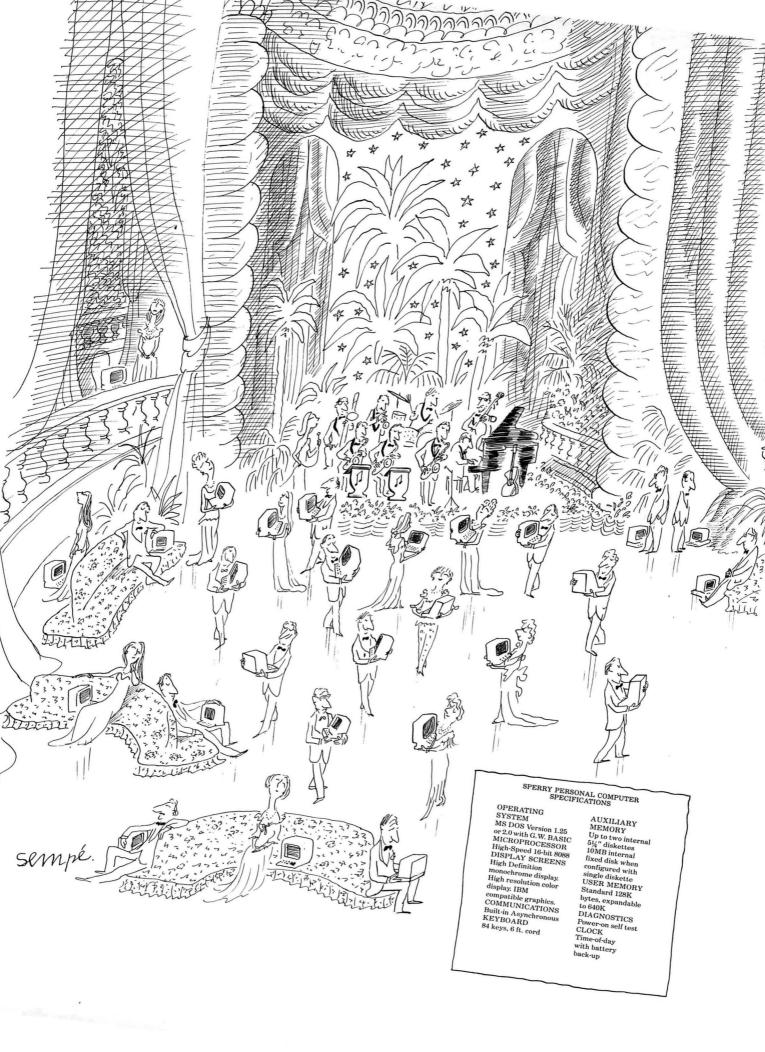
```
        SEQ -- Do the following in sequence:
          brewing:= FALSE
          WHILE running
            ALT -- Do only 1 of these:
              button ? request  -- Make tea, stop making tea, or alarm:
                IF
                  NOT brewing
                    PAR
                      start.timing ! ANY
                      brewer ! make.tea
                      brewing.started ? ANY
                      brewing := TRUE
              finished.timing ? ANY -- tea.timer
                SEQ
                  brewing := FALSE
                  speaker ! tea.made
                  finished.speaking ? ANY
                  brewer ! pour.tea
                  brewing.started ? ANY
              alarm ? ANY
                SEQ
                  speaker ! good.morning
                  finished.speaking ? ANY
                  IF
                    NOT brewing
                      SEQ
                        start.timing ! ANY
                        brewer ! make.tea
                        brewing.started ? ANY
                        brewing := TRUE
              stop ? ANY
              SEQ
                timer.stop ! ANY
                running:= FALSE :
-- End of Controller -------------------------------------------------
```
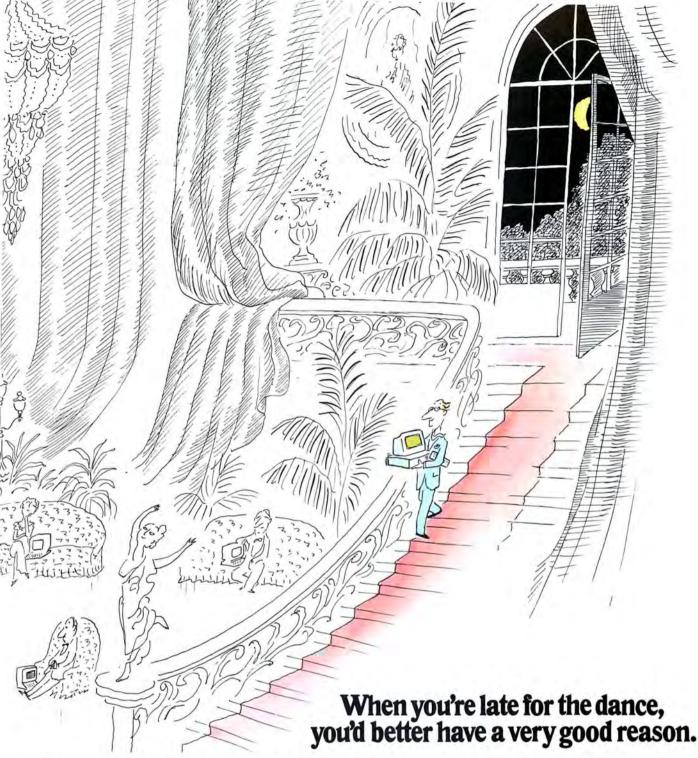
resembling the Pascal "record," and only integer and Boolean arithmetic are supported by the language. Occam is better suited for situations requiring control of many processors and processes. While Occam wouldn't be used in word processing, it would be used in robotics, communications, and local area networks.

Occam is a concurrent, control-structured language—therein lies its versatility. Occam reflects a human's interactive approach to problem solving rather than a computer's one-step-at-a-time method. As more microprocessors find their way into personal computers, appliances, and machinery—in short, as these machines become more like humans in their functioning—Occam and similar programming languages will take center stage. ◓

David Benchley is a systems analyst working in San Francisco.

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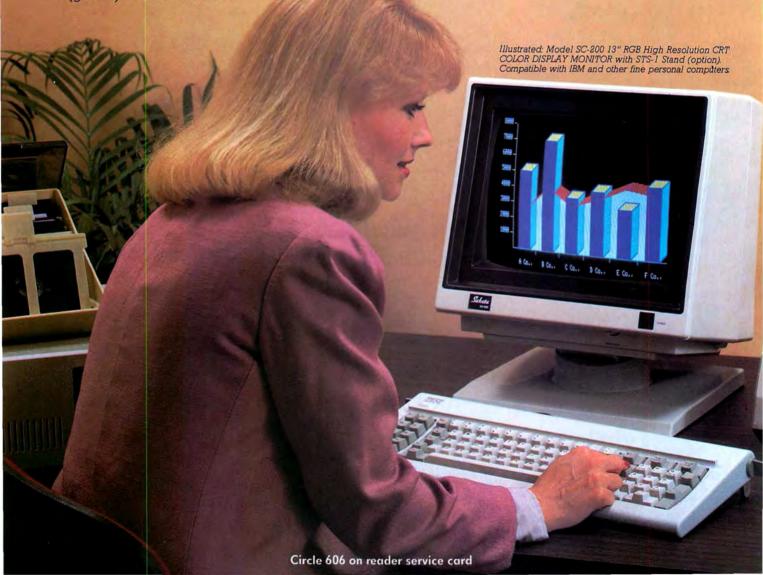
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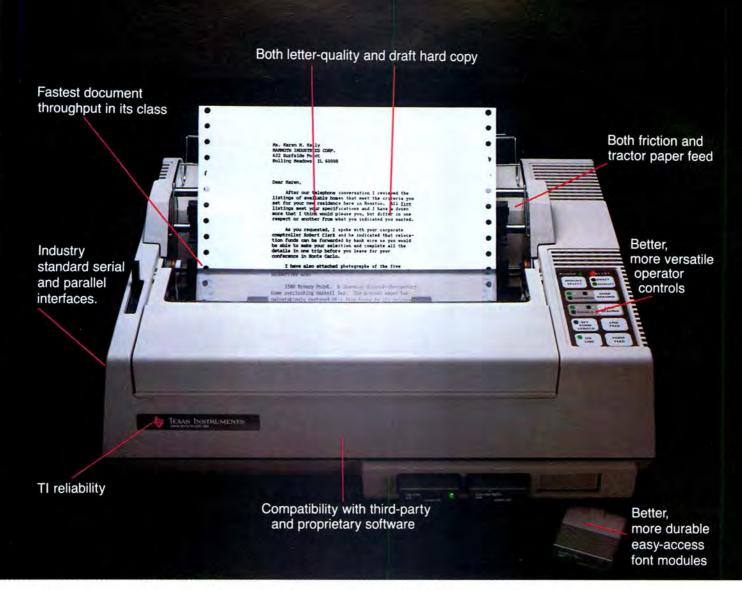
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Big Ideas from Smalltalk

Multitasking, concurrency, windows, and mice—buzzwords for a new technology that started with a little-known language called Smalltalk.

Jeff Fox

The player pushes a mouse around on a table; an arrow screeches across a screen full of numbers and flickers for an instant on the image of a tiny wastebasket. The player clicks a button on the mouse, and the numbers collapse; with a second click, a display jammed with pie charts blossoms in their place. The arrow zips down the screen to another little figure, and—click—the display is divided into four sections.

What I've just described is not a video game but a few moments behind the keyboard of an Apple Lisa. This scenario is becoming more common as Lisa-like features find their way into applications software and operating environments such as *VisiON* and *Microsoft Windows*. But such products did not spring whole from the head of Steve Jobs or Bill Gates. With the mass marketing of Lisa and window programs, attention has finally focused on Smalltalk, the original software system that made much of this new technology possible.

Smalltalk was developed in 1973 by Xerox's Learning Research Group in Palo Alto, California, for the company's Alto personal computer, a machine that managed a number of applications simultaneously and provided a simple user interface through the use of windows and a mouse. Though the Alto didn't take the market by storm (at a cost of $20,000 to $30,000 it wasn't likely to) the concepts and methods developed for it in Smalltalk have spawned a growing number of software and hardware products.

> Programs written in Smalltalk are extensions of the operating system.

Smalltalk is both a language and an operating system; the two are intimately linked, and applications programs written in Smalltalk are in effect extensions of the operating system. Smalltalk applications programs are not very portable and must run under the Smalltalk operating system. But the loss in machine portability is offset by the ease with which many different kinds of applications programs can be seamlessly integrated and run concurrently.
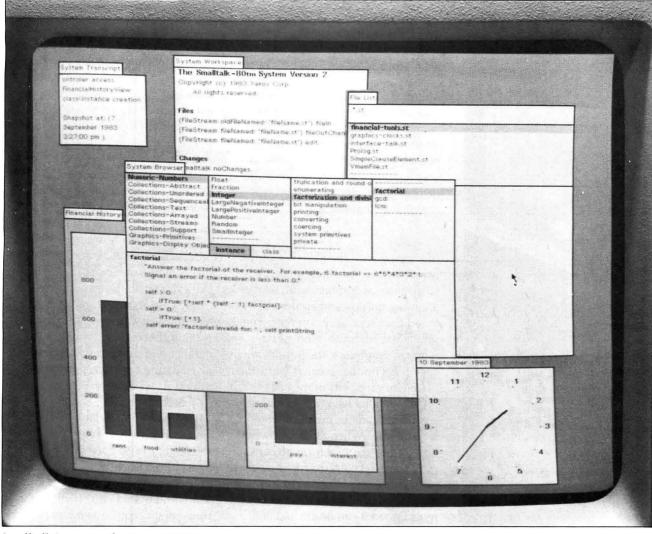
In the Smalltalk integrated environment the user moves freely between programs without losing data or functions. The use of overlapping windows enables the user to keep track of different applications on the screen and to monitor them as they simultaneously execute. You could, for example, edit a text file, save a spreadsheet, and search a data base—all at the same time and on the same screen.

Objects

Smalltalk is an object-oriented language in which discrete modules—be they programs, routines, procedures, data, or even individual statements—are independent of one another. In procedure-oriented languages such as BASIC or Pascal, the program and the data are closely connected since the program must make assumptions about the nature of the data it manipulates. But in Smalltalk the size, structure, or content of an object can be altered without affecting other objects in a system; other sections of code do not have to be rewritten to reflect the change.

Objects communicate by means of messages that inform a receiving object what tasks need to be done but not when and how to perform them. The receiving object determines whether the message will be executed or passed along to another object. A message can be a pointer that allows an object to access other parts of a program. How a message is interpreted and acted upon is also determined by the particular Smalltalk applications program that is running.

Smalltalk in use on the Xerox 1100

Multitasking and Memory
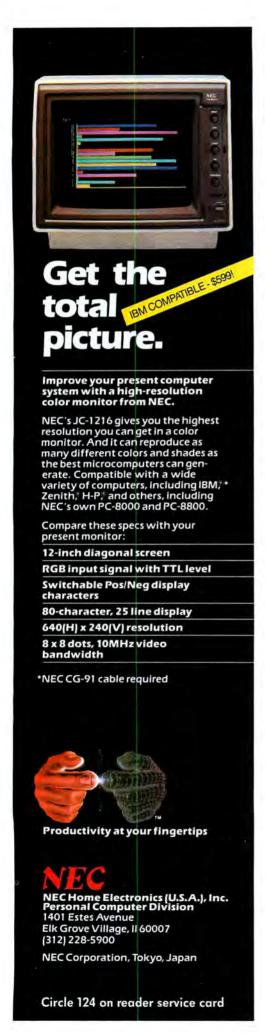
When several programs are run concurrently, there must be enough memory to support each application and the data it manipulates. Each application must also copy certain operating system data, such as its own local variables and the status of a task being executed. The memory management techniques used by Smalltalk allow large chunks of memory to be manipulated quickly when a task changes. Smalltalk can operate in an 80K environment if there is at least 300K of disk storage available for virtual memory use. Virtual memory involves moving data and applications from RAM to disk and

back again in a manner that is transparent to the user. In Smalltalk, routines, data, or entire applications are scattered throughout RAM and disk memory; pointers are used to keep track of related portions and link them together automatically. Although floppy disk technology is too sluggish to make virtual memory techniques practical, a hard disk is fast enough. Another factor that enables Smalltalk to use virtual memory efficiently is that it swaps objects (which can communicate with one another anywhere in the system) instead of common blocks to and from the disk.

Beyond Menus

Perhaps Smalltalk's most important feature is its single-mode operating environment. A mode is a set of possible interactions between the user and computer. In DOS, for example, you type DIR to list the files on a disk, while in BASIC the command is FILES. These are two different modes of operation. Usually there are many modes to contend with when you are using a personal computer, because each program has its own mode of operation. As applications programs are incorporated into one system, the number of modes—and confusion—multiplies. Users often forget what the current mode is and which commands it requires.

⬤ State of the Art

Smalltalk's single-mode environment and window and mouse support reduce and simplify menu use. Menu selections are made with the click of a mouse; with overlapping windows you can see how far you have come; previous menus (or applications) remain partly visible as new windows appear, and they can be brought to the foreground with the click of a mouse.

Graphics

In keeping with the idea of a simple user interface, Smalltalk makes extensive use of graphics since images are more quickly and easily understood than text. Any computer running Smalltalk must support bit-mapped graphics, a method in which each pixel on the screen is controlled by one or more bits in memory. Each bit is individually addressable, and each pixel can be turned on and off by software. When Smalltalk writes text to the screen, a form object supplies the pixel patterns for each character. Since text is displayed as graphics shaped to form letters, almost any font can be created and mixed with charts, graphs, digitized images, and other graphics.

This flexibility is important when windows are used. Many applications require a fair amount of user interaction, and problems multiply when more than one application runs in a multitasking environment. In earlier attempts to use windows in a text-only display, a window could only be positioned within the rigid columns defined by the computer; the size of a window was similarly limited by such boundaries. Smalltalk's use of bit-mapped graphics allows a larger number of variably sized windows to be placed anywhere on the screen.

Any applications program running under Smalltalk uses the same operating system primitives to perform screen input/output (I/O) operations. In other systems that are not inte-

grated or in which disparate programs are brought together under an operating environment umbrella, many applications may perform their own screen I/O without using the operating system. While those programs will function under such an umbrella, getting them to share data or the screen may be difficult, if not impossible.

Business Applications

Every company's requirements vary, and no software package meets every need. Some businesses need word processing, graphics, and spreadsheets, while others need electronic mail, time management, and electronic calendar programs. Current integrated software packages such as *1-2-3* and *MBA* are limited in the number and breadth of applications offered, and trying to get separate programs with different data formats to share information is difficult. Many users would like to use data from a spreadsheet to produce graphics, or they might want to insert a pie chart into a document. With the proper utility programs, data can be shared—but at a cost. Four applications might require as many as a dozen data exchange utilities. And of course, with every application and utility there is a different operating mode to master.

Smalltalk is well suited to developing integrated business applications programs because of its object-oriented design and user interface. Applications written in the Smalltalk language share similar data structures, a design feature that eliminates most conversion problems that complicate conventional, procedure-oriented systems. Furthermore, the use of graphics, the mouse, and multiple, overlapping windows all contribute to the reduction of modes within an integrated environment.
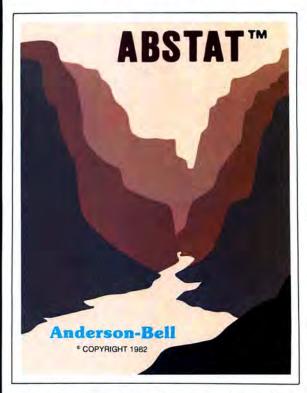
The power and ease Smalltalk offers the end user is also available to the programmer. Small, efficient programs can be written because they build on the existing Smalltalk oper-

ating system. Development and debugging are easy in an integrated, windowed environment, because the programmer can move freely between activities. For example, you could write a program module in one window, compile a second in another window, stop the compilation if there were an error, edit that code, and return to the first module without losing your place and without having to go through numerous load and save procedures.

Smalltalk Products

More and more Smalltalk-like products will appear in the marketplace as time goes by. Multitasking operating systems and applications that utilize windows are already in use and gaining in popularity. As multiple-processor systems (the PC included) are more widely used, vendors will likely develop programs that have Smalltalk features. Local area networks are another multiple-processor area in which Smalltalk's influence is likely to be felt. The PC and other personal computers will soon be running Smalltalk. The Xerox 1100 currently uses Smalltalk and LISP, and Apple has developed a Smalltalk version for the Lisa. Xerox is licensing Smalltalk to software houses developing large, custom applications.

Of course, Smalltalk is not the only production language being used, and chances are it will not conquer the computing world. But the concepts that first took root in Smalltalk are blossoming in a hundred other places. Smalltalk may not be a revolution in itself, but it may have helped the current one along. ⬤

Jeff Fox is a small systems and terminal technologies consultant for the San Francisco division of Bank of America.

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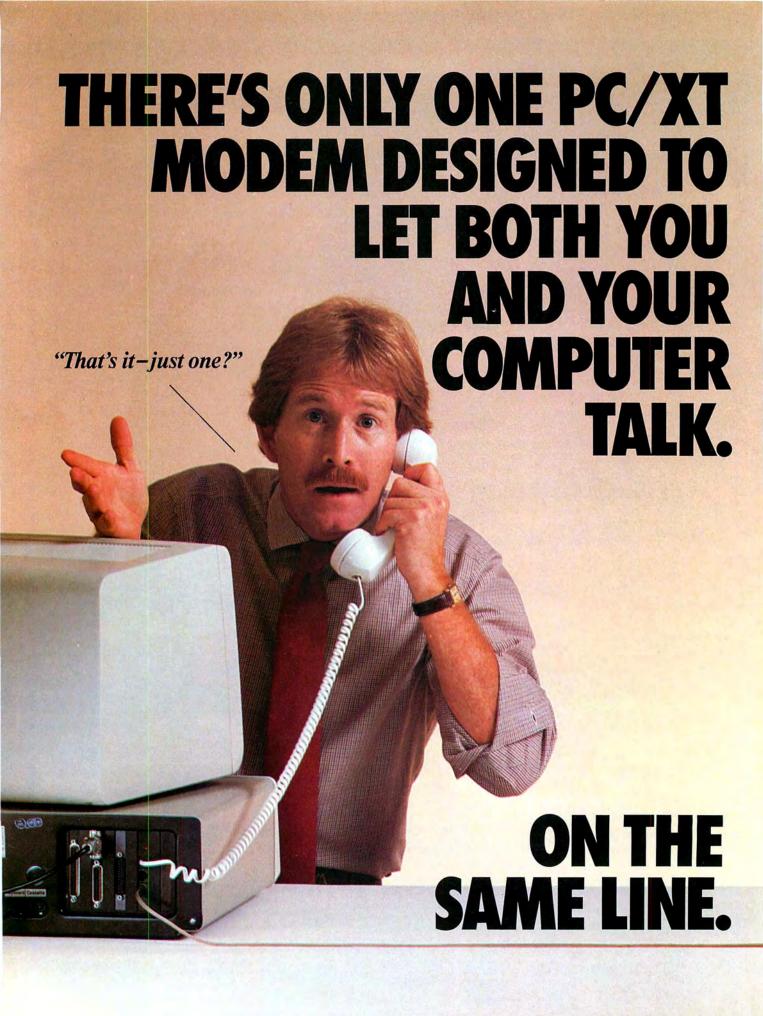
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PCjrWORLD

*The Home Computer Magazine for
People with IBM PCjrs and Compatibles*

PC Software for PCjr

IBM's Personal Communications Manager Makes PCjr Speak

What Happens If It Breaks? Warranty and Service Tips

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PCjrWORLD

Personal Communications Manager, a telephone, and a modem link PCjr to the outside world.

When PCjr Speaks

Lisa B. Stahr and Gregory Pearson

Polo is a rich man's game: the equestrian equipment needed to play is costly, the skill required to compete hard earned. As a rule, those who play polo have few financial concerns and plenty of free time.

Not long ago, communicating with computers was like playing polo. If the cost of the equipment wasn't prohibitive enough, the knowledge required to use it was. An elite group of engineers were the best—but also the only—players.

Today hundreds of thousands of people use computers to communicate, play games, and send reports. And with IBM's announcement of PCjr and the optional program *Personal Communications Manager (PCM)* even more people will dare to tread where once only scientists worked and played.

Telecommunications Basics

Using computers to communicate over a distance is called telecommunicating. The information sent, whether a brief message or a complex computer program, is called data. In the computer, data is encoded in a series of electrical on/off pulses called bits. Although it varies, 7 bits are normally used to create one alphabetical or numerical character. Ordinary telephone lines are used to carry the data from one computer to another, but because of differences in how computers and telephones communicate, information travels across the phone lines in a state different from that inside the computer. A device called a

modem is required to change the data from the computer so that phone lines can transmit it and change the data back again so that the receiving computer can digest it.

There are many formats in which data can be transmitted by a computer. The machine needs a program to tell it which format to use. These programs are called communications software. *PCM* is a communications package that tells both IBM Personal Computers, the PC and PCjr, what to do when they are telecommunicating. Without this program or one like it your PCjr would be forever mute; with it, PCjr speaks.

What You Need

PCM is a simple program that performs complex functions. The program doesn't operate alone, however; it works with PCjr. This interdependence means that PCjr must have certain features to help *PCM* do its job, including a color or monochrome monitor, one disk drive, room to store 128,000 bits (referred to as 128K memory), and a modem.

The PCjr Entry Model has 64K of user memory and two slots for program cartridges. Although options can be added, this version lacks the memory, the second disk drive, and the modem needed to use *PCM*. The Enhanced Model has a disk drive and enough memory for the *PCM* program, but like the Entry Model it needs a modem to telecommunicate. You can purchase one of the many modems such as the Hayes Smartmodem 1200 or the Bytcom 212 AD that plug into PCjr, or you can buy IBM's internal device that's sold as an option with either PCjr model. IBM's modem, called a modem board, fits inside the computer and can send and receive 300 data bits per second (bps).

The IBM modem, like the *PCM* communications package, is simple in design. It performs the basic functions that a modem should perform but without the flair and grace of more highly developed and therefore harder to use devices. Both *PCM* and the internal modem board were designed for novices and serve those people well.

Communications Made Easy

When the people at IBM created PCjr for novices, they recognized the need for a simple communications program. The software has to tell people what to do just as clearly as it instructs the machine. Microcom of Norwood, Massachusetts, is the company that IBM contracted to create such a package. The result is *PCM*.

PCM uses a series of hierarchical menus, which are lists of program operation choices that guide you through the telecommunications process. Through

PCjr can be connected to countless information services.

one series of menus, for example, *PCM* allows you to choose the format in which you want the computer to send data. This process is called setting the communications parameters and is accomplished by selecting the Reconfigure option from the program's main menu (see Figure 1). Once inside this branch of the menu tree, you can choose how many bits are to be used to create a character, how fast the information is to be transmitted, and whether the sending and receiving computers should check for transmis-

sion errors. If you don't want to change the settings, the computer uses the default parameters that are preset by Microcom and IBM.

PCM's simple menus are just one example of how the program makes telecommunicating easy; several other features eliminate confusion as well. If you enter a menu other than the one desired, for instance, a prompt at the bottom of every screen reminds you that pressing the <Esc> key returns you to the preceding menu. This option guarantees an exit no matter where you are.

To ensure that you know which menu you're in, the name of each selected menu is listed at the top of every *PCM* screen. If you are creating a mailbox, for example, the screen says:

ELECTRONIC MAIL
ADDRESS BOOK MAINTENANCE
MAILBOX MAINTENANCE

By looking at these three menu names you can see that you're in the Electronic Mail menu, under the Address Book Maintenance section, doing Mailbox Maintenance.

What to Do with PCM

Of the many menus integrated into *PCM*'s operation, the first is the most important. All the program's capabilities are buried beneath the five options listed on the main menu (see Figure 1).

Exit is self-explanatory; it lets you leave the program. Reconfigure, as previously mentioned, allows

Personal computer users who connect their machines with mainframes can vastly increase their computing power.

you to change the communications parameters. Edit File is the choice to make to write text. The first two options, Enter Terminal Emulator and Enter Electronic Mail, are the most important features that *PCM* offers.

Terminal Emulator

When *PCM* is in the Terminal Emulator mode, it can communicate with the large computers, called mainframes, that are used to run various information services. In computer language a terminal is similar to a personal computer except that it lacks disk drives. Instead of using programs, the terminal is dependent on a mainframe to "think."


```
        Personal Communications Manager

           1. Enter Terminal Emulator
           2. Enter Electronic Mail
           3. Edit File
           4. Reconfigure
           5. Exit Program

     Make selection (1–5): [_]
```

Figure 1: Main menu

When a computer such as PCjr connects to the mainframe at an information service, the personal computer must fool the larger system into thinking that the small-fry is just a terminal. The communications software that runs the smaller computer is responsible for creating this illusion. Hence, you use the Terminal Emulator portion of *PCM* to connect to such a service.

PCjr can be connected to countless information services. The most popular are information utilities such as The Source, CompuServe, and the Dow Jones News/Retrieval service; information retrieval services such as Dialog, Orbit, and BRS; and free bulletin boards run by computer enthusiasts.

Information Utilities

Information utilities were created on the premise that personal computer users who connect their machines with mainframes can vastly increase their computing power. These services offer a seemingly endless array of computing options. The Source, for example, the oldest system, offers more than 1200 features and programs. The Source's closest competitor is CompuServe; it also has numerous programs and features for sale.

The variety of features available on these services can be divided into five major categories:

News and sports. News, weather, and sports from major wire services, newspapers, and magazines.

Entertainment and consumer services. Games, special interest tests, travel arrangements, electronic buying and banking, and reviews of theater, books, movies, restaurants, and hotels.

Business. Past and present financial information,

corporate profiles, electronic banking, programs for financial analysis and planning, and information on money markets, stocks, bonds, and mutual funds.

Home information. Gardening tips, advice columns, encyclopedias, and an assortment of electronic publications covering topics such as family health, home decorating, automobile maintenance, and education.

Communications. Electronic mail, software exchange, word processing, and bulletin boards.

The features listed above are just a sampling of what's available on information utilities. The Source and CompuServe are the two largest services, but not the only ones. Delphi, for example, operating out of Cambridge, Massachusetts, is the most recent competitor. For financial news and information, though, no service is more complete than the Dow Jones News/Retrieval service. A financial data base turned information utility, Dow Jones is similar to the other services in that it offers news and general information, an encyclopedia, and consumer reports. But its strength is clearly in financial matters. Any stockbroker or business person who uses a personal computer should become familiar with Dow Jones News/Retrieval.

Dialing for Data Bases

Of the many programs and features offered on information utilities, only a few have enough commercial draw to compete on their own. A service that offers only advice for the lovelorn might not attract enough paying customers to keep it on line, but a service that retrieves information on just about any topic will.

Dialog, Orbit, and BRS are such services. By searching their numerous data bases, they can produce bibliographic and full-text references on just about any topic. Whether you want to search for a specific patent or trademark, learn how to heat an underground dwelling, or find a recipe for a certain fruit, you can find what you are looking for in the data bases of these information retrieval services.

Each service has a full line of data bases to search. Dialog, for example, has over 175 data bases available with a total of 80 million entries; Orbit has 70 data bases with more than 55 million entries. The information that goes into these data bases is gathered from special information indexing and abstracting services that scour books, newspapers, magazines, annual reports, conference papers, maps, and government legislation (just to name a few sources) for the information. All the services offer special

---

Where to Sign Up

Ready to tap into some information? The following list will help you get started. To find out about bulletin board services read BBS Watch *in this issue of* PC World.

BRS
1200 Route 7
Latham, NY 12110
800/833-4707

CompuServe
5000 Arlington Center Blvd.
P.O. Box 20212
Columbus, OH 43220
800/848-8199

Delphi General Videotex Corp.
3 Blackstone St.
Cambridge, MA 02139
800/544-4005

Dialog Information Retrieval Service
3460 Hill View Ave.
Palo Alto, CA 94303
800/227-5510

Dow Jones News/Retrieval
P.O. Box 300
Princeton, NJ 08540
800/222-0081

IBM
Systems Products Division
P.O. Box 1328
Boca Raton, FL 33432
800/447-4700, 800/322-4400 Illinois,
    800/447-0890 Alaska, Hawaii

Orbit
SDC Information Services
2500 Colorado Ave.
Santa Monica, CA 90406
800/421-7229, 800/352-6689 California

The Source
Source Telecomputing
1616 Anderson Rd.
McLean, VA 22102
800/336-3330

courses to teach subscribers how to search their system effectively, and with so much information at your fingertips, it's wise to make the investment in the training.

Bulletin Board Bonanza

The applications for the information retrieval services just mentioned are limited almost entirely to business; few home users are willing to pay the high price of this unlimited knowledge. Information utilities such as The Source and CompuServe cater to both home and office subscribers, but these services can be costly. PCjr users may find that calling electronic bulletin boards satisfies the desire to telecommunicate without requiring a significant financial investment.

Hundreds of computer bulletin board systems (BBSs) are in operation. The only price a person pays to access these BBSs is that of a local or long-distance telephone call.

BBSs offer people a chance to trade ideas, programs, announcements, and advice on any topic they care to discuss. Some are general-interest bulletin boards, and some are devoted to specific topics such as certain computers and programming languages, satire and humor, games, and medicine. PCjr will undoubtedly have its own set of bulletin boards as well.

Bulletin boards are run by computer enthusiasts who enjoy witnessing and sharing the power of their machines. All that's required to start a BBS is a computer equipped to communicate with other computers, 48K of user memory, one disk drive, a modem that's capable of automatically answering the telephone, a computer bulletin board system software package, and a dedicated person, known as the system operator, to maintain the service. Of all these ingredients, the system operator is the hardest to find.

Logging On

Getting onto communications services or bulletin boards usually requires signing up. Whether this initial enrollment is done via the mail or the computer, most companies and system operators want to know who's on line. Once the sign-up is complete, you are given a special password or number sequence that, when entered, logs you onto the system. Logging onto a service using *PCM* is as easy as pressing one key.

By referring to the *PCM* documentation, you can program any of PCjr's function keys to recreate a logon sequence automatically when pressed. You can dial the appropriate telephone number, enter the cor-

Figure 2: Unattended electronic mail screen
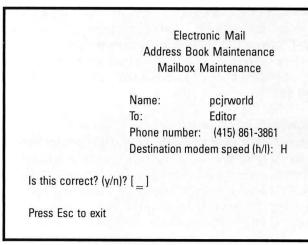
Figure 3: Add mailbox screen

rect service codes, and sign on with the identification sequence by pressing a single key. These sequences can be saved as a special file on the program disk so each function key can have unlimited commands associated with it. A special series of prompts asks you whether to save each sequence for future use.

Electronic Mail

Using *PCM* to link up to a special information service or bulletin board requires the Terminal Emulator mode of operation. The other important mode, Electronic Mail, has many features of its own (see Figure 2).

PCM can electronically mail any kind of file that PCjr is capable of storing on disk, including printed text files, text data files (those with text and numbers), and special binary files. Printed text files can be created with *PCM* by choosing the Edit File option from the main menu. This option works with your word processor or text editor, enabling you to write messages, letters, and even long reports for electronic mailing. Once a written message is created or a file loaded, you can send it to three possible receivers: a mailbox, a list, or a telephone number.

Address Books and Mailboxes

Sending electronic mail is like sending standard mail: before the message can go anywhere it has to be addressed. Whenever you address outgoing mail, the computer automatically enters the information in an address book (see Figure 3). Each entry in this address book is called a mailbox.

If, for example, Mr. Sublett in Washington wants to send a report to Ms. Barker in Ohio, he is asked for the appropriate header information: the name of the person to receive the mail, the date and time to send the report, the mailbox name, the name of the file to be sent, the subject of the mail, and the mail class (text file, text data file, or binary file).

If Mr. Sublett lists the time the mail is to be sent as midnight that night, PCjr will hold the mail until that time. By relying on its internal clock, the computer can send mail any time day or night without a person there to help it. Using this feature you can take advantage of lower telephone rates.

Once the specified mailing time is reached, the computer automatically calls the telephone number listed for Ms. Barker and relays the report to her computer. If Ms. Barker has never been listed in Mr. Sublett's address book and consequently has no mailbox listing, he can either create a mailbox listing for her or send the report directly to her telephone number.

A *PCM* address book can contain up to 40 mailboxes. Each time a new mailbox is created, the program displays on screen how many mailboxes are still available (see Figure 4). If all 40 mailboxes are filled, the program creates a new address book. By following one of the two methods listed in the program documentation, you can create a new address book before the original book is filled.

If you want to send the same file to several associates around the country, you can make a distribution list within the address book. Each address book can contain up to ten lists, each with its own unique

```
            Electronic Mail
       Address Book Maintenance
          Mailbox Maintenance

       hartford
       nashua
       pcjrworld
       provdnce
       waterbry
       worcest

       Mailboxes available: 34

  Press Ins to add/change mailbox
  Press Del to delete mailbox
  Press Esc to exit
```

Figure 4: Mailbox maintenance screen

name and description. By entering a list name for the mailing, you tell the program to address the mail item automatically to every mailbox on the list.

In addition to sending electronic mail, *PCM* users can also review logs of mail scheduled to be sent, print those logs, and try again to send mail that previously could not be sent or received. *PCM* can tell even before sending a file if it's too long for the receiving computer's memory. In this case, the program refuses to send the file and lists an error message on the transmitter's screen.

Features like these make IBM's PCjr and *Personal Communications Manager* useful telecommunications tools. What's more, *PCM*'s ability to run on the PC exactly as it runs on PCjr creates endless opportunities for home, office, and home-to-office connections. With *PCM*, IBM has shown that it can make a product right the first time.

Lisa B. Stahr is a freelance writer who is currently working on a book about communications for PC World Books. Greg Pearson is chief network architect for Microcom of Norwood, Massachusetts. He has worked in protocol design since 1978 and is the principal designer of the Microcom Networking Protocol.

Megabytes

Katie Seger

Megabytes *reports about the people, products, and developments in the computer world surrounding PCjr. We will keep you up to date on the events and trends as well as the occasional speculations that occur in this rapidly expanding world.*

What's in a Name?

With all the preannouncement information leaks, hoopla, and hype that surrounded PCjr, it's amazing that the real name of the computer took as long as it did to surface. The machine was referred to as the "Peanut" by industry sources until only weeks before IBM made the announcement. An IBM spokesperson acknowledged that the computer had been dubbed "Peanut" in the early planning stages, but he said that company decision makers believed that members of the PC family should have the same initials, so the new computer was christened PCjr.
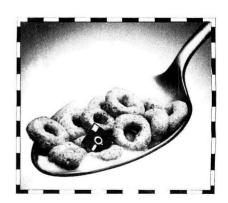
One of the reports that accompanied the Peanut moniker was that Charlie Brown's creator, Charles Schulz, would do the illustrations for the computer's advertising campaign. An IBM spokesperson said that the company has not signed an agreement with the master cartoonist.

Although Schulz isn't working with IBM, other artists and cartoonists have begun to discover the wealth of comic possibilities associated with computers. Before his "Doonesbury" sabbatical, Gary Trudeau's daily strip featured Michael and the Rev. Scott Sloan trying to buy a word processor from a "user-friendly, consumer-compatible sales rep." MacNelly's eagle-eyed editor in "Shoe" constantly wages battle with his video display terminal—which loses stories and scrambles copy—in his tree-house newsroom. And much to the chagrin of his ever-weary father and various FBI agents, "Bloom County's" young hacker, Oliver, continues to access computers at NASA, the National Strategic Defense Center, and the *New York Times.*

Other well-known artists are making extra money by working for hardware and software manufacturers directly. Hank Ketcham's "Dennis the Menace" is skipping around with Digital Research's Dr. Logo—Mr. Wilson won't believe all the trouble Dennis can cause with a computer. And Jean-Michel Folon, international artist and sometime *New Yorker, Atlantic,* and *Time* illustrator, is conferring with marketing and advertising directors at Apple. If the late Al Capp were still doodling, Li'l Abner would probably be carrying a COMPAQ to the Sadie Hawkins dance.

Born Too Soon

Remember eating boxes of Alpha-Bits, Honeycomb, and Raisin Bran to save enough box tops for a se-

cret decoder ring that would stump any and all enemies of Freedom and the American Way? Nowadays, cereal consumption can earn you a computer.

General Foods' Post Cereals and Atari's Catch On to Computers program are offering computers and software in exchange for proof-of-purchase seals from the entire line of Post Cereals. The program, which runs through June 30, allows youth groups, such as Boy and Girl Scout troops and 4-H clubs, and public, private, and parochial schools to redeem proof of purchase seals for equipment such as the Atari 800XL and 1450XL computers, disk drives, printers, and educational software.

Post Cereals hopes that the computer giveaway will be as successful as its "Fun 'n Fitness" program, which has placed 250,000 pieces of athletic equipment in 45,000 schools since 1980. Teachers, administrators, and group leaders, call 800/435-7678 (800/892-1869 in Illinois) or write to Catch On to Computers, P.O. Box 3445, Kankakee, IL 60902 for more information about the Post redemption program.

Hundreds of educational software packages have been written for the PC since it was introduced. Since the PCjr has a lower price tag and is PC software compatible, it should be a more popular school computer than its PC big brother. Maybe a Boca Raton-Battle Creek alliance is in order.

Play It Again, Sam
Baldwin Piano & Organ Co. has introduced a new computerized piano. The PianoPro is built with three microprocessors instead of traditional hammers and strings. PianoPro weighs half as much as a regular piano and requires no tuning. The piano can be set for different modes of play, including one that allows musicians to play chords with only one finger. A Baldwin spokesperson stressed

that the PianoPro produces acoustic pianolike sounds very different from the electric pianos that have been on the market for years. PianoPro will sell for approximately $3000.

Politics to Micro Chips
What do you do when you step down from the governor's office and you're too young to take up gardening as a full-time hobby? Go into computers, of course. At least that's the route former California Governor Jerry Brown took.

After an unsuccessful bid for the U.S. Senate in 1982, Brown formed the National Commission on Industrial Innovation (NCII), a nonprofit research/consulting/lobbying group, which is mainly supported by computer and software manufacturers (Advanced Micro Devices, National Semiconductor Corporation, and Convergent Technologies are the group's largest contributors). Brown is chairman of the board of the Los Angeles-based group.

As NCII chairman, Brown testified before a congressional subcommittee and urged the passage of legislation granting federal income tax credit for computer manufacturers who donate computers to schools. Any proposed federal legislation would be pat-

terned after California law A.B. 3194, which allows a tax credit of 25 percent of market value for any computer and peripherals donated to public or private schools.

Modem Your Mail

MCI, the telecommunications corporation, now offers a nationwide electronic mail service, MCI Mail, in addition to its long-distance phone service. MCI Mail can be sent with any personal computer to anyone in the United States, even if the addressee doesn't have a computer. So don't use a stamp when you can use PCjr.

A subscriber to MCI Mail connects with the service through a local phone call in 15 major cities or through a toll-free number for the rest of the continental United States. The subscriber writes a letter (no minimum number of letters or messages is required) on a personal computer and then, using a modem and communications software such as *PC-Talk III* from Freeware, *Personal Communications Manager* from IBM, or *Hostcomm* from Janadon, sends the letter over the telephone. MCI Mail offers four delivery options (listed here in order of delivery speed):

$1 "instant" service sends letters from one computer user to another.

$25 "four-hour" service provides paper-copy delivery by courier within the metropolitan areas of 15 cities regardless of the message's point of origin.

$6 "overnight" service provides paper-copy delivery in 20,000 continental United States cities.

$2 "MCI Letter" transmits the copy electronically to the MCI postal center nearest its destination, then delivers paper copy to the U.S. Postal Service for quick local delivery.

Unlike MCI's telephone service customers, who pay a monthly fee, MCI Mail subscribers sign up and give billing instructions by phone and are charged on a per-message basis. For more information call 800/624-6245.

Stocking Up at Home

C. D. Anderson, a small discount broker in San Francisco, is letting customers buy and sell stock via modems and personal computers like PCjr. Investors pay a one-time brokerage fee of $300 and pay telephone charges ranging from 10 to 40 cents per minute each time they call the broker with a stock order.
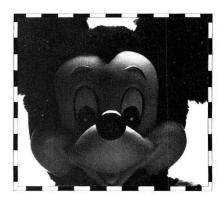
Anderson said that most of his firm's 17,000 clients live in the San Francisco Bay Area, but several hundred people across the nation take advantage of the at-home stock ordering service by calling the brokerage firm via local Telenet numbers.

Anderson said that he expects competition. Although a spokesperson would not confirm or deny the report, Wall Street watchers believe that another discount broker, Charles Schwab & Co., will establish a similiar home service this year. Two full-service brokerages, E. F. Hutton

and Dean Witter Reynolds, offer securities research and account information via home computer to their clients, but at present neither investment firm has plans to offer at-home buying and selling services.
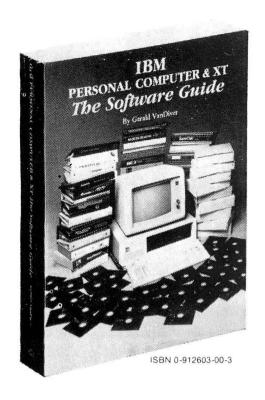
Disney on PC

While PCjr owners shouldn't expect to have Mickey Mouse and Donald Duck running across their computer screens for a while, plans for converting Walt Disney Productions software to work with the PC and PCjr are being made. The creative people who gave us *Snow White and the Seven Dwarfs,* "The Mouseketeers," and the EPCOT Center are introducing approximately 50 educational programs in 1984.

Favorite Disney characters like the Cheshire Cat and Peter Pan have been enlisted to help children in their science, social studies, math, and language classes. If the programs are anything like previous Disney products, the software should be worth at least an E coupon.

Megabytes welcomes contributions of interesting items. Send them to Megabytes, PCjr World, 555 De Haro St., San Francisco, CA 94107. Please include your name, address, and phone number.

Working at home on PCjr requires a new breed of software. The way new programs are designed will determine if users and software developers strike pay dirt.

Working the Home Claim

Adrian Mello

A computer's usefulness stands on two pillars of strength: the quality of the machine itself and the abundance of good software that runs on it. The most successful computers are those that have a large software base. Consumers and software designers are anxious to find out what products will be available for PCjr to determine what roles PCjr will take on.

In a world where most computer manufacturers are eager to provide test machines or at least hardware specifications to encourage software development, IBM chose to keep PCjr under wraps. As a result, PCjr's introduction created a situation that one expects to see only in a TV western: word is out that someone has discovered gold, and all those ready to strike pay dirt are waiting around in the local saloon for a hint as to the exact whereabouts of the claim.

Despite the relief that IBM had finally announced their much anticipated home computer, few computer product manufacturers had PCjrs during the months immediately following the machine's introduction. Since they were not able to study the new computer, manufacturers had to go back to the waiting room while they wondered what kind of products PCjr would warrant bringing into the world.

Working around the Hardware

Software publishers are concerned about designing programs to match PCjr's hardware features. Developers who are used to creating programs to work with the IBM PC's two disk drives, 83-key keyboard, and potentially large memory hope to avoid costly adaptations for PCjr. Professional software created to take advantage of the hardware bounty of the IBM PC must, to run on PCjr, work within a memory size of 128K, with one disk drive as op-

posed to the two commonly expected in the business world, and with a 62-key keyboard that doesn't seem to be designed for professional word processing.

Program designers at Lotus Development Corporation, publisher of the best-selling spreadsheet *1-2-3*, have no plans to adapt the program to run on PCjr. The program requires a hefty 192K of memory, which exceeds PCjr's 128K limit.

Partially as a result of the difficulties of adapting *1-2-3* to the PCjr hardware, and because they are not convinced that PCjr will take on a work-at-home role, Lotus employees have what they call a "wait and see" attitude toward PCjr. In the meantime they expect people who want a computer for work at home to use machines like the PC-compatible COMPAQ Portable Computer.

Whether PCjr takes on a work-at-home role depends on how software publishers respond to the technical and financial questions of new product development. Many people who use IBM PCs at the office will want to use PCjr at home. Most people will want to use software that they have grown to trust in the office, and PCjr users will also want to buy pro-

grams that enable them to take their data disks home from the office. Employers might even pay for workers' home use of programs to encourage increased productivity.

The Price of Porting
Development costs play an important role in a company's decision to revise products. More difficult adaptations require more money and must be prioritized against other scheduled projects. Some companies may have to choose among products because they don't have enough money or people to develop every product they want. Programs that are easy to adapt keep costs down and are more likely to get the go-ahead than those that require extensive modification.

The cost of adaptation becomes especially important in the case of PCjr because home computer owners are likely to have less money to spend on programs than businesses have. The result may be that software publishers won't earn as much money for each PCjr program as they earn for a comparable PC program. Peachtree Soft-

ware, IUS, SoftWord Systems, BPI, and other manufacturers intend to provide home use programs in the $100 to $200 range. Their business programs for the PC run from $150 to $750.

Popularity is another consideration in choosing products to revise for PCjr. Manufacturers prefer programs that have already demonstrated their popularity and show promise for the home mar-

Most people will want to use software that they have grown to trust in the office.

ket. Microsoft, the company that produced the MS-DOS operating system running on both IBM microcomputers, plans to support PCjr in its roles as an educational, entertainment, and work-at-home machine. Russ Werner, Microsoft's product manager for PCjr, says he doesn't know yet if the company's *Flight Simulator* will need modification to run on PCjr. He says that the program is a good choice for the home market because it is popular with PC owners. In the area of professional

software, Microsoft's spreadsheet *Multiplan* already runs on PCjr, and the company will probably convert their word processing program *Microsoft Word* to conform to PCjr's hardware requirements.

Program Pruning and Feature Grafting

Related to decisions about cost are decisions developers must make about which features to include in PCjr programs. Software developers may choose to eliminate features of IBM PC programs to create new scaled-down versions that work within the bounds of PCjr's 128K memory and single disk drive. Another choice is to optimize a program so that it takes advantage of PCjr's unique features such as the programmable, remote-control keyboard. The penalty of such a strategy, however, is that the program will operate on only PCjr.

Peachtree Software is one company that will prune back existing programs to develop new products for PCjr. Company planners intend to revise their well-known *Series 8* accounting programs, and since word processing software accounts for more than 70 percent of Peachtree sales, it is no surprise that consumers will be able to purchase a scaled-down version of *Peachtext 5000.* IBM sells the present *Peachtext* version under the IBM name and claims that it operates on PCjr. IBM does not recommend *Peachtext* for use with PCjr, however, because when it runs on the home computer, both the program and data files must share the same disk.

Along with the adaptations of existing products Peachtree will release an entirely new series of accounting software that is incompatible with the *Series 8* programs but can be used on both the PC and PCjr. The first three programs in the new series will be general ledger, accounts payable,

and accounts receivable applications. The programs will soon be followed by inventory, sales order processing, and payroll packages.

Another major software publisher that will introduce a remodeled product with limited features is Information Unlimited Software (IUS). *EasyWriter I,* IUS's PCjr word processor, is based on *EasyWriter II,* not to be confused with earlier products, *EasyWriter 1.0* and *1.10,* which are no longer distributed. IBM is the sole distributor of yet another IUS-designed *EasyWriter* version, *1.15.* *EasyWriter 1.15* runs on PCjr but is different from *EasyWriter I* and *II.* Mail-merge and spelling-checker programs, formerly sold as separate products by IUS, are now part of the word processing package.

One company, Perfect Software, claims to have expected PCjr's hardware limitations. The company's programs were designed so that they could be converted eas-

> *Software developers may choose to eliminate features of IBM PC programs to create scaled-down versions that work on PCjr.*

ily once the home computer was announced. Perfect Software will offer full-featured versions of *Perfect Calc, Perfect Filer, Perfect Writer,* and *Perfect Speller* for PCjr. Robert Glidden, cochairman of the company, states that "in anticipation of IBM's PCjr, we purposely limited our program size to 128K, minimized system calls, and maximized code portability. With these features our programs can be quickly revised to run on new versions of DOS."

Software Publishing, producer of *pfs:FILE* and *pfs:REPORT,* feels that PCjr will become a work-at-home machine. IBM distributes both those programs for PCjr under the IBM logo. Software Publishing also plans to modify the memory requirements of *pfs:GRAPH* and *pfs:WRITE* to allow them to work on PCjr.

SoftWord Systems, creator of the *MultiMate* word processor, has decided to cut back some of the program's features and add others that address PCjr's hardware. The company is releasing a new version called *MultiMate Jr.* that contains many of the features of the PC version but does not include background printing, mailmerge features, or full header and footer capabilities.

MultiMate Jr.'s design allows the entire program to be loaded into memory at once. This design lets the program run even when the system disk is removed from the disk drive. *MultiMate Jr.* users can insert a document disk into the drive and save their documents on it without having to swap system and document disks every time they want to save a document.

While some features have been eliminated in the PCjr *MultiMate* version, one feature has been added to replace commands such as COPY, MOVE, and SEARCH and REPLACE that on the PC are activated by the function keys. *MultiMate Jr.'s* command options are displayed on screen. Users choose options by moving the cursor to a symbol of the desired command and pressing the <Enter> key. *MultiMate Jr.* has another feature called phrase memory that enables users to save and recall portions of text such as frequently used names and addresses by highlighting the text and saving it in a library. Up to nine phrases can be stored and recalled for any document.

One of the best features of Soft-Word's PCjr program is the compatibility between *MultiMate* and *MultiMate Jr.* documents. Because of this design, people who create documents on disk with *Multi-Mate* for the PC can edit the same documents with *MultiMate Jr.* on PCjr.

Applications Cartridges

Putting applications software on PCjr cartridges the way IBM did with Cartridge BASIC may be one way to make the computer's single disk drive available for file storage. One software developer taking this approach is Camilo Wilson of Lifetree Software. His PCjr version of the *Volkswriter Deluxe* word processor will soon be released on cartridge.

Whether software publishers decide to adapt programs by reducing or adding features or even providing cartridge versions, they probably won't wait long to act. Some manufacturers are confident that PCjr will be a tremendous success. Bruce Rampe, a spokesperson for Software Arts, which designed *VisiCalc* and *TK!Solver*, said that he doesn't know yet if *TK!Solver* runs on PCjr. If Software Arts has to change *TK!Solver* to fit PCjr, company decision makers will have to weigh the costs of development against potential sales. After addressing the question of *TK!Solver*'s compatibility with PCjr, Rampe brings up a point that must be weighing on the minds of many manufacturers. "Considering the publicity PCjr is getting, the machine will probably produce a market that software publishers can't ignore."

Adrian Mello is an Assistant Editor for PC World Special Editions.

A 12-month warranty and disposable parts make PCjr an industry trendsetter.

What Happens If It Breaks?

Katie Seger

Many new computer owners are afraid of breaking the computer once they get it home and out of its protective box. The feeling is an understandable but unfounded fear for new PCjr owners. By following the instructions that IBM provides on unpacking and setting up, you can have your new computer up and running in a short time.

Even if there is a problem with the computer, you are in luck. PCjr comes with a 12-month warranty. In an industry in which 90-day warranties are the norm, IBM set a laudable precedent when it opted to offer PCjr buyers nine additional months of protection from mechanical troubles. Since IBM offers only the standard 90-day warranty for its best-selling PC, the offer of a one-year warranty is a boon for PCjr customers.

The IBM warranty promises that the company will exchange any nonfunctioning PCjr component—the keyboard, system unit, motherboard, or transformer—for a new or reconditioned component. Internal IBM parts such as the Memory and Display Expansion board and disk drive fall under the same warranty.

The idea of trading bad for good computer parts is not entirely new. IBM dealers usually exchange PC and XT keyboards, monitors, and printers that are under warranty. But PCjr is a "disposable" computer—all internal and external parts will be automatically exchanged in the stores. IBM technicians will then decide if the part can be repaired and used again or must be thrown away.

It Pays to Be Careful

The IBM warranty does not cover damage caused by accident, disaster, misuse, abuse, or non-IBM modification of the product. In other words, if you accidentally drop the system unit down your front stairs, or if your 3-year-old pours honey in your disk drive, you are out of luck.

PCjr's 16 colors as displayed during diagnostics.

IBM spokespeople refused to comment on what "non-IBM modification of the product" means. However, it is likely that if a PCjr owner adds more options (such as a second disk drive) than the company announced at the computer's unveiling, IBM will not honor the warranty.

Identifying the Problem

A nice feature of PCjr is the built-in diagnostics program included in the computer's read-only memory (ROM). When you run the program, the diagnostics identify malfunctioning parts such as the keyboard and the system unit motherboard, components such as the internal modem and the Memory and Display Expansion board, and peripherals such as a thermal or parallel printer or a joystick. The diagnostics help pinpoint computer trouble so you can call your dealer with the information needed to help get PCjr fixed quickly. Besides saving time, the diagnostics can save you the trouble of bringing in all your PCjr components, parts, and peripherals if only one item needs to be fixed.

Step-by-step instructions for running the diagnostics are found in the *Guide to Operations*. These instructions include some valuable tips to keep in mind when setting up and operating your system. For example, the book advises you not to set up your computer in extremely bright light such as direct sunlight or bright fluorescent light because strong light can interfere with PCjr's infrared keyboard.

Icons Show the Way

Two PCjr test menu screens with drawings called icons appear on the PCjr monitor during the diagnostics. These picture menus are helpful, easy to understand, and make testing the system easy and quick. The first menu (see Figure 1) has pictures representing a floppy disk, a monitor, a joystick, a speaker, a keyboard, and a modem. The second test screen has one or two drawings of printers, depending on the number of printers connected to your PCjr. Each drawing has one or more "test tags"—numbers or letters that appear underneath each icon. The numbers or letters blink if the option is part of your system.
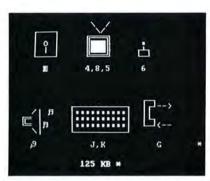
Figure 1: The first PCjr test menu

Test tags underneath components like the keyboard and the television and 40-column display that are part of every PCjr always blink. The "K" test tag, which is found under the keyboard icon, is, according to the guide, "reserved for future use." An IBM spokesperson said that the tag is reserved for a future 83-key keyboard resembling the PC's.

To run a diagnostics test from the menu, move the cursor onto a test tag, press the <Enter> key, and follow the testing instructions listed in the *Guide to Operations* and shown on the screen.

If, for example, you are having trouble saving data on your floppy disk, run the disk drive diagnostics to see if the drive is working properly. To test the disk drive move the cursor to the test tag under the icon of the floppy disk and press <Enter>. PCjr's monitor shows you a disk being inserted into the disk drive and coming out erased. These pictures remind you to use a blank disk during this test so that you don't lose any data. You are then instructed to insert a disk, type the letters MPNP, and press <Enter>. If you type the wrong letters, PCjr beeps once and waits for you to backspace and type the correct letters.

Once you press <Enter> PCjr checks the disk drive and then replaces the first test menu on the screen. An asterisk appears under the floppy disk icon if the disk drive is working properly. If it is not, you receive an error message telling you to have your computer serviced.

Major Trouble

Of course, your PCjr might be so damaged that none of the diagnostics work. If a manufacturing error in the system unit motherboard is causing a problem, for example, the PCjr power might not turn on or the screen might appear blank. If that happens, box up your PCjr and head to your dealer. For the most part, however, the diagnostics can quickly help you determine what's wrong with your computer. With PCjr's built-in diagnostics, you don't need a medical degree to play computer doctor.

Katie Seger is an Assistant Editor for PC World Special Editions.

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FOR THE IBM PCjr

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FOR THE IBM PCjr

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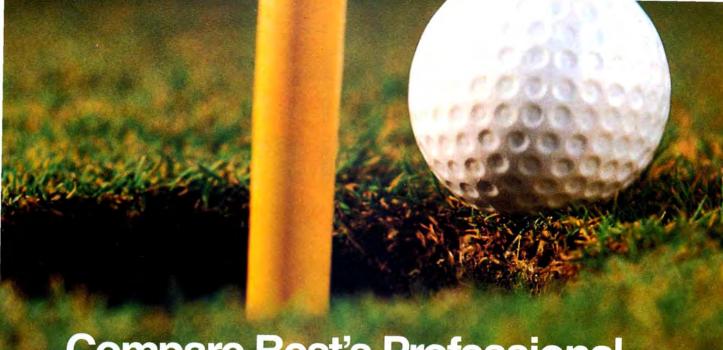
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Good Impressions

Janette Martin and Stuart R. Schwartz

Budget-minded IBM PC owners no longer have to suffer with the crude impressions of dot matrix type. Letter quality printers are dropping in price without sacrificing quality. The following is a review of four moderately priced printers (the CR-II, the Transtar 130, the TTX-1014, and the NEC 2050) that can turn IBM PC generated text into professional-quality type.
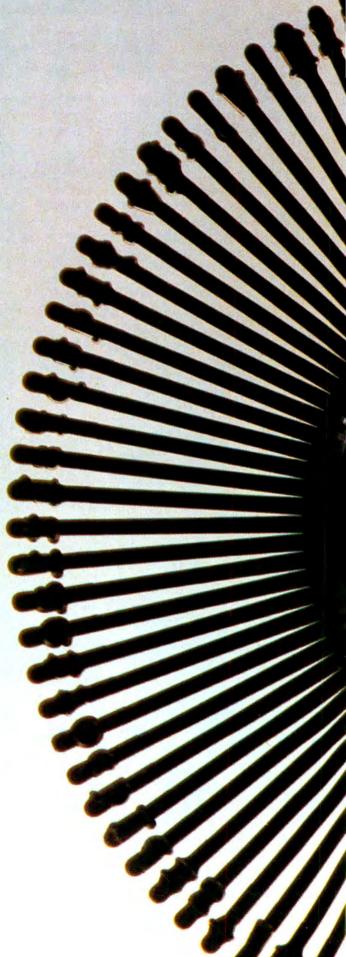
A friend who recently published his first book stood in front of a blinking, buzzing video game in a darkened arcade. He jammed buttons and whirled dials. As he obliterated a fleet of enemy invaders with a massive assault of video lasers, he lamented that personal computers and digitized data were soon going to eclipse the printed word, maybe even before his book had a chance to go paperback.
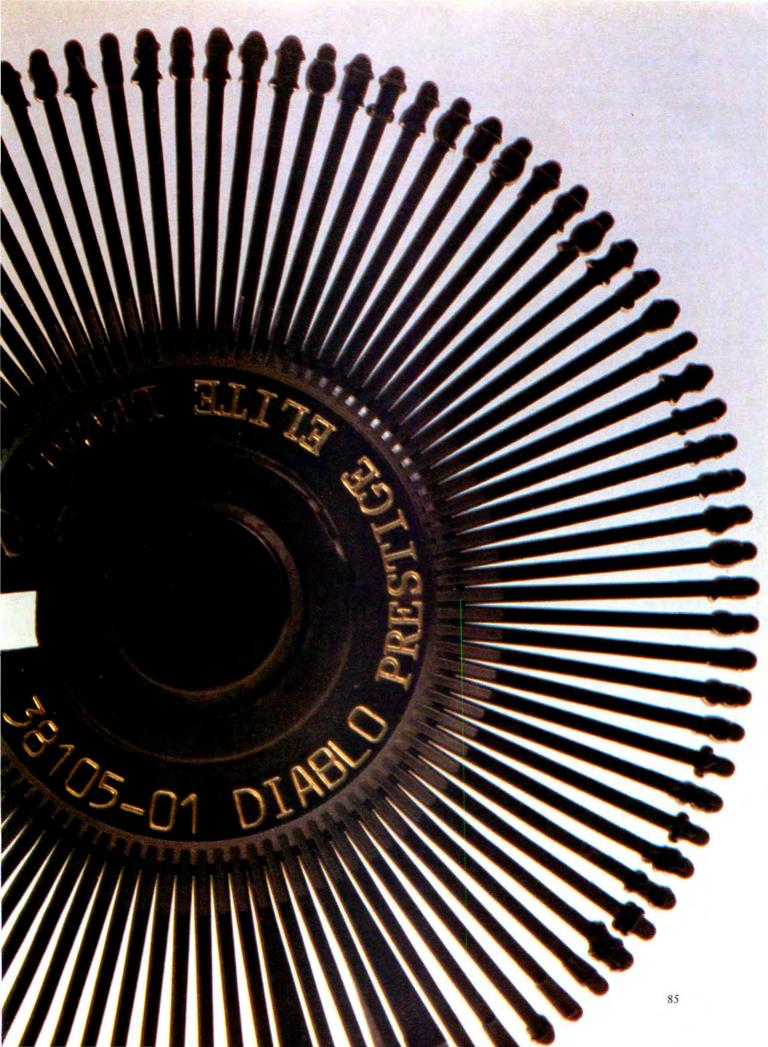
Our friend can relax—the printed word is alive and well. The "paperless office" some envision is by no means common. Moore Business Forms, one of the world's largest suppliers of computer paper, sells about 4.1 million linear miles of continuous form computer paper each year in the United States alone. That's enough paper to stretch to the moon and back eight times. Although there is a trend toward exchanging information by disk, modem, or local area network, most of us still choose the printed page.

Buying a printer can be nearly as large a financial consideration as buying a computer. A printer, having more movable parts and therefore more potential for mechanical problems, must be carefully analyzed in terms of quality, performance, price, and suitability.

The first decision to make is whether you want a fast dot matrix printer with graphics capabilities or a

Figure 1: Daisy wheel from TTX-1014 printer

slower letter quality printer with high-quality type. In the recent past, letter quality meant expensive, and if one's printer budget was measured in hundreds rather than thousands of dollars, there were few choices. Fortunately, prices have dropped, and letter quality printers with slow to fair printing speeds are now available at a fraction of the cost of their predecessors.

"Letter quality" print means that the printed text looks as if it were typed on an electric typewriter. The characters are fully formed, unlike the broken or overlapping dots that form characters produced by dot matrix printers.

The four printers reviewed here have several common characteristics. They are in the low to middle price range, operate at fairly slow speeds of 11 to 20 characters per second (cps), and produce high-quality print in a variety of type styles. These printers are designed for low-volume users—individuals who want letter quality printing for personal projects (such as resumes, letters, and manuscripts) or small businesses or professional offices where economy is as important as speed. Higher priced letter quality printers operate at 35 to 55 cps.

Anatomy of a Printer

Letter quality character printers use interchangeable print wheels, or daisy wheels, that attach to the printhead. The printhead is positioned in front of the platen where the paper is inserted before printing. Print wheels are disk shaped and are made of either plastic or metal. Spokes radiate from the print wheel's center with fully formed, embossed characters on the end of each spoke (see Figure 1). Print wheels are positioned vertically on the printhead, like the wheel of a car on its axis.

Print thimbles, shaped like miniature tilt-a-whirls, are also used on letter quality printers (see Figure 2). Thimbles are secured on the printhead with their center hubs facing down. The spokes are positioned at perpendicular angles to the hub and sit parallel to the printer platen. NEC Information Systems, developer of the print thimble, emphasizes that there is less stress on the print element and head than there is with the daisy wheel since the thimble's spokes are smaller, closer together, and of lower mass than the daisy wheel's.

Rotations of the wheel or thimble position characters one at a time in front of a hammer that strikes the spoke tip against a ribbon so that the character image is transferred to paper. As the paper is advanced, the printhead, with its attached wheel or thimble, moves left and right, performing character-by-character impression onto paper. Because the print element is pressed directly against the platen, these printers are also referred to as impact printers.

Print wheels and thimbles come in a variety of fonts and pitches. "Font" refers to a complete set of characters, including letters, numbers, punctuation marks, and special characters, usually of a particular size and design (typeface).

"Pitch" refers to the number of characters printed in a horizontal inch and the number of lines printed in a vertical inch. A horizontal pitch of 10 characters per inch (cpi) means that 85 characters can be printed on an 8½-inch-wide piece of paper, while 12 cpi allows 102 characters. A vertical pitch of 6 lines per inch (lpi) means that 66 lines can be printed on an 11-inch-long piece of paper, while 8 lpi will permit 88 lines.

To achieve a typeset look, you will need a printer that can print with proportional spacing, one that automatically adjusts the amount of print space for each character depending upon the width of the character. With proportional spacing, a narrow letter such as *I* takes up much less space than a wider letter such as *W*. With standard spacing, every character takes up the
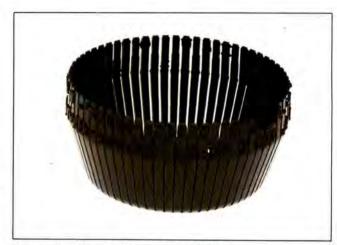
Figure 2: Thimble from NEC 2050

same amount of space on a line, regardless of the character's width.

On most letter quality printers, horizontal pitch settings can be changed by toggling a DIP switch on the printer's chassis to coordinate with the print wheel in use (see Figure 3). If a 10 cpi print wheel is used with a 12 cpi DIP switch setting, the printer will try to print at 12 cpi and the characters may touch or overlap. It is important to coordinate the print wheel with the printer's pitch setting, especially when you are using the proportional spacing option. Vertical lines per inch spacing settings can also usually be controlled by DIP switches.

DIP switches manually set on the printer chassis usually control the printer's most frequently used settings, though they do not control all the settings. Changing DIP switch settings signals different Control and Escape sequences within the printer to start or change special printing effects.
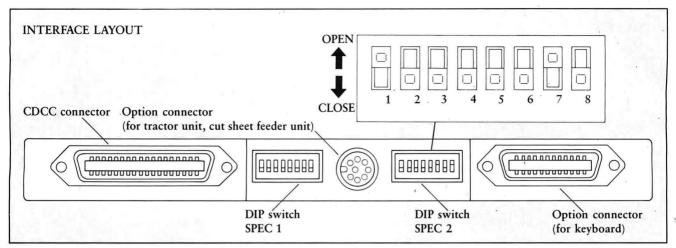
Figure 3: Rear panel layout of CR-II printer and close-up of DIP switch configurations

There are several ways to manipulate these codes in addition to setting a DIP switch manually. One way is to use a word processing program configured with a printer driver made for the printer in use. The printer driver coordinates the program's special print effects with the printer's code sequences. If a specific printer driver is not available for a printer in use, a generic driver usually comes with the program, but it may not reproduce all special effects such as boldface or superscripting.

A second way to change these codes is to patch the word processing program by adding a specific printer's codes to the generic printer driver. Instructions for patching are given in the program. Some programs, such as *WordStar* and *MultiMate*, offer a third way to achieve special print effects by enabling you to add the printer's special codes within a body of text to signal style changes during printing.

If you want to use your printer's special effects and change print parameters when using a program that lacks printer controls, you can sometimes add the printer codes into a BASIC program. For example, a short BASIC program that sets a printer's form feed at 51 lines instead of 66 can be written to work with *dBASE II*. This utility enables you to create shorter pages than the 11-inch page *dBASE II*'s Report Form command allows. Code settings made through software are temporary and will revert to the DIP switch settings once the computer or the printer is turned off.

Assessing Good Character

The four printers reviewed are the CR-II, the Transtar 130, the TTX-1014, and the NEC 2050. The two main areas of evaluation are printing characteristics and operating performance. Printing characteristics include qual- ity of print, speed, software compatibility, variety of fonts and pitches, and maximum number of characters printable on a horizontal line. The operating performance category reviews noise level during operation, forms-handling features, the presence of ribbon- and paper-out detects, and the ease of setting DIP switches and changing print wheels and ribbons.

Other areas of review include evaluating the printers' user manuals and comparing standard and available options such as forms tractors, sheet feeders, keyboards, and other add-ons. Table 1 compares the four printers and gives general technical specifications for each printer.

Print Quality

The main reason for sacrificing speed in buying a letter quality character printer is cosmetic. This type of printer should produce high-quality print—characters that are fully formed, evenly spaced, precisely aligned, and uniformly colored. Print quality can be affected by the ribbon or print wheel being used. High-quality carbon ribbon can be used only once, while a cloth ribbon rewinds indefinitely, producing increasingly lighter impressions. The cloth ribbon, however, is more economical since it can produce more images than a carbon ribbon. You might want to use a cloth ribbon for drafts and a carbon ribbon for the final product.

In this test, the four printers all produced high-quality print. The two slowest printers, the CR-II and the TTX-1014, produced the clearest, most uniformly colored, and most precisely aligned images. The Transtar 130 produced fine, light images and the NEC 2050 printed a richer, darker image.

	CR-II	Transtar 130	TTX-1014	NEC 2050
Print Characteristics				
Print quality	Excellent	Very good	Excellent	Very good
Printing speed**	11–13 cps	16 cps	12–14 cps	20 cps
Bidirectional	Yes	Yes	Yes	Yes
Software compatibility	WordStar MultiMate	WordStar	WordStar	WordStar MultiMate
Pitch (cpl)	10, 12, 15, PS*	10, 12, 15, PS*	10, 12, 15	10, 12, 15, PS*
Pitch (lpi)	6, 4, 3	1/48" Increments	8, 6, 3	8, 6
Maximum horizontal characters	165	225	173	203
Operating Performance				
Ease of use	Excellent	Very good	Fair	Very good
Noise level	65 dBA	65 dBA	65 dBA	60 dBA
Ribbon-out detect	Yes	Yes	Yes	Yes
Paper-out detect	No	No	No	No
Form feed	Yes	Yes	Yes	Yes
Line feed	Yes	Yes	Yes	Yes
Paper feed (inches per second)	2 ips	4 ips	3.5 ips	2 ips
Number multiple copies	5	5	5	5
Maximum paper width	14"	17"	14"	16"
Self-test	Yes	Yes	Yes	Yes

Table 1: Comparison of printing features

Speed Test

If two printers produce identical quality print but one prints 5 cps faster than the other, you may seriously consider paying a few hundred dollars more for the faster printer. A 5 cps difference can mean almost a 50 percent increase in speed when you are comparing an 11 cps printer to a 16 cps printer.

A printer that uses bidirectional logic seeking prints a line of text from left to right and then prints the following line of text from right to left, saving the time it would take for the carriage to return to the left margin. This attribute speeds up the printing process considerably.

The NEC 2050 and the TTX-1014 both print bidirectionally, using generic printer drivers in word processing software. The CR-II and the Transtar 130 are capable of bidirectional printing but must first be configured with specific printer drivers. In our speed test, in which a BASIC program was used to gage throughput, neither the CR-II nor the Transtar 130 printed bidirectionally. This should be considered when you compare the speeds of all the printers.

	CR-II	Transstar 130	TTX-1014	NEC 2050
Documentation				
Clarity	Excellent	Very good	Poor	Fair
Completeness	Very good	Very good	Fair	Very good
Options Available				
Forms tractor	Yes	Yes	Pin Feed (Standard)	Yes
Sheet feeder	Yes	No	Yes	No
Keyboard	Yes	No	No	No
Supplies Available				
Mylar carbon ribbons	Yes	Yes	Yes	Yes
Cloth ribbons	Yes	Yes	Yes	Yes
Print wheels	Yes	Yes	Yes	Yes
Technical Specifications				
Parallel	Centronics	Centronics	Centronics	Centronics
Serial	RS-232C	RS-232C	RS-232C	RS-232C
Weight	20 lbs.	31 lbs.	24 lbs.	26 lbs.
Standard buffer (parallel)	3K	256 bytes	No	256 bytes

**Print speed figures supplied by manufacturers
*Proportional spacing

Generally, the faster the printer, the higher the cost—you get what you pay for. In the benchmark speed test used for this review, the printers were tested at 10 cpi. At over 22 cps the NEC 2050 performed much faster than the other printers and even faster than its advertised 20 cps. The Transtar was second at 13.71 cps. That's short of the advertised 16 cps, but still respectable considering the 10 cpi setting (slower than 12 cpi) and the lack of bidirectional printing. The TTX-1014 performed well at 12.4 cps using bidirectional printing, and the CR-II printed at 11.2 cps without using the bidirectional feature.

Software Compatibility

While most letter quality character printers work well printing standard word processing text, special printing features require that the software be configured with the appropriate printer driver. Otherwise, you have to patch the software to coordinate the program with the printer

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in use. Many printers can use a different printer's driver because the internal coding of the printers is the same or similar. To find out if a printer can use another printer's driver specifications, read the manual or check with the manufacturer. The Transtar 130, for example, is a Diablo 1610 plug compatible printer and can use *WordStar*'s Diablo 1610 printer driver to produce all of *WordStar*'s special effects.

The CR-II emulates the Diablo 630 printer and therefore may be used effectively with *WordStar* and *MultiMate*, which both have printer drivers for the Diablo 630. The CR-II also works well with a Diablo 1610 or 1620 driver, but the 630 driver achieves the best results. The NEC 2050 can use the NEC 3550 driver available both in *WordStar* and *MultiMate*. The TTX-1014 user manual lists *WordStar* patches and directions for installing them. Check with the word processing software's vendor to see if the printer you want to buy is fully supported by their software or if patches can be made to accommodate your printer.

Fonts and Pitch

The availability of different fonts and pitches is important for those who require a variety of formats. For example, a 15-pitch print wheel allows you to print as many as 210 characters on 14-inch-wide paper. Although 15 pitch is perfect for spreadsheet applications, it is usually too small and closely set for printing regular text. You may choose proportional spacing to give the text a professional appearance. Of the printers reviewed, only the TTX-1014 cannot produce proportionally spaced copy.

The CR-II has more than a dozen fonts available on daisy wheels. Since the CR-II also provides DIP switch settings for numerous foreign language character sets, including German, French, Italian, and Dutch, many of the wheels for each language are available in the different fonts. For example, a Pica 10 print wheel is available in several character sets, including American English, King's English, and American Spanish.

The NEC 2050 provides thimbles in many fonts, including foreign-language character sets. The NEC's pitch defaults are set at 10 cpi and 6 lpi and can be modified through software Escape sequence codings, not DIP switches.

The Transtar 130 has six fonts, including Courier 10 and 12, Prestige Pica 10, Prestige Elite 12, Modern Proportional Spacing, and Mini Gothic (15 pitch). Most pitch settings are easily selected by DIP switches located inside the front panel of the printer, but the 15-pitch selection must be made through Escape sequences.

The TTX-1014 has several print wheel fonts, including Courier 10 and 12, Prestige Elite 10 and 12, Mini Gothic 15, Mikron 15, Cubic 10, Great Script 10, Grande Schrift 10, and Orator 10. The pitch selections on the TTX-1014 are easier to make through Escape sequences because the DIP switches are difficult to access.

Evaluate a printer on the basis of its ability to produce all the applications you plan to use. If you want to

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The Transtar uses the widest paper and prints the greatest number of characters per line.

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print a spreadsheet using a horizontal line of 156 characters, you will need a printer that will accept wide paper and print as many character positions as necessary.

The Transtar uses the widest paper (17 inches) and prints the greatest number of characters per line (225 at 15 cpi). The NEC 2050 accepts 16-inch-wide paper and prints up to 203 cpi. The TTX-1014 works with 14-inch-wide paper and prints a maximum of 187 characters at 15 cpi. The CR-II accepts paper up to 14 inches wide and prints a maximum of 165 cpi.

Operating Performance

Because letter quality character printers are generally slow, they are not usually used for long, continuous form printouts. You will spend a lot of time handling the printer, inserting paper, and setting switches. After continued use, a printer's idiosyncrasies, such as difficult DIP switch positions and grating noises, can turn your home or office into a torture chamber. Considering these details before buying a printer can eliminate many headaches.

The Transtar offers the most convenient access to DIP switches; they are located on the front inside panel of the printer. With the CR-II, you choose pitch selections on the front panel, and the DIP switches are conveniently located on the back of the printer. The NEC's switches are easy to access but cannot be manipulated if the IBM dedicated version of the printer is used. In that version, all DIP switch settings are defaults and must be changed through Escape code sequences in software.

The TTX-1014's DIP switches are quite difficult to reach. They are hidden behind removable plates at the back of the printer under the parallel interface connector.

According to the manufacturer, this positioning will soon be changed. The CR-II has a copy switch on the front panel that lets you print the contents of its 5K buffer as many times as you want. This feature facilitates printing multiple copies of a short document.

All the printers except the NEC have form-feed and linefeed switches on the front panel. The NEC has several forms-handling features on the platen knob at the right side of the platen. The knob can be manipulated to make a form feed fast or slow and forward or backward. The NEC's platen knob, with which you can manually advance the paper, is located on the right side of the printer; the paper release lever is on the left. This positioning is opposite that of most printers and can be confusing at first if you're used to others.

Changing print wheels, thimbles, and ribbons is a simple task on all four printers. The CR-II's print wheel is cased in a snap-on plastic cassette with a tab on one end for easy handling. The NEC's thimble is easy to replace after you take a few seconds to check the instructions in the user manual. The NEC's mylar carbon ribbon can be turned over and reused.

All four printers are noisy, even though they come with plastic noise buffers over the printhead and carriage. The 65 dBA ratings can be reduced somewhat by installing an acoustic cover. The NEC 2050's thimble makes a tinny, tapping sound that at first makes you suspect that something is not properly seated on the printhead.
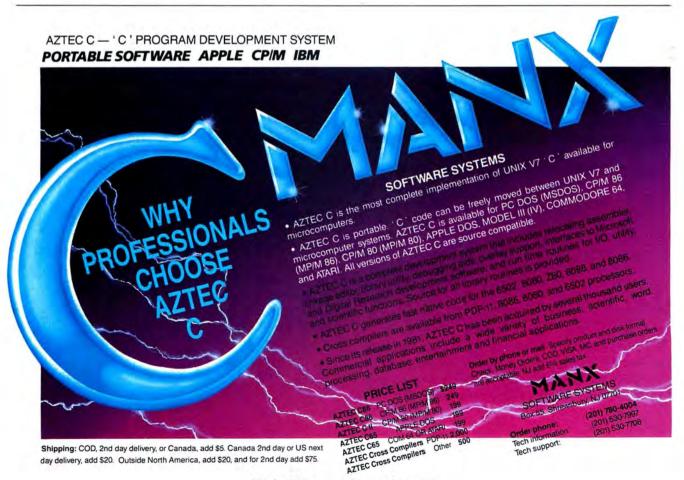
The printers tested all have ribbon-out detects, but none have paper-out detects on the standard model. The CR-II has a paper-out detect when a sheet feeder is used, and the Transtar has one when a forms tractor is used. The paper-out detect is handy; if the page to be printed is longer than the paper in the platen, the printer signals you and stops when it detects the end of the paper. Thus, you can change paper and continue without damaging the platen by printing on it.

A paper guide is good for keeping the paper from slipping and changing your margins. The CR-II and the Transtar both have this feature, but the paper guide on the TTX-1014 slides so easily that it moves at the slightest contact with paper. The NEC has no paper guide.

Manuals

A printer's manual not only provides instructions for setting up the printer and getting it to run, but it is indispensable for setting Escape sequences, trouble shooting, and coordinating DIP switch settings.

≜ Review

The CR-II's manual is the best of the four; it has clear drawings, sharp photographs, and understandable text. The Transtar's manual is fairly clear and includes an index, an appendix, and excellent line drawings. NEC has adapted the format used for IBM PC documentation. Although the line drawings are good and the manual includes a glossary of terms and an in-depth section on Control and Escape codes, some of the instructions are unclear and misleading. The TTX-1014 manual is poorly organized and includes few illustrations.

Options and Add-ons

Several separately sold options and add-ons are available for these printers. If you are printing manuscripts or letters, you may want a sheet feeder to cut down printing time by eliminating the need to feed single sheets manually into the printer. Also, a forms tractor can be a desirable option since it enables you to print rough drafts without feeding individual sheets.

You can buy the NEC with a wide variety of options, including a unidirectional or bidirectional forms tractor, a sheet feeder, and an envelope feeder. The CR-II offers a tractor or sheet feeder option. In addition, a keyboard version of the CR-II can be purchased so that the printer can function as an off-line typewriter.

> Evaluate a printer on the basis of its ability to produce all the applications you plan to use.

Other CR-II options include correction tape (handy to use with the keyboard version) and a red ribbon. The Transtar also offers a forms tractor or a sheet feeder option. Teletex has thoughtfully made the TTX-1014 available with a standard pin feed mechanism that lets the printer use continuous form paper without needing a tractor. You can also buy a sheet feeder for the TTX-1014.

Recommendations

We recommend the CR-II for personal or limited business use. Although it doesn't break any speed records, it offers high-quality print and lots of options at a very reasonable cost. For offices that do more printing on a daily basis, we recommend the NEC. It produces high-quality print at top speeds for a printer in this price range and also has many useful options.

In essence, buy what you need. Judgments on print quality and printer handling are subjective, and certain features are essential to some while useless to others. A good printer, carefully selected, should make the job of getting text from computer to paper painless. The quality and affordability of these letter quality printers should help assure our skeptical friend in the video arcade that the printed word will continue to be a viable medium of communication. ≜

Janette Martin is a freelance writer and trainer in word processing for the IBM PC who also owns an information processing service. Contributing Editor Stuart R. Schwartz is a clinical professor of psychiatry at the University of California School of Medicine in San Francisco and president of Senior Software, Inc.

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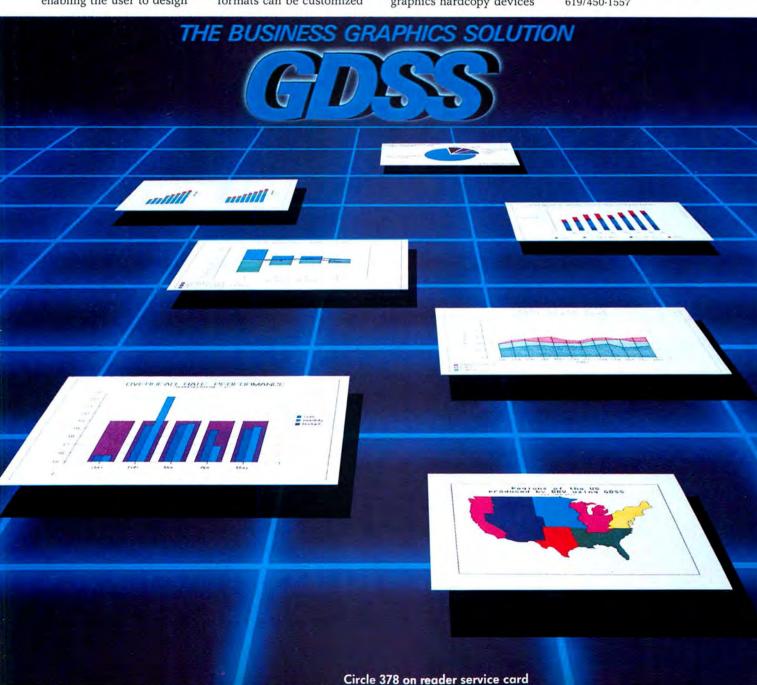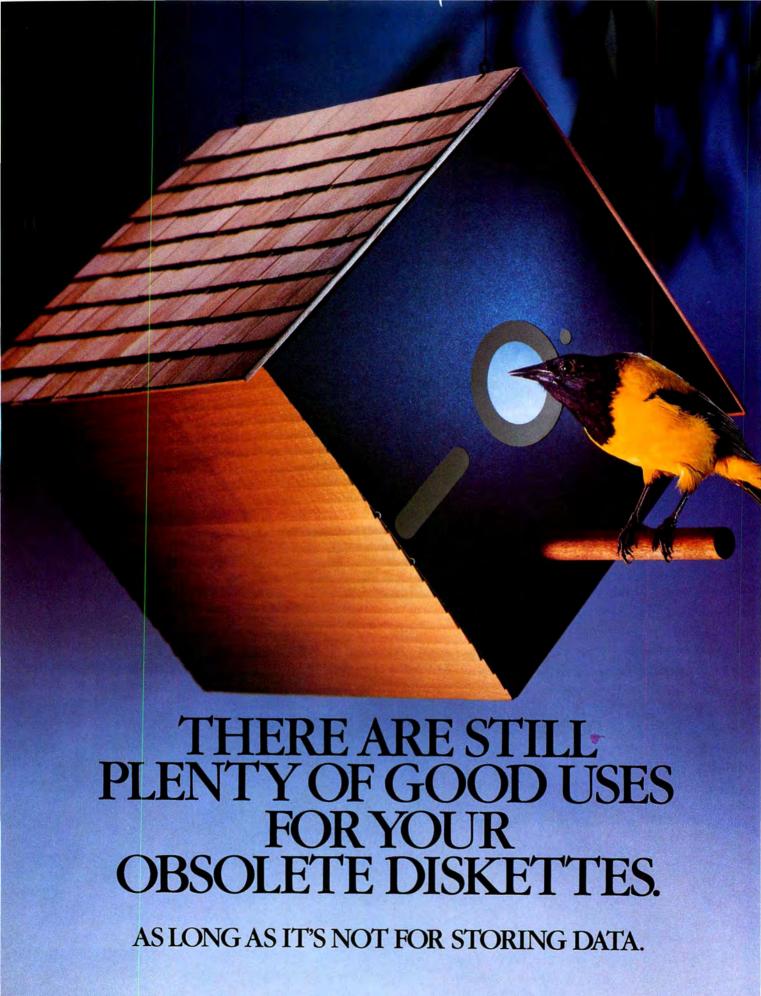
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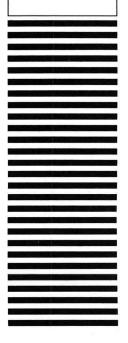
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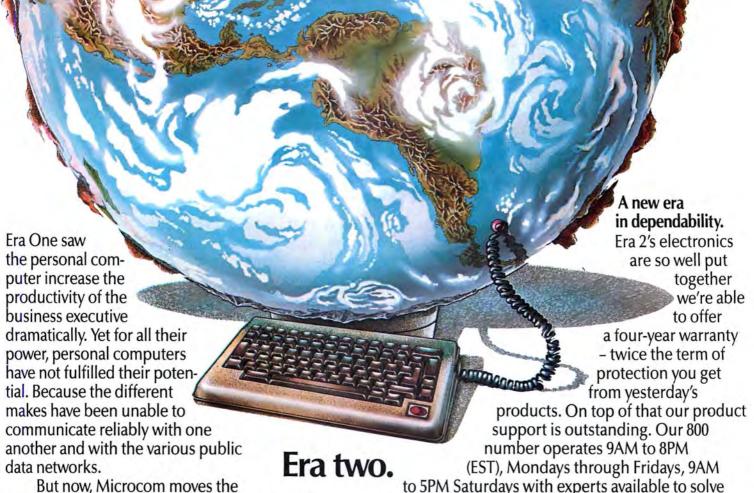
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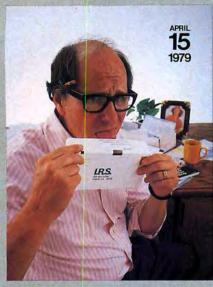
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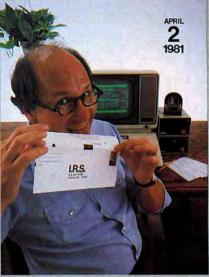
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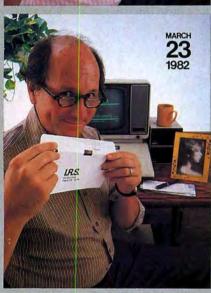
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SuperCalc3: A Step Up

Bill Permar
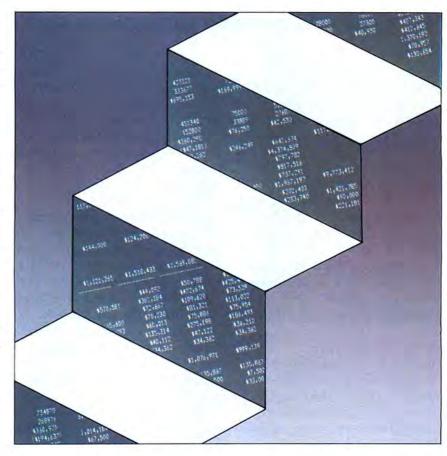
In 1982 Sorcim's *SuperCalc* challenged the reigning spreadsheet leader, VisiCorp's *VisiCalc*, and managed to walk off with a sizable share of the market. Today Sorcim is again challenging the spreadsheet champion, Lotus *1-2-3*. This time the contender is *SuperCalc3*.

Having written a tax template, *1983 1040Plan*, that can run only on a spreadsheet that has the speed and power of *1-2-3*, I had high hopes for *SuperCalc3*. Several of the program's new features looked impressive. *SuperCalc3*'s graphics are more flexible and easier to use than those of *1-2-3*. The program's eXecute command, although not as powerful as *1-2-3*'s macro capability, is easier to use.

But from that point on in the comparison, *1-2-3* leaves the contender in the dust. *1-2-3*'s overall handling is smoother than that of *SuperCalc3*, and its recalculation time is much faster. And more important for advanced applications such as mine, *1-2-3* can automatically handle forward and circular references. *SuperCalc3*'s lack of these abilities significantly reduces Sorcim's claim to state-of-the-art spreadsheet status.

Recalc Blues

Traditional spreadsheet programs recalculate in an orderly, tabular fashion, starting at the upper left corner (cell A1) and computing down the

column from top to bottom or across the row from left to right. This is the way computers like to think. Unfortunately, people (and financial situations) are not as orderly as computers would prefer. For many spreadsheet applications, a more appropriate form of computation can be achieved by means of forward or circular references.

If a formula refers to a cell value forward of the calculation order, it is called a forward reference. For example, if a formula in cell C1 is (A1), and the formula in cell A3 is (A1), and the formula in cell B2 is (C1 + A3), C1 is a forward reference in column calculation, and A3 is a forward reference in row calculation. Thus, if

● Review

	VisiCalc IV	1-2-3	SuperCalc3
Space needed on disk (in bytes)	55,680	75,520	65,280
RAM space used by program and template (in bytes)	115,000	180,000	250,000
Loading time from disk to RAM	2 minutes, 50 seconds	40 seconds	30 seconds
Recalculation time per loop	1 minute, 14 seconds	N/A	1 minute, 14 seconds
Total recalculation time for 8 forward reference loops	42 seconds	3 seconds	42 seconds

Table 1: Recalculation speed test for VisiCalc IV, 1-2-3, and SuperCalc3

you change the value in cell A1, the new calculated value of the formula in cell B2 may not be correct until you force an extra recalculation (with the exclamation point command). This problem occurs because the formula in B2 is calculated before the value of cell A3 is updated.

A circular reference is one in which the computations are made in a circle. For example, if the formula in cell D1 used the value of cell F1, and the formula in cell F1 used the value in cell D1, you would have created a circular reference.

In the traditional manner, SuperCalc3 (like all versions of VisiCalc) lets users choose between a row or column order of recalculation. Lesson 9 of the SuperCalc3 manual explains how the user must keep track of recalculation problems. This type of burden is for computers and other "beasts of," not for people.

1-2-3 allows you to choose between row, column, iteration, or "natural" order of recalculation and displays CIRC on the screen to indicate circular reference. When a natural order of recalculation is used, a formula is not calculated until it has already processed all the other formulas upon which it depends. The natural order of recalculation is 1-2-3's default order, and the CIRC

message on the screen saves you from wandering into building a disastrous template. While the VisiCalc manual recognizes this problem and states, "A circular reference can prevent accurate results and can be particularly difficult to diagnose," VisiCalc, like SuperCalc3, offers no help.

Forward and circular references are not necessary for many spreadsheet applications, but they are important for tax computations and financial projections. 1983 1040Plan has 12 forward reference loops. The template follows the IRS 1040 forms to summarize the data and make the computations more understandable. Templates using forward reference loops allow the user to concentrate on presentation instead of recalculation order.

When preparing business plans and dealing with interest expense, the computation can require both a circular and a forward reference. For example, the higher the loan balance, the higher the interest expense, the lower the profit, the lower the loan repayment, the higher the loan balance. If you design a template with a planned loop, you will want to plan the number of recalculation loops made. 1-2-3 has an iteration status

choice that allows such computation planning. SuperCalc3 doesn't.

I had originally intended to compare the performance of 1983 1040Plan running on 1-2-3 with its performance on SuperCalc3. However, SuperCalc3 does not have a choose function and does not allow for a multiple-column lookup table. Although the choose function can be simulated by a series of if statements, Sorcim reports that future versions of SuperCalc will include a choose function. These two features are basic elements of most tax template designs. So I compared the performance of the earlier VisiCalc template, 1982 1040Plan, when used with VisiCalc IV, 1-2-3, and SuperCalc3 (see Table 1).

To test calculation times without forward references I created a large spreadsheet composed of one-third simple formulas and two-thirds values. Even without forward references, the difference in performance was substantial. 1-2-3 calculated the worksheet in 33 seconds, while SuperCalc3 took 1 minute, 8 seconds. SuperCalc3 is faster in loading and disk access time, but slower in recalculation. To realize the magnitude of the problem of slow recalculation time, run the program with a tax template. When the VisiCalc 1982 1040Plan was transferred to 1-2-3, it expanded to take 13 seconds to recalculate instead of the original 3 seconds. If the 1983 1040Plan could run on SuperCalc3 or VisiCalc IV, theoretically, on a straight line progression, it would take approximately 8 minutes to recalculate. The manufacturer promises that a future version of SuperCalc will be rewritten to use the same binary math calculations as 1-2-3. That adaptation should mean much faster calculations. The planned 8087 math coprocessor support would make that future version run even faster.

How important is fast recalculation? The answer depends on the type of problem being solved. With smaller spreadsheets, recalculation speed is not as critical, but speed be-

comes a significant factor when you are running complex financial projections.
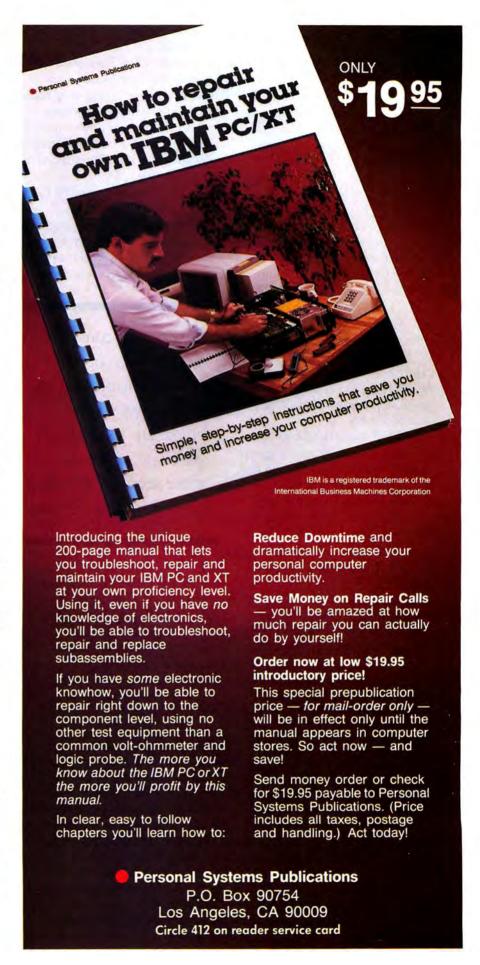
Back in the old days when financial projections were prepared by hand, accountants usually computed three estimates: high, low, and medium. Recently, after discovering that I had a PC, a client asked me, "Could you prepare projections on a 10 percent, 20 percent, and 30 percent increase in sales, at interest rates of 12 through 18 percent, assuming a capital expansion or outside contracts for the extra business?" In essence, he was requesting 36 projections. In precomputer days that would have been a herculean task, but with an electronic spreadsheet it was no problem. And the faster the calculation time, the less of a problem such analyses pose.

I don't know to what degree computers help people make better decisions, but I do know they use a lot more paper than the old pencil pushing method did, and they come up with a lot more possibilities on which to base decisions.

Graphics Power
The ability to display and print graphics is where *SuperCalc3* shines. *SuperCalc3*'s graphics capabilities are more flexible and easier to use than *1-2-3*'s. *SuperCalc3* can display a graph on a monochrome screen without a graphics board, but with so little hardware support the display is quite crude. Another *SuperCalc3* advantage is that you don't have to change disks to print a graph. This feature could save a substantial amount of time in the presentation phase, when you're trying to get the printed graph just right.

1-2-3 has difficulties with the layout of pie charts and labels, and in certain circumstances it prints the labels on top of each other or off the page. *SuperCalc3*, on the other hand, considers the label size before picking the pie size and also allows you to create an "exploding" pie chart, with one or more sections slightly separated from the pie. *SuperCalc3* offers high, low, and area graphs, options

⊜ Review

not found in *1-2-3*. Titling graphs is easier in *SuperCalc3* than with *1-2-3*. *SuperCalc3* prints a graph as easily as either program can view one; simply press the <F9> key. *SuperCalc3* prints a graph on an Epson printer faster than *1-2-3*.

eXecute vs. Macros

SuperCalc3's eXecute command and *1-2-3*'s macro ability accomplish about the same thing, automatically performing a series of previously stored commands and operations. Compared to *1-2-3*'s macro ability, the eXecute command is "quick and dirty." You can open the *SuperCalc3* manual to the eXecute command page, read it, understand it, and write a good eXecute command the first time you try. The eXecute function is more than adequate for a simple macro operation.

The *1-2-3* macro instructions are more complex. The manual suggests that you read the macro section several times and warns the user, "Do you really want to be a programmer?" However, once you understand the *1-2-3* macros, you will find them more powerful, flexible, and elegant than any eXecute command could ever be.

While the styles of the two manuals are completely different, both are good. The *1-2-3* manual is a cross between a novel and a coffee-table picture book. The first half of *SuperCalc3*'s manual reads like a tutorial, and the second half provides a reference manual followed by a series of detailed appendices.

The extensive formulas and functions of the two spreadsheets are about the same. If you have a particular application in mind, I suggest that you browse through the appendices of each manual. For example, my tax template design suffers on *SuperCalc3* due to the lack of a choose command or a multiple-column lookup command.

The most sexy feature that *SuperCalc3* has and *1-2-3* lacks is the ability to split the screen, with formulas on one side and values of the same area on the other. This feature will either dazzle your friends or cause them to whisper behind your back: "Computer nerds get off on the weirdest things." Another *SuperCalc3* feature that *1-2-3* lacks is the ability to write text within formulas, as in (IF A1 = "yes" , B1, 0). (Lotus reports that a future version of *1-2-3* will include this feature.)

An obscure feature you might want to consider is maximum cell space. In *SuperCalc3* the maximum number of characters one cell can

> *SuperCalc3* considers the label size before picking the pie size and also allows you to create an "exploding" pie chart, with one or more sections slightly separated from the pie.

hold is 116, while *1-2-3* has a maximum of 240. Most people won't use this potential, but I have written a formula with over 200 characters. (No, I am not sure I understood what the formula did, but it fit.) Interestingly, though, *SuperCalc3* provides wider column widths (127 as compared to *1-2-3*'s 72).

Data Management

It is doubtful whether any spreadsheet program has successfully integrated data management. *1-2-3* is a fantastic spreadsheet program with some integrated sorting, extracting, and matching capabilities. These capabilities are useful when you are analyzing a static file. Once you learn the difficult data commands, the analytical abilities are extensive. Still, it is not a true data management program.

SuperCalc3's data management facility includes an excellent selective extract feature; search capabilities; a sort command; list functions; and average, count, max, and min capabilities. *SuperCalc3* does not have the data table function (for sensitivity analysis) or any of the data management statistical functions (variance, standard deviation, frequency distribution, etc.) that are part of *1-2-3*. Although *SuperCalc3*'s data base functions are not as powerful as *1-2-3*'s, they are easier to use. In addition, *SuperCalc3*'s dictionary sort (by alphabetical value of the letters) is more accurate than *1-2-3*'s ASCII sort (by the ASCII code value of the letters).

Hard to Be Easy

1-2-3 is slightly easier to use than *SuperCalc3*. Except for the graph, eXecute, and sort commands, *1-2-3* is much smoother. When you are using a spreadsheet, you spend most of your time either moving the cursor or entering data and formulas, and it is in these common activities that *1-2-3* excels. *1-2-3* uses all the PC function keys, while *SuperCalc3* takes advantage of only four. The range name structure of *1-2-3* is elegant and very useful in large spreadsheet applications. *SuperCalc3* has nothing comparable to range names.

As for commands, *SuperCalc3* uses cryptic, one-letter "slash" commands with subcommands spelled out. *1-2-3*'s fuller description on each command menu spares you from double-checking or memorizing. However, *SuperCalc3*'s structure allows you to execute some functions with fewer keystrokes than *1-2-3* requires.

Both programs have help screens, but help screens always seem to say things you already know. Using the macros in *1-2-3* to create custom command menus gives templates a dimension not available with the eXecute command. *SuperCalc3*'s use of the function keys is limited, and the program does not use the <End>, <PgUp>, or <PgDn> keys. *Super-*

Calc3 stores spreadsheets more efficiently than *1-2-3*. That is, you can fill more spreadsheet cells using equivalent amounts of main memory (RAM), mostly because *SuperCalc3* doesn't use up memory by keeping track of blank cells.

I once had a boss who liked to say, "I don't want an explanation, I want an answer." Since I no longer have to answer to my old boss, here is an explanation. If you use a spreadsheet once in a while for simple problems and are on a budget, buy *SuperCalc3* and save yourself $100. If you already own an earlier version of *SuperCalc* your savings will be even greater, and you won't have any problem learning the program because its basic structure hasn't changed.

If you use a spreadsheet often, value your time, or have complex problems, *1-2-3* may be a better buy. Although *SuperCalc3* is a more than adequate spreadsheet, it is not in the gallery of state of the art. *1-2-3* is still in a class by itself. ⊜

Bill Permar is a certified public accountant in Oakland, California. He has been using microcomputers since 1976.

1-2-3
Lotus Development Corporation
55 Wheeler St.
Cambridge, MA 02138
617/492-7171
List price: $495
Requirements: DOS 1.10 128K, DOS
  2.00 192K, two disk drives

SuperCalc3
Sorcim Corporation
2310 Lundy Ave.
San Jose, CA 95131
408/942-1727
List price: $395
Requirements: 96K, DOS 1.10 or
  2.00, two disk drives

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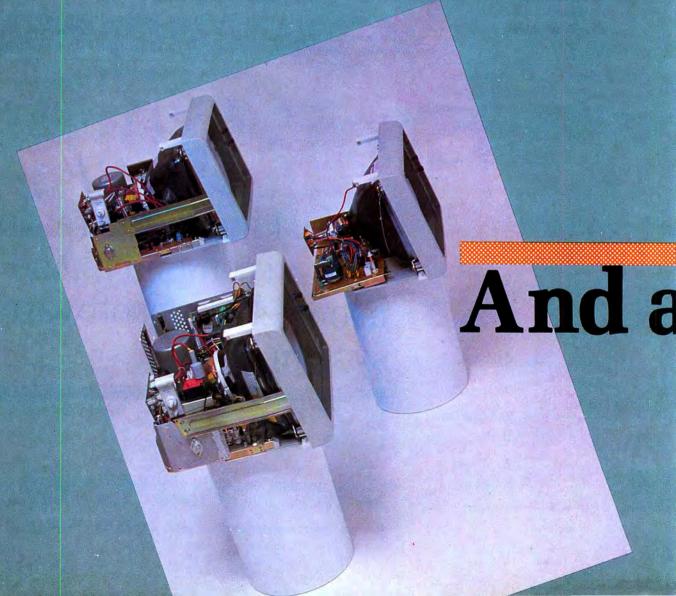
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All three PGS monitors are engineered for no-compromise performance: to provide you with a cleaner, sharper image than any other monitor in the same price class. The HX-12 and the SR-12 both feature uncompromising color convergence for crisp whites without color bleed. The MAX-12 offers impressive clarity in a mono-chrome monitor with easy-on-the-eyes amber phosphor.
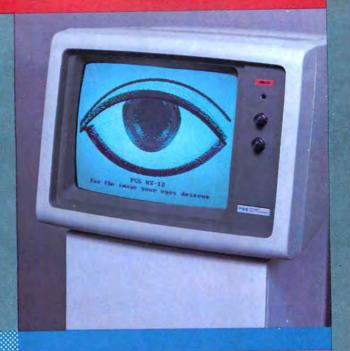
And all three monitors come with a shielded cable that plugs directly into the IBM PC or XT.

And does it a

And a
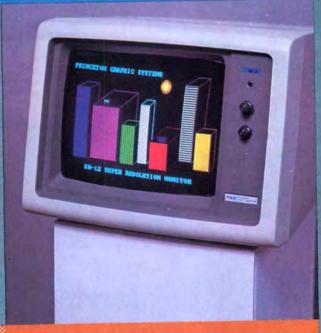
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The HX-12 has the highest resolution (690x240) and the finest dot pitch (.31mm) in its class. And yet it's suggested retail price is comparable to many medium resolution monitors. The HX-12 brings no-compromise color to the PC and now, with the PGS RGB-80 board, to the Apple IIe as well.

gain.

The new SR-12 also features a .31mm dot pitch supporting 690 horizontal resolution. However, by increasing the horizontal scan rate to 31.5 KHZ, the SR-12 can support 480 vertical resolution in non-interlaced mode. This results in a very high quality, flickerless image with the ability to generate text that is truly of monochrome quality, making it equally suitable for word processing and for color graphics. Suggested retail price, a remarkable $799.

gain.

The new MAX-12 offers you an amber monitor with 720x350 resolution at a suggested retail price ($249) that is actually lower than the leading green-on-black competitor. And the MAX-12, unlike many other amber monitors, runs off the IBM PC monochrome card—no special card is required. Clarity of the MAX-12 is enhanced by **dynamic focusing circuitry** which ensures sharpness not only in the center but also in the edges and corners.
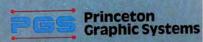
A non-glare screen is standard on all PGS monitors, color or monochrome—a feature your eyes will really appreciate in a long work session.

Whatever your needs, from word processing to super resolution graphics, there's now a no-compromise PGS monitor that sets the standard. Ask your dealer for a demonstration and let your eyes decide. Or call for more information and the name of your nearest dealer.
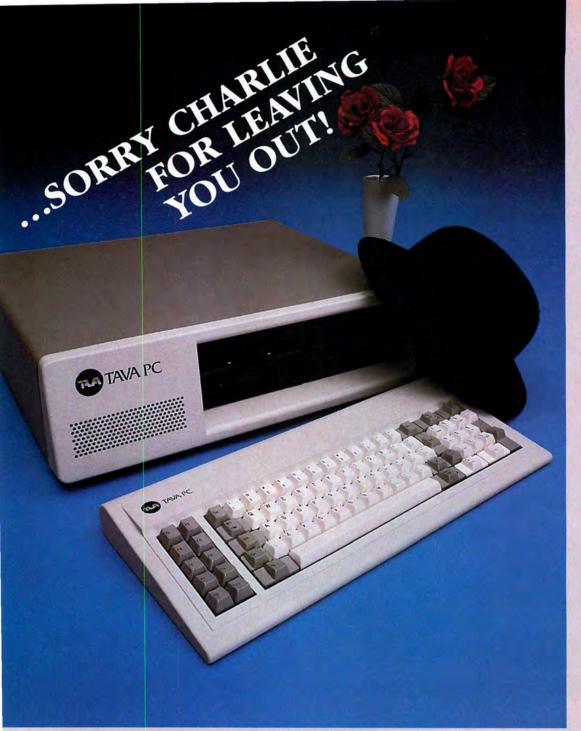
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Direct to Disk

The next computer magazine you buy may do more than decorate your coffee table.
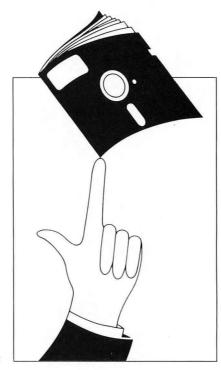
Keith Richard Cook

One of the latest creations of the computer revolution is an entirely new form of communications—disk magazines. They consist of articles, features, ready-to-run games, utility programs, tutorials, and columns on a floppy disk. They are not just translations of paper magazines into floppy disk format, but separate and original entities with their own editorial and production staffs, design layouts, and editorial approaches. The real benefit of disk magazines is programs and demos in usable form.

I recently had a chance to look at two first-generation disk magazines that focus on the IBM PC: *Mentor* and *I. B. Magazette.* I expected to see video screen versions of *PC World;* what I saw instead were two forms of an interactive communications medium remarkably different from any paper magazine. Disk magazines could be the most exciting and socially far-reaching mode of communication since the inventions of radio and television.

I. B. Magazette

When you want answers, go to the top. I called Shreveport, Louisiana, home of *I. B. Magazette,* and talked to Carol Hall, the magazine's editor and cofounder, along with President and Publisher Bill Wiener, Jr., and Technical Editor John Sigle.

> Everything on the disk is yours to copy, use, and keep in your software library.

I. B. Magazette made its debut in August 1982 and was, according to Hall, the first disk magazine on the market. The magazine was created for "the PC user who needs help getting started," Hall explains. "More than half our subscribers are profes-

sional people who use a PC in their work, but we're beginning to get some of the younger computer buffs."

The *I. B. Magazette* philosophy is explained in its introduction section: "*I. B. Magazette* will play several valuable roles: software supplier, magazine, user group, amusement, troubleshooter, forum." Of these roles, user group probably best describes the magazine. "We see ourselves as an unofficial user group," Hall says, adding, "We field questions, problems, and solutions."

Copyright-Free Software

I. B. Magazette costs $15. It is what the folks there call a "flippy-floppy" disk (a disk that can be flipped so that a single-sided drive can read either side) on which the current issue of the magazine is written. You can't stuff *I. B. Magazette* into your back pocket, read it on the bus on the way to work, or fold it in two and swat flies with it, but it does offer some advantages over paper magazines.

Everything on the disk is yours to copy, use, and keep in your software library. While any computer magazine can list programs, only a disk magazine like *I. B. Magazette* lets you copy them directly onto another disk. No longer must you type a great new program into your PC by hand, one line at a time, or pay your

kid to do it for you. The savings in your time or your kid's copying fees could easily make up for the price of *I. B. Magazette*.

Reader Participation

I. B. Magazette actively encourages a sense of community and participation among its readers. Reader programs and letters make up a large part of the magazine, and in each issue *I. B. Magazette* awards a free copy of the magazine along with a box of disks (the flippy-floppy kind) to the reader who contributes the best written and most usable program. Contributors must fill out contract, disclaimer, and program submission forms, which are provided with each issue. In the hope of stimulating the growth of copyright-free software, the magazine encourages the readers who make use of a contributed program to make a contribution to the author.

I. B. Magazette accepts no advertising. Disk space on any floppy is limited, a problem with which all disk magazines will have to contend, and *I. B. Magazette*'s founders want the magazine to be a user-community resource rather than an advertising medium. They have chosen to devote all available space to programs and letters sent by readers.

Loading and running *I. B. Magazette* is easy. Boot up with DOS, load BASICA, insert the magazine disk in drive A, and type RUN "START" . The *I. B. Magazette* logo pops onto the screen, followed by—at your option—a cheery little tune. Right away you notice that the writing style is as chummy and enthusiastic as a fan-club newsletter, with generous use of capital letters, boldfaced text, and exclamation marks.

Contents

At this writing the latest issue of *I. B. Magazette* I could get was issue 2.4, the September/October 1983 issue. The main index (which a paper magazine would call the table of contents but which works more like a program menu) contained these sections:

(A) How I. B. Magazette Works, (B) Preview of Coming Issues, (C) I. B. Magazette News, (D) Programs in This Issue, (E) Hints, Tips, Problems, and Solutions, (F) Features, and (G) Your Comments. You can access any of these sections by typing the appropriate letter. *I. B. Magazette* provides

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I. B. Magazette accepts no advertising.

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additional tunes whenever you access certain sections, such as the main index.

Sections A, B, and C contain general information about *I. B. Magazette* and include the reply and program submission forms. The meat of the magazine is in sections D, E, and F. When you type D, for Programs in This Issue, the main index is replaced by another menu that lists four subsections: (A) Games and Novelties, (B) Business and Home, (C) Educational, and (D) PC Utilities. Within each subsection are programs submitted by *I. B. Magazette* readers.

The issue that I reviewed offered a poem-writing program, one that turns your video screen into an Etch-a-Sketch, a mailing list program, a full-screen editing program, geography and math quiz programs, and a program that allows the user to set up the function keys to particular requirements in Interpreted BASIC.

Aside from the *I. B. Magazette* staff's philosophy that new software should be available to everyone, or at least to *I. B. Magazette* readers, Hall sees other benefits in eliminating retailers and other middlemen from the flow of software from author to retailer to user. The price of the software is reduced to the price of *I. B. Magazette*, and readers of the magazine can peruse a new program at their leisure and in private. "We feel

our users want to be able to try new software without a salesman around," Hall says.

Section E—Hints, Tips, Problems, and Solutions—provides information and advice from staff and readers on avoiding problems with and improving the performance of your software and hardware. This section has had a growing reader response that supports the concept of the magazine as a user group. Hall adds, "We are aiming not only to assist the user with his PC but with expanding the capabilities of his software too."

Section F, Features, is divided into five subsections: an article on random and sequential sorting methods, an editorial, a list of the contents of all previous issues, a minicontest that urges readers to write a home finance program and a monochrome arcade-style game, and an article on the searching method known as hashing.

The article on hashing features another disk magazine innovation: an animated demonstration program that illustrates how a search program set up with the hashing method would operate. Pressing the space bar moves a highlighting effect forward one line at a time in the same sequence that the program would follow. As you move through the program, the results of the computations appear below the program listing. Animated program demonstrations can be an invaluable aid for any programmer, especially one who has not yet reached hacker status.

I. B. Magazette has many convenient features that help ease the pain of reading via video and keyboard, including backward paging, one-key returns to the main index or the most recent menu, and a bookmark feature that lets you shut down and later return to the same place. *I. B. Magazette* also lets you switch between color and monochrome monitors.

I. B. Magazette is an impressive effort for a new magazine, especially since it is a new journalistic medium. Quality is tough to maintain as a magazine's style, tone, and organizational framework evolve over many

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issues, but the people behind *I. B. Magazette* haven't lost sight of their readers' needs. Hall agrees that "the general format is growing and changing with every issue," but she also insists that "we want everything we publish to be well written and well tested."

Mentor

Mentor's first issue came out in July 1983, almost a year later than *I. B. Magazette*. As the new kid in town, *Mentor* has a few rough edges, such as a cumbersome system-disk copying procedure, a lack of graphics and sound effects, and no backward paging, but anyone who buys the magazine will find a lot to like.

Mentor has taken a different road from the one *I. B. Magazette* is on. *I. B. Magazette* is a disk magazine by and for users and offers new programs. *Mentor* uses professional writers and provides program enhancements that upgrade popular software such as *WordStar*, *dBASE II*, and *1-2-3*.

New Approach to Ads
Mentor also differs from *I. B. Magazette* in that it accepts advertising. Even so, the software advertisements differ from those of a typical magazine. The ads are listed in the main menu, not slyly inserted next to your favorite programming column, so if you want to see an ad you must call it up from the main menu. If you call up an ad, you are likely to see something else that you won't find in a paper magazine, an interactive demonstration of the program complete with a "teaser," or storylike opening, to lead you into the ad.

Mentor has the same problem with disk space limitations as *I. B. Magazette*, but gets around it in a couple of clever ways. Demos are either put on the reverse side of the disk or, like the program demonstrations for Execuware's *Next Step* or VisiCorp's

VisiWord, are provided on separate disks supplied by the manufacturers.

Mentor also frees additional memory by putting operating instructions on one disk and programs on another. You copy your operating system disk from a system disk master included with the first issue of your *Mentor* subscription. Mentor sends updated system disk masters approximately every four issues. Making a system disk backup is a nuisance, but the backup lets you run all future issues of *Mentor* until you receive the next updated master.

To run *Mentor*, put your system disk backup in drive A and your program disk in drive B, and either switch on your PC or depress the <Ctrl>-<Alt>-<Del> keys simultaneously.

Having the operating system on a separate disk makes *Mentor* less user-friendly but results in more and lengthier programs and articles than would otherwise be possible.

Contents

Mentor uses an alphabetical main menu of the various sections of the magazine, but unlike *I. B. Magazette* it does not use menus within menus. A scan of the September 1983 issue's main menu revealed several regular features: How Mentor Works—A User's Guide; Publisher's Sector, which includes a user bulletin board; Ringydingy Telecommunications, featuring a user-supported, unadvertised free program; Batch File Special, featuring a batch file program selected by the staff; and Coming Attractions.

Each issue of *Mentor* also includes a *PC-File* data management information section containing a cumulative index of articles and programs that have appeared in the magazine; a glossary of computer terms from Ashton-Tate's *Reference Encyclopedia for the IBM Personal Computer*; a referral section that gives names, addresses, and phone numbers referred to in the magazine; and a warranty.

The rest of the magazine consists of two short editorials and a variety

⬢ Review

of interesting and useful customizing programs for popular software. Among the programs in my copy were a cash plan worksheet, which figures changes in the bottom line due to variations in projected sales, for use with BASICA, *1-2-3*, and *Multiplan* or *VisiCalc*; a banner add-on for DOS 1.10 that displays the name and first 65 characters of each file listed; Color 3, a DOS colorizer; and a *ProKey* template that can save hundreds of keystrokes when you use *WordStar*.

Interactivity

After looking at *Mentor* I called up Editor Emil Flock to ask about his new disk magazine. Flock is an enthusiastic guy, the kind of "silicon philosopher" who relishes the idea that *Mentor* and other disk magazines can make new programs and information widely available to users.

As mentioned earlier, the major practical advantage of disk magazines like *I. B. Magazette* and *Mentor* is the easy transfer of programs, especially machine language programs, made possible by the disk format. Flock agrees but also sees other benefits. "The beauty of a disk magazine," he says, "is in the decentralization of power, the fact that six people can put out a magazine to compete with the big publishing interests."

Mentor's staff, like *I. B. Magazette*'s, is tiny compared with the 80 or more people needed to put out a paper magazine like *PC World*. Fewer people means fewer costs. Also, a disk magazine is an electronic rather than a physical medium, so production costs are lower. Anyone with a computer and a case of disks could, in theory, put out a disk magazine.

Flock recognizes the need for a communications link between users and computer novices and thinks that *Mentor* can be that link. "We're trying to break through the shield of jar-gon that computer people put between themselves and the general public," he observes. Flock describes *Mentor* as "an interactive magazine that leads you by the hand," but quickly adds, "We're servicing both sides of the market, the hacker as well as the business professional."

For the future, Flock says "there's a potential that we haven't yet exploited, in terms of interactivity, as in games like *Temple of Apshai*." Flock doesn't see *Mentor* as the appropriate disk magazine for games, but he does envision including programs from other magazines. "We're talking with *BYTE* and *SoftTalk*," he says.

Flock asserts that the staff at *Mentor* is aware of the magazine's shortcomings and that the problems will be addressed in the near future. "We hope that by the fourth issue we will have a graphics page with each article, backward paging, and faster scrolling." A large infusion of capital and a big distribution network wouldn't hurt, either. According to Flock, *Mentor* is being courted by several large publishing interests, making the disk magazine business one to watch during the next year. ⬢

Keith Richard Cook is a Contributing Editor for PC World.

I. B. Magazette
1306 Petroleum Tower
Shreveport, LA 71101
318/222-8088
Requirements: 64K, one disk drive
List price: one-year subscription (12 issues) $150, 6 issues $80, single issues $15 each

Mentor
533 Sutter St. #914
San Francisco, CA 94102
415/558-9551
Requirements: 64K, two floppy disk drives or one hard disk drive
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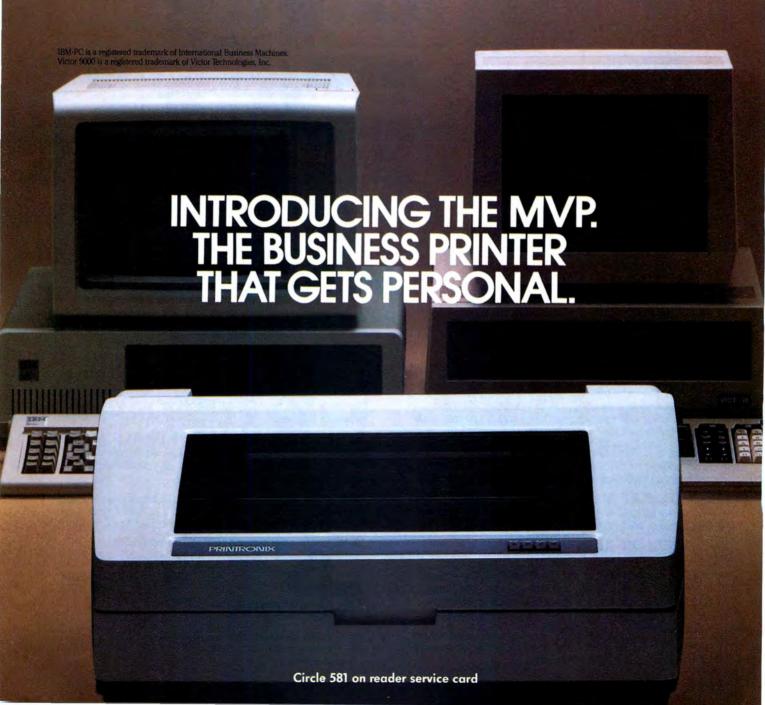
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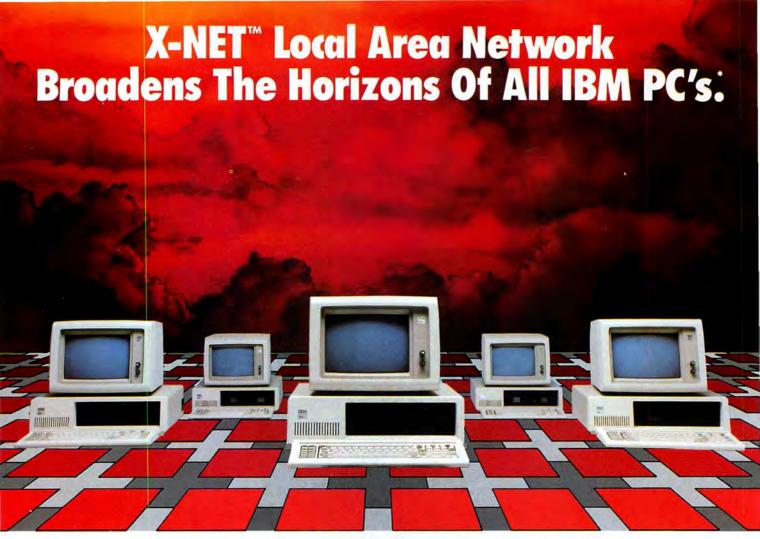
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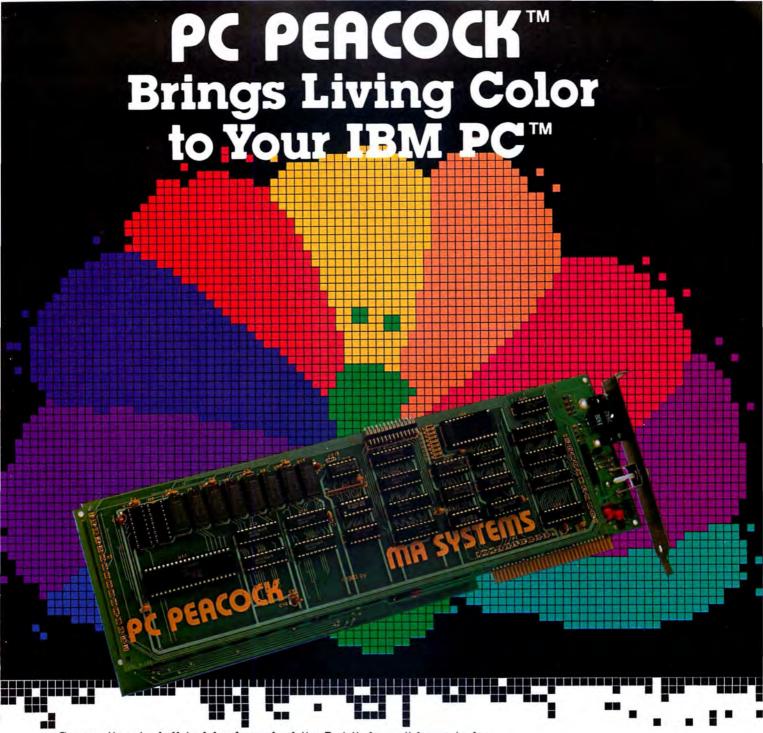
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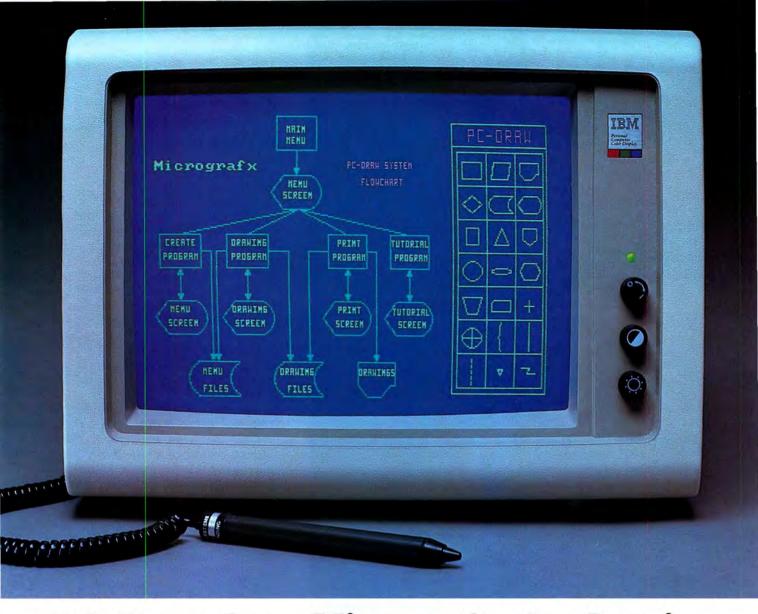
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For Game Gourmets

Three games that will help you trade those winter chills for computer thrills

Keith Richard Cook

This month's *For Game Gourmets* examines a maze/treasure hunt game, the official version of a popular arcade game, and a sports statistics game. With these programs you just might strain your brain, sharpen your reflexes, or turn a fast profit.

Beneath Apple Manor

Far from the placid tedium of everyday life lurks a specter of malevolence: Apple Manor. Long deserted and blackened by fire, Apple Manor waits for its next victim like a brooding vulture perched atop a desolate, bramble-covered hill.

Apple Manor was the ancestral home of the evil Apple family. They commanded an army of monsters made savage and grotesque by years of having nothing to do but eat Hershey bars, smoke cigarettes, and attack peasants throughout the countryside. Such foul deeds continued for 300 years until one day the last of the Apples mysteriously vanished.

Legend tells that the satanic power through which the Apples controlled the monsters lay in a magical golden apple. This apple, along with a hoard of stolen riches, is said to be hidden somewhere deep within the bowels of the dungeons.

Beneath Apple Manor

Legend also warns that the monsters who once ravaged the countryside still stalk the dungeons, protecting their stolen treasures with bloodthirsty zeal and dropping cigarette butts and Hershey bar wrappers wherever they go.

Many would-be heroes have ventured into the dungeons in search of wealth and power, but none have returned. Now, you too can risk your life at the hands of some unsavory creature in exchange for a few hours

of arduous, teeth-gritting adventure, and maybe fulfill your secret fantasy of being a big hero. But before you rush off to seek your fortune and meet your fate, here's what you can expect to find *Beneath Apple Manor*.

Playing the Game

To enter the monsters' lair, first put the disk into drive A and switch on your PC. Prompts ask what type of monitor you have, whether you want sound effects, whether to restore a previous game or start a new one, and what level of difficulty you want.

Once it receives instructions, *Beneath Apple Manor* constructs a dungeon with rooms, hallways, locked doors, treasure chests, gold, magic potions and weapons, and monsters. You enter the dungeon through a hidden staircase. In order to receive credit you must carry any treasure you find back to the staircase, and if you manage to steal all the treasure you can advance to a more difficult dungeon.

Before you start, suck in your gut and tighten your sword belt. You are about to engage in life-or-death combat with bizarre and merciless creatures. No matter how strong or clever you think you are, don't expect to capture the golden apple without paying your dues. You must start as a lowly Warrior and work your way up to Hero, Swashbuckler, Champion, and Superhero before attaining Lord status. This noble rank is required before you can locate the apple. You gain points to reach your goal in two ways: by scooping up all the treasure you can find and by killing as many monsters as it takes to reach the treasure.

You begin your quest equipped with 20 points in each of four attributes: Strength, Intelligence, Dexterity, and Body. Strength means physical power, which is essential for killing monsters quickly, smashing down doors, and carrying off treasure. Intelligence is the ability to cast spells that can destroy a monster, "teleport" you out of danger, or heal your injuries. Dexterity measures your ability to destroy a monster you attack and to avoid being hit. Body means physical toughness, or the amount of damage you can withstand and still survive. Totals for all four attributes are shown at the bottom of your screen, which displays an overhead view of the dungeon you are exploring.

Gold-point and experience-point totals appear next to the attribute totals. You receive gold points for each treasure chest captured, depending on its value. You can trade these points for better armor and weapons, or you can buy a "brain scan" that lets you save your current position to disk so you won't have to start all over again if you are killed.

Experience points are awarded for finding treasure and killing monsters. You can trade experience points for attribute points and divide them among your attributes any way you like.

En route to your goal of becoming a Lord and finding the magical golden apple, you may discover that the brute strength in your sword arm and the razzle-dazzle of your magic spells are insufficient. Success comes in proportion to cunning, patience, self-discipline, and care in reading the instruction manual.

Monsters

Monsters love human blood; it washes down the taste of 300 years of Hershey bars. If you don't want to end up as an after-dinner drink, you must be alert and keep your attribute totals up, especially Body points. Monsters are rude beasts who seldom bother with introductions before attacking. If they catch you with your attribute totals down, they will clobber you with glee. Take it from me, even begging and weeping won't dissuade them.

Of course, your job is to destroy monsters, not grovel for mercy, because these brutes are one bunch of bad apples. In ascending order of nastiness they are green slimes, malodorous ghosts, foul-smelling trolls, putrid purple worms, stinking invisible stalkers, virulent vampires, and disgusting dragons. Be grateful that your PC can't transmit smells.

Like you, every monster has four attributes. Each monster differs in its ability to move, damage you, and survive your attacks. The monsters' attribute totals are set during the creation of each new dungeon and are based on your current attribute totals. That means you can never simply overwhelm the monsters, although you'll have fun trying.

Each monster has unique strengths and weaknesses. Purple worms are very strong and can kill you with one or two blows, but since they have little dexterity (have you ever seen a worm that was fast on its feet?) they seldom hit you. The worms are tough to kill; you have to strike them repeatedly before they will die. On the other hand, vampires and invisible stalkers die easily when hit but are highly dexterous and therefore difficult to hit in the first place.

As a Warrior on the first dungeon level, you fight green slimes. As you gain in rank and attribute totals, you do battle with their nastier neighbors. The more powerful and dan-

> You may discover that the brute strength in your sword arm and the razzle-dazzle of your magic spells are insufficient.

gerous the monster, the richer the treasure chest that it protects.

Humiliated is the player who cannot rise above Warrior status; he or she is trapped in a cubbyhole-dungeon level and doomed to a life fighting green slimes. Other adventurers sneer and call you "slimelord."

Commands

Beneath Apple Manor gives you more than 25 commands with which you can rise to glory or sink to obscurity. The quantity and variety of those commands is too great to detail here, but the commands break down into several categories: movement, door breaking, sensory, combat, treasure chests and gold, resting, and spells.

⬒ Review

All but three commands have a price tag attached to them. Each movement costs some Dexterity points, spells cost some Intelligence, attacks cost some Strength, and being hit costs some Body points. You can restore your attribute totals by resting, but if you are attacked you must either fight or flee since you can't very well just sit on the floor and let some scrungy beast jump all over you.

The key to doing unto the monsters before they do unto you is memorizing all the commands, especially my favorite, Run in Panic. Laugh if you want, but even the bravest man-at-arms will run like a turbocharged chicken when he suddenly feels the hot, fetid breath of a dragon on one side of his neck and the icy nibble of a vampire on the other.

Another command that is very useful in tough situations is the Teleport command, an Intelligence-draining spell that whisks you instantly into another part of the dungeon. You don't even have to say, "Beam me up Scotty," but you do need to watch that your Intelligence total doesn't erode too far. In this business a stupid adventurer is a dead adventurer.

Documentation and Packaging

Beneath Apple Manor's 24-page instruction booklet deserves special mention. Four pages provide strategy tips for seasoned adventurers. The remaining pages explain the game's more than 25 commands, eight menus, and numerous cues, options, and monsters. The booklet gives a lot of information to wade through, but it is well organized and fun to read. Each section is headed and sub-headed into logical chunks. A Summary of Commands page provides quick reference.

You can order a backup copy of *Beneath Apple Manor* for only $5. The game's 90-day limited warranty offers a free replacement for a defective disk returned within the warranty period. After that, the replacement price is the same as the cost of a backup copy.

The game comes in a sturdy cardboard box with a colorful rendition of the game by G.C. Garcia, who also did the black and white drawings for the manual.

Evaluation

Beneath Apple Manor is an easy game to learn, since you spend most of your time either moving, fighting, resting and healing, or trading experience points for higher attribute totals. The tricky part is knowing when to fight, where and how to move, how often to rebuild your attribute totals, and when to cash in your gold and experience points. You must have a plan for each of these operations, and they must all work together within an overall strategy.

You must also be flexible, because the game is cleverly designed to put you into one dilemma after another. The program uses a random number generator each time it builds a dungeon, lays booby-traps, hides treasure chests, distributes monsters, or determines the outcome of a battle. No situation is predictable.

Every move you make has one or more effects, usually unpleasant. Suppose you just killed a vampire, but not before he had bitten you two times. All four of your attributes have been greatly reduced, and a dragon, attracted by the sounds of battle, is closing in on you. You know you are too weak to survive even one hit from a dragon. You can't Run in Panic because you are trapped between a stone wall and a treasure chest. You can't Teleport because your Intelligence is too low. Not only that, you lost your traveler's checks. What will you do?

You can play *Beneath Apple Manor* on either a color or monochrome monitor. A minor nuisance with this game is the relatively slow response to keyboard input. That slowness is more pronounced on a color monitor, and the slight advantage of seeing a purple worm look

purple instead of gray is not worth the extra delay in response time. The simple graphics also won't cause you to gasp in wonder, but they are functional.

Although *Beneath Apple Manor* doesn't offer visual fireworks, it does provide armed combat and adventure in a dungeon-quest format and carries it off beautifully. By sticking to a simple framework and testing thoroughly, Quality Software has created a complex, engrossing game.

Frogger
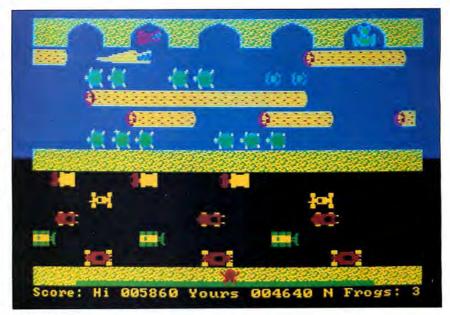
Frogger is a game you'll enjoy if you like amphibious creatures even half as much as I do. *Frogger* is the quintessential (not to mention the only) frog lover's game. You get to help a little green frog cross a five-lane, frog-flattening freeway and five channels of river hazards so he can reach the safety of his lily pad.

Frogger will improve your sense of altruism in case you plan to join the Society for Prevention of Cruelty to Animals. It is also a game for cowardly types who would never expose themselves to death by squishing, drowning, or mastication, but who don't mind subjecting a frightened

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Frogger has the right combination of action, challenge, and romance.

---

little creature to such perils.

Even if you don't usually become personally involved in computer games and are just looking for entertaining arcade adventure, *Frogger* has the right combination of action, challenge, and romance to make it worth a try.

Frogger

Playing the Game

Your frog starts at the bottom of the screen on a safety curb. Facing him are five lanes of vehicular traffic moving at different speeds, densities, and directions.

You move your frog forward, backward, left, or right, either by nudging a joystick in the appropriate direction or by tapping the correct control key. Once you get Froggy across the street, he can rest on the second safety curb—but not for long, because he has only 120 beats of the program's timer (about 30 seconds) to get onto one of his five lily pads at the top of the screen.

Unlike most frogs I've known, this frog can't swim. He gets across the river by hopping onto the backs of turtles and crocodiles or onto floating logs. Like the highway traffic, the river traffic moves at different speeds, densities, and directions.

A word of warning about turtles and crocs: turtles often dive without warning, and a croc will make a snack of your frog if it hops too near the croc's mouth. Your greatest worry about the fast-moving logs is that they will carry Froggy to oblivion at the edge of the screen.

You can lose your frog in other ways too. He can drown after a miscalculated hop. He must jump into

the exact center of his lily pad or he will crash into the surrounding concrete retaining walls. He may run out of time. He may even, if he is terribly unlucky, be captured by a nationally syndicated puppet show and be forced to sing, dance, or kiss a pig.

Just to make life interesting, as you near 10,000 points a deadly snake starts prowling the second safety curb, and a frog-eating otter prowls the river. But if you are swift and unerring in guiding Froggy past the highway and the river and onto a lily pad, you are rewarded with bonus points. If you blow it, Froggy croaks.

Froggy has an endless supply of relatives, all of whom need to reach a lily pad. You guide each frog one at a time until you have placed a frog onto each of the five lily pads, completing one round.

The object of *Frogger* is to get the highest score. Each forward jump is worth 10 points, reaching a lily pad scores 50 points, and you get five points for every beat of the timer remaining when your frog makes it home.

You get 1000—count 'em, 1000—points for putting frogs onto all five lily pads.

⬣ Review

You can also score bonus points if you help Froggy get together with Lady frog. Lady frog appears at random on a floating log. Place Froggy directly on top of Lady Frog (this is embarrassing), guide them both safely onto a lily pad, and you receive 200 bonus points. Getting your frog onto a lily pad while a tasty bug is sitting on it is also worth 200 bonus points.

Jumping to Conclusions

Frogger has a good selection of options, with a menu available by pressing <F10>. Some of the options let you choose one of four screen color combinations, toggle the calliope-style sound effects, and display the ten high scores. <F5> works as a pause key, in case you get the urge for a frog sandwich and a beer.

Frogger lets you play with either a joystick or the keyboard control keys, but the latter are faster and easier to use. If you don't like the preset control keys, you can press <F1> and define them yourself. One wish list item here: you can use the arrow keys on the keypad (8 for forward, 2 for backward, 4 for left, and 6 for right) but no others on the keypad. Some players prefer to use the 5 key instead of the 2 key, but the program won't accept that input.

Frogger offers three skill level settings: Normal, Advanced, and Expert. On Normal you start the game with five frogs and normal traffic. On Advanced you get three frogs and normal traffic. On Expert you get three frogs and fast traffic. Fine, except *Frogger* scores exactly the same on Advanced and Expert as it does on Normal, so what's the inducement to play the higher levels? If you play a tougher game, you should get more points.

Frogger can't be considered a nonviolent game since frogs die in several gruesome ways. When they get hit by a car or truck, all that remains is a bloody smear. If they drown or get eaten, the site of frog death is marked by a skull and crossbones. Still, *Frogger* involves no blasting or shooting, and the object is to help the frog avoid violence rather than be a victim of it.

> *Gridstar* could be just the ticket to spice up those cool autumn afternoons at the stadium.

Sensitive, frog-loving people who want to help their small friends live long, meaningful lives will enjoy this game. Now then, where did I put my recipe for breaded frog legs?

Gridstar

Sometimes a new program comes to my attention that is difficult to categorize or too specialized in what it does to rate an in-depth review but which still deserves a look. In this case, *Gridstar* is an offbeat program that just might grab your interest—and make you the terror of your football pool.

Billed as a "professional football analysis system," *Gridstar* contains a wealth of NFL statistics, enough to open your own football consulting business, get merrily lost in a sea of stats, or quite possibly make some money. *Gridstar* has a data base consisting of a variety of statistics on 2184 games played by all 28 NFL football teams between 1973 and 1983.

You can display, edit, and search the data base, feed NFL-related data into the program as it becomes available each week, and build an index for easy cross-referencing. The program will analyze the data, considering such factors as home advantage and power rating performance.

Gridstar then produces a prediction with point spread for each game. (A team's power rating is calculated from its scores in previous games and is figured by subtracting total opponent's points from total points against opponents and dividing by 10.)

The *Gridstar* package includes two large, sturdy, three-ring binders of instructional material with 89 pages of charts, graphs, text, and columns of statistics to explain *Gridstar*'s features and operations.

As you may have guessed by now, *Gridstar* is a serious analytical tool, not a frivolous amusement, although football fans may disagree. Let's face it: anyone who would buy a program like *Gridstar* would have to be a diehard football fanatic, but America has no dearth of those. A program like *Gridstar* could be just the ticket to spice up those cool autumn afternoons at the stadium. ⬣

Keith Richard Cook is a Contributing Editor for PC World.

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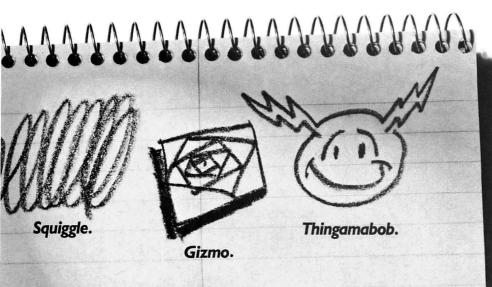
See your local Computerland store or call 800-227-1617, ext. 400 (in California, 800-772-3545, ext. 400) for the dealer nearest you.
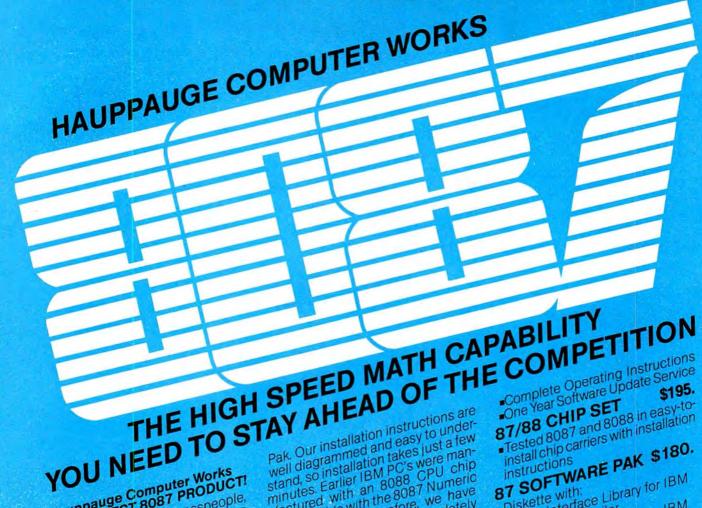
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HQ just called. For 1984 they want revenues of 10 million and profits of 1 million. They want the sales history and a forecast—today—in Chicago.

I waste no time. With the information manager, I quickly combine and retrieve information from the (1) sales department file, (2) marketing department file, and (3) manufacturing department file. With the push of a button, it all gets sent to the electronic spreadsheet.

Inside the spreadsheet, I must now calculate the sales volume and advertising expenditures to meet HQ's 1984 goals. But, if I can play the "what-if" game, finding the right combination of figures could take hours.

Luckily, the spreadsheet I'm using has Goal Seeking. This way, I can enter my two target values and let the spreadsheet calculate the right combination of sales volume and advertising. This way, I know I've got the right values—

I've learned that HQ doesn't like wading through reports to get the bottom line—they want to see it as clear as day. So, I'll move the spreadsheet results directly into the graphics module. In a few keystrokes I have a mountain of raw data distilled into a bright, three dimensional color bar graph.

Time Management — Spreadsheet

Information Management — 3-D Graphics

Communications — Word Processing

and does Arithmetic.
Your Appointments
Talks to the World.

Write Your Summaries.

Communicate With Your Offices.

And Still Keep Your Appointments.

Fortunately, this word processor is powerful enough that I can quickly call up last year's sales report, edit the changes, copy in the spreadsheet model, and include a command to print the graphs at the end of the report.

Now, I can rewrite the critical lead paragraph to get the wording just right, perform a global search and replace to update the year, and block margin the paragraphs for a professional appearance. 9:43 am. Finished!

After a quick review of all the work done, I thank my lucky stars for the powerful communication module. This allows me to simply display HQ's phone number from a list and with the push of a button, my intelligent modem calls the number. Then, a few keystrokes and—zip—I've sent it all to Chicago by electronic bit stream. Time 10:47. I just saved 4½ days!

I expect the quality of this report to raise some eyebrows at HQ. So, I'll schedule the rest of today off since I've already finished a week's work. Fortunately, my appointment scheduling system reminds me of my dentist appointment at 4:30. I'll also schedule a briefing at 9:00 am tomorrow for the sales staff and my secretary can use the rotary card file to call everyone on the list. Well, I'm off for the golf course—Good-bye!

Initially available on the IBM-PC and compatibles.

Not-So-Identical Twins

The FinalWord and Perfect Writer are rival word processors cut from the same block, but subtle differences arise in command structure and style.

Wendell Wallach

When two programmers from M.I.T. decided to design microcomputer software for text editing and print formatting, they modeled their software on the popular *EMACS* and *Scribe* programs that run on DEC minicomputers. The two programs, *Mince* and *Scribble,* were written in C and ran under CP/M. The programmers formed a company called Mark of the Unicorn.

In 1981 Mark of the Unicorn was approached by entrepreneurs who wanted to purchase the rights to combine, modify, and sell *Mince* and *Scribble* under a different name. These rights were naively sold for $10,000. The entrepreneurs from Perfect Software bound the two programs together, developed new documentation and tutorials, made a few other modifications, and re-marketed the programs under the name *Perfect Writer.*

Although the program has been vigorously promoted for only one year, it is already one of the most popular word processors around. Perfect Software was particularly successful in persuading microcomputer manufacturers to bundle the program with their computers. *Perfect Writer* is now bundled with more models of microcomputers than any other word processing software.

Mark of the Unicorn reviewed the criticism made of *Mince, Scribble,* and *Perfect Writer.* It made some revisions, added a few new features, and came up with *The FinalWord.*

Perfect Writer and *The FinalWord* both offer exciting features such as split-screen editing, virtual memory, and special formats for footnotes, in-

> Either program is well worth the trouble it takes to learn the commands.

dexes, and tables of contents. The programs are fast and provide all the editing and printing features expected from a good word processor. These are excellent word processors for writers, academics, and anyone who requires specialized features.

But (and all dream programs have a but) extensive features mean an extended and complicated system of commands. If you need a powerful word processor, either program is well worth the trouble it takes to learn the commands. However, if your word processing needs are limited, you may want to look elsewhere.

Shared Features

The FinalWord and *Perfect Writer* have several unusual features. The programs' speed, ability to work with multiple files, split screens, advanced format environments, and commands for formatting long documents are all a cut above what I had come to expect from a word processing program.

The essential features of *Perfect Writer* and *The FinalWord* are the same, but there are major differences in the way these features have been implemented. Both programs allow you to enter a file directly from DOS by typing the program's initials and the file name. Within a file, the second line from the bottom displays pertinent information, including the file name and an indication of how far through the file the cursor is located. The bottom line echoes commands, displays questions, and accepts responses. Although the editor does not display the cursor's line and column location, page width, or tab settings, other commands provide that information.

Text can be formatted on the screen. Both programs provide extensive commands for moving the cursor, inserting and deleting text, searching and replacing with query, and moving blocks of text. You can delete by next character, previous character, next word, previous word,

line, line forward, sentence, paragraph, or block of text. For those of us who are not good typists or can't always remember when *i* comes before *e* there is even a command for transposing characters.

Saving the Environment

An extensive series of advanced format commands enables you to set style parameters (margins, spacing, and line width) and typeface (bold, italic, underline, or special fonts). The most interesting advanced format commands are called *environments,* preset formats that bypass the laborious task of setting new margins, line spacings, and tabs. The Quotation environment automatically prints out the designated text single-spaced and indented ½ inch from either margin. Description is an environment that causes items in a list to be separated from and followed by an aligned descriptive paragraph (see Figure 1). The programs have environments for verse, indented text, addresses, flush-right text, centering, and many other format designs.

Another series of commands facilitates formatting long documents. You can automatically produce indexes, tables of contents, headers and footers, and footnotes. Files can be strung together with pages numbered sequentially, and all entries in the table of contents or index will be renumbered accurately. You can even print out an entire book using a single print command.

Both programs have extensive advanced format features and essentially the same formatting commands. Each command is introduced by the @ key and followed by a letter or a name.

Perfect Writer and *The FinalWord* were the first microcomputer word processors to offer split-screen editing. The screen can be divided into two windows, and different files or different parts of the same file can be viewed simultaneously. You can scroll and edit both documents and transfer

blocks of text from one document to the other. Split-screen editing is useful in countless situations. I frequently want to see whether a passage I wrote in another document is appropriate for a document I am working on. After using a word processor with split-screen editing, I find it hard to work without it.

A multiple-file buffer enables you to work with a number of files at the same time (7 files with *Perfect Writer,* 12 with *The FinalWord*). A buffer directory tells you which files are available in memory. Any file in the buffer can be immediately called to the screen in either of the two windows.

The programs were designed with virtual memory architecture, which permits you to work with files of unlimited size. Periodically, the program automatically exchanges information in memory with information stored on the disk.

Both programs support printers that can print with proportional spacing. During installation you can customize your program for nearly any printer or printing feature; for example, you can change the width of individual characters when using a nonstandard printwheel.

Perfect Writer

While I was impressed by *Perfect Writer*'s features, I was immediately put off by the complexity of the commands I had to learn. Fortunately, *Perfect Writer* comes with the best on-screen training program I have seen in a word processing program. By the time I had completed the training lessons, I found myself nimbly working with the commands.

Some of the complexity is eliminated by using mnemonic commands. For instance, the F key sends you forward, and the B key brings you backward. But some commands are introduced by holding down <Ctrl> while striking a second or even a third key, and other commands require you to strike and release the <Esc> key before hitting a second key. To make matters more confusing, a multiple-key command may or may not require that you hold down <Ctrl> while striking the other keys. For instance, <Ctrl>-X <Ctrl>-S implements the Save File command, while <Ctrl>-X 2 gives you the Two Window command.

The command form:

(α BEGIN(DESCRIPTION)
apple(α \ a red fruit that is very useful in making apple pies. Apples have a light crunchy texture.

orange(α \ a round orange-colored fruit used in making orange juice.

watermelon(α \ a large oblong fruit with lots of seeds—a summertime favorite.
(α END(DESCRIPTION)

The result:

apple	a red fruit that is very useful in making apple pies. Apples have a light crunchy texture.
orange	a round orange-colored fruit used in making orange juice.
watermelon	a large oblong fruit with lots of seeds—a summertime favorite.

Figure 1: Description environment on Perfect Writer

● Review

Commands introduced by <Esc> generally perform a larger version of the function introduced by <Ctrl>. <Ctrl>-F moves the cursor forward one character while <Esc>-F moves the cursor forward one word. For all commands that require you to strike more than two keys, the first two keys are <Ctrl>-X. The <Ctrl>-X command introduces a series of extended functions, including file commands, buffer commands, and split-screen display.

When you first get *Perfect Writer*, ignore the bound documentation and read the small pamphlet *Perfect Software Tutorial for the IBM PC*. This pamphlet explains how to load the file TEACHME.PW, and after loading it you are engaged in an excellent on-screen training program. Consecutive lessons lead you through all the important features of *Perfect Writer*. The authors carefully provided full commands at every juncture, including the B or A prompts for file-loading commands. Early in the tutorial you are introduced to the split-screen utility. The remaining lessons are taught using the lower half of the screen for scrolling through the lesson and the upper half for creating a document or calling up sample documents. The split screen is a wonderful utility for a training program.

One of the *Perfect Writer* lessons contains a bug. The second lesson tells you to press <Esc>-<Ins> in order to close a passage that has been opened for text insertion. When I tried this the command was not implemented, my PC locked up, and I had to reboot the system. I couldn't get past this point until I ignored the instructions and refused to issue the command.

Perfect Writer also contains minor bugs. My lesson program periodically presumed that I was using a Chameleon or a Columbia (IBM PC compatible computers for which the lessons were first written). More frustrating was the fact that the system's well-illustrated paperbound docu-

mentation was written for CP/M and that there were some discrepancies between the documentation and the program. For example, the main menu on the screen differed from the one in the book. Fortunately, the accompanying pamphlet for the PC covered many of these inconsistencies, and Perfect Software sent me a manuscript of new documentation specifically written for the PC and other MS-DOS computers. By the time you read this, the new documentation should be published.

> When I tried to close a passage, the command was not implemented, my PC locked up, and I had to reboot the system.

I was also irritated that holding down the <Esc> key a little too long flipped the screen over to a help menu that listed some activities assigned to the function keys rather than executing the command I wanted.

In adapting *Perfect Writer* for the PC, Perfect Software implemented the function keys and most of the special keys, including <PgUp>, <PgDn>, and <Backspace>. A plastic overlay for the function keypad lists the 36 commands assigned to these keys. You can move the cursor either with the cursor keypad or through keyboard commands. Computer aficionados will be disappointed by the lack of any program for changing or reconfiguring the keyboard. The CP/M version of *Perfect Writer* enables you to reassign commands to the keys of your choice, but the PC-DOS version does not.

Perfect Writer is configured for the IBM PC, but the printer selection menu is rather limited. Although *Perfect Writer* comes with a program for

customizing the software for any printer, some users may not know how to answer the questions the program asks, so Perfect Software gives a phone number for technical support. *Perfect Writer* does not provide any on-screen menus, but at any point in the program you can call up help menus that list all the commands.

We all occasionally destroy text before data has been saved on disk. *Perfect Writer* has an option for avoiding this headache: you can have your text automatically saved to disk every 512 characters.

The FinalWord

If your electricity is unreliable, *The FinalWord* may be the only word processor you should buy. A state-save feature constantly writes your document to a swap file on the disk. I unplugged my computer while working and then rebooted the system. My full document was still available on disk, including the last few characters I had typed.

The programmers at Mark of the Unicorn are clearly great technicians, but the company doesn't fully understand the needs of first-time users. While *The FinalWord* may be the Porsche of word processors, you have to be fairly proficient with a computer to take full advantage of the program and its customization features.

The FinalWord's documentation and training program are mediocre. Although the information in the documentation is accurate, it is often unclear what audience the authors have in mind. Sometimes the training program is almost condescendingly simple, while at other times the lessons are over the heads of the most experienced users. Some lessons are on disk, but most of the training is found in the manual. The lesson program's authors did not have Perfect Software's insight of using the split screen as a training tool.

While using *Perfect Writer* I kept wishing that all the commands were

accessible through the <Ctrl> key, and Mark of the Unicorn acted on this critique in creating *The Final-Word*. You can forget about the <Esc> key with *The FinalWord*. Even though they fulfilled my wish, I was rather disappointed with the results. Implementing all commands through the <Ctrl> key requires using multiple keys to do simple functions. For example, to delete three characters you might first strike <Ctrl>-D for delete, then <Ctrl>-C to indicate you want to delete a word, then <Ctrl>-A to repeat the action, and <Ctrl>-A to eliminate the third character. I performed the same function with *Perfect Writer* by holding down <Ctrl> and striking D three times.

<Ctrl>-X introduces you to a series of extended commands and a hierarchy of on-screen menus. The first menu gives you a list of nine submenus: The Buffer, Capitalization, File, Layout, Region, Set, Windows, Help, and Miscellaneous. The menus are welcome, but this arrangement means you need to press four keys to initiate an activity.

Happily, there are solutions to the problem of having to strike many keys to perform simple functions. Forty commands have been assigned to the function keys, and you can customize your keyboard and function keys so that the actions you choose are bound to the keys of your choice (see Figure 2). I was able to assign a Delete Word Forward command on both the <F1> and the <Ctrl>-\ keys without much difficulty.

The PC-DOS version of the program is configured with the cursor and the special keys already implemented. The Printer Selection menu is more extensive than that provided by *Perfect Writer*. Most of the major printers are covered, and a program for configuring *The FinalWord* to a custom printer is included. In fact, *The FinalWord* comes with the most extensive series of customization options I have seen in a word processor. The procedures for customizing your

<F1> through <F10>		<Ctrl> + <F1> through <F10>	
Reverse	Forward	Read file	Write file
Delete	Undelete	Find file	Backup file
Search	Print	List buffers	Two windows
Exit	Menus	Switch buffer	Switch window
Repeat	Again	Delete buffer	One window

<Shift> + <F1> through <F10>		<Alt> + <F1> through <F10>	
Set marker	Go to marker	Highlight on/off	Fill on/off
Delete to marker	Undelete	Query replace	Global replace
Copy to marker	Append to KILLS	Advanced print	Directory edit
Fill paragraph	Justify paragraph	Reverse sentence	Forward sentence
Center line	Unjustify paragraph	Reverse yank screen	Forward yank screen

Figure 2: Default settings for The FinalWord's function keypad

program are menu-driven and not too difficult to follow. But if you have any problems, Mark of the Unicorn provides technical support over the phone.

Eenie Meenie Minie Mo
While I can recommend either *The FinalWord* or *Perfect Writer*, I've changed my mind many times about which program I like best. The choice mainly depends on what kind of command structure you prefer.

The FinalWord is the cleaner program, with a logical system of commands and a few extra features including state-save, on-screen menus, and keyboard customizing. But because many keys must be pressed for common commands, I was not happy with the program un-til I had extensively reconfigured the keyboard. The joy of the program is that one can do that. *The FinalWord* is most suitable for word processing aficionados.

The FinalWord comes with the most extensive series of customization options I have seen in a word processor.

While *Perfect Writer* has more bugs than *The FinalWord,* it comes with better documentation and training for first-time users. The training helps simplify the commands, and the essential commands require fewer keystrokes than with *The FinalWord*. Beginners and those who are not inclined to customize their programs will probably find it easier to get started with *Perfect Writer* than with *The FinalWord*.

Other factors to consider are price and the availability of adjunct programs. *The FinalWord* lists for $300 and *Perfect Writer* for $495. Because of Perfect Software's aggressive marketing, dealers' prices for the two programs may show a much smaller discrepancy.
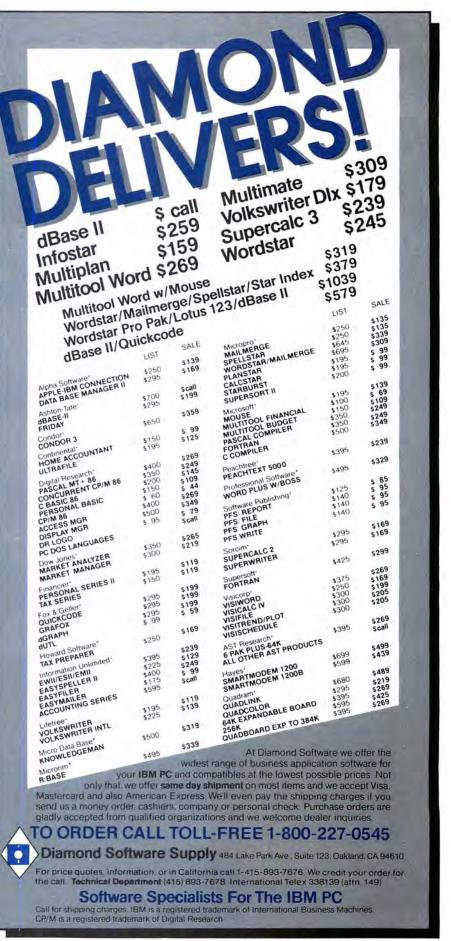
Although Mark of the Unicorn plans to release programs for mail merge and spelling correction, they are not available yet. However, you can use programs from other vendors for those functions. Perfect Software

has already released a system of integrated software that includes a spreadsheet and utilities for filing, mail merging, and spelling correction (see "The Almost-Perfect Library" in this issue). If you need these utilities, *Perfect Writer* and its companion programs will suit you.

Soon we will meet a third child of *Mince*. Mark of the Unicorn has sold Alpha Software the rights to modify and market *The FinalWord* under another name. Meanwhile, if you need a powerful word processor, check out *The FinalWord* and *Perfect Writer*. ⊜

Wendell Wallach works for Multi-Business Computer Systems of Portland, Connecticut, as a microcomputer consultant to universities, businesses, and public schools.

The FinalWord
Mark of the Unicorn, Inc.
222 Third St.
Cambridge, MA 02142
617/576-2760
List price: $300
Requirements: 64K, two disk drives
(one must be double-sided)

Perfect Writer
Perfect Software
1400 Shattuck Ave.
Berkeley, CA 94710
800/222-4222, 415/644-3001
List price: $495
Requirements: 64K, two disk drives

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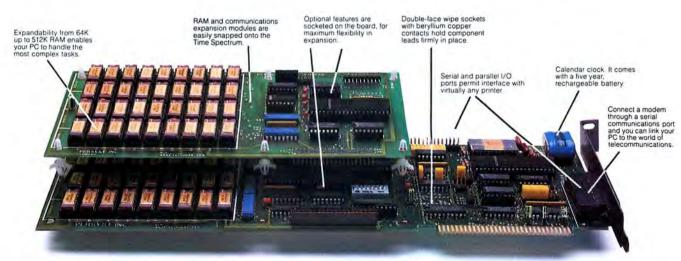
And still only consume *one* slot.

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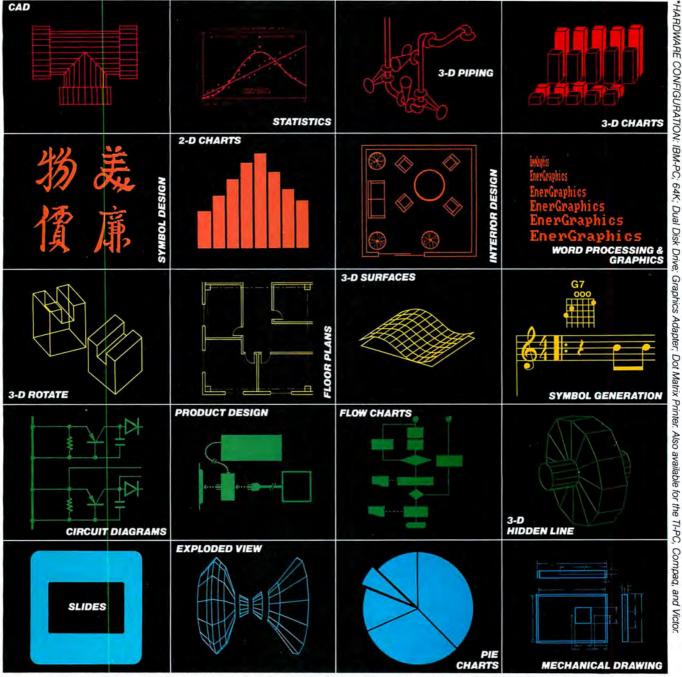
Persyst Products, Personal Systems Technology, Inc., 15801 Rockfield Blvd., Suite A, Irvine, CA 92714. Telephone: (714) 859-8871. TWX: 467864.

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The Almost-Perfect Library

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and truly integrated.

Wendell Wallach

Nearly every major software company has introduced or is planning to introduce a system of integrated software. The integrated package (typically a word processor, a spelling checker, a spreadsheet, and a data base manager) is a gamble for both software companies and consumers.

Whether computer users will shell out hundreds of dollars for an integrated package just because it is integrated is doubtful. One problem with integrated packages is that they tend toward mediocrity. In the interests of compatibility and competitive pricing, the individual programs in the package are usually scaled down, their special features sacrificed for the good of the whole. Another problem with integrated packages is that some are not truly integrated.

These problems don't seem to apply to *The Perfect Library*, an integrated package from Perfect Software that comprises *Perfect Writer*, *Perfect Calc*, *Perfect Filer*, and *Perfect Speller*. Although individually some of these programs have limitations, they are all good programs, and they work well together.

Perfect Software has paid a great deal of attention to documentation, packaging, and training tools that make *The Perfect Library* attractive to first-time users. The package includes lessons, keyboard overlays for the function keys, and a quick-reference command summary.

The programs are united by a common set of commands; cursor movements, file maintenance, and other common activities are accomplished with the same commands in all the programs. That means that once you have learned one program, it's easy to learn the others.

All files are written in true ASCII code, which makes it easy to move files from one program to another. A spreadsheet file can be edited using the word processor, and data from the spreadsheet or the filer can easily be integrated into a written report. In fact, files created using *The Perfect Library* can be used by many other programs.

The centerpiece of *The Perfect Library* is the highly regarded *Perfect Writer*. *Perfect Writer* is reviewed in another article (see "Not-So-Identical Twins" in this issue); this article looks at what the other programs offer and how they work together.

Perfect Calc

In the spreadsheet race *Perfect Calc* has been overshadowed by *1-2-3* and *MBA*, integrated management tools that combine data management with graphics. But compared to other stand-alone spreadsheets, *Perfect Calc* is among the best. *Perfect Calc* has all the features we have come to expect from an electronic spread-

sheet, including the ability to alter the width of individual columns. The spreadsheet provides 52 columns by 255 rows; 8 columns and 24 rows can be displayed at one time.

Perfect Calc's virtual memory architecture lets you work with extremely large files without fear of running out of memory. Virtual memory is particularly good for those who don't have a great deal of RAM to play with. Periodically, the computer exchanges information stored in its memory with information stored on disk, thus preventing the kind of out-of-memory errors that often plague electronic spreadsheet users.

> Once you have learned one program, it's easy to learn the others.

Most spreadsheets allow you to create windows, split the screen, and view different parts of the spreadsheet simultaneously, but *Perfect Calc* is the only electronic spreadsheet that lets you call up, view, and work with two different files at the same time. That means that the top half of the screen can display a different spread-

	a	b	c	d	e	f
1				Annual Budget Report		
2						
3	Description	January	February	March	April	May
4						
5	Feed	9675.78	12430.25	14893.08	8270.67	6793.22
6	Medicine	210.77	313.65	118.06	75.09	88.65
7	Equipment	516.97	227.83	415.69	338.91	42.99
8	Payroll	4413.56	4512.86	4353.78	4474.04	4123.95
9						
10						
11						
12						

	a	b	c	d	e	f
1				Feed Report		
2						
3	Feed Type	January	February	March	April	May
4						
5	Barley	454.99	319.44	219.60	529.83	274.67
6	Oats	1253.05	896.57	1028.55	1302.72	954.87
7	Hay	2254.78	1975.79	1794.66	1933.03	1189.76
8	Cottonseed Hulls	1456.11	1733.75	2437.71	1944.82	1552.43
9	milo	2018.22	1942.61	2119.02	2005.11	1832.14

b:10arts * a1

Figure 1: Split-screen capabilities of Perfect Calc displaying two files simultaneously

sheet from the one you are working on in the bottom half of the screen (see Figure 1). The windows can be manipulated independently, and data can be transferred from one spreadsheet to the other. All changes can be viewed on the screen.

Perfect Calc's multibuffer capability enables you to work with as many as seven files at one time. The program keeps track of all the files and allows you to move among them, inserting and editing at will.

Perfect Calc comes with many sample spreadsheets for study or use. One set of sample spreadsheets is particularly valuable in illustrating *Perfect Calc*'s powerful associate file utility. These spreadsheets were set up for real estate investors who want

to track the value of investments. Individual spreadsheet files record income and expenses for maintaining each piece of property. A master spreadsheet tracks the total worth of the owner's property portfolio.

Within this master, individual cells have pointers that indicate that the values for those cells will be derived from values on the spreadsheets for the individual properties. When you enter the master spreadsheet, the associated files are automatically loaded into the buffer, and the income or loss from individual properties is automatically transferred to the appropriate cell in the master spreadsheet. Any changes made in the individual spreadsheets are immediately reflected in the master. The program is also capable of linking secondary and tertiary spreadsheets so that a se-

ries of consecutive changes can be made from one spreadsheet to another.

Perfect Calc's function library of built-in formulas is unusually large and includes financial formulas, arithmetic operations, and statistical indicators. It is possible to expand the function library, add your own specialized formulas, or modify the built-in functions.

Perfect Calc uses the same on-screen tutorial format that works so well with *Perfect Writer*. After loading a lesson, you are quickly introduced to the essential commands for loading and saving files, scrolling, and splitting the screen. Once the screen is split, the lower half displays text and the upper half is used for spreadsheet manipulations, including

⬛ Review

calling up demonstration templates. The designers of this training program were very careful to give the student clear directions at every juncture. The tutorial is so well implemented that a beginner should be able to grasp even *Perfect Calc*'s more complex features.

The one hitch to learning *Perfect Calc* is that you are expected to remember a fairly complex system of commands. While help screens are available and most commands are mnemonic (<Ctrl>-P for previous line or <Ctrl>-O to open a line), *Perfect Calc*'s command structure is somewhat more cumbersome than that of similar spreadsheets.

The PC version of *Perfect Calc* takes full advantage of the keyboard. The cursor keys, <PgUp>, <PgDn>, <Ins>, and <Home>, and the function keys have all been implemented. The function keys have been assigned 36 commands, which are listed on a plastic overlay that comes with the program. The function keys can be struck alone or in combination with the <Alt>, <Ctrl>, or <Shift> keys.

Perfect Calc integrates easily with *Perfect Writer*. At the end of a *Perfect Calc* session you need merely save the spreadsheet or region of a spreadsheet with an .MSS extension in the file name. This file can then be edited by *Perfect Writer* or immediately inserted into a *Perfect Writer* document. I found this utility particularly useful for solving the problem of editing tabular matter or charts in word-processed documents. I merely set up the charts in *Perfect Calc*, saved the data in a file with an .MSS extension, and inserted the file into my document. If by chance you find yourself unable to load a spreadsheet because some data has been destroyed, you can edit the spreadsheet with *Perfect Writer* and repair any damage.

Organization: PC World
Address1: 555 De Haro St.
Address2:
City: San Francisco   State: CA Zip: 94107
Country: USA
Phone: (415) 861-3861   Active [x]
                                        .Inactive [ ]

Contact Person: David Bunnell
Comment: Publisher

                                        Date Entered: 1 /1 /80

Figure 2: Sample form for Perfect Filer form letter

Most users will find that *Perfect Calc*'s capabilities far exceed their spreadsheet needs.

Perfect Filer

Record management programs vary from simple card-filing systems to sophisticated applications development tools such as *dBASE II* and *InfoStar*. Perfect Software was correct to call their program a filer. As a filing program, *Perfect Filer* has some nice features, but after the versatility I found in *Perfect Writer* and *Perfect Calc*, I was surprised to find *Perfect Filer* so limited.

Fortunately, *Perfect Filer* is fully menu driven, so you don't have to be a programmer to design and manipulate your data records. The three subprograms—Create, Filer, and Move—let you build or modify a record file, add and delete data, generate form letters and labels, sort by up to five consecutive fields, format reports and lists, and move individual records between data base files. A record is limited to 24 lines, 70 data fields, and 1024 characters per data field.

Perfect Filer is both the information manager and the mail merging program of *The Perfect Library*. It is not necessary to buy another package for large mailings. Two prestructured mailing list templates allow you to begin compiling files immediately.

Using *Perfect Filer* with *Perfect Writer*, I was able to set up and print out a short form letter to five people in less than 10 minutes. The mail-

merging feature is extremely easy to use, but it does have one drawback: according to the documentation, a form letter used for large mailings cannot contain some of *Perfect Writer*'s extended format commands. Fortunately, there is a way around this limitation. The letters can first be output to a data file and then printed out by *Perfect Writer*.

Perfect Filer is both the information manager and mail merging program of *The Perfect Library*.

One unfortunate program design decision was to give all data files the same file name. That means that only one data file can be kept on each disk at a time. This system makes for a very inefficient use of disk space and makes working with separate mailing lists difficult.

Perfect Filer does not perform calculations within fields. To do any mathematical manipulations of data, you have to transfer the data to a *Per-*

```
(Perfect Writer) Perfect Speller Selection Menu
© 1982. Perfect Software, Inc.

Available options for the Spelling Checker are:

A —Add a new dictionary
B —Change the backup file extension name
D —Use the dictionary specified instead of DICTNARY.SPL
L —List the misspelled words on the terminal
M —Mark words with the specified character
N —Make no backup of the file being checked
O —Send all the output to the specified file
P —Use the specified prefix/suffix table
G —Start checking the spelling now
X —Return to the top level of the menu

Your Pleasure: (A, B, D, L, M, N, O, P, G, X)▄
```

Figure 3: Perfect Speller's main menu

fect Calc spreadsheet using *Perfect Calc*'s split-screen function, and then manually key the recalculated totals back into the data file.

The training program for *Perfect Filer* is standard: read the directions from the manual and hit the prescribed keys. The manual is well illustrated, and the directions are straightforward. Predesigned data bases are used to illustrate the form letter and data manipulation capabilities (see Figure 2). The lessons include a guide for creating your own data base and producing a customized report.

If you want to create reports, do large mailings, or make simple sorts, you will probably be pleased with *Perfect Filer*. But if your data management tasks require mathematical calculations, working with many files simultaneously, complicated sorts, or customized reports, plan on buying a full data base applications development system from another vendor. If you buy another program for record management, you may still have to use *Perfect Filer* for mail merging. That means you'll have to find a way to transfer data between the other data manager and *Perfect Filer*; oth-

erwise, you will have to waste time keying the same data into both programs.

Perfect Speller

While editing a document in *Perfect Writer*, you can strike <Ctrl>-X S and go immediately into *Perfect Speller*. A message appears on the bottom of the screen, 'File to spell <CR>:'. Press <Enter> to begin an immediate correction of the current file.

Perfect Speller comes with a 50,000-word equivalent dictionary and processes text at a rate of 4000 words per minute. A page of text can be processed in under 10 seconds. "Equivalent" means that the dictionary records the roots of words separately from suffixes and prefixes. *Perfect Speller* works with a table of 256 prefixes and suffixes. While a 50,000-word equivalent dictionary has the advantage of taking up less disk space than a 50,000-word literal dictionary, the literal dictionary would be more accurate. An equivalent dictionary will not catch nonsense words such as *buyed* or *post-operationment*.
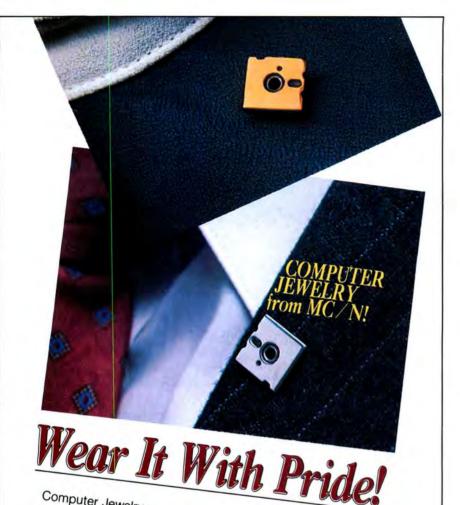
Perfect Speller lets you choose to view the unidentified words individually or have them marked in the

text. It also gives you the option of correcting the words in context. One-letter commands are available in both modes: A to add the word to the dictionary, C to change the word, E to return to *Perfect Writer*'s edit mode, I to ignore the word, R to enter the root of the word in the dictionary, and ? to get help.

When you enter the spelling correction program from the main menu (see Figure 3), you have the additional options of creating a new dictionary, changing the backup file extension name, using a secondary dictionary, listing misspelled words on the screen in alphabetical order, or creating a specified prefix/suffix table such as German prefixes and suffixes. Other features enable you to check the spelling of a single word during editing or give one-line commands from DOS for correcting misspelled words.

Only a few spelling correction programs contain more features than *Perfect Speller*. Some spelling checkers come with a literal dictionary and a utility that suggests words spelled similarly to your misspelled word. Nevertheless, I was so pleased by *Perfect Speller*'s convenience, speed, and accuracy that I doubt I would use any other spelling correction program with *Perfect Writer*.

Documentation

Perfect Software plans to produce a new set of manuals for MS-DOS computers, but the present set of bound manuals, while well illustrated and detailed, was written for CP/M computers and can be confusing to the PC owner. For example, the manuals discuss the <Del> key, but the <Del> key is not implemented on the PC, and the functions performed by the <Del> key on other computers are performed by the <Backspace> key on the PC. *Perfect Calc* and *Perfect Writer* come with short pamphlets that say "Read Me First" and cover some of the essential

◖ Review

information regarding the PC version of the program, but I still had to spend time trying to understand the differences between the documentation and the way my program performed.

Perfect Software has been giving big discounts to computer dealers, so you should be able to buy the programs for considerably less than their list prices. The company plans to round out their line of software with *Perfect Thesaurus, Perfect Graph, Perfect Executive,* and *Perfect Link.*

For those of you who purchased an IBM PC compatible computer in which *The Perfect Library* was bundled, the news is good. You own an excellent system of integrated software that will meet nearly all your word processing, filing, and spreadsheet needs. For those of you who are considering buying *The Perfect Library,* one word of caution: if you expect to use the computer for complex data management functions or moving large amounts of data between a spreadsheet and a filing system, you may be disappointed in the Perfect system of software. There are few PC owners, however, who need more versatility than they will get from *The Perfect Library.* ◖

Wendell Wallach works for Multi-Business Computer Systems of Portland, Connecticut, as a microcomputer consultant for universities, businesses, and public schools.

Perfect Software
1400 Shattuck Ave.
Berkeley, CA 94710
415/527-2626
List price: Perfect Writer $495, Perfect Speller $295, Perfect Filer $595, Perfect Calc $295, The Perfect Library $1250
Requirements: 128K, two disk drives

d hard way.


```
. prompt select
***UNKNOWN COMMAND
prompt select
CORRECT AND RETRY (Y/N)?
```

R way.

```
Push [ESC] when done with this data.
┌─────────────────────────SELECT─────────────────────────┐
│ SELECT is used for retrieving data from a relation. You need to specify the │
│ relation (table) with the data and what attributes (columns) you want to   │
│ see. If you want to see all columns you can use ALL for the attributes. If you │
│ want the data sorted, you may optionally specify attributes for sorting. If │
│ you want to restrict the rows selected, you can optionally specify the selec- │
│ tion conditions with a "WHERE" clause. Totals and column width can be │
│ specified for each attribute. │
└─────────────────────────────────────────────────────────┘

┌─────────────────────────PROMPTS─────────────────────────┐
│ Name of relation        :  [_____]            │
│ Attribute name(s) or ALL :                               │
│ Sorted by attributes (s) :                               │
│ Where (optional)        :                                │
└─────────────────────────────────────────────────────────┘
```

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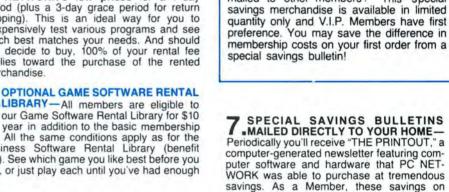
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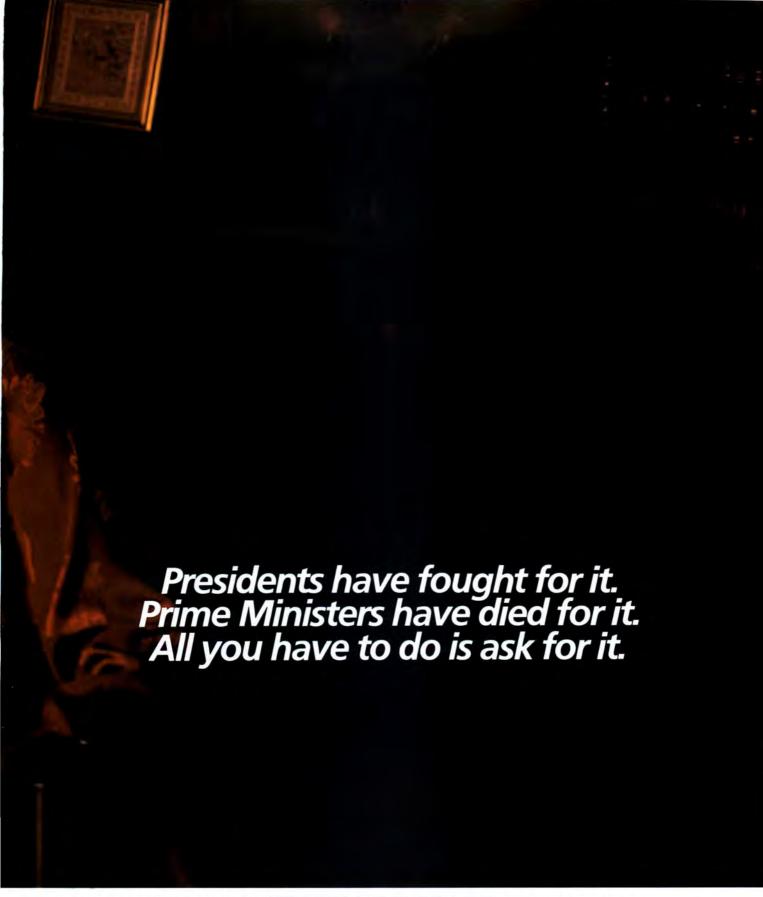
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/X Marks the Macro

Eric Weiss
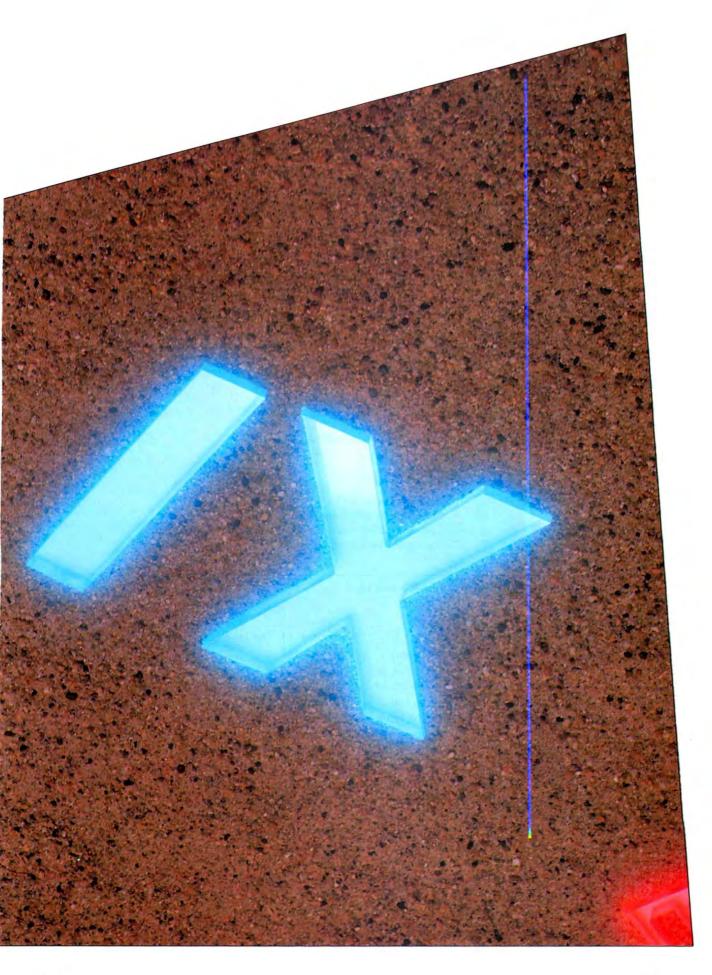
One characteristic that separates Lotus's 1-2-3 from its spreadsheet competitors is its advanced use of macros. This article takes a modular, structured approach in creating a master macro made up of smaller, stand-alone macros. Also revealed herein: the little-known use of macros within macros.
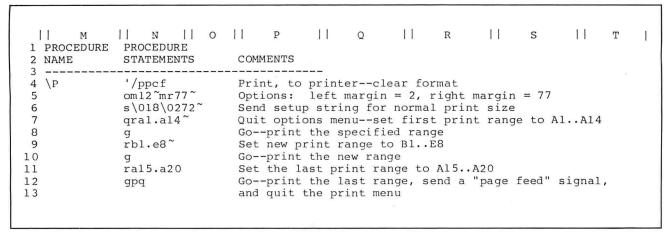
An electronic spreadsheet is a software package that requires no prior knowledge of programming. The user performs an application by entering labels and data in the same way that he or she would create a multicolumn worksheet by hand, but with the extra convenience of the computer performing calculations. The user can change a worksheet without having to redo it, and formal reports can be printed as often as needed.

Although electronic spreadsheets are time-savers compared to pencil and pad, they can still be somewhat tedious to use. Labels and numbers must be entered cell by cell, and cell formulas, which specify calculations and the relationships between cells, may be lengthy, confusing, and difficult to write. Any method of automating spreadsheet functions, from label and formula entry to worksheet formatting and printing, is highly desirable.

Keyboard macros store a sequence of keystrokes that represent labels, formulas, or commands that perform a specific function. Novices and intermediate users of *1-2-3* often write macros to automate report printing from frequently used spreadsheets or to handle file and graphics operations. But *1-2-3* contains a special set of commands, accessible only from within a macro, that enable the user to extend the capabilities of *1-2-3* and customize its operation.

```
   ||   M    ||   N   ||   O  ||    P     ||    Q     ||    R    ||    S    ||   T   |
 1 PROCEDURE   PROCEDURE
 2 NAME        STATEMENTS       COMMENTS
 3 ---------------------------------------------
 4 \P          '/ppcf           Print, to printer--clear format
 5             om12~mr77~       Options:  left margin = 2, right margin = 77
 6             s\018\0272~      Send setup string for normal print size
 7             qral.a14~        Quit options menu--set first print range to A1..A14
 8             g                Go--print the specified range
 9             rb1.e8~          Set new print range to B1..E8
10             g                Go--print the new range
11             ra15.a20         Set the last print range to A15..A20
12             gpq              Go--print the last range, send a "page feed" signal,
13                              and quit the print menu
```

Listing 1: Sample print macro

Version 1.0 /X commands are:

/XM (location)˜	invoke a menu in the control panel
/XG (location)˜	branch to the indicated macro cell
/XI (formula)˜(t-action)˜	if-then
/XQ˜	done; return to READY mode

Version 1A includes these additional commands:

/XC (location)˜	call subroutine (GOSUB)
/XR˜	return from subroutine
/XL (message)˜(location)˜	prompted label input
/XN (message)˜(location)˜	prompted number input

Figure 1: Macro commands for 1-2-3 versions 1.0 and 1A

Defining Macros

A keyboard macro is a series of *1-2-3* commands and text that is entered as a label in any range of cells. It's as if you were recording some keystrokes so that you could "play them back" later. You must name the range containing the macro (a single cell is still considered a range) using the */Range Name Create* command. The name must be two characters long; the first character must be a backslash, and the second can be any letter from A to Z. Once the range is named, the commands in the macro will be executed whenever you hold down the <Alt> key and press the letter used in the range name.

1-2-3's keyboard macro facility can be used simply to save typing keystrokes by storing the text of frequently used labels. For example, if you want to insert the months of the year in several labels, you can create 12 single-cell macros starting with JANUARY in a cell that you name \J. The labels can then be entered by typing
<Alt>-J SALES
<Alt>-J COST OF SALES
to produce
JANUARY SALES
JANUARY COST OF SALES
This limited application requires more effort to set up than is saved by using it. Command sequences that automate repetitive operations, such as the one shown in Listing 1, are more common. Listing 1 is a short macro that prints the contents of three ranges whenever the <Alt>-P key combination is pressed. This macro is a range of cells containing stored character equivalents of the keystrokes used to control printing. To create the macro use the command
/Range Name Create \ P <Enter> N5..N13 <Enter>
in which N5 and N13 are the first and last cells of the macro respectively.

```
    ||   A    ||    B      ||    C     ||    D    ||   E    ||   F    ||   G    |
 1 PROCEDURE     PROCEDURE                COMMENTS
 2 NAME          STATEMENTS
 3 ----------------------------------------------
 4 PROC          '/xgsetup~              Format worksheet
 5 STORE         '/xgds~                 Define storage
 6 INPUT         '/xg\i~                 Accept inputs
 7 STEP2         '/xgpaycomp~            Compute payment
 8 STEP3         '/xgbuild~              Create amortization schedule
 9 STEP4         '/xgsummary~            Do totals
10 DONE          '/xq~                   Return to ready mode
11
12
13
14 \S           '/wgcl2~                 Set global column width to 12 characters
15             '/wgf,2~                  Set global format to "," with 2 decimals
16             {goto}il~                 Position cursor at labels column (cell I1)
17             '/wcs20~                  Set column width to 20 characters
18             '/xgproc~                 Branch to macro called PROC
19
20
21
22
23 SETUP        {goto}i5~                Set up labels
24             PRINCIPAL~{down}
25             RATE~{down}
26             TERM (IN YEARS)~{down}
27             PAYMENT~{down}{down}
28             {right}                   Set up column headings
29             "PERIOD #~{right}
30             "PAYMENT~{right}
31             "INTEREST~{right}
32             "PRINCIPAL~{right}
33             "O/S BALANCE~{end}{left}{down}
34             '\=~
35             '/c~kl1.nl1~
36             '/xgstore~                Branch to define storage procedure
37
38
39
40 DS           '/rncinareal~j5~         Principal input area
41             '/rncinarea2~j6~          Annual rate input area
42             '/rncinarea3~j7~          Term input area
43             '/rncinarea4~j8~          Payment input area
44             '/xginput~                Branch to input procedure
45
46
47

(continues)
```

Listing 2: Loan amortization schedule—example macro system

With a little practice this type of macro can be written easily. You can apply the same concept to many cursor movement, file-handling, and graphing operations.

But macros are capable of much more. The *1-2-3* user manual briefly describes the /X commands, which are not accessed from the keyboard and can be used only in macros. Figure 1 is a list of advanced macro commands for *1-2-3* versions 1.0 and 1A. These commands enable users to create memory-efficient macros to handle complex modeling tasks. The master macro shown later in this article (see Listing 2) takes up only 6.8K of memory when first loaded. A formatted spreadsheet performing the same function takes up over 100K. As the macro version of the application is executed, the macro dynamically allocates memory in direct proportion to the number of iterations performed, something a formatted spreadsheet cannot do.

```
   ||    A   ||    B   ||   C   ||   D   ||   E   ||   F   ||   G   |
48
49 \I          {goto}inareal~
50            {left}{right}             Adjust window position
51            {?}~                      Input principal
52            {down}
53            {?}~                      Input rate
54            {down}
55            {?}~                      Input term
56            '/xgstep2~                Branch to step2 procedure
57
58
59
60 PAYCOMP    {down}{left}
61            '/cprompt1~~              Copy PROMPT1
62            {right}
63            {?}~                      Input payment or 0
64            '/xi$inarea4<>0~/xgstep3~
65            '@pmt($inareal,(($inarea2/100)/12),($inarea3*12))~
66            {left}
67            PAYMENT~
68            {right}
69            '/xgstep3~                Branch to step3 procedure
70
71
72
73 BUILD      {goto}nl3~                Position cursor
74            $inareal~                 Get beginning balance
75            {goto}j14~                Position cursor
76            {up}{up}{up}{up}          Adjust window position
77            {down}{down}{down}{down}
78            '+{up}+1~{right}          First period
79            $inarea4~                 Get payment amount
80            {right}                   Compute interest paid
81            '+nl3*(($inarea2/100)/12)~
82            {right}
83            '+{left}{left}-{left}~    Point and compute principal paid
84            {right}
85            '+{up}-{left}~            Compute o/s balance
86            {end}{left}
87 LOOP       '/c{end}{right}~          Copy logic
88            {down}~{down}
89            '/rnccount~~              Name count range
90            '/xicount<($inarea3*12)~/rndcount~/xgloop~
91            '/xgstep4~
92
93
94
95 SUMMARY    {down}{down}{right}
96            '@sum({end}{up}{end}{up}.{end}{down})~
97            '/c~{right}.{right}~
98            {end}{right}{right}+{up}{up}~{up}
99            '\-~
100           '/c~{left}.{left}{left}~
101           {down}{down}
102           '\=~
103           '/c~{left}.{left}{left}~
104           '/xgdone~
105
106
107 PROMPT1   PAYMENT AMOUNT, -->  _____  <-- OR 0 TO HAVE ME COMPUTE IT.
108
109
110 \D        '/fs~r                    File save and replace
```

Listing 2 *(continued)*

Templates vs. Macros

A formatted spreadsheet is known as a template; cell formulas are already established and perform calculations on inputted values. A user loads the template file into *1-2-3*, enters values, and lets the computer do the necessary calculations. Though a template is easy to use, it is hard to alter and takes up a lot of space in memory and on disk.

A macro can, in most cases, perform the same functions as a template, but it takes up less memory and is easier to understand and modify. However, you must spend more time planning, writing, testing, and correcting macros. A macro runs slower too, since each instruction requires at least one additional machine cycle to be read and executed besides the cycles needed to read and execute cell formulas.

So when should you use a macro? Generally, macros are best when a template requires complex cell formulas and many decisions, the data resides in several files, and the application is very large or its size varies from run to run.

A Sample Macro

The macro developed for the loan amortization schedule in the following example might be better suited for a template, but it is sufficiently complex to illustrate all the capabilities of a properly structured macro. This macro is composed of smaller, self-sufficient macros that are linked together, in much the same way that source code modules are combined to form a large, complex computer program.

The first objective in writing a macro is knowing exactly what it should do when it's completed. The example macro should accept input from the keyboard (the loan note's principal, pro rata annual interest rate as a whole number, and term in years). At the user's option, it should accept a payment as input or compute the payment from other keyboard input. From these inputs, it should produce a full amortization schedule, by period, in a desired format (see Figure 2). When the macro is completed, the user should be guided through the input procedure, and the computer should control everything except entry of the actual values.

The macro can be placed in any worksheet cell that cannot be written over, copied to, deleted, or otherwise affected by using the worksheet. Be especially careful not to locate macros where they may be altered by the effects of sorting data or inserting columns. Many users prefer to locate print and file-handling macros for an existing worksheet in the lower right corner. In my example, however, a worksheet does not yet exist and data will not be sorted, so the macro can start at the upper left corner.

The entire macro could be contained in one cell of the worksheet, but that would make it difficult to edit or change. You could write a macro using one column, but the procedures would not be easy to read. It is preferable to use smaller macros and at least three columns (see Listing 2). Column C is left blank to make the other columns more readable.

In writing any macro, remember that each statement is contained in one cell and entered as a label. Use a single quote as the label prefix for any macro cell that begins with a slash, backslash, or "at sign" character. Type the labels as they appear in cells A1 to D2. Type a backslash and a hyphen to create a repeating label in cell A3. Then use the */Copy*<Enter> B3..D3 command to extend the dashed line to column D.

Next type in the set of macros that start with PROC. These macros are simply a series of commands that call other macro procedures. This group is called the linking macro; it will determine the order of execution

> The macro can be placed in any worksheet cell that cannot be written over, copied to, deleted, or otherwise affected by using the worksheet.

of the other procedures. Of course, none of the statements in this section will work until the macros they call are created and activated by the */Range Name Create* command.

The macro called \S formats a workspace and sets up a column to hold labels up to 20 characters long. It then invokes the PROC linking macro. This, in turn, invokes SETUP, which types labels into several cells. Type in the SETUP macro as shown in Listing 2 starting at cell A23. In addition to the single-quote label prefix, the words entered as labels may have single or double quotes for left or right justification and are followed by a tilde ($\sim$), the symbol for <Enter>. At this point you should save the worksheet including the macros you've created so far. Use the */File Save* command and type in the file name (you might call it "amortize").

To save time you may want to create a file-saving macro: /fs~r will save the file under the current file name and replace the old version of the file. On the worksheet, enter the text of the macro at cell B110 and call it \D using the */Range Name Labels Right*<Enter> command with the cursor on cell A110 (see Listing 2).

Before the macros can be executed, range names must be assigned to each of them. The best way to do this is to type in all the macros first and then make the procedure name in column A the range name of the pro-

```
      |   I       ||      J      ||      K     ||      L    ||    M     || N ||    O    |
   5 PRINCIPAL          10,000.00
   6 RATE                   15.00
   7 TERM (IN YEARS)         1.00
   8 PAYMENT               902.58
   9
  10                     PERIOD #       PAYMENT     INTEREST     PRINCIPAL  O/S    BALANCE
  11                   ============================================================
  12
  13                                                                          10,000.00
  14                        1.00        902.58       125.00       777.58       9,222.42
  15                        2.00        902.58       115.28       787.30       8,435.11
  16                        3.00        902.58       105.44       797.14       7,637.97
  17                        4.00        902.58        95.47       807.11       6,830.86
  18                        5.00        902.58        85.39       817.20       6,013.66
  19                        6.00        902.58        75.17       827.41       5,186.25
  20                        7.00        902.58        64.83       837.75       4,348.50
  21                        8.00        902.58        54.36       848.23       3,500.27
  22                        9.00        902.58        43.75       858.83       2,641.44
  23                       10.00        902.58        33.02       869.57       1,771.87
  24                       11.00        902.58        22.15       880.43         891.44
  25                       12.00        902.58        11.14       891.44            .00
  26                                 --------------------------------------------------
  27                                 10,831.00       831.00    10,000.00            .00
  28                                 ==================================================
```

Figure 2: Completed amortization schedule

cedure in column B. Use the command /*Range Name Labels Right* and then use the cursor control keys to highlight column A, from the cell containing PROC to the one containing \D. In one operation a range name has been created for each macro and made part of the macro.

However, if you want to test one of the macros independently, you can temporarily change the name of the range to a backslash and a single letter. You should also temporarily add an extra label prefix (a single or double quotation mark) to the last statement in the group (the one that starts /xg...). The extra label prefix will cause the statement to be printed on the screen rather than executed.

If you test the \S macro independently, for example, the screen should display the labels formatted as shown in Figure 3. If you hear a beep, check the control panel to see what command was executing when the error occurred. One or more macro statement may be missing a tilde, or a label or bracket could be out of place.

Macro Statements

In the \S macro, a series of /*Worksheet* commands format the workspace. In SETUP there are several bracket symbols that indicate cursor movement keys. Where a word is followed by a tilde, *1-2-3* types that word into

the cell at which the cursor is located. The \S macro also contains two statements ({goto}I1~ and /xgsetup~) that are very similar. {goto} is a cursor control command, the macro equivalent of the <F5> key. /XG, however, is a macro branching instruction. When *1-2-3* encounters such a statement, it tells the computer in what cell it will find its next instruction. This command works with range names and cell addresses, but using range names improves the portability of macros.

When you write your own macros, after you have done a SETUP you should at least sketch out how cell formulas will be placed in the worksheet. From Figure 3, you can see that column J will show the period numbers from 1 to *n*, where *n* is the last payment in the term. Column K will be for the payment amount; columns L and M will contain formulas to compute portions of the payment attributable to interest and principal respectively. Column N will consist of formulas to reduce the outstanding balance by the amount of principal paid each period.

A macro must then be written that takes the input data, places it in the worksheet, and uses it to build the entries and formulas for each row in columns J through N. The steps in this process are:

1) Get the beginning outstanding balance and put it in N13.

2) Assign a number to the first payment in J14.

3) Put the payment amount in K14.

4) Multiply the amount in N13 by the pro rata an-

```
        |    I        | |      J      | |     K     | |     L     | |    M    | |  N | |     O    |
   5 PRINCIPAL
   6 RATE
   7 TERM (IN YEARS)
   8 PAYMENT
   9
  10                     PERIOD #        PAYMENT       INTEREST     PRINCIPAL    O/S       BALANCE
  11                     =====================================================================
  12
  13
  14
  15
  16
  17
  18
  19
  20
  21
  22
  23
  24
  25
  26
  27
  28
```
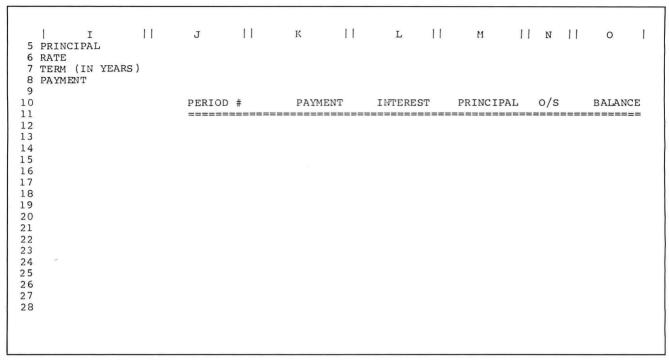
Figure 3: Results of SETUP macro

nual percentage rate (APR), or interest, and put the result in L14.

5) Subtract the interest in L14 from the payment in K14 and put the result in M14.

6) Subtract M14 from N13 to get the new outstanding balance.

7) Repeat up to and including the last payment in the term.

To make the macro system more portable and flexible, substitute range names for absolute cell references. The macro group named DS uses the */Range Name Create* command to define four such ranges. These cells will be used to accept the input data. It is not important that the first input cell is J5, but only that the first input cell be named inarea1. If you wanted to change the location of the first input cell, you'd have to change only one macro, and all the formulas that used inarea1 would automatically know where to look.

Type in the DS and \I macros now. \I is the macro that actually accepts and stores the input. Key this macro in using the four-column format, beginning with the name \I in cell A49. Save the file using the <Alt>-D command.

Using the PAYCOMP macro, you can enter a payment or have the computer calculate it. There are two new commands in this section: /C and /XI. /C (for copy) displays the named range called PROMPT1 in the current cursor location. This prompt tells the user the options for entering the payment amount. Type in the PAYCOMP macro now, starting at cell A60.
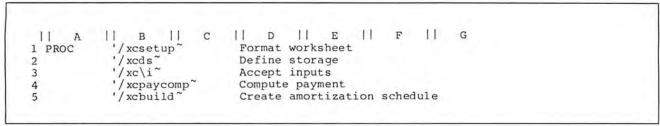
/XI is a conditional statement. *1-2-3* acts on the user's response, so if a payment amount is keyed in, the remainder of the macro will be ignored. Otherwise, the payment will be computed using the @PMT formula.

Macros in Macros

The BUILD macro is where the real work of the note amortization schedule will be done. First, you place the LOOP procedure in the middle of the BUILD macro. This label indicates the start of a macro within a macro, technically known as a subroutine. This subroutine creates a temporary variable (COUNT) name, which moves down a column testing the value of a cell. Once the comparison is done, the variable COUNT is deleted; it will be recreated on the next pass through the loop.

Before entering the loop, BUILD makes extensive use of cursor control key sequences to create the cell formulas for the first two rows of the note amortization schedule. The two ways to set up cell formulas with a macro are through cursor movements or cell references. Each method has its advantages and drawbacks, which

```
    || A     || B        || C      || D     || E     || F    || G
  1 PROC     '/xcsetup~          Format worksheet
  2          '/xcds~             Define storage
  3          '/xc\i~             Accept inputs
  4          '/xcpaycomp~        Compute payment
  5          '/xcbuild~          Create amortization schedule
```

Listing 3: PROC macro for 1-2-3 version 1.A

are discussed in detail in the *1-2-3* user manual.

Type in the SUMMARY macro now. SUMMARY takes column totals and prints them at the bottom of the worksheet. Finally, reset the range names and recreate the names this macro needs in order to run by typing */Range Name Labels Right,* and highlight column A from PROC to \D. Press <Enter> and save the file using the <Alt>-D command; press <Alt>-S and it should run. If the computer beeps, make sure that all tildes are in place, no labels are omitted, labels are aligned with the first cell of each macro, and /RNC statements are not omitted from DS.

When you press <Alt>-S, the cursor will stop at cell J5, next to the label PRINCIPAL. Key in the loan principal amount and press <Enter>. The cursor will automatically move down the column to cell J6 to wait for you to type in the annual percentage rate (interest). When you press <Enter> again, the cursor moves down to prompt you for the term of the loan, and finally the macro will ask if you want to specify a payment. If not, type a zero and the system will calculate a payment amount for you. When you're finished, the worksheet should resemble Figure 2.

If you are using *1-2-3* version 1A, however, you have the option of replacing /XG with the /XC and /XR command pair in the linking macro. /XG is a GOTO (cell location) command and is less flexible than the /XC and /XR commands, which GOSUB (go to a macro) and RETURN (from a macro) respectively. The linking macro for version 1A would look like Listing 3.

Each macro except \S would end in /XR~ instead of an /XG command. The /XR~ commands would increase the portability of each named range since it would no longer be necessary to specify the exact return point. Only the PROC label would be required.

Writing macros can be a forbidding experience at first. As you can see, structure is essential in creating useful, understandable, and efficient macros. But once you become more confident in using macros, you can write one for a function that *1-2-3* doesn't provide, no matter how complicated it may be, and use the macro in any *1-2-3* worksheet. You can create self-formatting worksheets that take data from the keyboard or from other worksheet files. The possibilities are limited only by your imagination. ⬤

Eric Weiss is an information specialist and systems analyst for the Firestone Tire and Rubber Company in Akron, Ohio.

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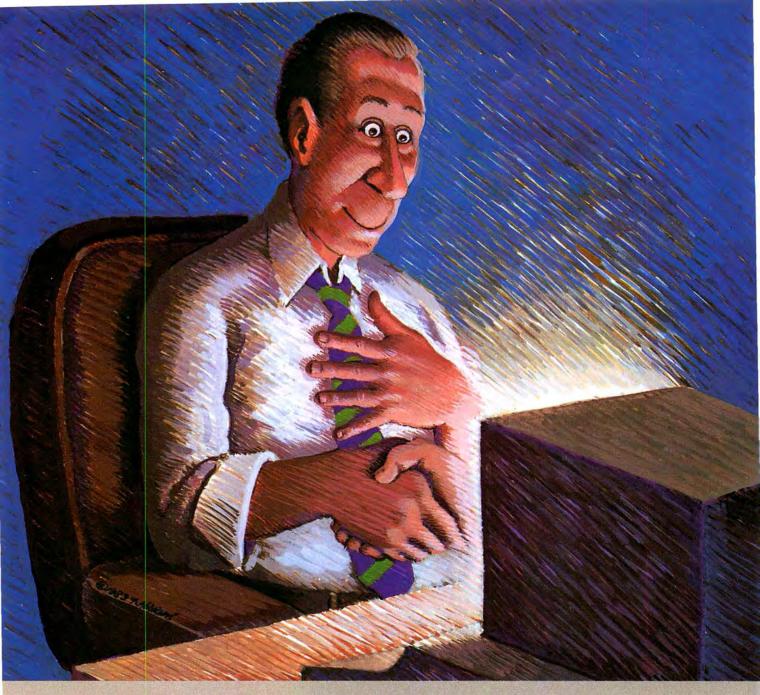
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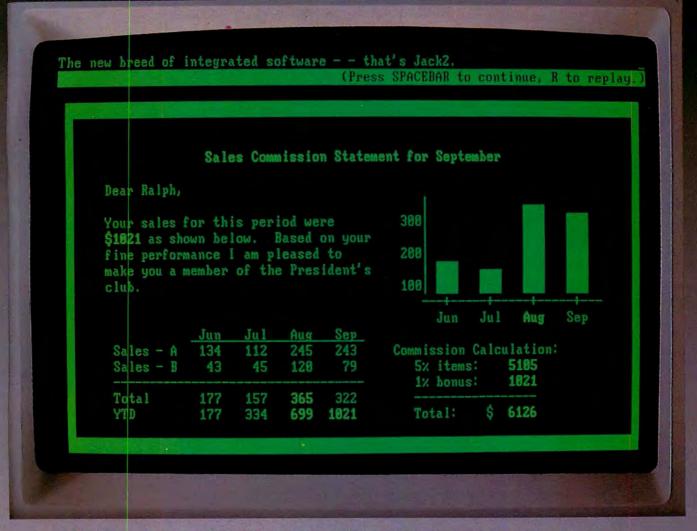
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Changing Keys

Redefining the PC keyboard doesn't require commercial software or complicated BASIC programs—just DOS 2.00 and a batch file.

Brian Mann

One reason the PC is so versatile is that you can define not only its function keys but also its standard keys. The definition process is somewhat complicated, particularly when the escape code (ASCII character 27) is required. This character is interpreted as an "erase line" command, and care must be taken when including it not to inadvertently destroy code or text.

Another problem is reassigning keys back to their original DOS definitions. It is often necessary to reassign key values so that other programs, such as the IBM *Personal Editor,* can define keys for their own purposes. By studying Chapter 13 in the DOS 2.00 manual, "Using Extended Screen and Keyboard Control," and using the DOS batch file in this article, the problems attendant with assigning and reassigning keys can be avoided.

Before the assigned key definitions, including those for the function keys, can be changed the ANSI driver must be resident in the PC. First, a CONFIG.SYS file containing the statement DEVICE = ANSI.SYS must be created on the boot disk. The CONFIG.SYS file will, among other things, install a program that is not "native" to DOS—in this case, the ANSI driver. The ANSI.SYS file, which is included on the DOS 2.00 disk, must also be on the boot disk.

To create this file, first place the boot disk in drive A. At the DOS A> prompt, type COPY CON: CONFIG.SYS and then press <Enter> . Type DEVICE = ANSI.SYS and press <Enter> . Finally, press <F6> (or <Ctrl>-Z) and press <Enter> .

The CONFIG.SYS file is automatically read only when the PC is turned on or restarted with the <Ctrl>-<Alt>-<Del> sequence. A disk containing CONFIG.SYS must be in drive A before any keyboard reassignment program can be run. ▪

> Before the assigned key definitions can be changed the ANSI driver must be resident in the PC.

Using an editor such as EDLIN, enter the batch program KEYS.BAT (see Listing 1) onto a disk in drive A. If you have an emulated disk drive, operation will be faster if you copy KEYS.BAT there. If you enter KEYS ON or keys on from DOS, the program will execute and define the keys you specify. If you enter KEYS OFF or keys off , the keys will return to their original DOS definitions.

How It Works
The first line in KEYS.BAT illustrates the undocumented fact that DOS treats a statement beginning with a period as a comment. The second line turns ECHO off so DOS won't display the KEYS.BAT statements as they execute. The "%1" used in the next four statements is equal to the parameter entered after the file name. In other words, when keys on is entered, KEYS.BAT is loaded and "%1" is set equal to "on." The statements determine what "%1" is equal to ("ON," "on," "OFF," or "off") and jump to the proper label, either ":ON" or ":OFF," or to ":END" if no value is set equal to "%1". Next, ECHO is turned back on. ECHO must be on so that the following key assignments accomplished via the DOS command PROMPT will work.

Defining Keys
The PROMPT command is often used to change the standard DOS prompt. For example, PROMPT = WHAT NEXT? would cause DOS to display WHAT NEXT? as a DOS prompt instead of A>. In KEYS.BAT the PROMPT command issues an escape code (ASCII character 27) with the symbol "$e"; this code is necessary when ANSI.SYS is used to define the keys.

```
.Keyboard Key Reassignment batch program by Brian D. Mann, 08/18/83
echo off
if %1 == ON goto ON
if %1 == on goto ON
if %1 == OFF goto OFF
if %1 == off goto OFF
goto END
:ON
echo on
prompt=$e[0;59;"DIR "p
prompt=$e[0;60;"TYPE "p
prompt=$e[0;61;"COPY "p
prompt=$e[0;62;"ERASE "p
prompt=$e[0;63;"A: "p
prompt=$e[0;64;0;64p
prompt=$e[0;65;"B: "p
prompt=$e[0;66;"C: "p
prompt=$e[0;67;"D: "p
prompt=$e[0;68;"A:BASICA ";13p
prompt=$e[0;120;"A:KEYS ON";13p
prompt=$e[0;129;"A:KEYS OFF";13p
.The Function Keys have been Defined
goto END
:OFF
echo on
prompt=$e[0;59;0;59p
prompt=$e[0;60;0;60p
prompt=$e[0;61;0;61p
prompt=$e[0;62;0;62p
prompt=$e[0;63;0;63p
prompt=$e[0;64;0;64p
prompt=$e[0;65;0;65p
prompt=$e[0;66;0;66p
prompt=$e[0;67;0;67p
prompt=$e[0;68;0;68p
.The Function Keys have been Disabled
:END
prompt $n$g
```

Listing 1: KEYS.BAT

Keys are defined in the first section of the batch file following the ":ON" label. If an automatic return is desired, the definition should be followed by ";13p"; if no return is desired, a "p" should be used.

Almost any key's value may be redefined. In order to change a key, the ASCII code representing that key must be sent to the ANSI driver via a special escape sequence. The ASCII codes of standard keys such as the A or backslash keys are only one character long, and a sequence would look like
prompt = $e[50;"definition "p

The PC has an extended set of ASCII codes to represent the special keys on the keyboard. The special keys (mostly function keys and keys shifted using <Alt> or <Ctrl>) are two characters long and are prefaced by a zero and a comma. A sequence would look like
prompt = $e[0;59;"DIR "p

Getting ANSI
But how are original DOS definitions restored? To understand the process, the role of the ANSI driver must be considered.

The letter A is not sent to the computer when you press the A key. Neither is the ASCII code of the letter sent, but rather a scan code determined by the location of the key. The ANSI driver, which can be imagined as a box between the keyboard and the PC, intercepts the scan code sent by the keyboard and compares it against a reassignment list. If the key has not been reassigned, the ANSI driver converts the scan code to the proper ASCII value and sends it to the PC. If the key has been reassigned, the ANSI driver sends out the character string that was given to the key.

```
echo off
date
time
echo on
prompt=$e[0;59;"DIR "p
prompt=$e[0;60;"TYPE "p
prompt=$e[0;61;"COPY "p
prompt=$e[0;62;"ERASE "p
prompt=$e[0;63;"A: "p
prompt=$e[0;64;0;64p
prompt=$e[0;65;"B: "p
prompt=$e[0;66;"C: "p
prompt=$e[0;67;"D: "p
prompt=$e[0;68;"A:BASICA ";13p
prompt=$e[0;120;"A:KEYS ON";13p
prompt=$e[0;129;"A:KEYS OFF";13p
.The Function Keys have been Defined
prompt $n$g
echo off
mode 80
verify on
graphics
cls
ver
vol a:
```

Listing 2: Example AUTOEXEC.BAT file

Restoring a key to its original DOS value involves writing over the last key definition. For example, the first prompt statement in Listing 1 following the ":ON" label (prompt = $e[0;59;"DIR "p) tells the ANSI driver to send out DIR when it intercepts the ASCII code. The first prompt line after the ":OFF" label (prompt = $e[0;59;0;59p) tells the ANSI driver to send out 0;59 when it intercepts the ASCII code. The computer is not aware that the ASCII code was ever intercepted and applies the original DOS definition (0;59) to the key. In reassigning the original definitions, it is not necessary to include an automatic return.

Off and On
In Listing 1 the <Alt>-1 combination (ASCII code 0;120) issues the command A:KEYS ON, and the <Alt>-0 combination (ASCII code 0;129) issues the command A:KEYS OFF. These definitions are not changed by the KEYS OFF com-

mand, since the above ASCII codes do not appear below the ":OFF" label. Once KEYS ON is executed, pressing <Alt>-0 returns the keyboard to the original DOS definitions; <Alt>-1 reassigns the keyboard.

After the reassignments or original assignments are made, KEYS.BAT jumps to the ":END" label, which sets the prompt back to A>. If execution is aborted by <Ctrl>-<Break>, the prompt will not appear, and prompt=ng must be entered to return the prompt to the screen.

Keys may be defined as desired, but there is a catch. If you exceed 190 characters of ANSI driver definitions, the COMMAND.COM file next to the ANSI driver on the disk is likely to be overwritten. The computer will freeze up, and you will be forced to turn it off and start all over.

Using the PROMPT command will sometimes produce an 'Out of environment space' error message. This will not freeze up the computer, but it will prevent key redefinition. The

environment, as defined by DOS 2.00, is a place where the operating system puts information so other programs can access it. (This is not the same as the ANSI definition space discussed above.) Issuing the command SET from DOS will display the environment, for example:
COMSPEC = A:\COMMAND.COM
PATH = A: B: C:
PROMPT = ng

When the PC is started, 127 bytes are allocated to the environment. If more space is needed, DOS will attempt to acquire more space. If a resident program such as MODE, PRINT, or GRAPHICS has been executed, space is not available and the 'Out of environment space' error message will show up. In the case of KEYS.BAT, the error message occurs when a large PROMPT statement is put into the environment after a resident program has been run.

There are two solutions to the problem. You can include key definitions in an AUTOEXEC.BAT file before any resident programs are run (see Listing 2). The second method is more complicated but may be superior. If you have an editor that permits use of the escape code (ASCII character 27), read the KEYS.BAT file into the editor, remove the "prompt = ng" statement after the ":END" label, and replace all occurrences of "prompt = $e" to ECHO followed by your editor's code for Escape. The ECHO statement prints the key definition text; this circumvents the prompt statement and the alteration of the environment altogether. ⊜

Brian Mann works as a nuclear engineer and is vice-president of the Central Virginia IBM PC Users Group.

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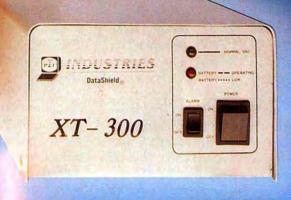
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Really Random

Testing the random number generator is not as straightforward as testing linear or transcendental mathematical functions.

John K. Mickelsen

Random number generation is a mathematical game that your computer and software play in order to create random choice patterns for a variety of applications. The creation of random values is essential to many game programs and is also used in educational software, in industrial simulation programs, and in approximating values of functions too complex for direct derivation. But how can you tell that your random number generator and other software-implemented numerical functions are accurate?

Testing the PC's ability to accurately calculate numerical functions such as a square root or a sine is relatively straightforward. Computed values can be compared to corresponding values in a high-precision table from a suitable mathematics handbook. Or some functions can be used to check the accuracy of others. For example, the square of the square root of a value should equal the original value. Similarly, the inverse of the inverse of a value should equal the original value. Other appropriate mathematical relationships can also be used; for instance, you can make sure that the computed sum of the square of the sine plus the square of the cosine is exactly equal to 1.

But how can random number generators be tested? There is no table of random numbers against which to compare each value computed by the random number generator. Nor are there any simple mathematical relationships that can be used. Just as it is unlikely when flipping a coin to get heads five times in a row, so certain

---

Since random sequences are by nature matters of probability, statistical tests are used to validate the random number generator.

---

sets of values from a random number generator are unlikely but not impossible.

Since random sequences are by nature matters of probability, statistical tests are used to validate the random number generator. For example, after a set of values is generated and stored, you can compute the average and variance for that set and compare them with the expected values. You can also check a set of values from the random number generator to see if the values in the set are distributed in a nearly uniform way. Knowing one value may help in forecasting the next.

Testing generators of uniformly distributed numbers is important for two reasons. Uniform distribution ensures the impartiality of the values for which the generator is used. In addition, a uniform distribution is often necessary to form the basis for distributions produced by other number generators.

The BASIC program BASRNDM .BAS (Listing 1) applies three statistical tests to values generated by the RND function of IBM PC BASIC 2.00. The program also sets up a visual test (if your PC is equipped with a color graphics board) called the Parking Lot test. The name alludes to the random parking patterns of a partially full parking lot.

The Program
The Parking Lot test is the first test performed by BASRNDM.BAS. The program first generates a set of 1000 random values. Then 500 points are generated from the 1000 values and are displayed on the screen. If the displayed points are scattered without any apparent pattern, like pepper sprinkled on a piece of paper, the set of values passes the test.

```
100 REM program BASRNDM.BAS checks quality of RND function
102 REM      by John K. Mickelsen
104 REM          East Syracuse, NY
110 REM
120 DIM R(999), D2%(99), D1D1%(9,9)
130 REM
140 KEY OFF:SCREEN 0,0,0,0:
150 GOSUB 1000   'initialize random number function
160 GOTO 180
170 GOSUB 2000   'see if another test case is wanted
180   GOSUB 3000   'generate next test case (1000 values)
190   GOSUB 4000   'display 500 points
200   GOSUB 5000   'compute mean and variance
210   GOSUB 6000   'check uniformity of distribution
220   GOSUB 7000   'check uniformity of transition
230 GOTO 170
980 REM
990 REM
1000 REM initialize random number function, RND
1010 REM
1020 CLS
1030 PRINT "     To begin this series of test cases,"
1040 PRINT "you must initialize the random number generator."
1050 PRINT
1060 RANDOMIZE
1070 RETURN
1980 REM
1990 REM
2000 REM see if another test case is wanted
2010 REM
2020 PRINT : PRINT
2030 INPUT "Do you want another test case (Y or N)"; T$
2040   IF (T$ = "N") OR (T$ = "n") THEN 9999
2050   IF (T$ = "Y") OR (T$ = "y") THEN RETURN
2060 GOTO 2030
2980 REM
2990 REM
3000 REM generate next 1000 pseudo-random values
3010 REM
3020 PRINT
3030 PRINT "Wait for 1000 values to be computed."
3040 FOR J% = 0 TO 999
3050   R(J%) = RND
3060 NEXT J%
3070 PRINT
3080 RETURN
3980 REM
3990 REM
4000 REM display 500 points, in a 200 by 600 region
4010 REM
4020 DEF SEG=&HB800:POKE 0,99:IF PEEK(0)<>99 THEN RETURN
4030 PRINT "Please turn on color display to view Parking Lot Test."
4040 DEF SEG=&h40:A%=PEEK(&H10)
4050 POKE &H10,(A% AND &HCF) OR &H20
4060 CLS:LOCATE ,,1,7,7
4070 SCREEN 2,0,0,0
4080 J% = 0
4090 FOR K% = 0 TO 499
4100   X% = INT (600! * R(J%)) + 40
4110   J% = J% + 1
4120   Y% = INT (200! * R(J%))
4130   J% = J% + 1
```

Listing 1: BASRNDM.BAS

```
4140    PSET (X%,Y%)
4150 NEXT K%
4160 LOCATE 25,10:PRINT "Press any key to continue";
4170 Z$=INPUT$(1)    'give user time to view Parking Lot Test display
4180 LOCATE 25,10:PRINT SPC(25);
4190 DEF SEG=&HB000:POKE 0,99:IF PEEK(0)<>99 THEN RETURN
4200 DEF SEG=&H40:A%=PEEK(&H10)
4210 POKE &H10,PEEK(&h10) OR &H30:LOCATE ,,1,12,13
4220 RETURN
4980 REM
4990 REM
5000 REM compute mean and variance
5010 REM
5020 SCREEN 0: PRINT "Computing average and variance"
5030 SUM = 0
5040 FOR J% = 0 TO 999
5050    SUM = SUM + R(J%)
5060 NEXT J%
5070 AVE = SUM / 1000
5080 SUM = 0
5090 FOR J% = 0 TO 999
5100    DIF = R(J%) - AVE
5110    SUM = SUM + DIF * DIF
5120 NEXT J%
5130 VAR = SUM / 999
5140 PRINT
5150 PRINT "   Average = " USING "#.####"; AVE
5160 PRINT "   Variance = " USING "#.#####"; VAR
5170 RETURN
5980 REM
5990 REM
6000 REM check for uniformity of distribution of two leading digits
6010 PRINT :PRINT
6015 PRINT "Checking uniformity of distribution": PRINT
6020 FOR J% = 0 TO 99: D2%(J%) = 0: NEXT J%
6030 FOR J% = 0 TO 999
6040    K% = INT (100! * R(J%))
6050    D2%(K%) = D2%(K%) + 1
6060 NEXT J%
6070 CHISQUARE = 0
6080 FOR J% = 0 TO 99
6090    DIF% = D2%(J%) - 10
6100    T = DIF% * DIF%
6110    CHISQUARE = CHISQUARE + T / 10
6120 NEXT J%
6130 PRINT "   Degrees of freedom = 99"
6140 PRINT "   Chi-square =" CHISQUARE
6150 RETURN
6980 REM
6990 REM
7000 REM check uniformity of transition of leading digit
7010 REM
7015 PRINT :PRINT :PRINT "Checking uniformity of transition"
7020 FOR J% = 0 TO 9
7030    FOR K% = 0 TO 9
7040       D1D1%(J%,K%) = 0
7050    NEXT K%
7060 NEXT J%
7070 REM
7080 PREV% = 0
```

(continues)

```
7090 FOR J% = 0 TO 999              7190    CHISQUARE = CHISQUARE + T
7100   K% = INT (10! * R(J%))       7200   NEXT K%
7110   D1D1%(PREV%,K%) = D1D1%(PREV%,K%) + 1   7210 NEXT J%
7120   PREV% = K%                   7220 PRINT
7130 NEXT J%                        7230 PRINT "  Degrees of freedom = 99"
7140 CHISQUARE = 0                  7240 PRINT "  Chi-square =" CHISQUARE
7150 FOR J% = 0 TO 9                7250 RETURN
7160   FOR K% = 0 TO 9              7980 REM
7170     DIF% = D1D1%(J%,K%) - 10   7990 REM
7180     T = DIF% * DIF% / 10       9990 REM
                                    9999 END
```

Listing 1 *(continued)*

Next, the program computes the mean (average) and the variance for the 1000 values. The mean estimates where the central value is located, and the variance indicates how closely the values huddle around the mean. If the 1000 values are uniformly distributed, the computed mean will be close to 0.5, and the variance will be about 0.0833333.

In the third part of BASRNDM .BAS the 1000 values are checked to see how uniformly they are distributed. The number that measures how closely the values fit the expected distribution is called chi-square. If it is zero the fit is perfect, but that is probably too good to be true. An ideal sample is a suspicious sample and could cause a researcher's data to be rejected as a fabrication. For the distribution test in this program, a chi-square value of about 99 is to be expected.

Finally, the values are tested to see how truly independent of each other they are. The transitions from one value to the next are checked in the order that they were generated and the chi-square for this check is computed. Again, as in the test for uniform distribution, a zero chi-square is too good to be true, and a value of about 99 is to be expected.

Case*	Parking lot	Average	Variance	Uniform distribution	Uniform transition
			Seed: 0		
1	OK	.5195	.08463	120.4	129.6
2	OK	.4898	.08592	79.2	100.2
3	OK	.5018	.08448	96.0	139.0
4	OK	.4997	.08289	119.4	94.0
5	OK	.4877	.08439	111.0	74.0
6	OK	.4995	.08353	94.6	82.8
7	OK	.4931	.08734	115.0	129.0
8	OK	.4921	.08468	91.0	138.0
9	OK	.4893	.08745	113.6	84.8
10	OK	.4978	.08375	112.0	107.2
			Seed: 31426		
1	OK	.5062	.08054	113.8	91.2
2	OK	.4988	.08350	140.6	94.8
3	OK	.5099	.07767	107.6	94.6
4	OK	.5016	.08369	106.0	86.2
5	OK	.5041	.08214	97.6	80.6
6	OK	.5202	.08061	95.0	86.2
7	OK	.4989	.08414	79.4	114.8
8	OK	.5057	.08453	127.2	89.6
9	OK	.4987	.08192	81.2	117.4
10	OK	.4952	.08366	115.2	101.6
			Seed: 12345		
1	OK	.5053	.08424	82.4	79.8
2	OK	.5066	.08141	87.0	107.0
3	OK	.5006	.08146	104.6	68.2
4	OK	.5083	.08203	115.4	92.4
5	OK	.4940	.08279	91.4	91.8
6	OK	.4883	.08586	100.6	96.0
7	OK	.4864	.08331	89.2	121.8
8	OK	.5067	.08794	104.8	109.2
9	OK	.5030	.08505	116.2	99.8

Table 1: Performance of the RND function of BASIC 2.00

Table 1 lists the results of several runs of the BASIC test program. In view of those results, the BASIC RND function of the IBM PC looks fairly good. However, the best way to be sure that a random number generator is functioning adequately is to test it for a particular application.
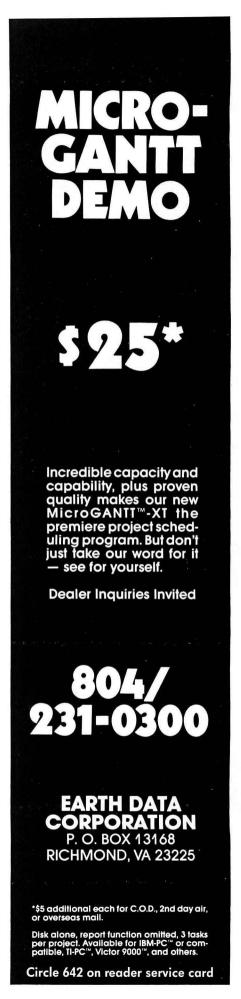
Testing the software-implemented capabilities of a computer system, besides checking the quality of those capabilities, gives the user the opportunity to learn how to use each capability tested. ≜

John K. Mickelsen is a software engineer who specializes in numerical analysis and statistics.

"Random Number Generation" by G. Marsaglia is a good introduction to this subject; it can be found in the Encyclopedia of Computer Science and Engineering, *second edition, edited by Anthony Ralston and Edwin D. Reilly, Jr., Van Nostrand Reinhold Co., 1983.*

Case*	Parking lot	Average	Variance	Uniform distribution	Uniform transition
10	OK	.5186	.08284	99.4	91.2
			Seed: 1		
1	OK	.5141	.08425	126.4	92.4
2	OK	.4909	.08513	112.8	96.4
3	OK	.4874	.08694	135.2	115.6
4	OK	.4836	.07771	104.4	125.4
5	OK	.4887	.08408	95.4	98.0
6	OK	.4985	.08200	89.6	113.8
7	OK	.5961	.08146	88.6	92.4
8	OK	.5148	.07995	73.0	83.0
9	OK	.5006	.08160	75.0	104.0
10	OK	.5027	.08421	79.4	86.8
11	OK	.4965	.08128	104.0	86.4
12	OK	.5071	.08308	71.0	93.8
13	OK	.4957	.08168	102.8	102.0
14	OK	.4942	.08207	98.4	90.2
15	OK	.5124	.08506	128.8	101.0
16	OK	.5160	.08104	98.8	101.2
17	OK	.5027	.08762	90.2	92.4
18	OK	.4967	.08552	115.8	72.4
19	OK	.4997	.08427	84.6	118.6
20	OK	.5014	.08528	124.6	92.6
21	OK	.4983	.08575	94.2	93.6
22	OK	.4891	.08122	113.2	87.6
23	OK	.5039	.08643	102.6	91.2
24	OK	.4990	.08310	80.8	107.8
25	OK	.5014	.08795	109.0	86.4
26	OK	.4981	.08202	94.8	109.4
27	OK	.4929	.08739	80.0	119.4
28	OK	.5136	.08037	114.2	116.2
29	OK	.4956	.08219	84.2	80.6
30	OK	.5095	.08231	102.4	126.4

*Each case is a sample of 1000 consecutive values.

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Taming the Pascal Compiler

Behind one of IBM's most impenetrable manuals lurks a well-designed implementation of a powerful language. Here's how to make it work for you.

Michael A. Covington

Some say Pascal is the FORTRAN of the future. The reasons FORTRAN caught on like wildfire among the computer users of the 1960s are that FORTRAN programs were concise, the syntax of the language was simple enough to remember without consulting a manual, and most importantly, you could easily write programs that would run with little or no alteration on any computer that ran FORTRAN.

Today Pascal has the same appeal. Based on research on the prevention of programming errors, Pascal has a simple syntax, incorporates many safeguards against typing errors, and encourages programmers to structure programs in small, easily understandable modules. Moreover, it is standardized so that, as with FORTRAN, programs are easily transferred from one type of computer to another.

IBM's Pascal Compiler, written by Microsoft, implements a full version of the language comprising all the standard features and many extensions. Error messages and error-handling routines are particularly well planned, and the compiler produces easy-to-read listings. Unfortunately, the accompanying manual is poorly organized, incomplete, and at times

almost unintelligible. This article will try to make up for some of the manual's deficiencies. I assume that you know, or can find out about, the standard Pascal language itself; I'll tell you how to put the compiler to good use in spite of its inadequate documentation.

Making It Run

The compiler translates a source file (a text file of a Pascal program) into an executable machine language program, which is stored on disk as an .EXE file. Like most compilers and unlike the BASIC Interpreter, the IBM Pascal Compiler does not provide an editing environment; you must use EDLIN, the line editor provided with PC-DOS, or another editor (many word processing packages will do the job) to write your Pascal program.

Lacking a Pascal interpreter, the IBM PC cannot execute the text (source) file form of a Pascal program; it must first be compiled. And compiled programs cannot be edited, for you can edit only the text form. So every time you make a change in the source file you must spend a few minutes recompiling it. But the resulting machine language program runs much faster than an interpreted program and will run on any PC, even the PCjr.
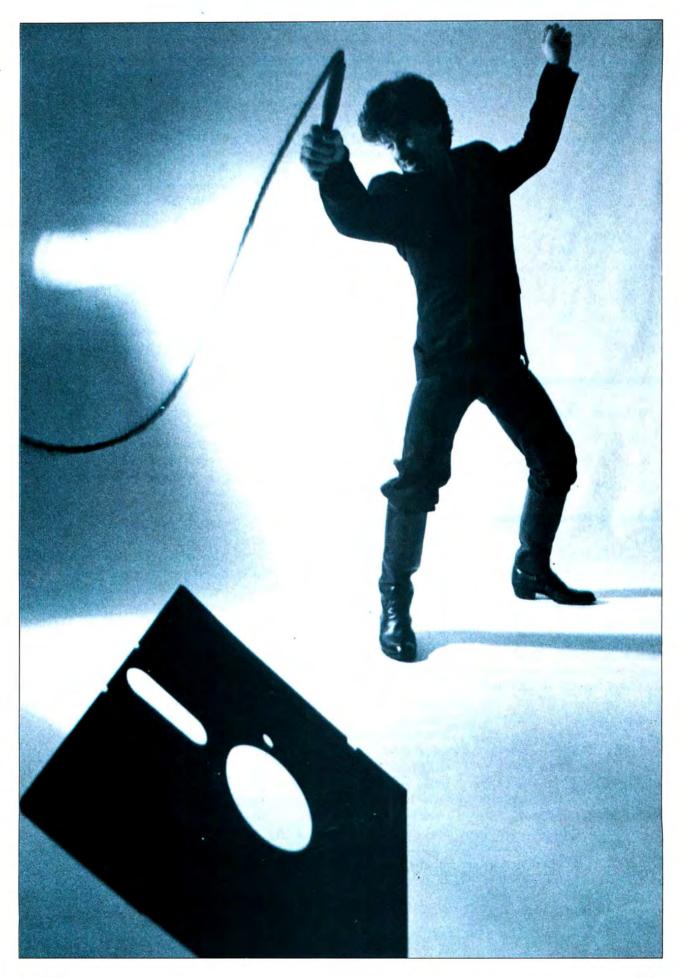
The compiler comes on three single-sided disks, labeled PAS1, PAS2, and PASCAL.LIB; if you have only single-sided disk drives, you will have to insert all three disks in succession every time you compile a program. Chapter 2 of the manual (which is more lucid than the rest) tells you how to do this. However, if you have two double-sided disk drives, there is an easier way.

First prepare a double-sided disk with the following files on it: PAS1.EXE and PASKEY from the

> IBM's Pascal Compiler implements a full version of the language.

PAS1 disk; PAS2.EXE from the PAS2 disk; PASCAL.LIB from the PASCAL.LIB disk; and COMMAND .COM, LINK.EXE, and EDLIN .COM (optional) from the DOS disk.

Now you can run the entire Pascal package from one disk, following the manual's instructions except for the

⬤ Hands On

part about changing disks. You can simplify the process even further by creating a batch file on the same disk called PAS-COMP.BAT, which contains the following commands:

```
B:
A:PAS1 %1;
A:PAS2 /P
A:LINK %1;
A:
```

Don't forget the semicolons—they're important. With this batch file, compiling and running a Pascal program is easy:

1) Place the Pascal disk in drive A. In drive B, place a disk that contains only the program to be compiled (I'll call it YOURPROG.PAS); the com-

---

Even the smallest Pascal program uses about 20K of run-time routines.

---

piler needs work space on this disk. Your program can have any name, but PAS-COMP.BAT requires the file name to have the extension .PAS.

2) Enter the DOS command
A:PAS-COMP YOURPROG
That is, start the PAS-COMP batch file and give it the program's file name (do not include the .PAS extension) as a parameter.

3) After completing the first pass of compilation, the compiler will ask you to press <Enter> to start the second pass. Do so only if no errors turned up in the first pass; otherwise, terminate the process with <Ctrl>-<Break>.

When the compiler and linker have finished their task, the compiled program will reside on disk B under the name YOURPROG.EXE. Because this program has to run by itself without further aid from the com-

piler, it will be quite large. Even the smallest Pascal program uses about 20K of run-time routines. You can copy the program onto other disks and change its name, provided the new name also ends in .EXE. To run YOURPROG.EXE, simply type its file name (you may exclude the extension) just as you would to invoke a .BAT or a .COM file.

Accessing DOS Files
Within a Pascal program, you refer to files by arbitrary names rather than their actual DOS file names. This useful feature enables you to run the same program several times to process different files without changing the program itself. However, before each run you must specify which DOS files are to be used in place of the arbitrary names contained in the Pascal program.

There are three ways to assign specific DOS file names to a Pascal program's arbitrary file names. The simplest is to use the predefined AS-SIGN procedure. For example
ASSIGN(MYFILE,'B:QWERTY.TXT')
tells Pascal to use the DOS file B:QWERTY.TXT instead of MY-FILE until the end of the program or until MYFILE is assigned again. If the drive designator is not specified, Pascal assumes that the file resides on the disk in the default (logged) drive. ASSIGN must be given the DOS file name as a string constant or as a PACKED ARRAY OF CHAR and will truncate any trailing blanks.

If CHR(0) is specified as the assigned file instead of a DOS file name, as in
ASSIGN(MYFILE,CHR(0))
Pascal will create a temporary file on the default drive and assign it to MY-FILE, and delete it when the program ends. That is a handy way to allocate work files that are used only when the program is running.

Often, however, you will want the program you are creating to ask the

user for a file name or to read the name of one file from within another file. The simplest way to do this is to use READFN, another predefined procedure of the IBM Pascal Compiler. For example,
READFN(INPUT,MYFILE) means "read a file name from the file IN-PUT (i.e., the user's console) and assign it to MYFILE." The program UPPRCASE (Listing 1) uses this procedure. Naturally, a file name can be read from any file, not just INPUT.

The third assigning method is to include the arbitrary file names to which specific DOS file names are to be assigned in a PROGRAM statement at the beginning of the program. For instance, let's assume that the program begins with the statement
PROGRAM MYPGM(INPUT, OUTPUT,QWERTY,MYFILE);
and that the compiled version exists as the file A:ASDF.EXE. When the program begins, the user is prompted to enter the specific DOS file names to be assigned to the arbitrary file names:
A>asdf
QWERTY: b:number1.txt
MYFILE: b:number2.txt
Alternatively, the DOS file names to be assigned to the arbitrary ones may be included on the DOS command line as parameters following the program's file name:
A>asdf b:number1.txt b:number2.txt
Either way, the files B:NUM-BER1.TXT and B:NUMBER2.TXT are assigned to QWERTY and MY-FILE respectively. Note that this is the only situation in which files other than Pascal's predeclared files INPUT and OUTPUT are included in a PROGRAM statement.

Other Command-Line Parameters
The DOS command line may contain parameters other than file names. Paramdmo (Listing 2) is a program that recovers a file name, an integer, and a character string from the DOS command line. If the compiled ver-

```
program UPPRCASE(input,output);

    { Copies a file translating all lowercase letters to uppercase. }
    { Demonstrates use of the READFN statement to obtain file names }
    { interactively.                                                }

var infile, outfile: text;
    c: char;
    diff: integer;

begin

  {Obtain filenames}
    { Note that the files being assigned here were NOT listed }
    { in the PROGRAM statement at the top.                    }
    write('Please type input file name:     ');
    readfn(input,infile);
        {i.e., read a file name from INPUT and assign it to INFILE}
    write('Please type output file name:     ');
    readfn(input,outfile);

  {Open the files}
    reset(infile);
    rewrite(outfile);

  {Determine numeric difference between uppercase and lowercase}
    diff := ord('a') - ord('A');

  {Main loop}
    while not eof(infile) do
      begin
        while not eoln(infile) do
          begin
            read(infile,c);
            if (c < 'a') or (c > 'z')
                then write(outfile,c)
                else write(outfile,chr(ord(c)-diff))
          end;
        writeln(outfile);
        readln(infile)
      end;

    writeln('File conversion complete.')

end.
```

Listing 1: UPPRCASE

sion of Paramdmo is stored on the disk in drive A under the name NUMBER2.EXE, the DOS command
A>number2 sample.txt 3 Hello Hello
executes the program. Paramdmo begins by assigning the DOS file name SAMPLE.TXT to OUTFILE, the value 3 to N, and the string 'Hello Hello' to TEXTSTRING. This pro-

gram will then write 'Hello Hello' three times into the file SAMPLE.TXT.

As it does with file names, Pascal prompts the user, using the relevant Pascal variable name, for any parameters not supplied. For example, the following sequence produces the

same results as the preceding example:
A>number2
OUTFILE: sample.txt
N: 3
TEXTSTRING: Hello Hello
With a suitable choice of variable names, you can make this completely automatic mechanism fairly user-friendly.

```
program paramdmo(input,output,outfile,n,textstring);

{ Writes TEXTSTRING, repeated N times, on OUTFILE. }
{ Demonstrates use of program parameters.          }

var  outfile: text;
     textstring: packed array[1..50] of char;
     n,i,j: integer;

begin
  rewrite(outfile);
  for i:=1 to n do
    begin
      for j:=1 to 50 do write(outfile,textstring[j]);
      writeln(outfile)
    end
end.
```

Listing 2: Paramdmo

The DOS command line is scanned in the same way that the standard READ procedure scans a line: starting one character after the end of the command, Pascal reads as many characters as are needed to produce a valid item of the type requested, then moves on to the next item. If the command line ends before the declared number of characters of a string variable has been read, the rest of the string is padded with blanks. Parameters of the wrong type (such as non-numeric characters where a number is asked for) cause an abnormal termination just as if they occurred in an input file.

Screen Control

One of the things missed most when moving from BASIC to Pascal is control of the screen and cursor. BASIC can easily move the cursor around the screen; display intensified, blinking, and inverse characters; and create other special effects. IBM Pascal cannot even clear the screen.

This lack of screen control may be intentional. After all, a main motivation for using Pascal is easy transfer of programs from one machine to another, and not all computers have screens that work the same way. This may be why IBM Pascal's implementors chose to use the simplest of the ways DOS provides of putting things on the screen, a mode called teletype emulation. The only special charac-

There are unorthodox ways to achieve screen control by poking values directly into the PC's screen buffer.

ters the mode supports are backspace, CHR(8); linefeed, CHR(10); carriage return, CHR(13); and beep, CHR(7). All other character codes are displayed as characters, even those that would produce cursor movements if used in BASIC.

Fortunately, there are unorthodox ways to achieve screen control by poking values directly into the PC's screen buffer. Listing 3 is a set of screen control procedures and functions that you can include in your programs.

The function SEGPEEK and the procedure SEGPOKE are used by the other functions and procedures in Listing 3. The prefix operator ADS and variables of the type WORD are used to access memory locations directly. The number sign indicates that a value is hexadecimal.

CSRLIN, CSRCOL, VIDEO MODE, and DISPLAYWIDTH are functions that return the cursor position, type of display, and screen width. Like their BASIC namesakes, LOCATE(ROW,COL) positions the cursor, while CLS clears the screen and homes the cursor.

Because these operations bypass the operating system, they cannot be expected to work on MS-DOS machines other than the IBM PC or even on future PC models. But they are better than nothing. (Not all the corresponding PEEKs and POKEs will work in BASIC; BASIC has its own input/output procedures and does not use those of DOS.)

Beware of Bugs

The IBM Pascal Compiler has at least one bug: when you ask for the sine of a negative number, the number itself is erroneously returned instead of its

```
{ Screen control package for use with the IBM PC Pascal Compiler }
{ Michael A. Covington    1983                                   }

function segpeek(segment,offset : word) : integer;
var addr : ads of char;
begin
 addr.s := segment;
 addr.r := offset;
 segpeek := ord(addr^)
end;

procedure segpoke(segment,offset : word; argval : integer);
var addr : ads of char;
begin
 addr.s := segment;
 addr.r := offset;
 addr^ := chr(argval mod 256)
end;

function csrlin : integer;
   { line on which cursor is positioned, 1..25 }
begin
   csrlin := segpeek(#0040,#0051) + 1
end;

function csrcol : integer;
   { column at which cursor is positioned, 1..80 }
begin
   csrcol := segpeek(#0040,#0050) + 1
end;

function videomode : integer;
   { Significance of value returned:                        }
   {  0 : Color/graphics, 40-column text, color disabled    }
   {  1 : Color/graphics, 40-column text, color active      }
   {  2 : Color/graphics, 80-column text, color disabled    }
   {  3 : Color/graphics, 80-column text, color active      }
   {  4 : Color/graphics, 320x200 graphics, color active    }
   {  5 : Color/graphics, 320x200 graphics, color disabled  }
   {  6 : Color/graphics, 640x200 graphics, color disabled  }
   {  7 : IBM Monochrome Display                            }
begin
   videomode := segpeek(#0040,#0049)
end;

function displaywidth : integer;
   { Screen width in columns, 40 or 80 }
begin
   displaywidth := segpeek(#0040,#004A)
end;

procedure locate(row,col : integer);
   { Positions cursor.  Numbering is from 1 to 25 and 1 to 80. }
begin
   segpoke(#0040,#0050,(col-1) mod displaywidth);
   segpoke(#0040,#0051,(row-1) mod 25);
end;
```

(continues)

Listing 3: Screen control package

```
procedure cls;
    { Clears the screen and puts cursor in row 1, column 1. }
    { Done in a rather exotic way to get instant action.     }
type
    bytepair = array[1..2] of char; {attribute and character bytes}
    scrnline = array[1..80] of bytepair;
    screen = array[1..25] of scrnline;
var
    [static] blankline : scrnline;
    blankscreen : screen;
    scrnaddr : ads of screen;
    i : integer;
value
    blankline := scrnline(do 80 of bytepair(' ',chr(#07)));
begin
    for i:= 1 to 25 do blankscreen[i] := blankline;
    if videomode = 7 then scrnaddr.s := #b000 else scrnaddr.s := #b800;
    scrnaddr.r := #0000;
    scrnaddr^ := blankscreen;
    locate(1,1)
end;
```

Listing 3: *(continued)*

sine. All the other mathematical functions appear to work correctly.

For some reason, a simple demonstration program that I wrote did not detect a disk-full condition during one of my test runs; it happily created a file with zero bytes in it and terminated normally. I don't know whether this was due to a bug or whether file system error checking was disabled for some legitimate reason.

Hope Abandon, Ye Who Enter Here
I've been telling you that the IBM Pascal Compiler manual is poorly written. Let me show you what you're up against.

Although the first four chapters—introduction, how to run the compiler, terminology, and compiler commands—are quite respectable, it's a struggle from here on out. The main weakness of the middle part of the book is that it does not summarize Pascal syntax but merely comments

on it; hence the manual cannot serve as your main reference book.

The manual really falls apart at the end, in the chapters on the operating system interface. For example, after giving the methods of retrieving DOS command line parameters (described earlier in this article), the manual notes, "For the application programmer who wishes to use advanced command line processing, the Unit U procedure PPM provides this capacity" (Chapter 13, page 7). "PPM" is not in the index. Ferreting out Unit U, I found a procedure called PPMUQQ that can be used to retrieve program parameters, but no instructions on how to invoke or use the procedure except the cryptic remark, "The first two parameters of this function are unused and reserved" (Appendix B, page 39).

The documentation given for one useful-sounding procedure is another example of the manual's inadequacy:
FUNCTION DOSXQQ(COMMAND:BYTE;
  PARM:WORD):BYTE;
"This function can be used to invoke the IBM PC-DOS directly" (Chapter

11, page 21). That is all the documentation the manual provides. Fortunately, the assembly language code for DOSXQQ is provided on the PAS1 disk; maybe someday I'll figure out how it works. ◈

Michael A. Covington is a postdoctoral fellow at the University of Southern California, where he works with computer applications in the humanities.

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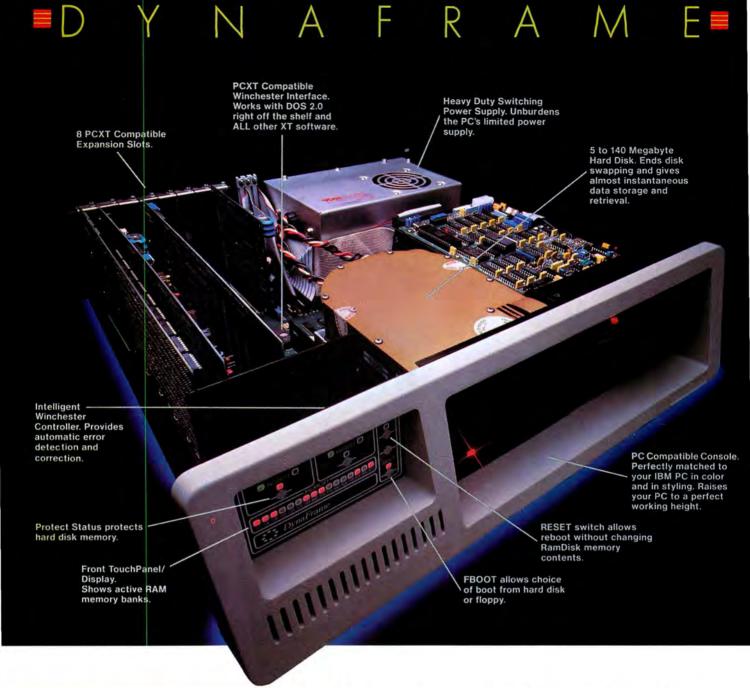
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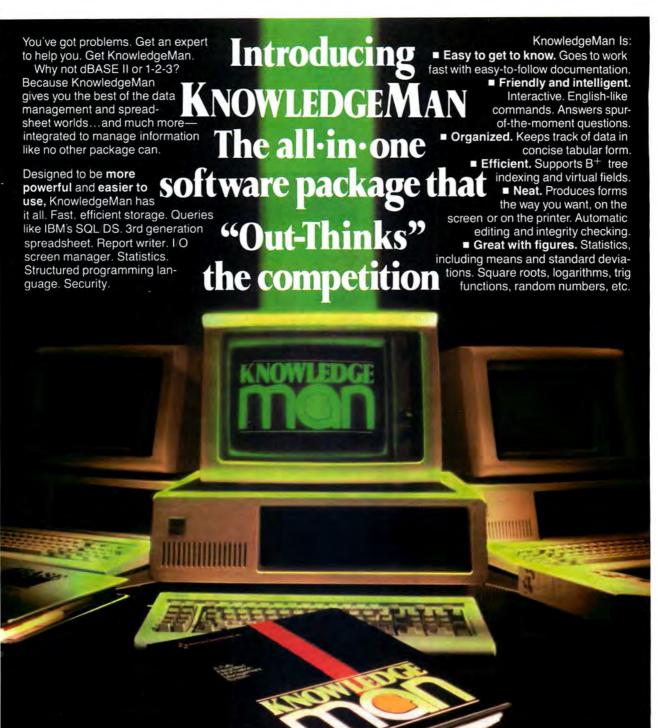
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❋•❋ Star-Dot-Star

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Edited by Karl Koessel and Art Wilcox

This month we received an excellent graphics program, *PC Picture Graphics,* that can be obtained free. In addition, we include a programming tip that helps speed up the execution of Compiled BASIC programs and an assembly language program that enables users to input "yes" or "no" to a batch file, which then branches accordingly. Several word processing hints complete this month's discoveries. We hope you will find them helpful and enjoyable.

PC Picture Graphics

This graphics program is being distributed free to all IBM PC users. The program handles five character fonts: roman simplex, roman duplex, roman complex, gothic English, and script. The symbol library contains all kinds of Greek, zodiac, music, math, and flow chart symbols as well as icons, animal, equipment, and vehicle pictures.

Graphic objects on the screen can be moved by the numeric keypad, a joystick, or a light pen. With the program you can create graphs on the IBM Graphics printer and the following plotters: HP7470A, HP7580, IBM XY/750, IBM XY/749, and IBM 7374. The program also enables you to reverse the direction of the plotter's data flow so that it works as a digitizing tablet.

If you use DOS 1.10, you need an IBM PC with 128K memory; with DOS 2.00 you need 192K. The size of the graph files produced by this program is very small, so you can save hundreds of files on a disk.

This program works best if you use two monitors: one for text and one for graphics. If you start the program on a monochrome monitor, instructions will be displayed on the monochrome screen while graphics
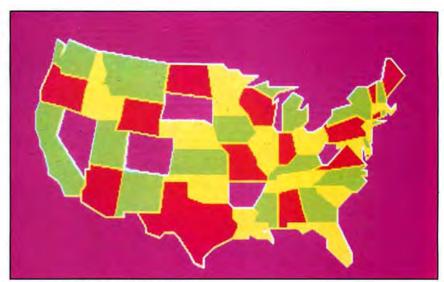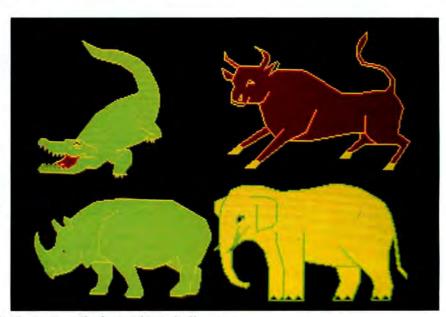
Figure 1: United States map

Figure 2: Elephant, rhino, bull, gator

are displayed on the graphics monitor. If you start the program on the graphics monitor, the program will run in single-screen mode; while designing graphics you may press the <F1> key (help) to look at the instructions, and then press the <Esc> key to return your original image to the screen for further designing.

To get a quick demonstration, load DOS, type PCPG , press <Enter>, select option 4, type in DEMO , and press <Enter>, and the first of ten

demonstration pictures (two of which are shown in Figures 1 and 2) will be displayed. Press <Enter> to proceed.

You can get a free copy of this program by sending a blank, formatted disk in a protective, self-addressed stamped mailer to the address below.

Eugene Ying
P.O. Box 549
Kingsbridge Station
Bronx, NY 10463

Editors' note: This program represents several weeks of the author's time. Those who find it useful are encouraged to send a contribution.

BASIC Advice for BASCOM
Two notes about BASIC on the IBM PC:

• While we are told that putting a complete FOR...NEXT loop on one line saves time in programs compiled with BASCOM, I find the savings minimal. A much larger savings can be achieved by making the loop count down, such as FOR I = N TO 0 STEP -1. The savings results from the test 'does I = 0 ?' rather than 'does I = N ?', thereby avoiding the need to load N each time. In the interpreter, however, I find no corresponding time savings.

• Logical statements can be combined with mathematical expressions to give compact (and interesting-looking) code. A true statement is evaluated as -1, while a false statement is evaluated as zero.

Thus, for example, the statement
IF I > 10 THEN J = J + I
can also be written as
J = J - (I > 10)
(note the minus sign). Because this is no longer an IF statement, additional

statements can be put on the same line after a colon. Similarly, the statement 'IF I<>0 THEN...' can be shortened to 'IF I THEN...'.
Robert M. Ziff
Ann Arbor, Michigan

Batch
I have owned an IBM PC for several months, and I am just beginning to appreciate the utility of batch files for decreasing keystrokes for certain computer tasks such as assembling, linking, and executing programs. However, I have been frustrated when using batch files because there is no convenient way to remain interactive with them while they are executing.

My efforts to circumvent this limitation have resulted in the enclosed program, which I have named QUERY (see listing by that name). When called from a batch file, QUERY will prompt the user for a yes or no response (Y, y, N, or n) and return a flag value (1 = yes, 0 = no) in the ERRORLEVEL register. Batch files can easily access ERRORLEVEL with the IF statement and branch to a routine appropriate to the user's yes or no response.

Two typical applications of QUERY are included. The first, EALE.BAT (Edit, Assemble, Link, Execute), is useful when putting together assembly programs. The second application, ZAP.BAT, is useful when filespecs contain wild cards, since it allows a preview of the files before deleting them. ZAP.BAT is shown in the comment at the beginning of QUERY.

QUERY was written under DOS 2.00 and is not compatible with earlier versions of DOS. An additional (and hopefully obvious) condition for using QUERY is that it is accessible

to the batch file that calls it (either that it resides in the same directory or that it may be found along a path that has been specified).
Kevin Cogan
Carrollton, Texas

VW in Overdrive
I use Camilo Wilson's *Volkswriter* frequently, and I'd like to share two ways I've found to speed up its operation.

The first speed-up is for PCs that have more than 128K, using the 128K version of *Volkswriter*. *Volkswriter* does a lot of disk access during operation. By putting a few key files in a disk emulator, the program can be accelerated dramatically, even if you don't have enough room to put the whole package in RAM.

Set up a disk emulator as drive C. Although the disk can be as big as your memory is capable of handling, to hold the key files you need only 17K. Now, copy these files from your *Volkswriter* disk onto drive C:
VW0.EXE
PRINTER*n*TBL
PWPWPWPW.PWP
Make drive C the default drive by typing C: . Finally, start up *Volkswriter* by typing A:VW . The speed enhancement is incredible. I put the above commands into an AUTOEXEC.BAT file on my *Volkswriter* disk so that everything is done automatically when I boot the disk.

The second speed-up is a little patch to *Volkswriter* itself. After using *Volkswriter* a few times, I got tired of sitting through the opening pyrotechnics. The following DEBUG session eliminates *Volkswriter*'s flashy title page and gets you down to business quicker.

✳•✳

```
;
; QUERY - BATch file 'Y/N' prompt routine.
; Written by Kevin Cogan.
; Copyright October, 1983
;
COMMENT &        This program, which can be called from a BATch file,
                 prompts the user for a yes or no (Y OR N) response
                 and then returns an ERRORLEVEL of 1 to the BATch file
                 for a reply of 'y' or 'Y' and a 0 for a reply of 'n'
                 or 'N'.  The only acceptable responses to the prompt
                 are 'y', 'Y', 'n', or 'N'.  An 80 column display is
                 assumed.
                     The 'question' displayed from the BATch file
                 can be via a REM statement or an ECHO statement, but
                 the 'question' should end with a '?'.  The '(Y or N)'
                 prompt will then start 2 spaces beyond the '?'.  If
                 a '?' is not used, then the '(Y or N)' prompt will
                 be placed on the next line following the 'question',
                 in the third column.  A typical application of this
                 program is as follows:  ZAP.BAT

                 ECHO OFF
                 DIR %1
                 ECHO The above file(s) have been targeted for
                 ECHO destruction.  Is this acceptable?
                 QUERY
                 IF ERRORLEVEL 1 DEL %1
                 IF NOT ERRORLEVEL 1 ECHO * Destruction aborted *   &
;
; Set up stack segment.
;
        SSEG        SEGMENT STACK
                    DB        16 DUP ('STACK   ')
        SSEG        ENDS
;
; Set up data segment which contains prompt.
;
        DSEG        SEGMENT 'DATA'
        PRMPT       DB        ' (Y or N)'         ; Prompt message

                    DB        '$'                 ; String terminator
        DSEG        ENDS
;
; Start of the routine.
;
        CSEG        SEGMENT 'CODE'
        START       PROC      FAR
                    ASSUME CS:CSEG;DS:DSEG;SS:SSEG;ES:NOTHING
;
                    MOV       AX,DSEG              ; Get location of data segment
                    MOV       DS,AX                ; Load data segment into DS
```

QUERY

```
;
; The first task is to find where the cursor is, since the 'question'
; requiring the prompt will be on the line above the current cursor
; location.
                    MOV     BH,0            ; Set page number to 0
                    MOV     AH,3            ; AH=3: Request cursor position
                    INT     10H             ; Call BIOS for cursor position
;
; The cursor position is in DX (DH=row, DL=column).  We now can
; begin searching the previous line, which contains the question,
; for a '?' which is the question terminator.
;
                    SUB     DH,1            ; Decrement row index by 1
                    MOV     CX,80           ; Load counter for '?' search
                    MOV     DL,CL           ; Load column index
;
; Beginning of the '?' search loop.  Search will begin in the last
; column of the display (79), and continue towards column 0 until
; search is successful.  If no '?' is found, the prompt message
; will be placed on the line following the 'question'.
;
        LOOK        LABEL   NEAR
                    SUB     DL,1            ; Decrement the column index
                    MOV     AH,2            ; AH=2: Move cursor to (DH,DL)
                    INT     10H             ; BIOS request to locate cursor
                    MOV     AH,8            ; AH=8: Get value of character
                    INT     10H             ; BIOS request for character
                    CMP     AL,63           ; Is character a '?'
                    JZ      FIND            ; Goto FIND when '?' is found
                    LOOP    LOOK            ; Else continue looking
;
; If '?' search is unsuccessful, then the row index is incremented
; by 1 so that the prompt will appear on the next line.
;
                    ADD     DH,1            ; Increment row index by 1
        FIND        LABEL   NEAR
                    ADD     DL,1            ; Increment column index by 1
;
; Prompt message is displayed and reply is read from the keyboard.
;
        PLACE       LABEL   NEAR
                    MOV     AH,2            ; AH=2: Move cursor to (DH,DL)
                    INT     10H             ; BIOS request to locate cursor
                    PUSH    DX              ; Save cursor location
                    MOV     DX,OFFSET PRMPT ; Load data location into DX
                    MOV     AH,9            ; AH-9: Output data
                    INT     21H             ; DOS service request
                    POP     DX              ; Retrieve cursor location
                    MOV     AH,1            ; AH-1: Wait for keyboard input
                    INT     21H             ; DOS service request

    (continues)
```

```
;
; Check input for affirmative, negative, or illegal value.
;
                CMP     AL,89           ; Is input 'Y'?
                JZ      YES             ; Then goto YES routine.
                CMP     AL,121          ; Is input 'y'?
                JZ      YES             ; Then goto YES routine.
                CMP     AL,78           ; Is input 'N'?
                JZ      NO              ; Then goto NO routine
                CMP     AL,110          ; Is input 'n'?
                JZ      NO              ; Then goto NO routine
                JMP     PLACE           ; Bad input: Reissue prompt
;
; Affirmative response routine. ERRORLEVEL flag is set to 1 via AL.
;
        YES     LABEL   NEAR
                MOV     AL,1            ; Set ERRORLEVEL to value of 1
                JMP     DONE            ; Goto wrap-up routine
;
; Negative response routine.  ERRORLEVEL flag is set to 0 via AL.
;
        NO      LABEL   NEAR
                MOV     AL,0            ; Set ERRORLEVEL to value of 0
;
; Wrap-up routine
;
        DONE    LABEL   NEAR
                PUSH    AX              ; Save ERRORLEVEL value
                MOV     DL,10           ; Set DL value for LINEFEED
                MOV     AH,2            ; AH=2: Output character in DL
                INT     21H             ; DOS service request
                MOV     DL,13           ; Set DL value for CR
                MOV     AH,2            ; AH=2: Output character in DL
                INT     21H             ; DOS service request
                POP     AX              ; Retrieve ERRORLEVEL value
                MOV     AH,4CH          ; AH=4CH: Terminate code
                INT     21H             ; DOS service request
        START   ENDP
        CSEG    ENDS
                END
```

QUERY (*continued*)

Note that this patch applies only to the 128K version of *Volkswriter,* although I'm sure that something similar could be done for the 64K version. As with any program patch, the following steps should be attempted on a backup copy of *Volkswriter*—leave your master copy unaltered.

First, so that DEBUG doesn't perform relocation, change the .EXE extension on the *Volkswriter* program file with the command RENAME VW.EXE VW.BUG . Now, get into DEBUG by typing DEBUG VW.BUG . Activate DEBUG's "enter" command by typing E 1DD3 . Type in the following two-digit hexadecimal values, separating each pair with a space: EB 03 90 90 90 . Ignore the values that DEBUG

prints each time you press the space bar. After the last pair, press the <Enter> key.

Write the modified program back to disk by typing W , and quit DE-BUG by typing Q . The last step is to restore the program file's proper name by typing RENAME VW.BUG VW.EXE . Test the program. You should be able to go directly to the main menu without killing time while *Volkswriter* plays games with the screen.

David Whitman
Hanover, New Hampshire

Leading Periods in WordStar
WordStar uses a leading, left-justified period to indicate a formatting command or a comment that is to be displayed on the screen but not printed on paper. This "tag" character works fine when it is used as intended, but it is less successful when it is included as part of regular text material such as in a discussion of file name extensions (e.g., .COM and .EXE) or in a discussion of dot commands themselves.

Unanticipated results may occur when a period appears as the first character in the left margin; the line may inadvertently become a footnote, or it might be omitted from the printout. To prevent this from happening, put boldface commands (^PB) around the period and it will be treated as a period, not a tag character.

Marianna van Erp
Seoul, Korea

Editors' note: This tip works well except for the minor irritation of a boldface period in the text. To avoid this, put both boldface commands before the period, and it will print out as normal.

PeachText and DOS 2.00's PATH
The **.** item by John A. Pierce [*PCW*, Vol. 1, No. 9] described an approach to editing files from any directory with *WordStar*. This approach overcomes the fact that *WordStar* does not recognize PATHs. *PC World* readers who use the IBM *PeachText* word processing package with DOS 2.00 may have the same problem because *PeachText* does not recognize PATHs. The following approach permits *PeachText* to edit files from any directory. It requires 128K and DOS 2.00.

This approach uses one batch file in the root directory of the fixed disk (drive C) and an Advanced BASIC program as shown in the listings EDIT.BAT and PATH.BAS respectively. EDIT.BAT, after turning off the ECHO and clearing the screen, causes the current directory name to be written into the file called TOPATH.BAT. It then establishes a PATH to BASIC, my directory that contains all the BASIC processors, and executes the program PATH.BAS. This program reads and then rewrites TOPATH.BAT, cre-

```
ECHO OFF
:START
 ECHO Edit %1?
 QUERY
 IF NOT ERRORLEVEL 1 GOTO ASSEMBLE
 ECHO Insert EDLIN utilty in Drive B,
 PAUSE
 B: EDLIN %1
:ASSEMBLE
 ECHO Assemble %1?
 QUERY
 IF NOT ERRORLEVEL 1 GOTO LINK
 ECHO Insert MACRO ASSEMBLER in Drive B,
 PAUSE
 B: MASM
:LINK
 ECHO Link %1?
 QUERY
 IF NOT ERRORLEVEL 1 GOTO EXECUTE
 ECHO Insert LINK Utility in Drive B,
 PAUSE
 B: LINK
:EXECUTE
 ECHO Execute %1?
 QUERY
 IF NOT ERRORLEVEL 1 GOTO CONTINUE
 %1
:CONTINUE
 ECHO Continue with %1?
 QUERY
 IF ERRORLEVEL 1 GOTO START
```

EALE.BAT

```
ECHO OFF
CLS
CD >C:\TOPATH.BAT
PATH C:\BASIC
BASICA C:\BASIC\PATH.BAS
PATH C:\
IF EXIST %1 GOTO EDIT
COPY C:\EMPTY.DAT %1    >NUL
:EDIT
COPY %1 C:\EAZE\WORK.DOC  >NUL
C:
CD C:\EAZE
ECHO EDIT THE WORKING DOCUMENT
PEACHTXT
PATH C:\
TOPATH WORK.DOC %1
```

EDIT.BAT

```
10 OPEN "C:\TOPATH.BAT" FOR INPUT AS #1
20 INPUT #1,P$
30 CLOSE 1
40 IF RIGHT$(P$,1)="\" THEN D=LEN(P$)-1 ELSE D=LEN(P$)
50 OPEN "C:\TOPATH.BAT" FOR OUTPUT AS #1
60 PRINT #1,"ECHO OFF"
70 PRINT #1,"CLS"
80 PRINT #1,"COPY %1 ";LEFT$(P$,D);"\%2 >NUL"
90 PRINT #1,"DEL %1 >NUL"
100 PRINT #1,LEFT$(P$,2)
110 PRINT #1,"CD ";P$
120 CLOSE 1
130 SYSTEM
```

PATH.BAS

ating a true batch file. EDIT.BAT then copies the file to be edited (creating an empty file if the file does not exist) into EAZE, my directory that contains the *PeachText* package. It then changes to the EAZE directory and executes *PeachText*. The default document that *PeachText* uses is named WORK.DOC; it now contains the file to be edited. Upon completion of the editing session, EDIT.BAT establishes a path back to the root directory, and there it executes the batch file TOPATH.BAT. This batch file copies WORK.DOC back to the original directory, changes to that directory, and ends.

The only additional requirements are that an empty file named EMPTY.DAT exist in the root directory of the fixed disk, and that a path to the root directory of the fixed disk exist whenever file editing is to be done. I set up this path in my AUTOEXEC.BAT file. To edit a file, I now simply type EDIT *filename* <Enter>.

Larry E. Axsom
Boca Raton, Florida
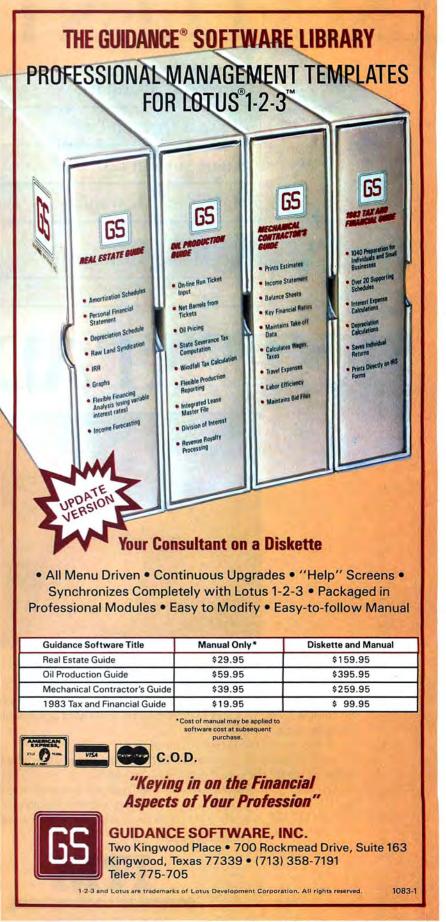
Imperfect Writer

There is a rather serious bug in the IBM PC version of *Perfect Writer* [see "Not-So-Identical Twins" in this issue]. Like all ASCII files, *Perfect Writer* files indicate the end of a line by means of a carriage return character followed by a linefeed character. If the carriage return happens to be the last character in a disk sector, *Perfect Writer* may treat it as an end-of-file marker, so that it looks as if the rest of the file has disappeared. This situation is easy to recognize because *Perfect Writer* shows ^M as the last two characters in the file.

If this happens to you, do not save the document; if you do, you'll make the damage permanent. Instead, exit from *Perfect Writer* without saving the file, and use EDLIN or any other editor to change the file in some way that alters the number of characters preceding the point at which the problem arose. For instance, you might add a blank line at the beginning of the file. The problem should then disappear.

Michael A. Covington
San Gabriel, California

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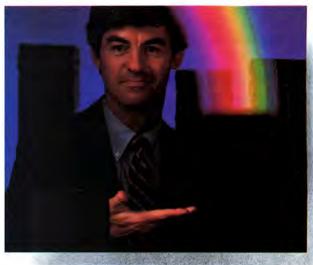
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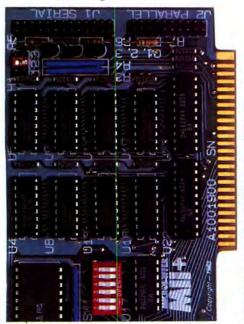
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These are stand-alone units that install In-line between virtually any computer and printer.

Besides printer buffering, the In-line serial interface (MBIS) can be used to efficiently transmit data from the computer to almost any device using a serial RS-232C interface. The parallel Microbuffer In-line (MBIP) is built exclusively for parallel interfacing, and works exceptionally well in virtually any parallel computer and any parallel printer.

Each of the stand-alone models have controls for making multiple copies (up to 255). With the pause control, printing may be halted at any point and continued later—it will pick up right where it left off. Even while you are printing copies of a document, additional files can be sent to the buffer and they will be processed in turn. Both

come with either 32K or 64K of RAM, and are easily upgradable up to 256K for processing greater amounts of data.

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Nobody puts ideas on paper so many ways.

Brokerage Firms Go On Line

N. Steidtmann
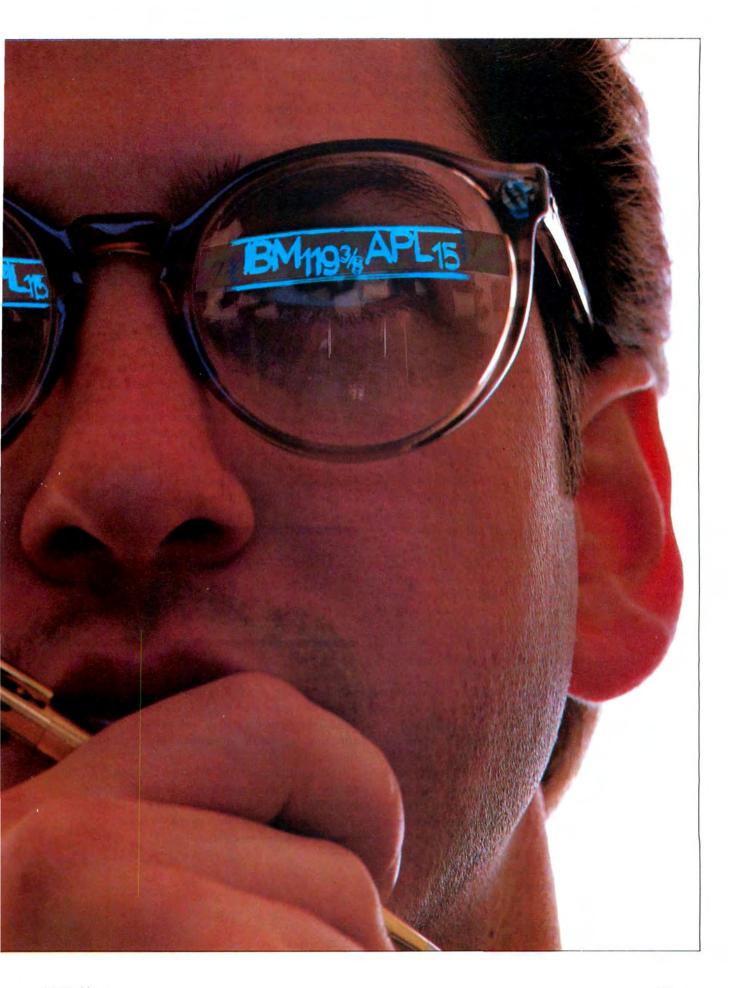
If you're anxious for the day when you can call up your stock portfolio on the computer, you don't have long to wait. Most major stock brokerage firms are unveiling on-line networking systems that provide investors with instant information and an extra nudge to buy more stocks. Although the systems are all either new or in the planning stages, two things seem certain: investors will be charged extra for system access, and none of the brokerage houses expect to profit directly from their on-line services.

Personal computer access to on-line information is relatively new in the stock brokerage business. It all started when adventurous account executives began turning away from their Quotron dumb terminals (used to gather the latest stock prices) to use personal computers for client management and stock analysis. It wasn't long before this productive trend was noticed by management. Soon personal computers were being integrated into the companies' infrastructures. Each firm built its own in-house information network in its own way.

It wasn't long before clients who had personal computers demanded immediate access to stock prices too. Clients can now gain access to "client peepholes" that allow customers to view their accounts, stock analyses, and research materials, almost all the information available to an account executive. To gain access to these systems an investor needs only a personal computer and a modem. Software is provided by the brokerage firm, or recommendations are given as to the most appropriate communications program to buy.

⬟ Community

Brokers view customer access to on-line information with mixed feelings. Some believe clients' on-line access will cut the time wasted giving quotes over the phone. Brokers will be able to devote more time to research and will be better prepared to advise their clients. Customers not only will be better informed, but will take a more active interest in their accounts. This in turn should lead to increased trading, which means more profits for brokers.

Other brokers are not so confident of the financial windfall. Some fear that on-line information will rob them of client interaction, and they'll lose their chance to "make that sale." Hutton officials working on their videotex service concede that they worked hard to overcome broker opposition to their system.

E. F. Hutton & Co. Inc.

E. F. Hutton, the nation's second largest retail brokerage house, was the first brokerage firm to announce an on-line system. In June 1983 Hutton announced the Huttonline, which received substantial coverage in the business press. The Huttonline debuted in September in South Florida on Viewtron, a commercial videotex network.

Norman Epstein, executive vice-president of operations for E. F. Hutton, views the introduction of the system as a positive step, whether or not it proves financially successful. A potential financial windfall for Hutton hinges on public acceptance of videotex. If videotex is successful, the half-million active accounts out of Hutton's 1 million customers could subscribe to the service.

If videotex fails, E. F. Hutton will still be set up to provide access through personal computers and modems. Epstein estimates that the 2 percent of Hutton customers owning personal computers may want to receive on-line information from Hutton via CompuServe Network Services.

Using a local telephone number, clients who have a personal computer or a communications terminal can access Huttonline in a manner similar to the MCI and SPRINT phone lines. Unlimited time on the system will cost $42 per month initially ($25 sign-up, $17 monthly charge), excluding videotex fees.

Huttonline offers its clients access to daily statements of their accounts, electronic mail to and from brokers, research information and analysis, and investment opportunities offered by Hutton.

To prepare for the heavy electronic access expected in the future, E. F. Hutton has created an office of the future. In March 1983 Hutton signed a $40 million contract with Data General for a Branch Information Processing System (BIPS). The installation of the system will place one MV4000, a 32-bit machine capable of executing 600,000 instructions per second, in each branch office along with 2 megabytes of main storage, a 147-megabyte hard disk, several CRT work stations, and two or three letter quality printers.

Hutton's commitment to broker education and advice goes back to January 1982, when it published the first edition of its bimonthly *E. F. Hutton Personal Computing Newsletter*. Coverage in the publication includes software and hardware recommendations, discounts available through the company, and new trends and developments in the high-tech field that affect brokers.

Dean Witter Reynolds Inc.

"You look like you just heard from FAST" may be Dean Witter's new slogan as they introduce the Financial Action Service Terminal (FAST). Focusing on the large number of IBM PC users, Dean Witter has developed a communications package to connect IBM PCs to their on-line system. The package will be provided free to their clients. For users of other computers the firm will recommend appropriate commercial software.

"The FAST system provides tiered access to accounts," explains Michael Neumark, Dean Witter's first vice-president of national sales. Depending on his or her rank in the company, a broker or client will be allowed

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> **Brokers view customer access to on-line information with mixed feelings.**

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to look at a certain level of information. Most clients and investment counselors may view only their own accounts and general research. Only the top 20 executives and board members will be able to oversee the entire company's operations, executive holdings, and sales statistics.

To get into the FAST system a client dials an 800 number to connect with 1 of 96 ports available on two large IBM Series 1 computers. After passing through four levels of security, the client presses <Enter>, and a menu is displayed (see Figure 1).

```
                              <= = ENTER YOUR NEXT REQUEST    VER.2.0.83192
ACTION/FUNCTION          VERB    PROTOTYPE   ACTION/FUNCTION    VERB   PROTOTYPE
─────────────────────────────────────────────
ACCOUNT INQUIRY .............    A       V O A
BROADCAST (SELECTED PGS) ....    B       V P
DISPLAY VERB INDEX ...........   HELP    V
LAST MONTH STMT SUMMARY .        L       V O A
SECONDARY ACCOUNTS ........      MULT    V
CHANGE PASSWORD ............     PASS    V
QUIT SESSION ..................  QUIT    V
RESEARCH OPINION ............    R       V S
STMT SUMMARY ................    S       V O A
YESTERDAY'S STMT CHANGES ..      Y       V O A

V = VERB, O = OFFICE, A = ACCT #, E = ACCT EXEC, S = STOCK SYMBOL, P = PAGE, R = REGION, D = DATE-YYMM,
I = INTEREST TYPE, N = NAME (SHORT), * = 'BPR'
```

Figure 1: Main menu for Dean Witter's FAST system

The FAST communications software, supplied by IBM and modified by Dean Witter, has built-in shortcuts for the IBM PC user. Function keys can be used to streamline the FAST access procedures (see Figures 2 and 3).

The system shuts off automatically if no activity occurs for 5 minutes. However, the user will still remain connected to the computer and incur charges. Neumark estimates that most clients will need to spend only 5 minutes on FAST to monitor their accounts. For research and investment information Neumark doubts that investors will abandon their brokers, but rather will use FAST to supplement the account executive's advice in trading stock. In essence, FAST can be used as a second opinion for the skeptical investor.

No price for FAST has been set. Discussion is revolving around a small set-up fee plus a monthly fee for hours spent on the system. FAST provides 15-minute delay quotes and in the future may offer access to the Dow Jones News/Retrieval service. At present you can only display data on the screen, but future enhancements will include the ability to download information.

Merrill Lynch Pierce Fenner & Smith Inc.
Merrill Lynch, with its nearly 6 million customers, is keeping quiet about its on-line plans. The firm won't discuss specifics, but they say they're currently searching for the "right media" to provide on-line information to their customers.

"We will be in the game," says Ritch Gatti, manager of Merrill Lynch's Advanced Office Systems. "We're de-

veloping something completely unique which should be available around the end of 1984."

The firm has integrated 15,000 Quotron terminals with its IBM 3081 over the last two years, and they are expanding information bases. Proprietary software and analytical tools are being made available to brokers, and many Merrill Lynch staffers have purchased personal computers.

"E. F. Hutton has predictable results on its pilot program; there'll be a big demand in the beginning, and then it will fall off," says Gatti, who questions the staying power of the personal computer route for providing customers with information.

"The foundations haven't been laid. The industry's too young. Over the next ten years we're looking at a moving target."

Shearson-American Express Inc.
At Shearson-American Express, personal computers are being tested in house before the company looks at providing on-line services to customers.

Jack Weingarten, manager of Shearson's Advanced Technology division, says Shearson is investigating various methods for downloading personal computer data to their IBM mainframe. Once that system is in place, says Weingarten, Shearson will consider extending on-line services to customers. Shearson customers may also be able to tie into American Express's data bases.

● Community

Although present plans are sketchy, Shearson is aiming at giving brokers a turnkey system that will include a personal computer, a training manual, and software to handle portfolio management, client accounting, electronic mail, and calendar functions.

Bache Halsey Stuart Shields Inc.
On-line plans at Bache "will be announced shortly," according to Lenny Seeman, vice-president in charge of Manager Order and Distributed Processing. There are no plans for client access, but an in-house system enabling account executives to work at home should be in place by the end of 1984. Bache is looking at alternatives to the personal computer, such as dumb terminals and keyboard devices that hook into cable television.

Paine Webber and Charles Schwab & Co., Inc.
Both Paine Webber and Bank of America's discount broker, Charles Schwab, refuse to say anything about their plans. However, on August 26, 1983 Paine Webber announced the signing of a contract with California-based Quotron for the development of an on-line system for branch offices.

C. D. Anderson
Since July 1983, 400 investors doing business with the San Francisco discount brokerage firm C. D. Anderson have been able to buy and sell stocks over their personal computers using *The Desk Top Broker* system. Customers can buy and sell stocks, view their portfolios, and monitor and track 18 selected stocks. A double-password system is used for security when buying and selling stocks.

The system costs $195 initially for registration and software. On-line charges range between 10 and 40 cents per minute, depending on the time of the call. Software features include auto-dialing, pagination, and downloading information into spreadsheet programs.

C. D. Anderson Marketing Director William R. Wallace says that out of the company's 18,000 clients, the buying and selling patterns of the on-line clients haven't been changed much by the new system.

Ultimately, both the brokerage-customer relationship and the entire computer industry will be affected by the reception these services receive in the marketplace. The hardware industry hopes that uncertain consumers may finally decide to buy a personal computer because it

<F1> automatically enters the VERB command and office number, allowing the user to type in a six-digit account number.

<F2> displays a client's statement, updated to the previous evening.

<F3> displays client's last month's statement.

<F4> clears the screen.

<F5> displays updated stock news from the "broadcast" section.

<F6> calls up research information on a particular company or field, with the exception of companies owned by Dean Witter (see Figure 3).

<F7> clears the screen.

<F8> and <F9> are currently not in use.

<F10> displays the help screen.

Figure 2: Function Key designations for FAST access procedures

```
  R T                    2 PAGE 1
AMER TEL & TELEG COMPANY   NY    MCKEEVER
UTILS-TELEPHONE B,C
RATING:B/H              AS OF 08/15
YR END DEC           1982   1983E   1984E
FULL DILUTED         $8.40  $8.40   $9.20
5-YR EST EPS GROWTH RATE          8.00
NEXT QTR 09/83         2.20E VS        2.32
REPORT = 08/03C1742     OPTION TRADED
T     65    AS OF    8/17   AVG. VOL    9742
SUP N/T   60 M/T   54  RES N/T   70 M/T   70
52 WK HI         70 1/4 LOW       54 1/4
```

Figure 3: Research report on AT&T on Dean Witter's FAST system

has practical value as an investment tool. If on-line services are well received, the broker-customer relationship could be significantly altered. If poorly received, the on-line systems may be discontinued in a few years and become nothing more than memories. ●

N. Steidtmann is a freelance writer who specializes in business and entertainment.

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Open Doors

By helping the disabled gain new skills, the PC has opened the door to the future.

Jonathan Littman

DPI student Ed Isaac using a mouth stick to program on the PC

Like many computer programmers in this age of telecommunications, Jim Stevens's work is not confined to the office. He often programs at home in the evenings and on weekends, tying his PC into an IBM mainframe computer at work. I watched Stevens key in the access codes that brought him on line with the distant computer. In seconds, the immense power of an IBM mainframe was tied to his IBM PC.

Jim Stevens is like many of today's technically sophisticated workers but with one difference—he is blind. Stevens refuses to let physical limitations interfere with his ability to work.

Many disabled people are discovering that the PC helps increase their ability to work and communicate effectively. New adaptations for the PC are meeting the varied needs of the disabled, helping those who lack hearing, sight, speech, legs, and arms to work productively.

Jim Stevens is a good example. When he types on his PC, a Votrax speech synthesizer tells him what is being entered and allows him to check previously entered code. But speech synthesizers are limited to pronouncing standard English words. A computer command such as SET-CRLF$ = CHR$(27) is difficult to type much less pronounce. Stevens's wife Debbie (also a programmer)

compensated for the synthesizer's limitation by writing a BASIC program that pronounces individual letters (see Listing 1). Thus nonwords used as commands or passwords can be understood. (Looking at Listing 1, you might notice what seem to be obvious misspellings such as *apaustruphee*. This spelling makes the computer produce more human-sounding speech.)

Stevens wasn't always so lucky. Before he had a voice synthesizer, he struggled with an unreliable, 15-year-old French Braille terminal. "When it did work," he said, "I would sometimes have to wait an hour for a long program to print out. When I finally got the printout, I would often touch the paper only to discover I had made several typos."
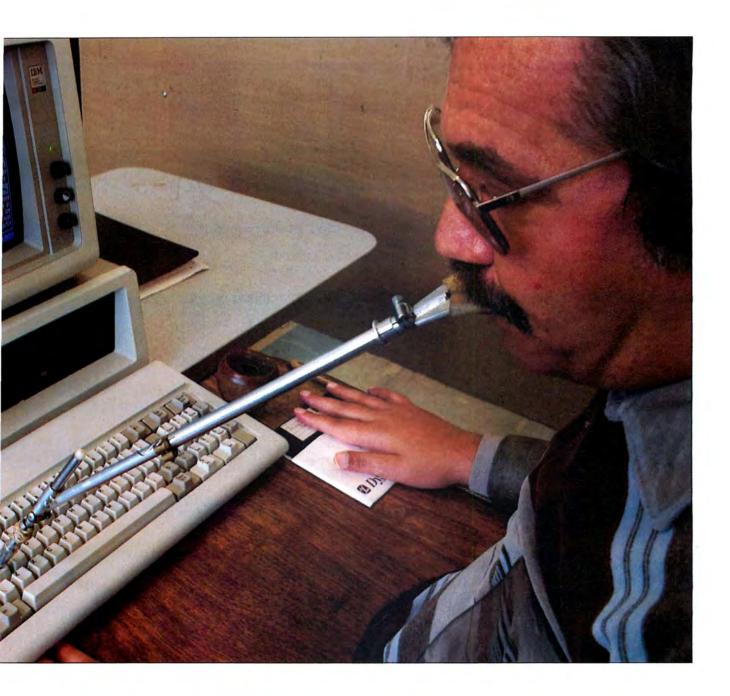
Sensory Aids Foundation of Palo Alto, California, helps Stevens and other disabled people by providing or recommending technical aids that help make the visually impaired competitive job seekers. Sensory Aids Foundation also helps them find employment and helps those whose jobs are threatened by the loss of sight. IBM and other corporations regularly consult the foundation when their employees develop vision problems.

Many jobs require microcomputers, and proper devices and training can help make a disabled person a productive employee.

Unfortunately, few manufacturers produce peripherals or software that meet the special needs of the disabled. But Susan Phillips of Sensory Aids Foundation feels that that is changing: "Manufacturers are beginning to produce peripherals that make the computer more accessible to older people and to those who lack typing skills. Many of these

products can also be used by the disabled." Phillips is particularly optimistic about the potential of the digitizing pad, a tablet that allows images to be drawn with a finger or a stylus and then stored on a floppy disk.

Hardware Solutions

David Thornberg, a developer of some of the first digitizing pads in the late 1970s, recently created the first IBM PC pad for Koala Technologies Corporation. Digitizing pads are position sensing devices that convert finger or stylus movement into digital signals for controlling computers or creating images. Although Thornberg's background is in metallurgy, he became interested in using computers in education. "Initially, I viewed the digitizing pad as an alternative to the keyboard, a communication tool that anybody—particularly children—could use," Thornberg explains. But in the 1970s

digitizing pads cost several thousand dollars. The cost has since dropped, and Thornberg's $125 KoalaPad Touch Tablet is expected to change the way PCs are used.

KoalaPads are not only being used in homes and schools but also by special education and rehabilitation groups throughout the country. At Johns Hopkins hospital a boy with severe cerebral palsy learned to draw in less than a day on a KoalaPad with a stylus strapped to his head. Says

```
10  '
20  '
30  '
40  '
50  '
60  '
160 'interpret function key pressed:
    F1=cursor up, F2=cursor down, F3=spell left, F4=spell right, F5=say
    line F6=say word
165 '
170 IF RIGHT$(K$,1)<>CHR$(59) THEN GOTO 190 'F1=cursor up
180 IF ROW% > 23 THEN BEEP: RETURN
    ELSE IF SCRN$(ROW%+1)="" THEN BEEP: RETURN
    ELSE LPRINT " up ": ROW%=ROW%+1: ROWCHG%=-1: RETURN
185 '
190 IF RIGHT$(K$,1)<>CHR$(60) THEN GOTO 210 'F2=cursor down
200 IF ROW% < 1  THEN BEEP: RETURN
    ELSE LPRINT " down ": ROW%=ROW%-1: ROWCHG%=-1: RETURN
205 '
210 IF RIGHT$(K$,1)<>CHR$(61) THEN GOTO 250 'F3=spell left
220 IF ROWCHG% THEN WHERE%=1: ROWCHG%=0
230 IF WHERE% = 0 OR WHERE% = 1 THEN BEEP: RETURN
    ELSE K$=MID$(SCRN$(ROW%),WHERE%-1,1): STUFF$=K$: GOSUB 490:
        IF K$=" " THEN LPRINT "space" ELSE LPRINT " ";STUFF1$;STUFF2$
240 WHERE%=WHERE%-1: RETURN
245 '
250 IF RIGHT$(K$,1)<>CHR$(62) THEN GOTO 290 'F4=spell right
260 IF ROWCHG% THEN WHERE%=0: ROWCHG%=0
270 IF WHERE% = 80 OR MID$(SCRN$(ROW%),WHERE%+1,1)="" THEN BEEP: RETURN
    ELSE K$=MID$(SCRN$(ROW%),WHERE%+1,1): STUFF$=K$: GOSUB 490:
        IF K$=" " THEN LPRINT "space" ELSE LPRINT " ";STUFF1$;STUFF2$
280 WHERE%=WHERE%+1: RETURN
285 '
290 IF RIGHT$(K$,1)<>CHR$(63) THEN GOTO 310 'F5=say line
300 STUFF$=SCRN$(ROW%): GOSUB 490: LPRINT STUFF1$;STUFF2$: RETURN
305 '
310 IF RIGHT$(K$,1)<>CHR$(64) THEN RETURN    'F6=say word
320 IF SCRN$(ROW%)="" THEN RETURN ELSE WHERE1%=1
330 IF ROWCHG% THEN WHERE%=1: ROWCHG%=0
340 IF WHERE%=0 OR WHERE%=1 THEN WHERE2%=INSTR(SCRN$(ROW%)," "): GOTO 360
350 WHERE2%=INSTR(WHERE1%,SCRN$(ROW%)," "):
    IF WHERE2%=0 OR WHERE2% > WHERE% THEN GOTO 360
        ELSE WHERE1%=WHERE2%+1: GOTO 350
360 IF WHERE2%=0 THEN WHERE2%=LEN(SCRN$(ROW%))
370 WHERE%=WHERE2%: STUFF$=MID$(SCRN$(ROW%),WHERE1%,WHERE2%-WHERE1%+1):
    IF LEN(STUFF$)=0 THEN STUFF$=SCRN$(ROW%)
    ELSE IF STUFF$=SPACE$(LEN(STUFF$)) THEN WHERE1%=WHERE2%+1: GOTO 350
380 GOSUB 490: LPRINT STUFF1$;STUFF2$: RETURN
385 '
390 'scroll virtual page
400 COL%=1: FOR ROW%=24 TO 1 STEP -1: SCRN$(ROW%)=SCRN$(ROW%-1): NEXT
    ROW%: SCRN$(0)="": WHERE%=1: RETURN
425 '
430 'initialize Votrax:  load exception table, turn on exceptions and
    digits, increase speech rate
440 LPRINT CHR$(27);"R0421.": WIDTH "LPT1:",255
450 LPRINT "!LXCLIST=TSEE LIST,CLISTS=TSEE LISTS,COBOL=TCO BOL,DD=TD D,
    DELETE=TDELEET,TSO=TT S O,USERID=TUSER I D,VSAM=TVEE SAM."
```

Listing 1

```
460 LPRINT "@C3"
470 LPRINT "@R3"
480 RETURN
485 '
490 'force pronunciaton of ;:-(),.'"$ -- semicolin, co lin, dash, open-
    paren, close-paren, comma, dot, apaustruphee, quote, dollar,
    exclamation-point, question mark
500 STUFF1$=LEFT$(STUFF$,LEN(STUFF$)/2): STUFF2$=MID$(STUFF$,LEN(STUFF$)/
    2+1)
510 SPOT%=INSTR(STUFF1$,";"): IF SPOT%<>0 THEN STUFF1$=LEFT$(STUFF1$,SPOT%
    -1)+" semicolin "+MID$(STUFF1$,SPOT%+1): GOTO 510
520 SPOT%=INSTR(STUFF1$,":"): IF SPOT%<>0 THEN STUFF1$=LEFT$(STUFF1$,SPOT%
    -1)+" co lin "+MID$(STUFF1$,SPOT%+1): GOTO 520
530 SPOT%=INSTR(STUFF1$,"-"): IF SPOT%<>0 THEN STUFF1$=LEFT$(STUFF1$,SPOT%
    -1)+" dash "+MID$(STUFF1$,SPOT%+1): GOTO 530
540 SPOT%=INSTR(STUFF1$,"("): IF SPOT%<>0 THEN STUFF1$=LEFT$(STUFF1$,SPOT%
    -1)+" open paren "+MID$(STUFF1$,SPOT%+1): GOTO 540
550 SPOT%=INSTR(STUFF1$,")"): IF SPOT%<>0 THEN STUFF1$=LEFT$(STUFF1$,SPOT%
    -1)+" close paren "+MID$(STUFF1$,SPOT%+1): GOTO 550
560 SPOT%=INSTR(STUFF1$,","): IF SPOT%<>0 THEN STUFF1$=LEFT$(STUFF1$,SPOT%
    -1)+" comma "+MID$(STUFF1$,SPOT%+1): GOTO 560
570 SPOT%=INSTR(STUFF1$,"."): IF SPOT%<>0 THEN STUFF1$=LEFT$(STUFF1$,SPOT%
    -1)+" dot "+MID$(STUFF1$,SPOT%+1): GOTO 570
580 SPOT%=INSTR(STUFF1$,"'"): IF SPOT%<>0 THEN STUFF1$=LEFT$(STUFF1$,SPOT%
    -1)+" apaustruphee "+MID$(STUFF1$,SPOT%+1): GOTO 580
590 SPOT%=INSTR(STUFF1$,CHR$(34)): IF SPOT%<>0 THEN STUFF1$=LEFT$(STUFF1$,
    SPOT%-1)+" quote "+MID$(STUFF1$,SPOT%+1): GOTO 590
600 SPOT%=INSTR(STUFF1$,"!"): IF SPOT%<>0 THEN STUFF1$=LEFT$(STUFF1$,SPOT%
    -1)+" exclamation point "+MID$(STUFF1$,SPOT%+1): GOTO 600
610 SPOT%=INSTR(STUFF1$,"?"): IF SPOT%<>0 THEN STUFF1$=LEFT$(STUFF1$,SPOT%
    q-1)+" question mark "+MID$(STUFF1$,SPOT%+1): GOTO 610
620 SPOT%=INSTR(STUFF1$,"$"): IF SPOT%<>0 THEN STUFF1$=LEFT$(STUFF1$,SPOT%
    -1)+" dollar "+MID$(STUFF1$,SPOT%+1): GOTO 620
630 SPOT%=INSTR(STUFF2$,";"): IF SPOT%<>0 THEN STUFF2$=LEFT$(STUFF2$,SPOT%
    -1)+"semicolin "+MID$(STUFF2$,SPOT%+1): GOTO 630
640 SPOT%=INSTR(STUFF2$,":"): IF SPOT%<>0 THEN STUFF2$=LEFT$(STUFF2$,SPOT%
    -1)+" co lin "+MID$(STUFF2$,SPOT%+1): GOTO 640
650 SPOT%=INSTR(STUFF2$,"-"): IF SPOT%<>0 THEN STUFF2$=LEFT$(STUFF2$,SPOT%
    -1)+" dash "+MID$(STUFF2$,SPOT%+1): GOTO 650
660 SPOT%=INSTR(STUFF2$,"("): IF SPOT%<>0 THEN STUFF2$=LEFT$(STUFF2$,SPOT%
    -1)+" open paren "+MID$(STUFF2$,SPOT%+1): GOTO 660
670 SPOT%=INSTR(STUFF2$,")"): IF SPOT%<>0 THEN STUFF2$=LEFT$(STUFF2$,SPOT%
    -1)+" close paren "+MID$(STUFF2$,SPOT%+1): GOTO 670
680 SPOT%=INSTR(STUFF2$,","): IF SPOT%<>0 THEN STUFF2$=LEFT$(STUFF2$,SPOT%
    -1)+" comma "+MID$(STUFF2$,SPOT%+1): GOTO 680
690 SPOT%=INSTR(STUFF2$,"."): IF SPOT%<>0 THEN STUFF2$=LEFT$(STUFF2$,SPOT%
    -1)+" dot "+MID$(STUFF2$,SPOT%+1): GOTO 690
700 SPOT%=INSTR(STUFF2$,"'"): IF SPOT%<>0 THEN STUFF2$=LEFT$(STUFF2$,SPOT%
    -1)+" apaustruphee "+MID$(STUFF2$,SPOT%+1): GOTO 700
710 SPOT%=INSTR(STUFF2$,CHR$(34)): IF SPOT%<>0 THEN STUFF2$=LEFT$(STUFF2$,
    SPOT%-1)+" quote "+MID$(STUFF2$,SPOT%+1): GOTO 710
720 SPOT%=INSTR(STUFF2$,"!"): IF SPOT%<>0 THEN STUFF2$=LEFT$(STUFF2$,SPOT%
    -1)+" exclamation point "+MID$(STUFF2$,SPOT%+1): GOTO 720
730 SPOT%=INSTR(STUFF2$,"?"): IF SPOT%<>0 THEN STUFF2$=LEFT$(STUFF2$,SPOT%
    -1)+" question mark "+MID$(STUFF2$,SPOT%+1): GOTO 730
740 SPOT%=INSTR(STUFF2$,"$"): IF SPOT%<>0 THEN STUFF2$=LEFT$(STUFF2$,SPOT%
    -1)+" dollar "+MID$(STUFF2$,SPOT%+1): GOTO 740
750 RETURN
```
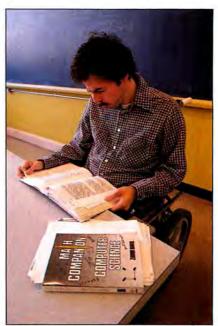
DPI students Kathleen Hillary and Dallas Green review a programming assignment.

Making the grade at DPI means hitting the books as well as the keys.

Thornberg, "We think the important thing is to get the KoalaPad to the people who work with the disabled. Once that happens, the custom overlays and software necessary for people with particular disabilities will be created."

Thornberg developed a digitizing pad for the Commodore Pet in 1978 to help people who have irregular hand movements to write. "Someone with cerebral palsy makes a letter that is often difficult to recognize," says Thornberg. "But that person probably forms the letter the same way every time. The pad recognized these recurring patterns and understood them as letters." Thornberg adds that such character recognition may soon be available on the KoalaPad.

Personal computers that listen and talk may eventually solve many of the difficulties the disabled have with computers. Computers with voice recognition systems can run programs on voice command, though most voice recognition boards are limited to understanding one voice and a vocabulary of a few hundred words. Janet Baker, an expert in speech technology at Dragon Systems in Boston, thinks that speaker adaptation systems hold promise for the disabled. These systems learn to recognize a user's voice patterns and thus are able to respond to each user's spoken commands. Speaker adaptation systems can assist people who have many different kinds of speech problems.

Speech synthesizers make the PC talk, using digitized or computer-generated voices. Digitized voices have a limited vocabulary of naturally spoken words that are digitized and stored. The result is more human-sounding speech, but this approach requires a lot of memory. Computer-generated voices use sounds that, when strung together, approximate human speech. These synthesizers produce mechanical-sounding speech, but they can speak an unlimited number of words.

Tecmar's Speech Master board combines both speech technologies. David Keene, designer of the board, knows at least one important use for it: "People who have serious speaking difficulties have the board talk for them on the phone. They type in messages, press <Enter>, and let the computer do the talking."

A person who doesn't have functioning limbs can make a computer run software. Tecmar's Voice Recognition Board can understand 100 spoken words that represent computer commands. But speech synthesizers and voice recognition boards may do more than help the disabled use personal computers.

Deteriorating sight has made reading virtually impossible for Shell Talmy of Los Angeles. He uses a speech synthesizer for writing novels and scripts. The speech synthesizer means independence to Talmy. "I don't have to rely on people to read or write for me," he says. It also represents companionship. "Writing can be a lonely job. My speech synthesizer makes me feel like somebody is talking to me."

How will the disabled use computers in the future? Greg Vanderheiden, director of the Trace Research and Development Center for the Severely Communicatively Handicapped at

the University of Wisconsin, feels that new hardware will play an important role. The center has developed several technologies to help disabled people use personal computers. One device, marketed by Prentke Romich, is the Express III communications palette. The palette is a stand-alone, 18K, attache-sized computer with a built-in 40-character printer, an LCD display, and a speech synthesizer. With the proper interface the palette can also function as a PC keyboard emulator.

The palette can be controlled by sticks, light wands, and sound or body movement activation devices. For example, electrodes can be attached to a quadriplegic's eyebrow; by blinking in Morse code the person can send commands to the palette's selection panel. Commands can also be issued by touching the palette's membrane with a stick or by pointing a light wand at LEDs on the panel. The Express III speech synthesizer verbally verifies the entered information.

Quadriplegics can "type" by using a light pen developed by Trace. The pen is strapped to the head and is pointed at different menu selections on the screen. An image of the PC keyboard is displayed, and the user "types" by moving his or her head and pointing the light pen at each image of a key. Words or programs are displayed by pointing the pen away from the screen, thereby replacing the keyboard image with the requested function or text.

Vanderheiden believes that keyboard alternatives are only stopgaps. An ideal solution for many disabled people is to use two computers. According to Vanderheiden, "A smaller portable computer such as an Epson HX-20 can translate the disabled individual's particular method of controlling the computer. The PC doesn't have to bother with the translation process and is free to run standard software."

Employment Opportunities

Not every disabled person needs special technology to use a personal computer. Ed Issac of Disabled Programmers Incorporated (DPI) in Campbell, California, is completely immobilized below the neck, yet he works as an IBM 370 programmer, typing in code with a mouth stick.

Tom Purro started DPI in 1980, after his son was left quadriplegic by a diving accident. Purro and his son painfully discovered that employment opportunities for disabled individuals were almost nonexistent. Purro, an IBM employee for over 30 years, asked for and was granted a leave of absence to study the problem. Six months later he came back with a novel plan to train and employ disabled people in the computer industry. Purro retired from IBM and started DPI.

IBM kept in touch with Purro, giving DPI its first programming contract and loaning the company several employees for start-up purposes. Today DPI has 44 employees, nearly half of whom were trained by DPI.

One reason for DPI's success is Purro's selective screening process. A prospective trainee must have previous programming experience or score high on a general aptitude test. Trainees must also be highly motivated. Purro firmly believes in the importance of finding paid employment for his trainees within a few months. Often, a trainee who learns a particular application is asked to teach it to the next group of trainees.

A woman in a wheelchair who had been training at DPI for only a few weeks expressed her joy in getting a chance to work as a DPI employee: "You can't imagine what teaching again means to me...but do you really think I can teach *Multiplan?*"

Don Odle, a handicapped man who is a senior employee with DPI, explained why DPI works: "The company doesn't pretend to give students a complete computer science education. That would be impossible

in our six-month course. But those who have aptitude and motivation generally find outside employment in a few months."

DPI's success depends on how and what the students are taught. DPI trains students in the particular languages and applications a company needs. Companies like IBM and Hewlett-Packard favor this method because it is the fastest way to prepare new employees for their way of doing things. DPI trainees are, as Purro says, "quickly worth their salt." Trainees earn their salt with hard work. A typical class day includes eight hours of instruction and programming with additional home study.

DPI students are also hired as teams—a reflection of DPI's buddy system. In the classroom and in job placement, students with complementary abilities are teamed together. A person who has full use of his or her hands is paired with someone who can enter only one keystroke at a time. The person who has a limited ability to enter data works on the parts of the program that require minimal keyboard entry.

> The PC is sophisticated enough to support a number of devices that aid the disabled.

New Applications

Few blind people have used the PC as more than a dumb terminal for a mainframe computer. But the PC's role for the disabled is changing as many discover its power and versatility. The PC uses advanced business programs and programming languages and is sophisticated enough to support a number of devices that aid the disabled.

● Community

Dick Gage, a staff member at the Cambridge IBM Scientific Center who has been blind since birth, is one person who is expanding PC applications for the disabled. Gage earned a master's degree in music and later became interested in the correlation between music and computers. When the PC first came out, Gage wanted to enable blind people to use it as a full-blown personal computer. He shared his ideas with Arnold Miller, a colleague at the Cambridge IBM Scientific Center. In his spare time Miller developed a speech synthesizer or "talking terminal" program known as *PC Speak*. It enables a blind person to use programs such as *VisiCalc* that require viewing whole screens of information at once. The PC is put into a suspended state when the user presses <Ctrl>-<NumLock>. In this mode the PC will not process data. A blind person can move the cursor through the program, making the speech synthesizer read what's on the screen.

While Gage is optimistic about the opportunities that the PC brings, he also recognizes potential obstacles: "Twenty years ago graphics were not a part of programming. A blind programmer was not that far behind if he could read his deck of computer key-punch cards. Now, graphics are an essential part of computer programming." The American Foundation for the Blind responded to this concern by developing tactile displays that allow a blind person to understand the screen by touching it. But Gage adds that this technology is not available to the general public. "The displays are far too expensive, in the $50,000 range, and serious mechanical problems remain to be solved."

Another obstacle confronting the blind is the information crunch. Gage believes that optical character readers will eventually alleviate this problem. "They could read printed documents, digitize the information, and store it in the PC's memory. Then the PC's voice synthesizer could read the information to the user."

Organizations and Products

The following is a list of organizations and products that may be of help to the disabled.

Organizations
American Foundation for the Blind
15 W. 16th St.
New York, NY 10011
212/620-2000

Disabled Programmers Incorporated
One W. Campbell Ave.
Campbell, CA 95008
408/866-5818

Sensory Aids Foundation
399 Sherman Ave.
Palo Alto, CA 94306
415/329-0430

Trace Research and Development Center
University of Wisconsin
314 Waisman Center
1500 Highland Ave.
Madison, WI 53706
608/262-6966

Products
ProKey H2.20
RoseSoft
4710 University Way NE #601
Seattle, WA 98105
206/524-2350
List price: $75

Voice Recognition Board $995
Speech Master Board $395

Speech Master Software Support Package $95
Auxiliary Vocabulary Chip $100
Tecmar Inc.
Personal Computer Division
6225 Cochran Rd.
Cleveland, OH 44139
216/349-0600

Express III
Prentke Romich
8769 Township Rd. #513
Shreve, OH 44676-9421
216/567-2906
List price: $4100, speech synthesizer $825, activation devices $90 to $700, PC interface $450

KoalaPad
Koala Technologies Corp.
3100 Patrick Henry Dr.
Santa Clara, CA 95050
408/986-8866
List price: $125

PC Speak
Solutions by Example
P.O. Box 307
New Town Branch
Boston, MA 02258
617/244-5880
List price: $395

Personal Speech System
Votrax Inc.
1358 Rankin St.
Troy, MI 48083
313/588-0341
List price: $395

One application that may benefit a broad spectrum of disabled people is related to the PC's programmable keyboard. RoseSoft of Seattle, Washington, took advantage of this fact and developed *ProKey,* a program that enables users to issue a series of commands with a single keystroke.

Disabled people liked the program because it reduced repetitive entries, but they suggested that the program be redesigned to permit sequential keystrokes of functions that are normally keyed simultaneously, such as <Ctrl>-<Alt>-<Del>. RoseSoft lis-

tened to the advice and developed this additional feature for *ProKey*. Future versions will also enable users to define Dvorak keyboards that are specially made to accommodate people who have only one hand.

Reaching Out

Gage believes that personal computers will enable more disabled people to work, both in the office and at home. "I know of many blind people who use their personal computers to access The Source, CompuServe, Dow Jones, and other information retrieval services," he says. "Now they can use voice synthesizers to read today's news or financial information. They can send mail or work from home. The computer helps people who would otherwise have a difficult time establishing normal business or social relationships."

Personal computers equipped with technical aids will not solve all the problems that disabilities present, but they do offer assistance. Computers have also made the word *disabled* a relative term. A PC equipped with the appropriate software and peripherals can help the disabled communicate and find satisfying work. Those without voice can use the PC to speak for them. Those without sight can use the PC to read to them. Those without legs can use the PC to travel the electronic highways crisscrossing the globe.

Not too long ago someone who couldn't see, hear, or speak had little contact with others. Yet, using the PC, Gage has communicated with such a person: "The man had electrodes attached to his leg. When I typed messages on the keyboard, they were transformed into Morse code that vibrated on his leg. He typed his reply in Morse code on the keyboard."

More evidence of the indefatigable will of the human spirit. ⊜
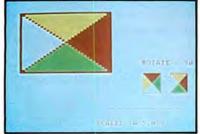
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WildCard 2 (formerly The Alaska Card)

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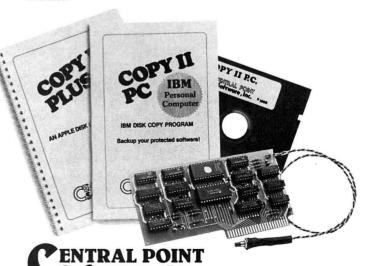
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CONNECT...

Garbage in, gospel out! The Saba Hom Line in the San Diego, California, area (619/692-1961) is collecting comments on printers. Leave Wendell Wyly a message listing the features that made you buy a printer or those that would dissuade you from doing so again. Wyly is interested in finding out which computers and word processors your printer can work with. Information on frequency of repair and ribbon problems would also be appreciated.

Also at Saba, Brad Brown and Herman Kaplan collect 800 numbers and are more than willing to share. Here are a few of the numbers they have acquired:

800/858-9313	OKI Semiconductor demo line
800/424-9090	News from the White House
800/424-5405	Latest on mortgage rates
800/424-5201	Small-business advice on export financing
800/424-5488	Banking information and complaints against banks
800/638-8780	Federal crime insurance data

From John Smedley on the Saba Hom Line: a new BBS for all you "gamers" out there. It's called THE PALACADE. Call up 619/484-1787 to get a password.

Tom Badura, from the Woodstock, New York, BBS (914/679-8734), collects TV show tickets. If you have any leftover stubs or tickets, Tom will be happy to hear from you.

More?

Press ? for help. On the Granada Engineering Group Bulletin Board (213/360-5053) Bill Sprint checks in with a technical note about Microsoft's *Flight Simulator.* Microsoft's latest version, 1.05, corrects a few bugs found in version 1.00. You can now reboot the PC with <Ctrl>-<Alt>-<Del>. In the old version you had to do a cold boot and wait 10 seconds. Also, Microsoft fixed the bug that caused planes flying upside down in clouds to crash unexpectedly.

More?

New BBSs. From the Olympia, Washington, BBS (206/357-7400) Barry Beattie announces a new BBS with a Dungeons and Dragons board (206/491-4143).

From Doug Attig: Sound to Summit BBS in Tacoma, Washington, (206/922-5873) is open for business seven days a week from 6 p.m. to 6 a.m.

More?

FORTH programmers tend to be zealously devoted to their powerful and difficult language. Not surprisingly, they have their own BBS, a conference tree at 415/538-3580. Categories include employment, publications, a library of FORTH routines, and articles on such special interests as computer art and artificial intelligence.

Also from the FORTH conference tree, an announcement of a new publication, *Art Com Magazine,* P.O. Box 3123, Rincon Annex, San Fran-

cisco, CA 94119. *Art Com* is looking for art and article ideas, computer art, projects, and general exploration of the "computer aesthetic."

More?

???? for global. The Woodstock BBS had a recent caller from Finland. Tapani Pitkanen noted: "We here in Europe have problems accessing your BBS because of different modem standards. This time I am working with a CCITT V.22 1200 bps modem (compatible with Bell 212). I have also 1200 bps Vadic."

The Woodstock board also received a call from Holger Petersen in West Germany who was trying out his home-brew modem. It's a small world.

Finally, Proxima, a Hayward, California, BBS run by North Star Computers (415/357-1130) reports that Trevor Smith called from what he claims is England's first CBBS, CBBS North-East (0207-543555).

More?
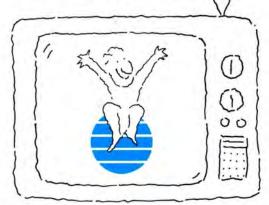
BBS of the month. And now we come to this month's most notable BBS, Delta Connection in New Jersey (609/896-2436); Jonathan Levine, SYSOP. Delta is a free-for-all. You have to like it for being so uninhibited and creative. Features include a literary magazine, a humor section, and a section called the Human Connection.

More?

Press ^K to abort. The Energy Tree in Sausalito, California (415/332-8115), is full of information about alternative energy sources. One message outlines the advantages and disad-

BBS Watch

vantages of tax credits for energy-saving home improvements. My favorite message describes something called a solar chimney, which heats air under a huge plastic sheet. The air then rises through a very high chimney, driving a turbine within it. The message does not go into whether you can hang glide in the exhaust, but it recommends solar chimneys for places like Saudi Arabia and Libya, where hang gliding is probably illegal anyway.

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

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
24 hrs, download & upload, messages, 300/1200
(Passwd = IBMPC)

203/966-8869
New Canaan, Connecticut
SYSOP: Whit Wynat
24 hrs, download & upload, messages, 300

212/541-5975
New York, New York
SYSOP: Mike Hermann
24 hrs, download & upload, messages, 300/1200

213/368-5801
San Fernando Valley, California
24 hrs, download & upload, messages, 300

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

(continues)

Our Password Modem's sophisticated new control panel

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PASSWORD™ is a modem so efficient and convenient there is little to do but turn it on to transmit at 300/1200 baud. Operating features include auto dial/answer, auto mode/ speed select, full/half duplex. PASSWORD has all this, plus a two-year limited warranty, at a price of just $449.*

TELPAC™ telecommunications software (optional) programs PASSWORD to transfer files, in terminal or host mode, with multiple error checks. Phone directory gives choice of timed automatic or one-touch dial and logon. Command mode includes file display and update, menus and help, and much more. Write or call for complete specifications.

Suggested list for PASSWORD complete with power, phone, RS232 Interface cables. TELPAC software optional extra, $79.

PASSWORD, TELPAC, USR logo and U.S. Robotics are trademarks of U.S. Robotics Inc.

U.S. ROBOTICS INC.
1123 WEST WASHINGTON
CHICAGO, ILLINOIS 60607
(312) 733-0497

BBS Watch

213/410-0714
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

214/985-8889
Dallas, Texas
24 hrs, download & upload
    (Xmodem), messages,
    300/1200
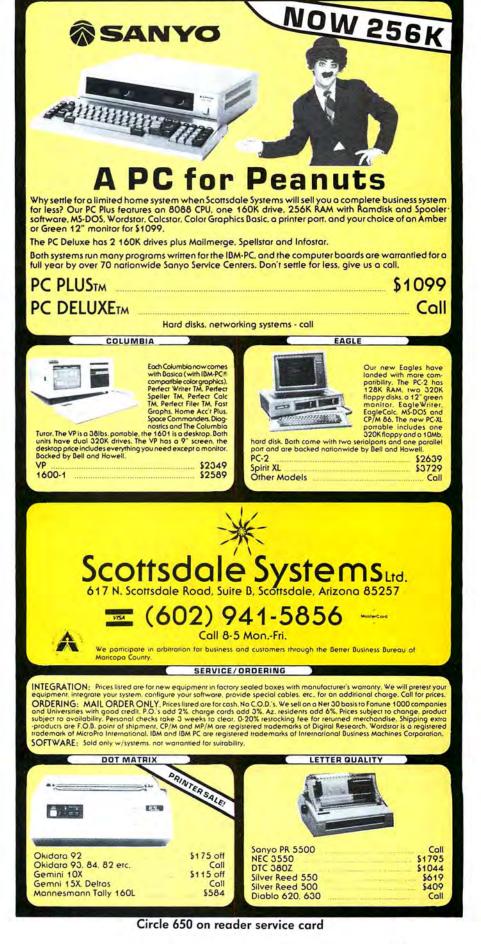
215/439-5696
Allentown, Pennsylvania
SYSOP: Glenn Wesley
24 hrs, download & upload,
    messages, 300/1200

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

(continues)

SIMPLIFIED SPREADSHEET ASSEMBLY
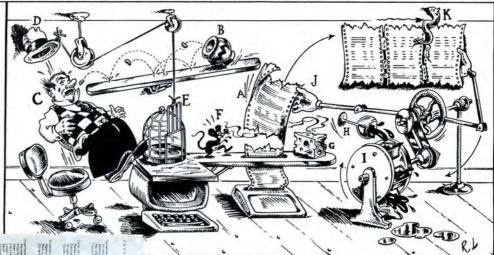
Rising spreadsheet (A) knocks Mexican jumping beans (B) into mouth of neurotic man (C) who is so discombobulated that his hair stands on end, dislodging hat (D) which opens cage (E) and releases epicurean mouse (F).

Mouse, inspired by scent of perfectly aged Camembert cheese, gnaws through spreadsheet, only to discover he has been fooled by aroma of over-ripe Gorgonzola (G).

In a fit of pique he spills vintage wine (H) into waterwheel (I) which turns pulley that causes glove (J) to grasp spreadsheet and move it to taping area.

Sheet is taped securely in place by trained adhesive tape worm (K).

MADE SIMPLE.
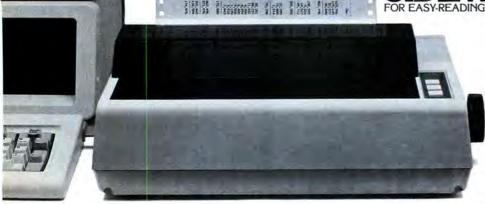
Now you can save time, aggravation, adhesive tape, and Gorgonzola cheese by following one simple direction—Sideways. It's the unique software program that lets you output all the spreadsheet columns you need, all on one continuous page, all with one print command—and all for only $60!

With Sideways on your side, no spreadsheet you invent with Lotus 1-2-3,™ VisiCalc,® Multiplan,™ or SuperCalc™ is too wide! And it's just as powerful an ally when you're creating far-into-the-future schedules and pert charts with your word processor. In fact, for any wide text file, for dozens of uses, the way to go is Sideways.

The experts agree. *PC* Magazine, for example, writes: "If you've got the need, Sideways has the solution." And *PC World* calls Sideways "nifty . . . . an easy to use program that does what it claims."

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SIDEWAYS™
FOR EASY-READING HARD COPY

BBS Watch

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
SYSOP: Jeff Machusak
24 hrs, download & upload,
    messages, 300/1200

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, 300

(continues)

BBS Watch

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, all
    day Sat and Sun, download
    & upload, messages, 300

412/963-0248
Pittsburgh, Pennsylvania
24 hrs, download & upload
    (Xmodem), messages,
    300/1200

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
    (Xmodem), 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)

503/754-5564
Corvallis, Oregon
SYSOP: Lee Damon
10 p.m. to 9 a.m. Mon to Sat,
    all day Sun, download &
    upload, messages, 300

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 & up-
    load, 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, mes-
    sages, 300
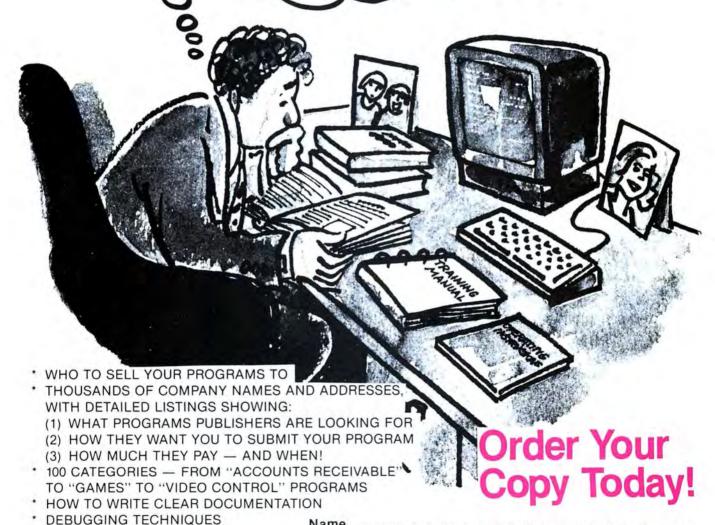
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When you are going to expand a thousand IBM PC's you want to get it right. Fact is, if you are going to expand one PC you want to get it right. That's why world leaders in computers, energy, manufacturing, research and education as well as tens of thousands of individual computer owners have picked Qubie' for their PC or XT expansion products.

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Circle 151 on reader service card

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March 1984

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IBM, Eagle, Columbia, Compaq, Kaypro, Otrona, TI, Victor or Zenith users: now give your files total protection — with Alloy's PC-BACKUP.™

Information wipe-out can be a costly, time-consuming nightmare that Alloy's PC-Backup can easily help you avoid. In fact, Alloy's PC-Backup works like your business does: it is file-oriented, backing up files in an organized way.

Alloy's PC-Backup is time and cost-effective precisely because it never lets you lose important data. Even more: only Alloy can give you high performance storage/retrieval and protection at the right price. And it even works with the IBM Expansion chassis.

Designed exclusively for small to large businesses, some of the features that make Alloy's PC-Backup the standard among users of major PCs are:
• Winchester hard disk backup and restore
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• High speed data transfers
• Up to 16.5 Mbytes of data per cartridge
• File-oriented backup

Also available, Alloy's new PC-9/TRACK tape drive, for backup with mainframe compatibility.

For further information, contact your local computer store, or call or write:

Alloy Computer Products
100 Pennsylvania Avenue
Framingham, Mass. 01701
(617) 875-6100

In Europe, contact:
*Alloy Computer Products (Europe) Ltd.
Cirencester, Gloucestershire, England.
Tel: 0285-68709   Tlx: 43340*

ALLOY
Computer Products

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.

February 20-22
1984 Office Automation Conference
Los Angeles Convention Center
Los Angeles
OAC '84 is an exposition and conference for office automation technology. The Executive Program includes speakers from Xerox and the Office Technology Research Group.
American Federation of Information
    Processing Societies
1899 Preston White Dr.
Reston, VA 22091
703/620-8926

February 21-23
Softcon
Superdome
New Orleans
An international conference and trade fair for the software industry. The show features 1800 booths and 100 seminars, panels, conferences, and workshops. Speakers at the conferences include Daniel Bricklin, Douglas Carlston, Steven Jobs, Mitchell Kapor, Benjamin Rosen, Seymour Rubenstein, and David Wagman.
Northeast Expositions
822 Boylston St.
Chestnut Hill, MA 01267
800/841-7000, 617/739-2000

February 25-26
Computer Supermarket
San Mateo County Fairgrounds
San Mateo, California
A personal computer show with emphasis on sales. Retailers, manufacturers, and distributors will offer discounts on hardware, software, and accessories.
Microshows
P.O. Box 4323
Foster City, CA 94404
415/571-8041

March 6-8
National Office Exhibition and
    Conference
Automotive Building, Exhibition
    Place
Toronto, Ontario
An exhibition and conference relating to computer hardware, software, office equipment, and office furniture.
Industrial Trade Shows of Canada
20 Butterick Rd.
Toronto, Ontario
M8W3Z8 Canada
416/252-7791

March 12-15
Interface '84
Las Vegas Convention Center
Las Vegas

A computer show for home or end users. The show includes an exposition of personal computer hardware, software, and peripherals.
The Interface Group
300 First Ave.
Needham, MA 02194
800/325-3330, 617/449-6600

March 13-15
Micro/Set 84
University Cultural Center
Detroit
A microcomputer exposition and conference for scientists, engineers, and technicians.
Engineering Society of Detroit
100 Farnsworth
Detroit, MI 48202
313/832-5400

March 19-22
1984 Federal Office Systems Expo
Washington Convention Center
Washington, D.C.
An exposition and conference focusing on both government and commercial office systems integration. This year's theme is "Office Systems Integration—Today's Realities, Tomorrow's Prospects."
National Trade Productions, Inc.
9418 Annapolis Rd.
Lanham, MD 20706
800/638-8510, 301/459-8383

World Events

March 23-25
9th West Coast Computer Faire
Brooks Hall, Civic Auditorium, and
   Trade Show Center
San Francisco
A computer exposition focusing on microcomputer software, hardware, and peripherals for home and business.
Computer Faire, Inc.
570 Price
Redwood City, CA 94063
415/364-4294

March 27-29
7th Annual Southwest Computer
   Conference
Myriad Convention Center
Oklahoma City
SWCC is a business and industry exhibition and conference aimed at management and technical personnel. More than 10,000 attendees are expected to visit 250 booths. The show features 50 seminar presentations.
E. Z. Million
SWCC
P.O. Box 950
Norman, OK 73070
405/329-3660

April 19
California Computer Show
Hyatt Hotel
Palo Alto, California
Sixty-five exhibitors will display the latest advances in the computer industry for OEMs and sophisticated users.
Norm DeNardi Enterprises
289 S. San Antonio Rd. #204
Los Altos, CA 94022
415/941-8440

April 28
4th Annual International Computer
   Problem Solving Contest
University of Wisconsin—Parkside
Kenosha, Wisconsin
Annual programming contest for pre-college students. The contest is divided into elementary, junior, and senior groups. Teams made up of one to three students per computer attempt to solve five problems within a two-hour time period.
D. T. Piele
ICPSC
P.O. Box 2000
University of Wisconsin—Parkside
Kenosha, WI 53141
414/553-2327

May 6-9
Comunicaciones Expo '84
Curtis Dixon Hall
Tampa, Florida

An exhibition and conference on tele-communications and data communications focusing on the Latin American and Caribbean marketplace. Conference topics include local area networks, management and computers, rural telecommunications, and mobile communications.
Mitch Hall Associates
LATCOM, Inc.
P.O. Box 860
Westwood, MA 02090
617/329-8090

May 22-26
MicroExpo 84
Palais Des Congress (C.I.P.)
Paris, France
The 9th annual MicroExpo is Europe's oldest and largest microcomputer show. Floor space has been doubled since last year, and over 35,000 attendees are expected.
Diane Brock
Sybex
2344 Sixth St.
Berkeley, CA 94710
415/848-8233
Telex: 336311

Are you sponsoring an event for the computing community? Please let us know. Send details as far in advance as possible to World Events, PC World, *555 De Haro St., San Francisco, CA 94107, CompuServe 74055,412, Source STE908.*

SWIG ©

SOFTWARE WRITERS INTERNATIONAL GUILD

Circle 163 on reader service card

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PC World Directory

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!

Accessories
Computer Covers

Custom PC Covers & ...
Maximum protection for low price. Antistatic dust covers of sturdy, clear vinyl material. PC covers (2 pc) $15.95. Elegant, clear plexiglass printer stands: Lg. $34.95, Sm. $29.95. Add $5 for slot. Visa/MC or check OK. Add $1 per cover/$3 per stand s/h. Printer & other covers also available. Free catalog. *SGW Enterprises, Inc., 722-J Genevieve St. Dept. W401, Solana Beach, CA 92075, 619/755-8324*

Computer Cozies
Custom-made, quilted dust-covers—antistatic, machine washable. Offered in 6 colors: grey, chocolate, cream, navy, burgundy, or rust. Any cover can be made-to-order. Sys unit: $24. Mon: $24. Kybd: $20. Nar Prnt: $20. Wide prnt: $24. 2-in-1 (sys on top of monitor): $40. Send for brochure. *Covers A Lot, P.O. Box 369, La Honda, CA 94020, 415/747-0352*

Furniture

Computer Desks
Beautiful wood-grain finish computer desks & printer stands. Desk & stand closes to protect equipment. Adjustable shelves allow you to use many accessories. Sturdy design calls for years of use. Ergonomically designed to reduce back & eye fatigue. Shipped to home/office. Satisfaction guaranteed. Prices start at $119. Send/call for brochure. *The Furniture Byte, P.O. Box 1757, Longview, WA 98632, 206/423-7524*

Jewelry
Computer Jewelry
Signifying professional involvement in the microcomputer industry. Unique designer pieces are perfect for gifts, awards, or premiums. Lapel pins, tie tacks, and stick pins in 18K gold vermeil ($12) or sterling silver ($10). Satisfaction is guaranteed, or your money back. (See display ad this issue.) *MC/N, Computer Jewelry, Simms Center, Box 9393, San Rafael, CA 94912, 415/453-7033*

Supplies

Touch Downs™
8 enlarged Keytops™ for the IBM PC. BACKSPACE; RETURN/ENTER; SHIFT (2 keys); TABS; O/INS; CTRL; ALT. Non-glare Keytops fit over tops of existing control keys, providing easier reach & bigger targets. Eliminate typing misses. Specify color choice: IBM grey or charcoal. Order Touch Downs, $18.95 postpaid: *Hooleon Company, P.O. Box 1810 A, Cottonwood, AZ 86326, 602/634-4507*

DOS/BASIC Index Tabs
Stop wasting time thumbing through the IBM manuals. Find the info you need quickly. Strong mylar holes & tabs; printed both sides. DOS 1.1/2.0. DOS reference card with most needed info & examples. Both manuals (28 tabs) plus ref. card: $15 + $1 post. & hand. Quantity discount to clubs. Visa/MC. *cum laude software, 10221 Slater Ave. #103, Fountain Valley, CA 92708, 714/964-4075*

DataBinder
NEW PRODUCT. Attractive, sturdy, vinyl-covered looseleaf binder for standard tractor feed 8½" x 11" printout paper. Large-capacity 1½" rings are spaced to accomodate vertical or horizontal storage, fanfold or separate.

Black, blue, brown, green & orange. $6 each + $2 shipping. Set of 5 colors, $28 postpaid. *Data-Bind, Inc., P.O. Box D, Margate, NJ 08402*

Computer Forms
Over 450 computer forms: checks, statements, invoices, tax forms, "no-perf" letterhead, envelopes, mailing labels, etc. Forms designed for Accounting Plus, BPI, CYMA, Continental, Great Plains, MBSI, Peachtree, State of the Art. 24 hour shpt. on non-imprinted stock, free shpt. on most forms. *Checks To Go, 8384 Hercules St., La Mesa, CA 92041, (NA) 800/854-2750, (CA) 800/552-8817, 619/460-4975*

Communications

PCOX—Co-ax Interface
PCOX is a high-performance IBM 3278/79 emulator for the IBM & compatible PCs. PCOX consists of a DMA-attached board & emulation software with an optional file-transfer facility. The file-transfer option operates with both TSO & CMS. Emulates mods 2, 3 & 4 of the 3278 & mods 2A & 3A of the 3279. *CXI, Inc., 10011 N. Foothill Blvd., Cupertino, CA 95014, 408/725-1881*

Computer Repair

CRC—Computer Repair
IBM PC & XT service. Prompt professional repairs on IBM & non-IBM devices. Large spares inventory reduces delay to a minimum. Trained certified technicians provide the professional user with the professional service he deserves. Nationwide through local franchises. *Computer Repair Corp., 1111 W. El Camino Real #133, Sunnyvale, CA 94087, 408/720-0994*

Consultants

California

dBASE II Consultants
dBASE II: fixed price reports.
• We send you a questionnaire.
• You describe your report needs.
• We give you a fixed price quote!
Specialists in order entry, repair tracking, mailing lists. Write or call: *David Jenkins & Associates, 1609 Bancroft Way, Berkeley, CA 94703, 415/644-2369*

Advance Info Systems
A micro is still a computer! Let me help you save your time & money. Services offered include user needs analysis, hardware & software selection & personalized training. Ask me about dBASE II, spreadsheet programs, networking, telecommunications, etc. IBM PC system integration is my specialty. *Advance Info Systems, 2818 Clay St., San Francisco, CA 94115, 415/922-6539*

Software Training
Make full, immediate use of your IBM PC software by consulting expert trainers. You will save money in time by eliminating trial and error self-instruction. We train in MultiMate (word processing), Multiplan (spreadsheet), dBASE II (data base management), and IUS (accounting) software. *Datacom Resources, 55 Sutter St. #441, San Francisco, CA 94104, 415/673-9772*

Accounting on Your PC
Let our CPAs help you select & set up the best accounting system for your needs. We use a proven approach that has helped many businesses computerize successfully. We have evaluated & used all of the major accounting packages (over 24) & know which are good. We sell no hardware or software. *Knight & Company, CPAs, 6644 Heartwood Dr., Oakland, CA 94611, 415/339-9036*

New Jersey

Computer Systems Labs
IBM PC communications specialists. Professional systems staff highly experienced with software/hardware selection, training and applications. Developer of PCTIE, async communications software for IBM & non-IBM systems. Custom software for all PC/Host networks. Call or write for brochure. *Howard Dean, Software Systems, 808 Shrewsbury Ave., Tinton Falls, NJ 07724, 201/842-5800*

Tennessee

Add-On Board Design
Engineering firm specializing in microcomputer hardware & software development. We will design products (add-on boards, peripherals, etc.) for the IBM PC, PCjr, or other microcomputers. We have extensive experience in industrial controls, data acquisition, & speech synthesis applications. *Arnet Systems, Inc., 1717 West End Ave., Nashville, TN 37203, 615/329-0728*

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Big Blue runs CP/M-80 programs on PC, COMPAQ or Columbia without CP/M. This single slot card includes Z80B, 64K RAM, parallel & serial ports, serial cable, real time clock & hard disk interface. Programs provided for emulation, communication & reading most CP/M formats. Just $595. *QuCes, Inc., 3 QuCes Dr., Metuchen, NJ 08840, 201/548-2135, Telex-299410*

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IEEE-488 Interface

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EIGHT TERMINALS can be connected to an IBM PC using the PC MUX. One printed circuit board mounts inside the PC. An external interconnect module with eight RS-232 connectors interface directly with terminals or other serial devices. $395. *Solana Electronics, 742K Genevieve, Solana Beach, CA 92075, 619/481-6384*

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Hard Disk III

Leading Edge* hard disk III is a 5¼" Winchester disk subsystem. Features (Z80A) microprocessor, which provides 18 high-level commands. TRS-80 model III & I & IBM PC compatibility. Provides power for 2 Winchester disk drives. Full sector buffer 256-512 bytes. *Leading Edge Products, 225 Turnpike St., Canton, MA 02021, 800/343-6833, 617/828-8150*

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With Inflo's drive system the PC can hold up to 4 floppy drives or 2 floppy drives and a hard disk inside your PC. Drives are available with storage from 320K to 1600K. *Inflo Inc., 244 Mill Rd., Yaphank, NY 11980, 516/924-9229 (voice line), 516/924-8115 (300/1200 24 hr modem line)*

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8" Inflosystem	$1700
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XCOM Modem

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Starwriter F-10

This 40 CPS daisy wheel includes low profile design, industry standard ribbons and print wheels, standard centronics parallel or RS-232C, and extensive built-in word processing functions. The Starwriter F-10 printer is supported by a full year warranty and national authorized Leading Edge service centers. *Leading Edge Products, 225 Turnpike St., Canton, MA 02021, 800/343-6833, 617/828-8150*

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FREE CATALOG! Includes pictures, product descriptions & prices of all letter quality printers featuring the IBM PC compatibles, the 3550 & the 2050. Catalog also illustrates all character sets (with alternate sets) available for the Spinwriter & identifies interchangeable Thimbles. Write or call: *WPPS Inc., One Industrial Way, Eatontown, NJ 07724, 201/389-1600*

Storage Devices

QCS HarDrives

QCS offers external Winchester Subsystems with capacities of 10 to 83M for the IBM PC, COMPAQ, Columbia and TI Professional. Backup to floppy or optional 5M removable cartridge drive with state of the art utilities. Fast, Reliable, Expandable. From $2499. *QuCes, Inc., 3 QuCes Dr., Metuchen, NJ 08840, 201/548-2135, Telex-299410*

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Combination 10M fixed Winchester plus 10M. Removable Cartridge for fast disk-to-disk backups. Compatible with MS-DOS backup & restore utilities with variable directory configuration per cartridge. Higher fixed capacities to 150M available. Ex-

cellent for XT backup using 10M removable cartridge only. *Systems Peripherals Consultants, 9747 Business Park Ave., San Diego, CA 92131, 619/693-8611*

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dBASE II Applications

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Crypt Master
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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*

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*

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 hard-copy, included

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screendump requires Epson printer.) Call, ask for Gary Rosen. To order send $29.95: *Gamma Productions, 817 10th St. #102, Santa Monica, CA 90403, 213/451-9507*

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 64K, 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 & computer monitored tests. Grading capabilities included. CALL language uses features of the IBM PC such as sound & 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:
c²b² - software design, 763 27th Ave., San Francisco, CA 94121, 415/751-1337

Lighting Design Program
Manages a data base of up to 400 fixtures. Performs IES zonal cavity lighting & ASHRAE 90-75 energy budget calc. for up to 200 rooms. All data input forms provided. Outputs incl. job fixture schedule, calc., 1st cost/operating cost report & alphabetized listing of fixture data base. Totally menu-driven. Specify PC configuration. $400. Demo: $25. *Marston/Kinney & Assoc., P.O. Box 2270, Grand Junction, CO 81502, 303/243-2386*

Process Engineering

16 Menu selected programs for equipment selection and evaluation, fluid flow, heat transfer. Friendly format includes single screen input/output form, on-line 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*

Chemical/Mechanical Eng.

PIPEDP: Gas/liquid pipe pressure drop, $40. PIPEQ: insulated pipe heat loss, $40. TANKQ: rigorous storage tank heat loss, $79. FLARE: radiation from hydrocarbon flare. STEAM: steam line pressure drop, flashing, $40. PIPELINE: gas pipeline design. More...Visa/MC. Send for catalog. *Techdata, 6615 La Mora, Houston, TX 77083, 713/498-0797*

Financial

Taxation

1983 Federal Tax Program, $750 ($150/each per state available). Program available for MS-DOS and CP/M Operating Systems. *Pencil Pushers United, Inc., Dept. PCW, 25 S. Greeley Ave., Chappaqua, NY 10514, 914/238-9600*

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, 4160 Club Dr., Atlanta, GA 30319, 404/237-9420*

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The "Personal" Financial Planner is a professional & comprehensive package fully integrated with Lotus 1-2-3™. Reports include: Net Worth, Cash Flow, Income Tax, Insurance, & Investment Analysis; Education Funding; Retirement Needs; & more. Productive, easy-to-use, & fully documented. $195. *Issaquah Data Systems, P.O. Box 1223, Issaquah, WA 98027, 206/453-6303, 206/392-8567*

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, Stamford, CT 06905, 203/968-0933*

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 be 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: *Monarch Venture Fund, 1720 S. Amphlett Blvd. #120, San Mateo, CA 94402, 415/345-5700*

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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*

Games

Sfinks PC Chess Game

The number 1, USCF rated 1793, chess game for the TRS-80 is now available for your IBM PC. Featuring problem mode, opening book, takeback, game save, clock, printer, hints, superior color/monochrome graphics,

Sfinks PC is unsurpassed! 64K disk, only $49.95 plus $2 s/h. MC/Visa. FL add 5% tax. *William Fink, 1105 N. Main, Ste. 24-B, Gainesville, FL 32601, 904/377-4847*

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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*

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Battle the Chinese Checker Champ! 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 IBM mono too. Req. 64K, 1d & PC-DOS. Only $24.95. *MicroClassics, 315 W. Grand Ave., El Segundo, CA 90245, 213/322-6888*

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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*

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Guess letters of the Oneliner to decipher hidden message. 1-4 players 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, challenge, competition & fun. 64K, Monochrome, $29. *Logical Games, Inc., 4509 Martinwood Dr., Haymarket, VA 22069, 703/754-4548*

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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, 801/943-6908*

Graphics

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*

Halo

The most powerful library of graphics subroutines under MS-DOS. Extensive functions include point, line, pie, arc, circle, ellipse, hatch styles, pattern fills, clipping, dithering, world coordinates, image compression, multiple viewports, rubberband mode, etc. Compatible with multiple devices & languages. *Media Cybernetics, Inc., 36 Columbia Ave., Takoma Park, MD 20912, 301/270-2272*

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4 packs in 1! Other sources have text/graphics; pixels/line/paints but GRAFMATIC follows thru w/2D interactive, 2D plots (contour too!), 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*

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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*

Softplot/BGL

GRAPHICS NOW SIMPLE TO PROGRAM w/BASICA Devise independent graphics library for IBM PC (MS-DOS) CP/M systems. Subroutines support advanced 2D viewing w/windows, 2D rotation, & 3D perspective plotting. EMUPLOT feature prints hi-res graphics w/o graphics display hardware, + supports most CRTs & plotters. Ideal for science eng, CAD, education & business application devlp. $200. *Mosaic Software Inc., 1972 Massachusetts Ave., Cambridge, MA 02140, 617/491-2434*

(DMS/BG)

DMS Business Graphics (DMS/BG). A picture is worth a thousand words. DMS/BG is an easy to use color graphics system for the IBM PC that allows you to create, save, edit, and print graphic data. Types of graphs include 3D Bar, 3D Multi Bar, Bar, Multi Bar, Line, Multi Line, and Pie. $79.95/ Demo $19.95. *Donovan Micro Systems, P.O. Box 483, Topeka, KS 66601, 913/272-4188*

Hobbies

Stamp Collectors

The Philatelic Management System is superior software for every level of collector. This powerful, easy-to-use package was professionally developed with over 40 programs specifically designed for philately. For IBM PC & Apple, only $295. Demonstration Package $15, credited to final purchase. *SoftStyle, Inc., 7192 Kalanianaole Hwy., Honolulu, HI 96825, 808/396-6368*

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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*

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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)*

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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. *Quest Research, Inc., 303 Williams Ave., Huntsville, AL 35801, 800/558-8088, 205/533-9405 (AL)*

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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*

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*

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Complete time billing package for firms with up to 18 lawyers. Features exclusive "video timeslip" for "magic quick" entry. Prints detailed client statements, lawyer time & client aging reports plus more. Large record capacity. Trust accounts & automatic interest. Very friendly. $350. *Satori Software, 5507 Woodlawn N., Seattle, WA 98103, 206/633-1469*

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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, standalone 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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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.128K. $2200. *Chen Information Systems, Inc., 1499 Bayshore Hwy. #205, Burlingame, CA 94010, 415/692-4358*

Literature Filing System
Searchlit stores & searches information related to your own literature collection. Retrieval based on key words in title/abstract/special key word file. Interpreted BASIC with assembly subs. Source code provided for user modification. $149.50—30 Day satisfaction or your money back (minus $4 s/h). *MediSoft, 1595 Soquel Dr. #350, Santa Cruz, CA 95065, 408/476-7106*

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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*

Hard Disk Security
DATAGARD protects files on hard disks under DOS 2.0, based on identity & privileges of each user & directory. 13 control levels, 4 i.d. groupings allow selective sharing of data. Works for all standard DOS & application commands, all DOS interfaces. Log file, 2 levels of password, and more. *Village Information Co. Inc., 55 Christopher St., New York, NY 10014, 212/924-8314*

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A powerful management tool for the IBM PC that improves organizational productivity & 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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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, 214/750-1212*

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REAL ANALYZER is 5 programs in 1; for income property & the residence. It will help you decide when to buy, refinance, sell or exchange any property by projecting cash flow & profitability before & after taxes... and more. Easy to use. Easy WHAT IF. $195. 30 day money back guarantee. Visa/MC OK. *Real-Comp Inc., P.O. Box 1263, Cupertino, CA 95015, 408/996-1160*

Real Estate Software
Amortizations, wrap-around loan analysis, buyer's cost analysis, rent vs. buy analysis, buyer qualification, seller's proceed statement, residential ownership analysis. 16 bit IBM PC, Zenith-100, (PC-DOS 2.0, MS-DOS 2.0); 8 bit CP/M-80 or MP/M-80. Microsoft BASIC. $135. MO/Cashier's Check. Avail. April 1984, Multiple listing software pkg., $325. *Real Estate Agent Computer Services, 10275 NE 23rd Ave., Mitchellville, IA 50169*

Scientific

muMATH-83™
Infinite precision rational arithmetic plus automatic formula manipulation. Includes exact integration, differentiation, limits, matrices, vector calcus, infinite series Laplace transforms & the solution of algebraic or differential equations: $300. Also muLISP: $250. *The Soft Warehouse, P.O. Box 11174, Honolulu, HI 96828*

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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*

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SURVTAB™
An easy-to-use system for tabulating data from survey questionnaires. Does crosstabs, frequencies, banner tables, means. Perfect for market researchers. Allows up to 80 items per questionnaire. File size limited only by capacity of your disk. Includes 43-page manual. $180. *Statistical Computing Consultants, 10037 Chestnut Wood Lane, Burke, VA 22015, 703/250-9513*

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*

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*

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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 multi-tasking 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™
1983 tax planning & preparation template for 2nd generation spreadsheet programs Lotus 1-2-3 & SuperCalc III. Follows IRS forms by line number & includes: form 1040 & schedules A,B,C,D,E,G,W,SE & forms 2119, 2441, 3468, 6251. Up to four different alternatives can be computed at once. Req. 256K. $45. *1040PLAN, 1125 Sunnyhills Rd., Dpt. PCW, Oakland, CA 94610, 800/227-1617, ext 644. In CA 800/772-3545, ext 644*

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*

1983 Tax Prep
1983 FED 1040 TAX PREP PROGRAM. Multiplan™ templates for IBM PC Prints on preparer ed. forms (10 included) $95. 1984 Tax-planner $75. Visa/MC accepted. *Objective Planning, 3301 Executive Dr. #102, Raleigh, NC 27609, 919/878-0022*

TAX83/PC™
Use with your spreadsheet program to simplify preparation of 1983 taxes! Accurately computes form 1040 concurrently with high-use schedules A,B,D, & W. Also 1984 estimated taxes (1040 ES). Specify Lotus 1-2-3, Multiplan, VisiCalc, SuperCalc or PeachCalc. On disk via first class mail. $14.95. CA res. add tax. *Tax Assistance Assoc., 3410 Lodge Dr., Belmont, CA 94002, 415/593-6875*

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*

Tools

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*

FSE/PC
THE Full Screen Editor for programmers that combines the best features of SPF, FSE, ICCF and CMS. Exceptionally FAST. Maximum file size 32K records. Requires 128K RAM. Insert, Delete, Copy, Merge, etc. Introductory price $79 with 30 day money back guarantee if not satisfied. MC/Visa welcome. *Data Processing Development Corp., 909 N. Mayfair Rd., Milwaukee, WI 53226, 414/778-1175*

PAL
Programming Alternative Language is the easiest & quickest way to develop structured BASIC programs for the PC. Great features: no fielding of data for data files; a b+tree filing system, no sorting required; the most optimum screen design for data entry & report screens; and procedures with parameter passing! Only $200! *K.R. Waletzki, P.O. Box 992, Rosemead, CA 91770, 213/285-3077*

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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*

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. $30. NJ add 6%. MC/Visa. *ErgoSoft, P.O. Box 454, Oakhurst, NJ 07755, 201/493-8352*

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, 4160 Club Dr., Atlanta, GA 30319, 404/237-9420*

PC File Compare
Compare disk files & get meaningful results. PC File Compare displays records that fail to compare, and highlights the differences. Allows displayed data to be changed. Compares files of different lengths, individual files. Allows global filename specification. $50. NJ add 6%. MC/Visa. *ErgoSoft, P.O. Box 454, Oakhurst, NJ 07755, 201/493-8352*

Backup Program
Copy II 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 II 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*

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*

DOS 2.0 & 2.1 Users
DOSshell—enhances DOS. 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. For hard disk systems. 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*

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*

CopyWrite
CopyWrite makes back up copies of all IBM PC software. No exceptions. CopyWrite is revised monthly, to keep up with the latest in copy protection, and comes with a trade in offer. It needs an IBM PC or XT, 64K bytes and one disk drive, but can use more memory or drives. Price: $50 US funds. *Quaid Software Limited, 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*

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 Turquoise St. #242, San Diego, CA 92109, 619/488-2262*

Screen I/O Utility

SCRIO creates complex displays, menus & input screens, under PC- DOS 2.0 using Lattice C (Lifeboat Associates). Separates the screen I/O parameters from the compiled program. Recompilation is not necessary to make changes. Immediate type checking, input limit checking, & more. Intro. offer only $79.95, List $99.95. *Delta-Pro, Management Consultants, Inc., 350 Sagamore Pkwy. #6, P.O. Box 2638, West Lafayette, IN 47906, 317/463-1936*

CopyLock Copy Protect

Superior copy protection at an affordable price. Protects against all available copy programs including the new interactive ones. Supports up to 32 programs per diskette. Any .COM or .EXE file can be protected including programs which chain or overlay. 2 drives, 64K, price $399. *SoftDesign, 6 Blodgett Rd., Lexington, MA 02173, 617/861-0902*

Disk Mechanic

The ULTIMATE Floppy Disk Backup & Repair Utility. Can back up ALL software protected disks written on the IBM PC. Works manually or automatically. Restores deleted files. Files or sectors can be searched, examined & changed. Checks disk drive speed. Requires IBM PC, DOS

1.1/2.0, 128K mem. & 2 floppy drives. $73 Ppd. USA. For info/MC/Visa: *MLI Microsystems, P.O. Box 825, Dept. PCWD, Framingham, MA 01701, 617/926-2055*

Word Processing

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 256K 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 IBM PC & for Epson printers provided. US distribution by TexaSoft, Inc. *TexaSoft, Inc., One Energy Square #660, Dallas, TX 75206, 214/369-0795*

PC-Write™

Features: wordwrap, search/replace, justify, block move/copy/delete, headers/footers, etc. Help screen, quick ref card, 100 page manual. Split screen edits two files at once. Disk w/software & manual $10; registration w/support, source, commissions $75. Visa/MC. Shareware: copy and share with others. *Quicksoft, 219 First N. #224, Seattle, WA 98109, 206/282-0452*

Typesetting

Cimarron

Top quality typesetting. Fast service. Save up to 40%. Send your disks or telecommunicate. Compugraphic typesetting equipment. Best for text jobs like newsletters, directories, catalogs, books, resumes. *Cimarron Graphics, P.O. Box 12593, Dallas, TX 75225, 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.

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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.

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Got a great new program up your sleeve?

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I/O WARE is looking for innovative programs for the home and small business markets: word processing, graphic arts, finance, planning, home budgeting, "how-to", etc. Programs that will run on the Commodore 64 (Disk or Tape); IBM PC and PC Jr. (Disk); Apple II (Disk); TRS-80 I, III, IV (Disk), and Color Computer (Disk or Tape). You'll receive our decision in 30 days. If you have what we're looking for we'll immediately send you an advance of *at least* $250.

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Circle 644 on reader service card

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The wide world of PC products

Edited by Art Wilcox
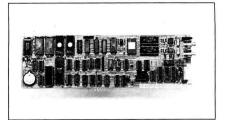
In the fast-paced personal computer marketplace *Just Announced* acts as an alert service to keep you abreast of the latest developments in IBM PC and compatible technology. Information for this department is provided by manufacturers; these write-ups are not reviews. Many of these descriptions will be followed up by reviews in future issues.

Hardware

Boards

USM-1 Speech-and-Sound Synthesizer
A board that provides the IBM PC with speech, music, and I/O capability. The USM-1's on-board microprocessor generates speech using the Votrax SC-01 speech synthesizer and text-to-speech algorithms. The
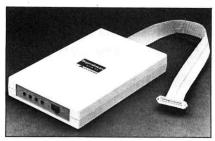
USM-1 Speech-and-Sound Synthesizer, Universal Computer Products

board creates sound and music with a pair of three-channel sound generators. The USM-1 includes menu-driven software to control speech and music synthesis, two parallel ports, a game port, and a clock calendar. List price: $445. Universal Computer Products, P.O. Box 4229, Irvine, CA 92716, 714/786-3244.

Modems

Signalman Mark XII
A stand-alone modem that answers and originates calls at either 300 or 1200 bps. Using its own commands and those of the Hayes Smartmodem, the Mark XII can operate manually or automatically to detect dial tones

Signalman Mark XII, Anchor Automation

and busy signals. The modem displays the dialing status on the screen and comes with two telephone jacks and a built-in RS-232C cable. List price: $399. Anchor Automation, 6913 Valjean Ave., Van Nuys, CA 91406, 213/997-6493.

Access 1-2-3
A Novation PC1200B modem board combined with the *Crosstalk XVI* communications program. The package requires 96K, one disk drive, and one expansion slot. The PC1200B modem board has auto-answer and auto-redial, audio monitoring of the line status, and a built-in dialer that detects dial tones and busy signals. The modem operates at either 300 or 1200 bps and provides analog and

digital loop-back test modes. *Crosstalk XVI* is an intelligent file transfer program that features checksum error checking, on-line control of communications parameters, a transmission time display, and 40 programmable key strings. List price: $595. Novation, Inc., 20409 Prairie St., Chatsworth, CA 91311, 213/996-5060.

Teleport 300
A stand-alone modem that permits users to enter data from a remote touch-tone telephone without using a terminal. It operates with an RS-232C serial port and accepts standard computer-to-computer data transmissions. The Teleport 300 has auto-answer, a password protection system for security, and two modes of operation. The first mode provides conventional computer-to-computer transmissions at speeds of up to 9600 bps. In the second mode, users call the computer system with a touch-tone device and enter data that is then converted to ASCII. List price: $349. Teletone Corporation, 10801 120th NE, Kirkland, WA 98033, 206/827-9626.

Teleport 300, Teletone Corporation

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Network Devices

DMS-816 Work Station

An IBM PC compatible work station that runs on Digital Microsystems' HiNet local area network. HiNet runs both MS-DOS and CP/M programs, accommodates up to 32 users, and provides 500K bps serial transmissions with SDLC protocol. The DMS-816 Work Station is equipped with a 12-inch monitor and detachable keyboard and includes dual Z-80A and 8088 processors, 256K RAM (expandable to 512K), an RS-422 network port, an RS-232C serial port, and a parallel port.

DMS-816 Work Station, Digital Microsystems

Digital Microsystems also offers the DMS-3/501 Master Station (file server) that includes a 15-megabyte hard disk, a 320K floppy disk, a Z-80A microprocessor, and 64K RAM. Both systems include the *Perfect Library*. List price: DMS-816 $1695, DMS-3/501 $6500. Digital Microsystems, 1755 Embarcadero, Oakland, CA 94606, 415/532-3686.

DMS-3/501 Master Station, Digital Microsystems

Printers

Primage I

A letter quality daisy wheel printer that includes switch-selectable parallel ports and RS-232C serial ports. The Primage I prints 45 cps and provides eight variable type fonts and multiple-language capability. By using ten character sets in firmware, users can print the special characters of over 30 languages without changing the print wheel. An automatic sheet feeder is available. List price: $1695. Primages Inc., 620 Johnson Ave., Bohemia, NY 11716, 516/567-8200.

CR-1810 ComScriber I

A personal plotter that produces charts, graphs, and illustrations in several colors. It requires the Comrex support pack, which includes pens, paper, parallel interface cable, manual, and tutorial software. The plotter produces graphics on transparencies and standard 8½- by 11-inch paper, which can be extended to up to 120 inches in length. The CR-1810 is accurate to 1/4000 inch, draws at a speed of 6 inches per second, and has a pause feature for changing pen colors. The unit is controlled with 12 keys and includes a self-test feature. List price: plotter $695, support pack $100. Comrex International Inc., 3701 Skypark Dr., Torrance, CA 90505, 213/373-0280.

CR-1810 ComScriber I, Comrex International

Storage Devices

Pegasus XT Conversion Kit

A 10-megabyte internal hard disk system designed for the IBM XT that includes the hard drive, software, and a controller board. For future upgrades, the Pegasus controller board supports hard disks that have a storage capacity of up to 140 megabytes. Pegasus hard disks fit in the extra bay in a single-drive IBM PC and are also available in 23-, 40-, 65-, and 140-megabyte sizes. List price: 10M $1295, 23M $1995, 40M $2495. Great Lakes Computer Peripherals, Inc., 2200 W. Higgins Rd. #245, Hoffman Estates, IL 60195, 312/843-1090.

Just Announced

Miscellaneous

Model 610 Image Processing Camera

An electronic digitizing camera that enables users to enter detailed images into desktop computers without using the keyboard. The camera requires the Model 110 Image Processing Interface designed specifically for the IBM PC. The Model 610 captures the images of documents, illustrations, and three-dimensional objects through a standard 35mm camera lens and translates them into a digital equivalent. The electronic image can then be displayed on screen, printed out, stored in memory, or telecommunicated to another computer.

Also available is the Model 90 Integrated Imaging System, which includes the Model 610 camera, the Model 110 Interface, the camera stand and power supply, illumination, camera lens, and necessary cables. List price: Model 610 $7850, Model 90 $9945. Datacopy Corporation, 1070 E. Meadow Circle, Palo Alto, CA 94303, 415/493-3420.

System Software

Utilities

micro/SPF

A programming tool that brings the SPF mainframe program editing environment to the IBM PC and the IBM 3270 PC. It requires 320K and two double-sided disk drives. *micro/ SPF* provides full emulation of the SPF environment including full-screen editing functions, split-screen formats, and full scrolling and search commands. The program also fea-

tures programmable function keys, access to the *micro/SPF* master catalog, an on-line tutorial, and full edit line commands. List price: $450. Phaser Systems, Inc., 24 California St., San Francisco, CA 94111, 415/434-3990.

Active Trace

A debugging and learning tool for BASIC and BASICA. It requires 64K and one disk drive. *Active Trace* provides programmers with cross-reference mapping that can be printed to disk and edited with a word processor. Also included is *SCOPE*, a utility that enables programmers to "see inside" a program as it runs. *SCOPE* displays or stores any or all BASIC variables and functions with their current values and line numbers on a screen, a printer, or a disk. It will also help users find the source of an error and its possible causes and display them on screen. *Active Trace* demonstrates BASIC functions and statements and enables users to scroll backward through a program's activity. List price: $79.95. Awareco Active Software, 38401 S. Highway 1, P.O. Box 695, Gualala, CA 95445, 800/358-9120, 800/862-4948 in California, 707/884-4019.

JSPOOL 2.05

A print-spooling utility updated for DOS 2.00 that works as an installable device driver. *JSPOOL* supports the XON/XOFF protocol and parallel and serial ports, and includes nine special processing commands. The commands can be input by the user directly or placed at the top of text files and automatically input as the

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spooler processes each file. They enable users to set tabs, odd or even page boundaries, and bps rates. The commands also pause or restart printouts, clear the print buffer, and direct output to one of seven printers. Users can change print buffer sizes from 2 kilobytes to 2 megabytes and can disable all print processing commands with a dumb mode. List price: $40. Tall Tree Systems, 1032 Elwell Ct. #124, Palo Alto, CA 94303, 415/964-1980.

Applications Software

Accounting and Inventory

Tenkey
A calculator program that can be stored in the IBM PC's memory to allow instant access to standard accounting calculator functions by temporarily interrupting any other active application program. It requires 64K and one disk drive. Pressing a preassigned key brings *Tenkey* to the bottom line of the display screen, where users can do calculations with up to 15-digit figures. The program provides user-definable decimal placement, macro storage of important figures for later recall, user-programmable key assignments, and a tape display for checking accuracy. List price: $48.50. Photon Software, P.O. Box 1408, Bellevue, WA 98009, 206/451-8272.

Business Management

Venture
A financial planning and modeling tool that enables users to forecast the profitability of proposed and existing business situations. It requires 192K and one double-sided disk drive. *Venture* is a microcomputer version of a mainframe time-sharing system. It enables users to do business planning, strategic planning, and capital investment analysis without writing equations or designing reports. The program generates ten reports, including Income Statement, Balance Sheet, Cash Flow and ROI, Discounted Cash Flow Analysis, Amortization Schedules, and Financial Ratios. *Venture* has interactive English commands, programmable function keys, and a help mode. It also features automatic calculation of depreciation, cash and debt figures, and 11 depreciation methods. List price: $495. Weiss Associates, Inc., 127 Michael Dr., Red Bank, NJ 07701, 201/530-9260.

Communications

FM/3000
A terminal emulation program that converts the IBM PC into a work station that can access Computer Solution's FM/3000 systems. It requires 96K, one disk drive, a communications board, and an RS-232C serial port. Designed for use in manufacturing environments, *FM/3000* adds sophisticated materials requirements planning (MRP), shop floor controls, and production capacity planning functions to the IBM PC's existing library of applications. Based on the Hewlett-Packard 3000 financial, manufacturing, and marketing control systems, the program enables users to tranfer data stored in an FM/3000 system into the PC and use the data with other applications pro-

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grams such as *1-2-3* and *dBASE II*. List price: $295. Computer Solutions, Inc., One Burlington Woods, Burlington, MA 01803, 617/229-2200.

PC-PROFS

A program that enables IBM PC users to access the IBM mainframe Professional Office System (PROFS) and its electronic mail services. It requires 256K, one double-sided disk drive, a Hayes Smartmodem, an asynchronous communications board, a color graphics board, and an RS-232C serial port. *PC-PROFS*'s "desktop" metaphor provides users with easy access to all of PROFS's services. The electronic desktop features icon manipulation, instantaneous screen swapping, and full support of the function and cursor control keys. List price: $250. Applied MicroSystems, Inc., P.O. Box 832, Roswell, GA 30077, 404/475-0832.

m3278/SPF

A communications package that enables the IBM PC to fully emulate the IBM 3278 work station. It requires 320K (512K recommended) and two disk drives. With *m3278/SPF,* the PC acts as a TSO/SPF distributed work station that can exchange programs with the mainframe, create new files, and edit preexisting files. The full-screen text editor included in the package is equivalent to the standard mainframe SPF software and requires no programmer retraining. With *m3278/SPF,* users can switch among interactive, remote, and local processing modes using one keystroke. List price: $2150. Phaser Systems, Inc., 24 California St., San Francisco, CA 94111, 415/434-3990.

Intercom 300

A program that enables users to transfer ASCII and binary files between an IBM PC and a Burroughs mainframe. It requires 128K, one disk drive, an asynchronous board, an RS-232C serial port, and ICC's *Datacom* module. *Intercom 300* can be customized for specific applications and allows PC applications programs to communicate with Burrough's applications. With *Intercom 300* resident in the PC and the Burroughs, users can make unattended and batch file transfers and store macros for logon sequences. List price: $250. Intercomputer Communications Corporation, 3195 Linwood Ave. #2A, Cincinnati, OH 45208, 513/321-3199.

Transend

A communications program that enables users to transfer files of any type between the IBM PC and information services, mainframes, and other microcomputers. It requires 256K, two disk drives, an asynchronous board, and an RS-232C serial port. Using a desktop metaphor, *Transend* enables users to send files automatically with logon sequences up to 20 lines long. The program also features an electronic mail mode with a text editor and an address book, Xmodem error correction protocol, unattended file transfers, and programmable key strings. List price: $189. Transend Corporation, 2190 Paragon Dr., San Jose, CA 95131, 408/946-7400.

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"Straw" into "Gold"
Wipe Out
"War" and "Famine"
Locate
"Atlantis"
Copy
"The Dictionary"
Even Justify
"The Meaning of Life"

All with single key strokes. Select Write word processing. All the power of the most complicated word processors. With none of the hassle. Select Write. Easiest to use. Easiest to learn. Easiest to buy. For the IBM PC, XT, PCjr and workalikes. See Select Write at your local dealer or write: Select Information Systems Inc. 919 Sir Francis Drake Blvd., Kentfield, CA 95094.

SELECT
WRITE

Circle 528 on reader service card

Data Management

R:base Series 4000

A relational data management system that handles 400 fields per record and record sizes of up to 1530 characters. It requires 256K and two double-sided disk drives. *R:base* provides relational data validation, 40 related files per data base, and alterable command menus. The program provides English commands and full help functions and allows users to sort and select data on up to ten criteria. *R:base* is compatible with *Multiplan* and *RIM*, the mainframe relational data base system. *dBASE II* files can also be converted to *R:base* format. List price: $495. Microrim, Inc., 1750 112th NE, Bellevue, WA 98004, 206/453-6017.

PC-File 9.1

A general-purpose data management system designed for novices. It requires 64K and one double-sided disk drive. *PC-File* maintains mailing lists, price lists, and telephone directories; prints both one-up and two-up mailing labels; and integrates *PC-File* data bases with *VisiCalc*, *Multiplan*, *1-2-3*, and *MailMerge*. The program performs comparison searches on any field in the record and creates new data bases from existing data bases. Records can be selected on up to ten comparisons, with totals and averages provided on the numeric fields. List price: $35 contribution requested. Jim Button, P.O. Box 5786, Bellevue, WA 98006.

The PC jr Specific Library from Brady

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Educational

Knoware
A game that instructs novices about software applications. It requires 128K, one disk drive, and a color graphics board. Users begin playing *Knoware* as mail clerks. At each step up the corporate ladder they are introduced to new applications software, including spreadsheets, word processing, data management, BASIC programming, graphics, and financial analysis programs. Users can refuse a promotion to examine a specific application more closely. All of *Knoware*'s programs can be used independently of the game to perform actual tasks. List price: $95. Knoware Inc., 301 Vassar St., Cambridge, MA 02139, 617/576-3825.

Entertainment

Tiao Chi
A computerized version of Chinese checkers. *Tiao Chi* requires 64K and one disk drive. Designed for people of all ages, this version of the traditional game of strategy has three skill levels, color graphics, and music and sound effects. Up to six players, human or computer, can compete at once. Symbols of each Chinese New Year animal are used as player tokens. List price: $24.95. Microclassics, 315 W. Grand Ave., El Segundo, CA 90245, 213/322-6888.

Sailing
A simulation game in which players sailing a small craft rescue swimmers trapped in the Bermuda Triangle. It requires 128K, one disk drive, a color graphics board, and a color monitor. *Sailing* features keyboard controls, a sound toggle, a pause key, and instructions that are accessible before each game. List price: $34.95. Accupipe Corporation, 222 W. Lancaster Ave., Paoli, PA 19301, 215/296-7376.

Pro Sports Stats
A statistical data base of the National Football League and its players. It requires 196K and two disk drives. Designed for the avid sports fan, *Pro Sports Stats* provides complete professional football records from 1970 to the present. Statistics include win and loss records, each team's record against the point spread, histories of points scored for and against each team, coaches' histories, and the playing surface of each game. A weekly update service, downloaded over a modem, is available. List price: $149.50. Soltys Associates, 1741 N. Ivar Ave. #106, Los Angeles, CA 90028, 213/465-5605.

Financial

Auto-Ledger
A menu-driven general ledger package designed for small businesses that includes on-screen help and two modes of data entry. It requires 96K and one disk drive. *Auto-Ledger* enables users to enter transaction accounts one at a time for quick

transaction splitting or in double-account form for foolproof account balances. The program also features user-customizable report generation, on-disk audit trails, displays of cash account balances, automatic posting and closing, and multiple profit center capability. Up to 400 accounts can be processed with the program. List price: $250. Emerald Software Inc., 2416 Warren Ave. N, Seattle, WA 98109, 206/282-2100.

EasyBusiness Payroll

A payroll program that enables users to keep employment records including earnings, hours, multiple deductions, vacation pay, sick leave, and tips. It requires 96K and two disk drives. *Payroll* specifies up to 94 paycheck deduction items, handles variable pay periods, and distributes an employee's salary to as many as three general ledger accounts. Users can review payroll data by various criteria including job classification, pay period, dollar amount, and hours. *Payroll* prints customized paychecks and government reports and can be integrated with other EasyBusiness products. List price: $745. Information Unlimited Software, Inc., 2401 Marinship Way, Sausalito, CA 94965, 415/331-6700.

Integrated Applications

InteSoft

An integrated series of office automation products designed for novices. It requires 128K and two disk drives. *InteSoft* consists of seven applications programs including *InteCalc*, a split-screen, three-dimensional spread-

sheet; *InteBase*, a relational data management system that integrates with other vendors' software; *Inte-Mate*, a mouse-driven program integration system; *InteVate*, an interactive applications generator designed for novices; *IntePert*, a job scheduling and resource allocation system; *IntePlan*, an executive time management program; and *InteWord*, a dedicated word processor. When combined, these programs enable users to build complex, custom business applications without programming. List price: *InteCalc* $295, *InteBase* $495, *InteMate* $249, *InteVate* $195, *IntePert* $195, *IntePlan* $149, *InteWord* $395. Schuchardt Software Systems, Inc., 515 Northgate Dr., San Rafael, CA 94903, 415/492-9330.

Job and Industry Specific

Broker's Notebook

A portfolio management and prospecting tool for retail securities brokers. It requires 128K and two double-sided disk drives. The *Broker's Notebook* generates personalized client and prospect letters based on security holdings and interest criteria. It also features Schedule D report generation, formats for extensive client notes, and cross referencing for security objectives. Users can make complicated sorts using up to five key fields from a total of 40 stored categories. *Broker's Notebook* includes electronic price and dividend

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updating and lets users combine portfolios from several clients to create one large account. List price: $1500. American Financial Systems, Inc., 134 N. Narberth Ave., Narberth, PA 19072, 215/668-2115.

Personal Management

PC/PFP II

A personal finance program that enables users to process multiple accounts, split transactions, and generate a range of financial reports. It requires 128K, two disk drives, and a 132-column printer. The *Personal Computer/Professional Finance Program II (PC/PFPII)* provides 52 accounts for checkbook and credit card records, 45 major budget categories, and storage of up to 5000 transactions on a double-sided disk. The program also features a payee address book, automatic checkbook reconciliation, bar graph functions, check printing, and an on-screen calculator. List price: $245. Best Programs, 5134 Leesburg Pike, Alexandria, VA 22302, 703/931-1300.

TaxCalc

A tax-planning program that computes income tax variables and indicates the best tax alternative. It requires 64K and two disk drives. *TaxCalc*, a spreadsheet template, works with *VisiCalc*, *SuperCalc*, *1-2-3*, or *Multiplan* files to perform income tax calculation, tax forecasting, and tax verification. The program computes capital gain deductions, capital loss limitations, contribution limitations, and two-earner married deductions. It per-

forms "what if" calculations for income-averaging taxes and minimum and alternate minimum taxes, and indicates the lowest payment figure. List price: *TaxCalc* $125, *California Template* $100. TaxCalc, 4210 W. Vickery, Fort Worth, TX 76107, 817/738-3122.

Miscellaneous

PROLOK

A software copy-protection system that resides on disk. It runs on computers using MS-DOS, CP/M-86, and some CP/M-80 systems. *PROLOK* prevents unauthorized copying of computer programs by placing a customized "fingerprint" on each *PROLOK* disk onto which users copy programs. The security system allows both protected and unprotected programs to reside on the same disk and prevents the use of mass bypass copying systems. List price: evaluation copy $9.95. Vault Corporation, 2649 Townsgate Rd. #500, Westlake, CA 91361, 805/496-6602. ●

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