PC WORLD

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The Personal Computer Magazine for IBM PCs and Compatibles

Special Report

What Can I DO with IBM's New PCjr?

PC WORLD

Volume 2, Number 2

PCjr Home Computing

• **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!

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

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

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

AST

Number One Add-On Products for IBM PC

Number One Add-On Products for IBM PC

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

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

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

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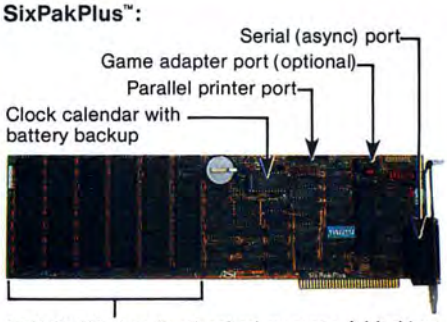
AST Research Micro-to-Mainframe Communications Products:

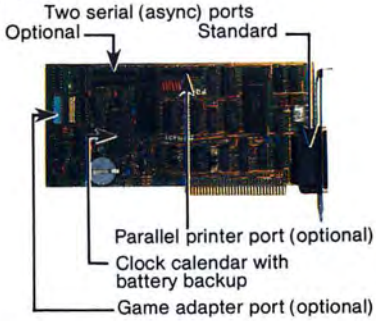
- **AST-SNA** — A family of five products that enable a PC to communicate with a mainframe via the IBM SNA protocol without the use of protocol converters.
- **AST-5251** — An interactive 5251 remote work station emulation package for use with the IBM System 34, 36, or 38.
- **AST-3780** — A hardware/software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

SixPakPlus™:

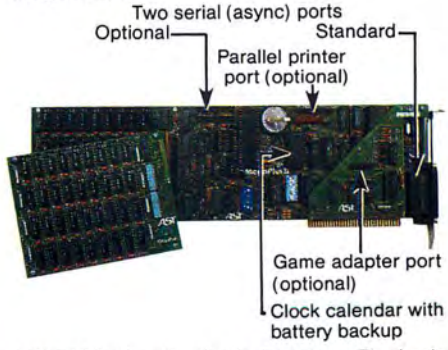


64K-384K of parity checked memory. Added to a PC or XT with a fully populated 256K system board, the SixPakPlus can bring the system memory to 640K, the maximum addressable user memory.

I/O Plus II™:

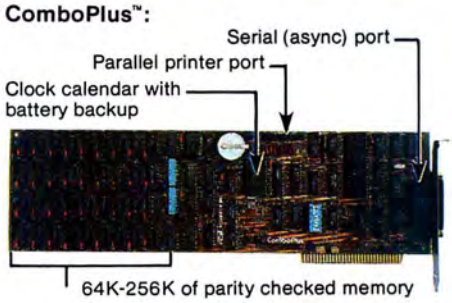


MegaPlus II™:



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

ComboPlus™:



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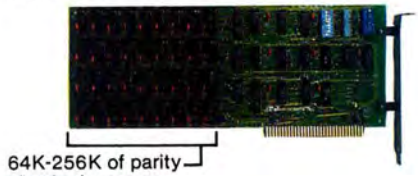

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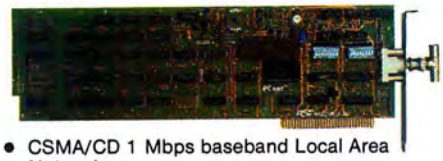

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- File lock-out
- DOS 1.1 and DOS 2.0 compatible

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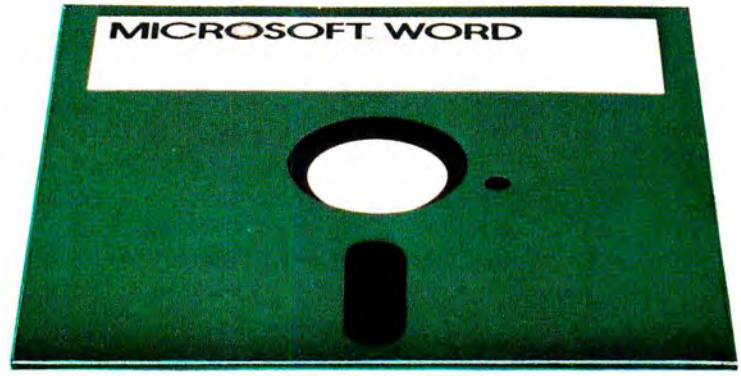
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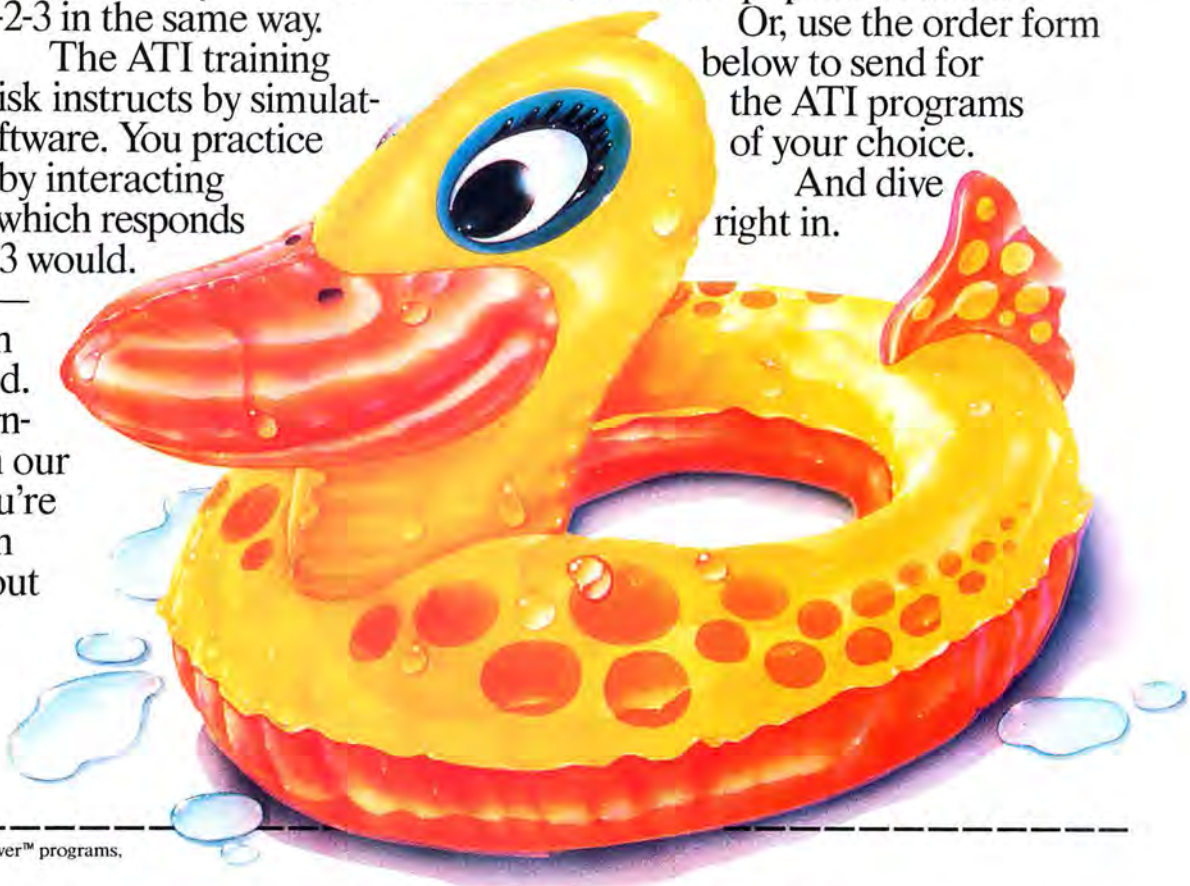

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PC WORLD

The Personal Computer Magazine for IBM PCs and Compatibles

State of the Art

34 **Logical Views,** ***David Jenkins***
Windows, fast data manipulation, and a sophisticated network structure make SSI's new data manager truly top drawer.

48 **PC-TV,** ***William Claxton***
Computer-controlled video editing with the IBM PC.

66 **Remote and Unattended,** ***Larry Jordan***
An introduction to unattended communications software.

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Review

132 **A Host of Hosts,** ***Larry Jordan***
A comparison of six unattended host systems.

151 **Play It Again, Samna,** ***Merrily Shinyeda***
Word processing changes shape when you zoom, fold, and split the screen with *Samna Word II*.

163 **ThinkTank,** ***Jonathan Littman***
Dubbed "the first idea processor," *ThinkTank* helps you organize and develop your thoughts.

172 **But Is It Really FORTRAN?** ***Chip Barnaby and Charlie Huizenga***
Do the available FORTRAN compilers have what it takes to run "real" programs on the IBM PC? A comparative review.

186 **Minding Your Business,** ***George C. Hayles***
The *Total Accounting System* from TCS.

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February 1984

Hands On

200 **Tracking Your Dividends,** ***Andrew T. Williams***
Build a spreadsheet to record your investment dividends—and relax at tax time.

212 **Making a Date,** ***Steve Manes***
A short assembler program that puts your system date to work.

222 **Lotus in the Lab,** ***Glen I. Ouchi***
Import data directly from lab instruments to the PC and process it in *1-2-3*.

Departments

15 **David Bunnell**
23 **Letters**
79 **PC World View,** ***Miriam Medom***
237 **The Help Screen,** ***Karl Koessel***
249 ***.***, ***Edited by Art Wilcox and Karl Koessel***
293 **User Group Dispatch,** ***Lee E. Miller***
311 **World Events,** ***Edited by Eric Brown***
336 **Just Announced,** ***Edited by Art Wilcox***

PC World Directory

322 A classified guide to products and services.

Indexes

353 **Products**
356 **Advertisers**

Community

270 **COMPAQ Gets a 10,** ***Edited by Eric Brown***
A conversation between David Bunnell and COMPAQ President Rod Canion.

280 **Portables Abroad,** ***Fred D'Ignazio***
Tips for taking your computer to Europe.

PCjr Special Report

94 **PCjr World,** ***Kearney Rietmann***
Computing at home with PCjr.

96 **IBM's Home Run,** ***Katie Seger and Frederic E. Davis***
A look at the hardware components that make up PCjr.

102 **Old Faces in New Places,** ***Adrian Mello***
IBM updates the BASIC language and Disk Operating System for PCjr.

108 **PCjr Arrives with a Crowd,** ***Reed McManus***
Big Blue unveils 12 new hardware products.

114 **Charting the PCjr Software Course,** ***Katie Seger and Adrian Mello***
PC programs for the home computer.

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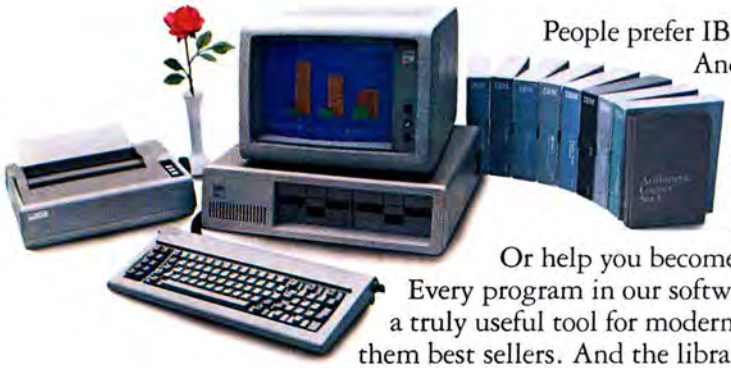

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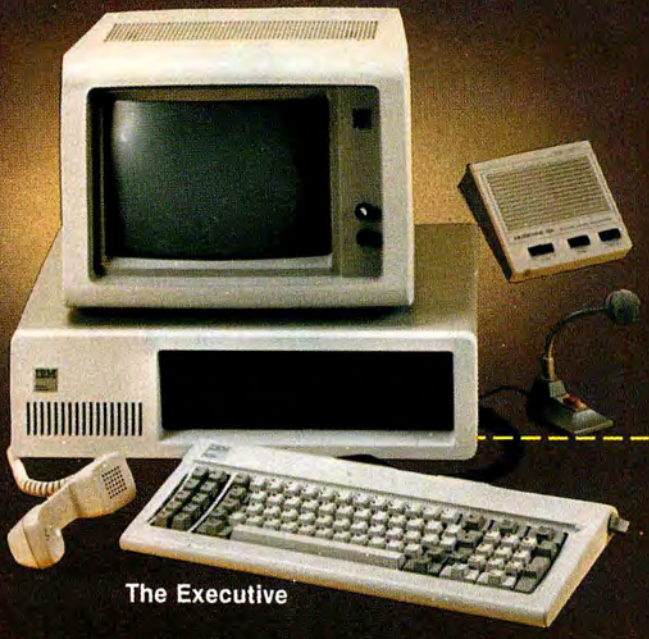
The MANAGER system adds a modem for telephone data communications and by adding a separate handset, will permit voice communications. The modem enables the MANAGER to receive unattended voice and data from any telephone in the U.S. Also, the MANAGER can accept commands through decoding the tones from the telephone keypad.



The Executive

The EXECUTIVE is the most complete implementation of ELAN, adding computer recognition of spoken commands. An executive might phone the PC to leave or retrieve messages or request specific information. The PC, in a spoken voice, can request a user's access code or prompt the user for a command. The executive can respond either by pushing buttons on the telephone, or by actually speaking back to the computer.

The SECRETARY is the basic ELAN system. It includes an Ethernet interface and all other ELAN features except modem and voice recognition.

Whether you choose the EXECUTIVE, MANAGER or SECRETARY, an ELAN system will improve your productivity and expand the versatility of your IBM PC.

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*ELAN (Extended Local Area Network) formerly ComNet

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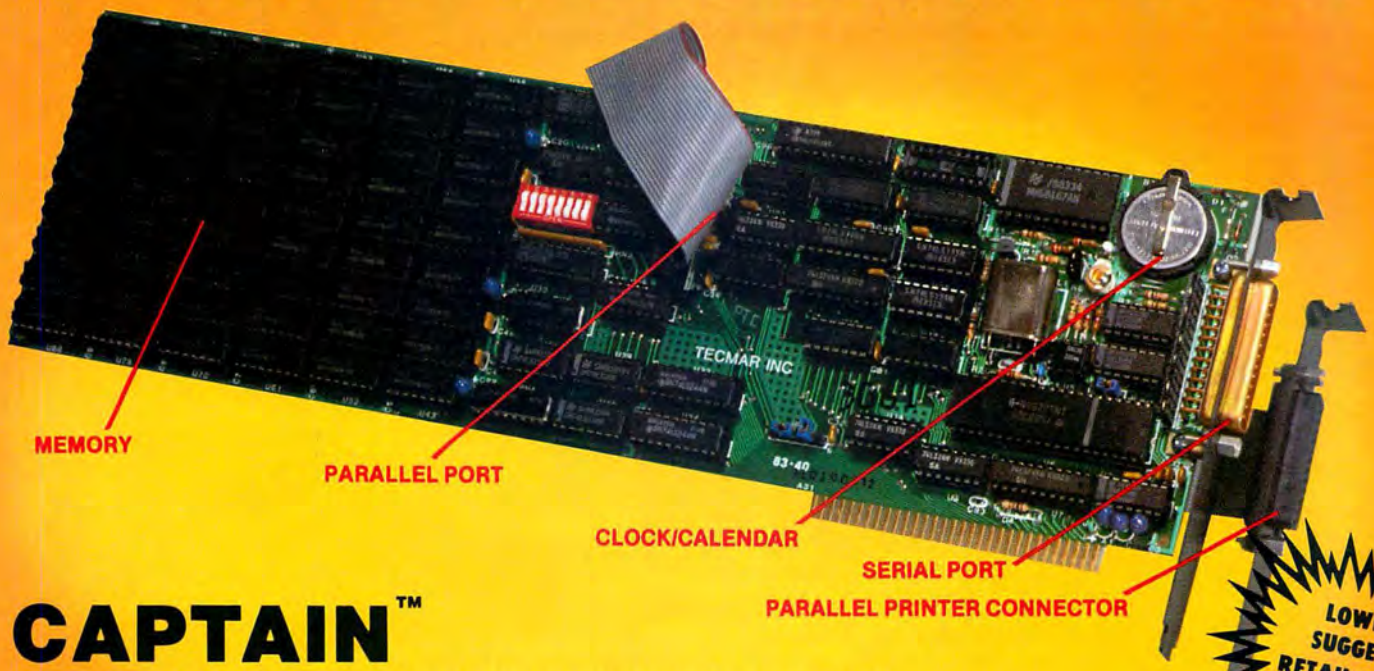

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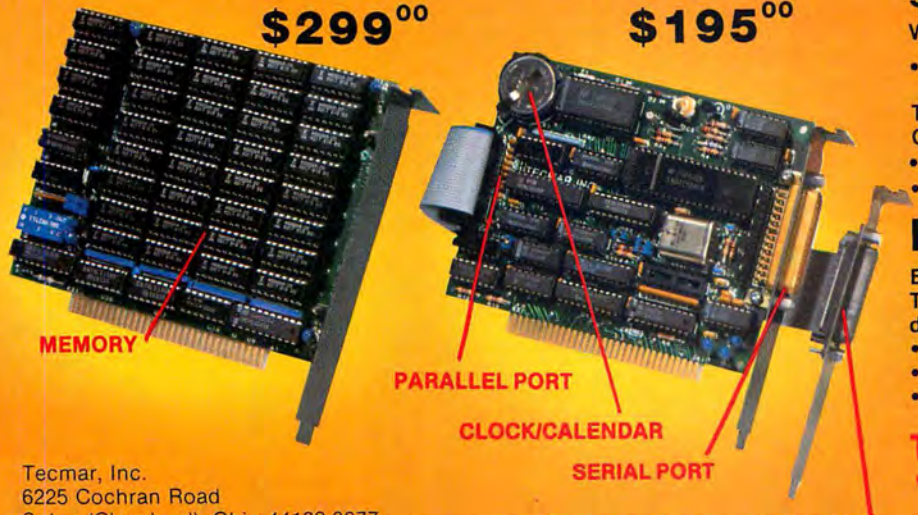

WAVE™

$299/64K **$449/192K**
$379/128K **$499/256K**

WAVE fits into a short slot in the IBM PC/XT.

- **64K to 256K MEMORY** - fully socketed for easy field upgrade in 64K blocks.

The following additional features are the same as Captain described above:

- RAMSpooler™ Software
- SpeedDisk™ Software

BOSUN™

BOSUN fits into a short slot in the IBM PC/XT. The following features are the same as Captain described above:

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- Serial Port
- Parallel Port
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- Autotime™ Software
- PAL Option
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TECMAR

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Available from COMPUTERLAND,® Entré® Computer Centers, MicroAge® Computer Stores and other participating computer dealers.

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European Distributor: CPS Computer Group, LTD Birmingham, England B276BH / (021) 7073866

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Tallgrass Technologies Corporation

Circle 188 on reader service card

Introducing COMPAQ PLUS, the first high-performance portable personal computer.

The makers of the COMPAQ™ Portable Computer, the industry standard, announce another breakthrough—the COMPAQ PLUS™ Portable Personal Computer. No other personal computer can handle so much information in so many places.

The new COMPAQ PLUS offers an integrated ten-megabyte fixed disk drive in a portable.

Plus a bigger payload

How much is ten megabytes?

Enough to tackle jobs that can't be conveniently handled on most personal computers.

A mailing list of 100,000 names and addresses.

Information that would fill your company's ledgers can be stored on the fixed disk drive of the COMPAQ PLUS.

Inventory records on a quarter million items.

The entire San Francisco phone book, with room left for Peoria.

Your most used programs can be permanently kept on the fixed disk drive of the COMPAQ PLUS, ready to call up and run.

Store a library of accounting programs—payables, receivables, general ledger, and payroll—*with* the company's books. Then take them to a board meeting or a branch office.

Your inventory control program and your inventory records can go with you to the factory. Your building specs and your project management programs can go with you to the construction site.

The high-capacity portable multiplies the productivity of every program it runs.

Plus more programs

The COMPAQ PLUS runs all the popular programs written for the IBM® Personal Computer XT, available in computer stores all over the country. And they run with no modification whatsoever.

You're buying a computer to solve problems. Why not have more problem-solving programs to choose from?

Plus a traveler's toughness

A true portable has got to be tough. The COMPAQ PLUS is.

Its fixed disk drive is designed specifically to travel. Rough roads and hard landings don't bother it because a specially designed shock isolation system protects the disk from jolts and vibration.

All the working components are surrounded by a unique aluminum frame with cross-members that strengthen it side-to-side, front-to-back, and top-to-bottom.

Does a portable personal computer really have to be this tough? Take a look at your briefcase and then decide.

Plus a lot more

The COMPAQ PLUS comes with a 360K byte diskette drive for entering new programs and copying data files.

The COMPAQ PLUS also works with optional printers, plotters, and communications devices designed for IBM's personal computer family.

It has two IBM-compatible slots for adding optional expansion boards. With companion programs, they'll let you network with other personal computers, communicate with your headquarters computer files or add memory capacity if your needs grow.

When you see all that COMPAQ PLUS has to offer, you'll be pleasantly surprised by the price. The fact is, it costs hundreds less than comparably equipped desktop personal computers.

See the first high-performance portable personal computer. The COMPAQ PLUS—performance, programs, productivity. Plus problem-solving power.

The problem-solving power of a high-performance desktop personal computer can now go where you need it.

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The COMPAQ Portable, the industry standard in portable personal computers. ▼

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Circle 204 on reader service card

David Bunnell

Is PCjr the Peanut?

For months we heard about the imminent introduction of an IBM home computer—code-named Peanut. Articles appeared regularly in the *Wall Street Journal*, the *New York Times*, and elsewhere speculating on the nature of the Peanut and when it would be introduced. Never before has an unannounced computer product received so much ink.

On November 1, 1983, IBM finally broke the ice and announced PCjr, which it referred to in its press release as "the company's newest and most affordable personal computer." This event has me puzzled.

I wonder, is PCjr really Peanut? Evidently, most industry analysts think it is, since no one has suggested otherwise. Personally, I think it probably is, but I wish it weren't. My vision of the Peanut, which I published in the October issue of my newsletter, *Subroutines*, had a standard PC keyboard and two half-height, 5¼-inch drives instead of PCjr's scaled-down keyboard and one drive. Like PCjr, it had limited memory expansion, but otherwise it was more of a cheaper PC and less of a limited PC than PCjr. But then, IBM didn't ask me what I thought. In fact, they consistently denied that PCjr or the Peanut or anything like it existed or would ever exist. Getting advance information out of IBM is like squeezing blood from a ROM cartridge.

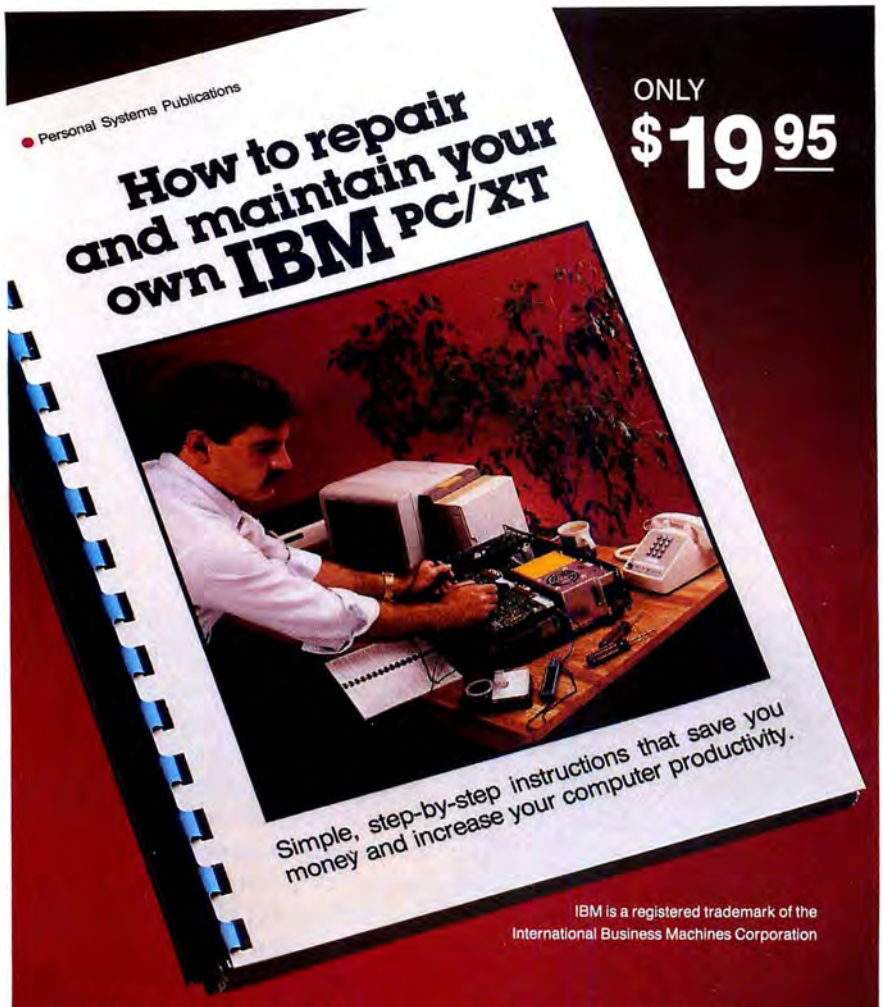
My second question is this: is PCjr a personal computer, a home computer, or both? One view is that personal computers and home computers were clearly different until IBM bridged the gap by introducing PCjr. Now the home computer and the personal computer are the same; IBM's PCjr is both.

Around industry circles the real question is, where is PCjr headed? Will it redefine home and educational computing or will it simply be a home extension of the office? How many people will buy PCjrs to use at home because they use PCs at work, and how many people will go the other route—start with a PCjr and graduate to a PC?

At *PC World* we track the IBM Personal Computer family as closely as anyone. We are excited that IBM has opened up yet another huge market. The more PC and PCjr users out there, the more readers for our magazine, the more advertisers, and the more things to write about and participate in. Clearly, whatever PCjr is, there will be lots of them. Not only does this product have the three magic letters in front of its logo, but it will receive a tremendous amount of software support from Microsoft, Digital Research, VisiCorp, and other companies. Some estimate that 500,000 PCjrs will be delivered in 1984 and over one million in 1985.

Around industry circles the real question is, where is PCjr headed?

We think PCjr will open up new possibilities for home and educational computing that will revolutionize the way we learn and live. We think that most PC users will also want to follow this story. For that reason, starting with the next issue of



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If you have *some* electronic knowhow, you'll be able to repair right down to the component level, using no other test equipment than a common volt-ohmmeter and logic probe. *The more you know about the IBM PC or XT the more you'll profit by this manual.*

In clear, easy to follow chapters you'll learn how to:

Reduce Downtime and dramatically increase your personal computer productivity.

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Send money order or check for $19.95 payable to Personal Systems Publications. (Price includes all taxes, postage and handling.) Act today!

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Circle 412 on reader service card

David Bunnell

PC World we will include a *PCjr World* inserted supplement which will be physically detachable from the rest of the magazine. Many of our readers, we think, will want to keep *PC World* at work and take *PCjr World* home.

How long will *PCjr World* remain an inserted supplement before it gets too fat and has to stand on its own? Around our office, bets range from three to eight issues.

Meanwhile, we would like to encourage you to let us know about your initial reactions to PCjr so that we can share your comments with other readers in our *PCjr World* inserts.

Now the home computer and the personal computer are the same; IBM's PCjr is both.

Even if you are interested only in using your IBM PC, XT, or compatible for serious computing, it seems to me that we all should keep an eye on Junior. PCjr will turn on thousands of newcomers to personal computers, and this in turn will have a meaningful impact on all computer users.

For example, the more personal computers, the sooner we will have low-cost, high-volume software. Also, the more PCs, the more networks and remote data bases there will be. The more PCs, the sooner we will have easily accessible electronic banking and shopping.

The benefits to personal computer enthusiasts and to society at large because of the introduction of the IBM PCjr (even if it isn't the Peanut) will be significant. As always, we are in for some exciting times.

INTRODUCING DATA BASE MANAGER II™ FROM ALPHA. IT'S FOR PEOPLE WHO HAVE THEIR OWN IDEAS ABOUT WHICH SOFTWARE SHOULD BE INTEGRATED.

Here's a proposition for you.

First thing tomorrow, throw out at least one of your favorite computer programs. Maybe your word processor. Maybe your spreadsheet. Maybe both. Just make sure it's something you like, and that you've spent some time learning it.

Now, start from scratch with programs you don't know. Ones that force you to give up features you depend on now.

Interested?

Well, if you plan to get in on the current "integrated" software rage, that's what you'll have to do. Because most integrated software systems only work with software from one manufacturer.

If you think that's too much to ask, then Data Base Manager II from Alpha is for you.

It starts by giving you an enormously powerful and elegantly approachable data base system. One that's menu driven and responds to simple, English-like commands. But one that's also truly fast. With all the advanced features you'd expect from a top-notch data base management system.

Plus, you get extended DBMS features like phonetic word search, built-in form letter, and date calculations. And a painless way to file data transferred to your PC from other micros, mainframes or information utilities.

And then it lets you do something else. It lets you totally integrate *your* word processor, and *your* spreadsheet program, instantly.

So you can quickly call up and manipulate any information. Then move it over to VisiCalc,® 1-2-3™* or Multiplan™ for calculations. Then shuffle it over to WordStar,® EasyWriter™ or Volkswriter™ for word processing. Without re-entering data. And without complex commands.

In fact, Data Base Manager II lets you integrate nearly any combination of the word processing and spreadsheet programs that run on the IBM PC or XT.

The prestigious software journal, *The Rosen Electronics Letter,* says Data Base Manager II's unique capabilities "unify some of the best of the productivity packages already on the market... This is a signal achievement."

You'll say that this is the way personal computing is supposed to work in the first place.

See the remarkable new Data Base Manager II today. Call us toll-free at 1-800-451-1018 (in Massachusetts call 1-617-229-2924 collect) for the name of the Alpha Software Dealer nearest you.

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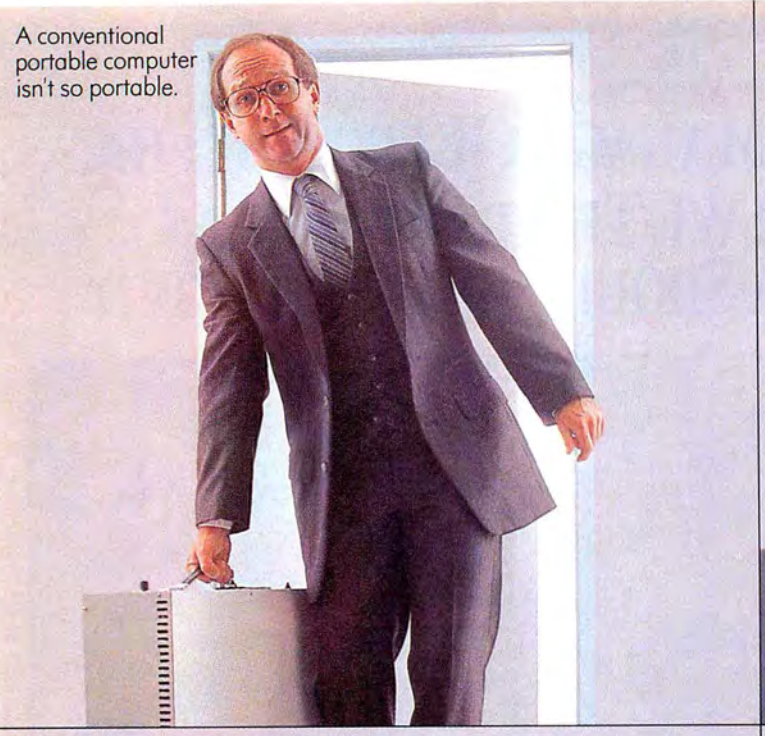
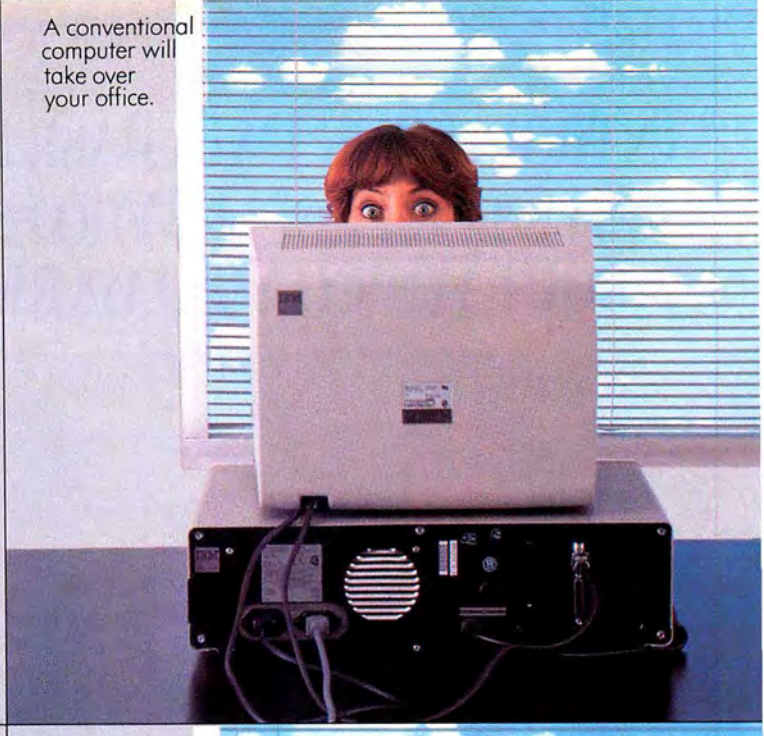
*DBM II directly reads and writes Lotus 1-2-3 Worksheet (WKS) files. No translating is required.

Circle 6 on reader service card

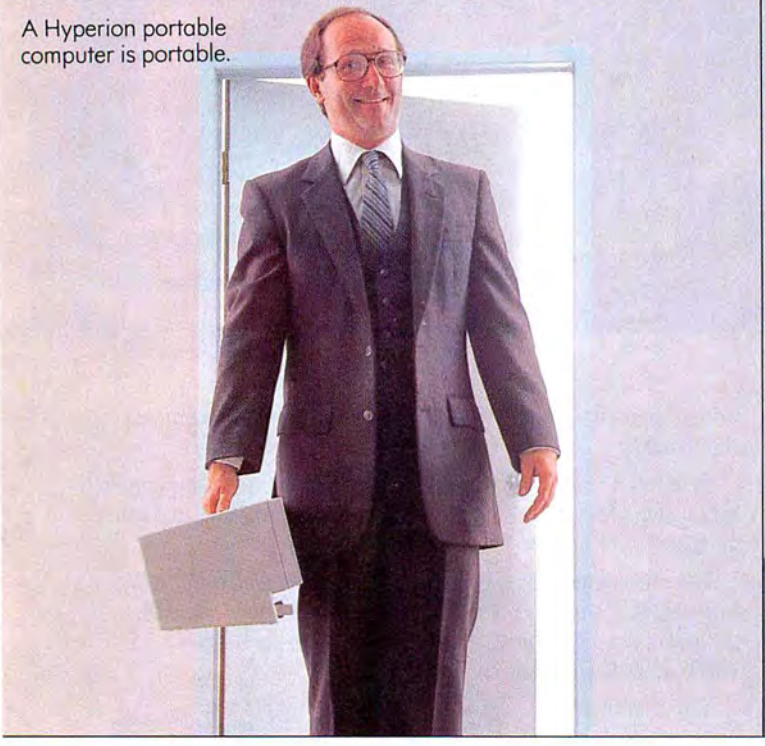
A conventional portable computer isn't so portable.



A conventional computer will take over your office.



A Hyperion portable computer is portable.



A Hyperion keeps a low profile.

How we designed the Hy for pe

Our first step was to remember how a person is designed.

A person isn't designed to carry a nearly 30 lb. object that bangs against the hip and cramps the fingers. So the Hyperion is a manageable 18 lbs. and travels in an easy-to-carry tote bag.

A person isn't designed to work in the shadow of a computer. So the Hyperion keeps a low profile.

A person isn't designed to worry about an expensive computer being dropped by baggage handlers. So the Hyperion fits under an airplane seat. Easily.

A person isn't designed with a phone attached to his ear. So the Hyperion has a telecommunications hook-up that finds numbers, dials, and makes a connection

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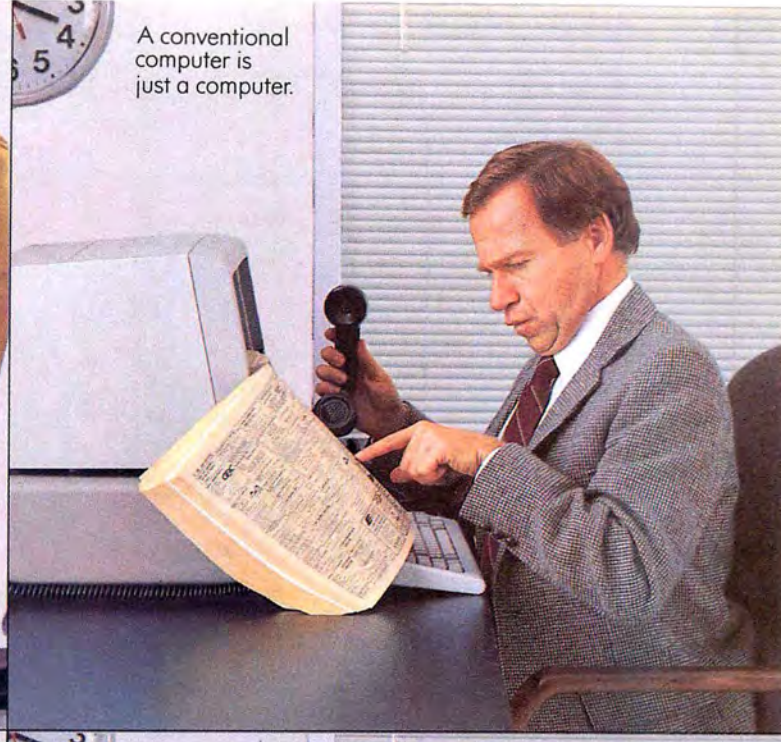

perion personal computer rsons.

without a person ever picking up the receiver.

And no person, no matter what design, wants to work harder than needed. So the Hyperion has all the power needed, and uses IBM* compatible software — the best and easiest to use software written.

But no matter what we say about the Hyperion, the only way to see the difference is to come in and pick one up. In person.

For the dealer nearest you call 1-800-323-1717, Ext. 246. In Illinois 1-800-942-8881, Ext. 246. In Canada call 1-800-267-1002 or 1-613-226-7255.

Hyperion™

You'll never look at computers the same way again.

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Circle 637 on reader service card

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.

VISI ON™

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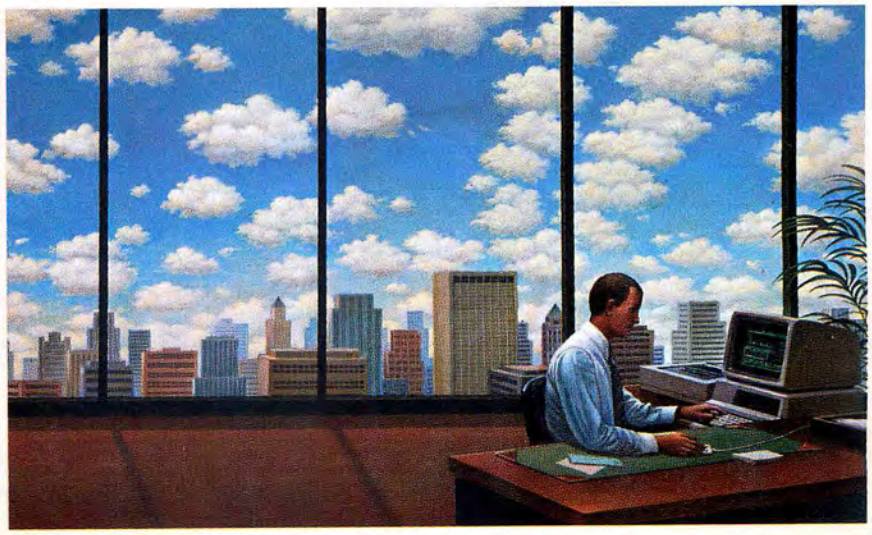
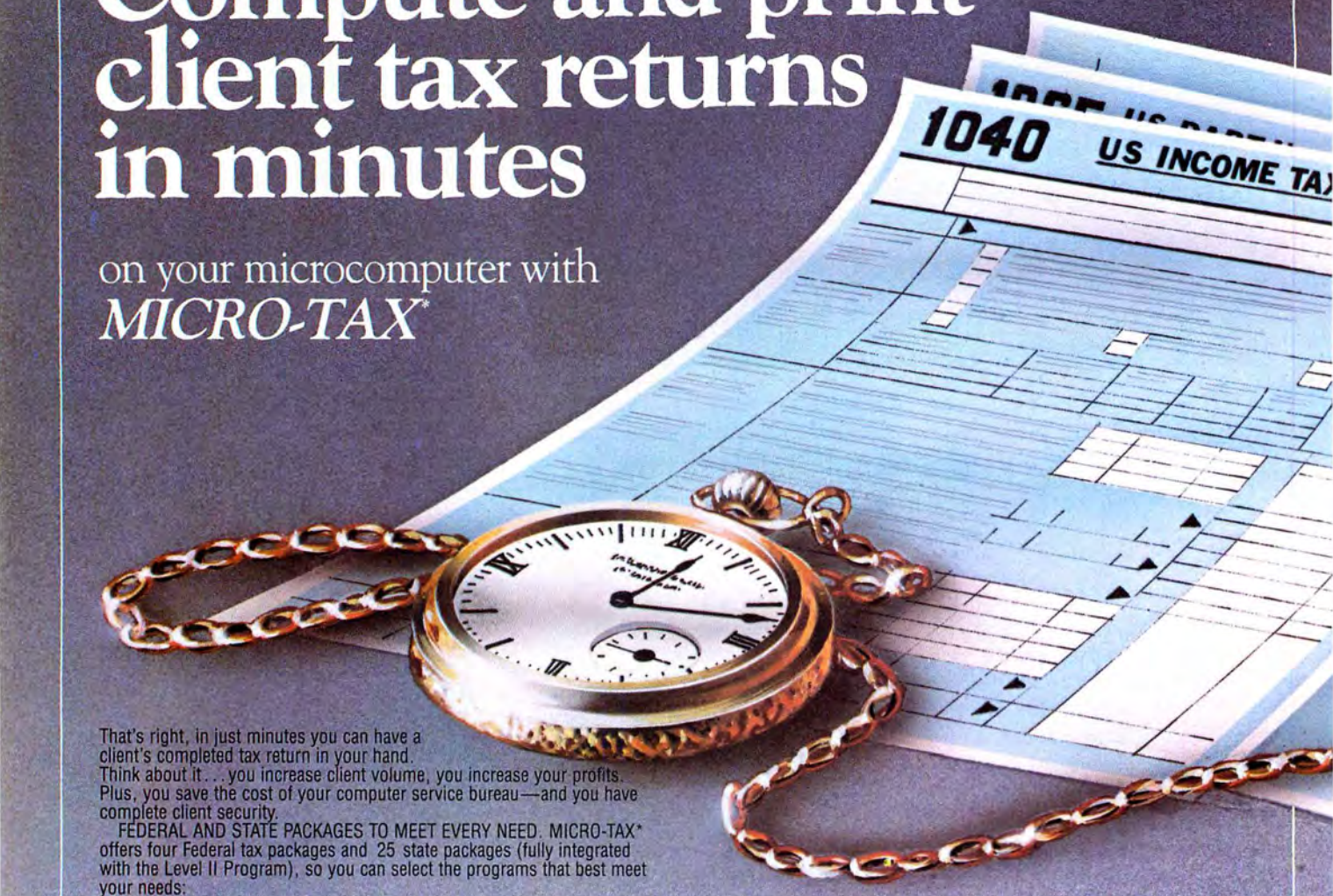


Circle 598 on reader service card

Compute and print client tax returns in minutes

on your microcomputer with *MICRO-TAX**



That's right, in just minutes you can have a client's completed tax return in your hand.
Think about it... you increase client volume, you increase your profits. Plus, you save the cost of your computer service bureau—and you have complete client security.

FEDERAL AND STATE PACKAGES TO MEET EVERY NEED. MICRO-TAX* offers four Federal tax packages and 25 state packages (fully integrated with the Level II Program), so you can select the programs that best meet your needs:

Level I—Federal Individual Package: for individuals preparing their own taxes.
Level II—Federal Professional Individual Package: for accountants, registered agents, tax attorneys, and other tax professionals.
Level III—Federal Partnership/Corporate Package: for those who prepare Federal Partnership, Corporate, and Subchapter S returns.
Level IV—Overseas Tax Package: addresses the unique tax situations of United States Expatriates.

Levels II, III, and IV have a depreciation module and automatically compute underpayment penalties and minimum tax. In addition, Levels II and III automatically compute self-employment taxes, and Level II computes income averaging.

FLEXIBLE DATA ENTRY. With MICRO-TAX* you can organize data entry in a sequence similar to that of manual tax preparation, or you can choose another sequence. The menu driven system makes data entry simple.

MULTIPLE PRINTING OPTIONS. You can input client tax information at the time of interview and produce forms immediately, or enter data during the day and batch print returns at night. MICRO-TAX* prints your returns on IRS forms, IRS approved substitute forms, or with transparent overlays.

TAXNET*—TELETEXT SUPPORT NETWORK. MICRO-TAX* customers can now have access to an electronic mailbox and instantaneous memoboard through the TAXNET* teletext support network. With TAXNET,* you can send information, ask questions, get answers and updates—directly through your computer and a modem.

TAX ORGANIZER. Now MICRO-TAX* offers a Tax Organizer. You get both the software and the forms, so each year, you can send your clients an organizer with the prior year's client data printed on it.

HARDWARE COMPATIBILITY. MICRO-TAX* is compatible with your IBM PC/XT,* DEC Rainbow,* Radio Shack,* or any other personal computer with CP/M-80,* PC DOS,* or MS DOS*—from Apple* to Zenith.*

So, take the tedium out of tax preparation—save time and money—*Call Micro-Tax* for complete details, or call your local dealer.*

| FULL FEDERAL MICRO-TAX* PERSONAL COMPUTER SYSTEMS | 1983 FEDERAL FORMS AND SCHEDULES INCLUDED | | |

Letters

Free Memory Map
I have developed a memory map for the IBM PC and XT as part of my latest software package, *The Inside Track*. This useful fold-out chart shows the important memory locations of the PC and XT. I will send one free copy of the memory map to any of your readers who send me a self-addressed stamped envelope before April 1, 1984. The envelope should be the standard business size (#10) or larger.

Brett Salter
Atlanta, Georgia

Crossed at the Border
I recently had occasion to test the theory that a portable computer can make you a more productive individual. During a combined business and vacation trip, I packed my COMPAQ along with my luggage. I was able to accomplish a great deal of work and also used the computer for recreation. It was most interesting to see that the hotels appeared accustomed to the idea of setting up a computer in guest rooms. The same cannot be said, however, for the Canadian government.

On the trip back to Connecticut, we decided to take a detour to see the Canadian side of Niagara Falls. Upon entering Canada, we were asked if we had anything with us other than clothes. I told the customs agent that we had our computer with us. I was then directed to the customs facility, where I was told that to enter Canada I would have to pay a duty of 10 percent of the value of the computer. I was told that I was obviously using the computer for business because "no one has ever traveled with a computer for fun in Canada." We were informed that if we had not declared the computer, it would have been subject to seizure and we to arrest.

I have since heard of additional cases in which Canadian customs has taken this postition. All computer users should be aware that, regardless of the great potential for the use of a portable computer in travel, Canada, at least, does not recognize the new technology.

I certainly hope that the many excellent Canadian hardware and software firms will prevail upon their government to recognize that this is the computer age and that people do travel with their computers on vacation.

Sheldon R. Gawiser
Westport, Connecticut

Computers for the Learning Disabled
I thought the article "No More Pencils" in the November issue [*PCW*, Vol. 1, No. 8] was terrific. I had a lot of trouble with learning while growing up, and still carry scars of those episodes. My reading and writing problems would be classified as dyslexia and dysgraphia, but as the article points out, the emotional overlays are far worse than any neurological disabilities I have.

I recently bought an IBM PC to use as a remedial writing tool for myself. Simply: it's the greatest tool I've ever used. The application of word processing for people with writing problems is so powerful and so important that I wish the people who need to know about it were the ones reading your magazine.

I'm teaching an experimental class at the University of Oregon called Remedial Writing with Computers. These tools are remedial in the truest sense of the word. We're using IBM PCs and *WordStar*. We're also using a program that I'm sorry wasn't mentioned in the article: *The Word Plus*. *The Word Plus* isn't only a spelling checker. It's an interactive learning tool that helps one explore the spelling of words. The program is great for anyone who writes a lot and is particularly useful to L.D. (learning disabled) writers who have a hard time with spelling. The feature of *The Word Plus* that makes it valuable for L.D. people with spelling problems is the subprogram Find. With this feature one can get around the paradoxical situation of trying to look up a word in the dictionary (book form) that one doesn't know how to spell. One can use question marks for unknown letters or an asterisk for any number of unknown letters. If one were trying to find the spelling of *naive*, one could type: find n??ve, or find n*ve. The word would appear on the screen among others.

It's too bad that so many schools are deep into Apple computers. The Apple screen is so coarse that using it for serious word processing hurts the eyes. For the L.D. student, this negative feedback competes with the wonders of word processing. The IBM monochrome monitor can be looked at for hours with little eyestrain. That was one of the factors that pulled me toward IBM when I was looking around. Another plus for IBM as a tool for L.D. writers is the tactile feedback of the keyboard. Multisensory feedback has been used for years in remedial reading classes and it works.

Letters

The idea of computers as prosthetic writing tools is important and needs to be spread outside the community of people comfortable with computers. I hope that the teachers who need to know about this aren't too entrenched in tradition to open up to it.

Richard Wanderman
Eugene, Oregon

Gemini Not a Perfect 10

Recent testing by myself and others in this area indicates that the Gemini-10 printer manufactured by Star Micronics does not perform to its advertised rate of 100 cps. Operationally, one can expect it to print at a rate of 50 to 60 cps using an IBM PC and *WordStar*. Operation with *dBASE II* is even worse, slowing my computer down to 15 to 20 cps.

I would respectfully request that you caution your readers about this rather significant deficiency. I also would appreciate your assistance in encouraging Star Micronics to correct this problem.

Eugene D. Teggatz
Marion, Iowa

More Gemini

After reading a product review in one of the PC magazines, I purchased a Gemini-10 printer manufactured by Star Micronics. I was impressed with the specs and the fact that the ads stated that it was compatible with my IBM PC.

My good impression soon changed when I found a bug in the software in the machine that causes printing to be very slow: about 20 to 30 cps rather than the 100 cps advertised.

What is more disturbing is that Star Micronics knew about this problem some months ago and brought out a new model, the 10X, but left the purchasers of the old model high and dry.

To date, Star Micronics has answered none of my letters, and according to the warranty department plans to do nothing to correct this defect.

I feel that other PC users would want to know about this lack of support.

David R. Zimmerman
Warminster, Pennsylvania

Manufacturer's Reply

Thank you for the opportunity to reply to the letters you received complaining about the Gemini-10 printer. I hope the following will clarify the situation to those experiencing these difficulties using the Gemini-10 with certain programs.

The Gemini-10 and Gemini-15 printers have a 2.3K buffer that works quite well with many programs on the market. From the letters we have received, most users are happy with the printer. However, with some applications the particular way the buffer works on the G-10/15 will slow down the throughput of the printer.

We at Star Micronics have come up with ways to get around this printer slowdown. The best and easiest way is to put a buffer box between the printer and the computer. By doing this, the printer is not waiting for the computer's output, which can be very slow with some programs. The in-line buffer stores the data while the printer is printing, and then quickly passes it to the printer when the printer is ready.

The other solutions to this slowdown involve a little more than plugging a box into the system. Since explaining them here might be too involved, I invite those readers who want more specific information to write or call us at Star Micronics National Service Headquarters in Irvine, California at the number listed below.

I would like to apologize for the problems some Gemini-10 owners have had in receiving assistance and to assure everyone that it is Star Micronics' goal to give the best possible product and service to all our customers. Unfortunately, in a fast-growing organization like Star, individual customers' needs are occasionally overlooked. We at Star will continue to improve our product and services with a goal of total customer satisfaction.

Glen A. Fritsch
Director of Engineering
Star Micronics, Inc.
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Big Is Beautiful

In your October issue [*PCW*, Vol. 1, No. 7] you printed a letter from Michael C. Mitchell, who dared to criticize the "obese" state of your recent issues. As a reader who appreciates every last word between *PC World* covers, I am writing to let you know that you should maintain your size!

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with software than with books. Because of this shift, an intensive re-education has been necessary and I appreciate every new scrap of information on PC products, innovations, costs, and companies that I can get my hands on. Both feature articles and advertising offer valuable information. I feel strongly that your magazine is one of the most useful tools a person in my position could possibly find. The large size of the magazine told me "information"—this is why I purchased my first issue. Packing plenty of information and advertising in an issue is a plus, and people like me will be grateful. Let the Michael Mitchells of the world skim what doesn't interest them.

Alison Clemente
New York, New York

Another Defender

Truly you are an example of the saying "Bigger is not always better." I have bought several of the IBM PC dedicated magazines and I can honestly say that your magazine is the absolute best that I have ever seen. I know that not everyone will have the same view that I do and will not be as grateful to have a magazine of such caliber, but I wish to express my gratitude.

Among the most interesting articles to me and the ones that I find most instructive are the "Hands On" articles as well as *.* and *The Help Screen*. It is not every day that you can purchase a magazine that will appeal to the novice as well as the experienced programmer. I know of several magazines that seem to have ample advertisements and descriptions of new products but don't get you to first base when attempting to discover new and interesting programming helps and hints. Sure they give you a book in size, but pictures and ads do not make it.

I think you give a well-balanced diet of pictures, advertisements, and in-depth articles on operation and programming of the IBM PC. Congratulations on a remarkable publication. Please don't change anything from what you are doing now. Perfection is hard to reach and never achievable, but one look at *PC World* can't help but show the difference between you and the the competition.

Gary B. Kendrick
Chattanooga, Tennessee

Interrupt Corrections

In reading "Mining the System Resources" by Leo J. Scanlon in the November 1983 issue [*PCW*, Vol. 1, No. 8] I noted two errors. First, on page 237, the Type 12H BIOS interrupt does not determine the amount of memory on the system board. It gives the total amount of memory as indicated by the internal DIP switches (regardless of the actual amount of installed memory). Secondly, even though the article indicates that interrupt 19H (pages 239-240) does a system reset, invoking it hangs the system. Register CS must be set to F000H, and register DS must be set to 40H before invoking interrupt 19H.

Otherwise, this article is excellent, as is his book. Please keep up the good work.

Shawn S. Patrick
Springfield, Illinois

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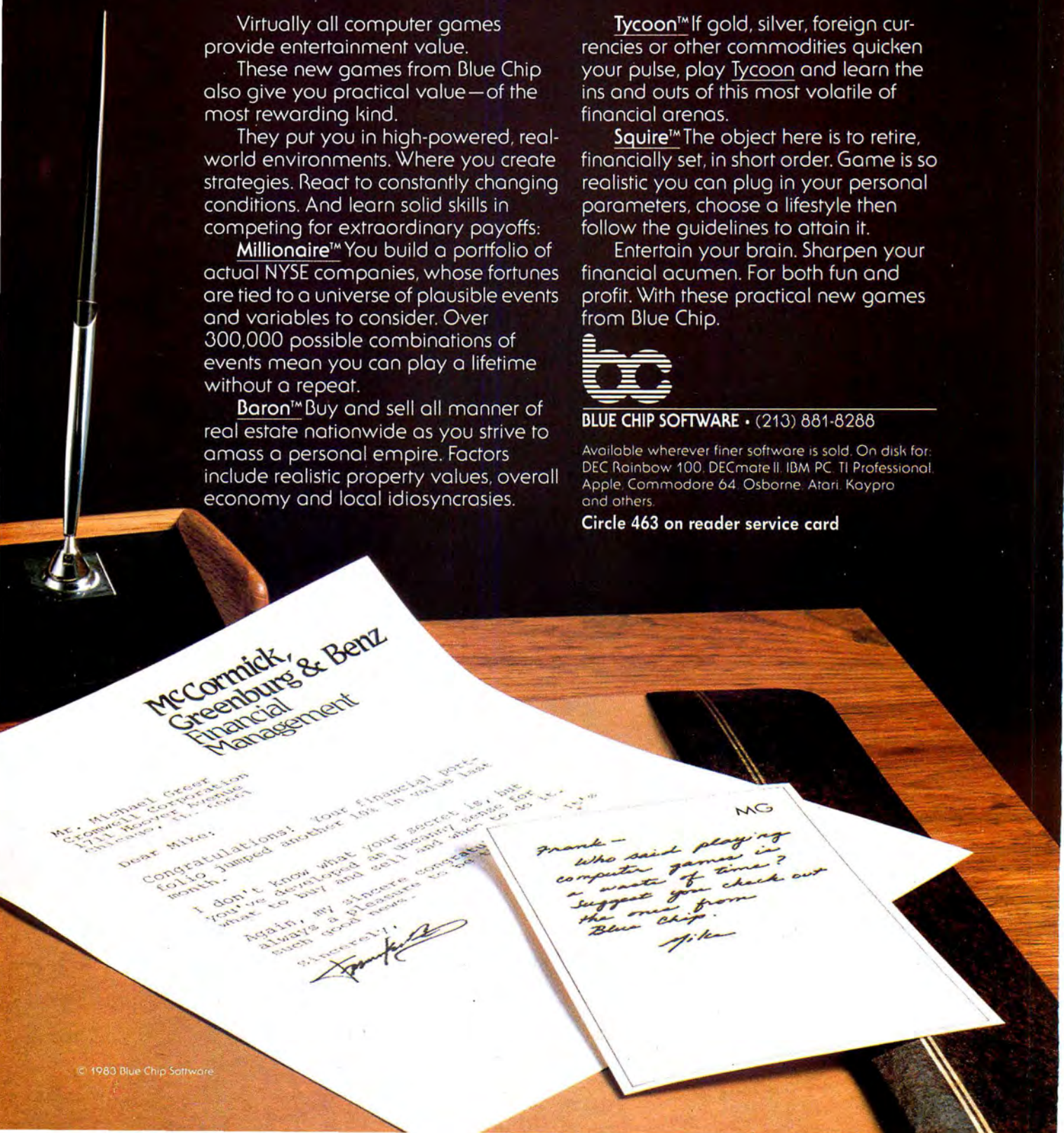

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Logical Views

David Jenkins

To paraphrase an old saying, build a better data management system and the world will beat a path to your door. While PC data bases have gotten friendlier, few have broken the chains that hold them to the 8-bit world. DataPath *from Satellite Software International (SSI) is one of the first data management systems to fully embrace the new concepts and technology embodied in the PC.*

When you think of window-oriented software, the names *Visi/ON* or Lisa usually come to mind. Window programs are basically operating environments that allow several applications programs to be displayed and used simultaneously. Few contemporary applications programs, particularly data management systems, use windows except in a very limited fashion. But that's likely to change with the introduction of *DataPath* from SSI. *DataPath*'s combination of windows, RAM-based data manipulation, and sophisticated network data base structure put it far ahead of the current crop of data management programs.

DataPath was written in FORTH by Lew Bastian, an ex-IBM programmer with many years of mainframe data base experience, and co-designed by Pete Peterson. A major goal in creating *DataPath* was to let the user specify data relationships according to his or her logical needs—not the computer's. For example, users should be able to view and change information in a data base without leaving their current task.

DataPath uses a number of techniques that make the dreary work of entering, changing, and processing large amounts of repetitive information fast, easy, and natural. Without programming, a wide variety of background information is available in the form of windows

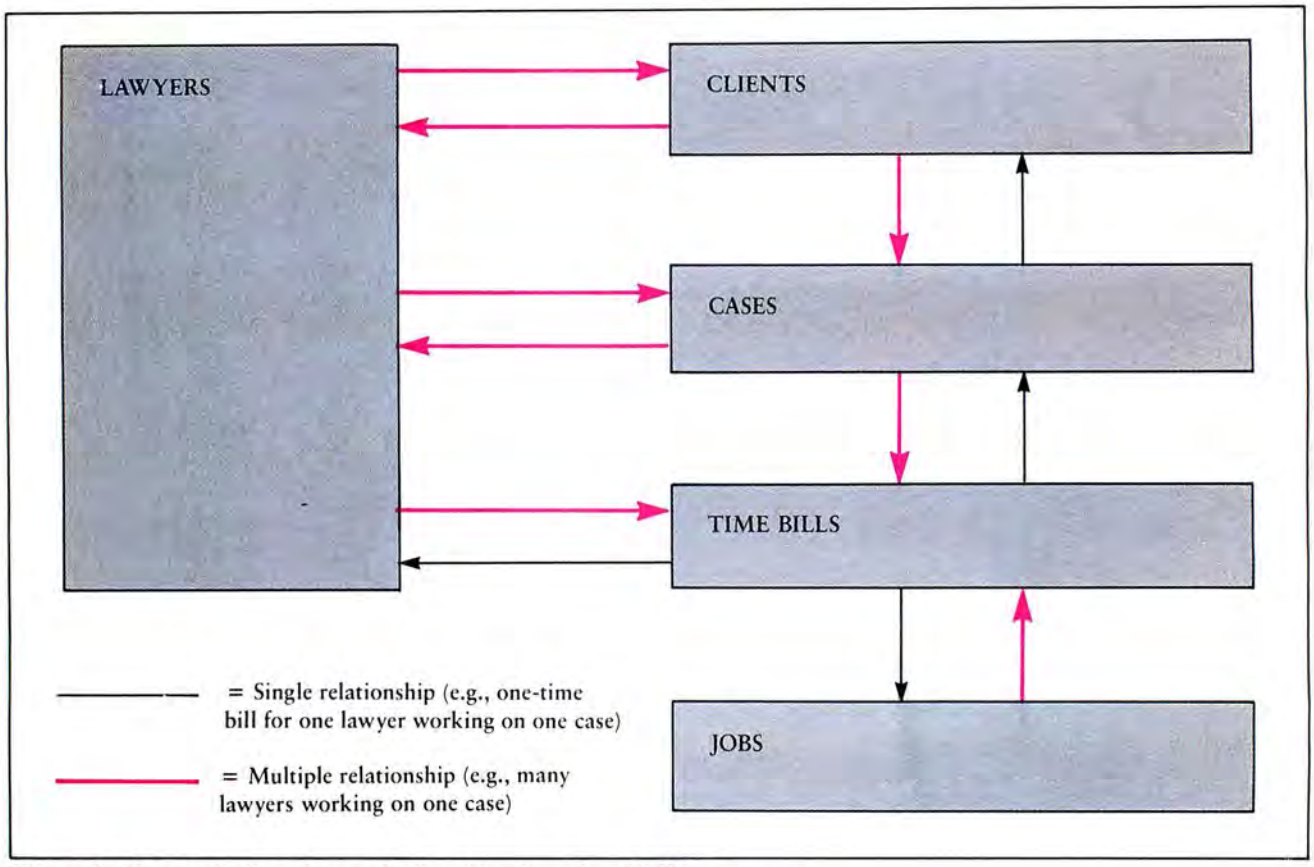

Figure 1: Network data base relationships in a legal billing system

into the data base, giving *DataPath* the speed and feel of a computer game. *DataPath* also allows a data base designer or user to add help commands to every data entry field. Even *DataPath*'s own messages can be edited to fit user requirements.

Data Base Billing

A practical application that SSI is developing with *DataPath* is a legal time billing package. A law office generally bills clients by the amount of time spent on a case. In defining this problem for a data base, the relationships among relevant data must be considered. A law office has clients and clients have cases. Each case may be billed differently; clients may have two cases, one billed at a fixed price and a second at an hourly rate. Lawyers may be working on several cases at different rates, and clients must be billed for the time spent by lawyers on their cases. In short, a client can have many cases, a lawyer can have many cases, a case can have many lawyers, and a time slip (or bill) has one lawyer and one case to which it refers (see Figure 1).

DataPath allows the user to take a "logical" view of this data. For example, at one point it may make sense to view all of a lawyer's time slips and at another point all the cases billed over $5000. *DataPath* creates the connections for the logical view the user specifies interactively on the screen (see Figure 2). In most data bases, this process is complicated and cumbersome, and program execution suffers.

The Network Approach

A major advantage in *DataPath*'s method is that defining a network data base is now almost as easy as describing a relational data base. In a network data base, relationships between files are set up by the user and the connections are two-way, which means that one record can be used to readily find others linked to it. Most popular data bases on the market are relational and are not designed to express this kind of complexity. Part of their popularity is due to the ease of defining data structures. Network data bases usually require sophisticated programming, but they can handle more complex tasks, since a user defines the structure and the relationship between files.

DataPath is very flexible; information almost anywhere in the data base can be viewed and changed from any location. As a result, you don't have to leave in the middle of one task if a needed piece of information is elsewhere in the data base. For example, if you cannot

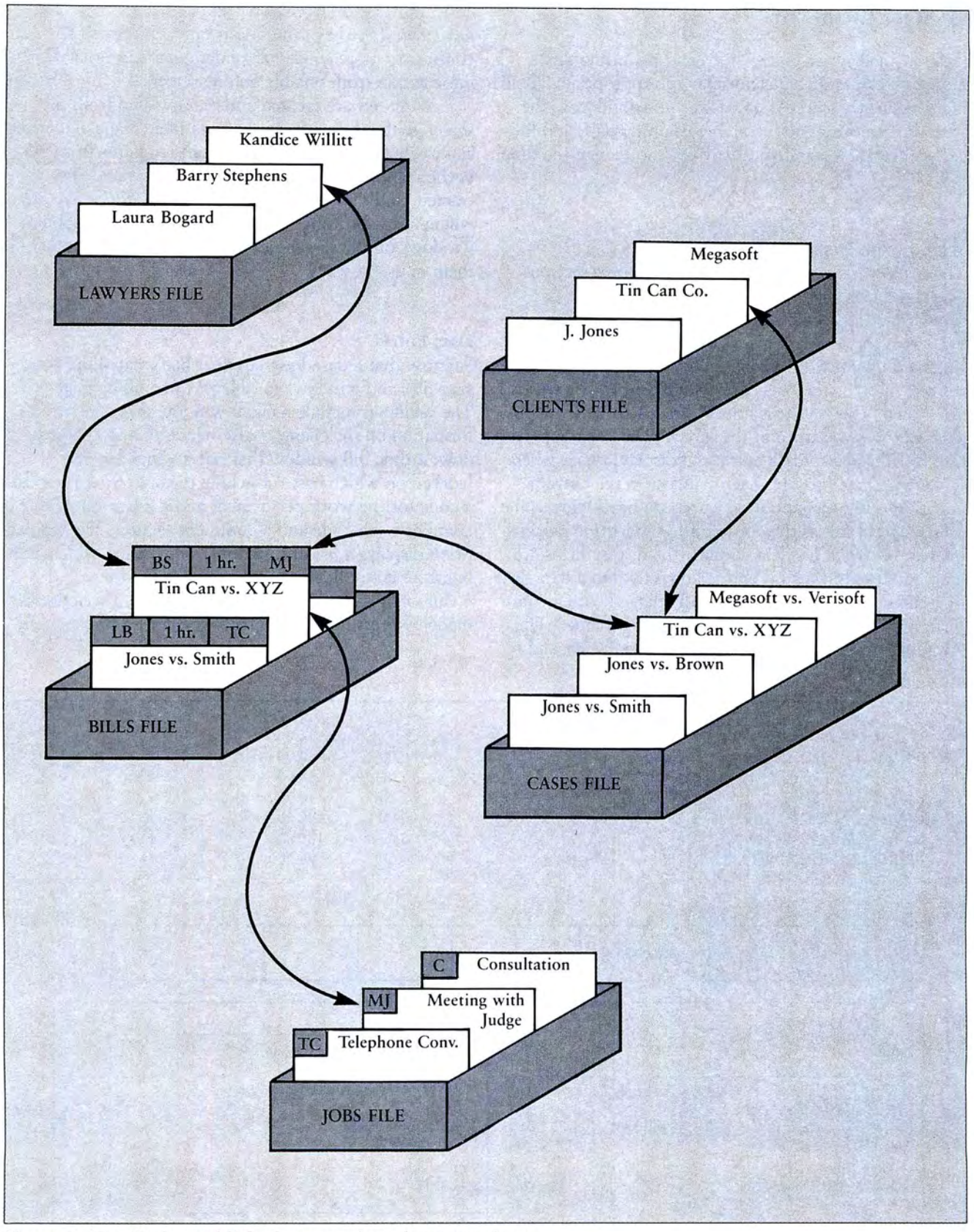

Figure 2: DataPath-established connections from user input. Barry Stephens bills Tin Can Co. for a one-hour meeting with a judge.

recall a client's case code while entering a time slip, *DataPath* can immediately display the appropriate file. In most menu-structured data bases, you would leave the time slip, go through several menus until you found the case codes, then wend your way back to reenter the time slip.

Windows on DataPath

The *DataPath* screen is partitioned into three sections (see Figure 3). The top partition displays records in a standard data base fashion, each record on a line stretching across the screen. This area also displays help messages and *DataPath* messages. The middle partition of the screen holds the "keybar," where defined key words are shown. The keybar is linked directly to window displays in the lower third of the screen. The bottom partition is dedicated to data entry and display; this is where windows come into use. Each window in the bottom partition is like a small display and can be as wide as the screen and as tall as the entire bottom partition (approximately 14 rows). Inside a window the display fields are marked; keyed-in data is entered directly into a data field of a file. Each display field is usually tagged with a comment or prompt such as "Please enter your name." The advantage to this is that the windows can display and receive information from any part of the data base, and movement between windows is quick and easy. This is in contrast to more conservative data managers that display information from one file on one screen.

Windows are created and manipulated from the screen without programming, and their shape and layout can easily be changed with a few instructions from the keyboard. *DataPath*'s windows can be expanded or contracted, and the cursor keys are used to move them anywhere in the bottom partition. Thus a designer can lay windows on the screen next to each other or overlap them in useful ways.

Data Entry

Suppose that a data base designer has created the necessary files and windows for a legal time billing system. The windows include a client window that contains information on the client; a case window; a lawyer window; a time bill window that notes which lawyer worked on which case, how long the lawyer worked, and a code for the work performed; and a job window that contains a job code and a comment section. The top partition displays a list of functions. The cursor, which highlights an entire line, is moved by pressing the <CursorUp> and <CursorDown> keys; a selection is made by pressing the <Enter> key. For example, to en-

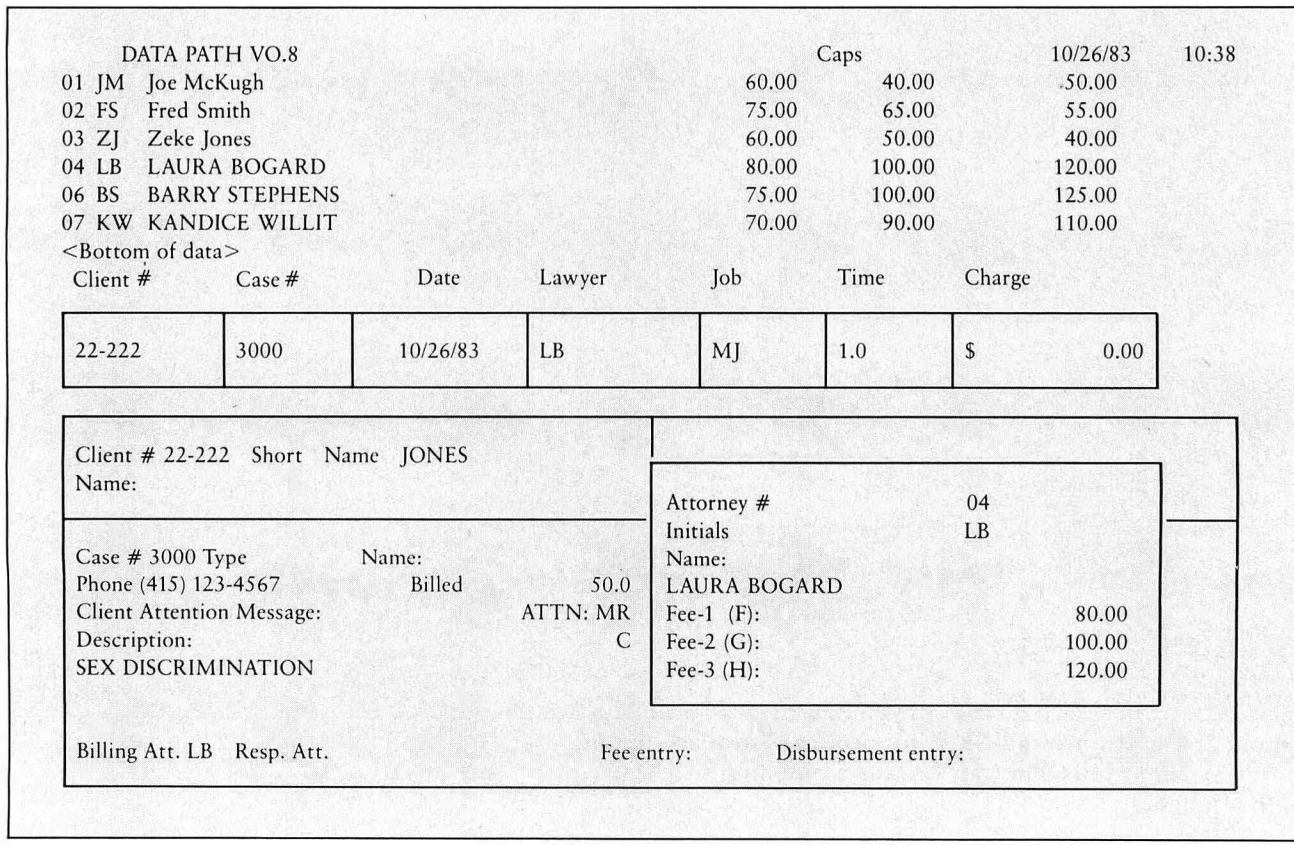

Figure 3: Viewing an attorney window

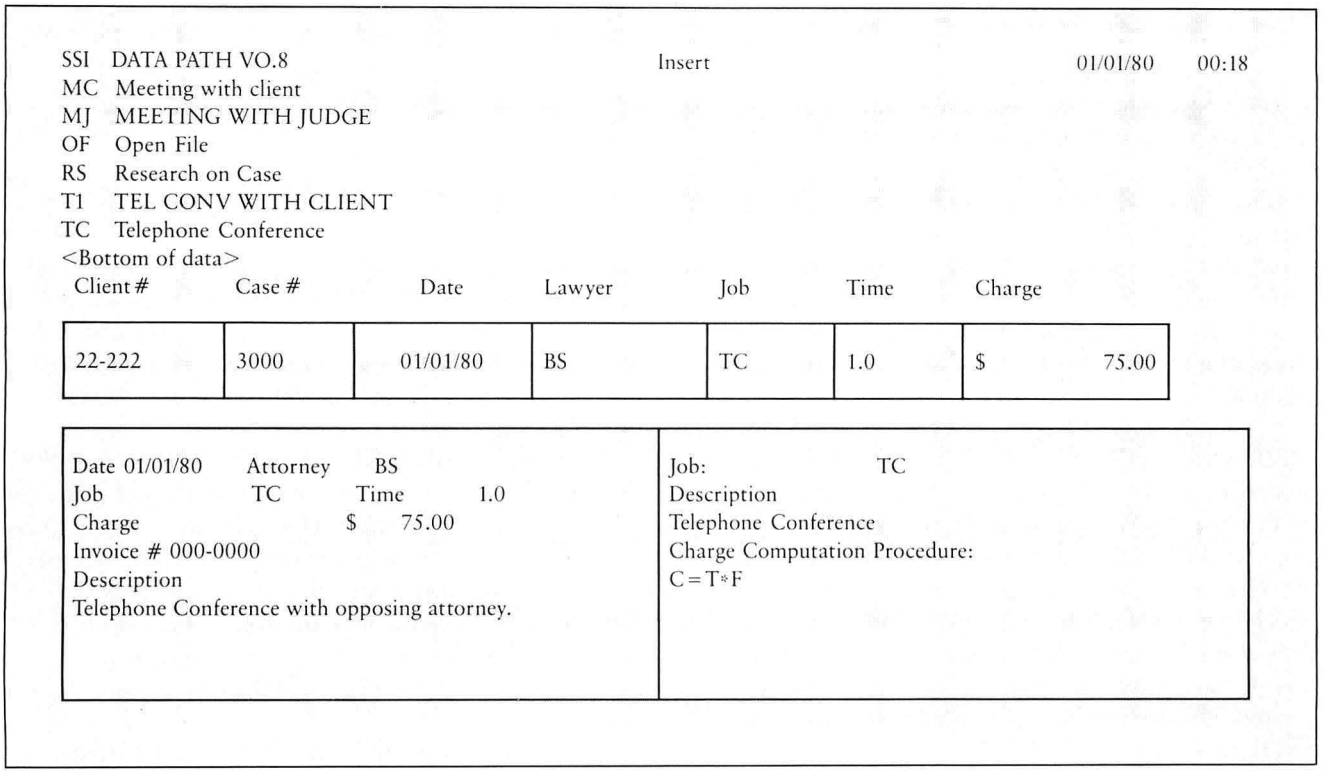

Figure 4: Entering the time bill

ter a new case for an existing client, the user chooses "Client /Case /Bill Entry." Upon pressing <Enter>, the top partition changes to display a list of clients and related information.

The keybar in the middle partition displays the following key fields: client number, case number, lawyer, job, time, and charge. *DataPath* initially positions the cursor at the first key. To enter a new client number, the <Enter> key is pressed. To work on an existing client, the client's code is keyed in—for example, 22-222 for Jones. At this point *DataPath* does two things: it quickly displays the client window showing Jones' name, address, and related information in the bottom partition; and it moves the cursor over one place in the keybar to the case field. A case number could then be entered, and the relevant information would automatically appear in the bottom partition. To enter a new case, the user presses the <Ctrl> and <CursorDown> keys. *DataPath* lays the case window over the client window and positions the cursor at the first field in this new case window.

Data pertaining to the case is now entered (see Figure 4). When the initials of a lawyer working on the case are entered, *DataPath* stores this information as a key field. The program retrieves this lawyer's information (code, initials, full name, and fee schedule) and displays it in another window. If everything is correct, pressing <Enter> moves the cursor to the next field. If you need to inspect the list of lawyers, pressing the <CursorUp> key produces a sorted list of lawyers in the top partition. Moving through this list changes the lawyer window in the bottom partition accordingly. Pressing <Enter> moves the cursor down to the lawyer window; pressing <Enter> again places the case window in front of the lawyer window.

This example illustrates the ease with which *DataPath* allows the user to switch among tasks—from examining clients, to entering a case, to examining the lawyer file, to returning to the case entry. *DataPath* retrieves, examines, and even changes or creates key information at any point where that key is referenced. The ungainly and time-consuming menu approach is avoided—and time is saved.

The execution speed of data management software has not always been considered of primary importance, the logic being that a user should be allowed to do only one thing at a time. But *DataPath* assumes that the user wants to see all the important information needed to make a decision. Data entry takes place against a background of constantly changing windows that look into the data base. Switching from foreground to background windows is quick, easy, and almost intuitive—as if a seasoned secretary were behind the monitor, anticipating every need before it is expressed.

DataPath's use of defined keys instead of menus changes the quality of data base interaction. *DataPath* is rather clumsy to use at first, but in a few hours key control becomes natural and faster. There are fewer direct instructions than in a menu system. Using *DataPath* is more like driving a car than ordering a meal.

State of the Art

Because *DataPath* takes full advantage of the PC, it finds information anywhere in the data base and places it on the screen quickly without interrupting the task at hand. There are two technical reasons for *DataPath*'s high performance. First, the screen is accessed directly. Like many games and some spreadsheet programs, *DataPath* bypasses DOS and writes directly to the screen buffer. Many software developers decline to do this because it makes programs machine-dependent and requires that most of the program's code be rewritten before it can be used on other computers.

Second, *DataPath* uses the PC's entire RAM space, which is accessed many times faster than floppy or hard disk memory. The *DataPath* program is projected to take up nearly 64K. With a PC configured at 128K, for example, *DataPath* will automatically section out the remaining RAM into buffers and keep track of the order in which information is used. Until the buffer space is filled, data is not written back to disk unless specified by the user. If the entire buffer is full, a least-recently-used algorithm decides which buffer should be written to disk and reused.

The program also notes which data is frequently accessed and keeps it in the buffer. For example, if you enter bills for one lawyer for the week, relevant client and case information is read from disk and kept in RAM. In this way, a small data base might work entirely in RAM; with large data bases *DataPath* takes responsibility for efficiently using all available RAM and moving data to and from the disk.

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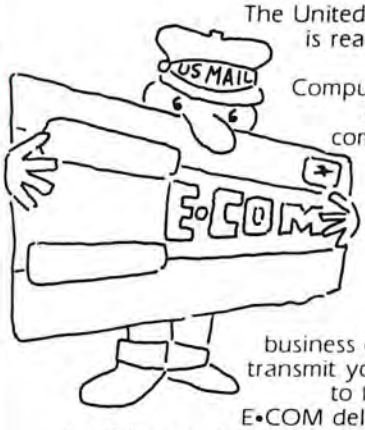

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Other Features

DataPath offers some word processing features and will be compatible with SSI's *WordPerfect* word processor. The user can create a 3-row, 60-character data field. A wraparound function is available; if the last word on a line does not fit, it is automatically moved to the next line of the data field.

There is a flexible relationship between *DataPath*'s display field (what you enter) and the data field where the entry is stored. *DataPath* display fields do not have to be as long as the longest possible entry in the file. If a user types in a 200-word comment but the display field is three rows of 20 characters, the entire comment is still preserved. The display field acts like a miniature screen, and you can scroll through all 200 words in the comment.

Data in the top partition is displayed according to the user's specification (alphabetically, by date, etc.). Five records are shown at once, and you can scroll the records in the partition to view others higher or lower in the list.

Changing Views

Because *DataPath* is a new product, it is difficult to compare it to mature data bases already on the market. But even viewed as an experimental system, *DataPath* is so full of new and exciting ideas that it seems certain to have an impact on the way data management software is designed.

If *DataPath* lives up to its promise, it will join Lisa, *Visi/ON*, and *Microsoft Windows* as part of the new wave of software. Many programs unwittingly turn the personal computer into an alien machine. *DataPath* is a tool that is both natural and logical to use.

David Jenkins is a computer consultant based in Berkeley, California, who specializes in dBASE II *applications. He currently directs several programming projects for* PC World *and is writing a series of* dBASE II *utility packages for future publication.*

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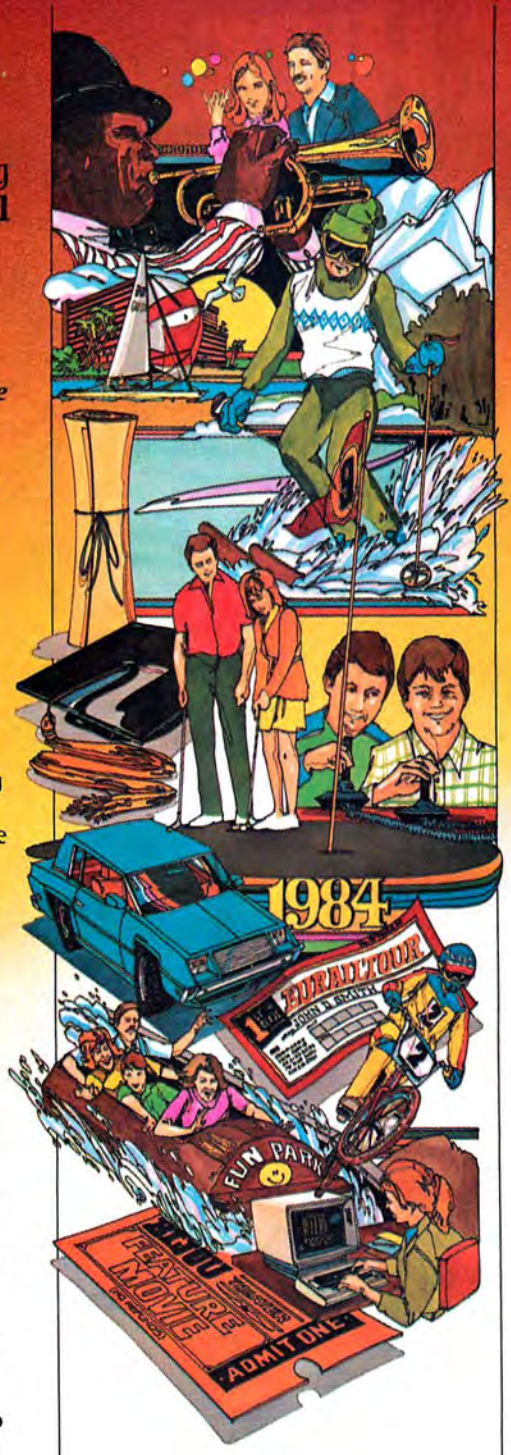

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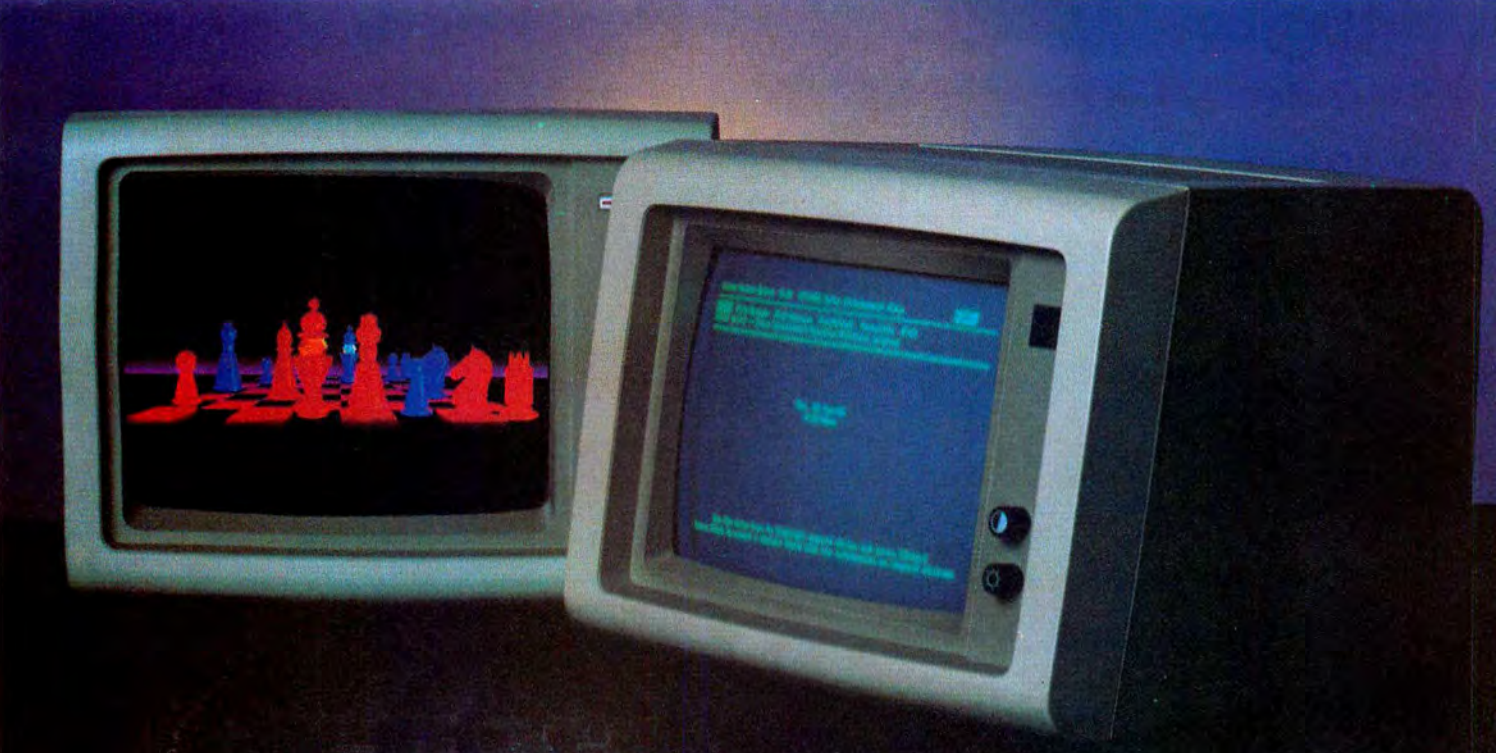

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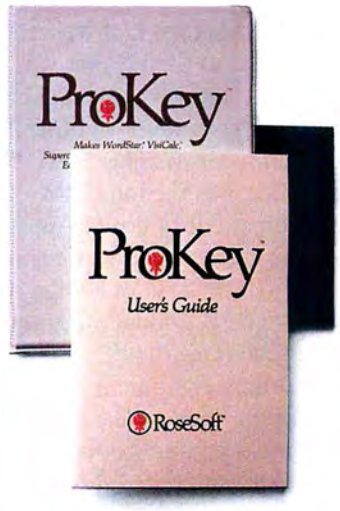

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To run ProKey, you'll need an IBM Personal Computer or workalike DOS (any version, including 2.0), and 64K of RAM (WordStar requires 96K).

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PC-TV

The power of the PC applied to video production and editing

William Claxton

Imagine yourself trapped with thousands of people during a blisteringly hot and dusty three-day weekend in the desert. You are at the largest sound stage ever built. Your job: to set up a data management system that will store and index the location of 70 hours worth of videotaped scenes from three days of musical performances.

This is exactly the situation I faced earlier this year when I took a video interface program written in IBM BASIC to the US Festival, the music and computer extravaganza held in San Bernardino, California, by Apple computer designer Steve Wozniak. Mine was the lone IBM PC on location amidst a dozen Apples used by the video production team. But I had the distinction of being given the toughest production problem of all: to interface the PC with video recording equipment and create a log during each concert performance that would precisely document in text what was recorded on tape—and be accurate within a fraction of a second. The log would later be used to assemble a documentary—a grueling task when you consider the thousands of feet of videotape involved.

Video production is a collaborative art, whether you are creating programs for entertainment, business, or education. The process involves many steps: scripting, videotaping, reviewing the tapes, and editing. Decentralizing this process is imperative. Programs are created by many people, each having a specialized skill. Knowing what others have done before you in the production process (and what will likely happen after you have finished your job) makes collaboration possible and fruitful.

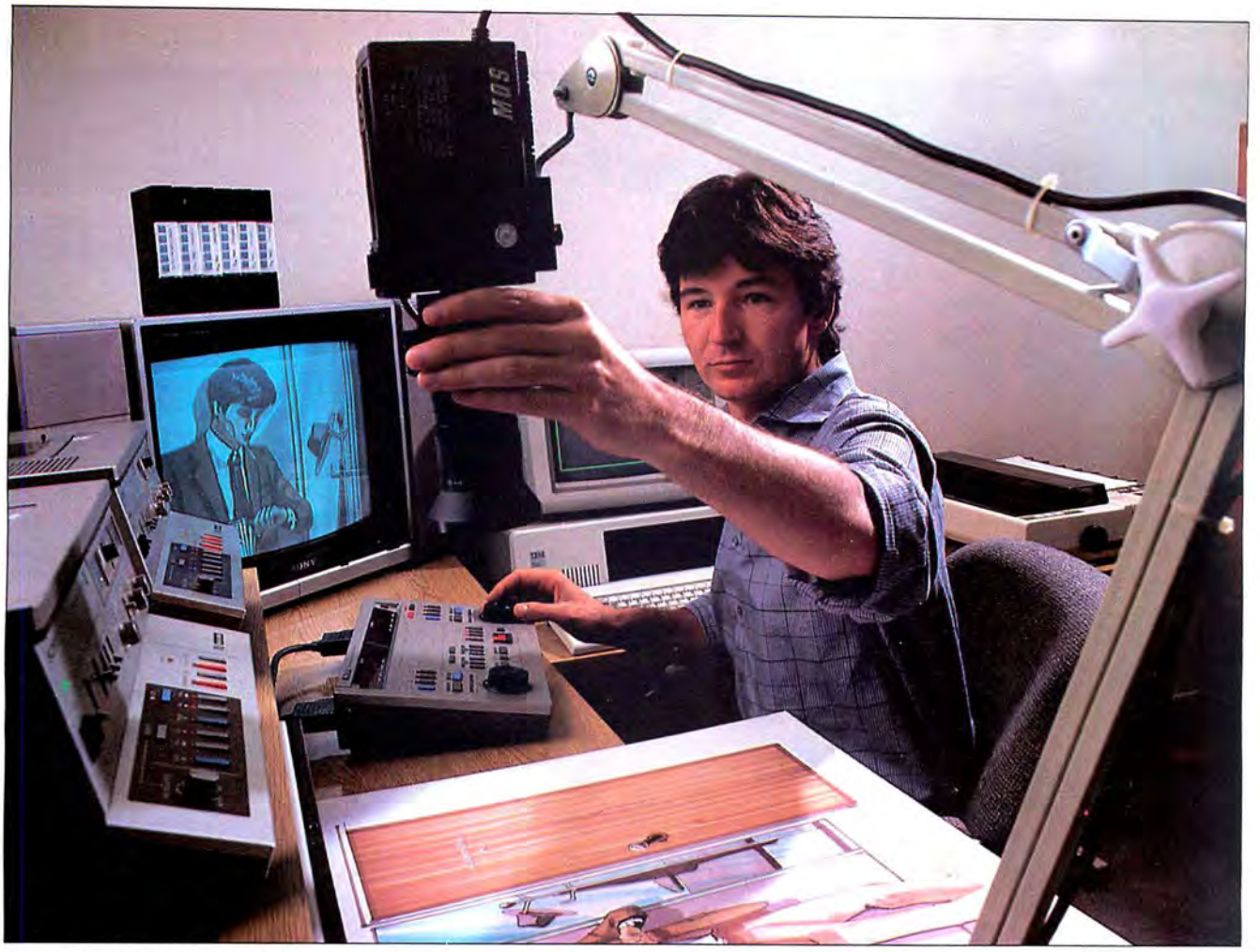
Interfacing video equipment and microcomputers has several advantages. Microcomputers can store and manipulate large amounts of text and make it available as needed. Video tape recorders (VTRs) offer random access storage and retrieval of sound and video images. Precisely cataloging and referencing each recorded image, however, is difficult; the PC is ideally suited for that task.

The smallest unit of information a VTR can access is an individual *frame*, a single image on videotape. A video frame is similar to a film frame although it is part of a continuous recording on magnetic tape rather than a discrete image. To identify each video frame accurately, engineers have adopted a coding scheme that relies on clock time. The videotape is encoded with a signal that can be read in hours, minutes, or seconds, and most importantly, in frames. This code is known as the *time code*, since any specific image can be located knowing only how much time and how many frames have elapsed since the program began.

A collection of frames makes up an individual *scene*, which can vary in length from 1/30th of a second to several minutes or longer. Scenes usually comprise a sequence taken of a given subject from various camera angles. The notation used by producers separates the scene from the shot and the take. A *shot* is a particular camera angle combined with a specific action, and multiple shots of the same subject are referred to as separate *takes* of the given shot.

> Videotape editing was formerly done with a razor blade and splicing tape.

Keeping track of all this activity is time consuming. Scene numbers are also used within the script to provide a link between script descriptions of scenes and the scenes as they appear on tape. By knowing where to locate the images that appear in a given scene—and the text that describes the scene—the producer gains an added measure of control.



The electronic video editing system

Electronic Editing

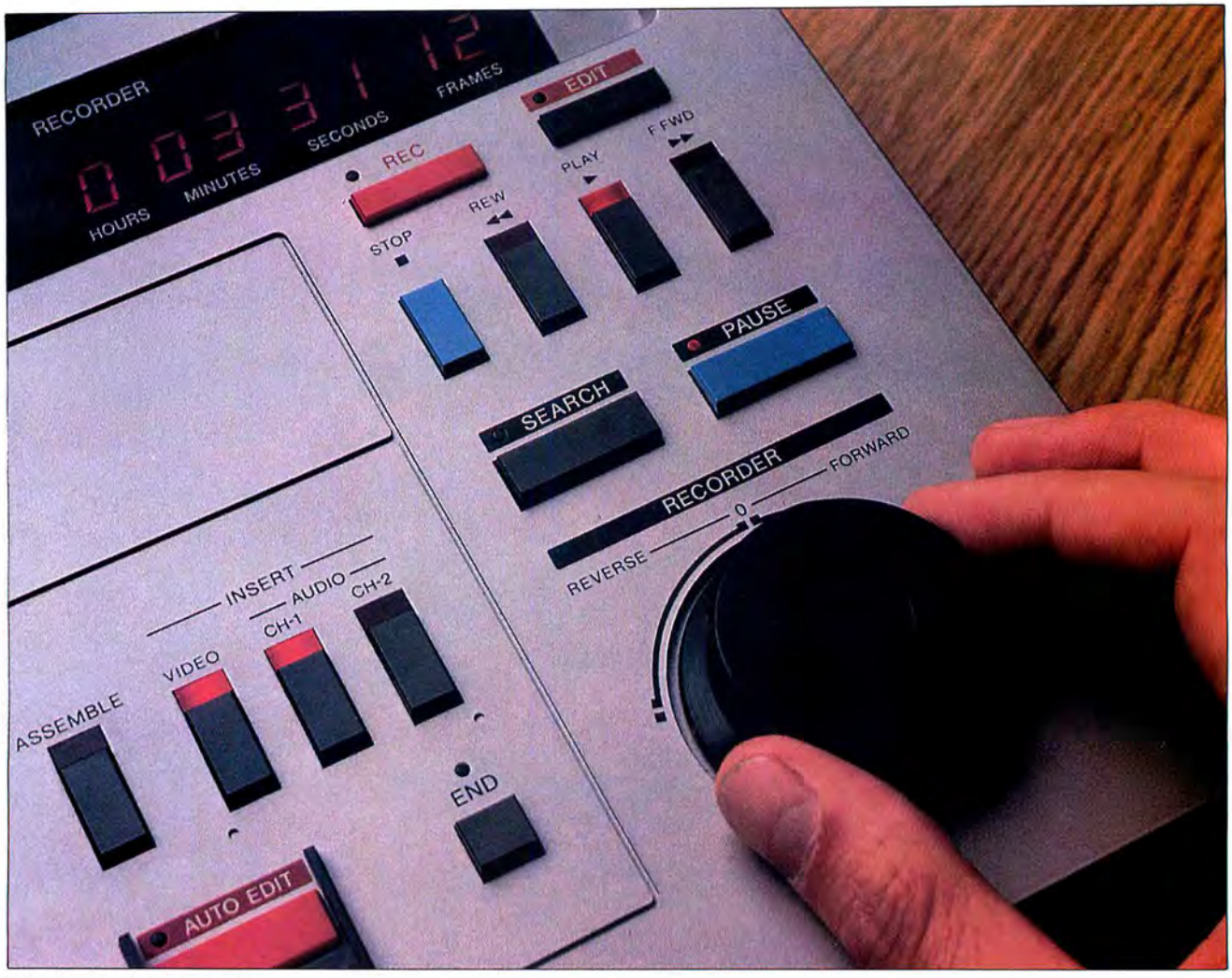
Videotape editing was formerly done with a razor blade and splicing tape. Scenes on a reel of videotape were physically cut and stuck together to create a program. The introduction of electronic editing to the professional video market in the early 1970s served to speed up the editing process.

The simplest electronic editing systems utilize two VTRs, one designated as a source VTR and the other as the record VTR. Individual scenes are copied from the source VTR onto the record VTR in much the same manner as copying a file from one disk drive to another. More sophisticated systems are capable of synchronizing three or more source VTRs and editing (i.e., transferring) the desired scenes onto one record VTR.

Since time code designates the starting and ending frames of a scene, an electronic editing system is capable of finding the scene and editing it onto the record VTR automatically. This has led to the incorporation of microprocessors in editing systems for handling time code lists, which represent the editing decisions made. However, editing systems are limited in how they handle text. The most text that can be added to a time code list is a brief comment about each scene.

As editing equipment improves, it often becomes more expensive. This financial consideration has led to a distinction between *off-line* editing, in which one is not dealing with master recordings, and *on-line* editing, in which an edited master program is assembled. Editing on-line (in a full-scale professional studio) can cost as much as $300 per hour. Producers have wisely tried to edit their programs off-line, using less expensive equipment to review videotape footage and prepare a rough version of the program, or *workprint*. Time code is noted off-line to ensure the integrity of the scene list, and these numbers are later used when final editing is done on-line.

The quality of off-line editing equipment has improved markedly in the last few years. Sony recently introduced an inexpensive video editing system that uses the same tape format as a home VTR. When coupled with a time code generator/reader, this system can effectively replace more expensive off-line studios.



The Sony dial controller

The Electronic Editing System

A time code generator/reader is the heart of any electronic editing system. Control Video Corporation makes such a device, the Intelligent Controller (IC), which can be linked with a computer to direct automated editing and assembly of scenes on videotape. The other major components of the system are the graphics camera, video monitor, dial controller (which is involved in moving the videotape forward and backward), and the source and record VTRs.

The IC and the VTRs rely on a color signal from the camera for synchronization. Video systems generally use AC current and thus must ultimately reference the video signals to the "house current"; by doing so, video images are synchronized and editing can take place. The *keyer* sections of the IC process the video signal and lay the appropriate time code over the video image coming in from the same VTR. This time code will appear as part of the picture on the editing monitor, the numbers rolling by like an odometer. Synchronization signals are first fed to keyer #1 and then to keyer #2, where the video images are played back or recorded. The outcome of all this routing is a beautiful color picture. Audio signals are routed in a similar manner.

The Editing Process

Editing a video program involves more than sitting down at an editing console with reels of tape. The process is broken down into several steps that allow information to be gathered and distilled in a orderly fashion: *tape logging* (making notes while reviewing tapes), selecting the *best takes* (those images that best represent what the director had in mind), and preparing a *rough cut*. The rough cut is as close as you get to a finished master program before going on-line. It is complete with audio tracks and the same sequence of images that will likely appear in the finished version.

DATE: 05-30-1983
TIME: 15:54:48
PROJECT: USII
LOGGER: WMC

REEL: 303

PROGRAM: MISSING PERSONS
DIRECTOR: SANDY FULLERTON

08:43:38:12	TAPES ARE ROLLING
08:51:40:23	Introduction of Mark from MTV.
08:52:42:16	MISSING PERSONS onstage. Camera 6 DIAMONDVISION graphics.
08:53:33:22	Pans of the audience waiting, dissolve to guy programming his guitar amp.
08:54:42:00	Luma crane is down for a few minutes.
08:57:14:04	Curtain is being drawn. Camera 8 is down temporarily. Iso switcher is down.
08:59:05:03	Players onstage, begin music.
08:59:39:22	Female lead comes out. Camera 2 is back.
09:00:07:08	Camera 3 has the best CU of vocalist. Camera 6 has a medium shot of the drummer and guitarist.
09:00:46:22	Camera 7 over the shoulder of the drummer. Camera 5 has a shot of the front of the drums.
09:01:57:24	Camera 7 has the keyboards.
09:02:13:05	Camera 2 also has keyboards. The set is wrapped in black vinyl.
09:02:41:05	End of feed to MTV. Begin next song. Camera 1 has a side shot of the lead singer.
09:03:15:21	Camera 5 has a high shot of the full stage. Camera 1 has the backup vocals.
09:04:00:16	Camera 4 has the guitar.
09:04:56:28	Camera 5 has an incredible shot of the drummer.
09:05:23:07	Female vocalist takes off her blouse and is wearing some kind of reflective bra.
09:06:12:12	Begin next song "What are words for?" Camera 2 has a good side shot. Camera 8 is back in. Camera 7 on drums.

Figure 1: Sample tape log

Tape Logging

Tape logging consists of watching a videotape and noting the action in each scene. This chronological log is usually written out in longhand by a video production assistant. It is the only text reference to video and audio recordings; it can pinpoint the location of audience shots, special camera setups, technical problems, and other footage the editor will later want to find (see Figure 1).

Selecting Best Takes

The next step is examining the workprint and log. The log gives an editor an idea of what happens before and after the scene being viewed. The editor can then decide what represents the best take of the scene.

The editor can review the tape continuously, moving it back and forth at almost any speed using a dial control knob. This device is the video equivalent of the mouse, since it gives the editor rapid, direct, frame-by-frame control of the tape, eliminating the use of inaccurate and unpredictable play, rewind, and fast-forward controls.

When it comes time to edit offline, the editor browses through the footage. Best takes are edited onto a best-takes reel, which will be the source for any rough cut assembled.

In some situations (such as a concert), no script is available to consult during production, and consequently there are no scene numbers. Time code can be used as a de facto scene number. Each entry in the original log becomes a new scene.

During a multiple-camera shoot at a concert, the log reflects which cameras were shooting at any one point and which had the best angles. The video workprint notes that the director switched from one camera to another in search of the best angle at the time of taping.

Rough Cut to Master

Rough cutting begins after a best-takes reel has been compiled. The editor reviews the best-takes reel and decides on the order of scenes. Once the scenes have been put in sequence, this rough cut is reviewed and more scenes may be deleted or reordered. The rough cut evolves from version to version in the editing process.

The final program is formed in the on-line environment using the last version of the rough cut. The producer or the editor will be concerned mostly with special-effects decisions; attention to the rough cut should be minimal.

PC Power Comes to Video

The power of the computer—in this case the IBM PC—is that it can link and automate many of the disparate elements that make up a video production. This includes everything from a tape log to the rough cut.

State of the Art

The tie that binds is made between the time code, the basis for all videotape tracking, and the text that describes the images on videotape. With the use of a special BASIC program, lists (tape logs, best-take lists, rough-cut edit lists, etc.) are generated by the PC at each stage of the production process. The BASIC program grabs the appropriate time code and list and puts them into a standard ASCII file that is compatible with any text editor, such as *WordStar*.

Having a system that links text and video references to each scene (in the form of a list stored on the PC) can be a time saver. Instead of editing the videotapes directly, the appropriate list is changed. As part of the electronic editing system, the PC takes the list and directs the IC (Intelligent Controller) to make the edits automatically. This procedure is particularly useful when videotaped scenes must be selected, put in order, and matched with sound and special effects.

The Process Reformed

During a review of best takes, the script or edit list can be linked to the workprint by the dial control. Thus, the editor can look at the workprint and the related text (such as a tape log) simultaneously. As a best-takes reel is compiled, a best-takes list will be created. If a script exists at this point, scene numbers will be correlated with the selected best takes and noted in the best-takes list. If, as in the concert environment, the production is unscripted, the time code entries in the shot log are transferred to the best-takes list.

Putting together a rough cut is simplified and speeded by PC automation. The editor need not manipulate the videotape directly. Changes are entered in the rough cut edit list, and the PC automatically assembles another version of the rough cut (see Figure 2).

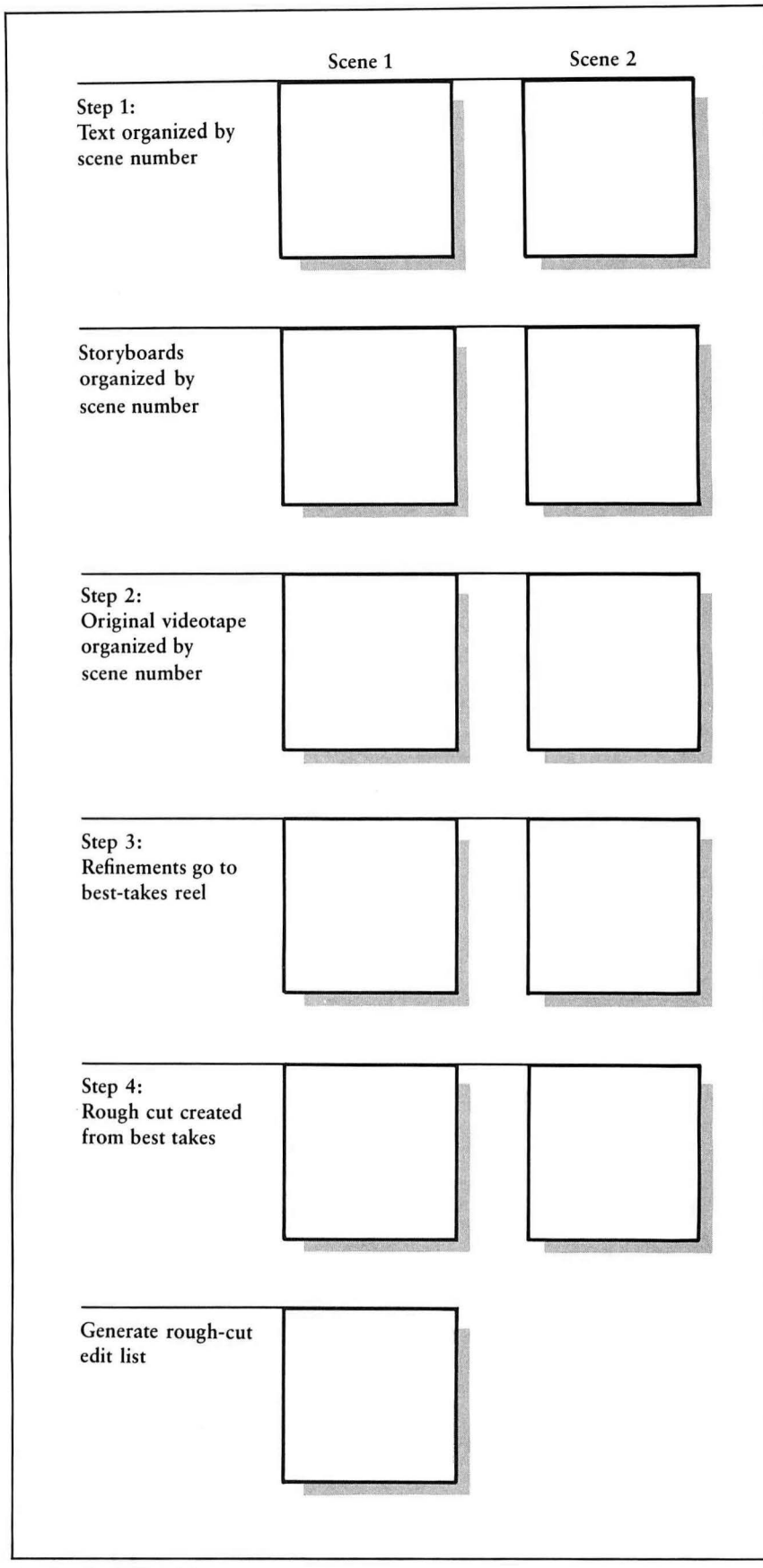


Figure 2: Assembling the rough cut

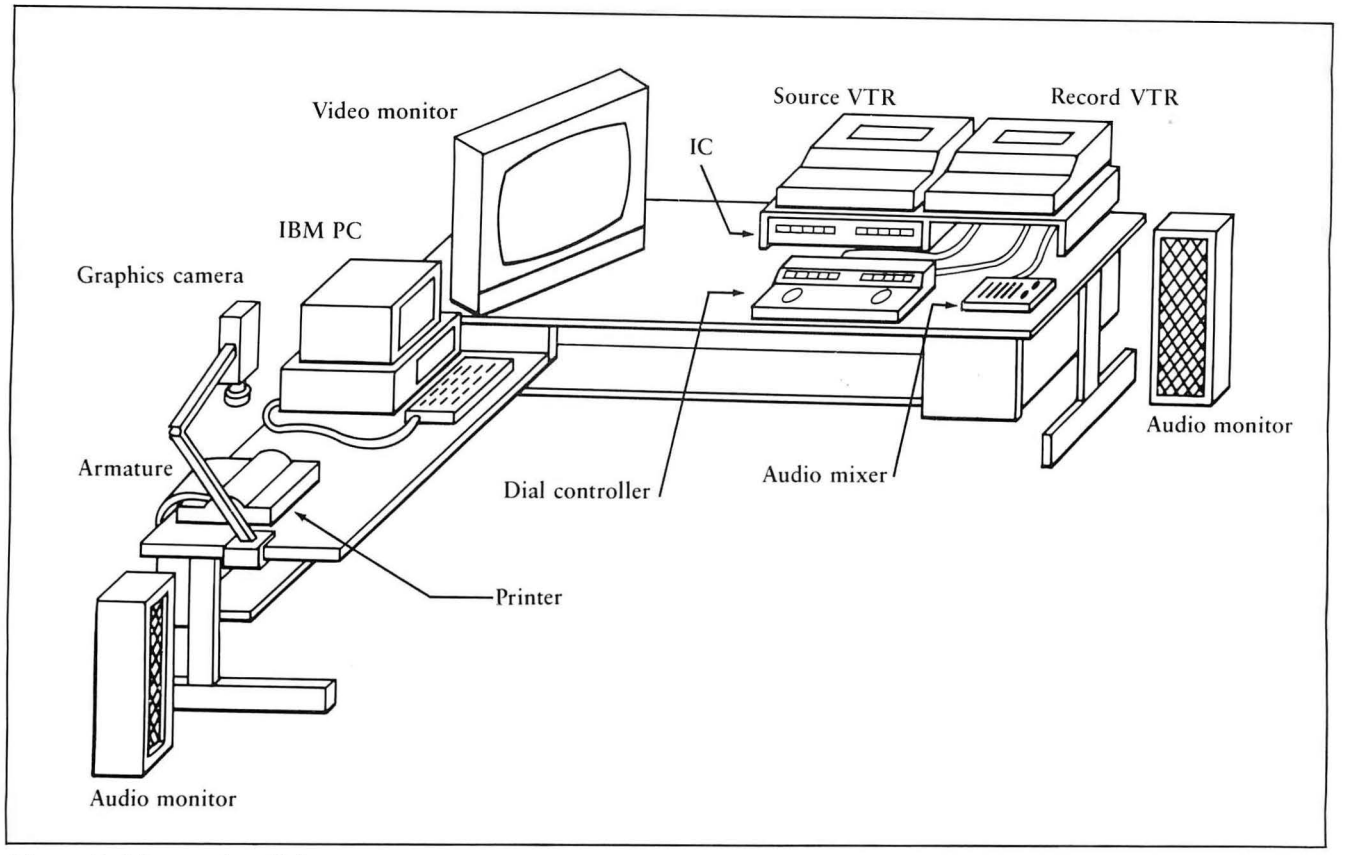


Figure 3: Electronic editing system

This interactive process continues, with members of the production team contributing ideas as the latest version of the rough cut evolves. The music director, for example, may use the first rough cut to get scoring ideas. The special effects engineer may drop in "canned" sounds to see what works before renting an expensive sound studio. With creative decisions documented at each step in the production process, creative disagreements may be avoided.

PC on the Cutting Edge

The power of the PC is realized when it is interfaced with the components of the video editing system (see Figure 3). The PC is connected to the IC, which it treats as a peripheral, sampling its internal memory constantly to retrieve time codes and the status of the VTR being controlled (see Figure 4).

The Sony dial controller and the PC both access the images recorded on tape. The Sony dial controller allows you to move the tapes forward or backward directly, position them, and perform the edit. The PC constantly monitors this activity, compiling a list of the scenes and edits made. Once the PC knows which scenes go where, it can automatically position the tapes (by sending the appropriate signals to the IC) and perform each edit in sequence, even while you're away at lunch.

The Vital Link

For the PC to edit a video program automatically, tape logging, selecting best takes, and rough cutting must be completed. This approach to production is called *script editing*, because under control of the PC the script can be automatically conformed to the edited tape.

First the PC and the video editing system must be taught to communicate. This is done using routines developed in IBM BASIC. The 64K limit imposed on programs that rely on the BASIC interpreter sometimes makes this difficult. But BASIC programming is relatively easy, and code can be rewritten as larger groups of functions are required.

One frequently used subroutine is the single "handshake" between the PC and the IC (see Listing 1). This is an ASCII string written according to the standard IC protocol that is sent down an RS-232C serial data line. The IC responds with a status message on current time code for the segment of videotape being monitored. The IC is capable of monitoring the position of videotapes on two VTRs simultaneously, but the PC must send two separate messages to retrieve information on both machines.

Indexing each segment by scene number is made possible through the use of a data base management system, in this case *dBASE II*. The key advantage of *dBASE II* is its ability to bring in machine language subpro-

grams. Sometimes it's useful to have a main menu program that prepares the system for editing and then passes control to a subprogram to perform a specific operation. In BASIC, control can be passed to a subprogram, but returning control to the menu program later is laborious.

Using *dBASE II*, each editing function (such as computing the duration of an edit) can be written into a machine language subprogram and called in when needed. Control is always maintained by *dBASE II*. Programming overhead is reduced, and menu construction is straightforward. However, writing machine language code requires a knowledge of how to compile a BASIC program originally designed to run with the BASIC interpreter. The payoff in terms of operating speed and efficiency is worth the effort.

The storyboard is a useful tool for plotting out an interactive program before the on-line editing stage.

Speaking Concurrently

Script editing is like juggling three balls at once. You must be able to jump from reviewing the script to managing the edit list to planning where sound effects should go. The process is made easier with an operating system such as Concurrent CP/M-86. With Concurrent CP/M-86 you can leave the script and get into the edit list with a single keystroke. During script editing, *dBASE II* monitors all program variables, even when it is not specifically asked to do so. This feature makes it possible to pass parameters (such as time code, scene number, and duration) between the script and the edit list. If a scene is moved in the script, the edit list is changed automatically. A new workprint can then be assembled from the updated list.

Challenging dBASE II

Several data base management problems crop up at the rough-cut stage. One problem is deciding which sounds to match with which images on the videotape. Another is deciding where a sound should go. The Sony video editing machine, for example, has stereo sound tracks, so an editor must designate which track will hold which sound. Either choice will automatically create an entry in the rough-cut edit list in the data base. While *dBASE II* can easily record changes in the rough-cut edit list, the real challenge is met when it functions alongside Concurrent CP/M-86 and *WordStar*.

Video images on the rough cut are recorded sequentially, and assembly with the PC is relatively simple. But with sound recordings it's a different story. The audio tracks of a video program (including dialogue as well as sound effects and music) also need to be placed on a rough-cut videotape.

Figuring out the placement for the audio portion is often difficult. A sound effect may last only a few seconds; music that bridges several scenes must be assigned a track and a position. The editor must look at the video segment and decide where the sound should start. This is known as the *in-point* on the VTR. By adding the duration of the sound to the in-point, the end of the sound, or *out-point*, is determined. Microprocessors in the editing system usually compute this number.

A rough-cut edit list contains four time code points for each edit: the in-point and the out-point for the image being edited (on the source VTR) and the in-point and the out-point on the record VTR where the image will be inserted (see Figure 5). By knowing three points the fourth is deduced arithmetically. The PC can readily perform this calculation using a BASIC routine (see Listing 2).

Given the relatively low cost of half-inch videotape and floppy disks, it's usually economical to keep a list and workprint for each rough-cut version. Finding the right tape (of the most recent rough cut) is not a problem. *dBASE II* compares the directory at the beginning of any rough-cut videotape with its own directory of edit lists. The appropriate edit list is automatically matched to the latest rough cut.

Saving On-line

Having the script, an edit list, and the last version of the rough cut, the producer is prepared for any detail that may arise during the session. If a scene needs to be changed or another one added, alternatives can be found quickly in the best-takes list.

A more complex level of video editing and list management is encountered when one goes beyond mere linear programs and begins to create interactive programs. Interactive programs, such as those used in education and training, select alternative scenes depending on the user's response to a choice presented in the program. This procedure is known as *branching*. Branching to new material in a program requires a thorough review of each possible alternative. Scene-to-scene continuity must be checked. This is aided by BASIC routines that recall a scene of text at random from the script (see Listing 3).

Many producers are forced to remake their masters because they are not experienced with interactive material. This situation, of course, increases the cost of production. The storyboard is a useful tool for plotting out an interactive program before the on-line editing stage. It is a series of illustrations used to lay out the order and content of scenes in a video program. Once static storyboard images are recorded on vid-

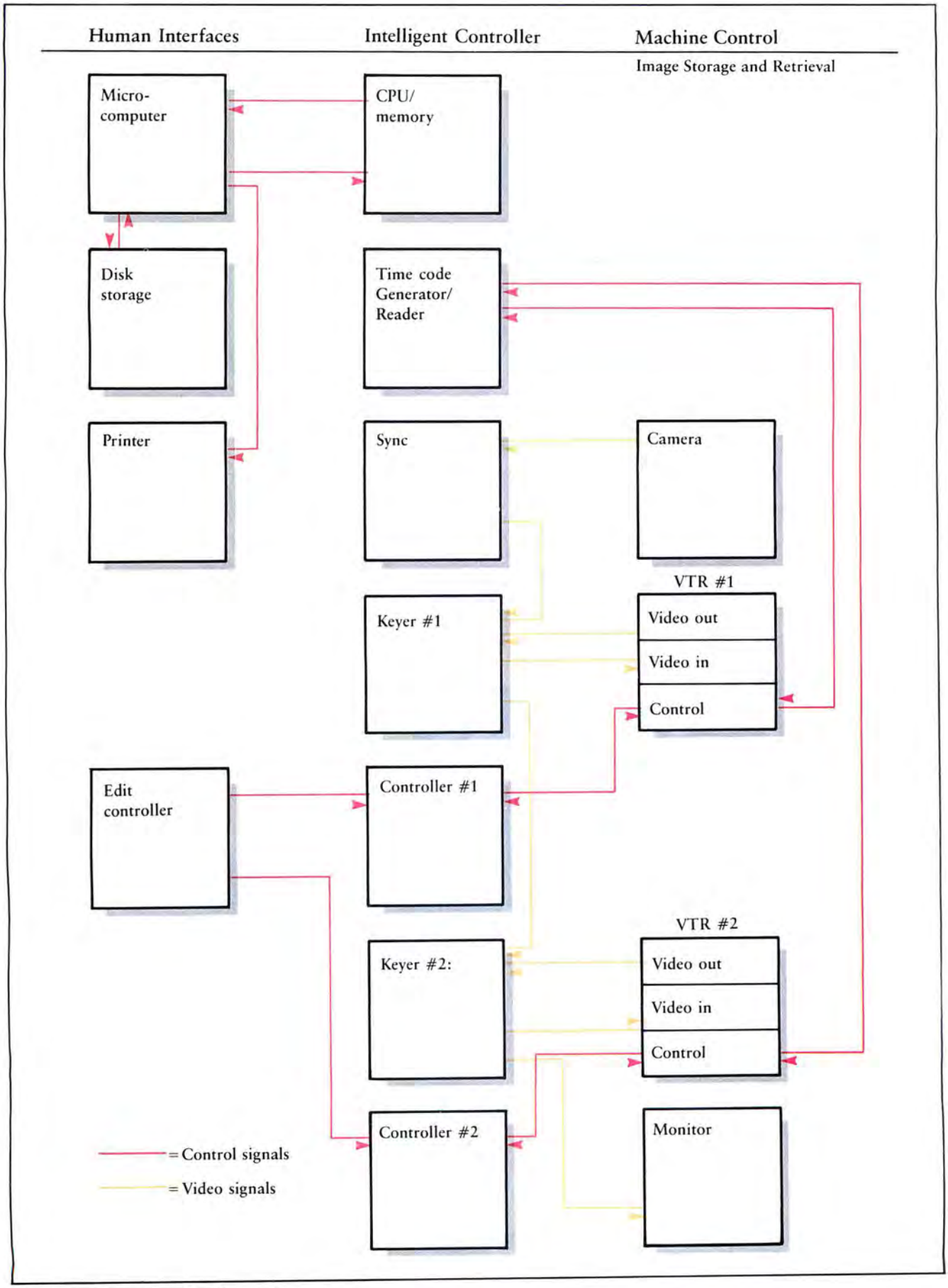
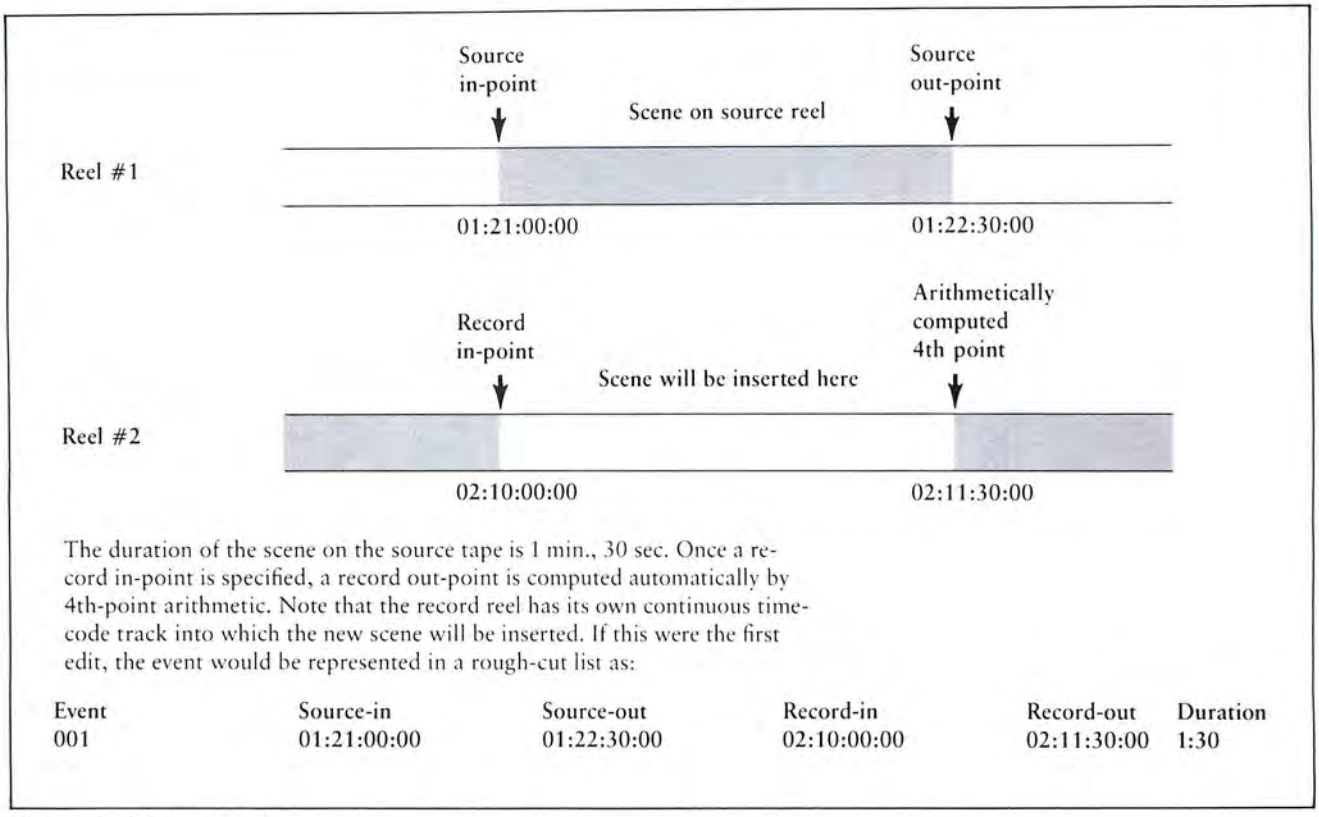


Figure 4: Control and video pathways



The duration of the scene on the source tape is 1 min., 30 sec. Once a record in-point is specified, a record out-point is computed automatically by 4th-point arithmetic. Note that the record reel has its own continuous time-code track into which the new scene will be inserted. If this were the first edit, the event would be represented in a rough-cut list as:

Event	Source-in	Source-out	Record-in	Record-out	Duration
001	01:21:00:00	01:22:30:00	02:10:00:00	02:11:30:00	1:30

Figure 5: An insert edit

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```
1000 'Subroutine to retrieve and display time code
1001 OPEN "COM1:9600,E,7,1" AS #1: SIDE$ = "1"                    'Select VTR
1002 PRINT #1, "::::00/0" + SIDE$ + "/21/A0/": S$ = INPUT$(36,#1)
1003 TIM$ = MID$(S$,22,11)                                  'This is the time code string
1004 HOR$ = MID$(TIM$,10,2)                                  'Sort hours
1005 MIN$ = MID$(TIM$,7,2)                                   'Sort minutes
1006 TEN$ = RIGHT$(STR$(VAL("&H" + MID$(TIM$,4,1))           'Mask data error
     AND 7),1)
1007 SEC$ = MID$(TIM$,5,1)                                   'Sort seconds
1008 FRM$ = MID$(TIM$,1,2)                                   'Sort frames
1009 COLOR 0,7: LOCATE 25,10
1010 PRINT HOR$ + ":" + MIN$ + ":" + TEN$ + SEC$ + ":" + FRM$;
1011 COLOR 0,7: CLOSE #1                                     'Restore color
1012 RETURN
```

Listing 1: PC and Intelligent Controller handshake routine

```
2800 'Subroutine to compute and display FOURTH POINT
2805 'All processing is done in a 2 dimensional array known as TIM()
2806 'The first row is reserved for marker to indicate time code selections
2810 FOR COL = 1 TO 4
2820 IF NOT TIM(1,COL) THEN W = COL  'Check to see which is the fourth point
2830 NEXT COL
2840 ON W GOTO 2850, 2860, 2870, 2880
2850 X = 4: Y = 3: Z = 2: DUR = -1: GOTO 2890
2860 X = 4: Y = 3: Z = 1: DUR =  1: GOTO 2890
2870 X = 2: Y = 1: Z = 4: DUR = -1: GOTO 2890
2880 X = 2: Y = 1: Z = 3: DUR =  1
2890 GOSUB 2950                                  'Compute SMPTE DURATION
2900 GOSUB 3080                                  'Do FOURTH POINT arithmetic
2940 RETURN
2950 'Subroutine to compute SMPTE DURATION
2960 IF TIM(5,Y) > TIM(5,X) THEN TIM(5,X) = TIM(5,X) + 30: CARRY = -1
2970 TIM(5,5) = TIM(5,X) - TIM(5,Y)
2980 TIM(4,X) = TIM(4,X) + CARRY: CARRY = 0
2990 IF TIM(4,Y) > TIM(4,X) THEN TIM(4,X) = TIM(4,X) + 60: CARRY = -1
3000 TIM(4,5) = TIM(4,X) - TIM(4,Y)
3010 TIM(3,X) = TIM(3,X) + CARRY: CARRY = 0
3020 IF TIM(3,Y) > TIM(3,X) THEN TIM(3,X) = TIM(3,X) + 60: CARRY = -1
3030 TIM(3,5) = TIM(3,X) - TIM(3,Y)
3040 TIM(2,X) = TIM(2,X) + CARRY: CARRY = 0
3050 IF TIM(2,Y) > TIM(2,X) THEN GOSUB 3800  'Test for ENTRY ERROR
3060 TIM(2,5) = TIM(2,X) - TIM(2,Y)
3070 RETURN
3080 'Subroutine to perform FOURTH POINT arithmetic
3090 TIM(5,W) = DUR*TIM(5,5) + TIM(5,Z)
3100 IF TIM(5,W) < 0 THEN TIM(5,W) = TIM(5,W) + 30: CARRY = -1: GOTO 3120
3110 IF TIM(5,W) > 29 THEN TIM(5,W) = TIM(5,W) - 30: CARRY = 1
3120 TIM(4,W) = DUR*TIM(4,5) + TIM(4,Z) + CARRY: CARRY = 0
3130 IF TIM(4,W) < 0 THEN TIM(4,W) = TIM(4,W) + 60: CARRY = -1: GOTO 3150
3140 IF TIM(4,W) > 59 THEN TIM(4,W) = TIM(4,W) - 60: CARRY = 1
3150 TIM(3,W) = DUR*TIM(3,5) + TIM(3,Z) + CARRY: CARRY = 0
3160 IF TIM(3,W) < 0 THEN TIM(3,W) = TIM(3,W) + 60: CARRY = -1: GOTO 3180
3170 IF TIM(3,W) > 59 THEN TIM(3,W) = TIM(3,W) - 60: CARRY = 1
3180 TIM(2,W) = DUR*TIM(2,5) + TIM(2,Z) + CARRY: CARRY = 0
3190 IF TIM(2,W) < 0 OR TIM(2,W) > 59 THEN GOSUB 3800 'Test for ENTRY ERROR
3200 RETURN
3800 'Subroutine to trap error
3810 PRINT "Fourth point computation error..."
3820 RETURN
```

Listing 2

```
1000 'Sample routine to retrieve text from ASCII file and display
1010 CLS: SPEED = 25
1020 INPUT "SELECT A FILE FOR REVIEW >  ",  FILENAME$
1030 OPEN "Random", #1, FILENAME$, 128
1040 FIELD #1, 128 AS QQ$
1050 GOSUB 1080                                    'Print keyline prompt
1060 ADDRESS = 1: GOSUB 1140                       'Display the text
1070 KEY ON: CLOSE: END
1080 'Subroutine to print KEYLINE for text display
1090 CLS: KEY OFF: LOCATE 25,1: COLOR 0,7
1100 PRINT "Select SPEED with 1, 2, 3, 4.";
1110 PRINT " PAUSE w/space bar. Anykey RESUMES.  X = EXIT.";
1120 COLOR 7,0: LOCATE 1,1
1130 RETURN
1140 'Subroutine to display an individual scene
1150 GET #1, ADDRESS
1160 K$ = INKEY$
1170 IF K$ <> "" THEN GOSUB 1470: GOSUB 1320       'Trap user interrupt
1180 IF K = 88 OR K = 120 THEN 1230                'Exit routine
1190 GOSUB 1240                                    'Display record
1200 IF INSTR(QQ$,CHR$(26))-1 > 0 THEN 1230
1210 ADDRESS = ADDRESS + 1
1220 GOTO 1150                                     'Get another record
1230 RETURN
1240 'Subroutine to review character by character
1250 FOR A% = 1 TO 128
1260 FOR T = 1 TO UNITS: NEXT T                    'Set drag coefficient
1270 S = ASC(MID$(QQ$,A%,1)) AND 127
1280 IF S = 10 THEN 1300                           'Avoid line feeds
1290 PRINT CHR$(S);
1300 NEXT A%
1310 RETURN
1320 'Subroutine to trap user interrupt for text display
1330 IF K < 49 OR K > 52 THEN 1350
1340 ON K-47 GOTO 1360, 1370, 1380, 1390
1350 IF K = 32 THEN 1400 ELSE 1410
1360 UNITS = INT(1 * SPEED): GOTO 1410
1370 UNITS = INT(2/3 * SPEED): GOTO 1410
1380 UNITS = INT(1/3 * SPEED): GOTO 1410
1390 UNITS = 1: GOTO 1410
1400 GOSUB 1420                                    'TEST for ANYKEY interrupt
1410 RETURN
1420 'Subroutine to TEST for ANYKEY interrupt
1430 K$ = INKEY$
1440 IF K$ = "" THEN 1430
1450 GOSUB 1470                                    'Interpret ANYKEY interrupt
1460 RETURN
1470 'Subroutine to interpret ANYKEY interrupt
1480 K = ASC(K$)
1490 IF LEN(K$) < 2 THEN K(2) = 0: GOTO 1510
1500 K(2) = ASC(MID$(K$,2,1))
1510 RETURN
```

Listing 3

eotape, they can be randomly accessed with any accompanying text and used interactively. Complex continuity problems can be anticipated in an interactive program before any footage is actually shot.

Software Solutions

Existing video production techniques are still cumbersome and expensive. While the cost of off-line video editing equipment is falling almost as fast as the cost of microcomputers, little is being done to provide video producers with software that can manage all the problems that go hand in hand with video editing. It is particularly important that affordable video-to-computer interface software be available for not only producers of entertainment programs but also the creators of training programs and educational courseware.

> Computer-controlled video editing will increase.

Without a doubt the microcomputer is in the video world to stay. As more and better interfaces are developed (along with the requisite software), computer-controlled video editing will increase. Portable computers will also play a role as standard field production equipment for logging video footage. Dial control may become video's equivalent of the mouse, offering the editor direct control of all the bits and pieces that make up the video whole.

William Claxton is an independent video editor and producer who is currently developing interfacing software for the PC and video editing systems.

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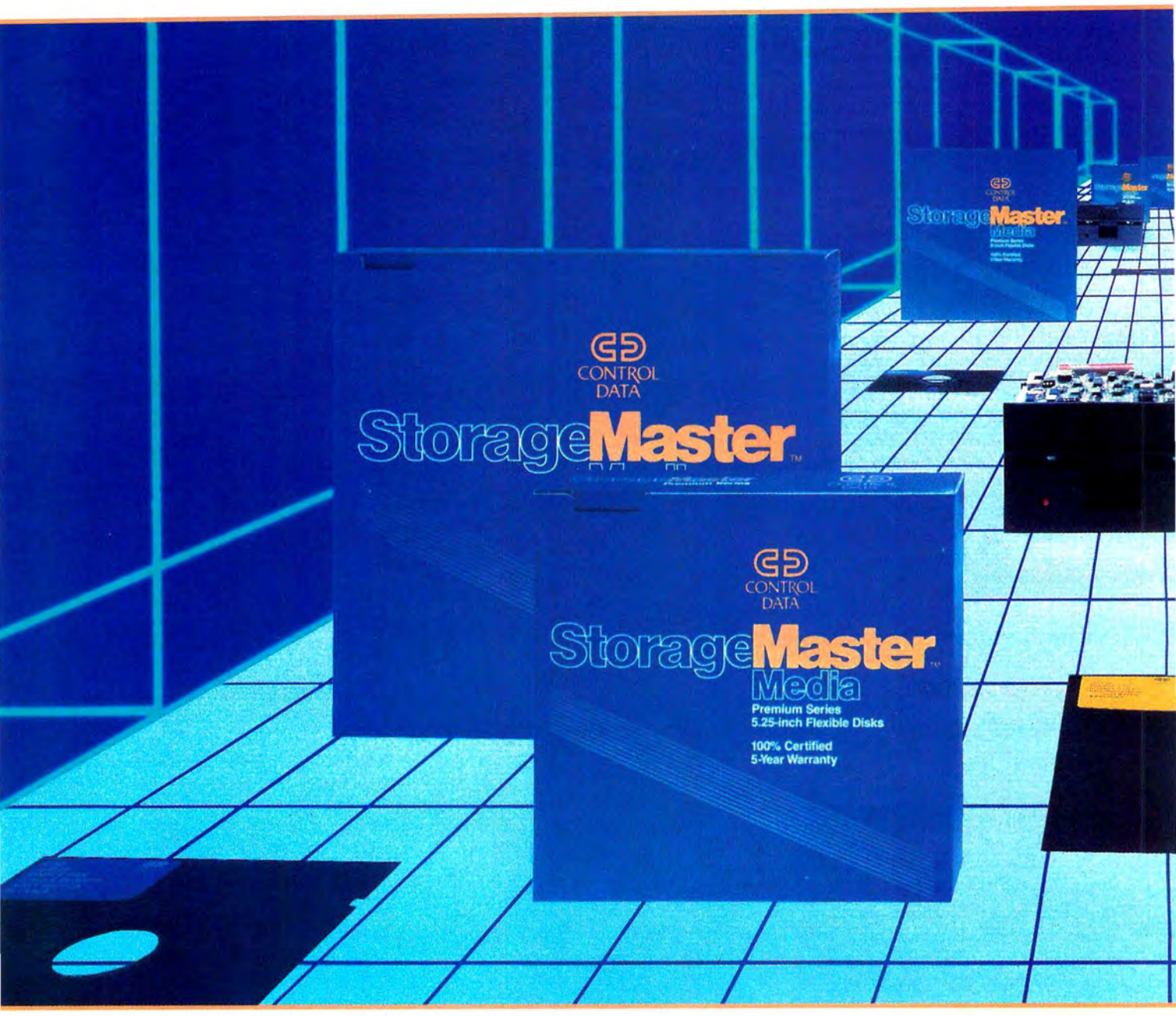

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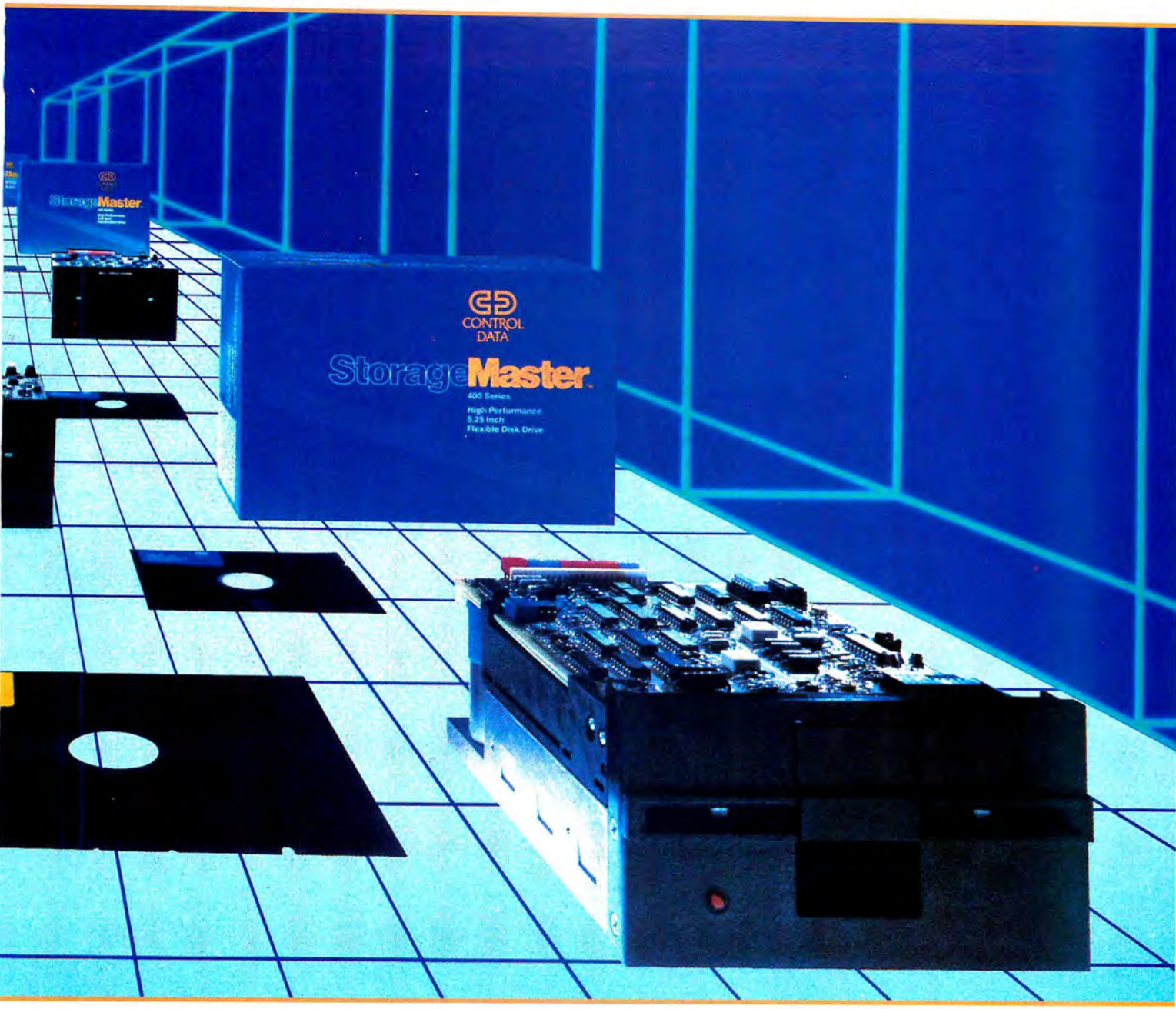

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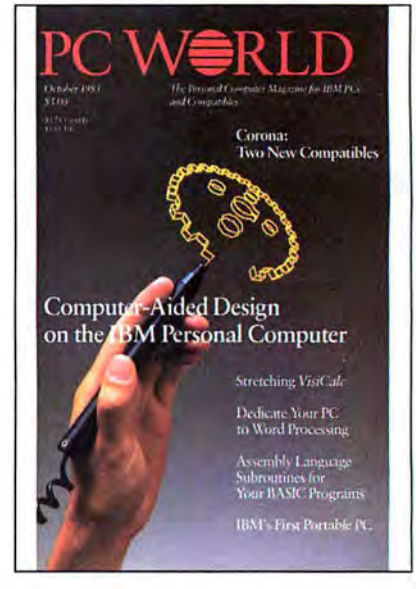

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Remote and Unattended

Unattended communications software can be used for setting up an electronic bulletin board, collecting data from a variety of sources, or running your PC from the other side of the country.

Larry Jordan

When I first started using smart terminal communications software with my IBM PC early in 1982, I could communicate with another IBM PC only if it had an operator at the keyboard. There was no software available that would enable an unattended remote PC to answer the telephone and communicate with me.

Times have changed. During the past year we have seen a tremendous proliferation of smart terminal communications software (see "The Communicators," *PCW*, Vol. 1., No. 5), and now we are beginning to see a growing number of remote and unattended PC communications packages. The capabilities of currently available packages are reviewed in this issue in "A Host of Hosts." This article provides the background information you will need for reading those reviews.

Host and bulletin board software can improve scheduling and enhance productivity. How many times have you wasted an afternoon calling someone who "just stepped out" for a minute? Perhaps you wanted to get information to members of a group quickly and had to resort to letter or postcard mailings. Or maybe you needed to collect data on a tight schedule from several sources but had to wait for several days for the information to arrive by mail. Unattended remote communications software can solve these problems in addition to providing the data transfer power you have come to expect from a smart terminal communications program.

Unattended communications software eliminates the need to have two communicating parties available simultaneously to transfer data. With unattended software operating on a 24-hour basis, callers can leave or retrieve messages or transfer data at any time, day or night, without disturbing the system operator. A writer or a programmer can work through the night and still meet a 9 a.m. deadline halfway across the continent by transmitting the completed work to a remote unattended PC as soon as it is finished. Many user group

newsletter editors who use unattended communications software to collect articles appreciate the freedom these systems give them—they go to bed the night before an article deadline and wake the next morning to find a disk full of valuable information.

Availability mismatches frequently occur between company offices located in different time zones. Host and bulletin board programs provide an extra 3 hours of communication time in the mornings and evenings for offices located on opposite coasts. Reports, data, or messages can be transferred while the recipient is still asleep or watching the evening news.

Bulletin board systems often serve as electronic order-taking devices. Callers are presented with bulletins on the latest products available and can order from a menu. The bulletin board software may also be capable of taking charge-card data and validating the identity of callers based on information stored in an on-line data base. This application of bulletin board software allows a retailer to get notices of product and price changes to potential customers quickly. It also speeds up the ordering process by eliminating mailing delays.

Bulletin board software is a useful communication tool for the hearing and speech impaired. Information on upcoming social or educational events can be posted on an electronic bulletin board, and bulletin board software can act as a visual answering machine, enabling callers to leave messages for each other. Bulletin board software enables these people to exchange messages with others who have similar impairments.

Host and bulletin board software can eliminate the need to physically transport information or hardware. Some situations make the transport of information, both printed matter and electronically stored data, impractical. Some hospitals, for example, eliminate the need to decontaminate notes and records made in infectious disease wards by entering the information into a terminal located in the contaminated area and transferring the data to a remote bulletin board system. This electronic transfer of information saves hospitals time and money that would otherwise be required for complex decontamination procedures.

Remote communications software is generally categorized as either host or bulletin board software, but some systems provide the capabilities of both. A PC equipped with host software is used primarily for remote operation, whereas a PC equipped with bulletin board software is used primarily for message exchange. A host system can accept calls from remote terminals and execute commands received through the serial port just as it executes keyboard commands. A bulletin board system is capable of receiving and storing messages from a remote computer and transmitting messages to a remote computer. Both host and bulletin board software are capable of receiving and transmitting files.

> Unattended communications software eliminates the need to have two communicating parties available simultaneously.

True host software gives a PC owner access to the power of his or her PC from any location equipped with a terminal, a modem, and a public telephone. Unattended host software systems allow remote callers to take control of their PCs and operate them through serial telephone communication links almost as if the callers were sitting at the PC keyboards.

With the exception of direct video memory-mapped software such as *VisiCalc* or the *Personal Editor,* callers can run any applications software used by the IBM PC. With the purchase of a Radio Shack TRS-80 Model 100 portable computer, PC owners can tap into a remote host-equipped PC from any telephone. A news article could be keyed in during an airline flight to a distant location and then transmitted back to a PC from a pay telephone once the distant location was reached. Later, the traveler could call back into the host PC, reformat the transmitted article using a word processing program, then retransmit the article to a third host computer via a second serial port and modem attached to the remote PC. This scenario is a little far-fetched, but it illustrates a point: the only limitation to host software applications is the user's imagination.

Communication Parameters

A well-designed, unattended software package should allow callers to use several communications parameter combinations. The software should detect and switch bps (bits per second—the speed of transmission) rate and parity to match that of the caller. Software that will operate only at a single bps rate or parity precludes callers who cannot reconfigure their systems to match the software's default parameters. Most unattended packages switch to match caller bps rates, but some are fixed to operate using 7 data bits and even parity, or 8 data bits and no parity.

Fixed parameter software also limits the power and flexibility of the remote PC when the system is accessed by a microcomputer equipped with smart terminal communications. Using only 7 data bits eliminates the transfer of the special IBM PC 8-bit graphics and symbol characters and prohibits the use of special error-checking file transfer techniques. Using only 8 data bits, on the other hand, eliminates the access of some remote dumb terminals to the PC because these models operate using 7 data bits only.

State of the Art

File Protection

Disk file protection is critical in both host and bulletin board systems that allow unscreened caller access. Unattended software should allow only selected callers to delete files. The software should either provide password protection of files or allow only the system operator to delete or rename files. Without those safeguards, callers can delete files intended for use by other callers or delete files that are necessary for system operation.

File Transfer

One of the most powerful features of unattended communications software is file transfer capability. The ideal host or bulletin board system should allow a caller to either receive a file from the system (download a file) or transmit a file to the system (upload a file). The system should allow the transfer of ASCII text and source code files as well as binary data and program files. Systems that require either the caller or the system operator to convert binary files (those with COM and EXE extensions) into ASCII, hex, or BASIC files are cumbersome and time-consuming to use.

> When entering a message, callers should be able to specify whether the message is private or public.

The file transfer capability of unattended communications software should include an error-checking protocol transfer option. As a minimum, the Xmodem protocol should be provided. This protocol is in the public domain and is available in many commercial communications packages.

The Xmodem protocol uses a checksum error-checking technique that automatically retransmits any block of data that contains errors. The checksum technique adds the ASCII values of a block of data on the sending computer and then divides the number by 255. That value is compared to the checksum made on the receiving computer. If there is a discrepancy between the two checksums, the block is retransmitted. This method ensures 99.6 percent error-free file transfers, an acceptable accuracy rate for most hobby and business data transfers.

For financial data transfers, which require greater than 99.9 percent accuracy, the cyclic redundancy check (CRC-16) technique may be required. CRC-16 is similar to Xmodem but uses a 16-bit error-checking value (twice as wide as Xmodem's) that is the result of a complex polynomial equation instead of the simpler addition technique used by Xmodem.

In this method, a polynomial-derived constant is divided by an algorithm into the numeric binary value of all character bits contained in a block of data. The resulting quotient is discarded, and the remainder is retained as a block-check character (BCC).

Error-checking equations are not 100 percent accurate because there is always the possibility that two or more errors will cancel each other out and therefore escape detection. With CRC-16, however, the complexity of the equation forces errors to crop up again and again in a cyclical manner as the values are carried forward through torturous mathematical manipulations. Only an infinitesimal chance exists that two errors will cancel each other out and avoid detection.

Unattended communications software should also provide the XON/XOFF file transfer speed matching protocol. This protocol prevents one computer from sending more data than another computer can handle in a given amount of time. The XON/XOFF protocol lets the receiving computer temporarily halt a file transfer until it can catch up with the flow of data. This protocol is not necessary when error-checking protocol transfers are performed, but it is needed for nonprotocol transfers of ASCII files. The absence of XON/XOFF support can result in communication buffer overflow and loss of data.

The file transfer capabilities of unattended communications software should provide information on file size and available disk space. When preparing to receive a file, a caller should be told the size of the file and the transfer time it requires. The caller should be allowed to abort the transfer after receiving this data if he or she doesn't have enough free disk space to receive the file or isn't willing to pay the long-distance toll charge for a lengthy transfer. When preparing to transmit a file to an unattended communications system, the caller should be told the free disk space remaining on the disk that will receive the file. The caller should be able to abort the transfer because of insufficient disk space on the unattended system.

Chat Mode

A good host or bulletin board system allows either the caller or system operator to initiate a conversation-mode keyboard chat. The system operator should be able to force the system into the chat mode at any time except during file transfer. The system should also let the system operator select the hours he or she wishes to be available to answer operator paging by callers. The system operator's "office hours" should be stored in the system data base and be easily modified by the operator. The system operator should also be allowed to set the volume of the operator page bell.

Case Conversion

Some remote communications stations operate in uppercase only and require remote system support in uppercase only. Immediately after callers gain access to a system, host or bulletin board software should ask

them whether lowercase is acceptable. If the caller is limited to uppercase, the system should convert all letters to uppercase before they are transmitted.

Help Files

Help files are a key element in introducing novices to a remote system. Each subsystem of an unattended software package should provide user help for all commands available in the subsystem. The help files should elaborate on the information provided in the novice menus.

Message Subsystem

A remote system message subsystem should enable callers to leave messages for other callers or retrieve messages left by other callers. It should let a caller retrieve a summary scan of each message and mark the message for later retrieval. The scan capability should enable a caller to search messages in ascending numerical order (forward search) or descending numerical order (backward search) beginning with a specific message number or date. Some systems let callers choose to scan or read only those messages entered since the caller was last on the system. Other systems allow callers to retrieve messages based on selected subjects. An automatic scan of the message file to locate messages directed to the caller may also be provided.

When entering a message, callers should be able to specify whether the message is private or public. Private messages should be readable only by the recipient and the system operator and should be encrypted when stored to ensure security. Public messages should be readable by any caller, but the sender should be able to select the level of message deletion protection; the system should allow only the message recipient, the caller who left the message, and the system operator to delete a protected message.

One often-overlooked aspect of a message subsystem is the message word processor. Message entry that does not provide automatic word wrap or search and replace editing is cumbersome to use. The quality of messages left on a system and the frequency of use of the message function often depends upon the quality of the message editor. Callers who have been spoiled by high-quality message processors on other systems may refuse to use the message function on a less sophisticated system.

> The system operator should be able to toggle the display on and off to "snoop" on caller activity.

The message capability of a host software package should at least allow message passing between callers and the system operator. The system operator should be able to direct messages to specific individuals, and callers should be able to leave private comments for the system operator. These comments should be protected from normal caller access by data encryption or file location protection.

Local Display (Snoop)

The screen of the host or bulletin-board-equipped system should be protected from prolonged display burn in. This is achieved by an immediate or time-delayed clearing of the screen after the system is booted up. The system operator should, however, be able to toggle the display on and off to "snoop" on caller activity. System activity snooping is necessary while the system operator is learning to operate the software and is also useful for checking on unauthorized or improper system use.

In addition to turning the local screen display on and off, the snoop toggle should also turn all system sounds on and off. The <Ctrl>-G bell used to indicate the end of ASCII file transfers and to prompt callers for input may become annoying after several weeks of system operation. The system operator should be able to toggle all the bells off locally without affecting the sounds transmitted to remote callers.

Logon Bulletins

Logon bulletins are the system operator's means of communicating with you before you get into the system. Bulletins can be delivered to a caller in several ways; the two most common techniques are sequential file delivery and menu-selectable text files. The sequential file method forces callers to read the entire file or terminate the file listing by sending the remote PC a special character. After the sequential bulletin (sometimes called "general mail") has been listed or terminated, the caller can read the bulletin file again only by terminating the session and calling back.

The menu-driven bulletin technique lets callers choose to skip all system bulletins or read selected bulletins. Bulletins can be reread any number of times. The menu technique is superior to the sequential file technique because bulletins can be categorized by the system operator, and the caller has more flexibility in selecting and reading the bulletins.

File Directories

One major distinction between host and bulletin board systems is the file directory. Bulletin board systems normally have text files that serve as directories of files available on the system. Each file name is accompanied by a brief file description. Each disk may be provided with one directory, or disks may be divided into several directories.

Techniques used to select files for transfer from the host system to the caller's system may differ. In some systems callers select files by number from a menu, while other systems require that the caller specify the exact

name of the file. Some callers like the menu selection design because it does not require the entry of file names; others like the file name entry technique because they don't have to switch file menus to access files.

Host systems normally have only one directory per disk—the one accessed through the DOS DIR command. These systems must list the directory before the user can initiate a file transfer program. Once the file transfer program is initiated, the only way to get a list of available files is to terminate the program and request another DIR of files. The advantage in this technique is that DOS wildcard substitution characters can be used to get a listing of files with specific characters in their file names or a listing of files with certain file name extensions.

System Logs

Unattended communications software should keep a log of all callers. Systems may also collect other caller data such as communications parameters used by different callers and files transferred. When a caller logs on, some systems search user records to determine whether the person has been on before; if the person has logged on before, the system automatically puts the parameter selections used during the last session into effect. The caller may modify current and future parameters with each call.

The user log provides the system operator with a tool to lock certain users out of the system. The lock-out does not keep crank callers from logging on under another name, but it does keep them from developing a following with name recognition.

System Operator Access

Unattended communications software should allow the system operator to access the system both locally and from a remote terminal. Operator access is necessary for file and system data base maintenance. Files often have to be added to the system directories or messages have to be deleted. The system operator may also want to enter messages for callers or revise system bulletins. Table 1 provides a summary of necessary and desirable system operator access capabilities.

The system operator should be able to gain access to the system from a remote terminal by using a special password. A special key combination should allow the system operator to access the system locally. A secret local-access password may also be needed for systems used for financial transactions or other special applications.

Caller Default Controls

Callers should be able to alter several system defaults to make the system either match a remote terminal design or perform in a desired manner. A caller should be able to change both the screen width and height assumptions made by the system. Small-screen terminals such as the Radio Shack TRS-80 Model 100 are difficult to use with a remote system that assumes a full 24-line by 80-column monitor when it transmits text and messages. A caller should also be allowed to turn prompt sounds on and off. A system that insists on sending beeps to a caller each time input is required can be annoying.

A user's default preference should be stored in the user data base and retrieved when he or she logs on the system again. This storage and retrieval of preferences keeps the caller from using valuable connect time to go through the default modification during each session.

Expert Mode

Unattended software should be menu driven so that novices are guided through the system, but programs should also let expert users choose an abbreviated menu or command struc-

Necessary Controls

File directory modifications
System bulletin menu and file revisions
Message entry and deletion
User data base listing and modification
Disk file viewing
Disk file directory listing
Listing of caller comments file
Deletion of caller comments file

Desirable Controls

Caller log deletion
User log statistical analysis
Caller log statistical analysis
Disk directory and system file directory

Mismatch Analysis

Modification of caller time limit
Modification of system default parameters

Note: The desirable controls may operate locally from only a chained or stand-alone system operator control program.

Table 1: Host and bulletin board system operator controls

ture. Menus are a welcome sight for the timid communications novice, but they are annoying for frequent system users, particularly at 300 bps. At 1200 bps, even the expert can tolerate long menus, but at 300 bps, menus seem to go on displaying forever.

A user should be able to switch between the novice and expert mode at any time. The expert mode should provide an abbreviated version of the novice menus because even expert users sometimes forget available commands or functions.

Remote Takeover

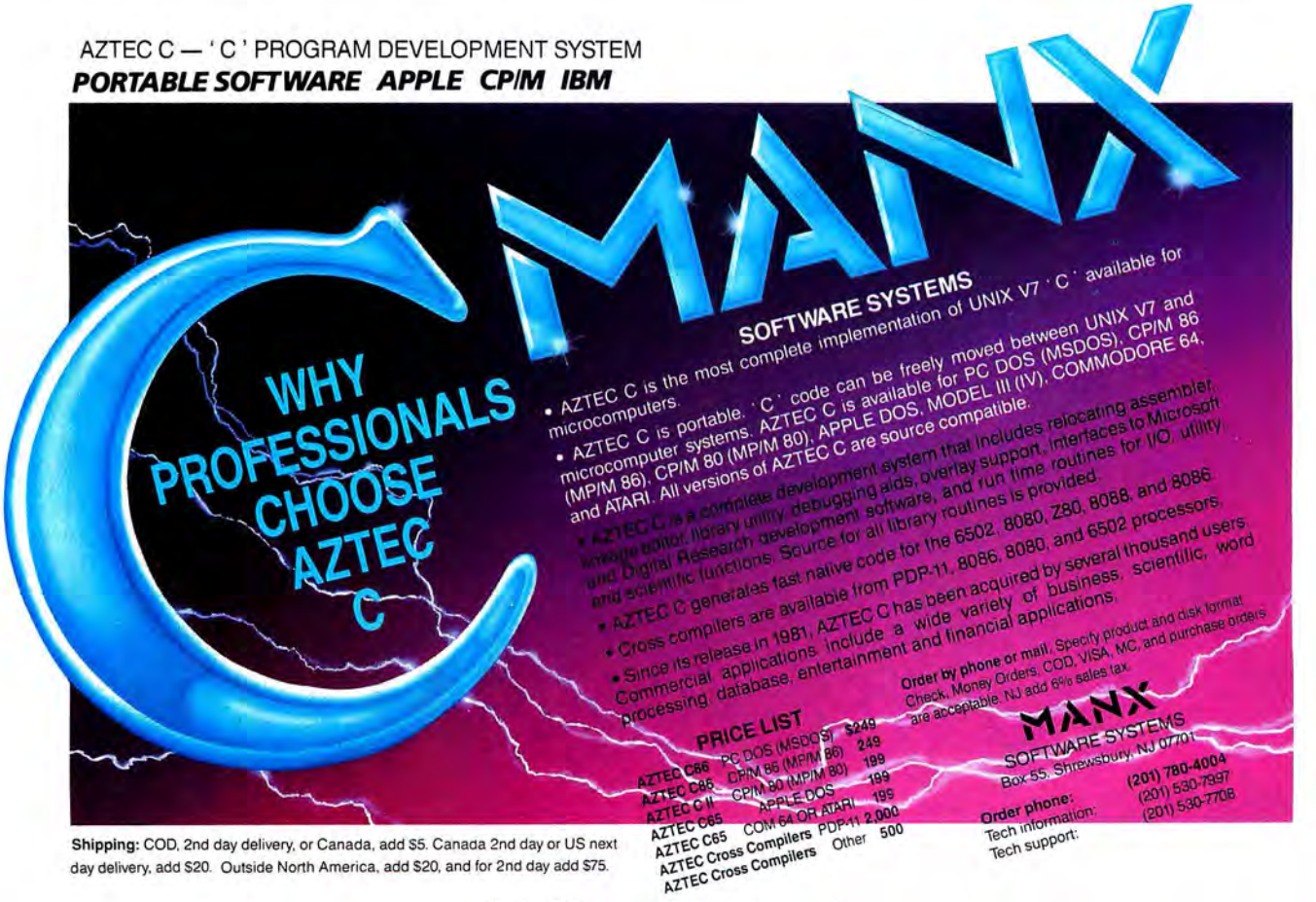
Remote system takeover is an essential feature of host software. Remote takeover should allow callers to access the system through password control and perform as many normal PC functions as possible from a remote terminal or personal computer. Callers should be able to execute DOS internal and external commands such as DIR, COPY, ERASE, and CHKDSK. A caller should also be able to run BASIC programs and any application that prints on the monitor one line at a time.

Most software that allows for remote takeover does not support operation of direct video memory-mapped applications software because too much time is required to send a full screen of information and because complex escape codes are required to format the remote display. *dBASE II* prints each line individually and can be operated remotely. *VisiCalc* and *1-2-3*, on the other hand, are direct video memory-mapped software and cannot be operated from a remote terminal.

As you can see from the many unattended communications software characteristics just described, this type of software is somewhat complex. It can, however, provide substantial communications power.

Unattended communications software can be operated under multitasking versions of the PC operating system to free the PC for other applications while unattended communications are being performed in the background. By combining unattended communications software with a multiuser, multitasking operating system, the PC can accommodate several serial dial-up connections, simulating the performance of a low-end minicomputer.

Larry Jordan is a freelance writer who manages power plant startup engineers for NUS Corporation. He coauthored the book Communications and Networking for the IBM PC *published by the Robert J. Brady Company. He is also president of the Capital PC User Group.*



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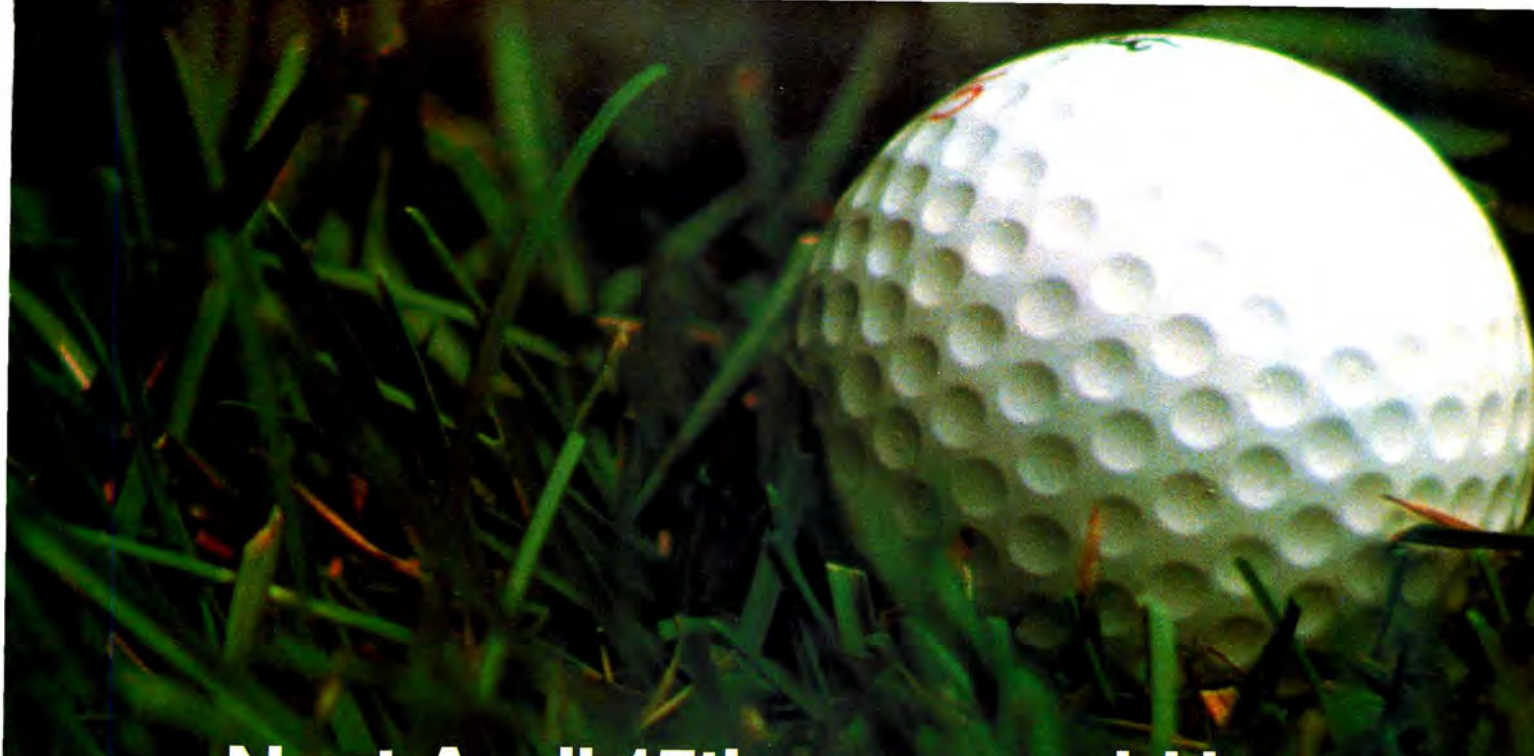

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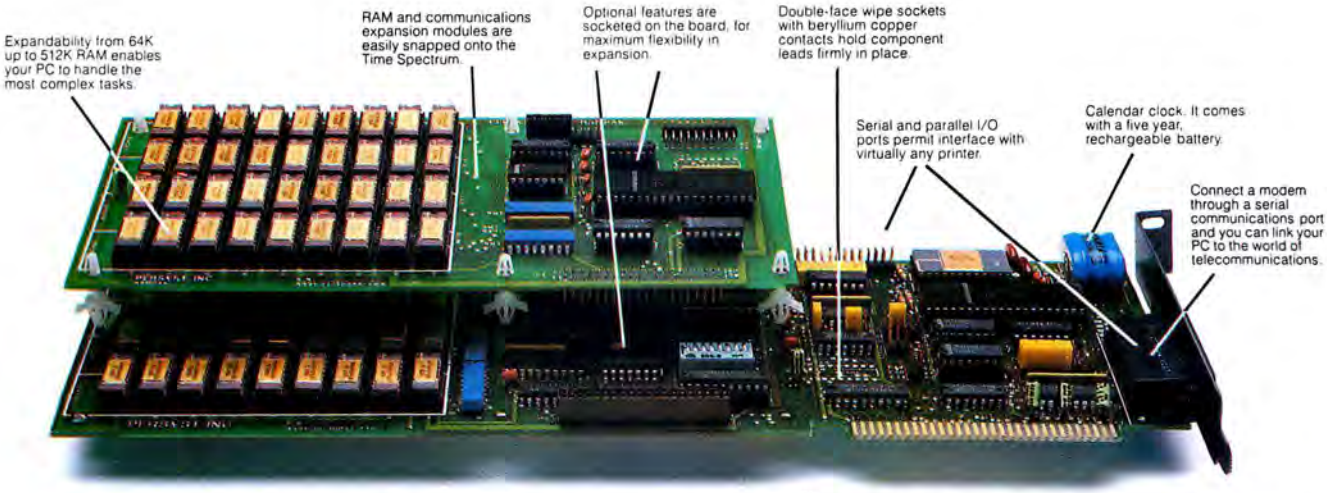

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PC WORLD View

News and notes for the computing community

Miriam Medom

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

Grapevine

Ma Bell's Other DOS

As of January 1, AT&T is permitted to market computers—something that it was not previously allowed to do under the regulations that govern its operations. Now that Ma Bell can sell computers, PC compatibility appears to be an important component of its systems. Industry sources report that Teletype Corporation, a subsidiary of Western Electric (the manufacturing arm of AT&T), has been negotiating with Microsoft to license MS-DOS for the business microcomputers Teletype will market. No doubt those computers will also have UNIX, the multitasking, multiuser operating system developed by Ma's own Bell Labs.

MS Network?

Industry speculation suggests that Microsoft is developing a local area network, to be called MS-Net. The principal evidence for this rumor is that the Bellevue, Washington, firm recently hired Leo Nikora, who previously managed the development of networking software for Xerox's Office Systems Division. When asked if he would work on network projects at Microsoft, Nikora reportedly limited his reply to, "I think that's a fair conclusion."

Peanut Clout

Anticipation of IBM's rumored home computer, nicknamed Peanut in the press, caused a stir among market researchers, journalists, and investors. On a single day, the *Wall Street Journal* reports, rumors about the Peanut cost investors $340 million. That day was last September 28, when two securities analysts predicted that IBM would announce the Peanut on November 1, and the stocks of other home computer makers took a tumble.

The computer firms that suffered big losses in the face of IBM's pending competition are Coleco (whose $600 Adam system was delayed several times beyond the originally announced release date), Commodore, Tandy, and Apple. Certainly other forces have contributed to the decline in price of these companies' stocks, but Peanut rumors seem to have prompted the greatest sag in competitors' fortunes. All of which leads us to observe that the high-tech grapevine is powerful indeed.

Computer Copier

Now you can prepare your resume on a computer and copy a picture of yourself to go with it. Two technology makers have begun to offer copiers that connect to microcomputers. Datacopy Corporation, of Palo Alto, California, sells a copier that can be connected to the PC. This new machine duplicates documents, such as charts, photos, and book pages, and processes the data so that it can be stored in the PC memory and on disk. Wang Laboratories has developed a similar computer-linked copier, which should help the firm maintain its prominent position as a provider of office automation equipment.

PC Arrested

Art Johnston of Dearborn Heights, Michigan, recently sent *PC World View* a newspaper clipping that reports what may be a PC first. A story in the *Detroit Free Press* reports that a drug raid in Highland Park, Michigan, netted a half-pound of cocaine, another half-pound of heroin, 14 alleged lawbreakers, and one IBM PC. According to Wayne County Sheriff Robert Ficano, in whose jurisdiction the raid took place, the PC was used to store the drug dealers' distribution records, including lists of suppliers, customers, and financial transactions.

Ficano also noted that this was the first time his department had confiscated a computer in connection with narcotics raids. Nobody would say what software the criminals chose for the drug-dealing data base, but our informant Johnston remarks that if they were using a spreadsheet, they didn't ask enough "what if" questions.

Big Blue's News

A Tiny Crack

As rumors piled up, high-tech stock prices oscillated, and dealers frantically cleared shelf space, IBM stonewalled about its home computer (aka Peanut, PC Junior, and other names). But in mid-October, a tiny crack appeared in the wall. Not that IBM leaked any information about the actual computer, but all the speculation and incessant queries must have gotten to Big Blue. So when IBM sent out telegrams at the height of Peanut speculation announcing a press conference set for October 18, the invitation included this sentence: "None of these products is designed for home use."

The products announced at the press conference were indeed business oriented, including new versions of the PC and XT that can be easily linked to certain IBM mainframe computers (see "Mainframe PC," *PCW* Vol. 2, No. 1). While admitting (in read-between-the-lines fashion) that these products did not relate to the widely anticipated home computer, IBM offered its own humble assessment of the new computers, promising that they "will have a significant effect on the way business, engineering, and office people handle information." That's a lot to say in a telegram, but then IBM rarely does things in a small way.

The IBM Skies

In a move that's apparently intended to increase both competition and safety, the Federal Aviation Administration (FAA) has instituted a competition between IBM and Sperry Corporation to design a new air-traffic control system for the United States. IBM received a contract for $40.6 million and Sperry got $35.7 million to plan systems that will replace the 20-year-old computer technology now in use; that increasingly obsolete equipment is based on the IBM 9020 computer system.

IBM has chosen Computer Sciences of El Segundo, California, to

design software for the air-traffic control project. Sperry has assembled a team of high-tech firms, including Amdahl Corporation and TRW for its entry in the race. Both competitors have 21 months to develop their systems; the FAA will choose the winner in mid-1985.

10,000 Voices

Last year IBM agreed to purchase up to 30 percent of the stock of Rolm Corporation, a telecommunications company with offices in Santa Clara, California. So far IBM has invested some $515 million for about 17 percent of the firm's stock. Now Rolm and IBM have announced their first jointly developed product, a business message system that uses a computerized switchboard from Rolm and a computer system, terminals, and a printer from IBM.

This combination product will be marketed as the Rolm Very-Large Business Communications System. It is capable of handling up to 10,000 lines of voice or data and will sell for about $115,000 in a configuration designed for 200 users.

Hands-on How-to

A few months ago IBM began offering training on the PC in many of its product centers. Now the firm will also market instructional software through its PC outlets and IBM catalogs. The firm providing IBM with this new software is American Training International (ATI) of Manhattan Beach, California. ATI will supply training software for PC-DOS, *WordStar, VisiCalc,* and BASIC.

Condo Swap

Several computer-exchange publications have surfaced throughout the country, and as more people buy or trade their first, second, and third computers, these publications are certain to thrive. The San Francisco area

version, *Bay Area Computer Classifieds,* offers substantial editorial content as well as display and classified advertisements. Most of the classifieds are predictable—used hardware, supplies, consultants and programming services, and so forth. But one ad in the "Wanted" column is too intriguing to ignore: "Las Vegas condo owner desires to trade use of unit for 64K PC."

Considering that both the NCC and the Fall COMDEX conventions will be held in Las Vegas this year, there should be a passel of Bay Area computer folks willing to loan their PCs in exchange for a condo at convention time.

If you're interested, contact *Computer Classifieds* at P.O. Box 2339, Berkeley, CA 94702, 415/848-6860.

Hackers Cut Off

The nation's oldest large-scale computer network was ARPANET, developed by the Defense Department.

Until late last year the network flourished as an online information exchange for civilian and military researchers. But ARPANET's 318 mainframe computers also became the targets of hackers, who could gain access by using conventional telephone links and stolen or adroitly guessed passwords. Although the interlopers failed to crack the codes for really sensitive files, they were traveling the network with increasing frequency.

So the federal government ended ARPANET and simultaneously created two new networks—one called R&DNET for civilians, the other, MILNET, for the military. Presumably, access to MILNET will be more strictly limited than it was to ARPANET, which had more than 5000 subscribers at the time of its demise. Time will tell whether hackers can break into the military system and, perhaps as interesting, whether the civilians will use R&DNET for the same purposes for which many of them used ARPANET—playing Dungeons and Dragons, swapping jokes and gossip, and arranging their social calendars.

Strange Bird

Contributing Editor Larry Magid reports this near-mystery:

"A friend of mine normally works at his computer with his parrot perched on his shoulder. Being something of a parrot fancier, he also has a picture of a parrot pasted on his computer and on his printer, a Diablo 620. One day my friend returned home to find that the small rubber belts that help move paper through the printer's tractor had been chewed to pieces. A careful investigation led him to the culprit—his parrot.

"He tried to patch the belts, but that didn't work, and he couldn't use the tractor without them. After making several calls to dealers and service people, he finally reached someone at Diablo's headquarters who could tell him what was needed to fix the tractor. Unfortunately, that was not just two little rubber belts but the whole paper feed assembly for the tractor.

"When my friend explained that his parrot had eaten the rubber belts, the Diablo representative suggested that he write a letter to Diablo explaining the situation. So my ever-creative friend composed a letter as if he were the parrot, referring to his insatiable appetite for rubber and contending that the picture on the printer obviously meant that he could peck

at the machine if he wanted to. This time creativity paid off, because a few days later my friend received a package from Diablo containing the necessary tractor parts—and no invoice."

School Days

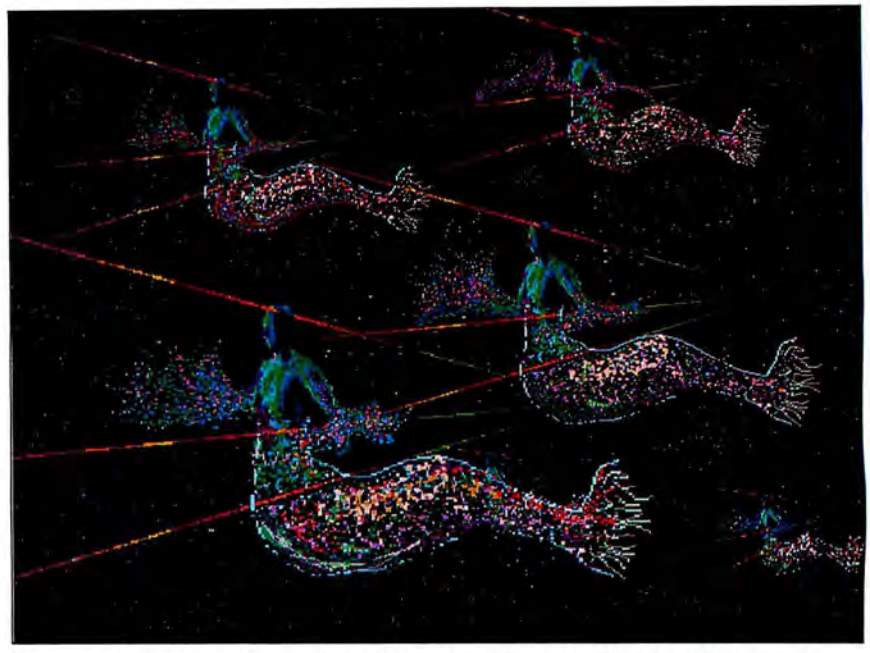
PC World View correspondent Linda Williams recently attended a conference where teachers mixed with computers. She discovered that there's a PC push on in the schools, as her report indicates:

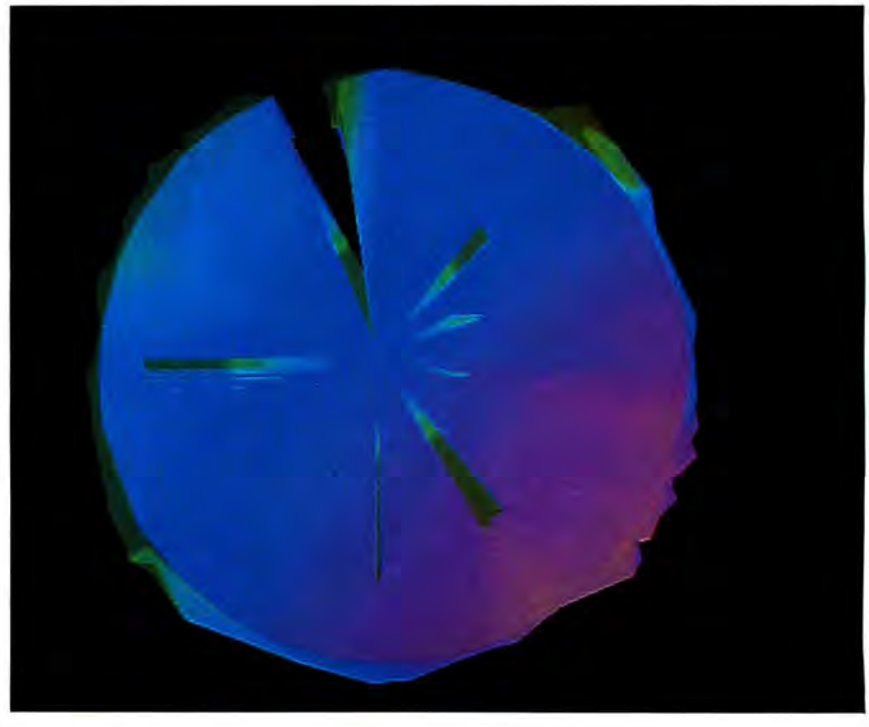
"What a difference a year makes! When 2000 teachers gathered for the 1982 Fall Conference of Computer-

Using Educators (CUE) in San Jose, California, the PC was not considered an educational computer. The only PCs at that conference were in one local dealer's booth. The 1983 CUE Conference hosted more than 3000 teachers, however, and IBM sent the keynote speaker, Dr. Harvey Long, national training director for the corporation.

"Dr. Long's presence at the conference demonstrated both IBM's interest in the educational market and educators' interest in IBM. Nor was IBM's presence at the conference limited to the speaker's podium. Michael J. Pacifico of IBM's Educational Special Projects department brought prerelease copies of IBM Logo and offered a hands-on workshop for teachers. In addition, Martin Schneiderman of the Educational Testing Service described IBM's Secondary School Computer Education Program, and many of the exhibitors' booths displayed programs for the PC."

Considering how fast the technology is moving, I'm wondering if they'll have Juniors hooked up to mainframes for next year's meeting. Or maybe all the teachers will just convene on line.





Computer art from Beyond the Horizon gallery in Pittsburgh: (top) by Joe Pasquale, (bottom) by Isaac Victor Kerlow

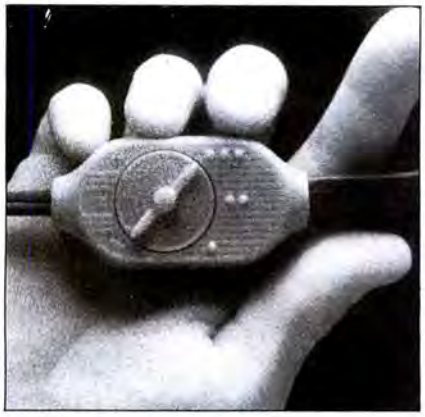
Computer Art Gallery

As computer graphics have become increasingly sophisticated, the medium has attracted a growing number of serious artists. Now at least one gallery has opened to show and sell their work: it's Beyond the Horizon, located at 5820 Elwood St., Pittsburgh, PA 15232. A letter from gallery director Elizabeth Van Dusen invites inquiries and notes that "all works of art are permanently recorded as fine prints or photographs."

Mystery Solution

Rodger G. Shanafelter of Cecil Field, Florida, smooths out a wrinkle in the electric-blanket hard-disk mystery reported in *PC World View* Vol. 1, No. 2.

"I have seen many problems of this type. When an electric blanket turns itself off (because the blanket reaches its maximum temperature), it can generate very strong voltage tran-



sients that can knock a power supply down if proper line filtering is not supplied.

"Two solutions to this problem are to install a line filter on all computer components and to install a separate power line and outlets for the computer. If this second measure is too costly, at least make sure that nothing else is plugged into the outlet where the computer is plugged in." ●

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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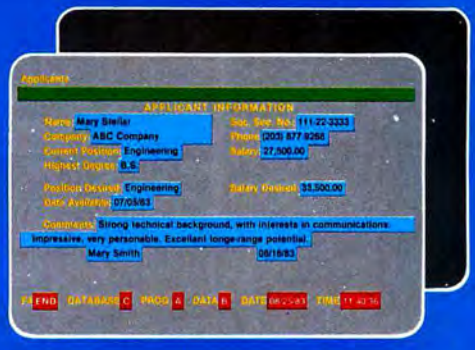

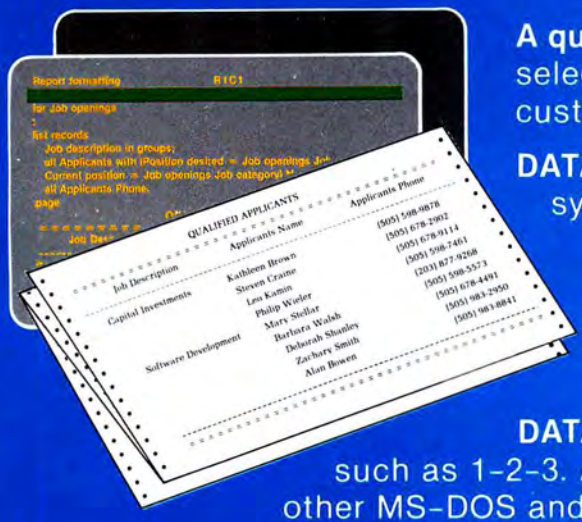

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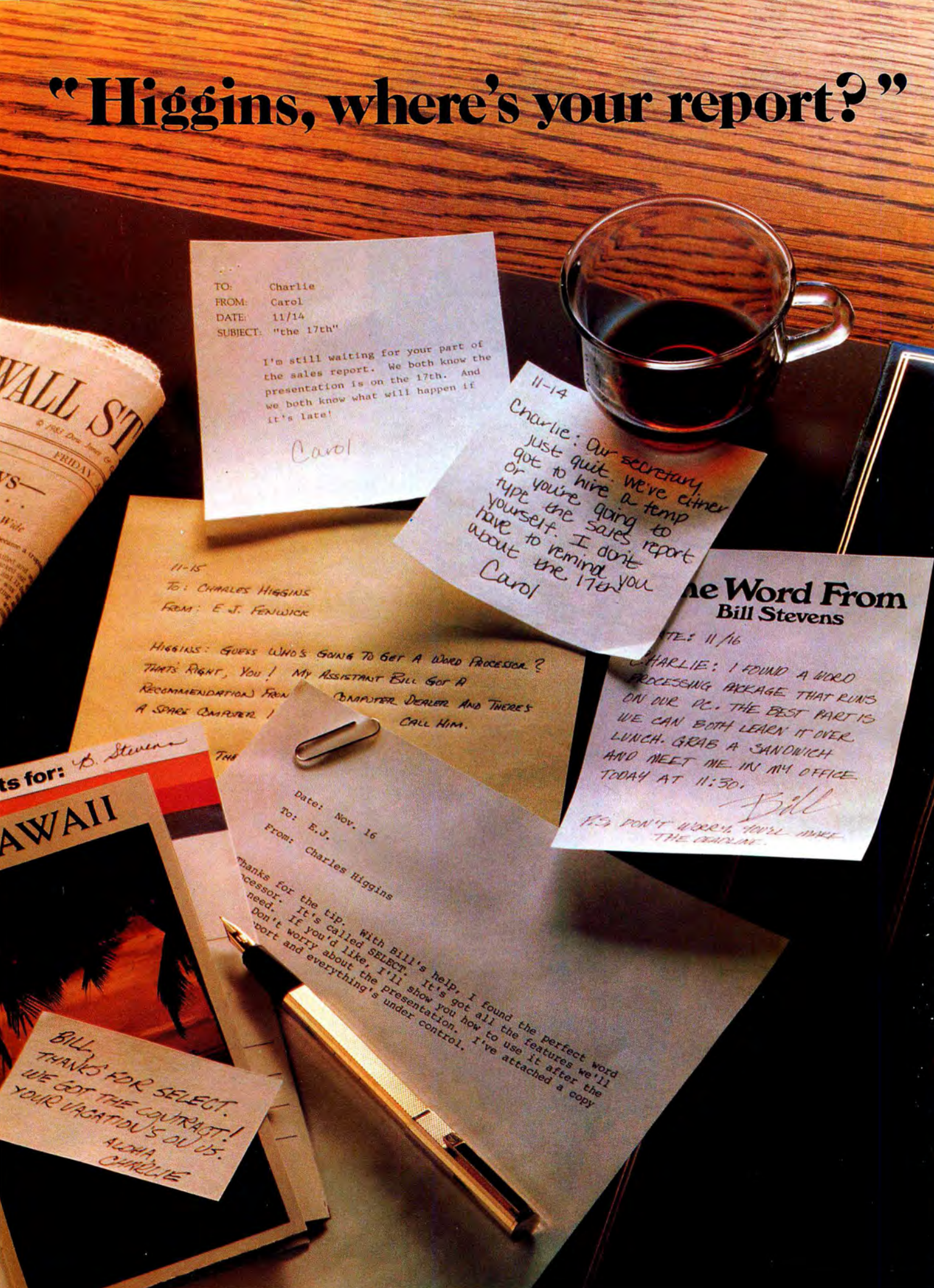

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List   - to LIST all the documents in your directory
Name   - to assign a new NAME to a document

Print  - to PRINT a document
Spell  - to check your SPELLING

Teach  - to TEACH you to use SELECT
Merge  - to MERGE a document with a mailing list
Help   - to HELP explain the commands
Quit   - to QUIT your SELECT work session
```

Select is the most versatile, powerful word processor available. Our interactive Teach™ on-screen tutorial guides you every step of the way. You'll be creating, editing and printing documents in less than 90 minutes—without reading a manual! And you can even use many of your existing "calc" and database files.

```
                    THE TEACH MENU

DIRECTIONS: 1. Read the menu choices listed below.
            2. Type number of selection you want, then press RETURN.
            - To leave TEACH press RETURN.

Your entry: *_  *   (To start at the beginning, type 1).

 1. How TEACH WORKS          15. How to FORMAT
 2. How to MOVE THE CURSOR   16. How to DISPLAY
 3. How to CREATE a document 17. How to VIEW
 4. How to READ THE COMMAND LINE 18. How to set POINTERS
 5. How to BEGIN A NEW DOCUMENT  19. How to MOVE
 6. How to EDIT a document   20. How to COPY
 7. How to INSERT            21. How to ZAP
 8. How to ERASE             22. How to OUTPUT
 9. How to XCHANG            23. How to WRITE
10. How to LOCATE            24. How to JUSTIFY
11. How to REPLACE           25. How to use KEY
12. How to GOTO              26. How to get HELP
13. How to APPEND            27. How to QUIT
14. How to set TABs
```

Select uses easy-to-remember single key commands—such as "E" for erase and "M" for move. It has a comprehensive spelling checker which makes sure everything that leaves your office is letter perfect. Everytime. A powerful and flexible Merge/Print function for combining letters with mailing lists. And, at the touch of a key, our exclusive "Help" feature provides instant on-screen assistance for every command. All these features are integrated into one competitively priced package. There's nothing extra to buy.

If you'd like to know more about how Select works on your computer, write us and we'll send you a free review copy. Then just type "T" for Teach. In less than 90 minutes, you'll be convinced that Select: The Word Processor will save your business time and money. Ask Higgins.

SELECT

Select Information Systems
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Kentfield, CA 94904

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We think you're calculating enough to

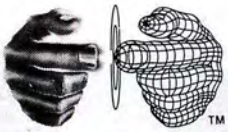
And we've devised a little test to prove it. All you have to do is compare our PC-8200's specs with the specs for Radio Shack's Model 100 or the HP-75. For someone who's savvy enough about computers to read this magazine, you shouldn't have any trouble picking the best one. So here goes:

	NEC	Radio Shack	Hewlett-Packard
Price	$799*	$799	$995
RAM/ROM	16K/32K	8K/32K	16K/48K
RAM Expandability (Internal/External)	To 96K (64K/32K)	To 32K (32K/none)	To 24K (24K/none)
Free bundled software	Yes	No	No
Function keys	10	8	0
RAM cartridges	Yes	No	No
Bar Code Reader, RS232, Parallel Port, Cassette Port	Yes	Yes	Not Standard
Floppy Disk and SIO Port, Cursor Cluster	Yes	No	Not Standard

*Includes perpetual clock calendar. NiCad battery pack, AC adapter charger optional. The PC-8200 is a battery-operated CMOS-based system.

It all boils down to more power and better features for the same price. And, of course, more software —14 FREE programs to start, including linear forecasting and word processing.

The PC-8200 portable from NEC. We think you should be impressed. If you're not, maybe you picked up the wrong magazine.



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PCjr WORLD

Introducing

PCjr

IBM's New Home Computer

PCjr World Offers an Assortment of Articles Filled with Fiscal, Functional, and Fun Advice on Getting the Most from Your IBM PCjr Home Computer

IBM's new home computer is designed for work, entertainment, and education.

PCjr World

Kearney Rietmann

At a time when a lot of people are shutting away their home computers in the closet because the machines don't do as much real computing as the owners would like, IBM has introduced a home computer that you'll want to keep in your living room. Imagine yourself sitting back in your most comfortable easy chair, changing TV channels with your remote control unit in one hand and doing your computing with the other hand on the PCjr cordless keyboard. Or think about playing music through your stereo that you programmed yourself with PCjr Cartridge BASIC.

Undoubtedly, PCjr will induce more people than ever before to do their computing at home. Simply because shopping for PCjr is easy and the price is affordable, lots of people will own the machine. Consumers can shop in retail or department stores like Sears and Macys just as if they were buying calculators, stereos, or TV sets. The PCjr entry model consists of a system unit (with 64K of user memory and two software cartridge slots but no disk drive), a keyboard, and a transformer. With a connector for a TV, an IBM Compact Printer, DOS 2.10, and Cartridge BASIC, the entire system lists at a little over $1000. The expanded model, with 128K, one disk drive, and communications capabilities, plus the added hardware and system software mentioned above, costs around $1600.

Computing with PCjr is designed to be fun, and features like program tutorials, color graphics, clearly labeled cable connectors, and a customizable keyboard with color-coded keys will make beginners feel right at home. But a few questions about PCjr come to mind. Is the computer a business machine? Is it a programmer's computer? Or is it a game, education, or home management computer? These questions will be answered as much by PCjr owners as by IBM marketing strategists. People will find PCjr to be a practical computer that offers applications ranging from games and home budgeting to financial man-

agement and planning, home education, hardware and software tutorials, communications, and programming.

From a hardware standpoint, games will be popular because of the PCjr's color graphics and music features. Home education for children will be a favorite application for the same reasons. People who do lots of calculations, however, may require a number pad on the keyboard, a feature that PCjr lacks. Writers and other professionals who produce long documents probably won't choose to do word processing with the color monitor, which is the only display currently operating with PCjr. The machine's 128K memory limit and maximum of one disk drive may inhibit both programmers and those who use complex applications programs.

The limitations, though, may not be as important as they seem. Hardware manufacturers who spot a need for a PCjr monochrome monitor, an enhanced keyboard, or expanded memory will undoubtedly develop products to fill the gap.

As with the PC, the work or play people do with PCjr will be determined by the features and quality of the available software. For the time being, Logo and BASIC are the only IBM languages running on the computer. Word processing has been one of the most popular uses for the PC, and anticipating the same popularity with PCjr owners, IBM has developed *HomeWord*, an easy-to-use word processor that makes extensive use of graphics and color for both editing text and operating the program.

Computing with PCjr is designed to be fun.

Another favorite application will likely be communications, since IBM's *Personal Communications Manager* allows easy access to information services like The Source, CompuServe, and the Dow Jones News/Retrieval service and also lets you transmit electronic mail between PCjrs, PCs, and other computers. With communications, people will be able to work at home with PCjr and remain in touch with business colleagues. PCjr may truly inaugurate the age of the "electronic cottage" by enabling people to study, work, and enjoy entertainment at home via their computers.

This *PCjr Special Report* gives you an in-depth look at IBM's new home computer. Katie Seger and Fred Davis describe the two PCjr models. Adrian Mello examines DOS 2.10 and Cartridge BASIC, comparing them to earlier PC system software. For software products compatible with PCjr, we've prepared a list that tells you which PC programs from IBM run on PCjr. We've also included a report by Reed McManus about new IBM PC and PCjr hardware.

The *PCjr Special Report* also gives you a preview of the *PCjr World* insert supplements that you will receive in the next few issues of *PC World*. *PCjr World* will introduce you to home computing and make you an expert at operating PCjr. We'll cover topics like word processing, programming in Logo and BASIC, home financial management, games, graphics, music, education, communications, and working at home. Through tutorials, you'll learn to run practical education and business applications, write programs, and operate new hardware. You'll also read PCjr product reviews written by our editors, meet people who compute with PCjr, and find out about the home computing community.

We hope you'll join us in exploring home computing and the world of PCjr.

Kearney Rietmann is the Editor of PC World Special Editions.

A look at the new computer that takes IBM out of the office and into the living room

IBM's Home Run

Katie Seger and Frederic E. Davis

PCjr might be a late starter in the home computer league, but it's bucking for rookie of the year honors. IBM's entry into the home computer market means that its batting order will never be the same. With its new wonder kid in the lineup, the IBM team should be a contender in the home market standings. Following is a look at the rookie's stats.

IBM offers two PCjrs, a $669 entry model and a $1269 enhanced model. Each model consists of a system unit, a keyboard, and an external transformer. The system unit is the heart of PCjr. Inside the system, covering the bottom of the beige case, is the motherboard. This hardware is a piece of hard, flat fiberglass embedded with computer chips and electronic circuitry.

The most important chip on the system unit's motherboard is the microprocessor, also known as the central processing unit (CPU). The microprocessor manages data and information used by the computer. Also found on the motherboard are memory chips and support chips. Memory chips store programs, instructions, and other information while the CPU is working on it. Support chips assist and link the CPU and the memory chips. Peripherals such as joysticks and printers attach to PCjr via connectors located on the side and the back of the system unit.

The PCjr keyboard operates with batteries or attaches to the system unit with a cable. The transformer, which supplies power for PCjr, also attaches to the system unit via cable.

Memory Capacity

The entry model is equipped with two types of memory chips. Computer memory is measured in kilobytes (K); 1K equals 1024 characters. PCjr comes with 64K of user memory, also called random access memory (RAM), and 64K of read-only memory (ROM). RAM is the active memory; it's like a blackboard that can be written on, read from, and easily erased. RAM is not permanent; the information in it is lost when you turn off the computer. To save what you are working on you must send the information stored in RAM to a permanent storage device such as a floppy disk or a cassette tape before turning off PCjr.

ROM, on the other hand, is like a book. It is the computer's permanent memory and can only be read from. ROM retains programs and instructions for PCjr. PCjr ROM also stores information such as the *Keyboard Adventure* program, which introduces you to PCjr's keyboard and a version of BASIC.

In addition to the ROM built into PCjr, you can purchase ROM cartridges containing other programs. The cartridges are inserted in two slots in front of the system unit the same way that you push eight-track music tapes into your home or car stereo. Program cartridges range in memory size from 8K to 64K and can only load programs into the computer; they cannot store user data. IBM currently offers five cartridges, four containing games and one containing IBM Cartridge BASIC. You must insert Cartridge BASIC to run certain programs such as *Dow Jones Reporter, Bumble Games,* and *Home Budget, jr.*

The PCjr entry model system unit weighs less than six pounds and can be hooked up to a color TV or a color monitor to display 40 columns by 25 lines of text and graphics.

More of a Good Thing

The enhanced PCjr adds the IBM Memory and Display Expansion board and a half-height, 5¼-inch double-sided floppy disk drive to the entry system unit. The expansion board, which is encased in a metal covering, increases the RAM to 128K and allows 80 columns of text and graphics to be displayed on the PCjr monitor. The disk drive, its controller board, and its cables are housed within the system unit. Like the expansion board, the disk controller board plugs into the motherboard. The disk drive is installed above the cartridge slots.

PCjr's circuitry was designed to accept additional boards without special installation or modification.

The Memory and Display Expansion board and the disk drive can be installed easily in an entry model PCjr unit to make it identical to the enhanced model. A front piece above the entry model PCjr's cartridge slots is removed to provide space for the disk drive opening. One nice feature of the computer is that PCjr expansion boards from IBM need only be plugged in. PCjr's circuitry was designed to accept additional boards without special installation or modification. That design is an improvement over the PC's, which requires that small switches on the motherboard be reset when certain expansion boards are installed in the system unit.

PCjr's system unit is about one-third the size of the PC system unit. Because PCjr is small, most color monitors or TVs used with it must be placed behind or to the side rather than atop the system unit. Only the smallest color TVs, such as the Sharp 5G11, can be placed on the computer without cracking its plastic casing. PCjr has three connectors for attaching video screens, so you have three monitor options. You can use an IBM Color Display Monitor, a non-IBM color monitor such as an Amdek or a Taxan, or a color TV.

The Infrared Link

A small infrared "eye" on the front of the system unit allows the PCjr keyboard to operate without being connected by a cord. In much the same way that a TV remote control unit enables you to change channels, the PCjr's infrared link makes the keyboard a remote control device that operates the computer from distances of up to 20 feet.

The remote control keyboard projects a beam of infrared light at the PCjr. Although you can't see this beam, the eye on the front of the computer can. The PCjr cannot receive the keyboard's messages if an object blocks the keyboard beam or if the beam is not directed at the computer.

The keyboard is well suited to a classroom setting since it lets instructors move around the room freely while controlling the computer. The keyboard requires four AA batteries for remote control operation.

One drawback to the remote control keyboard is that other infrared light sources can interfere with proper operation of PCjr. If more than one PCjr is operating in a room, the computers may get their signals crossed and behave strangely. To remedy this potential problem, IBM sells the optional $20 PCjr Keyboard Cord. The infrared "eye" is turned off when the keyboard and the system unit are linked by the cord.

The PCjr 62-key keyboard, which resembles the layout of a typewriter keyboard, has several features that will make it easier for beginners to use than the PC's 83-key keyboard. The <Enter> key is easy to find because its shape and size are different from the other keys. The four cursor keys, which move the cursor right, left, up, and down, are simpler to find because they are separate from the rest of the keys and are located on the lower right section of the keyboard.

Though it has fewer keys, PCjr's keyboard offers the same features as the PC's. IBM reduced the number of keys by eliminating the numeric keypad and separate function keys. Function keys are activated by pressing a two-key combination—the <Fn> key and one of the number keys on the top row.

The keyboard has small, rectangular keys similar to the keys on touch-tone telephones. The keys seem

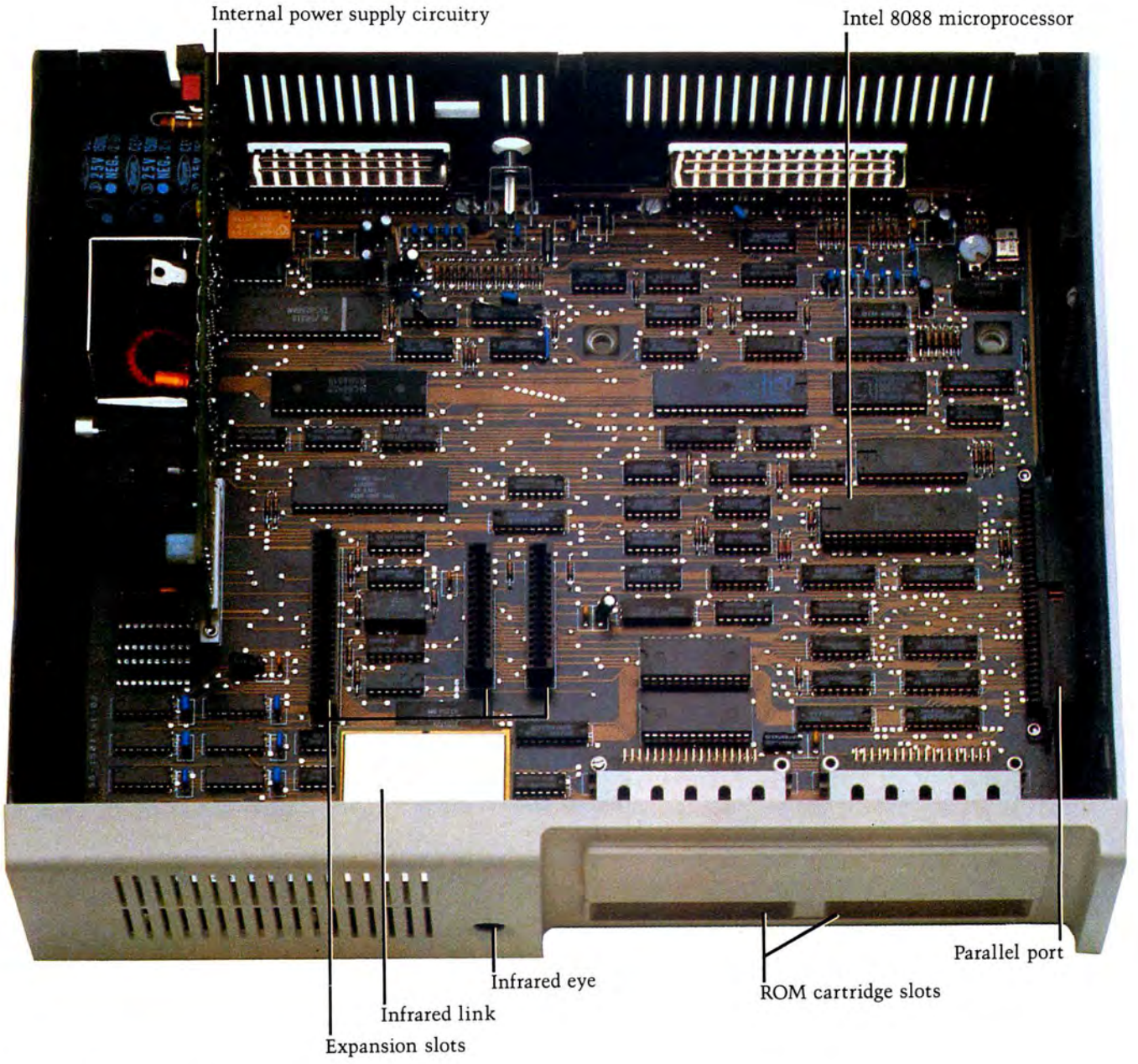

Figure 1: Inside the PCjr entry model system unit

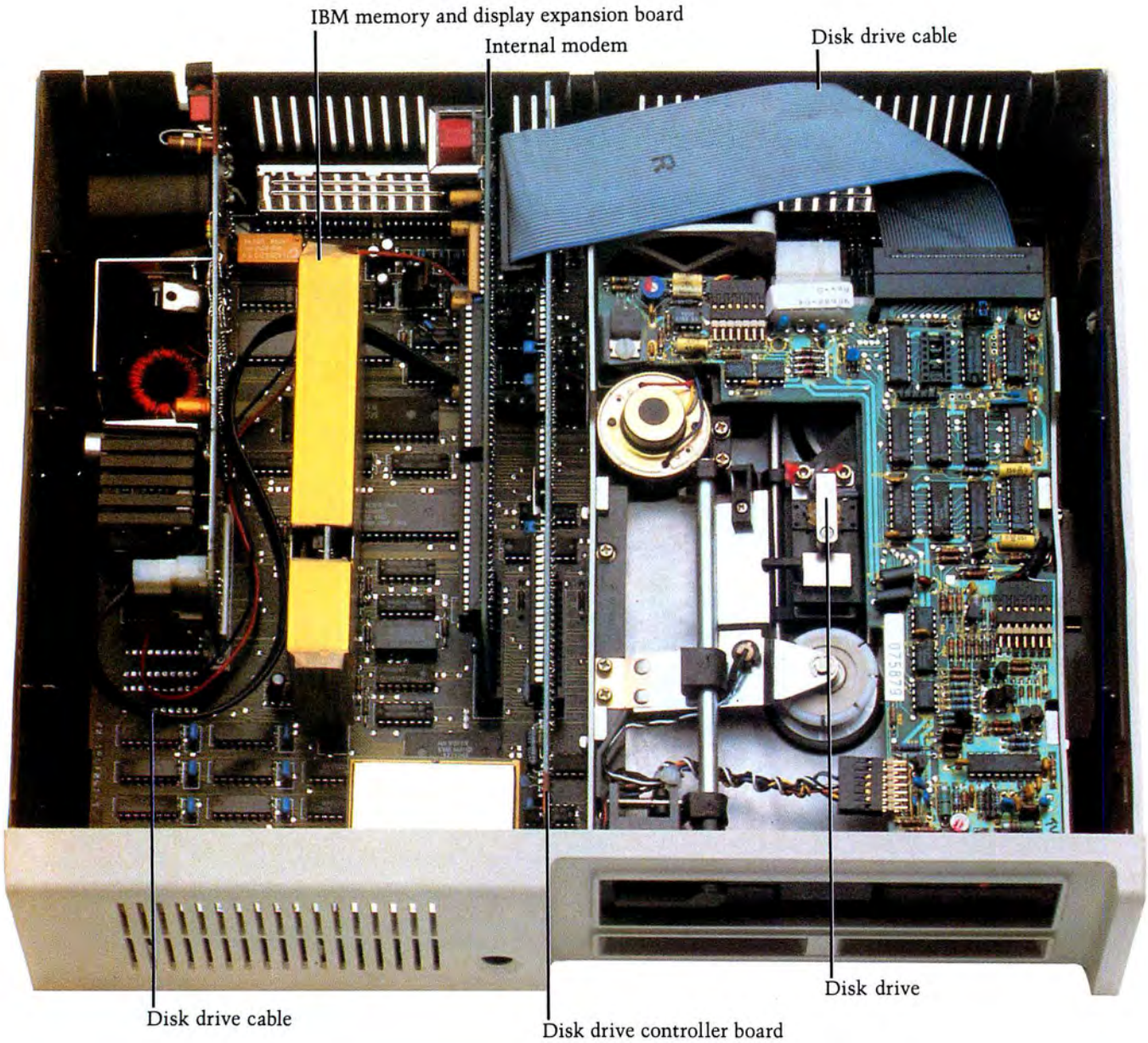

Figure 2: Inside the PCjr
enhanced model system unit

durable, but they are very different from those found on typewriters or business computers. The letters, numbers, and symbols are not printed on PCjr's keys but adjacent to them in the space between the rows. Because the key size and key name positions are unfamiliar, touch typists and word processors may find the keyboard awkward to use. An advantage of the PCjr keyboard, however, is that it is programmable. You can assign any letter, number, function, or command to any key on the keyboard and arrange precisely the keyboard layout you want.

The area around certain PCjr keys is highlighted with different colors to make special keys easier to locate. In order to make programs easier to learn, some software packages such as *HomeWord* come with overlays for the PCjr keyboard that identify keys important to the programs. You can also buy blank overlays to mark for your own purposes.

PCjr Power

The separately housed transformer provides the power source for PCjr. The transformer plugs into the wall and converts household current to 18 volts; this safer, low-level voltage is transmitted via the power cord, which is plugged into the back of the system unit. The transformer ensures that no hazardous voltage levels are found in the system unit.

Under the Covers

Like the PC and the XT, PCjr uses the Intel 8088 microprocessor. The CPU chip is labeled in Figure 1, which shows the inside of a PCjr entry model. Three expansion slots are located on the left side of the motherboard. The long slot is designed for the IBM Memory and Display Expansion board. The next slot to the right is for an internal telecommunications modem, and the last slot is for attaching a special board that works with only one disk drive. Figure 2 shows the inside of an enhanced PCjr with all three slots filled by additional hardware.

The internal part of the power supply is in the left rear corner of the system unit. These electrical circuits take the 18 volts of AC power provided by the transformer and distribute the proper voltages needed by different parts of the computer. The disk drive, for example, requires much more electricity than the minute quantity used by the memory chips.

When you look at the back panel of the system unit, you see the on/off switch in the upper right corner. The switch is labeled 1 and 0 (1 = on, 0 = off). Connectors, or sockets, for plugging in monitors, joysticks, light pens, and other peripherals are also on the back panel.

The connectors are labeled with letters to help you plug peripherals into their proper sockets. For example, A stands for "audio." The audio socket connects PCjr to home stereos or other sound systems. The C socket connects PCjr to a cassette tape recorder, which is used to store programs and data in lieu of a disk drive. Each peripheral for PCjr plugs into the connector with a special cord.

The S on the back panel marks PCjr's serial port. The new IBM PC Compact Printer plugs directly via cable into the serial port, and other peripherals such as external modems and letter quality printers can also be attached through this port. However, the PCjr serial port is not the usual 25-pin connector required by most serial devices. To get this 25-pin connector you must purchase the IBM PCjr Adapter Cable for Serial Devices.

To connect PCjr with the IBM Personal Computer Graphics Printer or other Epson MX-80 compatible dot matrix printers, you must attach a custom cable to the computer's parallel port. The parallel port is on the right side of the system unit hidden by a removable panel. This port will undoubtedly be used to connect external devices for increasing the power of PCjr, such as a second disk drive or a laser video disk player. Another possibility might be to link PCjr to a high-speed communications network that ties together many types of computers.

Batter Up

Rookies are usually only as good as the organization and management that brings them up through the ranks. IBM has a strong organization that stresses fundamentals, not frills, and the company's been in the majors for a long time. All eyes will be on IBM's long-awaited rookie to see how it performs in the big leagues.

Katie Seger is an Assistant Editor for PC World Special Editions. Frederic E. Davis is a computer consultant, systems engineer, and the author of Hardware for the IBM PC and XT *to be published in 1984 by PC World Books and Simon and Schuster.*

PCjr
IBM
Systems Products Division
P.O. Box 1328
Boca Raton, FL 33432
800/447-4700, 322-4400 Illinois, 800/447-0890 Alaska, Hawaii
List price: entry model $669, enhanced model $1269

IBM's new home computer makes its way into the world with familiar system software companions.

Old Faces in New Places

Adrian Mello

Compatibility between old and new versions of PC-DOS has been a big concern for both PC owners and software manufacturers. With the introduction of PCjr and DOS 2.10, IBM has revamped an already successful PC product to run on its home computer.

DOS 2.10 incorporates all the features of DOS 2.00, the operating system introduced with the XT in the spring of 1983. The 2.10 version enables the computer to use information stored in ROM cartridges and operate the half-height floppy disk drive. Whether you own the PCjr entry model with ROM cartridges or the expanded model with ROM cartridges and a disk drive, the operating system automatically determines whether it should signal a cartridge or the disk drive to load a program.

Besides enabling PCjr's system unit to be smaller than the PC's, PCjr's half-height drive makes use of a new technology controlled by DOS 2.10. The half-height drive has a longer head settling time than the PC's drive. Even though you won't notice the time difference, the PCjr drive technology causes the drive to take a little more time than the PC drive to check that it has reached the correct information located in a particular area of a floppy disk.

Because of the difference in head settling time, PCjr isn't likely to boot up under DOS 2.00. Programs and data files that run under DOS 1.10 or 2.00 and are otherwise compatible with PCjr will run on the computer as long as you install 2.10 on the disk you want to use.

Although earlier versions of DOS won't run on PCjr, 2.10 will run on the PC and the XT. PC and XT owners using 2.00, however, don't have any reason to upgrade to 2.10 if they are hoping to improve their machines' performance. DOS 2.10's modifications simply allow the system to run PCjr's hardware, and the only other changes are a few fixes to minor bugs in 2.00.

BASICally the Same

One of the many rumors surrounding PCjr before its introduction concerned Logo, a popular language used to teach programming to children. Some people said that BASIC, traditionally the first language learned by personal computer owners because it is so available, might be a runner-up to a ROM-based Logo. Such a move would have been a dramatic attempt on IBM's part to set a new language standard in a market where BASIC has the largest acceptance. What IBM ended up doing was more in character; Logo was provided as disk software, and BASIC was built into ROM.

With a few exceptions, PCjr's BASIC is identical to Cassette and Advanced BASIC, which is used on the PC. Cassette BASIC and IBM PCjr Cartridge BASIC are the two types of IBM PCjr BASIC. Cassette BASIC is built into 32K of ROM on the PCjr system board and is the same as the PC's Cassette BASIC. Cassette BASIC lets you save programs on cassette tape and enables you to operate other PCjr hardware such as the keyboard, display, printer, joysticks, and light pen.

Many people were surprised that PCjr Cartridge BASIC, which is similar to the PC's Advanced BASIC, resides in a ROM cartridge rather than on disk or on the motherboard. You'll need Cartridge BASIC to run some cartridge and even some disk programs such as *Adventures in Math, Home Budget, jr,* or *Dow Jones Reporter.* That is why there are two cartridge slots on the front of the PCjr. IBM probably chose to put BASIC on a cartridge in order to be able to upgrade the language without changing the motherboard and to avoid having a disk version take up PCjr's limited RAM. Besides giving PCjr owners an extra 32K of RAM, Cartridge BASIC offers sound and graphics features not included in the PC's BASIC. Cartridge BASIC provides three-voice sound capability that lets you include chords in the music you program, and it gives you color graphics capabilities beyond the PC's because PCjr BASIC lets you choose any 4 of 16 available colors.

The system software for IBM's home computer, DOS 2.10 and PCjr's BASIC, maintains as much compatibility with the PC and the XT as possible. In this sense, the presentation of these products reenacts the strategy IBM used to introduce the XT almost a year ago. Like the XT, PCjr shows that IBM prefers the power of convention to the force of innovation for its family of personal computers.

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

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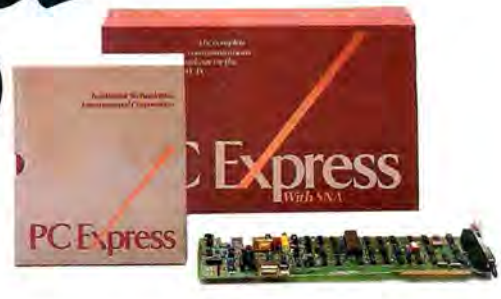

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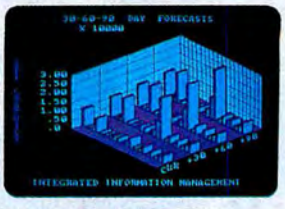

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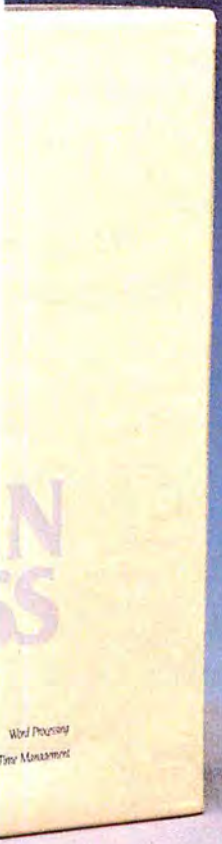

Because they do not have a dedicated relational data-base manager that can quickly direct massive amounts of data, other programs simply can't do what OPEN ACCESS can. Some don't have a communications program, others no dedicated word processor. None have a time management program.

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4

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5

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6

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Circle 562 on reader service card

Dress up your PCjr with a dozen new accessories for telecommunicating, printing, and game playing.

PCjr Arrives with a Crowd

Reed McManus

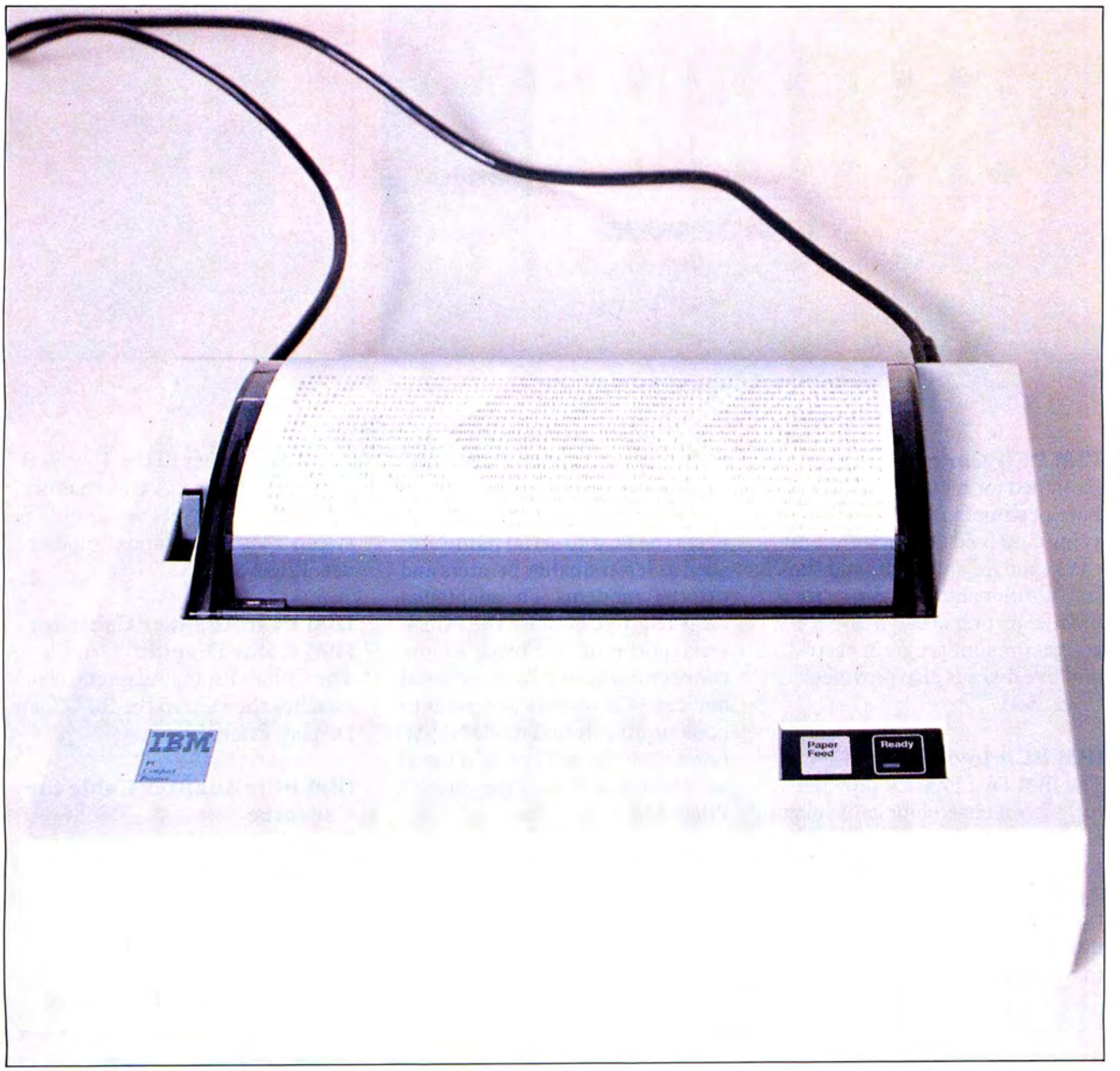
With all the excitement surrounding PCjr's unveiling, you might not have noticed IBM's 12 other new hardware products. The products include peripherals such as modems, printers, and joysticks as well as adapter cables and other devices that allow PCjr to use those peripherals. Although most of the new hardware is for the PCjr, some of these devices also run with the PC and the XT. All prices given are IBM Product Center list prices and will vary at other retail outlets.

IBM PCjr Internal Modem

Anticipating telecommunications as a popular home computer use, IBM designed an internal modem that plugs directly into the PCjr motherboard. With the IBM PCjr Internal Modem, PCjr owners can tap into computers and data bases through their telephones. The IBM PCjr Internal Modem transmits data at 300 bits per second, operates with touch-tone or rotary dial telephones, and offers automatic dialing and answering. The modem is programmable and provides error detection and status reporting. Price: $199.

IBM PC Compact Printer

The IBM PC Compact Printer is a lightweight (6.6 pounds), 50-character-per-second (cps) thermal printer. It can be used with the PC, the XT, and some non-IBM computers. The Compact Printer uses heat to form characters on thermal-sensitive paper and is smaller, quieter, and less expensive than standard printers. (Thermal paper costs approximately 7.5 cents per sheet as opposed to 1.5 cents per sheet for dot matrix, "fan-fold" paper, and thermal images fade with time.) The new printer comes with a connector cable and a power cord. Price: $175. PC and XT owners must buy the $40 IBM Compact Printer Adapter to use the Compact Printer.



The IBM PC Compact Printer is a lightweight thermal printer designed for home use.

The IBM PCjr Carrying Case holds the PCjr system unit and accessories.

IBM PCjr Carrying Case
Designed for moving and storing but not shipping the PCjr, the carrying case holds the system unit, the keyboard and cable, and the transformer and cord. Space for a parallel printer attachment, a TV connector, four program cartridges, and five disks is also provided. Price: $60.

IBM PCjr Joystick
The IBM PCjr Joystick provides full-screen control for game playing on the PCjr. The joystick can be set to "spring return" mode so that the stick will return to the center position when released, or to the "free-floating" mode so that the stick remains in position when released. The PCjr system unit accepts two joysticks. Price: $40.

IBM PCjr Adapter Cable for Serial Devices
The serial device adapter cable connects the PCjr to serial hardware such as letter quality printers and external modems. The adapter cable is required because the PCjr's serial port is not the usual 25-pin connector required by most serial devices. PCjr owners who want to hook up an external modem that is faster than the 300 bps IBM Internal Modem will need the cable. Price: $25.

IBM PCjr Parallel Printer Attachment
The IBM PCjr Parallel Printer Attachment connects the IBM PC Graphics Printer to the PCjr system unit. It works for the PCjr the same way that the IBM Parallel Printer Adapter Card works for the PC and XT. Price: $99.

IBM PCjr Connector for TV
The IBM PCjr Connector for TV enables you to use your home TV as a display screen. The connector plugs directly into the PCjr system unit and attaches to the TV's VHF antenna hookups. A two-channel selection switch lets you choose between TV viewing and computer use. Price: $30.

IBM PCjr Adapter Cable for IBM Color Display
The Color Display Adapter Cable attaches the PCjr to the IBM Color Display. Price: $20.

IBM PCjr Adapter Cable for Cassette
This adapter cable connects a cassette tape recorder/player to the system unit, offering an alternative to floppy disk storage. Price: $30.

IBM PC Color Printer
The IBM PC Color Printer is a high-speed printer that prints text and graphics in up to eight colors at near letter quality. The Color Printer is compatible with the PC and XT but not the PCjr. It provides

automatic text justification, proportional spacing, bidirectional printing, and programmable spacing and underlining. The Color Printer produces 30 to 40 cps for near letter quality printing, 110 to 150 cps for text quality, and 200 cps for data processing quality. The printer accepts fan-fold, single sheet, or continuous roll paper. Price: $1995. A Color Printer Paper Pack is available at $25.

IBM PCjr Keyboard Cord

The IBM PCjr Keyboard Cord is 6 feet long and is used to connect the PCjr cordless keyboard to the system unit when two or more PCjrs are operating in one room. The cord disengages the battery power and disables the infrared circuit of the keyboard. Price: $20.

IBM PCjr Cordless Keyboard Overlays

IBM PCjr Cordless Keyboard Overlays are a package of five blank keyboard overlays for use with the PCjr's programmable keyboard. Personally designed keyboard layouts can be marked on an overlay for quick reference. The overlays can also be used with commercial software programs to remind you of keyboard commands. Price: $10.

Reed McManus is Editorial Manager for PC World Special Editions.

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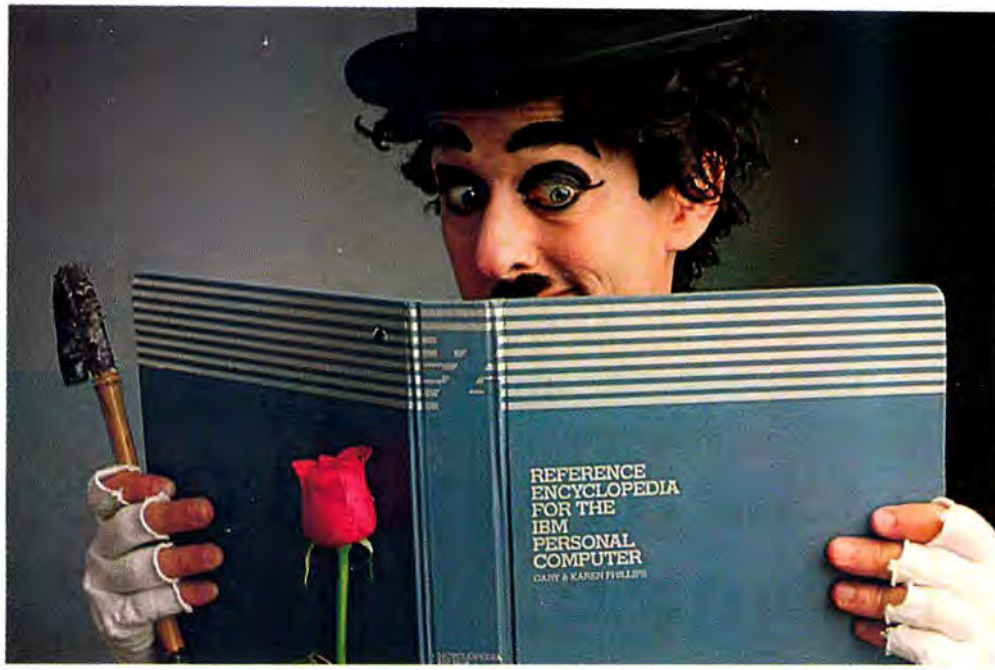
What IBM™ won't tell you.



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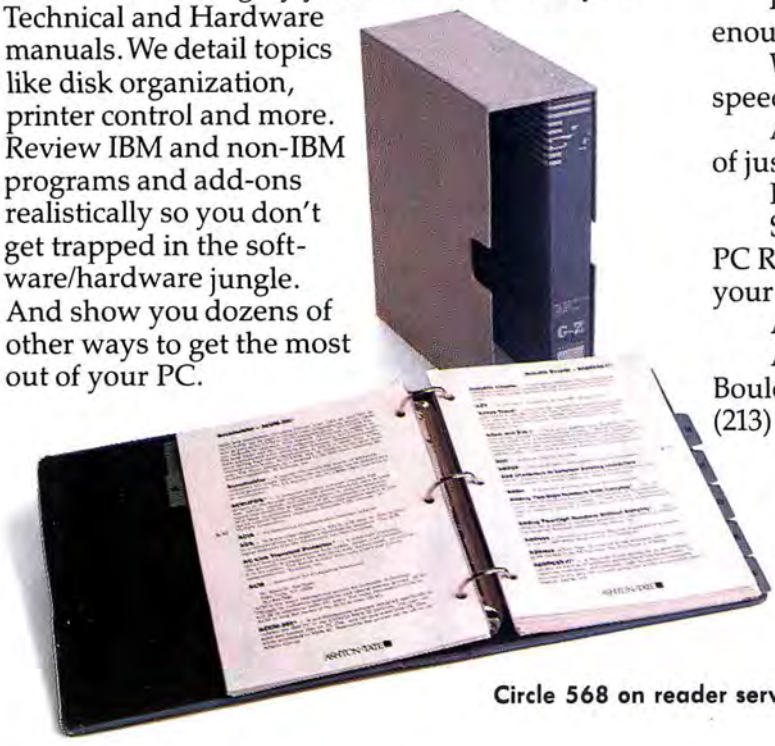

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PCjr's new software and how to determine which PC software is compatible

Charting the PCjr Software Course

Katie Seger and Adrian Mello

Software is sometimes called the tail that wags the dog because all computers, no matter how powerful, depend on software to help them perform tasks such as telecommunications, word processing, and data management. IBM has produced several new programs for PCjr and has released some PC programs that have been rewritten for the home computer. Some unmodified PC programs will also run on PCjr. We have included some guidelines to help you determine which programs are compatible with PCjr.

Software for PCjr comes in two forms, cartridge and disk. This software lets you perform tasks such as managing your budget, helping children with math, and playing games.

New Cartridge Software

The nucleus of the BASIC language, the Cassette version, is built into the read-only memory (ROM) of the PCjr. Cartridge BASIC extends its capabilities by adding commands for graphics, sound, and other advanced features. Cartridge BASIC must be in one of the PCjr slots to run certain programs, such as *Monster Math* and *Juggles' Butterfly.* Price: $75.

Mouser, an arcade-style game, pits a farmer against the mice that are overrunning his farmhouse. Within a certain time limit, the farmer tries to trap all the mice in his home. Price: $35.

Scuba Venture, another arcade-style game, allows one or two players to search for sunken treasure in an undersea cavern. Price: $35.

In *Crossfire,* players defend the streets of a city from a swarm of hungry insects. Price: $35.

Mine Shaft puts players in mining cars, which they maneuver through dangerous mine shafts as they search for precious diamonds. Price: $35.

IBM Software for the PCjr

Program Name/Version	Operates on PCjr	Requires DOS 2.10	Requires BASIC Cartridge	Display	Disk or Cartridge	Comments
System Software						
APL (A Programming Language)/1.00	No	n/a	n/a	n/a	D	
BASIC Compiler/1.00	Yes	Yes	No	Any compatible	D	Must have sufficient storage for COMPILE and LINK.
BASIC Programming	Yes	Yes	No	Any compatible	D	Not recommended for PCjr. Use same procedure to load DOS 2.10 as for DOS 2.00.
COBOL Compiler/1.00	No	n/a	n/a	n/a	D	Compiler output will run on IBM PCjr if there is sufficient storage.
Diskette Librarian/1.00	Yes	Yes	Yes	Any compatible	D	
Fixed Disk Organizer/1.00	No	n/a	n/a	n/a	D	
FORTRAN Compiler/1.00	No	n/a	n/a	n/a	D	Compiler output will run on IBM PCjr if there is sufficient storage.
IBM PCjr BASIC/1.00	Yes	No	n/a	Any compatible	C	
Logo/1.00	Yes	Yes	No	Any compatible	D	
Macro Assembler/1.00	Yes	Yes	No	Any compatible	D	
Pascal Compiler/1.00	No	n/a	n/a	n/a	D	Compiler output will run on IBM PCjr if there is sufficient storage.
UCSD p-System (all products)	No	n/a	n/a	n/a	D	

(continues)

Program Name/Version	Operates on PCjr	Requires DOS 2.10	Requires BASIC Cartridge	Display	Disk or Cartridge	Comments
Applications Software						
Adventure/1.00	Yes	No	No	Any compatible	D	Cannot set foreground and background colors.
Adventure in Serenia/1.00	Yes	No	No	Any compatible	D	Colors may vary from IBM PC.
Adventures in Math/1.00	Yes	No	Yes	Any compatible	D	
Animation Creation/1.00	Yes	No	No	Any compatible	D	Will run on a PCjr with 64K of memory.
Arithmetic Games (Set 1)/1.00	Yes	Yes	Yes	Any compatible	D	No color on composite monitor.
Arithmetic Games (Set 2)/1.00	Yes	Yes	Yes	Any compatible	D	No color on composite monitor.
Asynchronous Communications Support/2.00	No	n/a	n/a	n/a	D	
BASIC Primer/1.00	No	n/a	n/a	n/a	D	
Binary Synchronous 3270 Emulation/1.00	No	n/a	n/a	n/a	D	
BPI Accounting Software (All)	No	n/a	n/a	n/a	D	
Bumble Games/1.00	Yes	No	Yes	Any compatible	D	
Bumble Plot/1.00	Yes	No	Yes	Any compatible	D	
Casino Games/1.05	Yes	No	Yes	Any compatible	D	
Crossfire	Yes	No	No	Any compatible	C	
Decathalon/1.00	No	n/a	n/a	n/a	D	
Dow Jones Reporter/1.00	Yes	Yes	Yes	Any compatible	D	
EasyWriter/1.15	Yes	Yes	No	Any compatible, 80 column*	D	
Fact Track/1.00	No	n/a	n/a	n/a	D	
FileCommand/1.00	Yes	Yes	No	Any compatible, 80 column*	D	Use same procedure to load DOS 2.10 as for DOS 2.00.
Home Budget,jr/1.00	Yes	Yes	Yes	Any compatible	D	
HomeWord/1.00	Yes	No	No	Any compatible	D	
Juggles' Butterfly/1.00	Yes	No	Yes	Any compatible	D	
Learning DOS 2.00/1.00	No	n/a	n/a	n/a	D	
Learning to Program in BASIC/1.00	No	n/a	n/a	n/a	D	

Program Name/Version	Operates on PCjr	Requires DOS 2.10	Requires BASIC Cartridge	Display	Disk or Cartridge	Comments
Mailing List Manager/1.00	No	n/a	n/a	n/a	D	
Mine Shaft	Yes	No	No	Any compatible	C	
Monster Math/1.00	Yes	No	Yes	Any compatible	D	
Mouser	Yes	No	No	Any compatible	C	
Multiplan/1.10	Yes	Yes	No	Any compatible	D	
Multiplication Tables/1.00	No	n/a	n/a	n/a	D	
One-Hundred-and-One Monochrome Mazes/1.00	No	n/a	n/a	n/a	D	
PeachText/1.00	Yes	Yes	No	Any compatible 80 column*	D	Not recommended for PCjr.
Peachtree Accounting Software (all)	No	n/a	n/a	n/a	D	
Personal Communications Manager/1.00	Yes	No	No	Any compatible	D	
Personal Editor/1.00	Yes	Yes	No	Any compatible	D	
pfs:FILE/1.05	Yes	Yes	No	Any compatible, 80 column*	D	
pfs:REPORT/1.05	Yes	Yes	No	Any compatible, 80 column*	D	
Private Tutor/1.00	No	n/a	n/a	n/a	D	
Professional Editor/1.00	Yes	Yes	No	Any compatible, 80 column*	D	
Scubaventure	Yes	No	No	Any compatible	C	
SNA 3270 Emulation/RJE Support/1.00	No	n/a	n/a	n/a	D	
Strategy Games/1.05	Yes	No	Yes	Any compatible	D	
3101 Emulation/1.00	No	n/a	n/a	n/a	D	
Time Manager/1.05	Yes	Yes	No	Any compatible	D	
Turtle Power/1.00	Yes	No	No	Any compatible	D	
Typing Tutor/1.00	No	n/a	n/a	n/a	D	
VisiCalc/1.20	Yes	Yes	No	Any compatible	D	
Word Proof/1.00	Yes	Yes	No	Any compatible	D	

* Some monitors, including most televisions, display only 40 columns (characters) across the screen. This program requires a monitor that supports 80 columns across the screen.

n/a = not applicable C = cartridge D = disk

New Disk Software

Bumble Games and *Bumble Plot* teach children mathematical concepts. In the first program, a creature named Bumble from an imaginary planet introduces the concepts of "greater than" and "less than" by using pairs of numbers to name positions in an array or points on a grid. The same friendly creature builds on *Bumble Games'* graphing skills in *Bumble Plot*. Price: $40 each.

Juggles' Butterfly introduces preschoolers to PCjr. Designed for children who don't yet read, the program uses color and a keyboard template to explore the system. Children press keys to make pictures appear and learn about shapes and alphabet letters. Price: $35.

Animation Creation allows users to draw pictures on PCjr's color display. Pictures can be stored on a disk and displayed in rapid sequence to create an animation effect. Price: $40.

Monster Math lets students wipe away parts of an ugly monster by correctly answering addition, subtraction, multiplication, and division questions. The game has six difficulty levels. Price: $30.

Adventures in Math lets children work their way through three types of castles while brushing up arithmetic skills. Players open castle doors and discover treasures by correctly answering a variety of mathematical equations. Price: $35.

IBM's Logo makes use of color, turtle graphics, and music to introduce beginners to programming. One unique aspect of the language is its advanced mathematics features such as trigonometric and transcendental functions, random number generation, and scientific notation. Price: $175.

Turtle Power is designed to introduce children to Logo. Children type instructions such as line lengths and angles into the computer, and using these parameters, the turtle draws pictures on the screen. Price: $50.

Home Budget, jr. structures and maintains a household budget. Expenses are categorized, and income, payments, and purchases are recorded. Month-to-date and year-to-date reports can be displayed on a screen or printed out. Price: $45.

Programs that operate with only one disk and require 128K or less of memory should run on PCjr.

HomeWord is a word processing program that makes use of PCjr's color features. The program has picture menus and includes a custom keyboard overlay. Price: $75.

Personal Communications Manager is a telecommunications program that can link PCjr with business mainframe computers, information services like The Source and CompuServe, personal office computers, and other home computers. Electronic mail can be sent and received with this program. The IBM internal modem or an external modem is required to run the software. Price: $100.

Software Compatibility

The chart "IBM Software for the PCjr" tells you which software from IBM runs on PCjr. The programs are divided into two groups: system software and applications software. The chart tells you if a program requires DOS 2.10 or Cartridge BASIC and indicates if the program resides on a floppy disk or a cartridge. The chart also points out special program memory or display requirements.

At first glance it looks like non-IBM software written for the PC should be able to run on PCjr. Certain requirements must be met, however. As a rule of thumb, programs that operate with only one disk and require 128K or less of memory should run on PCjr. Perhaps in the future you will be able to add a second disk drive and more memory to PCjr, but until then the software you run must stay within these limits.

Even if the PC software meets the single disk drive and memory requirements, you still need to operate the programs under the updated version of DOS, DOS 2.10, that was released with PCjr.

If software meets the PCjr memory, disk drive, and operating system requirements and still won't run, it may be because the program is written to circumvent DOS. Such programs work directly with special hardware features of the PC to run programs quickly and efficiently. Since many PCjr hardware features are different from the PC's, these programs may not work on PCjr. The best way to know if PC programs will run on PCjr is to test them thoroughly on the new computer. Until test results are in, use the chart, which lists the software that IBM has tested.

Katie Seger and Adrian Mello are Assistant Editors for PC World Special Editions.

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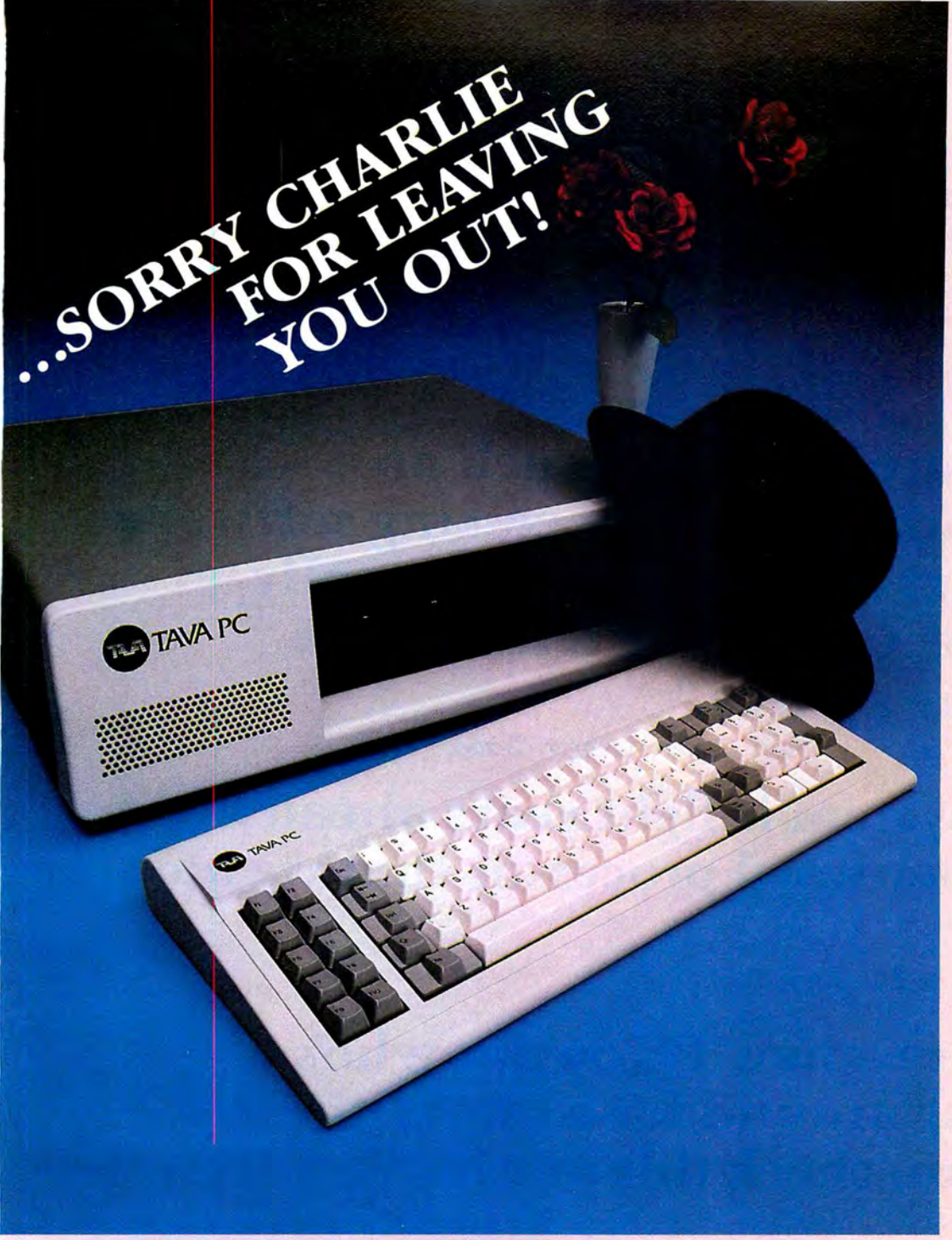

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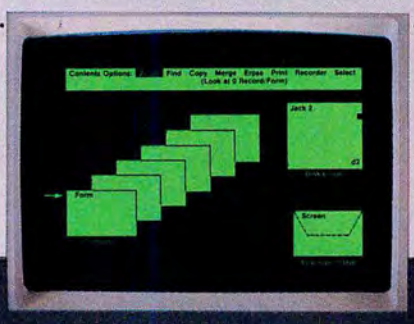

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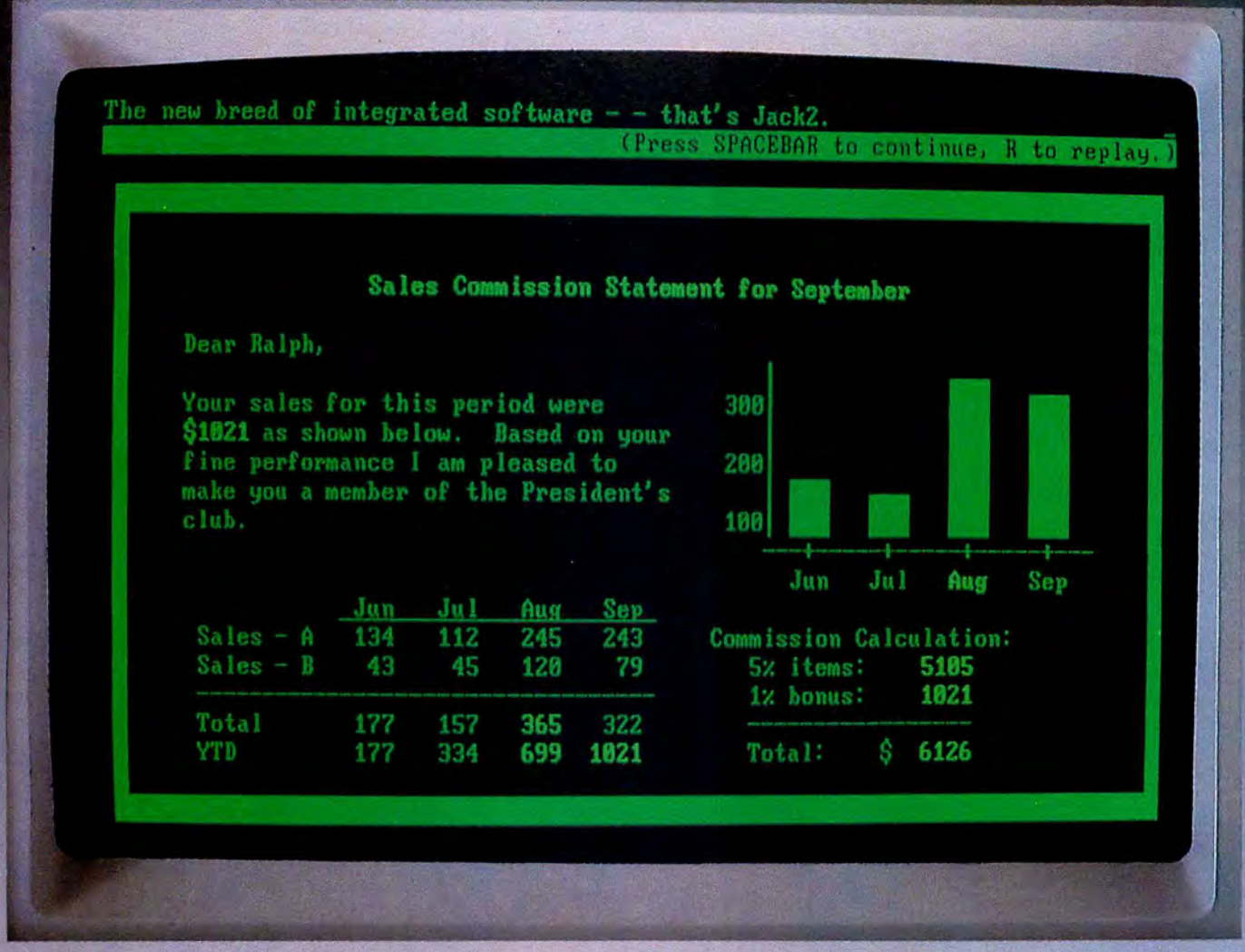

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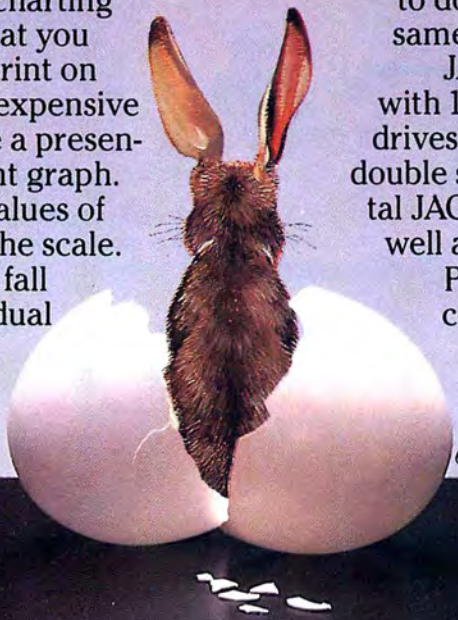

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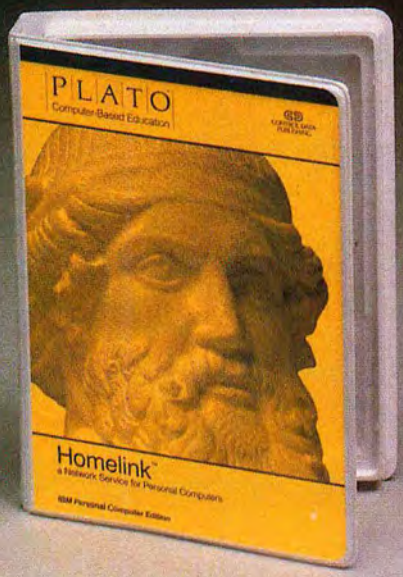

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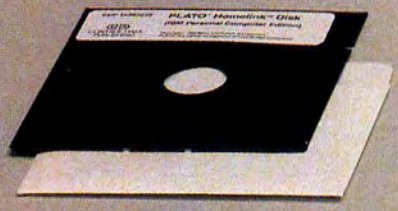

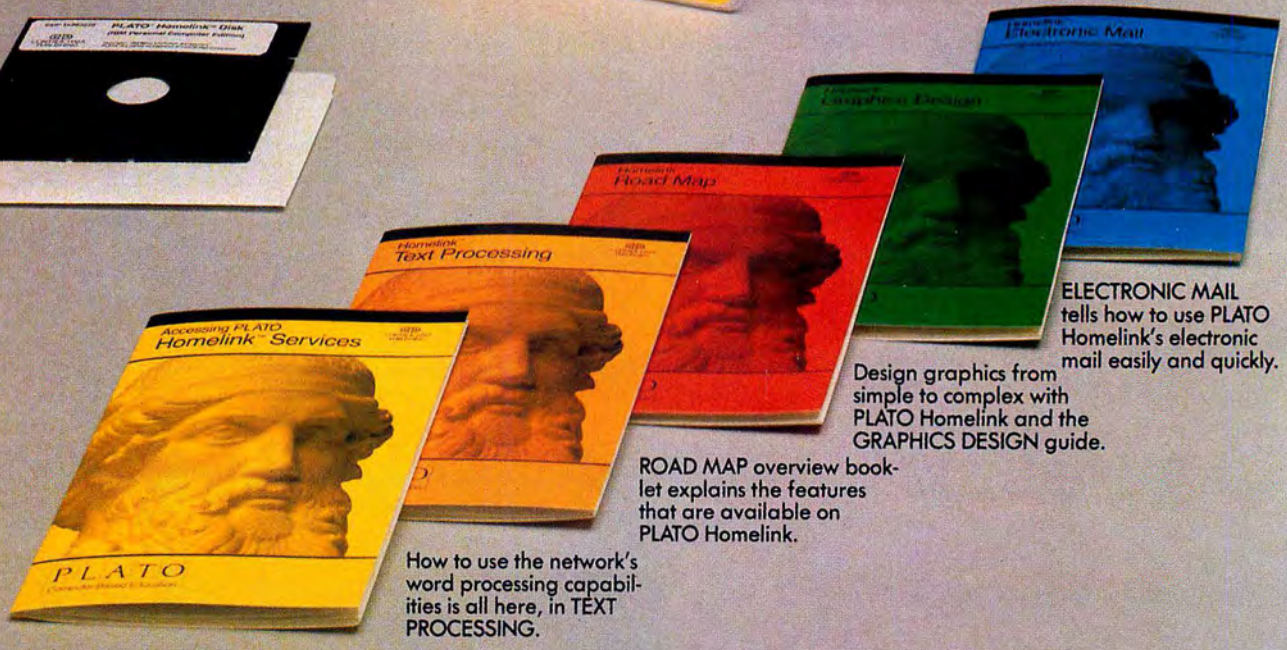

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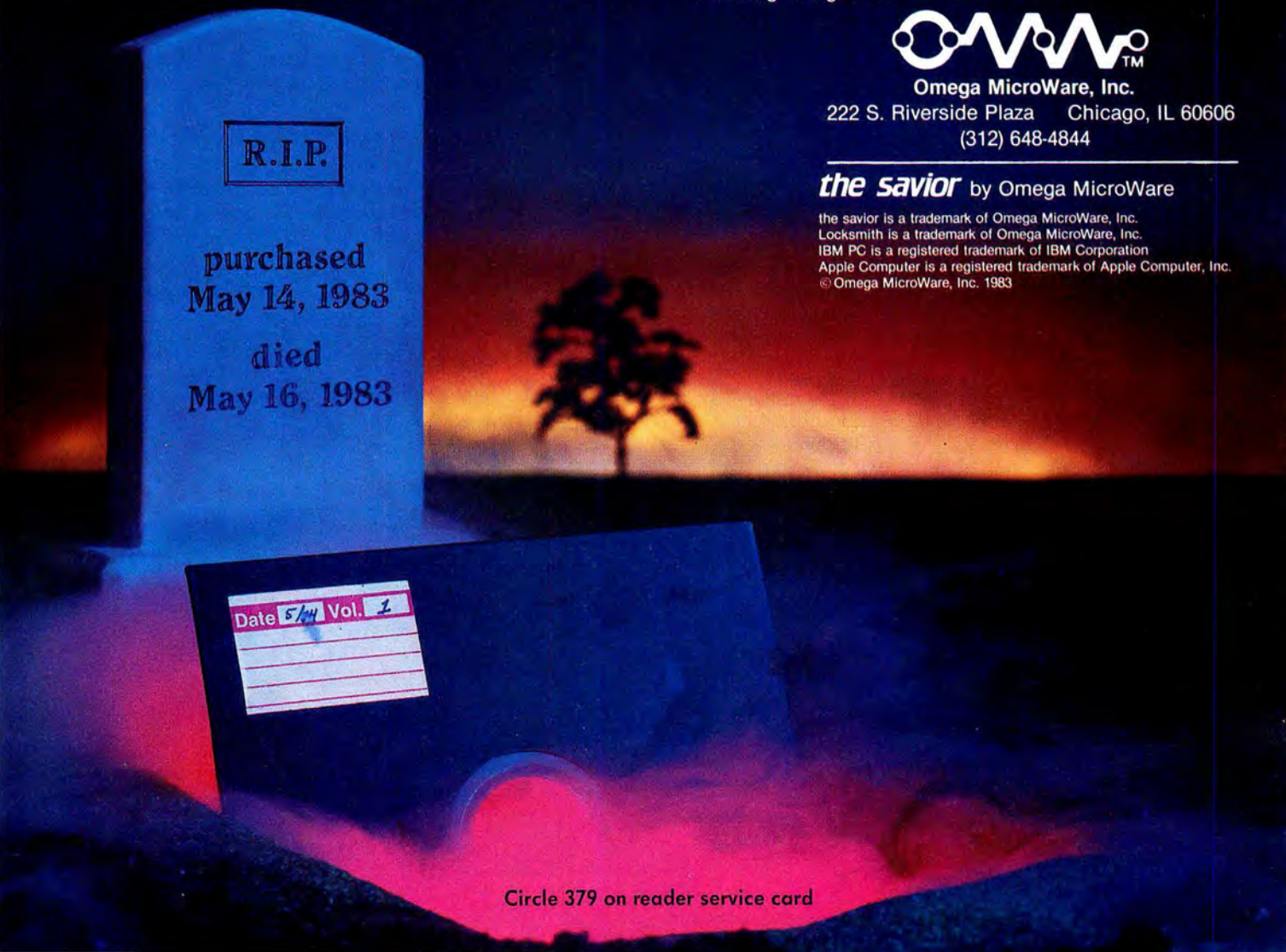

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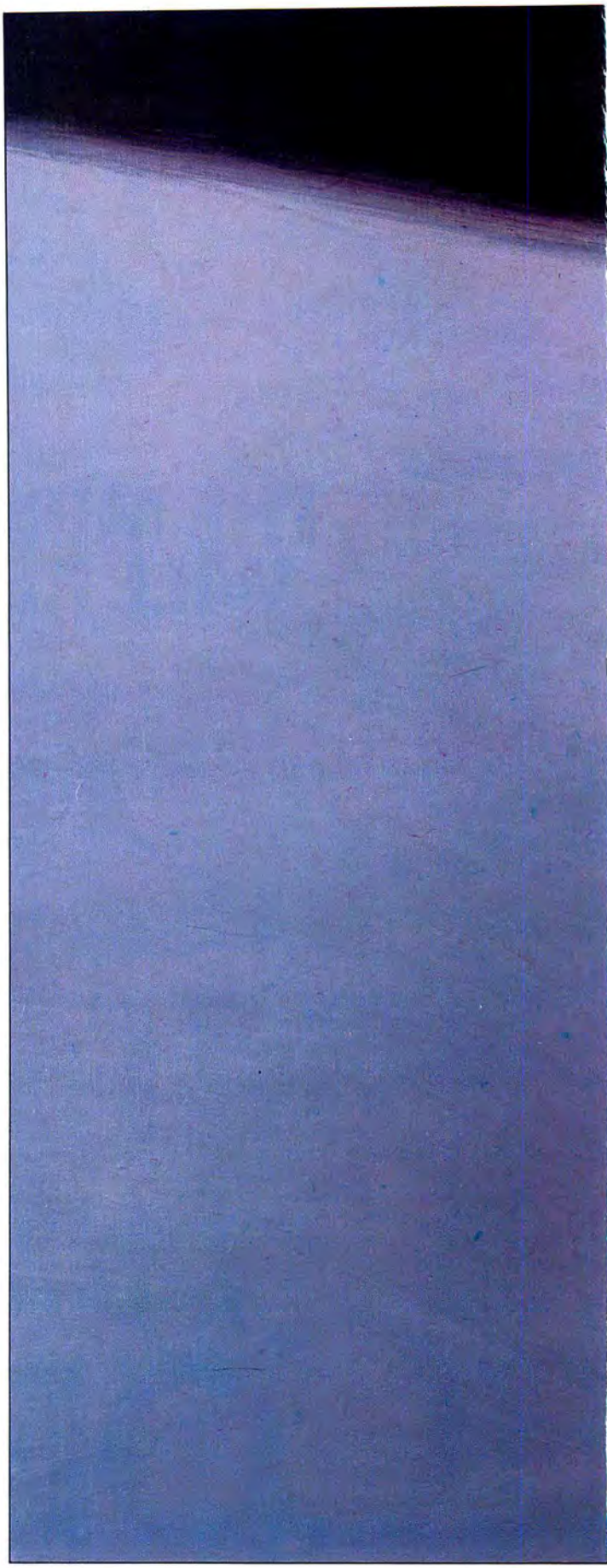


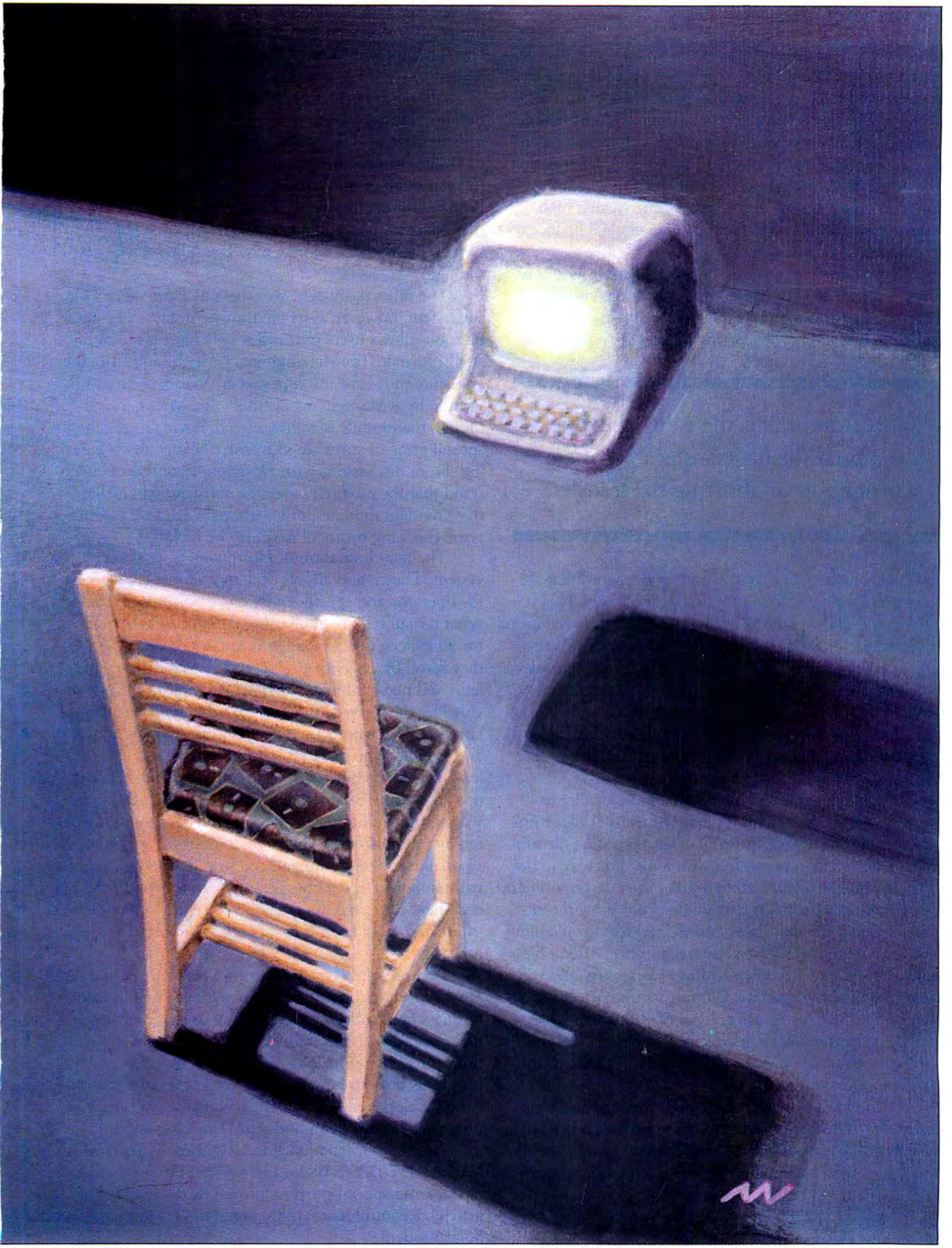
Larry Jordan

IBM PC users are finding a wide variety of uses for unattended host software. For some it's a way to work on their PCs while they are away on a business trip. Others use it to turn their PCs into answering machines. Thousands have set up electronic bulletin boards as clearing houses for information. The software industry has responded to this growing market with a variety of host communications packages. Some of the packages reviewed emphasize remote operation of the PC, while others concentrate on file transfer capabilities. No matter what your expected application is, one of these programs should be right for you.

Keeping in mind the plethora of remote communications software capabilities described in the article "Remote and Unattended" in this issue, let's take a brief look at the strengths and weaknesses of some IBM PC packages. Included in this review are four commercially available software packages, one hardware message system, and one public domain bulletin board system. Each package requires at least one disk drive, an asynchronous adapter, and an RS-232C cable. Other requirements are noted at the end of each review. A summary of the capabilities of each system appears in Table 1.

Hostcomm

The *Hostcomm* system is correctly described by its author as a personal host system. The system is not intended as a full host system and does not provide full remote operation capability. The system operator can set up only three applications programs that can be operated from a remote terminal. These applications programs can be Interpreted BASIC, compiled, or assembled programs, but they must be written to operate under a *Hostcomm* shell program.



Review

The outstanding feature of this system is its user access control. During the system logon procedure, callers are required to enter passwords. Specific, operator-designated passwords control access to three levels of remote control. Each access level is provided with menus that allow callers to perform selected functions. A caller with a low-level password may only be allowed to leave the system operator a message, whereas a caller with a high-level access may also be able to run a personal finance program and transfer files.

Hostcomm's password control also controls access to disk files. The software allows callers to come in at a specified file-directory level and switch to any directory at that access level or lower; the menu switch feature allows the system operator to specify a password that allows certain callers access to all file directories. This system is excellent for the exchange of files between users who require different levels of data security or privacy. *Hostcomm* also has several separately packaged utilities that make the task of disk file directory maintenance easier.

Hostcomm tells the caller the time required for file transfer and offers the option of aborting the transfer.

The *Hostcomm* disk file subsystem provides a good menu design and dependable file protection, but its file transfer capabilities are limited.

The *Hostcomm* file subsystem allows a caller to transfer files to the system (upload) or transfer files from the system (download). When a caller enters the file subsystem, he or she is presented with a file directory in the form of a menu. A file number and a brief description are displayed for each file; the menu does not show the actual names of the files. Files are selected for downloading from the menu by entering a menu number. After a file has been selected for downloading, *Hostcomm* tells the caller the time required for file transfer and offers the option of aborting the transfer. After downloading a file, the caller can choose to download another file without listing the available files, to list the available files, or to return to the main menu.

File uploading is equally straightforward and well prompted. The system asks callers to provide a brief description of each uploaded file. *Hostcomm* stores the file under a unique name derived from the date and time of file upload. This file menu and unique file name design limits caller access to files listed in the file directories. Disk files not shown on the menus cannot be downloaded.

Although *Hostcomm*'s file upload naming convention provides good security, it adds to the system operator's work load. Files with names that consist of a string of 11 numbers require significant system operator efforts to keep track of files and perform system maintenance. If the SYSOP renames files with alphanumeric characters that relate to their contents, the user file directories also have to be modified to match before callers can access the files.

The most significant weakness of *Hostcomm*'s file subsystem, however, is its file transfer design. The base package allows users to transfer only files stored in the ASCII format. Transferring binary files to and from the system requires the use of a special Xmodem program written by RMS Systems of Rockville, Maryland. Although the module is well designed, having to purchase a special piece of software to transfer binary files is annoying. From discussions with *Hostcomm*'s author, I understand that the next release of the software will include the Xmodem module in the base package. A CRC-16 error-checking protocol may also be included.

The final limitation of *Hostcomm* is its mail subsystem. The system allows exchange of messages between the operator and specific individuals only. *Hostcomm*'s general-mail feature allows the operator to leave bulletins for all callers, but the bulletins are not menu selectable; they scroll by once for each caller. A menu-driven bulletin and personal mail subsystem similar to the one provided by the *Remote Bulletin Board System* (described later in this article) would be significantly more powerful and flexible. The basic *Hostcomm* system lets callers leave private comments for the system operator, but it does not allow callers to leave messages for other callers without the addition of a special EMAIL program written by Cornerstone Computing of Fairfax, Virginia. *Hostcomm* caller comments are stored as individual files with numerical file names. A single-comment file that has each new comment appended to the end would be easier to use and would result in less operator maintenance time.

Because of the special-purpose program shell that *Hostcomm* provides, this software is excellent for some business applications. Order-taking or private communications with clients and customers are good applications for *Hostcomm*. The only hitch is that special programs have to be written by either the original software developer or by someone having the skills to write programs that will run under the *Hostcomm* shell.

Hostcomm, Janadon, Inc., P.O. Box 2462, Fairfax, VA 22031, 703/978-0866. List price: $170 (excluding utilities and special-purpose programs discussed in this article). Requirements: 128K, stand-alone Hayes Smartmodem.

Feature	Hostcomm	Intell-iterm	Multi-Link	PCS/2000	RBBS-PC	Remote Access
Parameter detect/switch	●	◉	●	◉	◉	–
File protection	●	●	–	–	◉	–
ASCII file transfer	●	●	◉	●	●	◉
Xmodem protocol	◉	●	–	–	●	◉
CRC-16 protocol	–	●	–	●	–	–
XON/XOFF flow control	–	◉	●	●	◉	●
File size indicator	●	●	●	–	◉	●
Operator chat mode	●	◉	◉	–	●	◉
Operator page hours	●	–	–	–	●	–
Case conversion	–	–	–	–	●	–
Help files	●	◉	◉	–	●	◉
Message storage	◉	–	●	●	●	◉
Message retrieval	◉	–	◉	◉	●	◉
Message maintenance	◉	–	●	◉	◉	◉
Message scan	◉	–	◉	◉	◉	–
Message protection	●	–	–	◉	◉	◉
Message word processor	◉	–	◉		●	◉
Local snoop toggle	●	◉	●	–	●	–
Logon bulletin design	◉	◉	◉	◉	●	◉
File directory listing	●	●	◉	◉	◉	●
Directory maintenance	◉	●	●	◉	◉	●
Callers log data	◉	◉	◉	–	●	◉
Users log data	◉	●	◉	–	●	◉
Users log maintenance	–	●	◉	–	●	●
SYSOP special controls	●	●	●	◉	●	●
System configuration	◉	●	◉		◉	◉
Caller defaults recall	–	◉	–	–	●	◉
Terminal emulation	–	–	◉	–	–	●
Expert/novice menus	●	–	–	–	◉	–
Remote operation	◉	●	●	–	–	◉
Multiple remote users	–	–	●	–	–	–
Local multitasking	–	–	◉	–	–	–
Disk area restriction	◉	●	–	◉	◉	–
Unattended reliability	●	◉	◉	●	◉	●

● = Excellent, ◉ = Good, ◉ = Fair, – = Not supported

Table 1: IBM host and bulletin board software compared

Review

Intelliterm

The *Intelliterm* package has a full range of host and smart terminal features as well as utilities. *Intelliterm*'s configuration program is designed to sense the specific equipment and memory in the host IBM PC. The program creates a DOS 2.00 CONFIG.SYS file that includes all the required *Intelliterm* device drivers as well as other drivers already established for the PC. The configuration program can also be used to specify path names to be used later by *Intelliterm*.

After the configuration is complete, the system operator is free to boot up the *Intelliterm* menu program. From this menu the operator can select any one of the options shown in Figure 1. By selecting the utilities option, the operator has most of the DOS commands available plus several programs designed to analyze past usage of *Intelliterm* by remote users. From this module the operator can either return to the main menu or invoke the *Intelliterm* text file editor. The editor is clean and fast, resembling *EDIX* and the IBM *Personal Editor*. The editor is excellent for text file maintenance because it eliminates the need to return to DOS to perform file editing.

After returning to the *Intelliterm* menu, the operator can dial a remote host computer by selecting the dialing directory. The directory can be used to access up to 999 unique host systems. Systems are accessed by selecting menu numbers associated with the systems. The directory also allows you to search for a particular host menu entry by entering a part of the host name as a string. Telephone numbers can be automatically redialed a specified number of times at a specified interval.

Once a connection is made with a host, *Intelliterm* can be used as an ASCII smart terminal to perform operations on the host system. The operator can enter a special protocol file transfer mode and transfer binary files to or from the host. The protocol mode uses a standard Xmodem protocol that can be used with similarly equipped remote bulletin boards or IBM PCs set up for remote communications.

The protocol mode also features two special options that can only be used to exchange files with a remote PC that is running *Intelliterm*. One of these options, Fast Xmodem, operates 6 to 10 percent faster than a standard Xmodem transfer. The other option, Bi-Async, allows simultaneous, error-checking file transfers in both directions while the operators of each system chat at their respective keyboards. This last option is a real plus when several files must be transferred in both directions; it allows at least 50 percent more data transfer in a given amount of time than can be achieved with unidirectional data transfer. Both the Fast Xmodem and Bi-Async modes allow wild-card file name character substitution for additional convenience.

Beyond these powerful smart terminal capabilities, *Intelliterm* can be set up as an unattended host system. The operator can specify up to 999 designated remote users along with user IDs, passwords, file-protection levels, access controls, and designated data path names for each user. The operator can also establish different disk file areas for data transfer and program operation. By setting up user IDs and passwords, the system operator can limit the host use to authorized persons only. The access controls also allow the operator to monitor system activity by user and lock out people who try to abuse the system. Designating data paths and program paths for each user enables the operator to restrict users to certain selected files—a significant feature for hard disk host system operators.

```
—Intelliterm V2.00X Main Menu (c) (p) 1982, 1983—

Choose:
      (A)   Auto-Answer Mode
      (D)   Dialing Directory
      (R)   Remote User Directory
      (I)   Intelliterm
      (L)   Change Logged Data Path
            (Default = B:\)
      (O)   Remote Sign-Off
      (X)   Intellitransfer (Xmodem)
      (U)   Utility Menu
      (Q)   Exit to system

Selection:
```

Figure 1: Intelliterm menu

The most powerful feature of the *Intelliterm* host mode is its file protection. The system operator gives each user one of five levels of file control. These levels and their associated DOS functions are shown in Table 2. Each level is achieved by patching the DOS COMMAND.COM file to eliminate selected command names. The proper version of COMMAND.COM is invoked after a user logs on. By restricting the user to an area of the disk that does not contain other versions of COMMAND.COM, the operator prevents him or her from changing the level of file control.

While on line, a remote user can invoke any of the *Intelliterm* file transfer modes to transfer files to the host or from the host to a remote system. Text files can be transferred using the ASCII mode, or binary files can be transferred using the protocol modes. All file transfers are performed without *Intelliterm* operator assistance.

Although *Intelliterm*'s designers have gone to great lengths to produce a package that meets all communications needs, the software has some weak points. The package contains a large number of DOS 2.00 batch files

Intelliterm Remote
Allowable DOS Functions By User Access Level

DOS Function	Full	System	Write	Read	Run
BREAK	●	●			
CD, CHDIR	●	●	●		
CLS	●	●	●	●	●
COPY	●	●	●	●	
CTTY	●	●			
DATE, TIME	●				
DEL	●	●	●	●	
ECHO	●	●	●	●	●
ERASE	●	●	●	●	
ERROR LEVEL	●	●	●	●	●
EXIST	●	●	●	●	●
FOR	●	●	●	●	●
GOTO	●	●	●	●	●
IF, NOT	●	●	●	●	
MD, MKDIR	●	●			
PATH	●	●			
PAUSE, REM	●	●	●	●	●
PROMPT	●	●	●	●	●
QUIT	●	●	●	●	●
RD, RMDIR	●	●			
REN, RENAME	●	●	●	●	
SET	●	●			
SHIFT	●	●	●	●	●
TYPE	●	●	●	●	●
VER, VERIFY	●	●	●		
VOL	●	●	●	●	●

Table 2: Intelliterm DOS functions

that provide state-of-the-art examples of the use of batch files. Although some are self-modifying, these files can become a nightmare for users who have nonstandard equipment configurations. For example, only astute programmers would be able to reconfigure these files for use in a local area network such as PCnet, a process that is usually easy for a novice to accomplish.

The size of the *Intelliterm* programs also restricts use of the system to hard disk configurations. The programs are written in Pascal and, in typical Pascal style, several modules are larger than 100K. Use of *Intelliterm* on a system configured with two double-sided disk drives would severely limit its capabilities.

Review

Above all, I found that the package was in a constant state of flux. The system designers are so busy adding features to the package that the documentation is always two versions behind the software. I also found that the software contained several bugs because of the hasty additions of new features. The system representative I spoke with assured me that the package would be thoroughly debugged and the documentation updated to match the current software version by the time this article is published. If Microcorp achieves these objectives, they will have a good system for IBM XT owners.

Intelliterm, Microcorp, 913 Walnut St., Philadelphia, PA 19107, 215/627-7997. List price: $150. Requirements: 192K, hard disk, DOS 2.00.

MultiLink

The *MultiLink* package contains both a host and a bulletin board system. The host is a multiuser, multitasking overlay for either PC-DOS 1.10 or 2.00, and the bulletin board is an Interpreted BASIC program that can be used by remote multiusers. As you can see from Table 1, the *MultiLink* bulletin board system (*MLBBS*) lacks many of the fancy file transfer capabilities of other systems reviewed in this article. However, it provides good access control to a powerful host system.

Before installing the multitasking, multiuser PC-DOS shell called MLINK.COM, the *MultiLink* user is advised to consider the execution of a program called SLICE.COM. This program forces "time-slicing" of the 8088 CPU when more than one application is being executed. This feature is a must for simultaneously executing two applications that perform frequent mathematical computations. SLICE causes the CPU to perform task switching rather than giving one application complete control of the CPU for long periods of time. For applications that do not require frequent use of the CPU, execution of SLICE is not advised because it degrades system response time even when there is no competition for use of the CPU; screen display and cursor control are sluggish, and computations require more time.

The *MultiLink* main module, MLINK.COM, allows the operator to set up a maximum of eight multiuser access windows (memory partitions) and up to two background multitasking windows. MLINK is executed using a single-line command and can be executed only once. To change MLINK's configuration you have to reboot with PC-DOS, and the MLINK command has to be reexecuted. The MLINK command specifies one of six terminal types, the baud rate, and the random access memory to be associated with each background task and user window.

After MLINK has been executed, the local system operator can access each window by pressing the <Alt> key and the function key associated with that window. The operator can then give each window one of two *MultiLink* execution speed priorities. The FAST command has a window high-priority mode that provides full control of all system resources. This is useful for foreground word processing while source code is compiling in the background; without high priority in the foreground, cursor control is sluggish and irritating. The SLOW command returns a fast mode window to normal priority. The local system operator can assign priorities for any task window or user window, but a multiuser can control only the priority of his or her window.

Multiusers can perform all DOS functions and operate certain applications software either locally or remotely. Files can be renamed, deleted, or created. Programs can also be executed, with certain limitations. Any software that prints one line at a time on the monitor can be executed, but software such as *1-2-3,* which writes directly to the system hardware (direct video memory mapping), cannot be executed from a multiuser terminal. The old 3.24 version of *WordStar* can be executed remotely, but version 3.3 cannot.

MultiLink offers some powerful multitasking and multiuser capabilities.

MLBBS is a less powerful bulletin board than the public domain *RBBS-PC* reviewed in this article, but it does provide good electronic mail features that can be used in the background while other tasks are being performed. Callers can leave or retrieve messages and ASCII program files, or read text files left on the system disk drives. *MLBBS* has a brief menu that is presented to the caller after initial system access (see Figure 2). The menu is not displayed again unless the caller enters a help command.

MLBBS's message file and user file controls are both well-designed and easy to maintain, and they don't waste disk space. Messages are placed into text files in groups of nine and can be deleted either individually by using a text editor or in blocks using the DOS DELETE command. The users log is a single random access file that limits logged users to 150. Recent users are placed at the beginning of the file, and old users are dropped off after the total number of users exceeds 150. The 150-user limit can be changed by the system operator.

The greatest power of *MLBBS* is its DOS command. By entering this command followed by a password, the caller is given the same level of control of the IBM PC as

any other multiuser. *MLBBS* can be set up to operate in all windows that are to be accessed by remote multiusers to provide a rudimentary security system.

Although *MultiLink* offers some powerful multitasking and multiuser capabilities, it has limitations. One limitation is random access memory (RAM) consumption. Each task and user needs at least 96K for typical application software execution; one remote user, one background task, and one foreground task require 256K of RAM.

Another *MultiLink* limitation is the serial interface requirements for multiusers. Multiusers can directly access the system locally through RS-232C cables or remotely through modem connections, but each user has to access the PC through a unique serial port. Going beyond two serial ports on the IBM PC requires special serial adapter boards because of the unique address required for each port.

The third limitation in *MLBBS* is its file transfer capability. The system upload speed is limited to 300 bps; file transfers at 1200 bps result in data loss. The system does not provide a protocol file transfer technique, so error-checked binary file transfers cannot be performed. Aside from the performance limitations of the system's file transfer methods, the file transfer prompts are brief and intimidating for novices.

Finally, disk space becomes a problem with multiusers. Because of the variety and size of files needed in multiuser applications, a hard disk is almost a necessity. With only *MLBBS* running in the background, I found the system cumbersome. I had to move files back and forth constantly between floppy disks and my electronic disk to keep from interfering with a bulletin board user accessing files on my B drive.

I also found several bugs in *MultiLink*. The most severe problem occurred when I tried to load the keyboard key reassignment program *ProKey;* each time, the system locked up and I had to turn the PC off to recover. Since I cannot live without *ProKey,* I consider this bug a major flaw. The second bug I found was function key actuation. When I pressed a function key in one window, all window function key traps were activated. The software did not provide enough interrupt isolation between memory partitions. This bug eliminated the simultaneous operation of two applications that contained function key controls. The final bug was sound control. Sound being executed in one window stops all sound execution in other windows. If programs in two windows try to produce sounds simultaneously, the system locks up and the system on/off switch is the only way to eliminate the lockup.

My greatest disappointment with *MultiLink* was documentation. The installation and operation manual is designed to fit into the PC-DOS binder and contains only 21 pages of text. Few examples and illustrations are pro-

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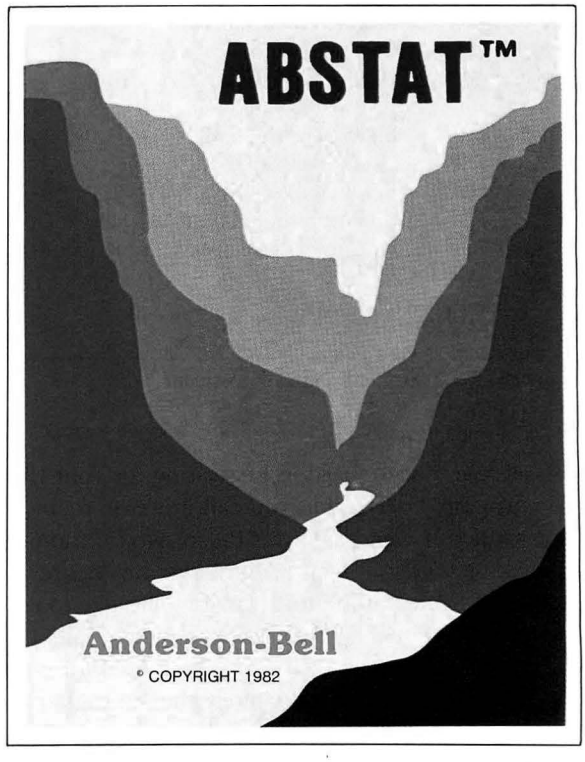

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vided for the MLINK, SLICE, FAST, and SLOW commands, and no documentation is provided for the bulletin board system. When I discussed my disappointment with a *MultiLink* representative, I was told that better documentation was in production. The software author is also the person who responds to frantic new *MultiLink* owner calls, and he is adding more documentation to reduce the number of calls.

```
.MSG   - Scan/read messages
.ENT   - Enter a message
.DIR   - List file directory
.name  - List specified file (see .DIR)
.UP    - Enter a file (upload)
.USER  - Look at user file
.BULL  - Retype bulletins
.TERM  - Change terminal type (use before .DOS)
.DOS   - Exit to PC-DOS (password required)
.BYE   - Sign off
.HELP  - This Menu
```

Figure 2: MultiLink MLBBS menu

If you always seem to be waiting for your IBM PC to finish one task so that you can move on to another, or you wish you could use your PC in two locations without relocating the equipment, *MultiLink* may be the package you have been waiting for. If you would like to run an office electronic mail system on an IBM PC with a hard disk while the same machine is being used for other applications, *MultiLink* is definitely the package you need. With a little patience, after a few telephone conversations with the software author, you will be able to push the PC's 8088 CPU to its limits.

MultiLink, The Software Link, Inc., 6700 Roswell Rd. #23-B, Atlanta, GA 30328, 404/255-1254. List price: $225. Requirements: 128K, Hayes Smartmodem, one asynchronous adapter for each multiuser, DOS 1.10 or 2.00.

PCS/2000

The Microcom Series PCS/2000 Networking Modem combines powerful modem capabilities with strong electronic mail features in one hardware package. (The PCS modem capabilities were reviewed in "The Modem Market," *PCW*, Vol. 1, No. 8.) The PCS can be used as a modem or as a stand-alone message and file transfer system. It is housed in a well-designed metal chassis and includes a large LCD display on the front panel. The display indicates whether or not mail is waiting for delivery and whether or not the system is in the auto-answer mail mode. A terminal or a microcomputer with communications software is required to alter the mode of the PCS and to send and receive mail and files. The *PC-Talk III*, *Telios*, and *ASCOM* smart-terminal communications packages work well with the system, but simpler communications software such as the COM.BAS program that comes with PC-DOS also perform all the necessary communication functions to make this system work.

PCS/2000 allows the operator to create one-line banners for automatic display. A different banner can be created for originate-mode message transfer and answer-mode message transfer. Messages can also be created in the modem's internal memory by interactively typing at the IBM PC keyboard, or prestored messages can be uploaded to the modem from a disk file. Messages can also be entered as files and sent to several callers. The limitation of the message system is 40 messages or 32K, whichever occurs first.

One unique PCS feature is its automatic message-sending capability. After entering a message, the operator can either store the message for later retrieval by the recipient or make the PCS automatically dial a remote PCS system and transfer the message. The auto-transfer is attempted ten times at 15-minute intervals. If a connection is not made and the message is not delivered, the PCS stores the message for the recipient to retrieve later.

The PCS also offers a Reliable Mode protocol that ensures high-quality message and file transfers. The cyclic redundancy check (CRC-16) error detection and correction technique used in this protocol ensures better than 99.9 percent error-free data transfer. This protocol is being licensed by VisiCorp and several other software developers for inclusion in future communications products. Microcom charges a one-time licensing fee of $2500 for the protocol, which includes a seminar and documentation on implementation of the protocol.

Other than the limited memory available in this system and the small number of messages it can store, the greatest limitation of the PCS is the electronic mail program. The program is stored in hardware and cannot be easily updated and expanded by the system developer. Upgrading the PCS to a new version requires the replacement of read only memory (ROM) chips located inside the PCS unit. With memory cost and size rapidly decreasing, the fixed memory and fixed program features of the PCS give it a finite lifetime as an electronic message system. Judging from the high cost of this modem relative to its lack of sophistication in features, I think its lifetime in the marketplace will be short indeed.

PCS/2000, Microcom, Inc., 1400A Providence Highway, Norwood, MA 02062, 617/762-9310. List price: $995. Requirements: Terminal, RS-232C cable.

REMOTE ACCESS FULL SCREEN TERMINALS

NUMBER	TERMINAL MODEL	NUMBER	TERMINAL MODEL
1	DEFAULT LOGIC	11	PC-PHONE
2	ADM-3A	12	OSBORNE I
3	BEEHIVE 150	13	REGENT/VIEWPOINT
4	CROMEMCO 3100	14	SOROQ-IQ/120
5	DEC VT52	15	SUPERBRN/CMPUSTR
6	DEC VT100	16	TELERAY SERIES
7	HAZELTINE 1500	17	TELEVIDEO
8	HEATH/ZENITH Z19	18	TI MODEL 940
9	HEWL/PACK HP2621	19	VECTOR GRAPHICS
10	IBM 3101		

Choose a terminal by number ?

Figure 3: Remote Access terminals emulated

Remote Access

The *Remote Access* software package is similar to the multiuser capability of *MultiLink,* but it does not allow more than one task to be performed at a time. The software is designed to operate with a Hayes Smartmodem and comes in two versions. The minimum package contains only the *Remote Access* software, whereas the full-screen version contains both *Remote Access* and a smart terminal program called *PC-PHONE.* The *Remote Access* software allows you to attach an extra terminal directly to a serial port in the IBM PC, or it allows you to operate the PC from any remote terminal by using a modem. The full-screen version gives callers or a local terminal a screen image that closely duplicates the characteristics of an IBM PC screen.

When *Remote Access* is initially installed, the local system operator is given a main menu of seven options. These options allow the operator to change communication parameters, system passwords, control keys, or the date and the time; they also allow the operator to list the user log or read mail left by users. *Remote Access* prepares itself to receive callers if the operator selects that option from the main menu or if no menu option is chosen within 20 seconds of initializing the program. After a caller logs off the system or the modem carrier signal is lost during a remote caller's session, *Remote Access* automatically reboots and prepares itself for the next caller.

When a caller gains access to *Remote Access,* the system asks for a password unless the system operator did not list at least one password during the configuration procedures. After the caller successfully enters a password, *Remote Access* logs the caller to disk and then invokes a special set of screen control escape codes that have been designated by the system operator. *Remote Access* defaults to line-at-a-time TTY-style output if no special terminal characteristics have been keyed to certain passwords. The list of terminal types supported by the full-screen option is shown in Figure 3.

Following the screen control setup, *Remote Access* gives the remote user complete PC-DOS control of the IBM PC. Any DOS internal or external function can be performed except CTTY, which uses some of the same signals as *Remote Access.* The remote user can operate any applications software except spreadsheet and word processing packages that route screen displays directly to the PC's internal hardware. Memory-mapped software such as *VisiCalc* and *1-2-3* bypass the normal BIOS calls that are intercepted and rerouted to the serial port by *Remote Access.* The software author says he is working on a memory-mapped version for release later this year that will allow callers to operate spreadsheet software from a remote IBM PC.

Remote Access offers limited electronic mail capability. Any user can send the system operator a message, but messages cannot be left for callers by the system operator or other callers. All mail left for the system operator is encrypted to prevent other callers from listing the message file. The mail encryption is performed by an Interpreted BASIC program that can be compiled to keep callers from listing and decoding the message-encryption technique. The system can be made even more secure by compiling the system programs that contain the encryption algorithm.

File transfers to and from *Remote Access* can be performed in two ways. The PUTFILE and GETFILE commands (they are actually programs) can be used to place files on or to copy files from the *Remote Access*

controlled disk. After executing either command, the system gives you the option of using either the ASCII or the Xmodem method of file transfer. The ASCII method lists the file just as the DOS TYPE command lists a file to the screen, and the communications software on the caller's computer has to capture the listing; there is no error correction performed in this method. The Xmodem method, on the other hand, performs a transparent transfer between *Remote Access* and the caller's Xmodem-equipped smart terminal software. Because of the special hand-shaking characters used by the Xmodem technique, binary text and data files can be transferred without alteration. The ASCII technique can only be used to transfer text files created by a text editor or created in the nondocument mode of a word processor.

Although *Remote Access* is a powerful single-user package, it is surpassed in both bulletin board features and remote access capabilities by other packages. *Remote Access* has a more powerful remote operation capability than *Hostcomm*, but it does not present files for downloading as well as *Hostcomm*. *Remote Access* also has a better file transfer system than *MultiLink*, but *MultiLink* allows more callers and users to access the PC simultaneously than *Remote Access*.

Although less complicated to use than most other host and bulletin board systems, *Remote Access* proved to be rougher on the IBM PC than the other systems I tested. The system frequently locked up and would not automatically recover so that other callers could use the PC. Following one such lock up, one of my disk drives remained on and spinning for 2 hours—until I got home from work and discovered the problem. *Remote Access* cannot detect and switch communications parameters to match those of the caller; the system operator sets up a single set of parameters (type of parity and number of data bits) that stays in effect until the system operator changes them.

I had two problems with the system's file transfer programs. The PUTFILE program could not support ASCII file transfers to the *Remote Access* computer at either 300 or 1200 bps; data was lost during file transfers at both speeds. I also had difficulty with the Xmodem download function in the GETFILE program; each file download progressed up to the last 128-byte sector, but then the protocol gave me several "short block" error messages and aborted the transfer.

If you have to have more remote access power than you get from the DOS 2.00 CTTY function but cannot afford the powerful *MultiLink* or *Intelliterm* software packages, you may find that *Remote Access* will meet your needs. The *Remote Access* package is reasonably priced, and the software is well supported by the developer.

Remote Access, Custom Software, P.O. Box 1005, Bedford, TX 76021, 817/282-7553. List price: $50, with full screen $89. Requirements: DOS 1.10 or 2.00, stand-alone Hayes Smartmodem.

Remote Bulletin Board System (RBBS-PC)

The *RBBS-PC* was originally written and put in public domain by Russ Lane of Houston, Texas. Approximately six months after its release, Brad Hanson of Bittendorf, Iowa, downloaded the system from a bulletin board system in Dallas, Texas. Brad added enhancements and debugged the *RBBS-PC* for about three months before passing it back into public domain through the CompuServe IBM PC data base. The system was downloaded by Scott Loftesness of Gaithersburg, Maryland, in March 1983 and received its final buffing by members of the Capital PC Communications Special Interest Group. The latest version of *RBBS-PC* is now available for downloading on many Capital PC bulletin board systems as well as on CompuServe. It can also be obtained on disk from the Capital PC Users Group Software Exchange.

I chose to review this public domain package because I feel it will set an industry standard for commercial bulletin board software. If a commercial package does not significantly surpass the features of *RBBS-PC*, it will probably not do well in the marketplace. *RBBS-PC* will be the driving force for unattended communications software excellence that *PC-Talk* is for smart terminal communications software.

RBBS-PC provides a configuration program that allows the operator to specify several system default conditions that will remain in effect until changed by the operator. In addition to specifying a remote password that allows the operator to do system maintenance from a remote location, the configuration program allows the operator to specify the disk drives to be used for file uploading and downloading and the maximum time each user will be allowed to stay on the system. These selected codes and parameters along with several others are stored by this program for later use by the main *RBBS-PC* program.

The second powerful *RBBS-PC* feature is its user data base. The system records several user choices such as expert mode on/off, prompt sound on/off, and screen height (page length) that are put into effect each time a caller returns to the system. The data base also keeps a record of the user's location, type of computer equipment, and message protection password. All these items of data except the caller's location and type of equipment can be altered with each call, and the new data are stored when the caller logs off the system.

The third major feature of *RBBS-PC* is its bulletin subsystem. Callers can elect to skip the system bulletins and go directly to the message subsystem, or go into a bulletin menu. From the bulletin menu the caller can

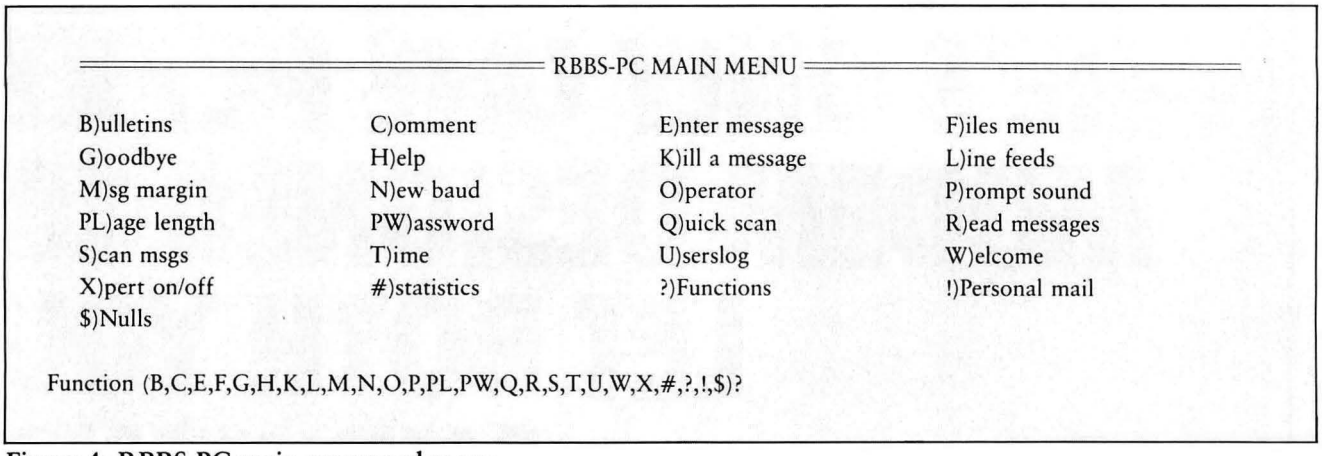

Figure 4: RBBS-PC main command menu

elect to read up to six bulletins or continue on to the message subsystem. Upon entering the message subsystem, the caller is apprised of all personal messages sent to him or her by other callers and is then given a 25-item main menu to select from. The main menu allows the caller to change system default parameters, list the recent system users, or access the system's powerful message features. The full *RBBS-PC* main menu is shown in Figure 4.

From the main menu, callers can elect to go to the files subsystem. This subsystem allows callers to list system file directories (text files created by the system operator) and upload or download files. File transfers can be done in ASCII or Xmodem mode. Both upload and download are fully prompted so the novice is guided through the file transfer process one step at a time.

Although *RBBS-PC* has several powerful features, it also has several limitations. First, private messages are marked as private with a special character but are not encrypted. An astute prankster could probably retrieve and read all messages left on the system if the system operator has not taken special precautions to prevent message file access. Second, the system requires a great deal of disk space when it is used frequently by callers. The caller and user logs can become large quickly, requiring frequent system maintenance. Finally, the system is not commercially supported, and the system user cannot depend on a software developer to correct bugs.

In spite of its limitations, the *RBBS-PC* package is a good choice for a communications hobbyist and for general bulletin board applications. The Interpreted BASIC source code that comes with this system provides some good insights into the design of unattended communications software, and the speed of the Compiled BASIC executable version is fast enough to handle large system user logs and the transfer of files at 1200 bps. *RBBS-PC* is also a good choice for user group bulletin boards because it does not increase operating costs.

RBBS-PC, Capital PC Software Exchange, P.O. Box 6128, Silver Spring, MD 20906. List price: $6. Requirements: DOS 1.10 or 2.00, 128K, double-sided disk drive, Hayes Smartmodem (stand alone or expansion board) or a Rixon PC212A modem.

Which Host for You?

Host and bulletin board systems, unlike smart terminal communications software, are not easily categorized as good, better, and best. Each system reviewed fit perfectly in certain applications and did not fit well in other applications. For applications that require remote operation of the IBM PC, the *Intelliterm* package offers the best file protection and file transfer combination of all the host systems reviewed. For remote operation that requires multitasking and multiuser capabilities for maximum IBM PC utilization, the *MultiLink* package is best. For electronic mail and bulletin board applications, the *RBBS-PC* software is the best choice.

You may be able to combine several of the packages to satisfy just about any special unattended communications software need. A version of the *RBBS-PC* software modified specifically for operation under *MultiLink* will soon be available; the software will be public domain and will be designed to replace the *MLBBS* software that comes with *MultiLink* to give you the combined capabilities of both packages. *Intelliterm* is also being modified so that it can be operated with *MultiLink;* the two packages will be sold by Microcorp as a combination package option. These two combinations are going to offer substantial unattended communications support for the IBM PC.

Larry Jordan is a freelance writer who manages power plant start-up engineers for the NUS Corporation. He coauthored the book Communications and Networking for the IBM PC, *published by the Robert J. Brady Company. He is also the president of the Capital PC User Group.*

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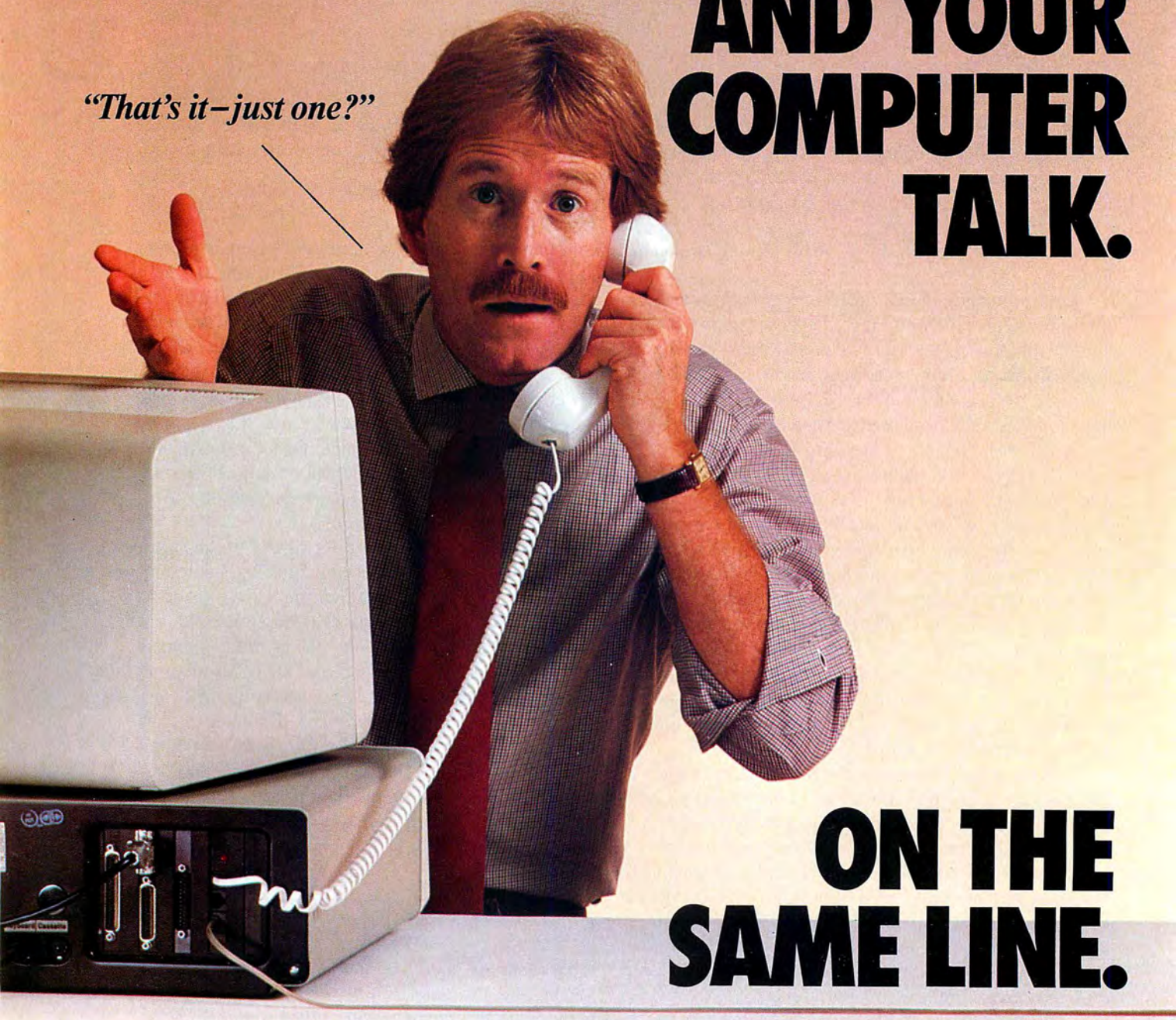

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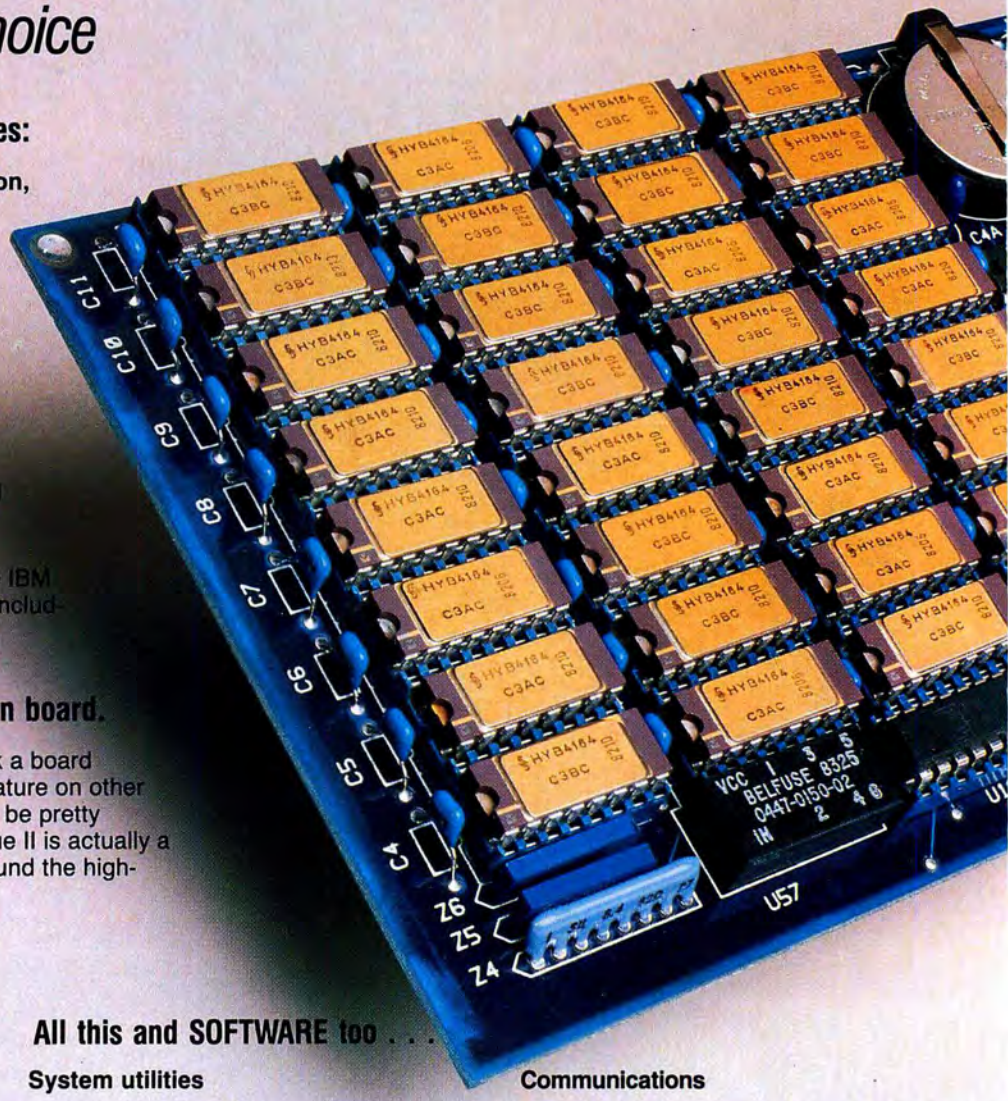

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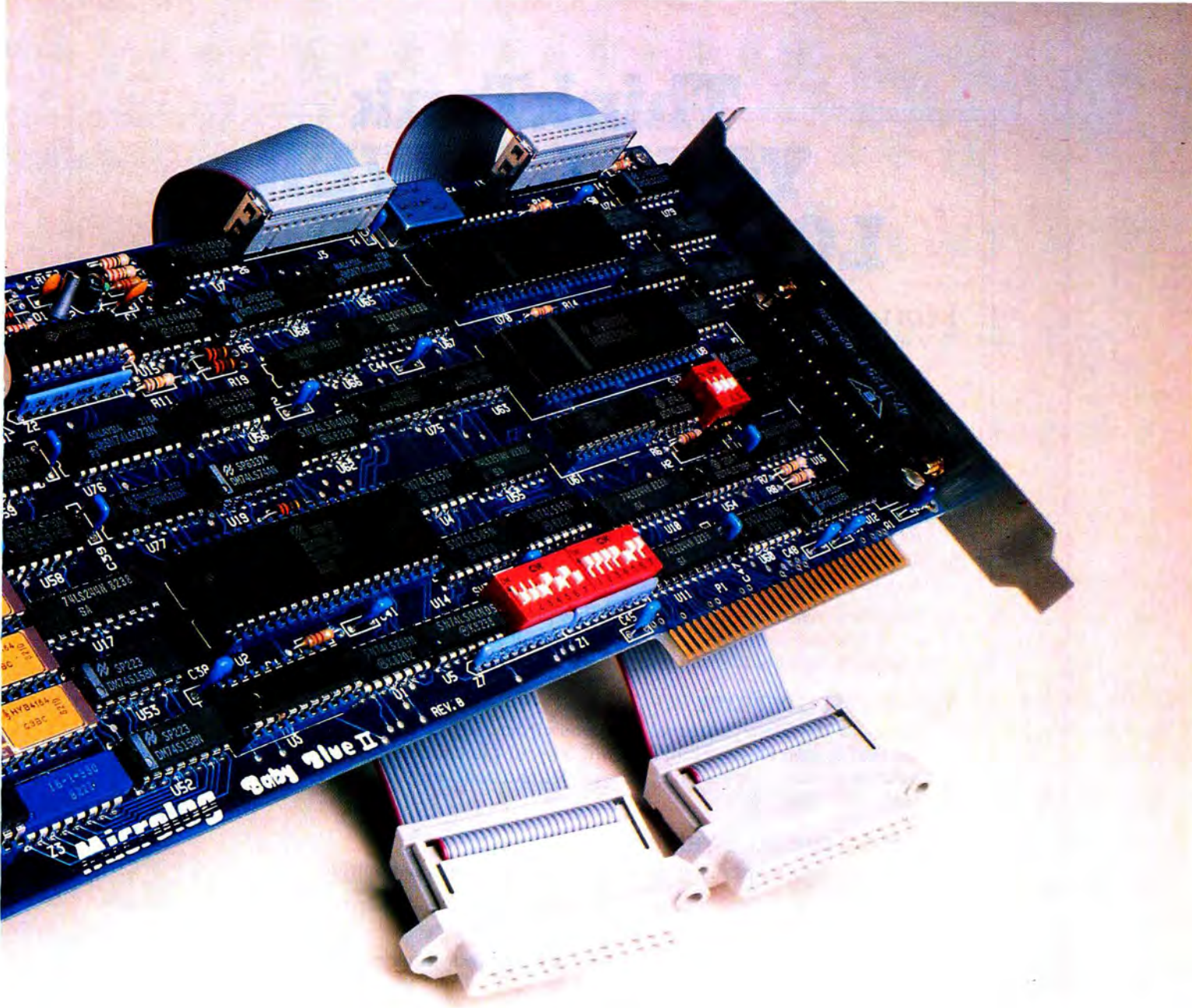

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Play It Again, Samna

Split-screen editing, an electronic "fold," and intelligent formatting features make Samna Word II stand out in the crowd.

Merrily Shinyeda

One more software company has tossed its disk into the PC arena hoping to defeat the market leader in word processing. Already softened by the blows of previous competitors, *WordStar* may soon find itself on the ropes fighting for its title. The latest contender is *Samna Word II,* a heavyweight with a dedicated word processing heritage.

The package includes three disks (word processing, utilities, and a tutorial) and an innovative reference manual. Samna has also provided stick-on keytop labels to simplify learning. The labels assign clearly defined operations to the PC function keys. Functions that are performed frequently during input and editing (like underline, center, and bold) each have a dedicated key. The key labeled DO brings up a menu that lists less frequent operations.

Other dedicated keys extend the cursor's movement capabilities. In addition to moving the cursor with the four directional arrows, the user can speed through text quickly using the keys designated Word, Line, Paragraph, Page, and File. For those who use their systems for a variety of applications in addition to word processing and do not want to modify their keycaps, Samna provides a keyboard reference card (see Figure 1).

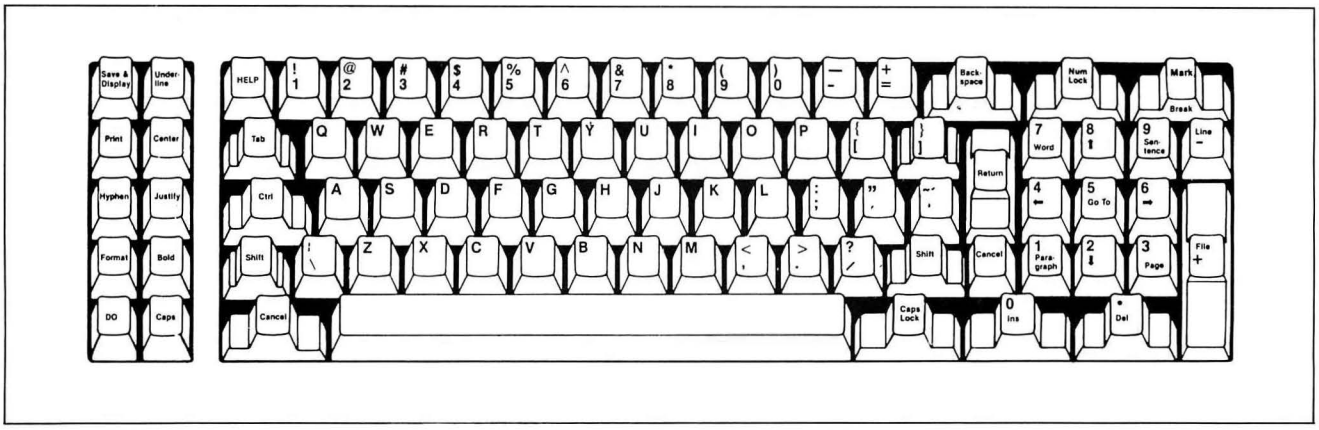

Figure 1: IBM PC keyboard with Samna Word II functions

Help, Help, and More Help

The first indication that this package is different comes when the software is loaded: instead of a menu, a blank page appears on the screen. Absent are the familiar questions that must be answered prior to beginning your work. *Samna Word II* lets you type up to 50 lines and print from the screen without having to create a file on disk. If more than 50 lines are typed, the program asks you to name the file before you continue. The advantage of this feature becomes ob-

vious when you need to create and print a short letter, an envelope, or a label.

The screen is designed to emulate a sheet of paper and supply constant feedback on a document's status. This emulation includes the ability to display underscoring, boldfacing, centering, intricate formats, and right justification on all or selected portions of your document. An inverse video band represents the left and right margins, and the first three lines of the screen display Help, Status, and Format.

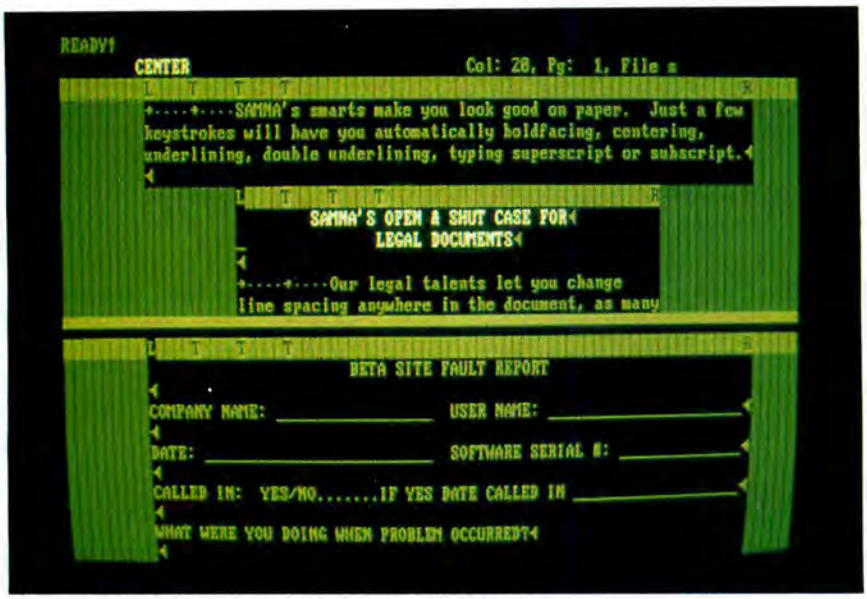

Figure 2: Help level two for "shading" feature

The three levels of the Help feature are so comprehensive that most people won't find the tutorial necessary. Level one offers a short question designed to help you remember the next keystroke; level two gives you a step-by-step guide through the function and is automatically activated if you press an incorrect key (see Figure 2); level three explains the function fully.

The automatic nature of the Help feature is another distinction between *Samna Word II* and other word processing packages. Instead of reprimanding you with the customary beep, the program provides information to correct your mistake. This is certainly a giant step in the direction of user-friendliness.

Below the Help line, the Status line displays the document's name, the page you are on, the cursor location, and the current mode of operation (e.g., center, bold, or underscore). The Format line displays your current margin and tab settings.

> One of the most exciting features is the capability to "fold" a wide page in the middle electronically.

Samna Word II uses a combination of mnemonics, menus, and function keys and yet maintains an operational consistency throughout all its word processing functions. First you define a function; next you specify the amount of text (usually by shading); then execute the operation. This consistent approach is illustrated in one of the most frequently used features, delete. Pressing the <Del> key activates the delete mode. Next, the unwanted text is shaded by advancing the cursor to the end of the block using the cursor controls or the keys designated Word, Sentence, Line, Paragraph, Page, or File. Pressing the <Del> key a second time executes the operation. If only a single character is to be removed, two consecutive depressions of the <Del> key are required.

Similarly, pressing the <Ins> key activates the insert mode. In this mode you can insert any amount of text, and any text entered assumes the current format. Once the insertion is completed, pressing <Ins> again deactivates the insert mode.

You can insert text from other files on the disk by typing <Ctrl>-<Ins> and the file name. This feature is useful for preparing boilerplate documents such as collection letters or legal agreements.

The use of the define/specify/execute approach is consistent throughout the program. Lessons learned during basic editing form the foundation for more extensive cut-and-paste editing functions such as move, copy, and formatting operations.

Windows and the Electronic Fold

Samna Word II's windowing capability makes it possible to display two documents or two portions of the same document on the screen simultaneously (see Figure 3). This feature eliminates the need to have a hard copy to consult when you are referencing another document. For example, if I want to refer to a statistical chart to review information for a report I am writing, I can devote the upper portion of the screen to the chart and the lower portion to the report. The two windows operate independently, and you can edit both documents simultaneously.

Samna Word II offers some exceptional features for statistical applications, including decimal alignment and unlimited document width. One of the most exciting features of this

Figure 3: Split screen showing two different files

word processing package is the capability to "fold" a wide page in the middle electronically, making it possible to view widely separated columns side by side. A second unique feature that is a boon in preparing wide statistical documents is the "zoom" feature. Zoom reduces the document displayed on the screen, allowing the user to see a large document that would otherwise be too large to view in its entirety. While editing is not possible in this mode, the ability to proof the overall format of the document is a tremendous asset.

Samna Word II easily handles information to be included at the top or bottom of each page. The user types these headers and footers in a window that appears when a header or footer mark is selected. Headers and footers can be any length, can be changed at any location in the document, and can even accommodate alternating left- and right-facing pages with automatic page numbering.

Footnoting, one of the most difficult word processing tasks, is performed elegantly by this package. While a number of word processing programs let you insert footnotes during document creation, few offer the ability to maintain the reference/page integrity after the document has been edited. With *Samna Word II*, no matter how much text you insert or delete, the footnote will usually appear on the same page as its reference. When less than two lines of the footnote fit on the page, *Samna Word II*'s widow/orphan line control takes over and moves the entire footnote to the following page. When you want to enter a footnote, open a window (<ScrollLock> F) and type the text of the footnote and the reference at the same time. You can either print the footnote on the same page as the reference or group all footnotes at the end of the document (see Figure 4).

Intelligent Search and Flexible Hyphens

Samna Word II's search and replace capabilities are flexible enough to find occurrences that are exact matches, that appear in a different case or mode, or that represent only part of a word. The program is intelligent enough to have the replacement match the form (uppercase or lowercase, bold, underlined, etc.) as well as the format (centered, justified, indented) of the original. *Samna Word II* also enables you to search in a forward or backward direction either automatically or interactively.

If you prefer the look of text with a tight ragged right margin over the straight edge of justified text, you will appreciate the formatting flexibility of *Samna Word II*'s hyphenation check mode. Here, the document is scanned for lines that are uncommonly short. The cursor races

Figure 4: Second print options menu showing footnoting options

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Review

through text, stopping and shading the first word on the line following a short line. The number of characters shaded represents the exact number of characters that will fit on the line above. Using the cursor controls, you can adjust the shaded characters so that the word is hyphenated correctly. Pressing <Enter> moves the cursor to the next hyphenation decision. If you decide not to hyphenate the word, pressing <Tab> lets you bypass the word and go on to the next. These "soft" hyphens will be deleted automatically when text is reformatted and the hyphen is no longer needed.

A Curious Omission

Samna Word II is undoubtedly a tough competitor in the fight for word processing software market share. But, like the other contenders, this program has its vulnerabilities. The most significant is its current inability to merge variable information into standardized documents. This is a serious omission. A word processing package that does not enable the user to prepare a mass mailing is missing a vital ingredient.

> Zoom reduces the document displayed on the screen.

Fortunately, Samna plans to include a mail merge feature in its upcoming word processing program, *Samna Word III*. In addition to merge capabilities, *Samna Word III* will include five-function math, automatic spelling verification, user-defined function keys, a phrase glossary, and an index generator. While it is encouraging that Samna intends to rectify its oversight in the new release, the merge feature should also be incorporated in *Samna Word II* as an upgrade.

Other idiosyncrasies, though not critical, are nonetheless bothersome. The program does not automatically underscore insertions placed within underscored text, making a second editing pass necessary. In addition, after the user deletes text from within a paragraph, the text from the right of the cursor to the end of the paragraph is readjusted automatically. For the most part, I like this feature. However, when you are working with exceptionally long paragraphs and need to make several deletions, the amount of time spent waiting for the text to stop moving around soon becomes annoying.

Road Maps

For the novice who is unfamiliar with word processing terminology, Samna's reference manual incorporates a "road map"—a two-page illustration of the most commonly used word processing functions, showing the page numbers where information can be found.

Another uncommon documentation approach is Samna's "Visual Guide." This guide provides a miniature drawing or photograph of each of *Samna Word II*'s features or capabilities and also lists manual page references. Unfortunately, the guide's miniature documents, keyboards, and screens are too small to be very useful.

The manual's functions section, however, is thorough and well executed. In addition to providing explanations and step-by-step instructions, this alphabetical listing offers a wealth of helpful hints.

Most importantly, the software itself is well written and includes an exceptional user interface. System prompts at the top of the screen guide the user through the steps of each function. Safeguards designed into the system protect your text from accidental loss. The program automatically stores text to disk every

few seconds to insure that you will never lose more than a few lines of text.

In user support Samna also appears to surpass its competition. Each *Samna Word II* program comes with 30 days of unlimited access to Samna's support team in Atlanta—a phone call away via a toll-free number. Samna also sends users an application newsletter called "Tips & Tricks" as well as free manual and software updates during the 30-day period.

> The program automatically stores text to disk every few seconds.

Samna has gone to great lengths to insure that every aspect of its product exceeds previous market offerings. From the consistency of its operations to its near-perfect screen-to-page relationship, the program exceeded my expectations of what a personal computer word processing package could do. With features like windowing, electronic fold, and intelligent formatting, *Samna Word II* has taken a long step toward making the PC emulate a dedicated word processor.

Merrily Shinyeda is the director of The Sierra Group, a Tempe, Arizona, based office automation marketing research and consulting company.

Samna Word II
Samna Corporation
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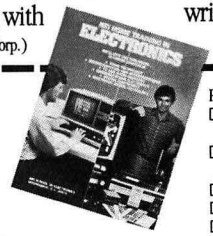

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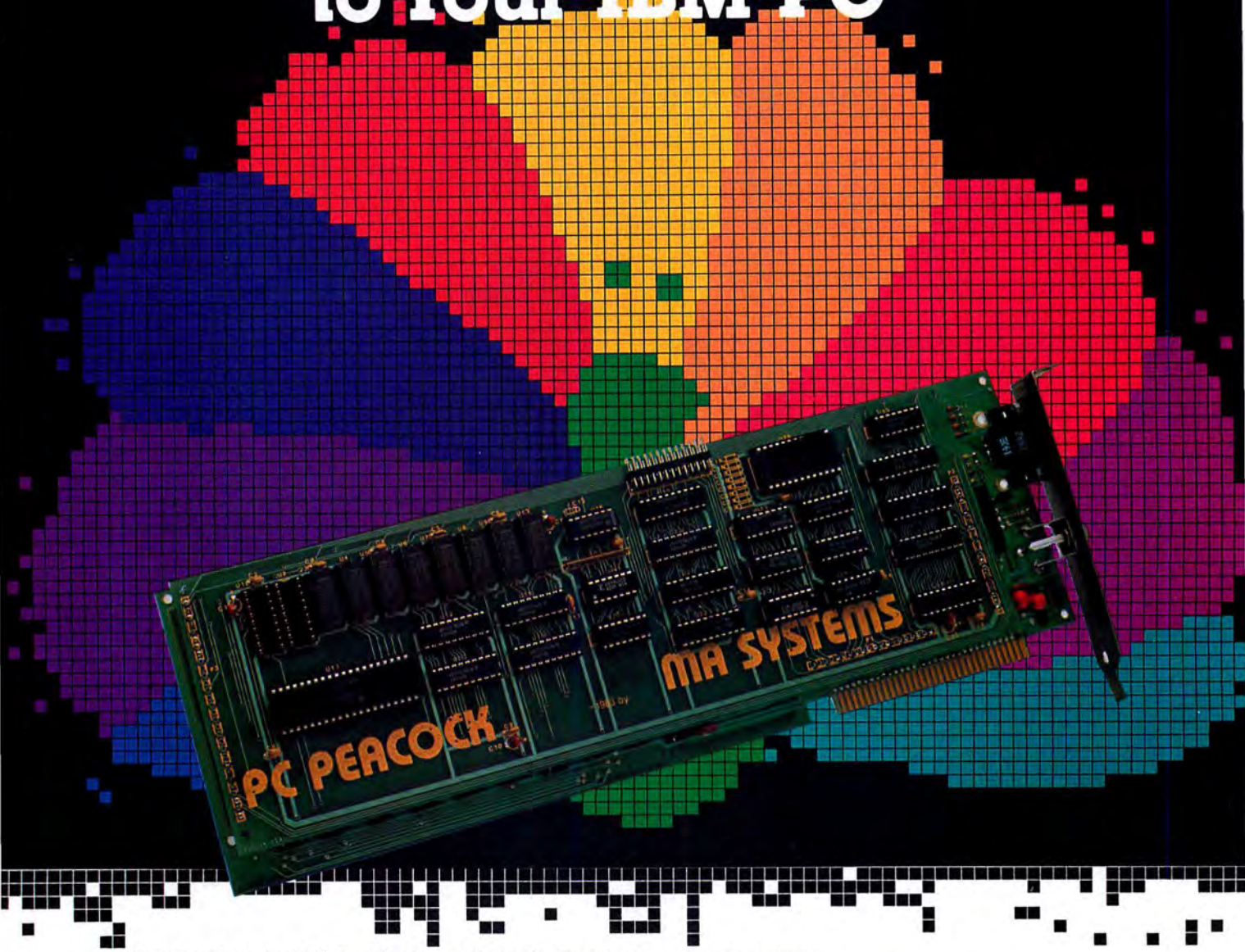

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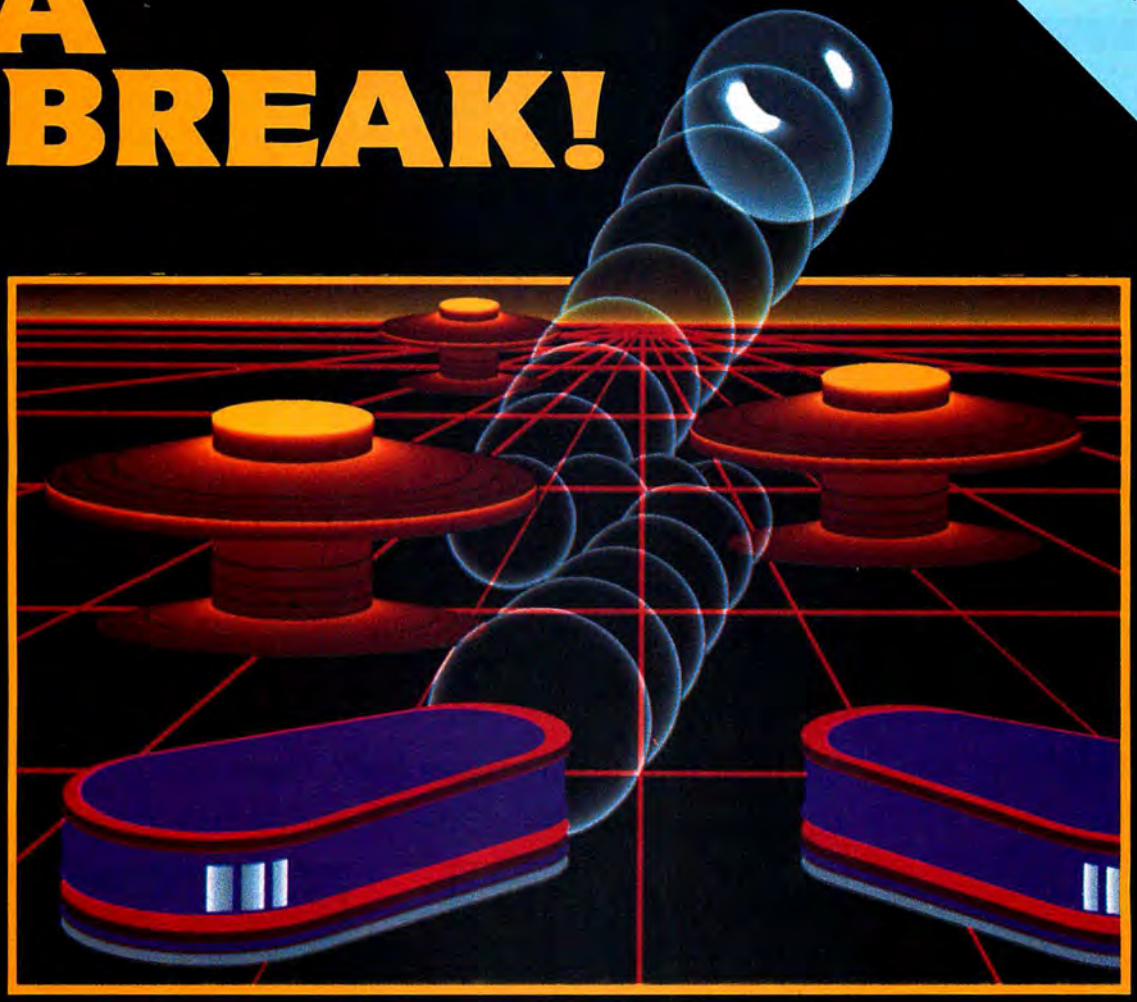

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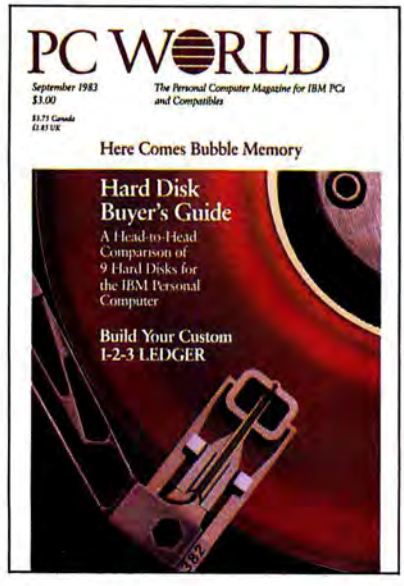

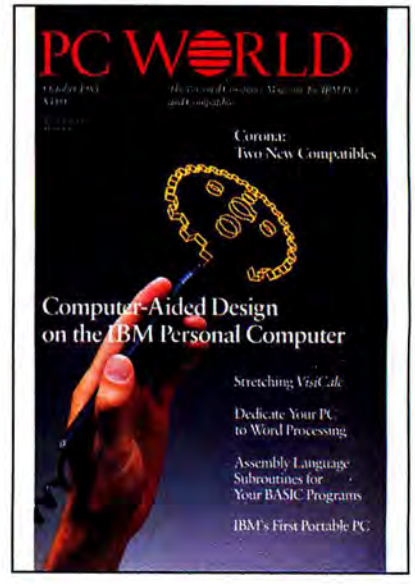

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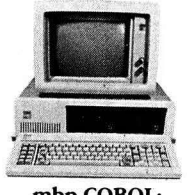

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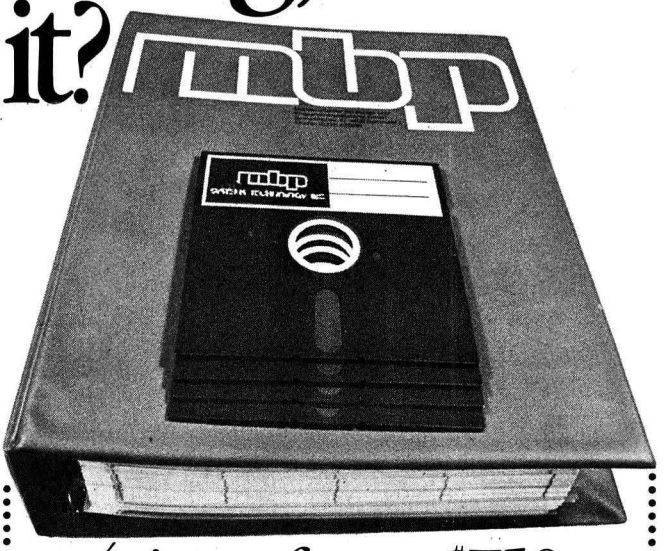

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ThinkTank

ThinkTank helps you to organize and develop your thoughts in a time-tested form—the outline.

Jonathan Littman

In his prophetic novel *1984* George Orwell warned of the potential for inducing thought control through technological means. Now that 1984 has arrived, we have what appears to be Orwell's nightmare on disk, a software program for the IBM PC touted as the "First Idea Processor."

Orwell needn't roll over in his grave. *ThinkTank* from Living VideoText is anything but an idea processor. But while that designation is inaccurate, it does point to *ThinkTank*'s closest relative—the word processor.

Although the program includes elemental word processing functions, *ThinkTank* is both more and less than a word processor. In its simplest form the program is an electronic filing cabinet for outlines. The user places ideas or information in a rough outline, and *ThinkTank* provides special features to expand or change the outline at any time.

After being stored in outline form, ideas or information can then be retrieved by means of searches similar to those used with data bases. For example, you can search by name, company, or date and can list or print outlines in standard or alphabetical order. *ThinkTank* outlines can be sent to a word processor or integrated with another program.

Those with little experience on the PC will appreciate the simplicity of copying DOS onto the *ThinkTank* disk.

ThinkTank may be part of a new generation of software, but that doesn't stop it from making old mistakes. When you start the program, you won't see instructions or even an introduction. Instead, the date appears at the bottom of the screen. A person experienced in using personal computers might enjoy this direct approach, but a novice may find it threatening. The date can be changed by pressing the right arrow key to move it up a day. If you always set the date, you will later be able to determine what version of an outline you are working on. To move past the date and into the program, press <Enter>.

> The screen becomes a fresh canvas for your ideas.

Despite that abrupt beginning *ThinkTank* is an elegant program. The screen becomes a fresh canvas for your ideas. At the top left corner is the beginning of any outline: the Summit. Your ideas go underneath the Summit. At the bottom of the screen is the command area. These three lines, highlighted by two strips of inverse video, display the instructions for manipulating your outlines.

Creating Outlines

The first step in creating an outline is pressing the <Ins> key and typing your heading. For an article explaining how to use *ThinkTank,* the outline might look like this:

+ Summit
+ Some Possible Uses for ThinkTank
  - Display ideas or information as outline
  - Organize and reorganize
  - Keep track of projects
  - Manage personal information
+ How to Create a Simple Outline
  - Press <Ins> key for a new heading
  - Press left arrow key to make heading larger
  - Press right arrow key to make heading smaller
+ How to Expand or Collapse Your Outline
  - Press <GrayPlus> key on numeric keypad to expand outline
  - Press <GrayMinus> key on numeric keypad to collapse outline
+ How to Add New Headings
  - Press <Ins> key to start new heading

Review

- Press arrow keys to move to insertion
+ Manipulating Outlines

One strength of *ThinkTank* is that information can be reviewed at different levels of development. If I wanted to "collapse" (abbreviate) the above outline, I'd move the cursor to the Summit and press the <GrayMinus> key to the right of the numeric keypad. The screen would then display '+ Summit'. The plus sign in front of a heading means that at least one more heading is underneath (in our case an entire outline). Want to see more? Just press the <GrayPlus> key. This "expands" the outline to the next level of development:

+ Summit
+ Some Possible Uses for ThinkTank
+ How to Create a Simple Outline
+ How to Expand or Collapse Your Outline
+ Manipulating Outlines

The <Enter> key can also be used to expand your outline. If you want to review the entire outline, continue pressing either <GrayPlus> or <Enter>.

The beauty of *ThinkTank* is that you carry out processes using keys whose names represent what they do. The <GrayPlus> key reveals deeper layers of your outline, and the <GrayMinus> key temporarily hides layers from view. Arrow keys move the cursor within the outline and can move headings to the right or left. *ThinkTank* provides both an elementary and an advanced mode for issuing commands. The elementary mode uses menus, while the advanced mode uses mnemonic codes and involves pressing the <Alt> key in conjunction with another single key.

It is no accident that a program that helps you organize your thoughts is itself logically designed. The process of using *ThinkTank* teaches simple logic. Though not designed for children, *ThinkTank* has a building-block approach to learning, thinking, and writing that makes it ideal for them. Writing becomes a game of putting pieces together.

Expanding to Text

ThinkTank doesn't lock you into expressing your ideas in outline form. Any time you wish to expand a heading or an idea, you can bring up the command menu with <F10> and enter the paragraph mode. In seconds you will be writing with an easy-to-use word processor.

ThinkTank's word processor uses simple commands and automatically reformats text while you edit. The cursor is controlled by the numeric keypad. Pressing the <End> key jumps the cursor to the end of the line, and pressing <Home> jumps the cursor to the beginning of the line. The <Ctrl> key amplifies the effects of those keys. Pressing <Home> or <End> with the <Ctrl> key moves you to the beginning or end of your paragraph. Deleting text is just as simple. The <Del> key deletes to the right, and the <Backspace> key deletes to the left.

ThinkTank is fast and well equipped to perform its tremendous expanding, collapsing, and rearranging tricks.

Not surprisingly, a word processor as simple as *ThinkTank*'s has limitations. Paragraphs or blocks of text are difficult to move, and formatting features are crude. There are no special effects such as boldfacing or underlining.

While the word processor may be restricting, the outline mode has abundant options. These can be viewed at the bottom of the screen by pressing <F10>. Most of the commands are self-explanatory, but help menus are available to explain each command.

ThinkTank commands help you control the structure of your ideas. The Window command lets you view any part of your outline that is not currently on the screen. The space bar can be used to scroll horizontally within the window. Move enables you to change the order and structure of your outline with the help of the arrow keys. Keyword searches an outline for a date or word or any pattern up to 80 characters long. Using Port you can send the outline to be stored on the work disk or to the printer. Files opens or closes new or existing outlines.

Extra gives you the secondary command menu, with more options for manipulating your outline. You can duplicate all or part of an outline with Copy. Alpha automatically alphabetizes or reverse alphabetizes subheadings, and Merge allows you to combine paragraphs.

ThinkTank's extensive editing features make changes easy. You can insert and delete text or exchange words and phrases. The Delete command enables you to delete sections of outlines, and the Restore command lets you restore your last deletion. The program's flexibility can be compared with throwing your crumpled notes in the trash basket and then retrieving them later in perfect form. With the Restore command you can get them right off the garbage truck.

Integrated Thinking

ThinkTank files are stored in simple ASCII code format, without any unusual formatting or control codes, and are therefore quite portable. With the Port command you can send an outline to a work disk, include it in a report, or even integrate it with financial data, models, or projections. Although you can send an outline to another word processor for further refinement, *ThinkTank*'s Port command has 16 excellent for-

matting features of its own. These control variables such as line spacing, margins, and depth of numbering for subheadings. Another feature allows you to create tables of contents. The format features you choose remain in effect until you change them.

When you print outlines directly from *ThinkTank*, each line appears on the screen after it prints. You can stop the print by pressing <Esc> and start it again by pressing the space bar.

ThinkTank is the easiest program I have ever used. If you understand the basic concepts of up and down and larger and smaller, this program is simple to learn. By using the numeric keypad for most of the basic commands, the designers have put *ThinkTank* above many of the cumbersome word processors that crowd today's market.

The function keys offer features that become more useful as your understanding of *ThinkTank* increases.

The program allowed me to develop my thoughts without having to separate the processes of outlining and writing.

Some allow you to define the degree to which you can expand or collapse parts of your outline. One will recall your last entry and another brings up a menu that explains the function keys. The menus are easy to read and free of superfluous information.

Other keys help make the program easy to use; for example, in most situations the <Esc> key cancels the current command. Since the cursor control keys on the numeric keypad are essential to the program, the <NumLock> key is disabled while you are using *ThinkTank*. That way you won't get an 8 when you think you're pressing the up arrow key.

ThinkTank requires 256K of RAM because it uses a lot of memory to expand or collapse an outline. It is conceivable that you might exceed the limit of 1000 expanded headlines. You can check how much memory you have left by issuing the % command.

Simplicity is one of the goals of elegant design. But achieving simplicity of function and appearance often requires an underlying complexity. Because it is written in Microsoft Pascal, *ThinkTank* is fast and well equipped to perform its tremendous expanding, collapsing, and rearranging tricks. When outlines are long, however, it may take a few seconds to read parts of them in from memory. You can eliminate this slight response time by using a hard disk or an electronic disk. A hard disk will also enable you to store longer outlines. *ThinkTank* includes instructions for placing the program on your hard disk.

Brainstorming with ThinkTank

I was skeptical of *ThinkTank* at first. Any program that promises to help you organize your thoughts could be dangerous. By encouraging you to think logically, might it not also curb the spontaneity that is the essence of creativity?

I don't pretend to know the answer to that question. I do know that little by little I found myself using *ThinkTank* for more than outlines. I even used it to brainstorm for this article. The program allowed me to develop my thoughts without having to separate the processes of outlining and writing. Perhaps creativity suffers under the organization made possible by *ThinkTank*, but developing ideas and eliminating repetition most certainly do not.

ThinkTank is an ideal tool for those who have difficulty putting their ideas into words. Writer's block is largely a fear of the tremendous freedom and responsibility of having to fill a broad expanse of page or screen. *ThinkTank* gives you a structure for your ideas. Nothing is final. You can change the structure as your ideas develop, like a painter adding layers, elaborating on a theme.

It took several years to develop the Apple version of *ThinkTank*. The more comprehensive IBM version was tested extensively before being made available to the public. Professionals from various fields—business executives to novelists—took part in the testing. The program is particularly useful for business. It's an excellent tool for an executive who drafts outlines or writes reports that can later be formatted on another word processor.

ThinkTank has applications far beyond traditional organizing and writing tasks. Mitch Kapor, president of Lotus, is having his designers use the program to develop version 2.0 of *1-2-3*. *ThinkTank*'s ability to change the structure of data is ideally suited to the turbulent process of designing software.

ThinkTank is an electronic filing cabinet whose drawers can be expanded at any time. But after you rattle off a few outlines, you may find that it is much more. *ThinkTank* provides a new way to develop and organize ideas. In that sense, it is a new tool of communication, as different from the word processor as the typewriter is from the pen.

Jonathan Littman is a freelance writer based in the San Francisco Bay Area.

ThinkTank
Living Videotext, Inc.
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Palo Alto, CA 94303
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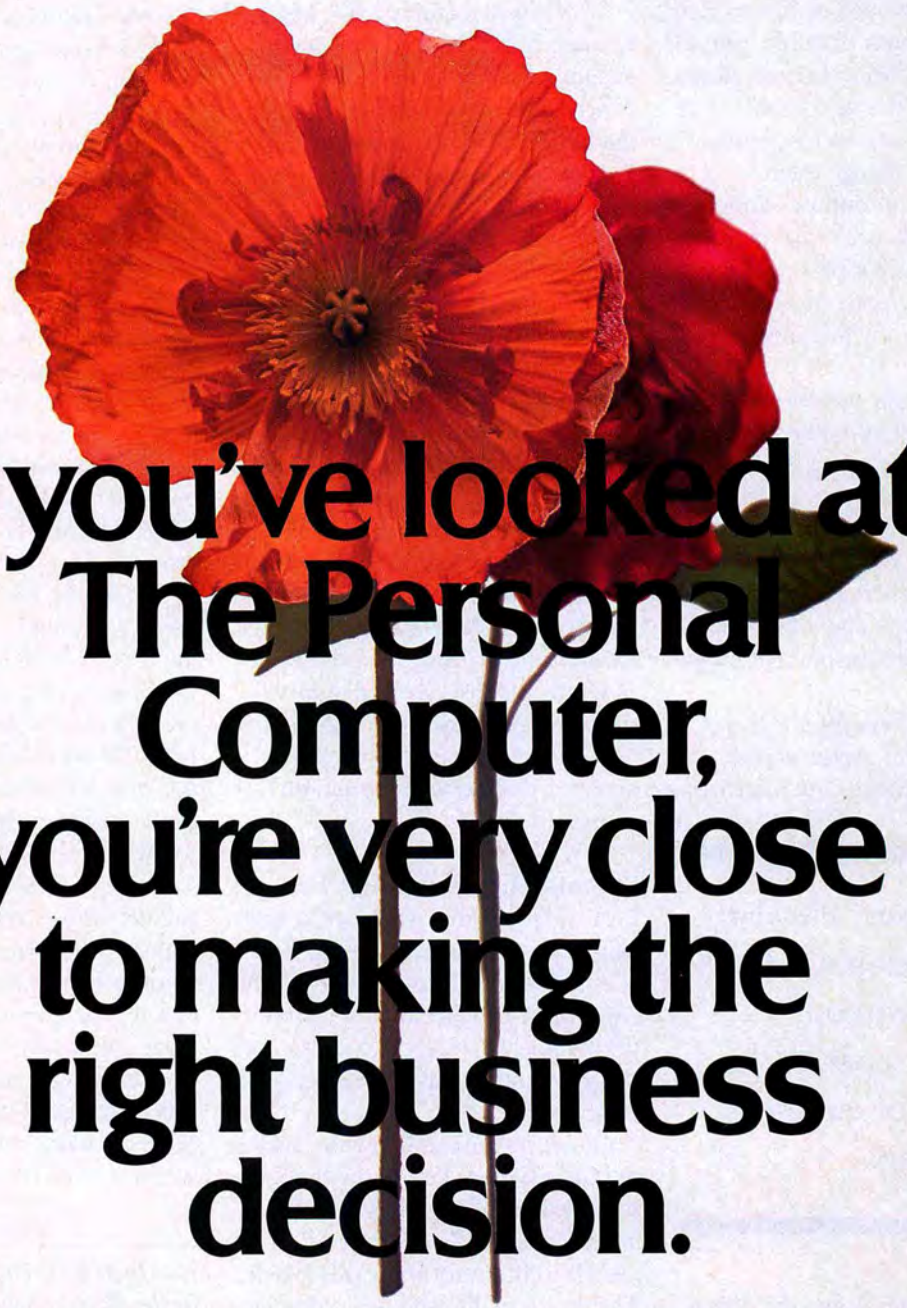

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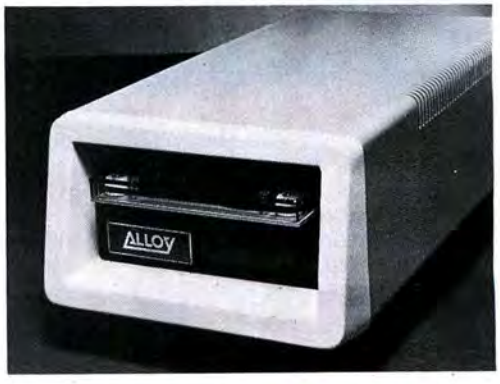

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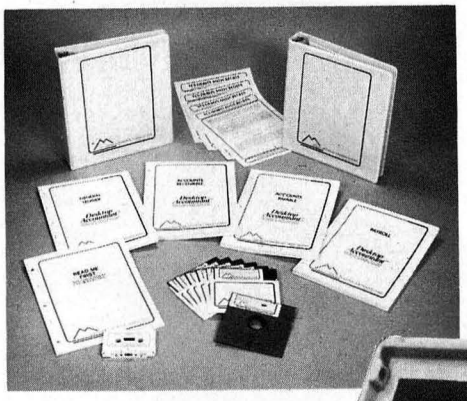

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But Is It Really FORTRAN?

Do FORTRAN compilers have what it takes to run "real" programs on the IBM PC?

Charlie Huizenga and Chip Barnaby

Berkeley Solar Group is a small energy consulting firm that makes extensive use of computer simulation programs that relate building design to energy consumption. Almost all the programs the firm uses are written in FORTRAN (the name is derived from FORmula TRANslation) and are intended for use on minicomputers or mainframes. As microcomputers have become more powerful and less expensive, their potential for running some of these powerful simulation tools is being explored.

One of Berkeley Solar Group's popular programs, *CALPAS3,* is used by architects and builders to predict energy use in conventional and passive solar buildings. *CALPAS3* is a relatively large program by microcomputer standards (10,000 statements) and runs quickly (20 seconds to one minute) on large machines. We chose it as a test program to explore the capabilities of the IBM PC.

Before we could install *CALPAS3* on the PC we had to address two major issues: program size and program execution speed. From past experience we knew that our choice of a FORTRAN compiler would greatly influence both these aspects, so we set out to review the available MS-DOS FORTRAN compilers.

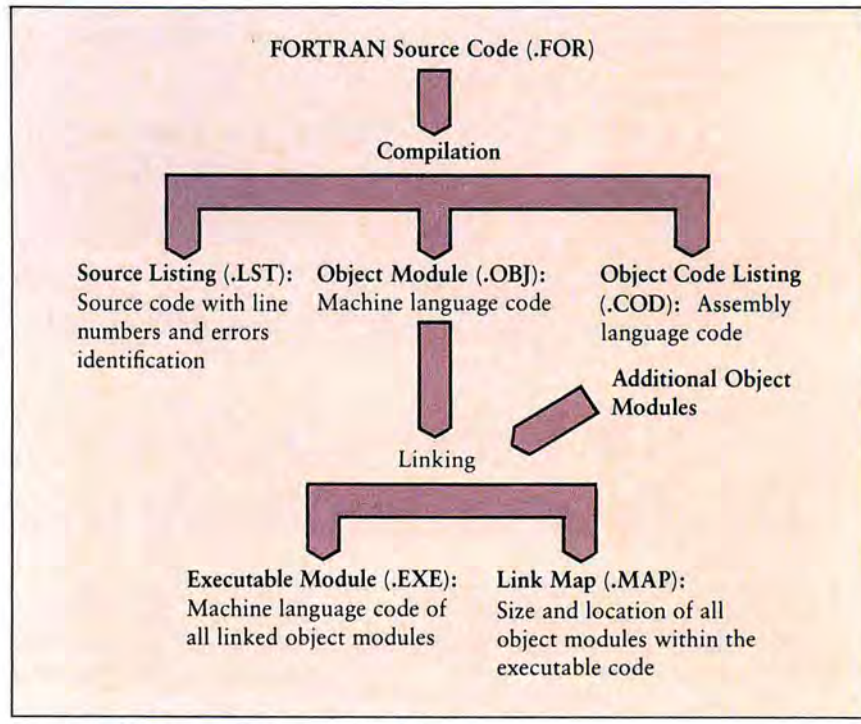

Figure 1: The compilation and linking process

Inside the Compiler

The central processing unit (CPU) of a computer cannot read and execute FORTRAN source code directly. FORTRAN compilers convert FORTRAN source code into a machine code so it can be understood by the CPU. This machine code, called an object module, is *relocatable,* meaning it can be placed anywhere in memory. Before execution, object modules must be linked and compiler libraries must be searched for any external references needed to build an executable program. An external reference may be a call to an intrinsic preprogrammed function, such as SIN(X) or SORT(Y), or a call to a subroutine or function. Linking al-

lows a FORTRAN program to be written and compiled in small, manageable sections, making the program more readable and easier to debug. The compiling and linking process is illustrated in Figure 1.

FORTRAN is a portable language; the same FORTRAN source code can be compiled and run on different machines (hopefully with the same results). The machine code that a compiler creates, however, is not portable, so every CPU must have its own FORTRAN compiler to create its specific machine code. We searched the market and found three currently available MS-DOS FORTRAN compilers: the IBM FORTRAN Compiler (written by Microsoft), the Microsoft FORTRAN Compiler (Microsoft's own version), and the SuperSoft FORTRAN Compiler. We determined that two disk drives and 256K of RAM was a reasonably common configuration for the IBM PC, and we set out to determine the feasibility of running large FORTRAN programs on such a machine.

In 1966 a FORTRAN language standard (ANSI X3.9-1966, or FORTRAN 66) was introduced by the American National Standards Institute (ANSI). The standard was adopted in an attempt to increase the portability of the language. In 1978 a new standard (ANSI X3.9-1978, or FORTRAN 77) was introduced that included many improvements to the language. Both standards have a full language implementation as well as subset language implementation, which is consistent with the full language but does not share all its capabilities.

IBM FORTRAN

IBM FORTRAN is an ANSI FORTRAN 77 subset language. The subset language has quite a few weaknesses compared with the full language. A major weakness is the absence of the BLOCK DATA statement. Initializing common blocks using DATA statements is impossible without this feature. Since this initialization technique is often used in FORTRAN programs, its omission is a significant problem; common blocks have to be initialized with a READ statement, and that increases the execution time of a program.

Another shortcoming of IBM FORTRAN is the lack of the double-precision data type. Since the main application of FORTRAN is in the scientific community where there is a need to represent a very large range of numbers accurately, this is a severe omission.

A major advantage of MS FORTRAN over IBM FORTRAN is its ability to use the 8087 numerical coprocessor.

IBM FORTRAN does have a few full-language features and some extensions to the full language. Full-language features include function calls and array element references in subscript expressions as well as DO variable expressions, those in I/O lists, and expressions in a computed GOTO statement. Extensions to the full language include backslash editing (which inhibits advancement to the next record), an end-of-file intrinsic function, and a series of metacommands that can be placed anywhere in the source and are designed to provide the compiler with information. The most useful metacommand is $DEBUG, which checks for arithmetic errors in the source code (such as dividing numbers by 0) and generates line numbers for run-time error messages. Other metacommands control the format of the listings, set the default size for storage allocation, allow inclusion of a specified source file in the compilation, and allow DO statements to recognize the FORTRAN 66 format.

MS FORTRAN

Not surprisingly, Microsoft's version of FORTRAN, MS FORTRAN, is similar in almost all respects to IBM FORTRAN. It has some important additions, such as the double-precision (REAL*8) data type, including all the double-precision intrinsic functions specified in the full language. MS FORTRAN also relaxes the FORTRAN standard regarding mixing variable types by using the $NOTSTRICT metacommand. This feature allows you to represent character expressions with noncharacter variables and use the equivalence statement to place character variables and noncharacter variables at the same location in memory.

A major advantage of MS FORTRAN over IBM FORTRAN is its ability to use the 8087 numeric coprocessor to perform high-speed real-number operations. Microsoft's implementation of the 8087 is quite clever, although the manual is somewhat confusing and incorrect in places. Essentially, you have a choice between linking a program with the 8087 library or the emulator library. If a program is run on a machine without an 8087, it must be linked with the emulator library. This generates code to perform real-number operations in software. If that program is later run on a PC with an 8087, the code is converted to include 8087 instructions during run time. This feature is very useful when you are marketing a program since one version can be used for applications with or without the 8087. If the program is always run on a machine with an 8087, using the 8087 library will result in a slightly smaller executable code (by about 8K).

SSS FORTRAN

SuperSoft's FORTRAN (SSS FORTRAN, which was developed by Systems Services Corporation of Urbana, Illinois) is a full implementation of the FORTRAN 66 language. It has some features that IBM FORTRAN and MS FORTRAN lack but

also some glaring limitations. For example, SSS FORTRAN is significantly limited in its representation of integers. The largest possible integer is 2 bytes (16 bits), or 32,768. Since the real numbers are represented in either 4 or 8 bytes, integers and real numbers can never be allocated the same amount of storage in memory. SSS FORTRAN's features include the BLOCK DATA statement, which allows initialization of common blocks, both double-precision and complex data types, substrings, and backslash editing (using the $ symbol).

The SuperSoft FORTRAN Compiler comes with an extensive library that includes many useful routines that, for example, get the system time and date, manipulate strings, and dynamically allocate memory. Like MS FORTRAN, SSS FORTRAN uses the 8087 coprocessor; but if you link a program with the emulator library, the code will not automatically convert to make use of an 8087 if it is present.

The Compilation Process

Compiling a FORTRAN program on the IBM PC is essentially the same no matter which compiler you use. The process begins by creating a source code file (with the .FOR extension) using EDLIN or any other editor. For the three compilers reviewed, compilation is a multiple-pass operation. The first pass reads the source code file, checking it for syntax errors; the second pass actually generates the object code. The Microsoft Compiler also has an optional third pass that generates an object code listing. The IBM Compiler can upon request also create an object code listing during its second pass. The SuperSoft Compiler does not create such a file.

Microsoft and IBM compiler first passes are nearly identical. Both provide informative error messages including the error code, a terse description of the error, and the line number at which the error occurred. Both compilers will optionally produce a source code listing with error messages inserted immediately after the offending statement.

SuperSoft has organized its first pass in a completely different manner. By default, the source code listing is "printed" to the monitor. It is similar to the IBM and Microsoft source code listings, but the error messages consist of error codes only. If the source code listing has more than 24 lines, the error messages will scroll up and off the screen. Of course, you can temporarily stop the output and look at it, but that can be somewhat cumbersome. You can send the source code listing to disk by using the /DISK switch when you compile, but you will not get an indication of errors in the program when you run the first pass unless you print out the source listing. This procedure is awkward when you are compiling several modules in batch mode. A third option, /LISTOFF, suppresses the source code listing and link map (which contains the size and location of the object module) but prints the error messages to the monitor.

> The SuperSoft FORTRAN Compiler includes many useful routines to get the system time and date, manipulate strings, and dynamically allocate memory.

The second pass actually creates the object code file and writes it to a file name that you specify. The SuperSoft Compiler creates a different object code file for each subroutine in your program, while both the IBM and Microsoft compilers create single object modules with multiple subroutines. If a source code file does contain subroutines, you should use the /RESPONSE switch on the second pass when you use the SuperSoft Compiler. This switch creates a file containing all the object code file names to be used in the linking process.

The object code listing option of the IBM and Microsoft compilers is useful. It prints the object code, written in assembly language, of the source code file broken down by line numbers. Using that option is also a good way for novice programmers to learn about the structure of assembly language, since you can see how each line of FORTRAN source code gets transformed into assembly code.

Once you have determined which switches and options meet your needs, you can create a batch file to run the compiler. This is especially beneficial when you are compiling many files. The source code listings should be sent to disk so that you can examine them afterward. The SuperSoft Compiler creates an object code file regardless of errors found during the first pass, while the IBM and Microsoft compilers do not.

Size Limitations

The size of the source code to be compiled is limited by three factors. These limitations are imposed by the design of the PC, not by the compilers. First, the executable code must fit onto a single disk. PC disk capacity is either 180K for a single-sided disk or 360K for a double-sided disk formatted with DOS 2.00. Formatted with DOS 1.10, disk capacity is respectively 160K and 320K. To give an indication of how this relates to

source code size, we used the Microsoft Compiler to compile a 220K FORTRAN source code module consisting of over 100 subroutines. The size of the executable code was 160K. Determining an exact relationship between source code size and executable code size is impossible because the relationship is dependent on how complex or how well the code is written.

The second size limitation is determined by the amount of internal memory available in the PC. This factor dictates how large a program can be loaded into the PC. The size of the loaded program can be determined by looking at the ending address of the last module on the .MAP file created by the linker.

The IBM Compiler consistently produced the largest object code modules and executable code. That not only decreased the maximum allowable size of the source code, but increased the execution time for the program. The Microsoft and SuperSoft compilers produced object code modules of comparable size, but the SuperSoft executable code was usually 40 percent smaller. This size differential is due to SuperSoft's libraries, which are considerably smaller than their IBM and Microsoft counterparts. For applications in which large programs are compiled, that is a distinct advantage.

The third size limitation on the source code involves the number and size of variables. The PC organizes data in 64K segments of memory. All local variables, constants, and blank common blocks reside in one of these segments. This segment also contains the "stack" and the "heap," which tell the processor where portions of code are located and how large they are; the total space taken up by all the local variables, constants, and

```
C************************************
C                                    *
C  This program computes the number  *
C  of pairs of rabbits after 12      *
C  months based on the Fibonacci     *
C  series.                           *
C                                    *
C  It emphasizes integer operations. *
C                                    *
C************************************

        PROGRAM RABS.FOR

        IMPLICIT INTEGER (A - Z)

        WRITE(*,101)
101     FORMAT(1X,'HOW MANY CYCLES ARE YA GONNA LET EM GO ? '\)
        READ(*,'(BN,I5)') N

        DO 20 I = 1,N
                FIB1 = 0
                FIB2 = 1

                DO 10 J = 0,12
                        FIB3 = FIB1 + FIB2
                        FIB1 = FIB2
                        FIB2 = FIB3
10              CONTINUE
20      CONTINUE

        WRITE(*,102) FIB3
102     FORMAT(1X,'THE NUMBER OF RABBITS AFTER 12 MONTHS IS ',I5)

        STOP
        END
```

Listing 1

```
C*********************************************
C                                             *
C                                             *
C This routine finds all non-prime numbers    *
C from one to the number specified (N).       *
C                                             *
C It emphasizes floating-point operations.    *
C                                             *
C                                             *
C*********************************************

      PROGRAM NONP.FOR

      DIMENSION NONPR(3000)
      INTEGER N

      WRITE(*,101)
101   FORMAT(1X,'JUST HOW HIGH DO YOU WANT TO GO ? '\)
      READ(*,102) N
102   FORMAT(BN,I5)

      NONPR(1) = 1
      I = 1

      DO 30 IPOS = 4,N
            POS = FLOAT(IPOS)
            DO 10 IDIV = 2,N
                  DIV = FLOAT(IDIV)
                  IF (POS/DIV.EQ.INT(POS/DIV)) GO TO 20
                  IF (DIV*DIV.GT.POS) GO TO 30
10          CONTINUE
20          I = I + 1
            NONPR(I) = IPOS
30    CONTINUE

      WRITE(*,103)NONPR(I)
103   FORMAT(1X,'THE LAST NON-PRIME NUMBER WAS ',I5)

      STOP
      END
```

Listing 2

blank common blocks cannot be larger than 64K minus the size of the stack and the heap. Since the stack and the heap rarely take up more than 4K, about 60K is left over. For example, a single REAL*4 variable array could have approximately 15K elements (15K elements * 4 bytes/element = 60K). If there are other variables, constants, or blank common blocks, the array must be smaller. Each named common block resides in its own segment, so it can be as large as 64K.

For applications such as *CALPAS3*, this limitation is not a problem. But many other scientific programs make use of very large arrays and would need substantial reformatting for the PC.

Speed Considerations

If you write many FORTRAN programs (or make a lot of mistakes on the few you do write), compiling speed is important. Waiting all day for source code to compile only to discover a misspelled word or a foolish mistake is a frustrating experience. We found that all three compilers operate quickly, although SuperSoft's is generally 30 percent faster. That speed is due in part to the size of the SuperSoft Compiler code, which is only one-fourth the size of the other two; thus, loading time for the program is considerably less. SSS FORTRAN compiles at a rate of approximately 300 to 600 lines per minute. Making use of a RAM disk emulator would make the process even faster.

```
C*************************************
C                                     *
C  This program was used to compare   *
C  the execution speed of the run     *
C  files created by the different     *
C  compilers.  It emphasizes LIBRARY  *
C  function calls.                    *
C                                     *
C*************************************

        PROGRAM FUNC.FOR

        IMPLICIT REAL*8 (D)

        WRITE(*,101)
101     FORMAT(1X,'HOW MANY CYCLES WOULD YOU LIKE TO MAKE ? '\)
        READ(*,'(BN,I5)') N

        DO 10 I=1,N

        X   = FLOAT(I)/100.
        DX  = DBLE(X)
        T   = TAN(X)
        DT  = DTAN(DX)
        S   = SQRT(X)
        DS  = DSQRT(DX)
        E   = EXP(X)
        DE  = DEXP(DX)
        SI  = SIN(X)
        DSI = DSIN(DX)
        M   = MOD(I,I)
        DM  = DMOD(DX,DX+1)
        MX  = MAX0(I,I+1,I+2)
10      DMX = DMAX1(DX,DX+1,DX+2)


        WRITE(*,105) N
105     FORMAT(1X,'FUNC DONE!! WE TOOK ',I5,' LAPS THAT TIME')

        STOP
        END
```

Listing 3

Execution Speed

One of the unresolved questions before we started the test was how fast the code would execute. We were confident that we could fit a large program on the PC, but what good would it be if it took days to run? To get a quantitative comparison of the three compilers, we wrote three small test programs and compiled them with the three compilers. One of the programs dealt primarily with integers (RABS.FOR), another with floating-point operations (NONP.FOR), and the last with intrinsic functions (FUNC.FOR) (see Listings 1 through 3).

Execution times were measured using an assembly language routine we wrote called TDDOS. The test programs were set up as subroutines of a generic timer MAIN program, and the interactive input was done there. The timer routine would call TDDOS to record the time (to the nearest 1/100 second), call the program to be timed, and then call TDDOS again to determine how much time had elapsed during the run.

If execution speed is important, you should use the 8087 coprocessor. That chip is specifically designed for rapid floating-point number manipulation. Both Microsoft and SuperSoft supply optional software to support the 8087 (IBM does not) consisting of a set of libraries that

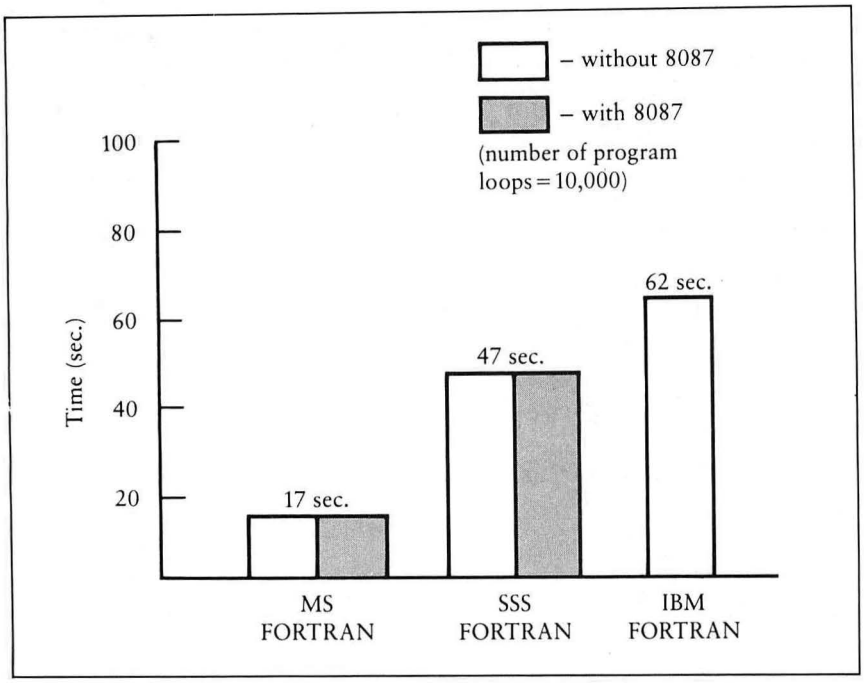

Figure 2: Execution time for RABS.FOR

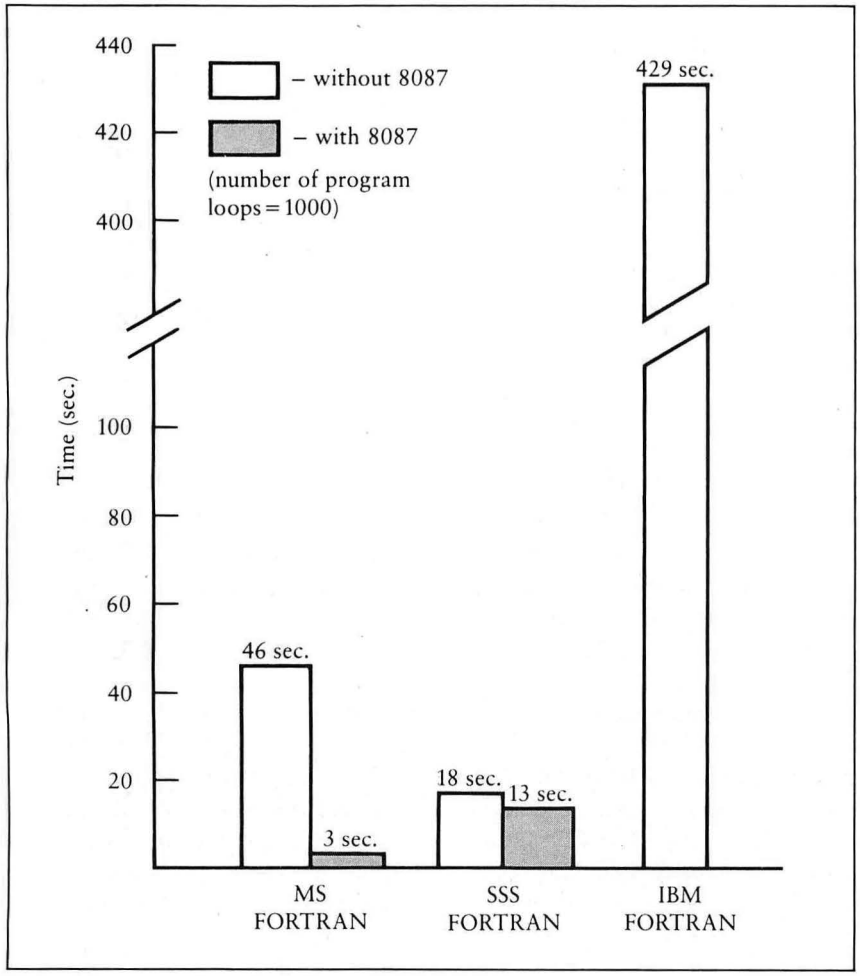

Figure 3: Execution time for NONP.FOR

make use of the 8087 hardware. When the 8087 is not present in the PC, the SuperSoft and Microsoft run-time systems emulate its operation by generating interrupt instructions to perform floating-point operations.

In terms of execution speed, IBM FORTRAN is clearly left in the dust (see Figures 2 through 4). It is so slow as to make it obsolete.

The results show that MS FORTRAN usually generates the fastest executable code. Note that the 8087 did not speed execution time at all for the integer-dominated routine. Keep in mind that the run times for the three programs should not be compared to each other to get a sense of which operations are fastest. For example, Microsoft ran the integer-dominated program in 17.2 seconds and the real-number program (with the 8087) in 3.2 seconds. These results do not indicate that real-number operations are faster than integer operations (they are not), but that the integer program ran in a loop a greater number of times.

Recommendations

Though the PC does have some definite size and speed limitations, it has the capability of running rather substantial FORTRAN programs. We found that putting *CALPAS3* onto the PC was an unqualified success. The program takes 10 to 15 minutes to complete an hour-by-hour energy simulation of a building for a one-year period. The operating system allows files to be spooled to the printer so that other operations can be continued while those files are printing. The batch capabilities of MS-DOS allow multiple runs to be completed without having an operator present.

The PC's major limitation lies in the way it allocates memory in 64K segments; the segment size cannot be enlarged. If this problem could be eliminated, the PC would be able to handle almost any program. The execution speed of FORTRAN programs is reasonable if the 8087 is used, but it is quite slow compared with that of larger machines. The ex-

Compiler	Language	8087 Implementation	INTEGER*4	REAL*8	Compiling Speed	Execution Speed with 8087	Execution Speed w/o 8087	Compiler Options
IBM FORTRAN	FORTRAN 77 (Subset)	No	Yes	No	Good	NA	Poor	.LST, .COD
Microsoft FORTRAN	FORTRAN 77 (Subset)	Yes	Yes	Yes	Good	Very Good	Fair	.LST, .COD
SuperSoft FORTRAN	FORTRAN 66 (Full)	Yes	No	Yes	Very Good	Good	Fair	.LST

Table 1: A comparison of features

ecution speed of large programs could be improved if some assembly language routines were written to make more direct use of the 8087 chip.

IBM FORTRAN has no advantage over MS FORTRAN. The IBM Compiler produces larger, slower code and has more language limitations. The Microsoft and SuperSoft compilers both have their strong points (see Table 1). We decided to use the Microsoft Compiler for our application for its INTEGER*4 capability and the flexibility of its 8087 implementation, though the SuperSoft Compiler creates smaller executable modules, making it attractive for many other applications.

Charlie Huizenga is a mechanical engineer and computer programmer who was responsible for converting Berkeley Solar Group (BSG) software for use on the IBM PC. Chip Barnaby is vice-president of BSG and the principal author of CALPAS3 *and other building energy analysis software.*

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IBM
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Requirements: 128K, one disk drive

Microsoft FORTRAN Compiler
Microsoft Corporation
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206/828-8080
List price: $350
Requirements: 128K, one disk drive

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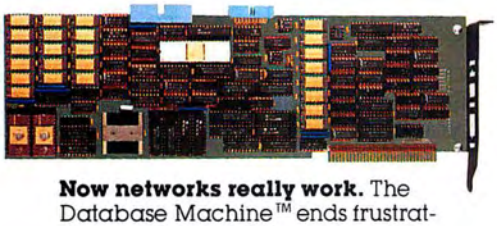

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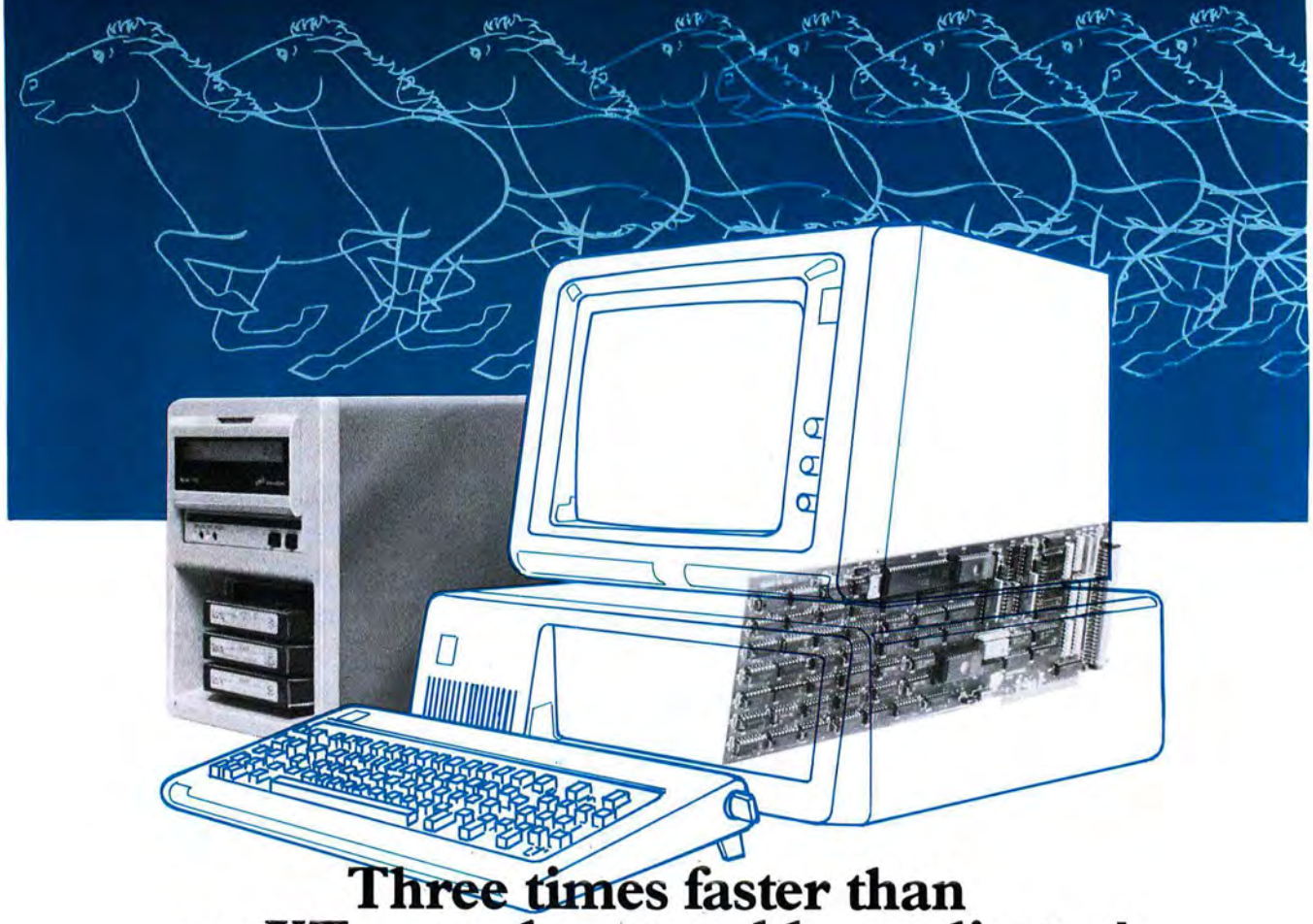

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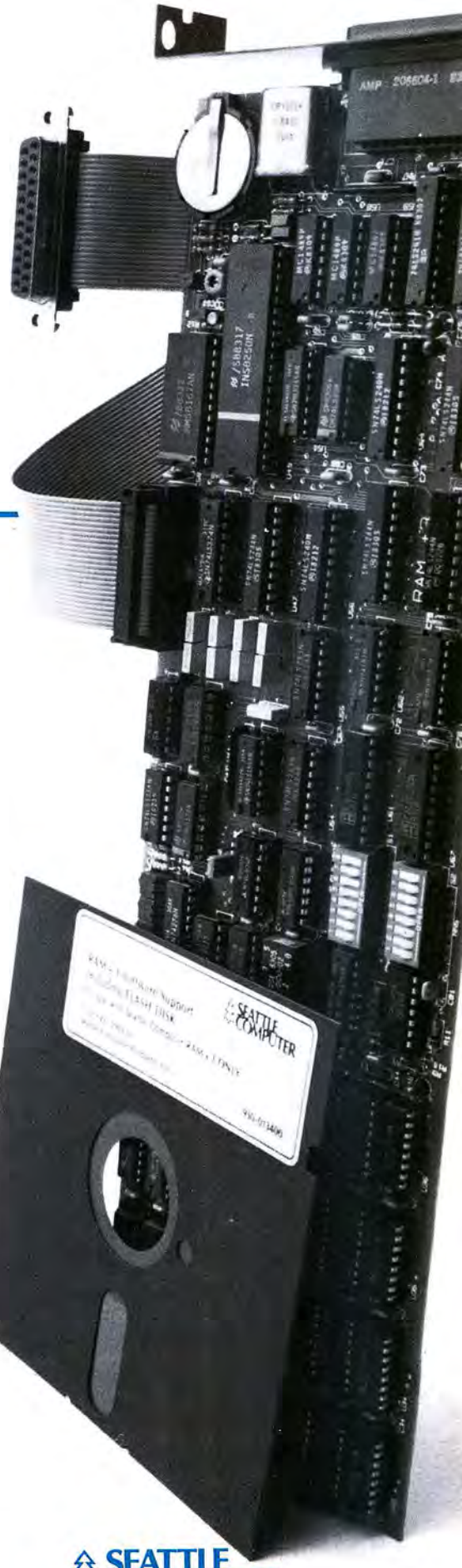

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Computer software has developed to the point that you can expect general accounting programs to provide features that let you answer "yes" to all of these questions. Although not every package falls into this category, the *TCS Total Accounting System* from TCS Software, Inc. does.

TCS Software's general accounting package has evolved through three generations, and it has reached a state of refinement that makes it a useful, thorough, and integrated accounting system. The *TCS System* consists of accounts receivable (A/R), accounts payable (A/P), payroll, general ledger (G/L), and inventory control modules, plus a file handling module that allows you to custom-tailor files and format nonstandard reports. You can purchase and use the modules separately, or you can integrate any combination of them.

Several features make the *TCS System* outstanding, including its set of standard reports, which present information in a variety of clear and concise ways. The program allows you to control detail in reports through interactive prompts.

Simple

Simple is a query and information filing program. It uses a question and answer approach to store, query, and report data from the files produced with the normal operation of the *TCS System*. *Simple* also lets you deviate from the standard reports provided by the system to produce your own. What's more, you can produce them without knowing how to program.

TCS calls *Simple* a "built-in data base management system." There's no doubt that *Simple* adds significant capabilities to TCS's general accounting packages, or that it gives the *TCS System* a significant advantage over packages that lack the option to modify file structures and/or produce user-specified reports. The module is not, however, a built-in data base management system, and it does not have the power to accomplish the broad range of file manipulation and reporting capabilities that a general accounting package written in *dBASE II*'s programming language, for example, does. If the *TCS System* were written in the *dBASE II* language, the ability to do ad hoc retrieval of any combination of fields in any records in the data base would be built in.

There is usually a trade-off between power and ease of use in any applications package. *Simple* exemplifies this trade-off. When compared to *dBASE II*, *Simple* is less powerful but easier for nonprogrammers to use. Producing custom reports with *Simple* is much easier than writing programs to produce the reports. For instance, rather than writing a program when you need to modify a file structure to include data within a specifically requested report, you add the new data into the *TCS System* with *Simple* by answering a series of questions.

> *Simple* lets you deviate from the standard reports provided by the system.

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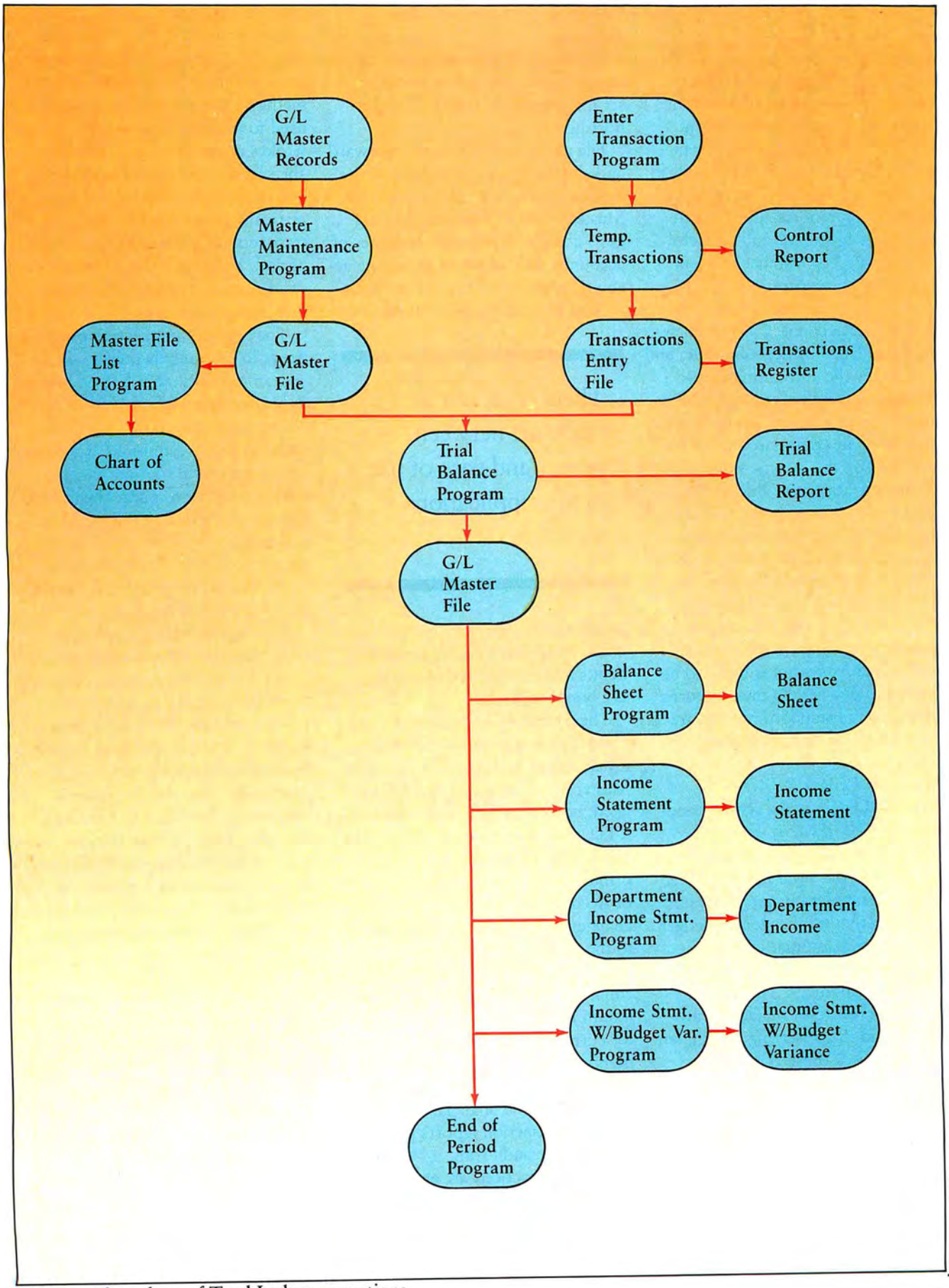

Figure 1: Flow chart of Total Ledger operations

Review

Standard Reports

If you don't want to spend a lot of time adding special reports to your accounting system, it's important that your system offer a broad range of reports. The *TCS System* excels in this area. It produces 58 reports or variations on reports, all of which are well designed and full of useful information. For instance, current expenditures, year-to-date (YTD), and budget values are reported for each master account. Cash disbursements are listed by account, date, and amount for the accounting period covered. Current month and YTD totals—both as absolute amounts and as percents of sales—are shown for each item on the income statement. An Income Statement Budget/Variance report shows current month and YTD data for actual budget variance and percent variance. These are highlights of the information reported in only one module, the *Total Ledger.* The *TCS System* offers such a breadth of information that any financial data you want is likely to be covered somewhere in these reports. Samples of all standard reports are included in the documentation.

The Total Ledger

The *TCS Ledger* is the central module in the *TCS System.* Figure 1 shows the relationships among the programs in the *Total Ledger.* All accounting transactions are either entered directly into this general ledger or transferred automatically to the ledger from the receivables, payables, and payroll modules. The module provides a record of financial transactions and the offsetting, double-entry balances of those transactions; financial statements that describe your business's current financial position; and budget-to-actual and actual-to-actual comparative data analyses over a two-year time frame.

The *Total Ledger,* like all of the general accounting modules, has a main menu and a series of question/response pairs that guide you through each main menu item. The *Total Ledger* main menu choices are subdivided into five categories: file maintenance, data entry, program setup, accounting transfers, and reporting.

File maintenance is straightforward and simple. The manual gives step-by-step instructions for creating the Master Chart of Accounts file, suggests account ranges for categories of accounts, and helps you define the accounts properly. It also defines asset accounts, capital/liability accounts, income accounts, and expense accounts and discusses the concept of debits and credits used in double-entry bookkeeping.

> There is usually a trade-off between power and ease of use in any applications package.

The Master File Maintenance program allows accounts to be established, queried, deleted, or changed. Master file accounts cannot be deleted, however, when the current or YTD amounts are nonzero. A Master File Listing program provides a printed version of the Master Chart of Accounts file for you to make changes, or you can bring accounts to the screen individually to make selective modifications. Each master account record has YTD and current-month fields, as well as budget fields for current and previous year by month or quarter. A Set Date menu option allows you to specify the date to appear on the financial statements and the transaction reports used in verifying the audit trail.

Daily transactions are easily entered by a code that TCS refers to as a *source code.* For example, a source code for cash transactions is assigned to each cash receipt and each cash disbursement, and these cash transactions are entered together. This entry method takes advantage of defaults used to minimize the number of keystrokes required to enter data into the system. The system keeps a record of repeating entries and automatically puts them into the transaction file for each accounting period. Validation checks (e.g., for valid account number) are also performed automatically.

The System Initialization program needs to be run only once to set up your company's name and address to appear on reports, report titles, account range definitions, and other system startup definitions. There are also some useful routines that tell the system whether to purge the transaction set at the end of the month or end of the year, whether to include or omit zero balance accounts on reports, and when page breaks are to occur in printed reports.

The Account Transfer program takes the end-of-the-month transaction data created by the accounts receivable, accounts payable, and payroll modules and places them in the general ledger temporary transaction file for further processing. This procedure integrates the general ledger with the other accounting modules. The Account Transfer program gives you the option of a control report to check for incorrect transactions. Transactions not accepted for transfer into the general ledger temporary file are listed in this report.

The End-of-Period Processing program prepares the master and transaction files for a new accounting period by adding the current monthly amounts to the YTD amounts and clearing the monthly account categories. When the End-of-Year Processing program is used, both the monthly and YTD amounts in each account category are cleared and all transactions are erased, readying the system for a new fiscal period. This procedure requires as much as one hour of elapsed processing time on

the IBM PC. However, the time you must invest (as opposed to elapsed computer time) to carry out the process should be less than a minute; you merely answer three questions and the system does the rest.

Other TCS System Modules

The receivables, payables, payroll, and inventory control modules, like the general ledger, are well written and thoroughly documented. These programs are the fine-tuned versions of earlier releases of the *TCS System* modules.

The *Total Receivables* module is a complete invoicing, monthly statement, and accounts receivable management reporting system. Its primary purpose is to track and report your company's aged accounts receivable. The module can be used with either open item or balance forward accounting methods. It prints invoices and statements on plain paper or on preprinted forms and provides an automatic customer billing option as well as an automatic interface to the *Total Ledger* module. Detailed daily transactions can be passed unbundled to the general ledger, or they can be consolidated at the end of the month for transfer.

The *Total Payables* module tracks current and aged accounts payable. The module prints checks automatically and produces a check register. It also helps you determine which bills to pay to take advantage of early payment discounts or to meet a cash requirement schedule. The *Total Payables* module also provides an automatic interface to the general ledger as well as automatic voucher creation for paying recurring bills such as a monthly building lease.

The *Total Payroll* module prepares periodic payrolls for hourly, salaried, and commissioned employees. All necessary tax information is collected, maintained, and reported during the process. In addition to producing reports for management

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Review

control, the payroll module generates local, state, and federal government returns. It prepares W-2 forms and maintains up-to-date reference information on each employee. The system contains built-in tables for federal withholding, FICA, and state taxes for all 50 states. These tables (or the methods of computing the taxes) can be modified without programming. Payroll checks are produced automatically, as are monthly journal entries to the general ledger.

> The *Total Payables* module provides an automatic interface to the general ledger.

The *Total Inventory* module provides a collection of management reports for inventory control. The module records current inventory levels for each inventory item; provides an audit trail for all transactions that change inventory status; and maintains a summary history of inventory status and movement or, optionally, provides a detailed inventory status history over the previous 12 accounting periods. The inventory module also handles multiple locations and departments and interfaces with the receivables module for invoice generation.

Documentation

The *TCS System* user manuals are as thorough and informative as the standard reports. The manuals are very detailed—so much so that they are cumbersome to use. But they are well organized and have comprehensive tables of contents. The tutorial sections of the user manuals are a useful feature. They contain sample data and reports for each module as well as a step-by-step discussion of the prompts and responses to expect when running the system. The tutorial sections can save you time as you learn to use the system or when you need to relearn it after being away.

The manuals are lengthy because they offer answers to many possible system prompts. (An on-line version of this information that you could call up with a help command would be a useful future enhancement.) Apparently the manuals were not revised for the PC-DOS version of the software; several references are made to the CP/M operating system but none are made to PC-DOS.

The *TCS System* is so thorough that it's difficult to imagine any special requirements of accountants and bookkeepers that would prevent them from using the package successfully. Still, it is unavoidable that some people will investigate or buy the *TCS System* and discover that the system is missing a feature important to them. The only sure way to avoid that problem is to custom develop a system, which for many is an overly expensive alternative. For most people, the *TCS System* is a good compromise.

George C. Hayles is a vice-president of PC Information, a company in Atlanta, Georgia, that provides training materials and information to business people on the practical uses of the IBM PC and compatible computers.

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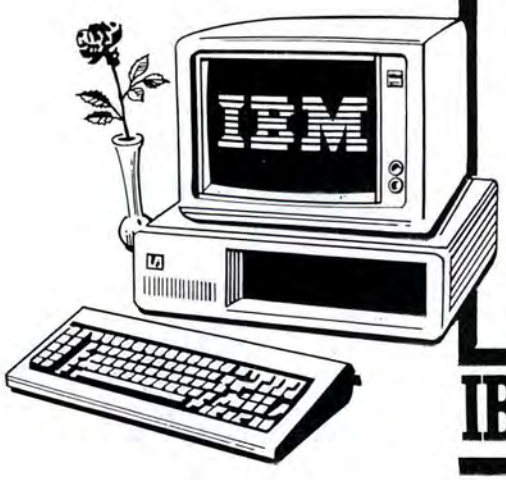

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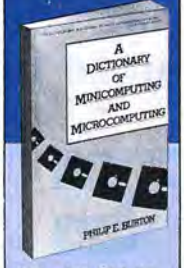

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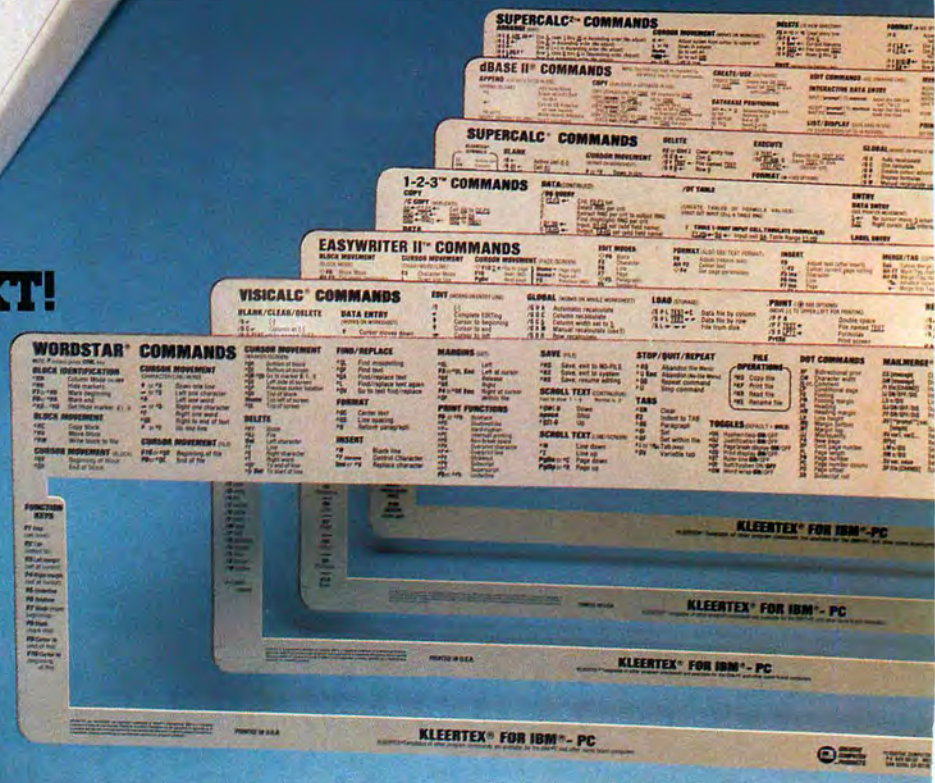

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Tracking Your Dividends

Andrew T. Williams

Accounting for your dividend income is a painstaking but necessary chore when tax time rolls around. Here's a spreadsheet model that will help take the pain out of keeping Uncle Sam happy.

Sometimes the worst thing about paying taxes is getting 12 months worth of information together for Uncle Sam. One of the areas I hate most is compiling information about dividend income.

The IRS wants a strict accounting of the dividends you have received from the companies whose stock you've owned throughout the year. If you're a typical trader, that can mean keeping track of 20 or more companies. And it takes an exhaustive search through 12 months of broker's statements to record all the dividends received during a year. Finally, the whole thing has to be entered into the appropriate blanks on the proper tax form. The process is tedious at best.

You can use the spreadsheet model to keep a complete record of your dividends and up-to-date information about how well your investments are doing. When you fill out your tax returns, just print the first two columns of the worksheet and staple them to Schedule B, the schedule for reporting dividend income.

The worksheet calculates the total return for each stock; namely, the total of the dividends received and the capital gain (or capital loss) on each stock. The total return is important for a complete picture of the performance of your investments, particularly for income stocks such as banks or utilities in which much of the profit from owning the stock comes in the form of dividends.

The worksheet also expresses dividend income on an annualized basis and calculates the dividend yield on each stock on the basis of both today's value and the purchase price.

The worksheet is constructed with *1-2-3*. Along the way you will learn how to use some of this powerful program's format commands and date functions. You can also reproduce this worksheet with a number of other spreadsheet programs such as *SuperCalc2*, *SuperCalc3*, and *VisiCalc Advanced Version*. All have date functions capable of reproducing the days-between-dates arithmetic used by the spreadsheet.

Constructing the Worksheet

The dividend worksheet (see Table 1) is divided into two parts so that the entire table can be printed at one time on standard 8 ½- by 11-inch paper in compressed type. The top part of the worksheet provides the summary information, and the bottom part gives quarter-by-quarter details.

Begin by setting the global column width to 12 characters with the command */Worksheet Global Column-Width* 12 <Enter> . If your holdings of a single stock or your total return on a single stock is more than $100,000, you will want to expand the width of columns D, I, and J.

Type in the column labels as they appear in Table 1. Note that the date under the title "1983 DIVIDEND RECORD" is not a label; it is a *1-2-3* date function. Type in the formula @TODAY so that *1-2-3*

will display the current system date. Use the formatting command */Range Format Date* 1 <Enter> to have the date displayed as it is in Table 1. For appearance sake, you can then use the command */Range Label-Prefix Right* to right justify all the column labels.

Next add the dotted lines by typing \- into the appropriate cells of column A. The backslash causes whatever character is typed (in this case the hyphen) to be repeated across the column. You can then use the */Copy* command to copy the dotted line from column A across the rows to column J.

Table 1 contains eight rows, but make your table large enough to accommodate the number of stocks you own. New rows can always be added with the */Worksheet Insert Row* command and formulas copied into the inserted rows.

The columns that display zeros (B, D, E, F, and G at the top part of the table and F and G at the bottom) contain formulas that will be discussed later. The columns that display four dots are for data entry. You can enter the dots in the appropriate cells of the first rows of the tables and then copy them down the table along with the formulas.

Formats

1-2-3 has a number of format commands that greatly clarify the worksheet. Begin by using the */Range Format $* command to place the currency format into columns B, C, D, I, and J of the top part of Table 1, and into all the columns except column A in the bottom part of the table. The currency format displays numbers with dollar signs, embedded commas, and a designated number of places to the right of the decimal point. It also displays negative numbers in parentheses.

Next, use the */Range Format Percent* command to format columns E, F, and G to display percentages in the top part of Table 1. The percent format multiplies the value in a cell by 100 and displays a percent sign in the appropriate place. As with the currency format, you can choose the number of decimal places to be displayed.

Date Formulas

1-2-3's date formulas work in conjunction with the */Range Format Date* command. The formula is used to enter the date, and the format is used to display it.

1983 DIVIDEND RECORD
23-Sep-83

STOCK	Y-T-D DIVIDEND	PRIOR YEARS DIVIDEND	TOTAL RETURN	YIELD ON PURCHASE VALUE	YIELD ON TODAY'S VALUE	ANNUALIZED TOTAL RETURN	DATE OF PURCHASE	VALUE AT PURCHASE	VALUE TODAY
IBM	$172.00	....	$1,734.50	3.16%	2.76%	33.38%	02-Apr-83	$10,900.00	$12,462.50
DJ	$90.00	$177.00	$7,292.00	3.04%	1.09%	78.72%	20-May-81	$3,950.00	$10,975.00
SLB	$144.00	$176.00	$1,245.00	1.84%	1.69%	6.99%	07-Jan-82	$10,425.00	$11,350.00
MIL	$52.50	....	($997.50)	1.88%	2.07%	-33.59%	18-Jun-83	$11,175.00	$10,125.00
....	$0.00	....	$0.00	0.00%	0.00%	0.00%	....	....	....
....	$0.00	....	$0.00	0.00%	0.00%	0.00%	....	....	....
....	$0.00	....	$0.00	0.00%	0.00%	0.00%	....	....	....
....	$0.00	....	$0.00	0.00%	0.00%	0.00%	....	....	....
TOTAL:	$458.50								

STOCK	1ST QUARTER	2ND QUARTER	3RD QUARTER	4TH QUARTER	Y-T-D DIVIDENDS	ANNUALIZED DIVIDEND
IBM	....	$86.00	$86.00	....	$172.00	$344.00
DJ	$30.00	$30.00	$30.00	....	$90.00	$120.00
SLB	$48.00	$48.00	$48.00	....	$144.00	$192.00
MIL	....	....	$52.50	....	$52.50	$210.00
....	....	....	....	....	$0.00	$0.00
....	....	....	....	....	$0.00	$0.00
....	....	....	....	....	$0.00	$0.00
....	....	....	....	....	$0.00	$0.00
TOTAL:	$78.00	$164.00	$216.50	$0.00	$458.50	

Table 1: Dividends worksheet

The formula in cell F4 (@TODAY) reads the system calendar. In Table 1 the @TODAY formula returns a number such as 30,582. *1-2-3* stores dates as the number of days since the beginning of the century (January 1, 1900). The date number 30,582 corresponds to September 23, 1983. Since it is not very informative to have 30,582 at the top of the table, Lotus provides the */Range Format Date* command to convert date numbers into an understandable format. There are three options: Day-Month, Month-Year, and Day-Month-Year. I chose this last option for Table 1.

The date format can be set without making any entries; that is recommended for cells in column H. Later, when you enter a particular stock, you will use the @DATE formula to enter the purchase date.

Formulas

Table 2 lists the formulas entered into the cells in the first row of each part of the worksheet and the summation formulas at the bottom of each part. Most of the for-

Cell	Formula
	Year-to-Date Dividends
B13	@SUM (B29..E29)
	Total Return: Capital Gains (or Losses) Plus Dividends
D13	(J13+B13+C13)–I13
	Yield on Purchase Value
E13	@IF (I13, G29/I13,0)
	Yield on Today's Value
F13	@IF (J13, G29/J13,0)
	Annualized Total Return
G13	@IF (I13, ((((J13+B13+C13)–I13)/I13)/(F4–H13))*365,0)
	Year-to-Date Dividends
F29	@SUM (B29..E29)
	Annualized Dividends
G29	@IF (E29, 4*E29, @IF (D29, 4*D29,@IF(C29,4*C29,@IF(B29,4*B29,0))))
	Sum of 1st Quarter Dividends, all stocks
B38	@SUM(B29..B36)
	Sum of 2nd Quarter Dividends, all stocks
C38	@SUM (C29..C36)
	Sum of 3rd Quarter Dividends, all stocks
D38	@SUM (D29..D36)
	Sum of 4th Quarter Dividends, all stocks
E38	@SUM(E29..E36)
	Sum of Year-to-Date Dividends, all stocks
F38	@SUM (F29..F36)

Table 2: Formulas for the cells in the first row of Table 1 and the totals at the bottom of the table

mulas are straightforward, but some require explanation. The @IF functions in cells E13, F13, and G13 prevent ERR from appearing when division by zero occurs when there is no stock on the line. For example, the formula in cell E13 is:

@IF(I13,	G29/I13,	0)
Logical	Evaluate	Evaluate
Expression:	When Logical	When Logical
TRUE or	Expression	Expression
FALSE	is TRUE	is FALSE

As with @IF functions on most spreadsheets, the *1-2-3* @IF function is made up of three arguments. The first argument must be evaluated as either logically true or logically false. If it is true, the function evaluates the second argument. If false, the @IF function evaluates the third argument.

The difference between *1-2-3*'s and other programs' @IF functions is that with *1-2-3* the value of the entry in a cell can be used instead of the more traditional logical expressions that use logical operators such as greater than and less than. If a cell contains a numeric value other than zero, it is considered true. If it contains zero or text, it is considered false.

In the formula above, the @IF function places a zero in cell E13 whenever the first expression is false. This situation occurs when there is no entry on the line and cell I13 is empty. If there is an entry, I13 is different from zero (hence true), and the @IF function performs the division in the second argument.

The next formula to look at is in cell G13. It calculates the total return for a stock as an annual percentage growth rate. To make this calculation the total return from cell D13 is first converted to a decimal fraction by dividing it by the purchase price from cell I13. Then the decimal fraction is divided by the number of days the stock has been owned.

The number of days a stock has been owned is given by the term (F4-H13). The cell designation F4 refers to today's date number stored in cell F4. The dollar signs are the means by which *1-2-3* signifies an absolute cell reference. Absolute cell references do not adjust when a formula is copied into other cells. The other term, H13, refers to the cell containing the purchase date, again stored as a date number. The difference between the two date numbers is the number of days the stock has been owned.

Once the decimal equivalent of the daily total return is calculated, it is a simple matter to multiply it by 365 to obtain the annualized total return on the stock in decimal form. The percent format then displays the annualized total return as a percentage.

Finally, to calculate the annual yield on a stock, you need to estimate the dividends you would receive if the stock were held a full year. There are several ways to do this, although each method has its shortcomings. The method chosen for Table 1 multiplies the latest quarterly dividend by 4 to arrive at the annualized dividend. The long formula in cell G29 uses nested @IF functions to determine the last quarter in which a dividend was paid. After identifying the appropriate quarter, the dividend is multiplied by 4 to estimate the annual dividend.

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It is assumed that the latest dividend rate will continue and that the return based on the dividend actually being paid is the relevant yield to calculate. A problem does arise, however, if a special or extra dividend is paid on a stock. In such cases, you must make alternative yield calculations.

When you have finished entering the formulas, use the */Copy* command to copy the formulas down the columns of your worksheet. Copy cell B13 to the range (B14..B20). Then copy the range (D13..G13) to the range (D14..G20). Finally, copy the range (F29..G29) to the range (F30..G36). If you are constructing the worksheet with a program other than *1-2-3*, the only formula containing an absolute reference is the formula in G13 that refers to cell F4. All other cell references are allowed to adjust as the formulas are replicated down the columns.

> 1-2-3 has a number of format commands that greatly clarify the worksheet.

Using the Worksheet

To use the worksheet in Table 1, fill in the blanks. You can add stocks as you purchase them and enter dividends as they are paid throughout the year. You will always know the latest total return on each stock you own.

When you sell a stock, freeze the total return on the sale date by entering the numbers that correspond to the Annualized Total Return on the sale date into the appropriate cell in column G. This replaces the formula in that cell, and the annualized return will cease to change with the passage of time. At the end of the year, print columns A and B from the top of the table and staple them to your tax return. If you wish, you can alphabetize the columns with *1-2-3's /Database Sort* command.

To prepare the worksheet for the following year, add the Year-to-Date Dividends from column B to the Prior Year Dividends in column C. Eliminate any stock sold during the past year with the */Worksheet Delete Row* command. While this worksheet won't make paying your taxes any easier, it will take some of the pain out of the tedious job of keeping your tax records.

Andrew T. Williams is the author of WHAT IF...A Guide to Selecting and Using Electronic Spreadsheets on the IBM PC, *John Wiley & Sons, Inc., 1984. He is currently writing a book on* 1-2-3, *also to be published by John Wiley in 1984.*

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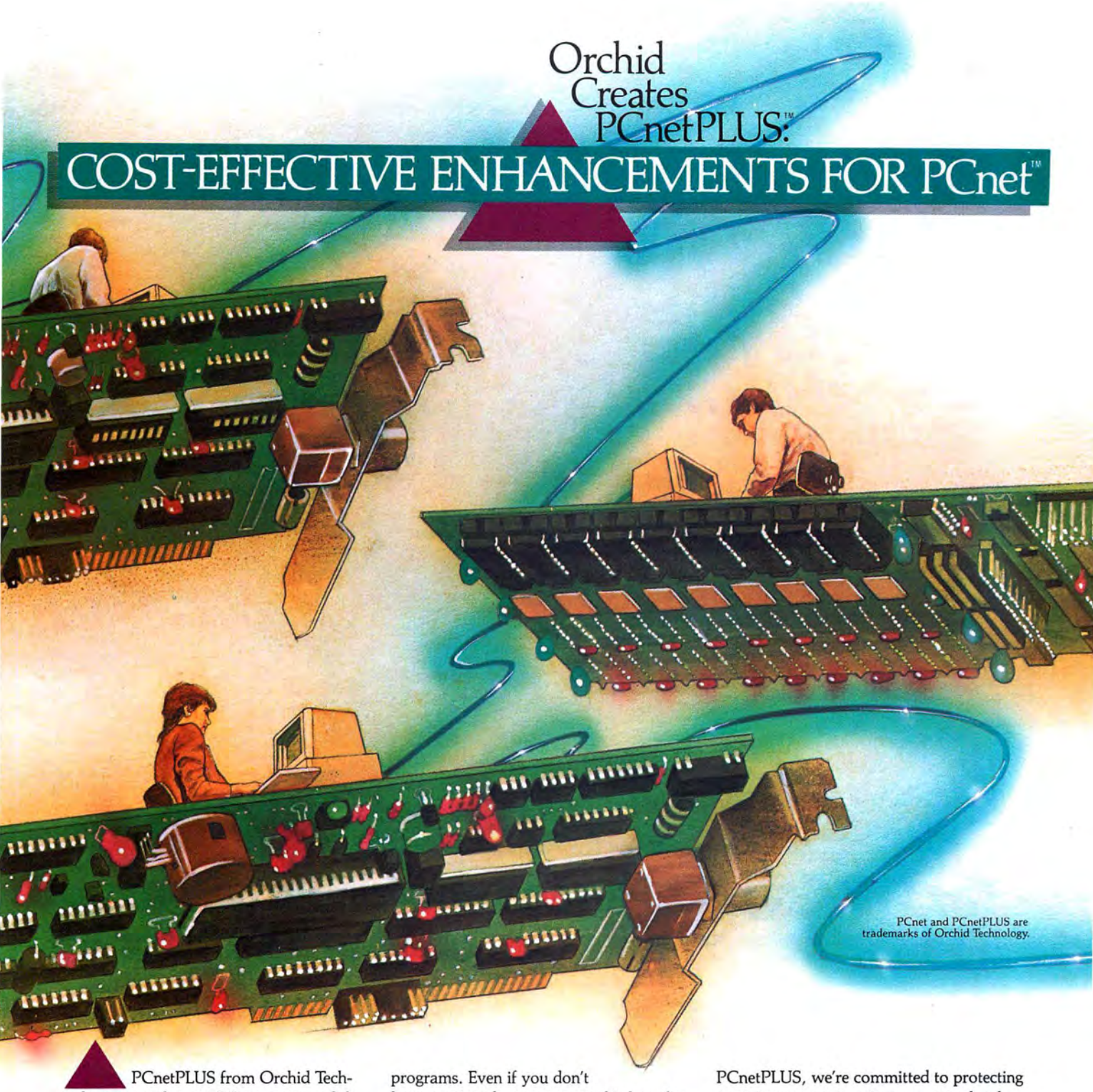

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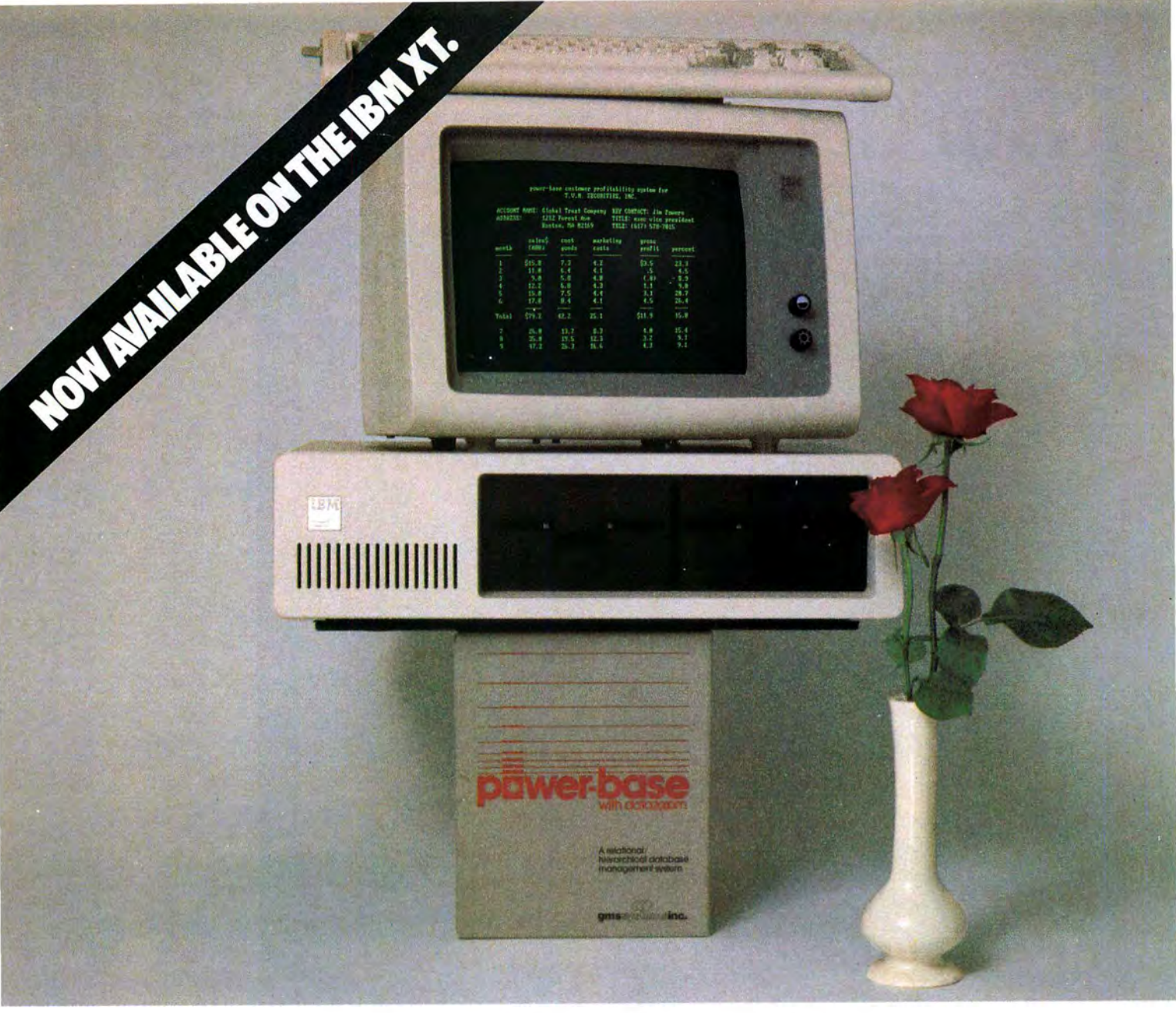

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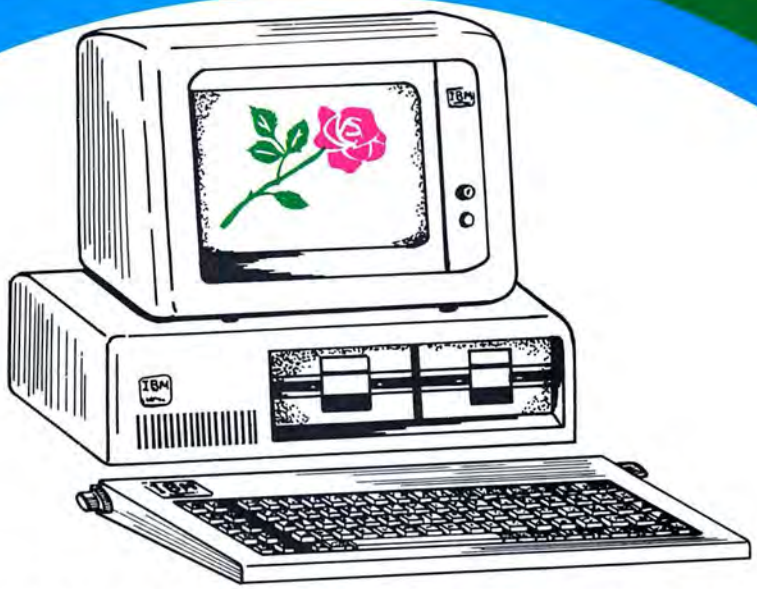

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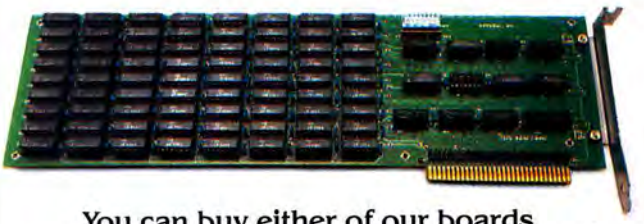

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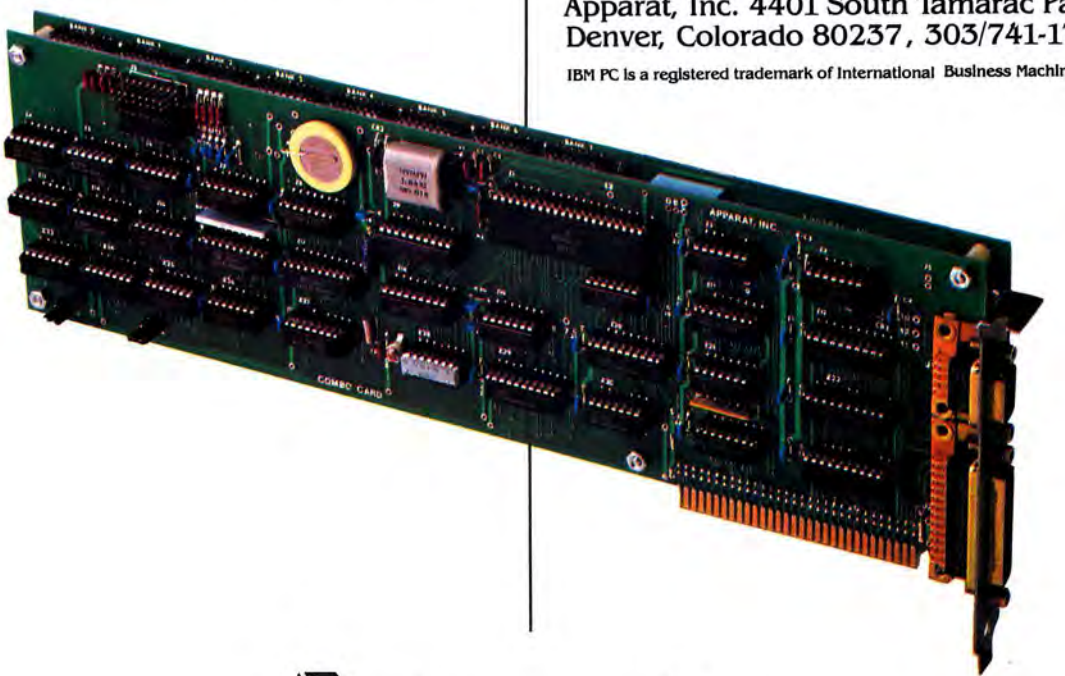

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Making a Date

A short assembler program that puts your system date to work

Steve Manes

Though I'm not a prolific writer, I spend at least two hours a day with my IBM PC and *WordStar*. With the exception of my work as a musician, that is more time than I'm likely to spend doing anything else. As an early convert to the IBM PC, I've found it interesting to watch the evolution of the PC and *WordStar* over the last two years. Those who used the first *WordStar* remember what a disappointment it was; printer output was slow, files crashed easily, and there was no comprehensive installation program.

Using the CP/M *WordStar* assembly interface notes from MicroPro and a few tips from friendly programmers, I managed to patch a number of the more annoying faults in *WordStar*. But MicroPro finally heard the mounting roar of discontent from users and responded by releasing several *WordStar* updates. I picked up a copy of *WordStar 3.3*, and with RoseSoft's *ProKey* at last had the word processor I always wanted.

I spent my first week with *ProKey* entertaining myself with the included *WordStar* macro starter set. One of the macros I created loaded my name and address to a letter, asked for the addressee's name, dipped into a mailing list file, and put the name and address on the document.

Taking the Date

To write the system date into a text file, I wrote a compact (508-byte) .COM program that loads the current date in correspondence form to a text file called DATE.DOC; it is pulled in by *WordStar* with the <Ctrl>-KR command, which reads the file into the current document. It should be noted that any word processor that reads ASCII files can use this program.

The program is called TODAY.COM (see Listing 1). It is a straightforward, interrupt-driven program that requires DOS 1.10 or 2.00 and the *Macro Assembler*. Originally written as an .EXE file, it is pared down to the .COM format to save on disk space and loading time.

1983
NOVEMBER
11
FRIDAY

```
;-------------------------------------------------------------------------;
; TODAY.ASM (c)1983                                                       ;
; IBM PC Macro Assembler                                                  ;
; Steve Manes, Roxy Recorders, NYC    September 15, 1983                  ;
;   -all commercial rights reserved by author.                            ;
; Writes the current system date, in correspondence form, to ASCII data   ;
; file DATE.DOC on the current drive.                                     ;
;-------------------------------------------------------------------------;
        Title           TODAY
;----------------------;
; PROGRAM CONSTANTS    ;
;----------------------;
          cr    equ     13                      ; carriage return
          lf    equ     10                      ; line feed

CSEG    SEGMENT PARA    'CODE'
TODAY   PROC    FAR
        ASSUME CS:CSEG,DS:CSEG,ES:CSEG,SS:CSEG
        ORG     100h
Begin:          ; PROGRAM CODE BEGINS
                ; WRITE INTRO MESSAGE AND FETCH CURRENT SYSTEM DATE
        lea     dx,prog_name
        mov     ah,9                            ; PRINT STRING function
        int     21h                             ;  (display program title)
        mov     ah,2Ah                          ; FETCH SYSTEM DATE function
        int     21h                             ; On exit:  CX = Year (1980-2099)
                                                ;           DH = Month (1-12)
                                                ;           DL = Day (1-31)
        push    cx                              ; save year on stack
        push    dx                              ; save month/day on stack
                ; POSITION BX POINTER TO CORRECT MONTH IN STRING
        xor     bx,bx                           ; clear the count register
        mov     bl,dh                           ; get current month to BL counter
        lea     di,month                        ; point to top of month variable
        dec     bx                              ; month = month-1
        jz      write_month                     ; month = 0? (DI already positioned)
month_offset:   ; SCAN MONTHS FOR BX OFFSET
        mov     al,' '                          ; character to find = ASCII blank
        mov     cx,12                           ; dummy value for SCASB instruction
        repne   scasb                           ; scan string
        dec     bl                              ; decrement counter
        jz      write_month                     ; if counter BL=0, leave loop
        inc     di                              ;  otherwise, offset to next character
        jmp     month_offset                    ;  after blank and loop again
write_month:    ; WRITE MONTH TO DTA BUFFER
        mov     si,di                           ; transfer string pointer to SI
        lea     di,dta                          ; position DI pointer to dta variable
        mov     ah,' '                          ; character to find
w_ml:
        mov     al,[si]                         ; get character at SI
        mov     [di],al                         ; move it to dta
        inc     si                              ; increment the pointer registers
        inc     di
        cmp     al,ah                           ; see if it's an ASCII space
        je      eof                             ; yes, goto eof
        jmp     w_ml
eof:            ; MOVE POINTER TO END OF DTA STRING
        add     di,8                            ; end of text string in buffer
        pop     dx                              ; restore month/day
        pop     bx                              ; restore year (orig. pushed in CX)
        cmp     dl,10                           ; is day a two-character print?
        jb      eof1                            ; no, pointer already positioned
```

Listing 1

```
        inc     di                      ; yes, add room for another digit
eofl:           ; ADD EOF MARK 1Ah
                ; NOTE: only 1Ah is necessary. The extra 0 is something
                ; I always add after an EOF mark for superstitious reasons
                ; mostly.
        mov     byte ptr[di],0          ; put a zero there
        dec     di                      ; back up string pointer
        mov     byte ptr[di],26         ; put ASCII EOF mark there
        push    di                      ; save end of ASCII string pointer
year:           ; WRITE YEAR
        mov     ax,bx                   ; copy year to math register,
        call    WRITE_ASCII             ;  convert it and write it to string
comma:          ; WRITE A COMMA AND BLANK
        dec     di                      ; back up pointer
        mov     byte ptr[di],' '        ; write a ' '
        dec     di                      ; back up pointer
        mov     byte ptr[di],','        ; write a ','
day:            ; WRITE DAY OF MONTH
        mov     ax,dx                   ; move month/day to math register
        mov     ah,0                    ; clear out month
        call    WRITE_ASCII             ; convert it and write it to string
        pop     di                      ; restore end of ASCII string pointer
                                        ; for success message print
                ; CREATE FILE DIRECTORY HEADING
        lea     dx,fcb                  ; point at file control block
        mov     ah,16h                  ; CREATE FILE function
        int     21h
        cmp     al,0FFh                 ; check status. Directory full?
        je      error1                  ; yes, print message and exit
                ; SET FCB CURRENT RECORD AND RANDOM RECORD FIELDS
        lea     si,fcb+14               ; point to record size
        mov     word ptr[si],20         ; record size = 20 bytes
        add     si,18                   ; point to current record field
        mov     byte ptr[si],0          ; current record = 0
        inc     si                      ; next byte
        mov     word ptr[si],0          ; random record number (low) = 0
        add     si,2                    ; one word over
        mov     word ptr[si],0          ; random record number (high) = 0
                ; SET UP DTA
        lea     dx,dta                  ; point at disk transfer buffer
        mov     ah,1Ah                  ; SET DISK TRANSFER ADDRESS function
        int     21h
                ; WRITE DATA TO DISK
        lea     dx,fcb
        mov     cx,1                    ; # of records to write
        mov     ah,22h                  ; RANDOM WRITE function
        int     21h
        cmp     al,1                    ; is the disk full?
        je      error2                  ; yes, print error message
                ; RECORD WRITTEN SUCCESSFULLY. CLOSE FILE AND EXIT
        lea     dx,fcb
        mov     ah,10h                  ; CLOSE FILE function
        int     21h
        cmp     al,0FFh                 ; check status. File closed properly?
        je      error3                  ; no, print error message
        mov     byte ptr[di],'$'        ; replace EOF mark with EOS char
                                        ;  for video display of date
        lea     dx,success              ; point to success message.
        jmp     exit                    ;  and exit
```

(continues)

```
error1:
        lea     dx,failure1             ; point to error message
        jmp     exit                    ;  and exit
error2:
        lea     dx,failure2             ; point to error message
        jmp     exit                    ;  and exit
error3:
        lea     dx,failure3             ; point to error message
        jmp     exit                    ;  and exit
exit:
        mov     ah,9                    ; PRINT STRING function
        int     21h                     ; print DX message
        lea     dx,cr_lf                ; carriage return, line feed sequence
        mov     ah,9                    ; PRINT STRING function
        int     21h
        int     20h                     ;  and exit to DOS
WRITE_ASCII     PROC
        ; This procedure converts an unsigned binary number to an ASCII
        ; string pointed at by DI.
        ; At entry, AX = number to be converted
        ;           DI = character destination address +1
        push    dx              ; save registers used
        push    si
        mov     si,10           ; divisor
convert:
        xor     dx,dx           ; clear the remainder register
        div     si              ; divide AX by 10
        add     dx,'0'          ; convert DX remainder to ASCII
        dec     di              ; back up string pointer
        mov     byte ptr[di],dl ; write ASCII number to DI string
        cmp     ax,0            ; finished?
        ja      convert         ; no, convert next number
        pop     si              ; yes, restore registers
        pop     dx
        ret                     ; return to caller
```

Listing 1 ***(continued)***

The program breaks down into three blocks. The first block contains assembler commands for the registers, a formality in this case since a .COM file automatically sets all its segment registers to the same value. The ORG 100H instruction tells the assembler that the file will load at the standard .COM file address. The BEGIN label points to the first byte of the program for the assembler END statement. If this program were stack-intensive, there would follow a few instructions to 80H and 100H to initialize the base and stack pointer registers. TODAY.COM prints the program title and jumps past the WRITE_ASCII procedure to the main section of the program.

The first instruction at main_prog fetches the system date using the DOS INT 'X'21 Function 2AH. A copy of the year, month, and day is saved on the stack to free up the result registers for other work.

The next step is writing the date to the disk transfer address (DTA) buffer. First, the BX register is cleared. To find the correct month in the month table, the binary month is taken from the 8-bit DH register and written to the BL register (the low byte of the BX register), which will be used as a counter to scan the month table, looking for the ASCII blank delimiters between the names. The month register is decremented before the scan loop so that the DI string pointer will rest on the first character of the correct month. Of course, if the system date is January, the DI register is already pointing at the correct month.

Once the pointer is at the correct month, the address in the DI register is copied to the SI register so that the DI pointer points to the destination string. This may seem wasteful, but it is a good programming habit to assign certain functions to certain reg-

```
WRITE_ASCII     ENDP

TODAY           ENDP            ; end of executable code
;-----------------------;
; PROGRAM DATA          ;
;-----------------------;
        fcb     db      0,'DATE    DOC'          ; standard file control
                db      28 dup(0)
   month        db      'January '
                db      'February '
                db      'March '
                db      'April '
                db      'May '
                db      'June '
                db      'July '
                db      'August '
                db      'September '
                db      'October '
                db      'November '
                db      'December '
     prog_name  db      cr,lf,"TODAY.COM (c)1983  Steve Manes",cr,lf,'$'
                ; Note: there is no '$' char after success message.
                ; The program will supply this.
     success    db      "Today's date written to DATE.DOC",cr,lf
        dta     db      21 dup(' ')             ; disk transfer buffer
     failure1   db      "Directory full$"       ; error messages
     failure2   db      "Disk full$"
     failure3   db      "File close error$"
        cr_lf   db      cr,lf,'$'               ; carriage return/line feed

CSEG    ENDS                    ; end of segment
        END     BEGIN           ; end of assembly
Author:   Steve Manes, Roxy Recorders, Inc.
          648 Broadway, New York, N.Y. 10012
          (212)533-1692  (212)475-6571
```

isters even if it costs a few bytes of code. In this case, the SI register points to the source string (month), and the DI register points to the destination string. If the 8086/8088 string move instruction MOVSB is used, this convention is mandatory.

The W_M1: loop writes the correct month to the destination string, incrementing both the SI and DI registers; the loop is left only when an ASCII blank is detected. With all the string operations provided in the 8086 and 8088, it is unfortunate that Intel did not include a string move that can point at a string and then search it for a value. TODAY.COM uses the SCASB (Scan a Single Byte) instruction to perform this function.

The second program block beginning at the label 'eof:' moves the string pointer in the DI register to the end of the destination string. From here on out we will be writing to the DTA buffer backward. The month and day are recovered from the stack. If the day is two characters long, an extra space is allotted for it in the string. An end-of-file mark is required at the end of the string.

The binary year value is recovered from the stack and put into the AX math register for conversion to ASCII characters. This is accomplished in the WRITE_ASCII procedure, which is based around the 8088/8086 division instruction. The AX register is divided by 10, and the remainder is moved into the DX register. By adding the decimal value 48 to the remainder in the DX register, the number is converted to the proper ASCII code. The DI register is decremented, and conversion halts when there is nothing left in the AX register to divide.

Hands On

The last program block contains the file-handling interrupts. The only variables added here are the file control block (FCB) field values necessary for the random record write. Success and failure messages are written where appropriate, and the program returns to DOS using the INT 20H interrupt.

Those experienced with assembler data file access may wonder why code is wasted formatting an FCB and DTA in the data block when there are two such areas already preformatted in the program at 5CH and 80H. This is the preferred method, but for visibility and simplicity I chose to put them in the data block.

```
F>ASM
The IBM Personal Computer Assembler Version 1.00
© Copyright IBM Corp 1981

Source filename [.ASM]: TODAY
Object filename [TODAY.OBJ]:
Source listing [NUL.LST]: TODAY
Cross reference [NUL.CRF]:

Warning Severe
Errors  Errors
0       0

F>LINK

IBM Personal Computer Linker
Version 1.10 © Copyright IBM Corp 1982

Object Modules [.OBJ]: TODAY
Run File [TODAY.EXE]:
List File [NUL.MAP]: TODAY
Libraries [.LIB]:
Warning: No STACK segment

There was 1 error detected.

F>EXE2BIN TODAY.EXE TODAY.COM

F>TYPE TODAY.MAP

Warning: No STACK segment

Start     Stop      Length    Name      Class
00000H    002FDH    02FEH     CSEG      CODE

Program entry point at 0000:0100

F>TODAY

TODAY.COM ©1983 Steve Manes
Today's date written to DATE.DOC

F>TYPE DATE.DOC
September 29, 1983
F>
```

Figure 1: Procedure for assembling TODAY.ASM

Running TODAY

This program is easy to run in a batch file before loading *WordStar*. It can also be run from the *WordStar* Run command. If you don't have a clock/calendar board installed in your system, TODAY.COM will not write the proper date to DATE.DOC unless you have already set the system date.

> It is a good programming habit to assign certain functions to certain registers even if it costs a few bytes of code.

Type in the program shown in Listing 1 using a standard text editor. Assemble as shown in Figure 1. Some word processors, such as *WordStar* in its document mode, corrupt ASCII codes, and the *Macro Assembler* will return error messages (if you're lucky) when it encounters such a file. Use the DOS TYPE command to look at your source code should this occur. If you see unfamiliar characters where there should be letters, they must be removed before the program will assemble properly.

Steve Manes is a professional musician, an arranger, and the owner of a New York City recording studio.

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■ Query multiple tables with a single command	No	No	Yes
■ Dynamic sort of query output	No	No	Yes
■ Multi-level control breaks	No	No	Yes
Use a spreadsheet?			
■ Rows by columns	0 x 0	2048 x 256	255 x 255
■ Cell can extract data from independent tables	No	No	Yes
■ Cell can be entire program	No	No	Yes
Make screens, forms attractive?			
■ Color, reverse video, blinking, half-intensity, bell.	No	No	Yes
■ Form-at-a-time processing	No	No	Yes
Safeguard data?			
■ Passwords, data encryption	No	No	Yes
■ Field level read/write protection	No	No	Yes

The information in this table is believed to be correct based upon vendor documentation but cannot be guaranteed.

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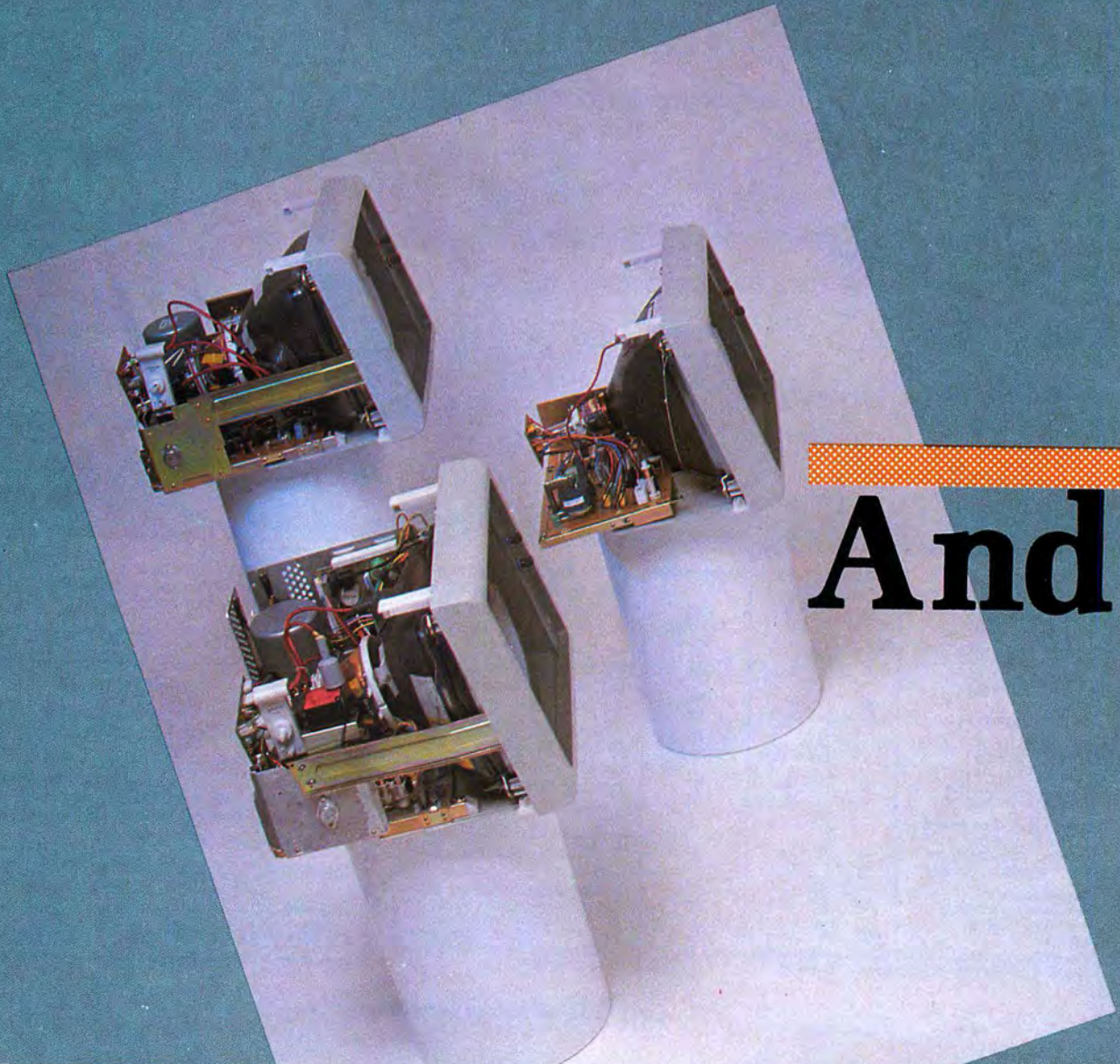

And a

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Lotus in the Lab

Scientists are gaining flexibility in data management by importing their lab data directly to the PC.

Glenn I. Ouchi

As the rest of the world rushes headlong into personal computing, many laboratory scientists are still making do with little more on-hand computing power than a calculator. Data from laboratory equipment is typically shipped to a distant mainframe where it waits in line with other projects. Once analyzed by the computer, the data is shipped back in standard printout format. If further data reduction is necessary, scientists have to send their results back to the data processing department and wait in line again.

One alternative to mainframes is purchasing lab instruments with built-in computers that handle analysis and data management. Although many lab instruments now feature built-in, computerized analysis, few allow for extensive data management and reduction, and those that do are prohibitively expensive for most applications.

Fortunately, there's a third alternative—the personal computer. As micros, and the software that runs on them, become more powerful, scientists are breaking the time-sharing habit and are enjoying the flexibility of data management and graphic output found on a PC.

The key to applying PCs to lab work is the ability to import data directly by tying the lab instrument to the PC through a cable interface. Most modern scientific instruments and product test equipment can transmit data by using the RS-232C protocol and are therefore capable of sending their results or raw data to an IBM PC.

This article demonstrates how to capture data from two typical scientific instruments, an ICP spectrometer and a chromatograph. It also shows how to manipulate and display the data using *1-2-3,* and how to create an analysis logbook for data management. In this case, the data in the examples comes from instruments I used to analyze soil and gas samples for chemical composition.

Most modern scientific instruments and product test equipment can transmit data by using the RS-232C protocol.

The logbook you construct can be used to track test results and can be easily modified to perform a number of functions, such as tracking samples, spotting errors, reviewing the history of data, and detecting trends. Data can be entered into the logbook through the keyboard or by importing data files captured directly from the instruments. This data can then be analyzed, correlated, and summarized using *1-2-3*'s data management and graphics commands.

Serial Data Capture

Importing data directly from lab equipment is preferable to reentering the information manually. The serial interface on the PC can be used to capture data from any instrument that transmits with the RS-232C protocol. For example, Plasma-Spec, manufactured by Leeman Labs, performs inductively coupled plasma (ICP) spectroscopy, a process in which the intensity of spectral lines emanating from artificially radiated matter is analyzed. The Plasma-Spec identifies and quantitatively analyzes trace levels of metals and other elements in nearly any type of sample, including water, soil, metal, cosmetics, and food. The instrument is controlled by a Z-80-based microcomputer that transmits raw scan data and computed results.

Tying the PC and the Plasma-Spec together requires an asynchronous board, a serial cable with the proper DB-25 connectors on each end, and a null modem. A null modem is a serial connector with the wires for pins numbered 2 and 3 cross-connected.

The null modem is necessary because the PC and the Plasma-Spec both use pin 2 to transmit data and pin 3 to receive data; with the null modem, the Plasma-Spec can transmit on pin 2 and the data will be received by the PC on pin 3.

To capture data from a single experiment you can use the MODE program in DOS to configure the serial port on your PC to match the transmission parameters set by the Plasma-Spec. Any commercial communications package can also be used to match baud rate, parity, data bits, and stop bits. The DOS command used with the Plasma-Spec is

```
MODE COM1: 300,E,7,1
```

Place a formatted disk in drive B and give the command to copy data arriving at the serial port to a disk file. To download the data to the file named ICPDATA.RAW, the command would be

```
COPY AUX: B:ICPDATA.RAW
```

To close the file and end transmission type <Ctrl>-Z .

The serial method of data capture is simple, but it completely ties up the PC, prohibiting you from running other applications. Most lab instruments analyze data slowly and send out results in random spurts. Since the majority of instruments don't have a data buffer, such a transfer can take all day. Consequently, dedicating a PC to a single experiment is not practical or cost-effective.

The solution is finding a buffer to hold the sporadic output of the Plasma-Spec while the PC performs other tasks. I considered having one tailor-made, but it occurred to me that I could use a standard printing buffer and simply reverse the direction of the data flow. I tried it, and it worked fine.

By placing the print buffer in the serial line between the Plasma-Spec and the PC, data can be stored in the buffer until you are ready to receive it. Some buffers store up to 512K, more than enough for a full day of tests on the Plasma-Spec. A copy but-

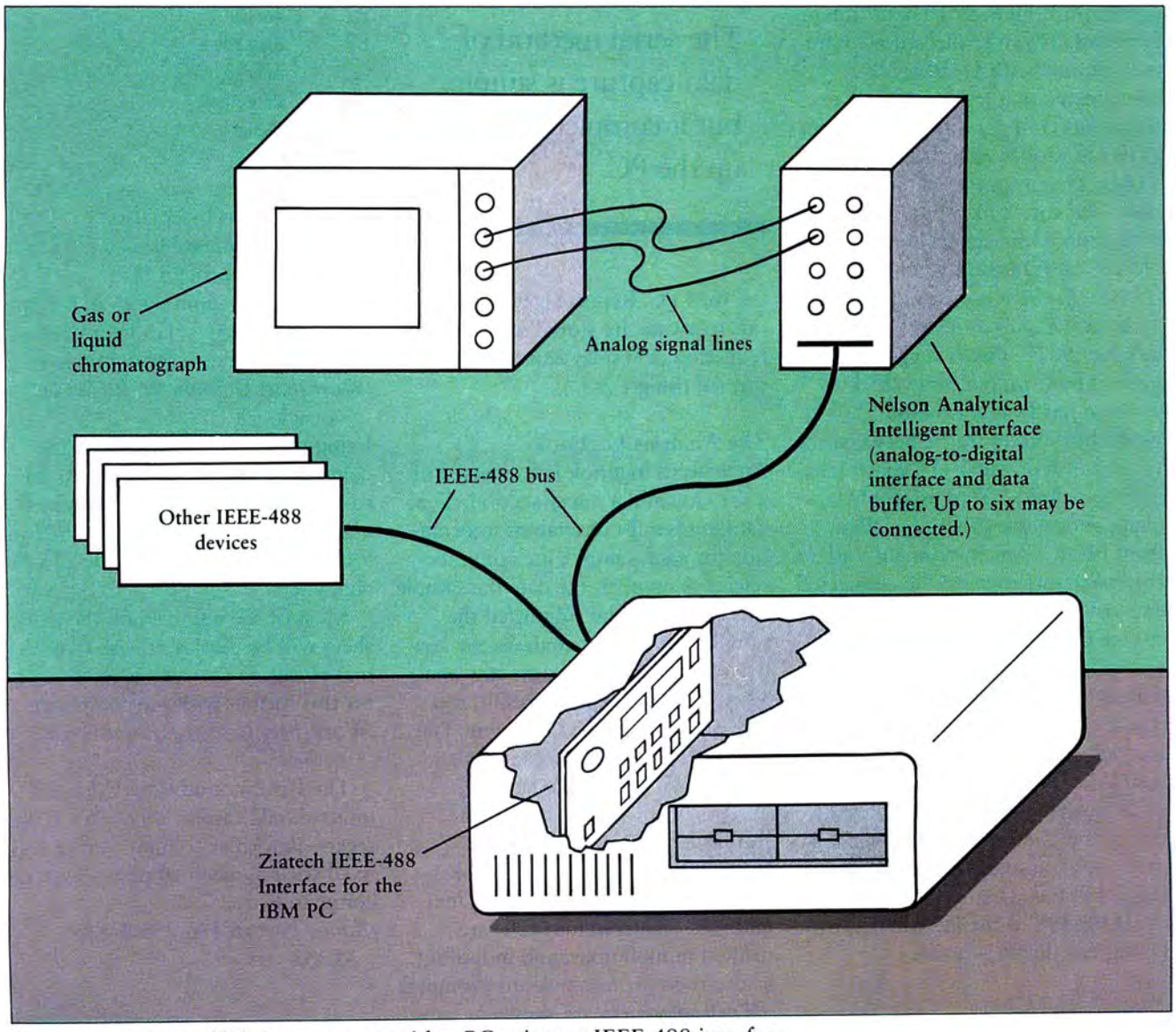

Figure 1: Link-up of lab instruments with a PC using an IEEE-488 interface

ton is a convenient feature to have on the buffer. When you are ready to receive data, press the copy button and a copy of the stored data is sent to the PC.

Once data is stored to disk it can be processed using programs written specifically for the application; data reduction and display can then be performed using *1-2-3*.

Multiple-Instrument Interface

If your application requires monitoring data from a number of instruments, you should consider using an IEEE-488 interface, also known as a GPIB (General Purpose Interface Bus) or an HPIB (Hewlett-Packard Interface Bus). This interface allows communications with 15 different instruments that are lined in an external bus configuration. The PC acts as the controller, designating when an instrument on the communications link can "talk," or transmit, information. Other instruments "listen" and transmit when the controller tells them to (see Figure 1).

Ziatech makes an IEEE-488 interface for the PC that is very versatile. It has a built-in, real-time clock to perform hardware "time-outs," which help direct traffic between the various instruments. The Ziatech interface includes 5K of assembly language subroutines that are called from BASIC. Any instrument with an IEEE-488 interface can be connected to a PC with the Ziatech interface.

One instrument you can interface to a PC with the IEEE-488 is the Intelligent Interface from Nelson Analytical. This instrument performs analog-to-digital conversion and stores the digital data in a built-in 192K buffer. The Intelligent Interface contains a Z-80 microcomputer that processes commands sent over the IEEE-488 bus. Data is then sent via the IEEE-488 to the PC whenever the PC signals that it is ready.

Instruments such as the Intelligent Interface are used to analyze chromatography data. The interface is connected to a device called a chromatograph, which separates a sample mixture into its individual chemical compounds (components). As the components pass through the chromatograph, they change the voltage sent by a detector to the analog-to-digital converter in the Intelligent Interface. Each change in voltage is displayed as a "peak" whose area is proportional to the component's volume percentage of the sample. Nelson Analytical has developed software that performs this analysis on the IBM PC. Reports generated by this software are stored on disk. Data reduction or display can then be performed using *1-2-3*.

> The serial method of data capture is simple, but it completely ties up the PC.

The Analysis Logbook

An analysis logbook is composed of a data log and a query section. The data log is a list of analysis information for each sample, including the reference number, the date the sample was received, who submitted the sample, the type of analysis, the analyte (analyzed feature), the raw analysis value, the computed result, the date analyzed, and a comment. The data query section summarizes and extracts data from the data log.

Building the Data Log

In the following sample logbook *1-2-3* commands are italicized, text and values entered into cells are printed in monofont, and monofont is also used for responses to prompts. All cell references are shown as capital letters followed by numbers.

The first step in building a data log is creating an input form. Clear the worksheet with the */Worksheet Erase Yes* command. In cell A1 enter

*** Laboratory Analysis Logbook ***

Move down to A5 and enter Data Log .

Place a repeating label of equal signs in A6 by entering \= . Copy the contents of A6 to cells B6 through I6 with the command

/Copy A6<Enter>B6..I6<Enter>

Now enter the following field names into the following cells in row 7.

A7	"Ref No.
B7	"Rec Date
C7	Submitted by
D7	Analysis
E7	Analyte
F7	Raw Value
G7	Amount
H7	Date Anal
I7	Memo

Go to A8 and make a repeating line of hyphens by entering \- . Use the Copy command to complete the line from B8 through I8.

Reset the column width of column C to 20 characters. Go to any cell in column C and give the command */Worksheet Column-Width Set* 20 <Enter>

Using the same command, set the column widths of columns D and E to 8 characters each. Set columns F and G to 12 characters, column H to 9 characters, and column I to 15 characters.

Most of the numbers on the worksheet will be displayed with two decimal places. Set the entire worksheet for this format with the command */Worksheet Global Format Fixed* 2 <Enter>

The Ref No. and Raw Value columns should display their data as integers. Reformat columns A and F as fixed with no decimal places with the command

/Range Format Fixed 0 <Enter> A9..A500<Enter>

	A	B	C	D	E	F	G	H	I
1	***Laboratory Analysis Logbook***								
2									
3									
4									
5	Data Log								
6									
7	Ref no.	Rec Date	Submitted by	Analysis	Analyte	Raw Value	Amount	Date Anal	Memo
8									
9	101	8308.01	Smith	GCHROM	propane	201045	400.00	8308.04	
10	102	8308.01	Jones	LCHROM	aspirin	45346	385.00	8308.04	
11	103	8308.02	Green	ICP	Hg	2314560	25.60	8308.05	
12	104	8308.03	Brown	ICP	Hg	2150780	25.50	8308.05	
13	105	8308.03	Johnson	UV	aspirin	35245	340.00	8308.07	
14	106	8308.04	Edger	IR	aspirin	40563	358.00	8308.07	
15	107	8308.04	Johnson	GCHROM	butane	23568	229.86	8308.08	
16	108	8308.04	Weaver	GPC	polyv	342789	469.23	8308.08	
17	109	8308.05	Mills	ICP	Hg	1894670	25.30	8308.08	
18	2001	8307.05	Calibration	GCHROM	propane	230145	500.00	8307.05	
19	2002	8307.05	Calibration	GCHROM	methane	150032	500.00	8307.05	
20	2003	8307.05	Calibration	GCHROM	ethane	120132	500.00	8307.05	

Figure 2: Analysis data entered into the Data Log

QUERY

Ref No.	Rec Date	Submitted by	Analysis	Analyte	Raw Value	Amount	Date Anal	Memo
			ICP					
Ref No.	Rec Date	Submitted by	Analysis	Analyte	Raw Value	Amount	Date Anal	Memo
103	8308.02	Green	ICP	Hg	2314560	25.60	8308.05	
104	8308.03	Brown	ICP	Hg	2150780	25.50	8308.05	
109	8308.05	Mills	ICP	Hg	1894670	25.30	8308.08	

Figure 3: Data query extract results

Before you enter data, save the current sheet with the command */File Save* PCLAB<Enter>

Sample Logbook

To see how the logbook can be used, try entering some data from a typical chemical analysis laboratory. This lab performs six types of analyses: gas chromatography (GCHROM), liquid chromatography (LCHROM), inductively coupled plasma spectroscopy (ICP), ultra-violet spectroscopy (UV), infrared spectroscopy (IR), and gel permeation chromatography (GPC).

Seven different compounds or elements are tested: propane, aspirin, mercury (Hg), butane, polyethylene (polyv), methane, and ethane. Enter the information into the data log by filling in a reference number, the date received, the submitter's name, the analysis type, and the analyte. When the analysis is completed, fill in the raw value, the amount, and the date analyzed in the memo section along with any comments. Also log the results of any calibration runs that are performed on an instrument. For these entries, replace the submitter's name with calibration data.

Enter all dates in the following form: make the first two digits represent the year, the next two the month, and the decimal portion the day. This method of representing the date is very practical when used with the *1-2-3* Data Query and Sort commands because all dates stay in numerical order. Unfortunately, this

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dating scheme cannot be used easily to compute the number of days between two dates.

Enter the data as shown in Figure 2. At this point you should save the worksheet again with the command
/*File Save* PCLAB<Enter> *Replace*

Names, Names on the Range

To utilize the data log with the *1-2-3* Data Query and Sort commands you must assign names to various ranges of cells on the worksheet. First, give the entire data log range the name INPUT by going to cell A7 and giving the command
/*Range Name Create* INPUT
<Enter>A7..I500<Enter>

That command names the range of cells from A7 to I500 (column I, row 500) as INPUT and sets the lower boundary of our data log at row 500. Note that the range starts at row 7 to include the labels given at the top of each field. Those labels must be included in the input range for Data Query and Sort to work correctly.

To set up the Data Query section, go to cell J1 and enter "QUERY . Then go to J2 and place a repeating label of equal signs by entering \= . Copy the contents of J2 to cells K2 through R2 with the command
/*Copy* J2<Enter>K2..R2<Enter>

Copy the labels from row 7 of the data log to cells J3 through R3 with the command
/*Copy* A7..I7<Enter>J3..R3<Enter>
Make a copy of cells J2 through R3 in cells J6 through R7 with the command
/*Copy* J2..R3<Enter>J6..R7<Enter>
Reset the column widths to match those in the data log section.

To use the Data Query and Sort commands you must create a few more named ranges. First set up the criterion or selection range by naming cells J3 to R4 as CRITERION with the command
/*Range Name Create* CRITERION
<Enter>J3..R4<Enter>

Then name cells J7 to R500 as OUTPUT with the command
/Range Name Create OUTPUT
<Enter>J7..R500<Enter>
Finally, name cells J8 to R500 as SORT with the command
/Range Name Create SORT
<Enter>J9..R500<Enter>

Notice that the CRITERION and OUTPUT ranges include a row of labels but that the SORT range does not.

Now you can connect all the named ranges so they can be used with *1-2-3*'s Data Query and Sort functions. You must define an input, an output, a sort, and a criterion range. Assign the A7 to I500 range as the input range with the command
/Data Query Input INPUT<Enter>
Continuing in the Data submenu, assign the range J3 to R4 as the criterion range with
Criterion CRITERION<Enter>
Assign the range J7 to R500 as the output range with
Output OUTPUT<Enter>
Press <Esc> to return to the main Data menu and assign the range J8 to R500 as the sort range with
Sort Data-Range SORT<Enter>

If your application requires monitoring data from a number of instruments, consider using an IEEE-488 interface.

Finding and Extracting Data

The Data Query command provides two ways to select items from the data log. The simplest is the Find method. Suppose you want to view each of the results that are derived from ICP analysis. Go to cell M4 and enter ICP under the Analysis label.

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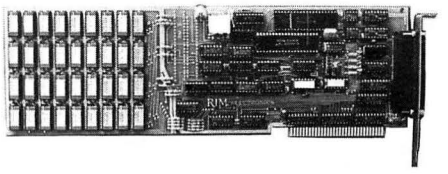

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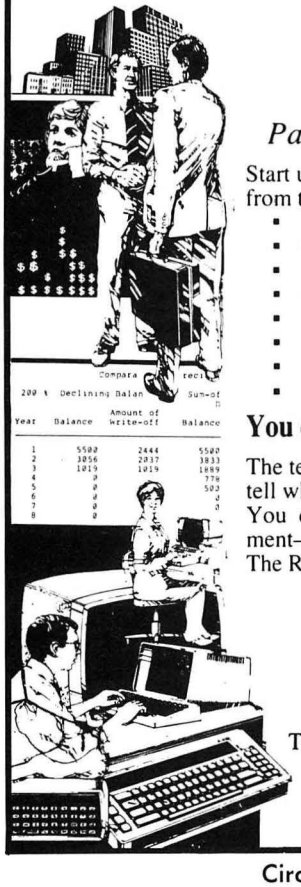

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Hands On

Now give the command */Data Query Find*. Doing this switches the screen to the data log area (INPUT range) and highlights the third entry, which is the first record in the input range that matches the ICP criterion. Press <CursorDown> and the highlight bar jumps to the next match, which is Brown's ICP submitted sample. Pressing <CursorDown> again jumps the cursor to Mills' ICP sample, and pressing <CursorUp> takes you back to Green's ICP sample. Press <Esc> to return to the Query menu.

The other method of Data Query is Extraction. Matching data is displayed in the data output range. First, extract all the ICP analysis data. Enter the command */Data Query Extract*

The matching data entries are displayed as shown in Figure 3. Now extract all the calibration data. Go to M4 and erase this cell with the command */Range Erase* <Enter>

Go to L4 and enter Calibration . Then enter the command */Data Query Extract*

In a few seconds all the entries with calibration will appear in the output range. To be more selective we could have entered values in other labeled fields (such as methane in the Analyte column), and only those entries with both calibration and methane would be extracted. Numeric values and formulas can also be used for the match criterion. For example, entering the formula

+Raw Value>2000000

would yield only three entries; these would be the ICP runs since they are the only entries with raw values greater than 2,000,000.

Experimenting with the Query capabilities of *1-2-3* can reveal new ways of looking at data. Once you have set up the matching criterion, you can press the Query key (<F7>) to quickly obtain the queried data.

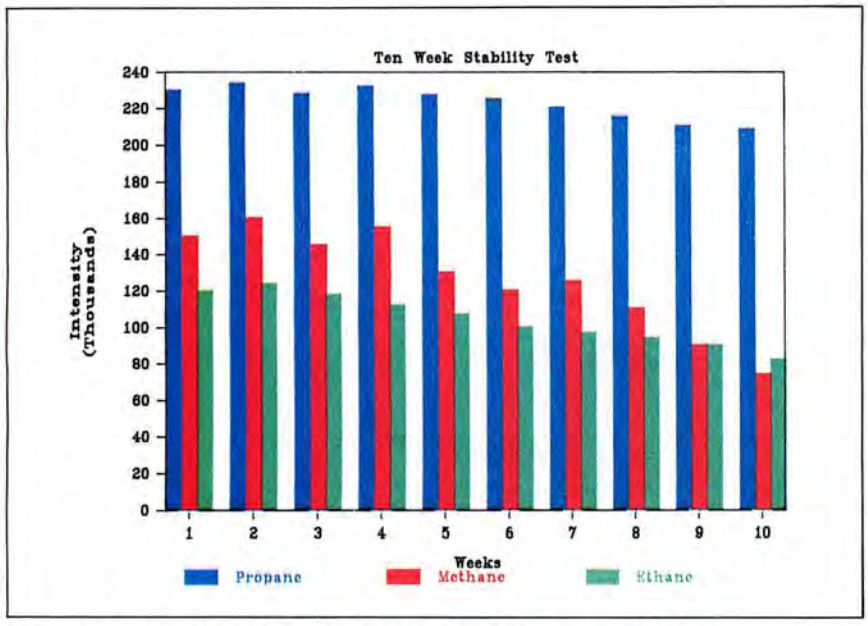

Figure 4: Bar graph of calibration data on three compounds

Sorting and Graphing

Extracted data can be sorted and graphed. With the calibration data in the output range, go to cell N8 and assign the Analyte column as the primary key using the command */Data Sort Primary-Key Descending* <Enter>

Then go to cell K8 and use the following command to assign the Received Date as the secondary-key: *Secondary-Key Ascending* <Enter>

Since the sort range has previously been defined, all you have to do is enter *Go*.

Before the sort, displayed entries are ordered by the date they were received. After the sort, they are grouped by analyte, with each group ordered by the date received.

Now the grouped data can be graphed. Go back to the main menu by pressing <Esc>. Select the data

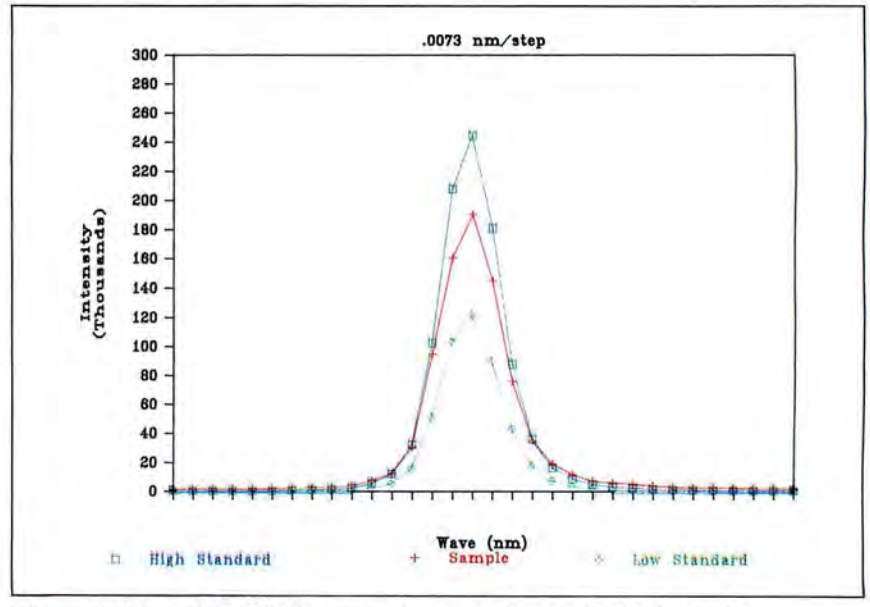

Figure 5: Line plot of ICP scans of sample data with high and low calibration data

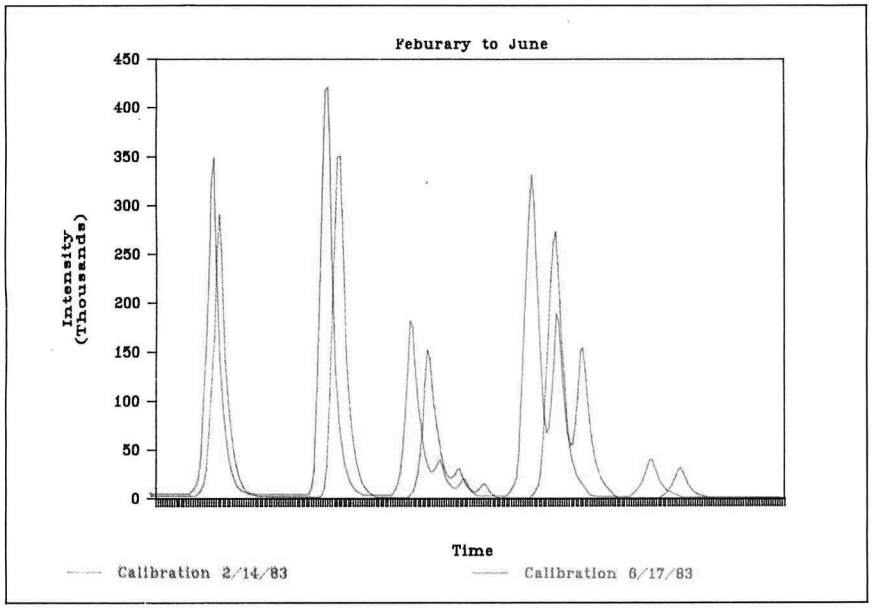

Figure 6: Line plot of two chromatography calibration runs

from column O to plot, in this case the A range for the propane data.

/Graphics A-Data <Enter>
08..017<Enter>

To select the B and C ranges for methane and ethane, type

B-Data <Enter>018..027<Enter>
C-Data <Enter>028..037<Enter>

Now you can select a bar graph with color and view the graph:

Type Bar-Graph <Enter> *Options Color* <Enter> *View*

By adding legends and titles you can create a graph like that shown in Figure 4.

Graphing Captured Data

You can use the graphing features in *1-2-3* to generate a number of displays of the data. For instrument data, the most useful displays are line plots and bar graphs. Two examples of line plots are shown in Figures 5 and 6. *1-2-3* provides a standard graphics plotting style, so various types of data can be graphed on the same size and type of graph. The graphing program also supports a number of high-resolution plotters, which means that you can create high-quality graphics and overhead transparencies.

The data for Figures 5 and 6 was captured directly from the instruments and stored on a disk file with the extension .PRN. Only files with the .PRN extension can be imported into *1-2-3*. To display the data from the imported file at the current cursor location give the command */File Import Numbers*. *1-2-3* creates a number cell for each number in the file and creates a left-aligned label for each quoted label. *1-2-3* places successive numbers and labels from the same line in the import file in successive columns of the same row. Thus, a file created by a BASIC program with the contents

"methane",1.27,2534711,400
"ethane",1.88,1183152,350
"propane",2.73,2192368,450

is imported into 1-2-3 as:

	A	B	C	D
1	methane	1.27	2534711	400
2	ethane	1.88	1183152	350
3	propane	2.73	2192368	450

The */File Import Number* command is very useful for viewing the contents of data files. A *1-2-3* worksheet can have up to 2048 rows, so files with as many as 2048 data points can be imported with a single command.

Once you have used *1-2-3* for a few data management and graphics applications, you will think of many more applications for this versatile program. For example, using the Data Tables command, you can generate tables that describe relationships of data (see page 205 of the *1-2-3* instruction manual or "The 1-2-3 Checkbook Ledger," *PCW*, Vol. 1, No. 6). You can also use keystroke macros to further automate the worksheet (page 107 of the *1-2-3* manual).

Handling data in *1-2-3* is a perfect way for first-time users to learn about interfacing with instruments since the design of the data reduction and display can be performed without leaving the program. If you need special data reduction or display not available in *1-2-3*, you can then write a custom program.

Glenn I. Ouchi is a programmer and chemist living in San Jose, California. He is also a consultant who specializes in using the IBM PC for scientific and small-business applications.

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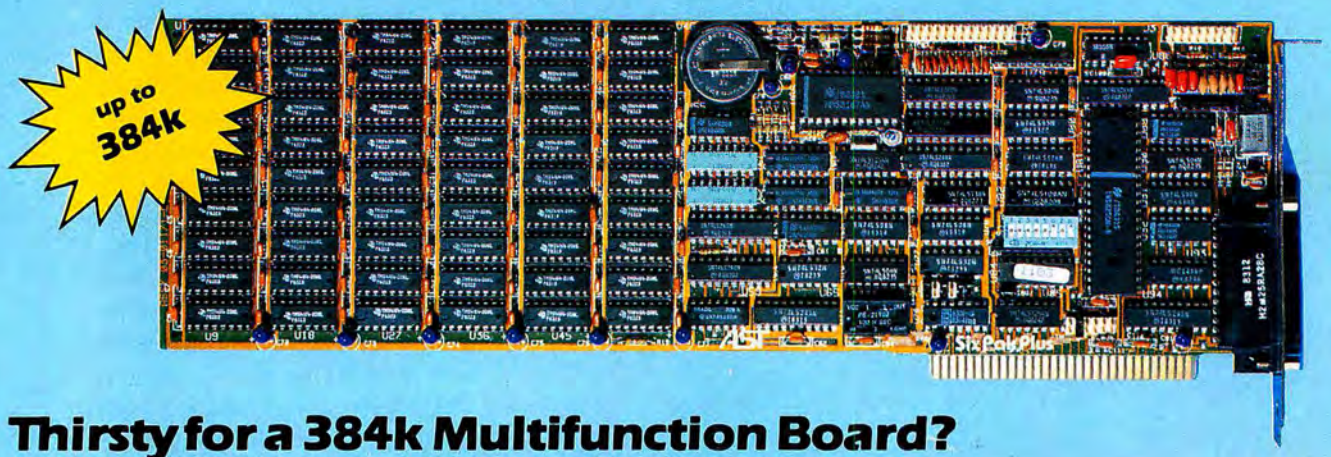

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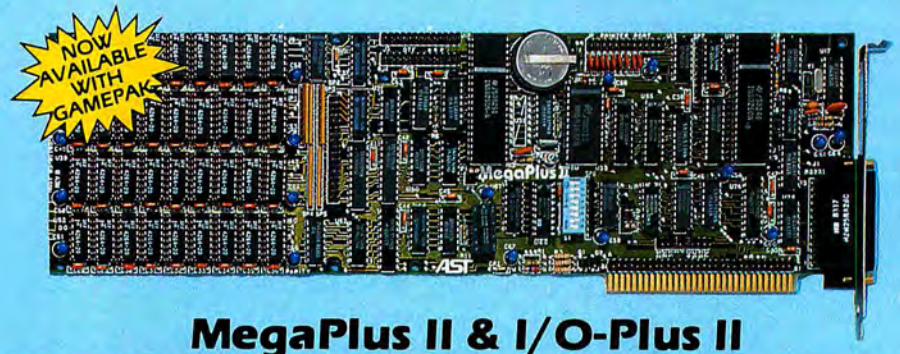

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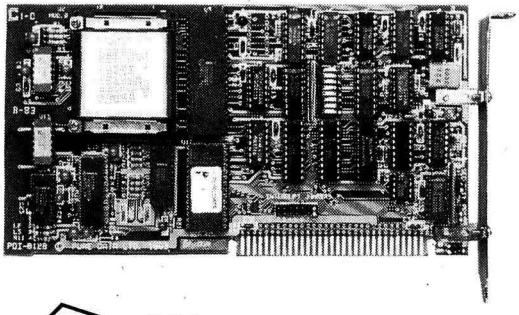

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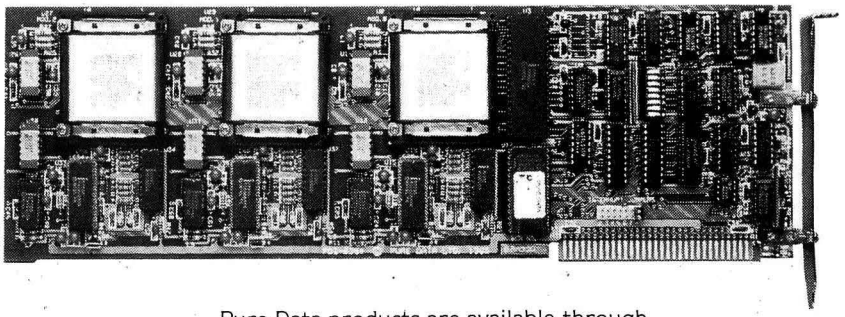

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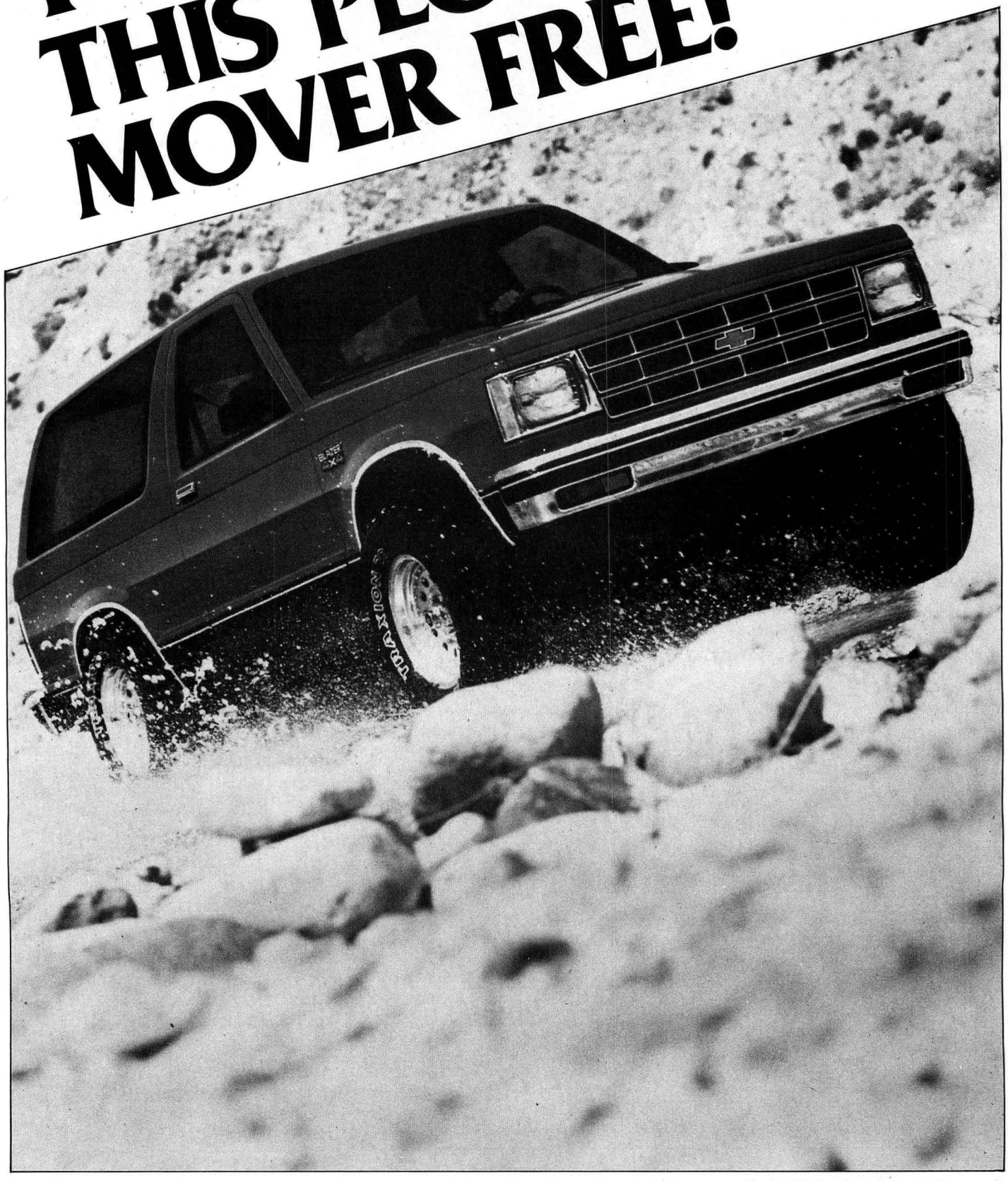

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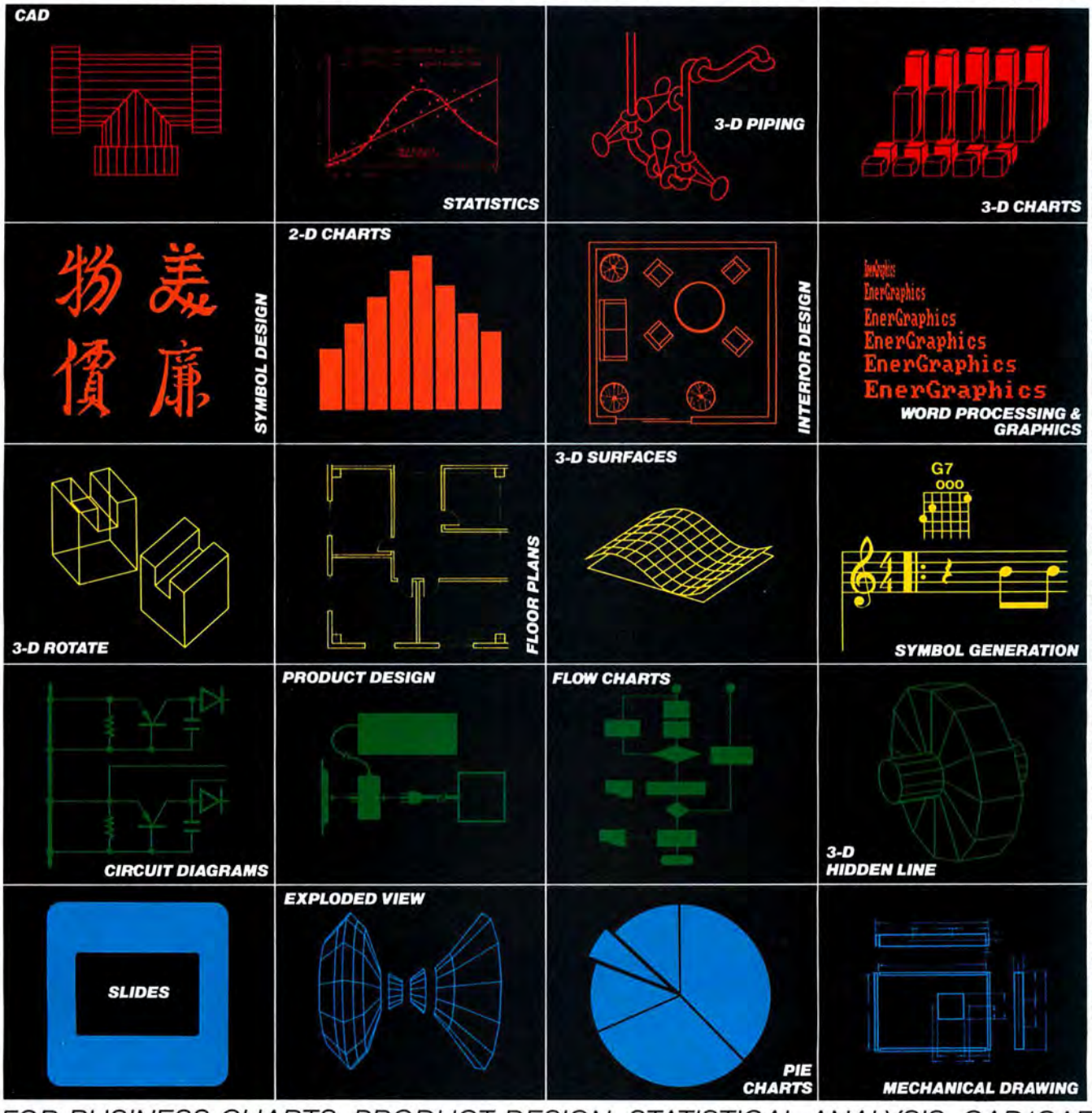

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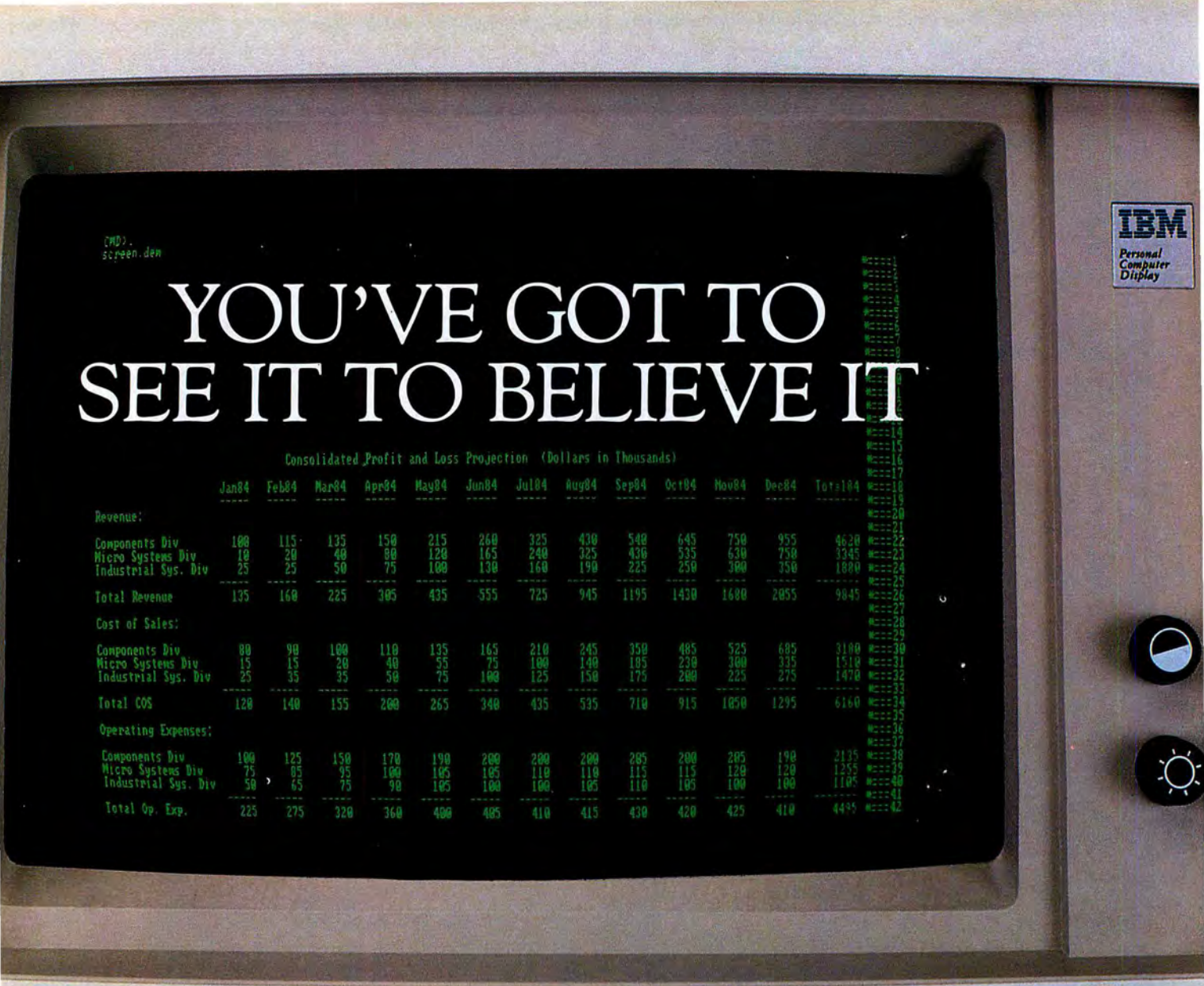

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The Help Screen

PC World offers answers and advice at every level.

Karl Koessel

In *The Help Screen,* Vol. 1, No. 7, readers were asked if they knew of IBM PC compatible keyboards with cursor control keys separate from numeric pad keys. One response informs us that Colby Computer of Palo Alto, California, manufactures the Colby Key-2, which has numerous enhancements in addition to placing an extra set of cursor keys above the top row of keys. Another keyboard, AccuFeel, available from Multitech Electronics of Sunnyvale, California, has 16 function keys above the top row, 4 of which can be programmed as cursor keys. Also brought to our attention was the Alpha from AFC Computer of West Germany. It has a cursor pad that includes diagonal keys and a number pad that includes hexadecimal keys.

This month we rename a file that contains an embedded space, entertain the unexpected appearance of tiny "squiggles" in a graphics printout, and touch on the IBM Macro Assembler's use of attribute operator PTR.

Spaced File Name

Q. This is kind of embarrassing, but I need help. Using PC-Talk III, *I downloaded a report from a business associate and the telecommunications session seemed to have worked fine. It wasn't until after I had turned my modem off and tried to open up the file in* WordStar *that I realized I had named the file 'REPORT B' (with a space in the middle).*

I know I shouldn't create a file name with a space in the middle, but it's too late now. My business associate is off on vacation, and I can't seem to open the file or print it out. The file appears on my WordStar *directory as 'REPORTB' and on my DOS directory as 'REPORT B', complete with all 40,000 bytes, but both* WordStar *and DOS refuse to admit that it exists. I can't TYPE it, RENAME it, or anything. I know the file's there somewhere. How do I get at it?*

George Camey
Kansas City, Missouri

> In BASIC, double quotes—not spaces—delimit file names.

A. The space is used to delimit parameters entered on the DOS command line. So although the DOS command DIR can read and display the file name 'REPORT B' from your disk's directory, there is no way to specify, on the command line, a file name that contains an embedded space.

WordStar uses DOS calls, so it will not even attempt to use a file name containing an embedded space. *WordStar*'s file directory function is similar to the command DIR, though for aesthetic reasons the spaces within a file name are not printed to the display ('TEST .DOC' appears as 'TEST.DOC').

PC-Talk is a BASIC program. In BASIC, double quotes—not spaces—delimit file names. BASIC can create and manage file names that contain an embedded space (which is why you were allowed to name your file 'REPORT B'). Thus it would seem reasonable to turn to BASIC for a solution to the embedded space problem.

We could load BASIC and place the disk with 'REPORT B' in drive B. Executing the command

```
FILES "B:REPORT B"
```

would confirm the file name's presence in the disk directory. We would note that FILES prints only the characters of a file name that precede an embedded space—'REPORT B' would be displayed as 'REPORT'. Next, executing

```
NAME "B:REPORT B." AS "B:REPORTB."
```

(remembering the period at the end of each file name so BASIC will not assume the extension .BAS) would rename your file, making it accessible to DOS and *WordStar.*

Rather than using BASIC, it is in fact possible to get DOS to select and rename 'REPORT B'. This can be done by substituting the '?' in place of the embedded blank. The '?' matches any character, so first make sure that 'REPORT B' is the only file name displayed in response to the DOS command

```
DIR B:REPORT?B
```

Now the DOS command

```
RENAME B:REPORT?B REPORTB
```

will rename your file.

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Uninvited Guests

Q. I have a problem with a simple BASIC routine I wrote that dumps a high-resolution graphics screen to either a Graftrax Plus (the graphics chips option) equipped Epson MX-80 printer or an IBM Graphics printer (see Listing 1). Sometimes a line that appears perfectly straight on screen is printed crooked (see Figure 1). The problem seems to be the periodic insertion of little squiggly lines that are not present on the screen. For example, look how the O in the underlined title is split in two. What is causing these little lines? How can I get rid of them?

Chuck LeFebvre
Carterville, Illinois

A. Although GRAPHICS.COM, a DOS 2.00 utility, and the routines provided in "Pixel to Printer" (PCW, Vol. 1, No. 10) provide more efficient dumping of graphics screens, your BASIC routine and printout illustrate a problem common to all dot graphics printing.

Each byte the printer receives while it is in graphics mode produces a vertical pattern: a column one dot wide and up to eight dots high. Upon close examination we see that one "squiggly little line" actually occupies two adjacent dot graphics columns, which means that the squiggle was produced by two consecutive bytes. The positions of the dots in each column indicate that the values received were 13 followed by 10.

> Line folding is intended to facilitate the printing of text.

The inserted squiggle is produced by the same sequence that, when the printer is in its usual text printing mode, produces a carriage return and a linefeed. This should remind us that BASIC, by default, inserts this sequence if 80 characters (including spaces) are printed on one line. Looking again at your printout, we see that the squiggles do indeed occur after every 80th dot graphics column.

This automatic insertion, called line folding, is intended to facilitate the printing of text. It defines a printer's *width;* after printing a specified number of characters, the printer begins a new line of text. Line folding is responsible for creating the squiggles in your graphics printout and obviously should be disabled before printing graphics.

In BASIC, the width of a device is set by the command

WIDTH *dev,size*

followed by an OPEN statement to the device. For "LPT*n*:", the OPEN statement is implicit, and therefore the WIDTH statement alone sets a printer's *size*. If *size* is 255, line folding is disabled and the squiggles disappear from graphics printouts.

```
40000 LPRINT CHR$(27)"3";CHR$(24)
40010 FOR PASS=0 TO 199 STEP 8
40020    LPRINT CHR$(27)"L";CHR$(128);CHR$(2);
40030    FOR X=0 TO 639
40040       GC=0
40050       FOR Y=0 TO 7
40060          IF POINT(X,PASS+Y) THEN GC=GC+2^(7-Y)
40070       NEXT Y
40080       LPRINT CHR$(GC);
40090    NEXT X
40100    LPRINT
40110 NEXT PASS
```

Listing 1: High-resolution graphics to Epson/IBM Graphics printer. Execute WIDTH "LPT:1", 255 before using this routine.

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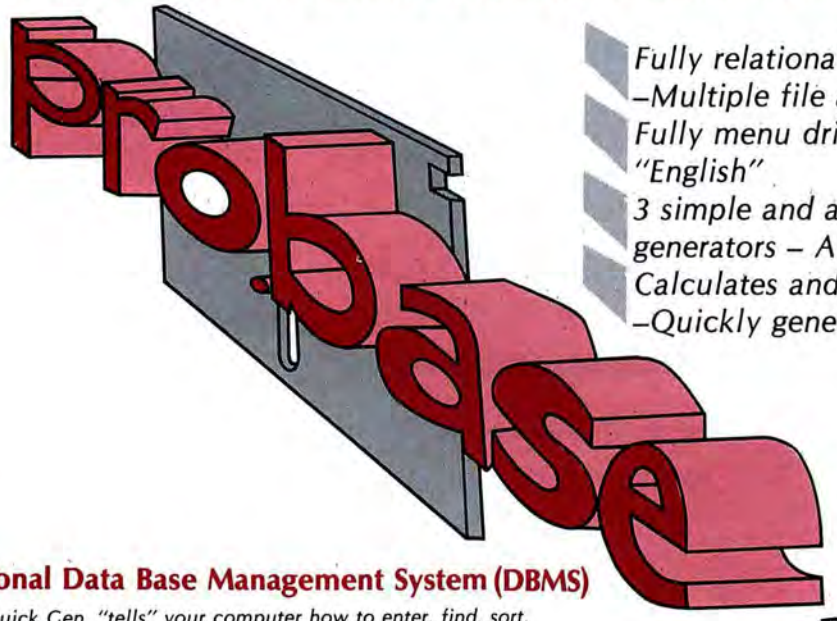

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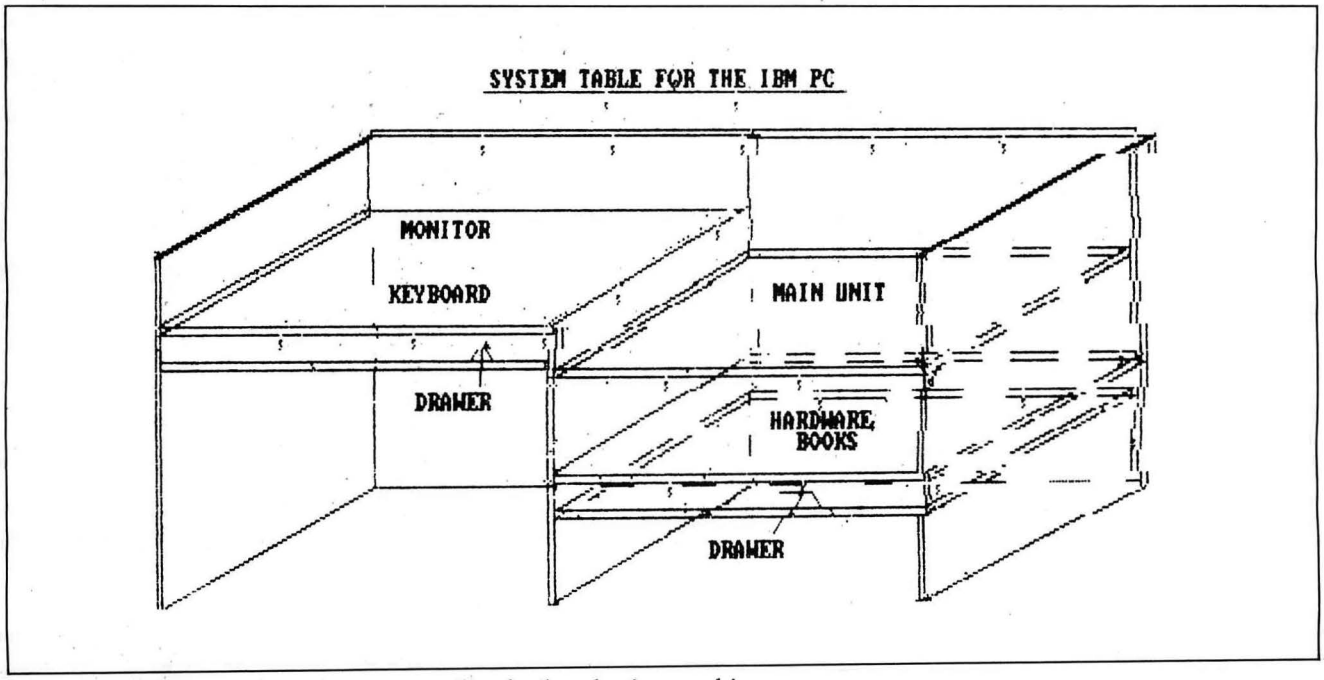

Figure 1: The effect of carriage return/linefeed codes inserted in a graphics printout

Assembler Problem

Q. When I got my PC I also bought the IBM Macro Assembler. Although I am an experienced Z-80 assembly language programmer, I have a problem with the IBM Assembler and cannot find a solution.

The instructions for the 8088 are assembled in either 8- or 16-bit format. The Macro Assembler is supposed to determine from an instruction's operands the appropriate format in which to assemble the instruction. This works fine if one of the operands is obviously 8 bits or 16 bits (e.g., a register). However, when trying to add an immediate value to an indirectly addressed value, as with ADD (BX),1 the assembler could not discern which format to use and refused to assemble the instruction. Although this should be a valid instruction, I can't find a way to make either operand obviously 8 or 16 bits.

Wayne Pickett
Trenton, New Jersey

A. Actually, 8088 instructions may be assembled in three formats: 8, 16, and 32 bits, according to an operand's type. The attribute operator PTR (pointer) is used to override an operand's type. The format is

type PTR *expression*

The attribute operator PTR causes an ambiguous instruction such as ADD (BX),1 to assemble in the BYTE, WORD, or DOUBLEWORD (8-, 16-, or 32-bit) format as specified by *type*. For example,

ADD WORD PTR (BX),1

PTR can also be used to override the distance (NEAR or FAR) of a label. The IBM Macro Assembler manual has examples of other attribute operators, beginning on page 4-14.

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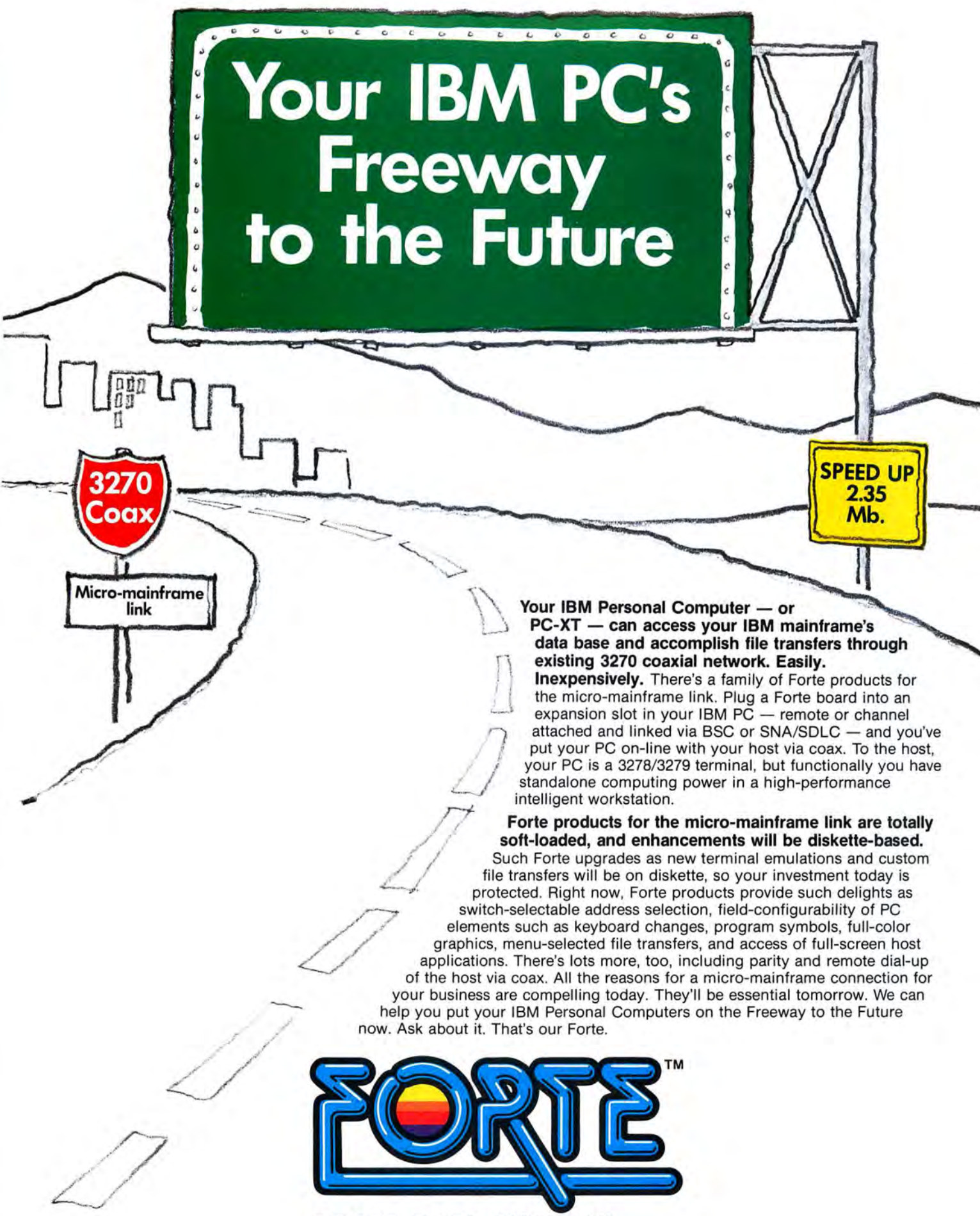

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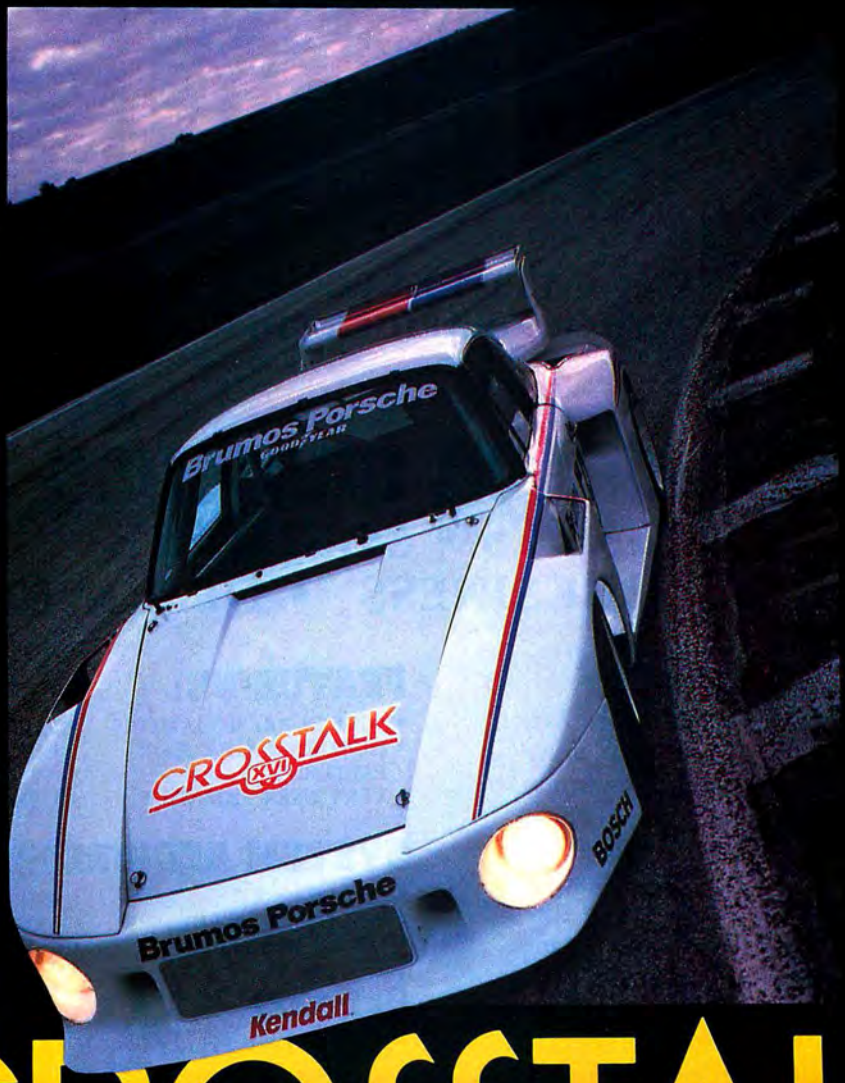

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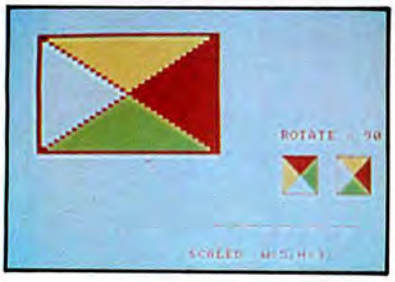

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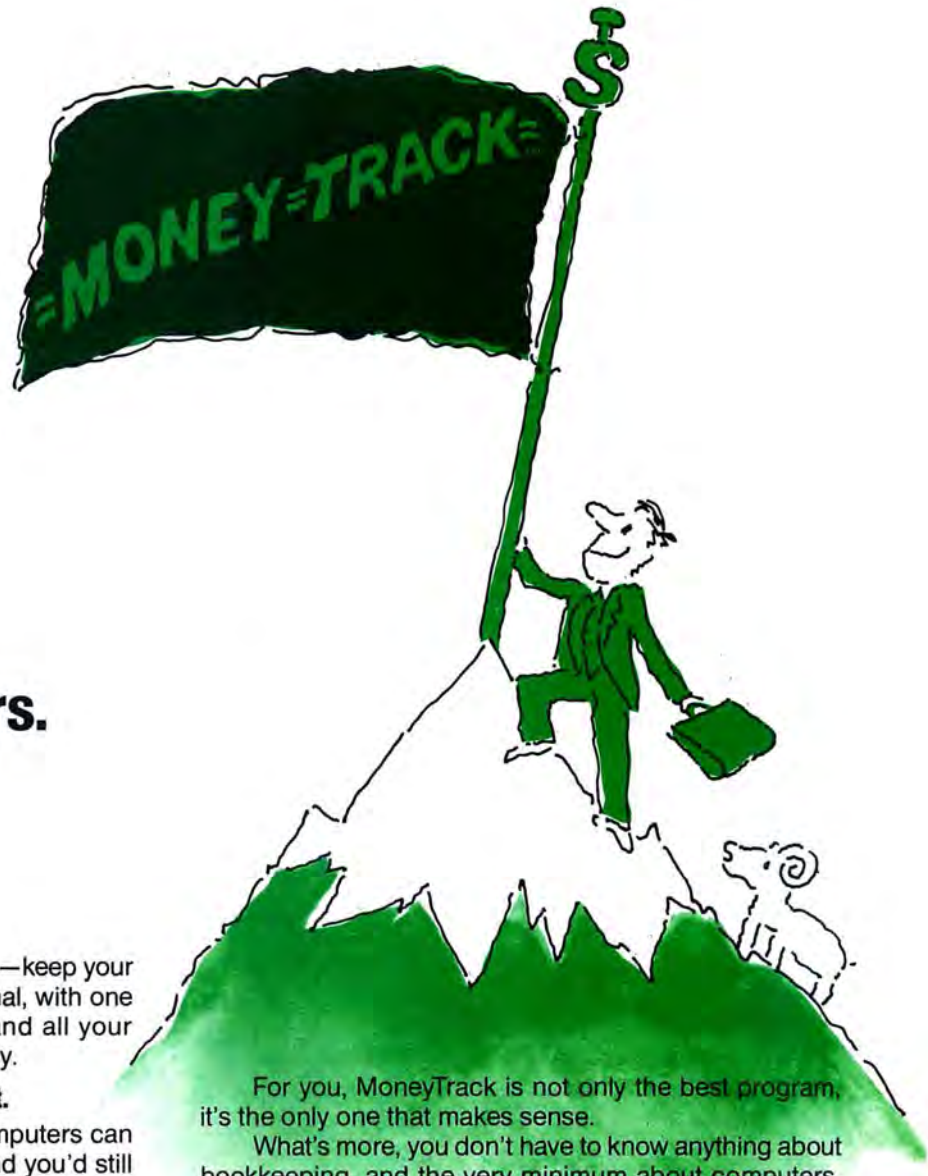

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A global exchange of personal computer discoveries

Edited by Art Wilcox and Karl Koessel

We do our best to test every item that appears in *.*, but occasionally even our most conscientious efforts are undermined. Such was the case with Morton Kaplan's Keyflags, which appeared in *PC World,* Vol. 1, No. 7. The program works as intended with most IBM PCs but causes others to go into never-never land, refusing to return until rebooted. Barry Goldsmith of Findlay, Ohio, discovered that the ROM entry point set by the instruction

```
ORG     0E9A8H
```

in KEYFLAGS.ASM (p. 270) is not correct for every machine. Newer PCs contain a different version of ROM that supports the addition of hard disks and expansion chassis. If Keyflags was inoperative on your PC, change the ROM entry point to

```
ORG     0E9A6H
```

for the assembler listing. The equivalent correction for the BASIC listing is made in line 120. Change the value A8 (second to last value in the line) to A6, and 78F (the last value) to 78D. Once this correction has been made, those errant, locked up PCs should return to normal operation, now enhanced with Keyflags. But remember to observe the cautions mentioned in the original item.

This month we include several items about the BASIC Compiler, the Assembler/Macro Assembler, and their respective linkers. You'll also learn how to customize your DOS 2.00 system prompt using the ANSI.SYS device driver, discover an easier way to enter *1-2-3* data using the PC's numeric keypad, and find a handy input subroutine for BASIC. All this along with a square root function for *dBASE II,* and MODE.COM patches for the Okidata ML92 printer.

Compiler Swap

I recently wrote a sort program using BASIC 2.0 that worked fine when run under the BASIC Interpreter. I was surprised, however, to find that the compiled version of the same program would not run. I have discovered that the BASIC Compiler 1.0 does not support more than two SWAP statements per line. Programmers should be aware that compiling such programs may lead to unpredictable results.

Winfried Melcher
Solingen, West Germany

Linker Bug

There is a significant bug in the IBM Linker version 2.00 (DOS 2.00) and the Microsoft Object Linker version 2.01. If these linkers run out of disk space while trying to write the .EXE file, they will cause a loss in usable disk space. They neither write a directory entry for the aborted .EXE file (as does the DOS 1.10 linker) nor mark the used clusters (disk allocation units) as available. The result is a chain of clusters with no directory entry pointing to them, rendering them unusable.

If you get the message 'Out of space on run file' before completing a linker run, you may take the following steps (under DOS 2.00) to recover the lost clusters: make sure the file CHKDSK.COM is on a disk that is on line, then enter `CHKDSK` *d*`:/F`, where *d* is the drive containing the problem disk. CHKDSK will report '*xxx* lost clusters found in *yyy* chains.'

Enter Y when CHKDSK asks if you wish to recover the lost data into files. It will then collect each chain (you should have only one, unless you've had this problem before) into a file named FILE*nnnn*.CHK, where *nnnn* is a 4-digit number. The FILE*nnnn*.CHK files may then be deleted to recover the disk space.

Philip D. Ryals
Fremont, California

Batch Links

I created three batch files from commands found in the BASIC Compiler and Assembler/Macro Assembler manuals. The batch files allow users to compile and link BASIC programs, and to assemble and link source files, using only one command.

BCOMPILE.BAT (see listing by that name) allows you to compile and link a BASIC program, with the option to list the compiler and linker output.

BMASM.BAT (see listing by that name) allows you to assemble and link a Macro assembly language source file with the option to list the assembler and linker output.

BASM.BAT (not shown) allows you to assemble and link a simple assembly language source file, and also to list the assembler and linker output. BASM.BAT is exactly the same as the BMASM.BAT, except that all eight occurrences of B:MASM (in step 4) should be replaced with B:ASM, and B:BMASM should be replaced by B:BASM (in step 1).

All three batch files perform according to the following seven steps.

Step 1. Turns off the ECHO option of DOS so that all subsequent batch file commands (except messages that are preceded on the same line by an ECHO statement) will not be displayed.

Step 2. Executes the CHKDSK command to see whether any lost clusters or bad chains exist on disk A.

```
REM ***** STEP 1 *****
ECHO OFF
REM
REM COMMAND FORMAT:
REM
REM B:BCOMPILE FILENAME (LINK/NOLINK) (LIST/NOLIST) (OPTIONS) (OPTIONS)
REM                                                  COMPILER  LINKER
REM

REM ***** STEP 2 *****
ECHO B:CHKDSK A:/F
B:CHKDSK A:/F

REM ***** STEP 3 *****
IF %3==LIST ECHO     ========== PRINTER MUST BE TURNED ON ==========
IF %3==list ECHO     ========== PRINTER MUST BE TURNED ON ==========
IF %3==LIST PAUSE
IF %3==list PAUSE
IF %3==LIST ECHO B:MODE LPT1:80,6
IF %3==list ECHO B:MODE LPT1:80,6
IF %3==LIST B:MODE LPT1:80,6
IF %3==list B:MODE LPT1:80,6

REM ***** STEP 4 *****
IF %3==NOLIST ECHO B:BASCOM %1.BAS,%1.OBJ,NUL.LST%4
IF %3==nolist ECHO B:BASCOM %1.BAS,%1.OBJ,NUL.LST%4
IF %3==NOLIST B:BASCOM %1,,NUL%4
IF %3==nolist B:BASCOM %1,,NUL%4
IF %3==LIST ECHO B:BASCOM %1.BAS,%1.OBJ,%1.LST%4
IF %3==list ECHO B:BASCOM %1.BAS,%1.OBJ,%1.LST%4
IF %3==LIST B:BASCOM %1,,%1%4
IF %3==list B:BASCOM %1,,%1%4

REM ***** STEP 5 *****
IF %2==NOLINK GOTO CHCKLIST
IF %2==nolink GOTO CHCKLIST
IF %2==LINK GOTO LINK
```

BCOMPILE.BAT

The option /F has been used just in case there are lost clusters or bad chains. If there are, you are prompted for the option to save them in a file.

Step 3. If the parameter LIST is used, step 3 will echo a message to the operator that the printer must be turned on and will pause. Note: the MODE is set for 80 characters per line at 6 lines per inch.

Step 4. Based on the parameter LIST/NOLIST, step 4 will echo back to the operator the appropriate BASCOM command for BCOMPILE.BAT (or MASM and CREF commands for BMASM.BAT, or ASM and CREF commands for BASM.BAT) that will be submitted to DOS.

Step 5. Based on the parameter LINK/NOLINK, step 5 will echo back to the operator the appropriate LINK command that will be submitted to DOS.

Step 6. Based on the parameters LIST/NOLIST (and LINK/NOLINK for BCOMPILE.BAT), step 6 will echo back to the operator the COPY and DEL commands submitted to

```
IF %2==link GOTO LINK
:LINK
IF %3==NOLIST ECHO B:LINK %1.OBJ,%1.EXE,NUL.MAP,B:%5
IF %3==nolist ECHO B:LINK %1.OBJ,%1.EXE,NUL.MAP,B:%5
IF %3==NOLIST B:LINK %1,,NUL,B:%5
IF %3==nolist B:LINK %1,,NUL,B:%5
IF %3==LIST ECHO B:LINK %1.OBJ,%1.EXE,%1.MAP,B:%5
IF %3==list ECHO B:LINK %1.OBJ,%1.EXE,%1.MAP,B:%5
IF %3==LIST   B:LINK %1,,%1,B:%5
IF %3==list   B:LINK %1,,%1,B:%5

REM ***** STEP 6 *****
:CHKLIST
IF %3==LIST ECHO COPY %1.LST LPT1:
IF %3==list ECHO COPY %1.LST LPT1:
IF %3==LIST COPY %1.LST LPT1:
IF %3==list COPY %1.LST LPT1:
IF %3==LIST ECHO DEL %1.LST
IF %3==list ECHO DEL %1.LST
IF %3==LIST DEL %1.LST
IF %3==list DEL %1.LST
IF %2==NOLINK GOTO END
IF %2==nolink GOTO END
IF %3==LIST ECHO COPY %1.MAP LPT1:
IF %3==list ECHO COPY %1.MAP LPT1:
IF %3==LIST COPY %1.MAP LPT1:
IF %3==list COPY %1.MAP LPT1:
IF %3==LIST ECHO DEL %1.MAP
IF %3==list ECHO DEL %1.MAP
IF %3=-LIST DEL %1.MAP
IF %3==list DEL %1.MAP

REM ***** STEP 7 *****
:END
ECHO B:CHKDSK A:/F
B:CHKDSK A:/F
```

DOS that will print the output listings and then delete the list files from disk.

Step 7. Executes the CHKDSK command to see whether any lost clusters or bad chains exist on disk A. The option /F has been used in case there are any lost clusters or bad chains. If there are, you are prompted for the option to save them in a file.

The STEP statements are for documentation only and will not affect the batch files' performance.

BCOMPILE.BAT requires an IBM PC or XT with 64K and two disk drives. The disk in drive A must contain the BASIC program to be compiled. The disk in drive B must contain the following files:

BASCOM.COM, BASCOM.LIB, BASRUN.EXE, BASRUN.LIB, BCOMPILE.BAT, CHKDSK.COM, IBMCOM.OBJ, LINK.EXE, and MODE.COM.

BMASM.BAT and BASM.BAT each require an IBM PC or XT with 96K (excluding DOS) and two disk

```
REM ***** STEP 1 *****
ECHO OFF
REM
REM COMMAND FORMAT:
REM
REM B:BMASM FILENAME (LINK/NOLINK) (LIST/NOLIST) (OPTIONS) (OPTIONS)
REM                                                ASSEMBLER  LINKER
REM

REM ***** STEP 2 *****
ECHO B:CHKDSK A:/F
B:CHKDSK A:/F

REM ***** STEP 3 *****
IF %3==LIST ECHO     ========== PRINTER MUST BE TURNED ON ==========
IF %3==list ECHO     ========== PRINTER MUST BE TURNED ON ==========
IF %3==LIST PAUSE
IF %3==list PAUSE
IF %3==LIST B:MODE LPT1:80,6
IF %3==list B:MODE LPT1:80,6

REM ***** STEP 4 *****
IF %3==LIST ECHO               B:MASM %1.ASM,%1.OBJ,%1.LST,%1.CRF%4
IF %3==list ECHO               B:MASM %1.ASM,%1.OBJ,%1.LST,%1.CRF%4
IF %3==LIST B:MASM %1,,%1,%1%4
IF %3==list B:MASM %1,,%1,%1%4
IF %3==LIST ECHO               B:CREF %1.CRF,%1.REF
IF %3==list ECHO               B:CREF %1.CRF,%1.REF
IF %3==LIST B:CREF %1,,
IF %3==list B:CREF %1,,
IF %3==NOLIST ECHO             B:MASM %1.ASM,%1.OBJ,NUL.LST.NUL.CRF%4
IF %3==nolist ECHO             B:MASM %1.ASM,%1.OBJ,NUL.LST.NUL.CRF%4
IF %3==NOLIST B:MASM %1,,NUL,NUL%4
IF %3==nolist B:MASM %1,,NUL,NUL%4

REM ***** STEP 5 *****
IF %2==NOLINK GOTO CHCKPRNT
IF %2==nolink GOTO CHCKPRNT
IF %3==LIST ECHO B:LINK %1.OBJ,%1.EXE,%1.MAP,B:%5
IF %3==list ECHO B:LINK %1.OBJ,%1.EXE,%1.MAP,B:%5
IF %3==LIST B:LINK %1,,%1,B:%5
```

BMASM.BAT

```
IF %3==list B:LINK %1,,%1,B:%5
IF %3==NOLIST ECHO B:LINK %1.OBJ,%1.EXE,NUL.MAP,B:%5
IF %3==nolist ECHO B:LINK %1.OBJ,%1.EXE,NUL.MAP,B:%5
IF %3==NOLIST B:LINK %1,,NUL,B:%5
IF %3==nolist B:LINK %1,,NUL,B:%5

REM ***** STEP 6 *****
:CHKPRNT
IF %3==NOLIST GOTO END
IF %3==nolist GOTO END
IF %3==LIST ECHO COPY %1.LST LPT1:
IF %3==list ECHO COPY %1.LST LPT1:
IF %3==LIST COPY %1.LST LPT1:
IF %3==list COPY %1.LST LPT1:
IF %3==LIST ECHO DEL %1.LST
IF %3==list ECHO DEL %1.LST
IF %3==LIST DEL %1.LST
IF %3==list DEL %1.LST
IF %3==LIST ECHO COPY %1.REF LPT1:
IF %3==list ECHO COPY %1.REF LPT1:
IF %3==LIST COPY %1.REF LPT1:
IF %3==list COPY %1.REF LPT1:
IF %3==LIST ECHO DEL %1.REF
IF %3==list ECHO DEL %1.REF
IF %3==LIST DEL %1.REF
IF %3==list DEL %1.REF
IF %3==LIST ECHO COPY %1.MAP LPT1:
IF %3==list ECHO COPY %1.MAP LPT1:
IF %3==LIST COPY %1.MAP LPT1:
IF %3==list COPY %1.MAP LPT1:
IF %3==LIST ECHO DEL %1.MAP
IF %3==list ECHO DEL %1.MAP
IF %3==LIST DEL %1.MAP
IF %3==list DEL %1.MAP

REM ***** STEP 7 *****
:END
ECHO B:CHKDSK A:/F
B:CHKDSK A:/F
```

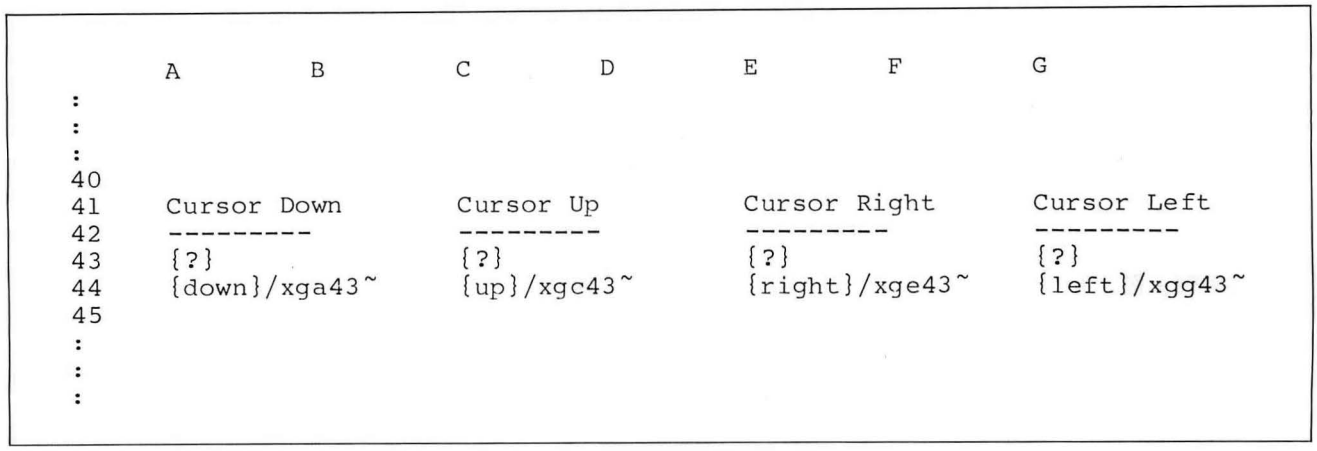

Figure 1: Sample 1-2-3 worksheet

drives. The source disk in drive A must contain the source file to be assembled. The disk in drive B must contain the following files: MASM.EXE (or ASM.EXE for BASM.BAT), CREF.EXE, LINK.EXE, MODE.COM, CHKDSK.COM, and BMASM.BAT (or BASM.BAT, with the nine changes mentioned earlier).

Duaine Hechler
Florissant, Missouri

Lotus Numeric Keypad

For frustrated *1-2-3* users who would like to take advantage of the numeric keypad for quick data input, here is a solution. You can create four Lotus macros that cause the cursor to move automatically when the <Enter> key is pressed. (Lotus macros are simply executable keystrokes stored within the worksheet.) The macros listed here work the same way except for the direction of travel—so let's walk through the "Cursor Down" macro to see how to set one up.

First, type {?} into cell A43 and {down}/xga43~ into cell A44 of an empty *1-2-3* worksheet as shown in Figure 1. Then move the cursor back to cell A43 and create a named range called \D (Lotus for <Alt>-D) with the following:

/RNC\D <Enter> <Enter>

Now, move to the top cell of the column in which you wish to input data. Invoke the macro by pressing <Alt>-D. Toggle on the <NumLock> key, then enter a number from the numeric keypad and press <Enter>. The number will be entered in the proper cell, and the cursor will move down to the next cell—ready for the next number.

The only way I've found to leave this macro is to press <Ctrl>-<Break>. Perhaps a cleaner method exists, but this one does the job.

Rick Andersen
Humble, Texas

dBASE Root

I am surprised that *dBASE II* does not have the capability to do mathematical functions that are common in other programming languages. The listing "dBASE II Square Root" is a simple program that I adapted to run under *dBASE II*. It is intended to be used as a subroutine of another program. Since many applications use square roots, many readers may find this program useful. The routine is not as fast as a calculator or BASIC, but it is faster than interpolating by hand.

Sam Mecham
Provo, Utah

Custom Prompts

DOS 2.00 users can create a variety of interesting and useful effects by combining the PROMPT command with the extended screen control functions provided by the ANSI.SYS device driver. As described in Chapter 13 of the DOS 2.00 manual, you install ANSI.SYS by including the line DEVICE=ANSI.SYS in the CONFIG.SYS file on the same disk with the ANSI.SYS file (from the DOS 2.00 disk).

After rebooting with this disk, a number of sophisticated screen functions may be controlled by sending sequences of characters that begin

```
*** PROCEDURE TO FIND SQUARE ROOT OF A NUMBER TO THE ACCURACY OF ***
***                    THE VARIABLE "ACCURACY"                    ***
***      Sam Mecham     9-24-83     Mecham-Western Consultants     ***
***                INPUT:  ORIGINAL --- OUTPUT:  ROOT              ***

do case
  case ORIGINAL < 0
    remark root of a negative number?
  case ORIGINAL = 0
    store 0 to ROOT
  case ORIGINAL > 0
    store 100000 to ACCURACY
    store ORIGINAL/2.00000 to ROOT
    store 0 to DIFFERENCE
    store f to ACCURATE
    do while .not. ACCURATE
      store ROOT + DIFFERENCE to ROOT
      store (ORIGINAL/ROOT-ROOT)/2 to DIFFERENCE
      if (int(DIFFERENCE*ACCURACY))/ACCURACY = 0
        store t to ACCURATE
      endif
    enddo
endcase
release DIFFERENCE
return
```

dBASE II Square Root

with the Escape character to the console. Users can include cursor movement, erase areas of the screen display, and control the video attributes of the characters being displayed. Since the PROMPT command (see DOS 2.00 manual, Chapter 10) allows Escape characters to be included in the character sequence sent by DOS as its prompt, all these screen control features may be used to design a truly useful prompt.

As an example of what can be accomplished, I set my prompt in the following way:

```
PROMPT $e[s$e[1;1H$e[K $e[7m $d $t $p
  $e[0m$e[u$g
```

This creates a status line on the top of the screen that shows, in inverse video, the date, time, and current directory of the default drive. The actual prompt character is a single '>'. This makes it very easy to know at all times where one is within a complex file system.

In addition, if you would like a batch file to run without displaying its lines on screen, the first command should be

```
PROMPT $e[s$e[8m
```

which makes all subsequent console output invisible. The last command should be

```
PROMPT $e[u$e[0m
```

which restores the cursor to its original position and makes the console output visible again. Be careful with this one; if the batch file should be aborted for some reason before the last PROMPT command is reached, all subsequent characters typed either by you or the system will be invisible.

Tim S. Axelrod
Livermore, California

Input Subroutine

The listing "Input Subroutine" demonstrates a subroutine (lines 1000 through 1250) I wrote that I have found quite useful, especially when it is used with longer programs. I hope your readers find it just as helpful.

```
10 ROW = 10
11 COLUMN = 10
12 CURSOR = 1
13 START = 12              'For Color/Graphics Adapter use START = 7
14 SSTOP = 1               'For Color/Graphics Adapter use SSTOP = 0
15 LENGTH = 4
16 PRIVATE = 0
17 CHARACTER = 254
18 NUMERIC = 0
19 DATE = 0
20 SCREEN 0:CLS
30 GOSUB 1030              'Call Input Subroutine
40 PRINT
50 PRINT "BUFFER$ = ";BUFFER$
60 END
70 '
1000 '*************************************************************************
1010 '******************** INPUT SUBROUTINE STARTS HERE ***********************
1020 '*************************************************************************
1030 ON ERROR GOTO 1200
1040 BUFFER$ = "" : IF DATE THEN LENGTH = 8 : NUMERIC = 1
1050 LOCATE ROW,COLUMN,CURSOR,START,SSTOP : IF PRIVATE THEN PRINT STRING$(
     LENGTH,CHARACTER); : ELSE PRINT BUFFER$ + STRING$(LENGTH-LEN(BUFFER$),
     CHARACTER);
1060 IF LEN(BUFFER$) = LENGTH THEN 1210 : ELSE LOCATE ROW,COLUMN+LEN(
     BUFFER$),CURSOR,START,SSTOP
1070 A$ = INKEY$ : IF A$ = "" THEN 1070
1080 IF LEN(A$) = 2 THEN 1140 : ELSE A = ASC(A$)
1090 IF A = 8 THEN IF DATE THEN IF LEN(BUFFER$) = 3 OR LEN(BUFFER$) = 6
     THEN BUFFER$ = LEFT$(BUFFER$,LEN(BUFFER$)-2)) : GOTO 1050 : ELSE GOTO
     1050 : ELSE BUFFER$ = LEFT$(BUFFER$,LEN(BUFFER$)-1) : GOTO 1050
1100 IF A = 13 THEN 1210
1110 IF NUMERIC THEN IF A>45 AND A<58 AND A<>47 THEN BUFFER$ = BUFFER$ + A$
     : IF DATE THEN IF LEN(BUFFER$) = 2 OR LEN(BUFFER$) = 5 THEN BUFFER$ =
     BUFFER$ + "/" : GOTO 1050 : ELSE GOTO 1050 : ELSE GOTO 1050 : ELSE
     GOTO 1050
1120 IF A>31 AND A<127 THEN BUFFER$=BUFFER$ + A$ : GOTO 1050 ELSE GOTO 1050
1130 '*************************************************************************
1140 'This section may be used to check for extended code keys.
1150 'See Extended Codes in Appendixes G of the BASIC Manual.
1160 'To get the second byte in A$ use "A = ASC(RIGHT$(A$,1))".
1170 '
1180 GOTO 1050
1190 '*************************************************************************
1200 RESUME 1050:                                    'Error trap
1210 ON ERROR GOTO 0
1220 DEF SEG=0  'Line 1230 normalizes the cursor for either display adapter
1230 IF (PEEK(1040) AND 48)=48 THEN LOCATE ,,,12,13 ELSE LOCATE ,,,7,7
1240 DEF SEG
1250 RETURN
```

Input Subroutine

The subroutine allows programmers to specify the location of the input field, whether the cursor is on or off, what the cursor will look like, the length of the input field, whether the input is to be displayed while being typed in or held private, what type of characters are to be used to show the length of the input field, and whether the input is numeric or alphanumeric. It also allows you to accept input in a special date format.

These features are specified by setting the following variables to the desired values before calling the subroutine:

ROW. The vertical position where you wish to display the input request.

COLUMN. The horizontal position on the row to begin input.

CURSOR. If equal to 1, the cursor is on (flashing); if 0, the cursor is off.

START. The starting position of the cursor on the line (see note for SSTOP).

SSTOP. The ending position of the cursor on the line. (For more information on START and SSTOP see "LOCATE" in Chapter 4 of the BASIC manual.)

LENGTH. The maximum number of characters that will be accepted.

PRIVATE. If equal to 1, the information will not be displayed on the screen as the cursor moves through the input field; if equal to 0, the input will be displayed as it is being typed in.

CHARACTER. The ASCII number for the character that will be displayed to show the size of the input field. (See Appendix G of the BASIC manual. In medium- and high-resolution modes, ASCII codes above 126 are not predefined.)

NUMERIC. If equal to 1, only the numeric characters 0 through 9 and the period will be accepted; if equal to 0, all alphanumeric characters will be accepted.

DATE. If equal to 1, only numeric characters will be accepted; a field of eight characters will be displayed. The slash will automatically be placed after the second and fourth input (e.g., 12/34/56, so single-digit months and days must be preceded by a zero). If equal to 0, the date function is turned off.

Lines 10 through 19 set these variables for the demonstration performed by the listing "Input Subroutine." So, when the subroutine is called (line 30), the cursor will be on (flashing), located on row 10, column 10. It will be a two-part cursor, a bar at the top and a bar at the bottom of the character cell it occupies. The input field will be displayed as a string of four small squares (character 254). The subroutine will accept alphanumeric input, displaying each character entered, and the input will not be in the special date format.

Upon return from the subroutine to the main program, BUFFER$ contains the information entered in the input field, and the cursor is changed back to its normal state.

John Bourg
Sugar Land, Texas

Editors' note: There are no checks for invalid parameters, and it is up to the programmer to assure that the variables used to specify desired features for the subroutine are correct. In particular, watch out for COLUMN when the screen is only 40 characters wide, and be sure that START and SSTOP are correct for the active display adapter, as the IBM Mono-

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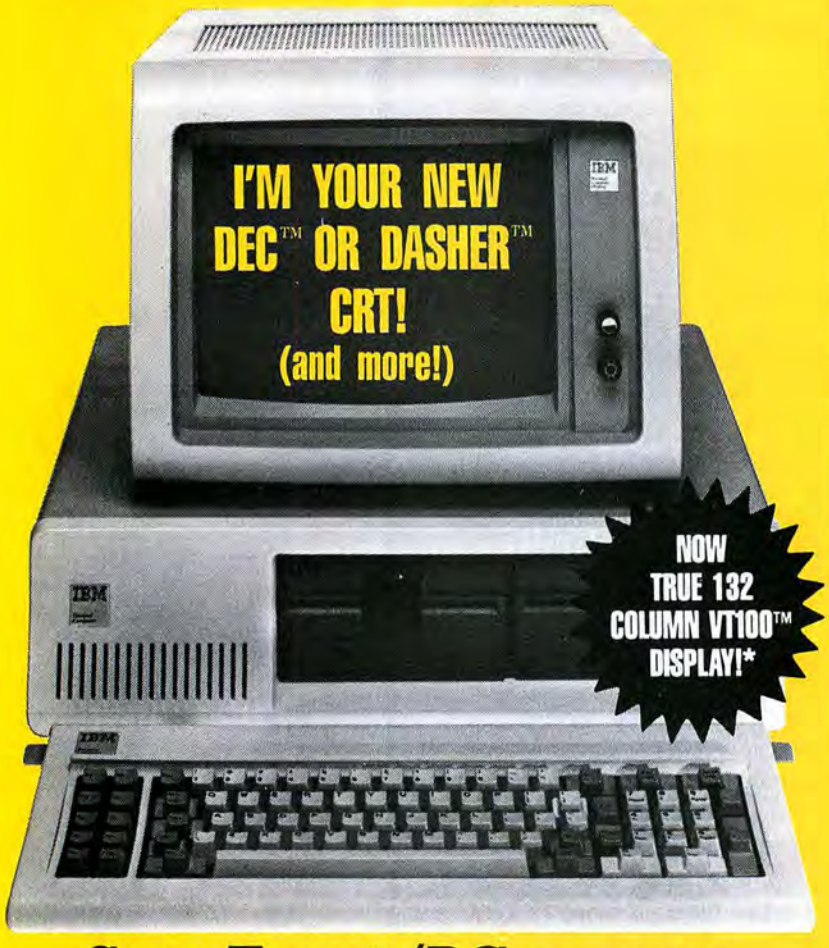

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chrome Monitor Adapter allows up to 14 (0 to 13) scan lines for the cursor, but the IBM Color/Graphics Adapter uses a maximum of 8 (0 to 7) scan lines for the cursor. Inappropriate START and SSTOP values may yield an invisible cursor.

Half-Height Fix

Here's a short problem-solver for those buying the new Teac half-height disk drive for their IBM PCs. The drive may not come correctly configured for the IBM PC, resulting in a lack of response to any access command. After consulting my dealer, I discovered a solution. On the bottom of the drive (on the circuit board) in the rear near the control cable connection is a jumper block.

To configure the drive properly, two jumpers are needed: one at the HS position (first on the right) and another at the DSI position (third from the right). This usually entails moving the inner jumper one space to the left. Now, with the number one wire (the red one) of the control cable to the left of the drive (as you face the drive's front), the Teac half-height drive should operate properly.

Maurice White
Omaha, Nebraska

Okidata Mode Fix

Users of the Okidata ML92 printer can easily patch the MODE.COM file to enable it to send the proper printer control codes for line length and number of lines per inch. Make a copy of the file MODE.COM, then type `DEBUG MODE.COM` .

For DOS 1.10 type E863 <Enter> 1E <Enter> E873 <Enter> 1D <Enter> E89B <Enter> 36 <Enter> E8A6 <Enter> 38 <Enter> W <Enter> Q <Enter> .

For DOS 2.00 type E855 <Enter> 1E <Enter> E865 <Enter> 1D <Enter> E88D <Enter> 36 <Enter> E898 <Enter> 38 <Enter> W <Enter> Q <Enter> .

The same technique may be used for other printers, providing that the printer control codes to set normal or condensed printing consist of a single character, and the printer control codes to set the number of lines per inch consist of Escape followed by a single character. Simply substitute the printer control codes in the above procedure according to the following table:

1E Control code for normal printing (80 characters per line, 10 cpi)

1D Control code for condensed printing (line length of 132)

36 Control code for 6 lines per inch

38 Control code for 8 lines per inch

To eliminate possible confusion, rename the modified MODE.COM file to something appropriate. I call mine OKIMODE.COM.

Philip D. Ryals
Fremont, California

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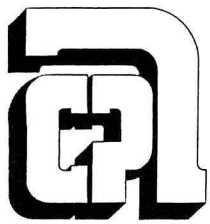

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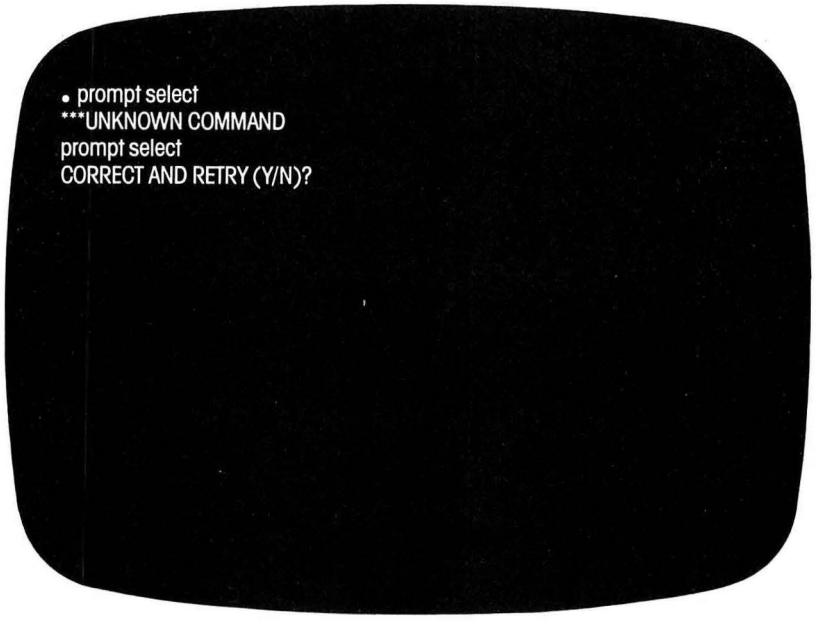
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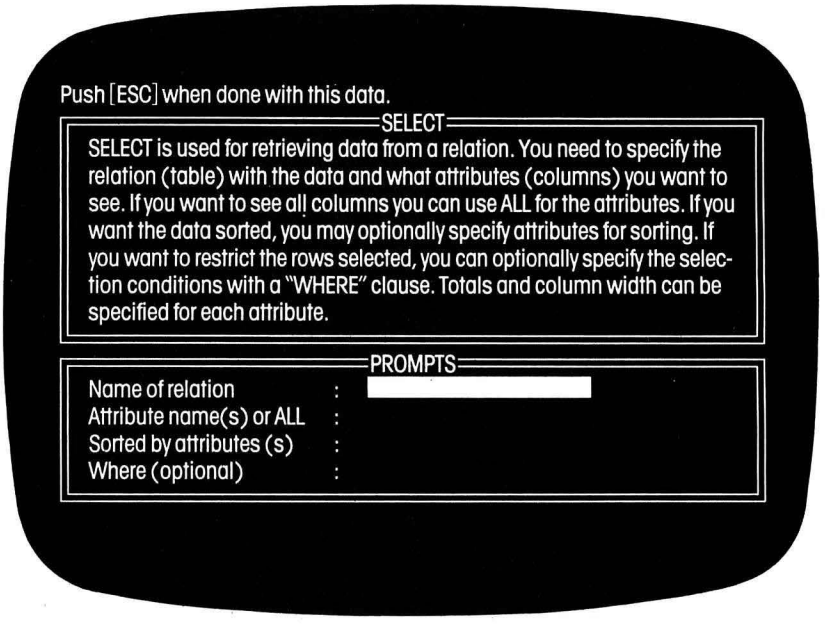

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(time to sort 1,000 records)

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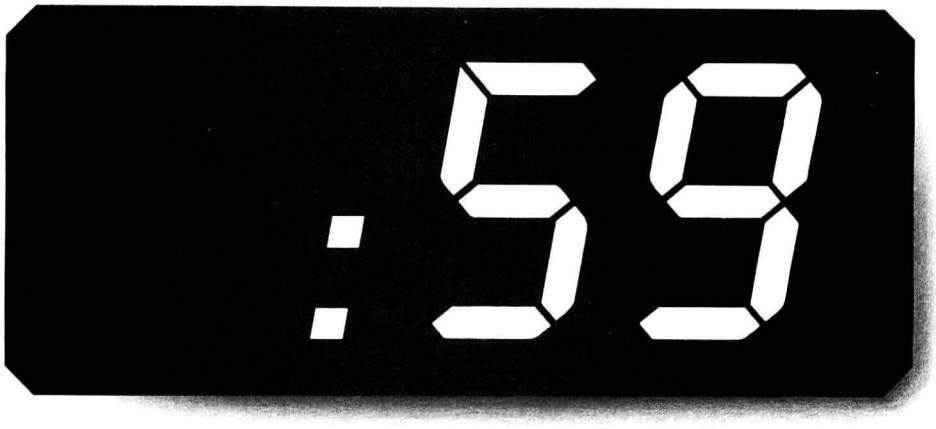

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COMPAQ Gets a 10

Edited by Eric Brown

The COMPAQ was one of the first IBM PC compatibles to hit the market, and it remains the most compatible. Although portable, it packs twice the power supply of the PC, has some of the quietest disk drives on the market, and has a built-in display that allows it to run programs and display characters you can't touch on the standard PC. All these attributes and more are present in COMPAQ's latest offering, the 10-megabyte COMPAQ-Plus.

When Rod Canion, Jim Harris, and Bill Murto left Texas Instruments two years ago to start a new computer company, some considered them traitors. (A multimillion-dollar lawsuit filed by Texas Instruments was recently settled out of court.) Others saw them as entrepreneurial folk heroes, and venture capitalists saw them as a source of future profits. With a combination of timing, smarts, talent, and incredible start-up capital, the COMPAQ gang rode out into the Texas night and quickly soared to the top, unveiling their new product to rave reviews at COMDEX/Fall '82. By the end of 1983, COMPAQ Computer Corporation raked in revenues of approximately $80 million and was selling its computers at over 750 dealer locations.

In this era of computer manufacturer failures and losses, the eyes of the industry are on COMPAQ to see if it can continue to perform miracles. Perhaps the level of success enjoyed by COMPAQ is due more to shrewd marketing than building a good computer. COMPAQ has closely shadowed IBM every step of the way and worked its way into the marketplace as the second computer to buy after the PC. Eschewing bundled software, COMPAQ has aimed its machine primarily at the executive who uses a company-owned PC at work and needs a compatible portable for doing work at home. So far, IBM has seemed content with this symbiotic relationship, allowing the COMPAQ to be sold side by side with the PC as the portable of choice. But a new IBM portable might force COMPAQ into drastic action.

As Steve Cook demonstrates in "The COMPAQ-Plus," the three wise men at COMPAQ are not prepared to rest on past successes. By moving into the hard disk marketplace with the COMPAQ-Plus, the company is competing head to head with the PC XT while reflecting the growing power and memory requirements of a new generation of software.

Just after COMPAQ announced the COMPAQ-Plus, it also announced its first public offering of 6 million shares of common stock at an estimated price of $15 to $18 per share.

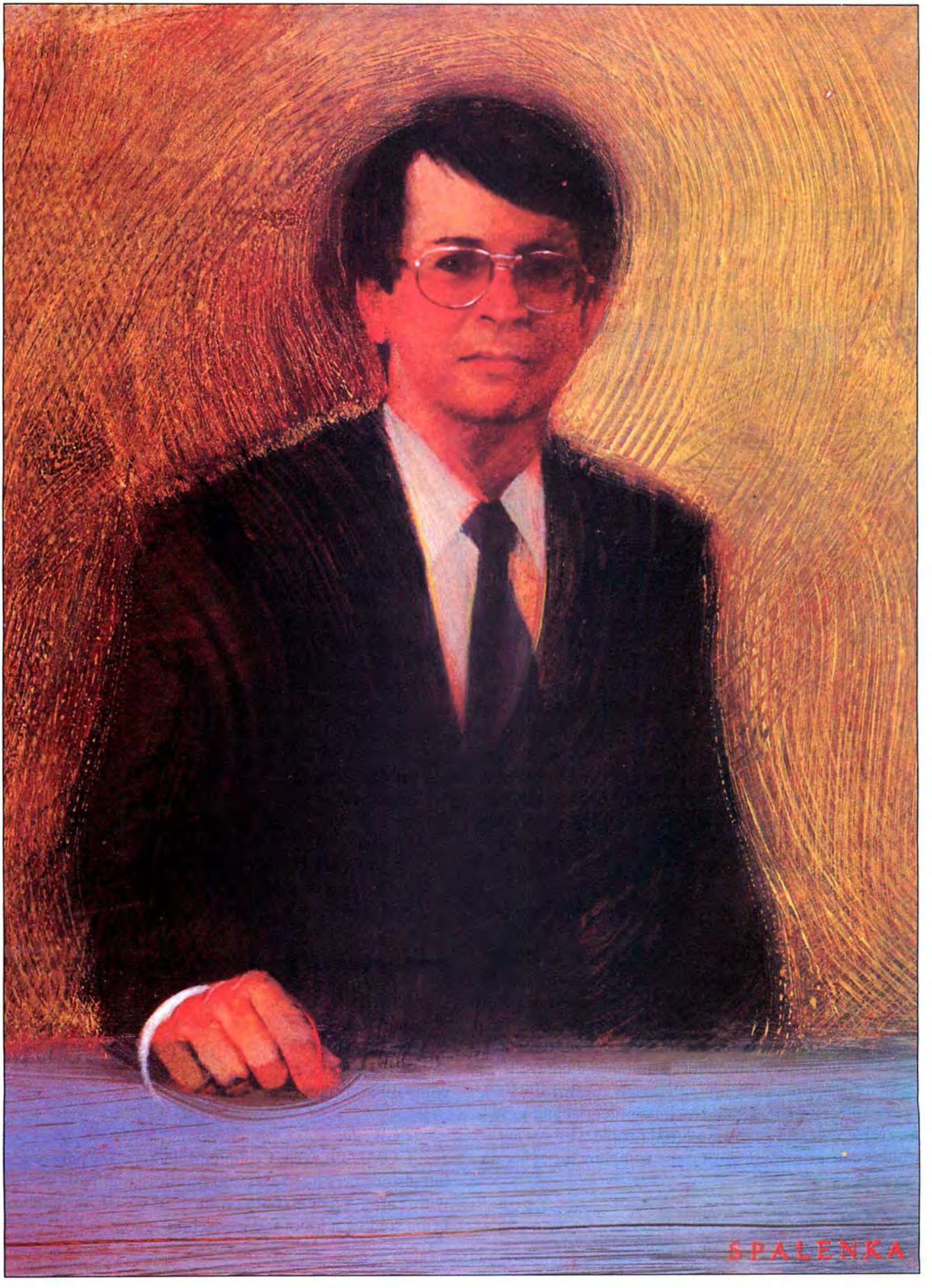
PC World Publisher David Bunnell visited COMPAQ President Rod Canion in Houston to ask him about past successes, future plans, and the significance of the COMPAQ-Plus. The following is an edited version of that discussion.

PCW: Tell us about the founding of COMPAQ. How was it started? Where did the idea come from? How were you able to grow so fast?

COMPAQ: That's a long story. It's exciting to think back on the time when we left Texas Instruments. We had saved up enough living expenses to last for six months, and we were prepared to go even longer if we had to. Meanwhile, we developed the idea and got capital funding.

PCW: Who were the founders of the company?

COMPAQ: Jim Harris, who is now Vice-president of Engineering; Bill Murto, Vice-president of Marketing; and myself. We had worked together at Texas Instruments, so we knew each other well. Our job was starting new businesses. We started the disk business at Texas Instruments back in 1979, so we knew we could work together. Bill covered marketing, Jim knew engineering, and I provided the business point of view.


SPALENKA

When we left Texas Instruments, Jim was still in disks, and Bill and I were off in terminal systems. All three of us more or less independently decided that we wanted to leave the big company and do something as friends. When we finally got to the point of feeling like we could do it—had enough confidence in our ability to come up with an idea—we jumped in and started swimming. Things went very rapidly from then on.

It's amazing when you come out of a big company environment where so many things are coming at you, overloading your thoughts and creativity; you get out and suddenly all that's behind you. Not only are you able to think clearly, but you also have this high motivation—you don't have any income. After a month of actively exploring ideas and looking for business opportunities, the theme for the idea of the COMPAQ dawned on me, and we pursued it very vigorously from that point forward. About six weeks later we had funded the company and had gotten it going.

PCW: How much money did it take to fund COMPAQ Computer Corporation?

COMPAQ: We initially raised $1.5 million, fairly typical for a start-up in this business. We shook hands in late February of 1982, borrowed $20,000 from our investors, and by the end of March had signed the agreement and pulled in $1.5 million. We already had a few employees busily designing the product and figuring our specific plans. The further we dug into the gap that existed between Osborne's limited portable and IBM's full-function desktop, the more we realized that there was a big opportunity there. We needed to grow fast, and we also needed to supply the demand. That summer we began raising more money. We set out to raise $5 million and ended up with $8.5 million. By September we had a total of $10 million. No one can recall anyone raising that much money in so short a time.

PCW: What were the other key ingredients to getting started?

COMPAQ: One key ingredient had to do with recognizing the potential for the product and structuring the company accordingly. We did enough early testing to decide that the product was going to be a success. We staffed with high-level people and hired a good manufacturing manager, who brought in a financial controller. We began building a team with a view toward 1983-84, when the company would reach its potential and grow by leaps and bounds. So we hired people who we felt could manage growth within the company for at least a couple of years.

PCW: How did COMPAQ come to be the leader among IBM PC compatible computers?

COMPAQ: One of the key factors to our success was that we were able to get into the heart of the dealer channel and supply them with the product that we shipped, probably by a larger portion than any other compatible company.

PCW: Do you mean ComputerLand?

COMPAQ: Well, ComputerLand is a key part of it, but also dealers like Sears and Businessland. Now we're with Entre, a major chain on the East Coast. We're also being sold by a lot of independents—people who IBM

The COMPAQ-Plus

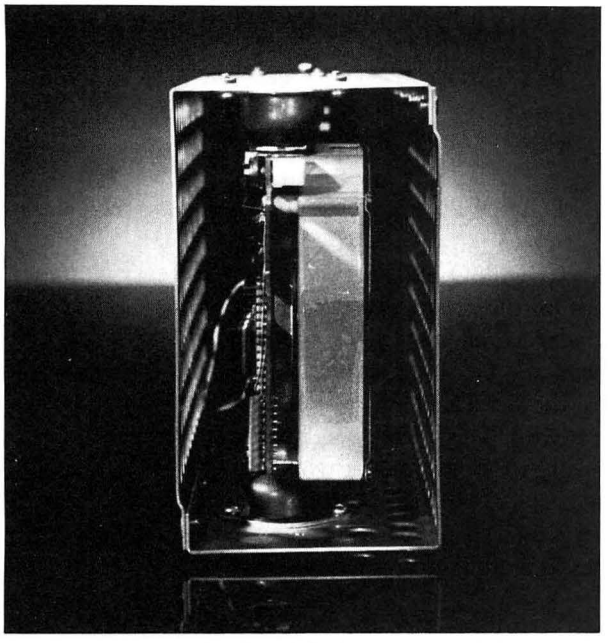
Steven Cook

The latest release from COMPAQ Computer Corporation is the COMPAQ-Plus, a hard disk version of the original COMPAQ computer and the portable equivalent of the IBM XT. The careful design of this new product demonstrates that COMPAQ Computer Corporation is well able to play ball in the same league as IBM.

Portable computers with hard disk drives have long been regarded with pessimism by industry experts. Most popular hard disk systems use Winchester technology, a design that places the disk drive's read/write head about 20 microinches above the disk surface. Winchester disk drives are popular because they allow large amounts of data to be stored in a very small area, but they are noted for their extreme sensitivity to physical shock. It is unwise to store large amounts of valuable data on such a delicate device when it will inevitably be treated roughly in transport.

But the COMPAQ-Plus provides tremendous security for data stored on its integral 10-megabyte hard disk. The 3½-inch drive is protected by internal shock mounts and then mounted on large rubber supports within a 5¼-inch frame (see photo). To absorb shock from an impact, the mounting design permits more than 1 inch of travel. Finally, the 5¼-inch frame is placed on another set of shock mounts inside the COMPAQ cabinet. This triple shock mounting ensures that the delicate Winchester disk will remain safe under even the worst conditions.

COMPAQ engineers have tested the integrity of the hard disk drive at up to a 40g shock, which is approximately equal to the force of a 20-mile-



The COMPAQ-Plus hard disk is suspended by a specially designed shock isolation system.

per-hour impact. Although the computer itself was destroyed by these tests, the hard disk drive worked flawlessly when it was connected to another machine. Clearly, data stored on the COMPAQ-Plus hard disk is at least as secure as data stored on floppy disks.

And while most portable-computer users prefer to carry their machines on board rather than risk having to watch them tumble to the ground during loading operations, COMPAQ's vice-president of engineering, Jim Harris, states that many COMPAQ employees now check their COMPAQ-Plus computers as baggage when they fly. The machines are unlikely to be damaged by normal handling, and the data will be safe even if the computers are destroyed. COMPAQ users who still prefer to carry their machines will be pleased to learn that the COMPAQ-Plus is 2 pounds lighter than its dual-floppy predecessor.

Owners of the original COMPAQ can thank COMPAQ's engineers for designing a machine that's easy to convert into a COMPAQ-Plus. The earlier design uses the same large power supply as the COMPAQ-Plus, so only the hard disk drive, its controller board, and some new ROM chips are needed to perform the upgrade. As a bonus, COMPAQ Computer Corporation is temporarily offering the upgrade for $500 less than the usual $2500. COMPAQ owners can upgrade their systems for the same price as a new COMPAQ-Plus, an option that was not offered to IBM PC owners when the XT was announced.

Hats off to COMPAQ Computer Corporation for its innovative designs and quality products. The COMPAQ-Plus is proof that they know how to play hardball in Texas.

COMPAQ-Plus
COMPAQ Computer Corporation
12330 Perry Rd.
Houston, TX 77070
713/890-7390
List price: $4995, upgrade kit $2500

had selected as their dealers. IBM had done their homework, and as it turns out, IBM's dealers were some of the best in terms of the commitment to training and customer support. By going in to those dealers, we got the best opportunity for the largest number of sales.

PCW: Is COMPAQ carried by dealers who don't carry the IBM PC?

COMPAQ: A few, but in almost all cases they carry the PC. If a dealer was already selling PCs, we felt that there would be a need for a portable. The dealers agreed; they were anxious to have a product they could sell that way. Plus, they already knew how to sell it—they knew how to operate it, they had the software already there, and the service people generally knew how to work on it. So there was not a lot of front-end effort to provide quality service.

PCW: What makes you think that you will succeed where a company like Osborne failed?

COMPAQ: The pitfalls that Osborne succumbed to are there for everybody. There are many lessons to be learned in trying to understand what happened to Osborne. You have to ask yourself questions: Is the product too old? Are we listening to the marketplace? Do we

have tight enough controls in the company? Are we really being thorough enough? Are our financial controls good enough? That is probably the core of surviving the opportunity growth that we're going through. If you take a good team of people and define a problem, they'll go solve it in almost all cases. But if you don't know what the problem is until that problem has got you, then you can't solve it. So it gets back to control. Do you know how much your machines are costing you? Do you know if your dealers are selling your product? Do you know why they are selling or not selling? Unless you have a regular way to get that information and look at it, you're open to many problems.

PCW: Do you think about the possibility of IBM introducing a portable?

COMPAQ: Certainly. Anything IBM does in the market will have an impact on everybody. They are the standard-setter. If IBM comes out with a product more like ours, it would have an impact on us.

PCW: Do you have plans to deal with that contingency?

COMPAQ: It would depend to a great degree on the specifics of the product. If you hypothesized that it would be a COMPAQ lookalike, our dealers would want to continue carrying COMPAQs as long as our product was competitive. They want other companies to be there to sell their products so they can balance their business and not be dependent on IBM. Since we have worked well with our dealers, they have a natural desire to keep carrying COMPAQ if it's competitive. If IBM comes into the market with a similar product, we'll have to offer our product at a competitive price and with competitive functions. If their price were to come in ahead of COMPAQ, I think we would have to take pricing action. If they were to introduce some new function that was highly desired in the market, we would probably have to figure out how to address that particular capability.

PCW: When did the idea for the hard disk version, COMPAQ-Plus, come into being?

COMPAQ: I guess we had always, even from the original concept of the product, felt that a hard disk would be necessary.

PCW: Is the COMPAQ-Plus the natural evolution of the machine?

COMPAQ: Definitely. After people have used a personal computer for a while, they need more storage. New applications are invented when more storage is required. We conceived of the need for the hard disk when we conceived of the original product and designed the product to allow for it. We didn't know exactly what it was going to be, but we left room for shock mounts, put a power supply in that had enough power to supply it, and designed our cooling system to handle more power than the COMPAQ generated at the time. We conceived of an upgrade path when the original product was developed. Once the COMPAQ-Plus is in the marketplace, it will be a big plus for COMPAQ purchasers. They won't be buying a computer that stops at two floppies—it can go on up to a 10-megabyte hard disk.

PCW: So users can convert the COMPAQs they now own?

COMPAQ: We'll offer a kit, so a dealer can do it.

PCW: Will COMPAQ owners get a special discount?

COMPAQ: No, but they'll have an easy upgrade path for the product to take off. It will not cost them a penalty for having bought the COMPAQ. You can go ahead and buy the first one, and the total upgrade will cost the same as if you had bought the COMPAQ-Plus to start with. The strategy is that you don't have to pay a penalty for not knowing what you will need. If you buy the base-priced IBM PC today, it will cost you an arm and a leg to get a Winchester added on in a separate chassis that takes up more space.

PCW: What's the next step in the COMPAQ's evolutionary path? Will it have a color monitor?

COMPAQ: A color monitor is an intriguing idea, but it doesn't naturally fit into the portable environment. A color monitor would make it bigger and heavier. But it is a possibility.

PCW: What about touch-sensitive screens?

COMPAQ: Touch is an interesting area. Now that Hewlett-Packard has introduced a touch screen, the technology will get a lot more attention. The general reaction I've heard is not particularly favorable to a touch screen, but I think it's worth looking into. With the new windowing software coming along, touch may find a place.

PCW: Since the COMPAQ-Plus has better screen resolution, I think window software would be perfect for this machine. Have you tried Visi/ON *on it?*

COMPAQ: Oh, yes.

PCW: But you can't run Visi/ON *on the standard COMPAQ.*

COMPAQ: Right, you have to have a hard disk.

PCW: Is there any problem with hooking a mouse to the COMPAQ-Plus?

COMPAQ: No problem at all.

PCW: What do you think about mouse technology? Is it going to make the machines more accessible and more popular?

COMPAQ: That's not clear yet, but it's a very important path. How do you make it easier for new users to get familiar with the machine and make it useful to them? I think mouse technology is an important stage, but it's probably not the final answer. People will use it and find out some good things and some bad things, and then there will be the next step in the evolutionary process. Hopefully, somewhere down the line new users will be able to come in and avoid the trial of learning how to communicate with the computer.

PCW: How do you think Visi/ON *compares with the Lisa?*

COMPAQ: The problem with the Lisa is that it's quite slow. My impression is that *Visi/ON* run on a hard disk will outperform Lisa. Considering the price difference, that is a significant situation.

Mouse technology is an important stage, but it's probably not the final answer.

PCW: There are some other areas in artificial intelligence that might help solve the user interface problem. Then there's the idea of using other means of storage, such as video disks.

COMPAQ: There are several technological paths that will open up new opportunities. It's difficult to predict exactly how fast they are going to evolve. One of the interesting things about this market is that no one can really sit down and say, "OK, here is where X is going to happen, and here is where Y is going to happen." They can say that, but they will be wrong. The best you can do is try to keep up with the direction and relative speed in which things are moving and be ready to respond when the time is right.

PCW: Do you think that the personal computer market will grow as planned, or is there anything that would stop it?

COMPAQ: It's difficult for me to see how it would not grow as projected. The fundamental reason that the personal computer market is not subject to the winds of the home computer market is that personal computers are really useful. Once an individual understands what a personal computer can do, there is no longer any doubt as to whether he or she needs one. Once that understanding has been communicated, the need is very real. As the education progresses and people see what other people are doing with computers, a strong momentum will build.

PCW: How do you tell people about personal computers? It strikes me that one of the problems in marketing the product is that it can be used for so many different things that it is difficult to choose. What do you zero in on?

COMPAQ: The reason the personal computer market exists is that people figure out what to do with them. No company can sit down and conceive of some great new application nearly as well as people who have a problem to solve. The key to the growth in the industry is how rapidly people communicate with their peers. It's a chain-reaction process.

PCW: So word of mouth is the strongest kind of marketing?

COMPAQ: Absolutely. There's no amount of advertising on TV or in print that does nearly as well. Once someone is interested, that's when the advertising comes in—to get people to pay attention to your product. We felt strongly from the very beginning that if we did become very successful, it would be easy to lose it if the product didn't deliver a high degree of user satisfaction. We've taken surveys to see where we are. It's really quite amazing. We sent the first survey to about 500 COMPAQ users; 98 percent said that they would recommend COMPAQ to a friend. That's an unusually high number. In statistics there's always 20 to 25 percent who will be against anything.

PCW: When you do your surveys, do you find out what most people use their COMPAQ for? What's the number one application? Word processing?

COMPAQ: I think it is financially/number related more than word processing. I don't have the specific numbers on it. Certainly, there is a lot of word processing needed, but the survey data we have says that people use it for its ease of moving around and for some kind of business or financial application.

PCW: Are COMPAQ users typically business professionals?

COMPAQ: Yes, but at my son's high school open house the other night his math teacher mentioned that she had a COMPAQ. She started telling me all the neat things she does with it. I guess it's starting to penetrate other places, but it is primarily for business professionals. That's where we think the biggest need is and where the biggest market growth will come.

No one is more

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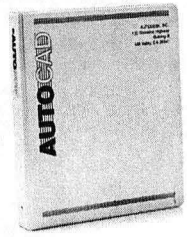

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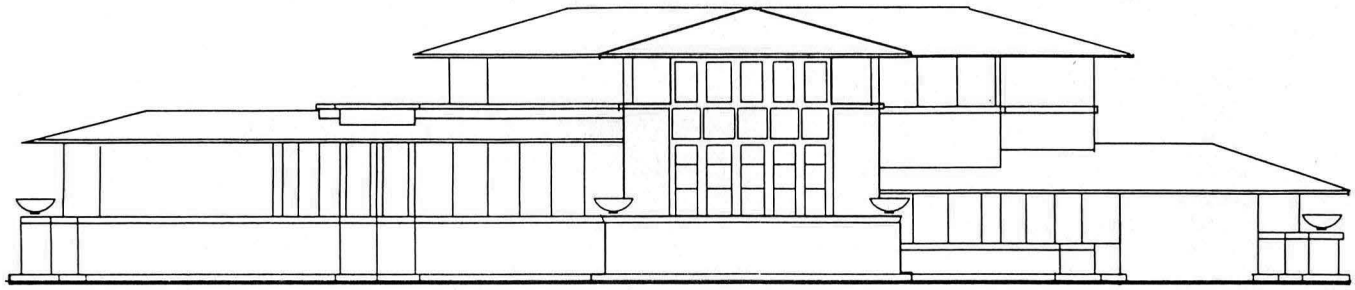

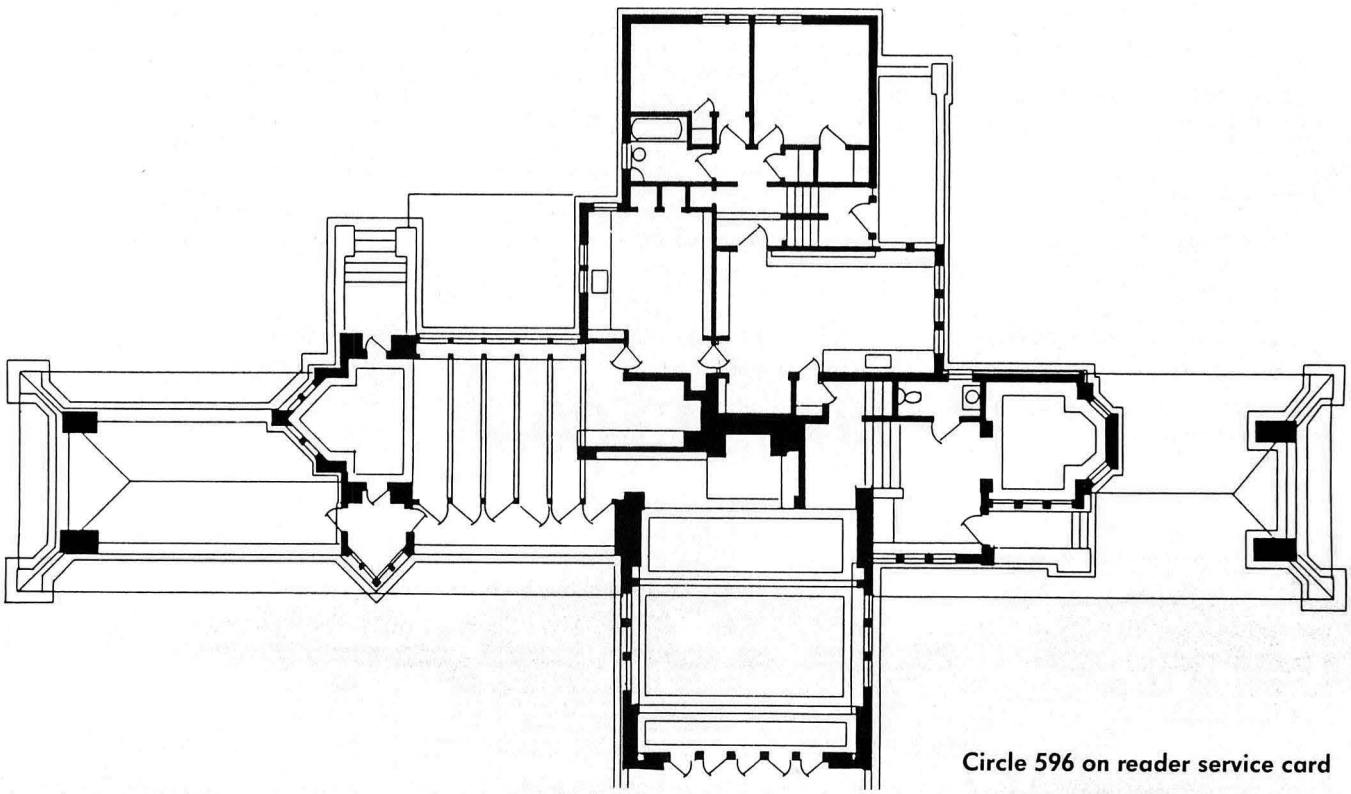

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Portables Abroad

Taking your computer overseas involves more than buying an airline ticket.

Fred D'Ignazio

I was frantic. I was leaving for London in two weeks, and I still didn't have a computer. I was going to London to teach a course on "Robotics Literacy." I planned to use a computer to organize my research, create my lectures, and prepare handouts for my students. I also wanted to take it across country to a week-long conference in Birmingham, and later to Gloucester where I would be teaching a class on robot programming. I wanted to take my computer everywhere. Clearly, I needed a portable computer, or at least one that was "transportable."

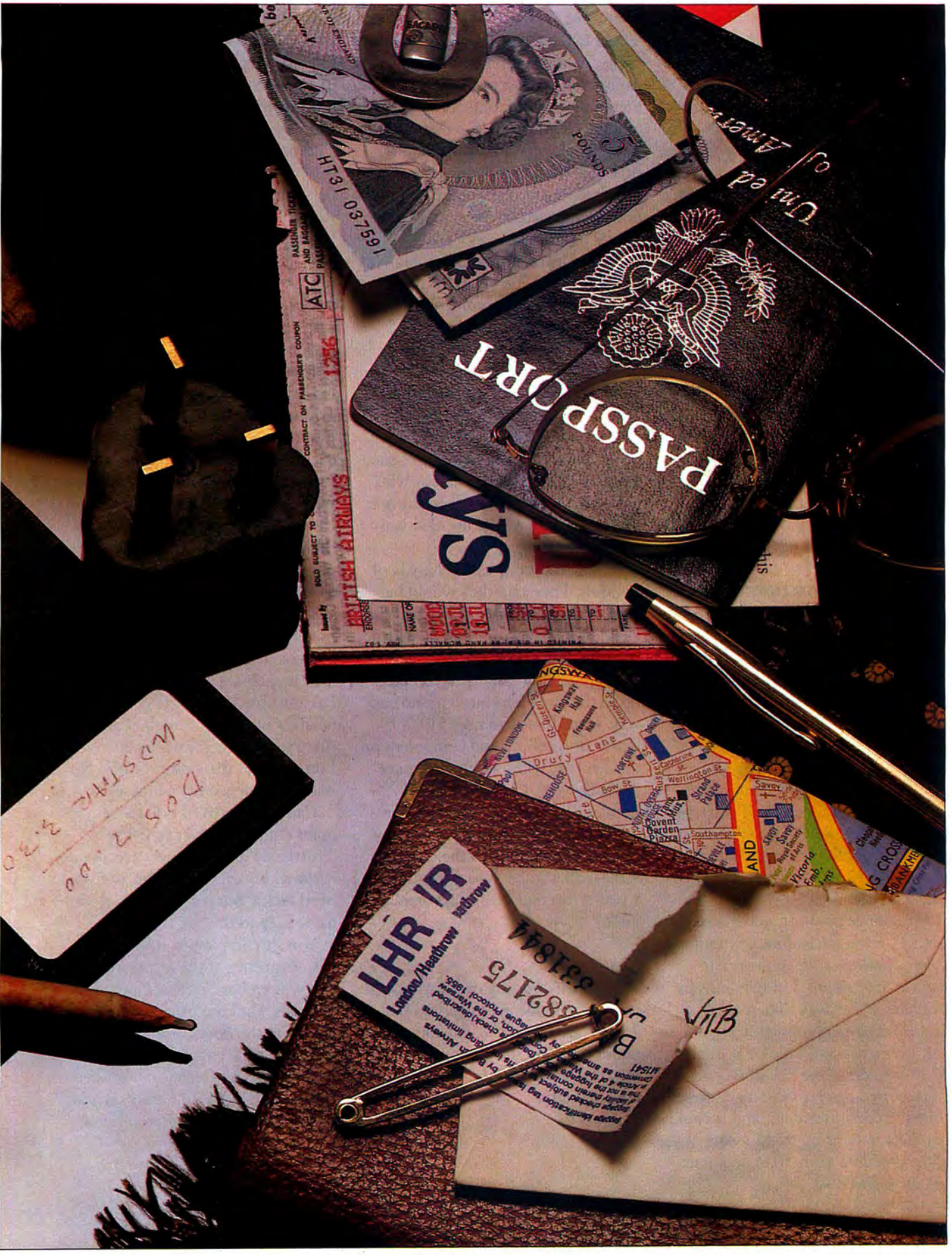
> The HX-20 was not up to the kind of data management and word processing tasks that the robotics course would require.

I spent two months before my London trip examining the different portable computers available. I had looked carefully at the Epson HX-20 portable and the Osborne 1 and COMPAQ transportables. The HX-20 is a superior machine. I finally bought one for the London trip to use as an "electronic briefcase." With the addition of ROM cartridges and microcassettes, the little computer became an electronic day-timer, a phone directory, a memo file, and a competent word processor.

But despite its many virtues, the HX-20 was not up to the kind of data management and word processing tasks that the robotics course would require. I needed a disk-based system with at least 128K of user memory, a full 80-column screen, and the software to do my work efficiently. A portable like the HX-20 was not enough. I needed a larger computer.

The Osborne 1 had the software but little else to recommend it. I decided against it when a local Roanoke, Virginia, computer store couldn't even hook it up to a serial-interfaced MX-80 printer. The COMPAQ, however, appeared to have the features I needed, and it was nearly 100 percent IBM compatible. Since I measure a computer by the richness and diversity of its software, this was a very important consideration. I knew I would have plenty of software to choose from if I bought a COMPAQ.

But where could I find one? Two weeks prior to leaving for London, I called around to all the local com-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puter stores. The COMPAQs were arriving in a couple of months. I finally located a COMPAQ at a ComputerLand in Evanston, Illinois. I asked for a fully configured machine with a clock/calendar board, extra memory (enough to create a superfast RAM disk), two 320K disk drives, and a serial interface. I also asked for *WordStar, dBASE II, 1-2-3,* RAM disk software, clock/calendar software, and print spooling software, plus the necessary cables.

I was forced to take $10,000 worth of software and equipment on the airplane without any insurance.

Since English household current runs at 230 volts and 50 Hz (versus the American 115 volts and 60 Hz), I assumed I would need a step-down transformer to convert the English current for the COMPAQ. This was not strictly true. Guy Fielder, an engineer with COMPAQ Computer Corporation in Houston, Texas, assured me that the COMPAQ would have no trouble running at 50 Hz. It was just the 230 volts that would cause problems.

Persistence paid off, and a week before I left for London, ComputerLand discovered the appropriate transformers from Todd Systems in Yonkers, New York. There were several transformers to pick from, one to suit every size and type of appliance. They suggested the SD38LRG because it had a receptacle for a three-pronged computer plug, and it could handle a load of up to 200 watts. This would be more than adequate for the COMPAQ.

Insurance

When I added up the value of all the software and equipment, I began seriously to consider insurance. I would be taking two computers (the HX-20 and the COMPAQ) valued at almost $8000 and software valued at another $2000. I first phoned my local insurance agent. He said he had no policies that would cover me. Other agents had the same story.

Then I learned that Columbia National General Agency (CNGA) would insure my equipment for travel, and against fire, theft, and damage from children and household pets—while it was in the United States. For overseas coverage they recommended American International Underwriters (AIU) in New York. This company had once issued a policy to a college professor who took his $4000 computer to Europe. It was a risk that AIU decided wasn't worth repeating.

In desperation, I called Lloyds of London. They said they would be glad to cover me when I reached England, but they would not insure the computers in transit.

I kept calling insurance companies up to the day I left, but with no success. I was forced to take $10,000 worth of software and equipment on the airplane without any insurance.

Later, when I returned from London, I discovered that the Kemper Group offers full, in-transit coverage for computers in the United States and abroad. The premium for a year's coverage costs approximately $100.

Customs

While I was fretting over my lack of insurance, someone suggested that I get in touch with U.S. Customs to see about bringing the computers back into the country without having to pay any duty.

I called customs officials at Washington Dulles Airport and at Chicago O'Hare Airport. They said that nothing was required but recommended that I come by the customs office en route to register all my equipment. The customs officials would examine the computers, record the serial numbers, and issue me a Certificate of Registration. When I returned to the United States, all I had to do was present the certificate to the customs officials.

Unfortunately, my travel plans called for me to pass through O'Hare on Sunday. In keeping with bureaucracies the world over, customs was closed that day. The solution? I created my own certificate of registration. I collected the sales slips for each piece of equipment, copied the computer and manufacturer names, the equipment serial numbers, and the prices onto a master list that I then had notarized. I made several photocopies and had those notarized as well.

When I arrived at Heathrow Airport in London, nobody even glanced at my assortment of high-tech wonders. I showed my American Passport, and the British customs officials waved me through. The same thing happened six weeks later when I returned to the United States. No one even opened my suitcases.

Can thousands of dollars of computer equipment be carried so effortlessly and routinely across international borders? Probably not. I had been lucky. But it's still a good idea to be prepared.

You should plan to stop at the customs office at the airport where you will embark on your journey overseas. Call the office in advance to check on the hours, and make sure you have time to get your equipment registered. The Certificate of Registration may come in handy on your return to the United States. It may

also be useful when you enter or leave countries overseas.

If you can't find time to get the equipment registered, it is advisable to prepare a homemade registration form, complete with receipts, and have it notarized as I did.

Airport Security

Customs was a breeze compared to the problems I experienced getting my equipment through airport security. It's generally not good practice to run a computer or software through an x-ray machine. And so I insisted that they not be subjected to this treatment. This naturally made the security agents suspicious at every airport I passed through.

As a result, I became an expert at taking computers apart and putting them back together. Opening up all this equipment and letting curious, skeptical security agents look at everything was extremely time consuming. On one occasion I actually missed a flight because the agents were still examining my computers.

The routine was trying, but the security agents were polite and helpful, even in busy, crowded airports. I was always on my best behavior when I was dealing with them. I discovered that a cheerful, patient, even playful attitude was a factor in the pleasant reception I usually received.

Transporting the Portable

"Portable" and "computer" sometimes seem like mutually exclusive terms. In the magazine ads the portable is chicly slung over the shoulder of a busy executive hurrying through an airport. No one mentions that the executive is a former tackle for the Pittsburgh Steelers.

Before leaving for the airport at Roanoke, I hefted the COMPAQ, the HX-20, and the Epson FX-80 printer. I quickly realized that unless I came up with some alternatives to carrying all this equipment, I was going to need a truss by the time I got to London.

I had already rejected the notion of checking the machines as baggage or sending them to England as air freight. All too many times I'd seen a baggage handler dribble my suitcase down on a conveyor belt. I was convinced that the portables would not survive unless I carried them.

Survival Strategies

My first strategy when carrying the portables was to walk in short, quick bursts. Second, I grabbed a redcap whenever I could find one. I even roped a couple of kids into helping me in one airport. I wasn't proud. Anybody over the age of 5 would do. Third, I bought a collapsible cart for $30. It worked for a while, but true to its name, it collapsed under the mass of the portables within a day.

Last, I learned to apologize. Carrying a portable computer is like carrying a sewing machine; it's heavy and ungainly, and you can easily knock someone down with it. I imagined that I weighed 400 pounds and

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had arms like Arnold Schwartzenegger. With that image in mind, I was able to lurch my way through crowds and down narrow airplane aisles without doing too much damage.

Getting on the Plane

Portable computers are still relatively rare, but they will soon be as common in airports as briefcases. But a portable computer is not bendable, droppable, or thin. This creates problems if you try to take a portable as carry-on luggage.

Before leaving for London, I notified my carrier, British Airways, that I would be bringing computers on board the airplane since they were too delicate to ship. They were not grateful for this advance warning. After four days of bureaucratic rumbling, I was told that British Airways would happily transport the computers provided I buy two extra round-trip tickets. I immediately changed my reservations to TWA, where they were more sympathetic to my problem.

But TWA has restrictions. A passenger can carry a computer on board a TWA flight if it weighs less than 62 pounds and its total measurements do not exceed 45 inches. The space underneath a passenger seat is 21 by 16 by 8 inches. Overhead racks are even more cramped. The COMPAQ alone was an inch over the space limit, though at 37 pounds it was within the weight requirements. The combined weight of all the equipment was close to 100 pounds; the combined measurements came to 171 inches.

After haggling with the officials at TWA, I struck a deal. If I met a ticket agent who was in a generous mood, I could take the portables on board and stow them where I could. As it turned out, luck was with me. The ticket agents neither snarled nor threatened to kick me off my flights. However, my luck was furthered by appearing friendly and inconspicuous. Deception was also useful.

When checking in at the ticket desk before a flight, I tucked the computers up in front so the agent could spot them only by peering over the top of the counter. Boarding the airplane I put the biggest computer on the shoulder opposite the ticket collector so it was less likely to be noticed.

Once on the plane I rushed past the flight attendants, acting as if the portables were lighter than a feather and smaller than they appeared. When I got to my seat, the hunt for space began. I squeezed the COMPAQ under the seat in front of me, the Epson under the seat next to mine, and the printer into the overhead luggage rack.

The transformer had an American plug, and the outlet was decidedly English.

As I've mentioned, diplomacy is the best tool when you take portables abroad. For example, on one flight the COMPAQ would not fit under the seat, and the luggage compartments on the plane were full. I approached a steward and explained my problem with the requisite amount of emotion, deference, and patience. The steward scouted around the cabin and found an empty seat in the front of the plane. Would my computer mind sitting between two gentlemen who promised to look after it? I followed the steward up front, introduced myself, and with their help managed to get the seatbelt around the computer's enormous midsection. I returned to my seat, the flight went without a hitch, and the COMPAQ arrived unscathed.

The Final Test

As soon as I arrived in London, I was anxious to plug in the COMPAQ and printer to see if they worked. I unpacked the transformer and discovered that it didn't plug into the wall. The transformer had an American plug, and the outlet was decidedly English.

After getting this far, a plug was not going to defeat me. I inquired at a local hardware store, bought an English plug, took out my penknife, chopped off the end of the transformer's cord, and replaced the American plug.

I plugged the transformer into the wall. Then I plugged in the computer and the printer using a three-outlet extension I had brought from the United States. This way one transformer served two pieces of equipment. But would this overload the transformer? Did English current allow such doubling of the load? Would the transformer even work? After all, I had never tested it.

I flipped the computer's power on. A few moments later, the cursor blinked into view. The disk drive light came on. The drive whooshed and the operating system booted. The clock appeared, giving the correct date along with Roanoke time. Then *WordStar* appeared. I was computing in England.

The tough part was over.

Fred D'Ignazio is an associate editor for Compute! *and* Gazette *magazines and a contributing editor for* Enter *magazine, produced by the Children's Television Workshop. He is the author of numerous books on computers, artificial intelligence, and robots. His latest book is* How to Get Intimate with Your Computer.

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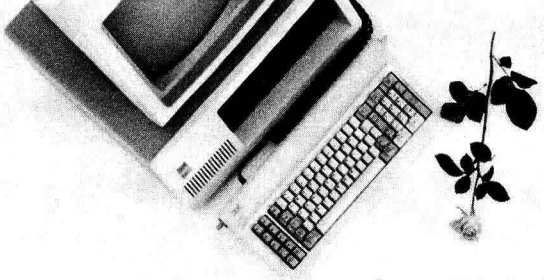

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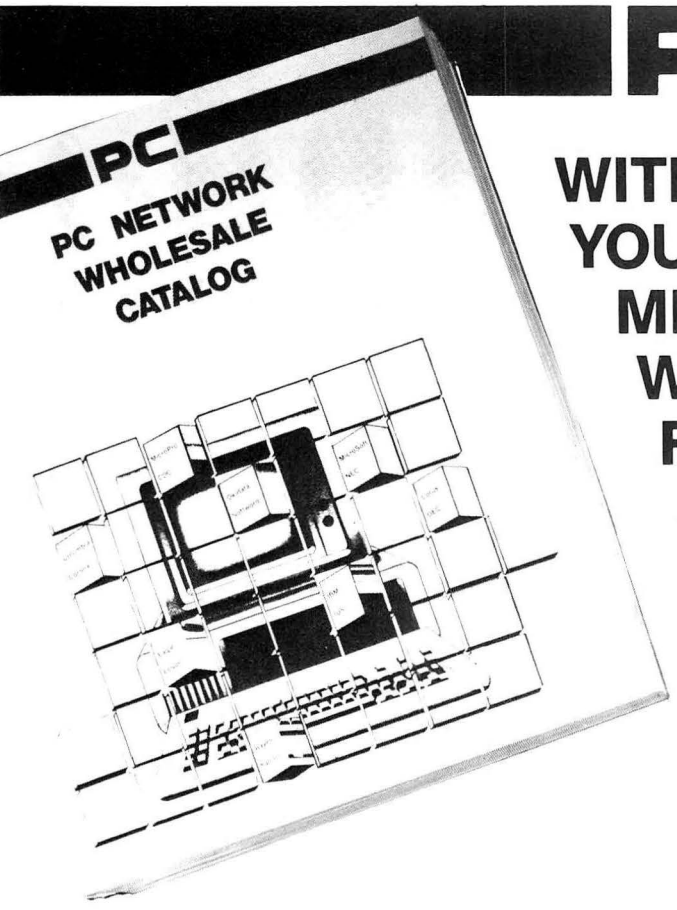

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User Group Dispatch

Meeting the needs of the new user

Lee E. Miller

User groups frequently find that a significant number of their members are new users who aren't computer literate and have a lot of questions to ask. The following are some of the questions that confound new PC users: What is a batch file? What does RAM drive mean? Is there a difference between the commands COPY *.* and DISKCOPY? Why doesn't the printer space itself properly when I am printing out a file? What is a RAM spooler? For the benefit of new users the answers appear at the end of this article.

It's not unusual for such questions to occupy the first 60 to 90 minutes of a monthly user group meeting. And because new members are always joining, the same questions are often asked at every meeting. What's helpful to new users can become boring for more experienced members of the group who would prefer to move on to more advanced subjects such as assembly language programming or patching applications software. To meet the needs of the beginners in their midst, many clubs form special interest groups (SIGs) for new users.

According to Al Hunt, president of the Diablo Valley PC User Group in Concord, California, 60 percent of the 175-member club have owned IBM PCs for three months or less. "Our need for a SIG for beginners arose because a majority of our members were new users," says Hunt. "We needed a forum where novices could ask questions without being intimidated by the hot dogs and hot shots. So we set up a new-user SIG that meets once a month and a series of classes for novices."

An average of between 25 and 30 members attend the three-week courses (one night a week) taught by Hunt and Bob LeBeouf, the club's software librarian. "The classes cover the basics and give new users an understanding of how the PC works and what it can do," explains Hunt. "Ideally, we will bring new users up to the same experience level and create a network of user-to-user interaction."

Instructor LeBoeuf says that he's often amazed by the number of people who are unfamiliar with the fundamental operating procedures of their computers. "Because of this," he explains, "the first class deals primarily with the basic DOS commands. We move on to format commands, and toward the end I usually spend a lot of time on batch files." The most useful time, adds LeBoeuf, is the question-and-answer period.

"There are some things that a manual just doesn't go into enough detail about," he says. "And then there are some areas where the manual goes into so much detail that the explanation becomes convoluted and the new user gets completely lost."

LeBoeuf says that he's even had frantic club members call him in the middle of the night with complicated questions. "Only a true computer nut like me can understand the urgency," he adds with a laugh.

Jo-L Hendrickson of the Silicon Valley Computer Society (SVCS) in Sunnyvale, California, started his club's new-user SIG after attending two large SVCS user group meetings. "There was a definite need for a new-user SIG," he explains. "Our user group has about 400 members, and an average of 200 or so attend each monthly meeting. With that many people it's just impossible for everyone to get their questions answered.

"A lot of new members are intimidated by a large group," adds Hendrickson. "The new-user SIG is small, with only 30 to 40 people, and it offers an uninhibited environment. It's just more comfortable to ask questions when you're in a smaller group."

Hendrickson structures the meetings around a guest speaker followed by an open discussion. The group meets once a month and members attend an average of six meetings. "People shouldn't stay in new-user groups forever," says Hendrickson. "After about six meetings they're no longer new users and they move on."

Hendrickson maintains that starting the Silicon Valley new-user SIG was not difficult. "The need for a special interest group for beginners was obvious. I just made an announcement, and people showed up. The new-user group has been meeting for eight or nine months now, and we think it's very successful. It gives the beginner a good place to hang his hat. Many people don't know what to do with a PC after they've bought it. The new-user group gives them a network for asking questions and exchanging experiences."

Answers for New Users

What is a batch file? This is a series (or batch) of commands that you'd normally type in each time you want the PC to do something. Depending on the function, the number of commands could be anywhere from 2 to 200. Typing them in each time can

become tedious. To save time, it's possible to create a batch file containing the text of all the commands so that when you want the PC to perform the function, you just type in the name of the batch file. The computer goes through and automatically performs each command for you.

What is a RAM drive? This refers to a software program that allows you to create a kind of pseudo disk drive using the unused memory in the PC. A RAM drive tricks the PC into thinking you've hooked up another disk drive. The RAM drive is often used when users make mass copies of the same disk. It can copy a disk in about 1/100 second, while a floppy disk drive takes at least 60 seconds to do the same job.

*What's the difference between the commands COPY *.* and DISKCOPY?* The COPY *.* command takes more time but gives you a more organized copy of the disk. It goes through and rearranges the material stored on the disk so that everything is in order, regardless of the haphazard way in which it may have been entered. DISKCOPY is much quicker, but it does not reorganize the material stored on the disk. It makes an exact duplicate, or carbon copy, of the original disk. DISKCOPY can be used with an unformatted target disk, whereas the COPY *.* command can only be used to copy to a disk that has already been formatted.

Why doesn't the printer space itself properly when I am printing out a file? This is an operational problem and usually means that you have the system switch on the printer set wrong, making the printer execute a carriage return without a linefeed. (The linefeed advances the paper one line.) Check the printer manual to find the location of the DIP switch, and then set the switch for a carriage return with a linefeed.

What is a RAM spooler? This is a software program that creates a print buffer out of the unused memory in the PC, so you can continue using the computer while the printer is working.

Lee E. Miller is a freelance writer based in Palo Alto, California.

Correction

In *PC World,* Vol. 1, No. 8, *User Group Dispatch* incorrectly reported that AST Research memory boards require a PROM change when such boards are used in an IBM PC XT having more than 128K. The boards do not require any change or addition to function properly with the IBM PC or XT.

User Group Directory

PC World publishes a User Group Directory every month. If your group is not in this list but would like to be, send the group's name, address, contact, and other information to *User Group Dispatch, PC World,* 555 De Haro St., San Francisco, CA 94107.

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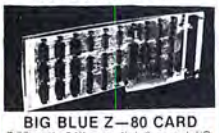

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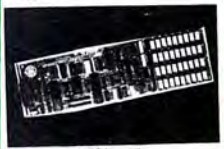

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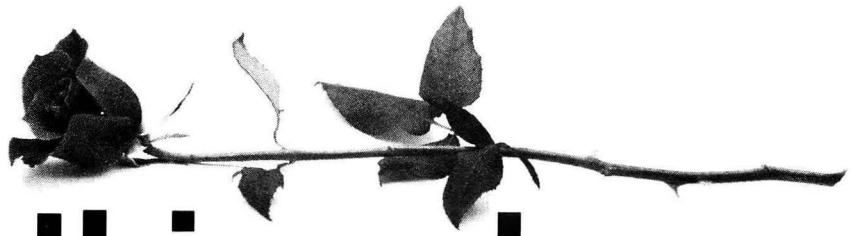

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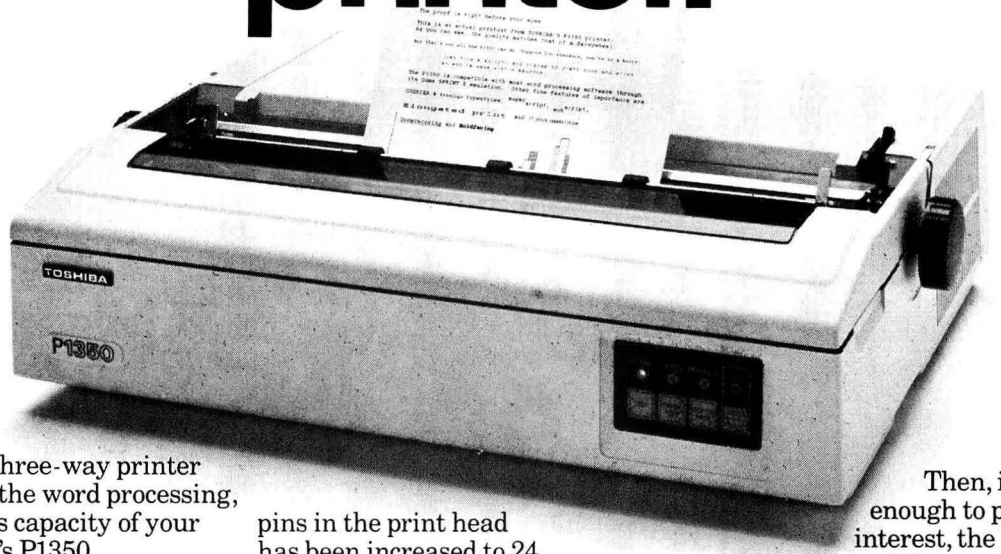

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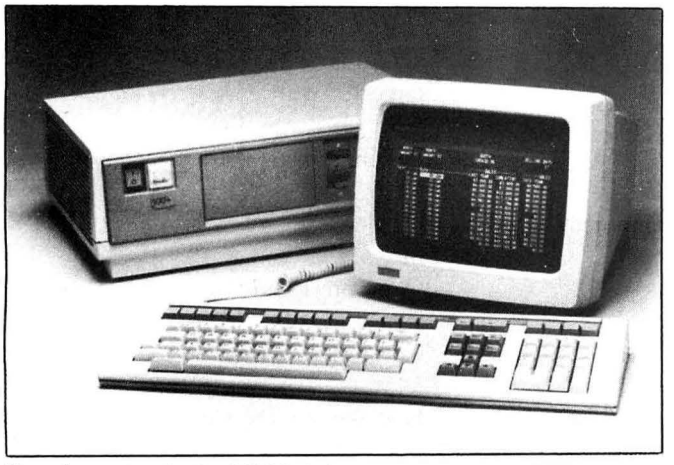

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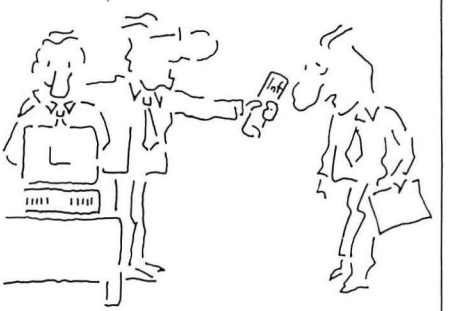

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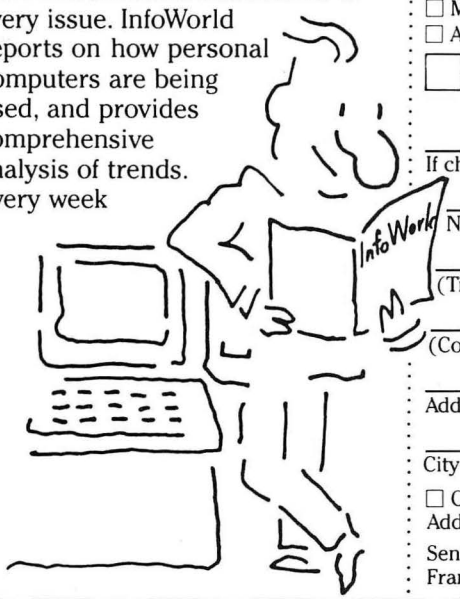

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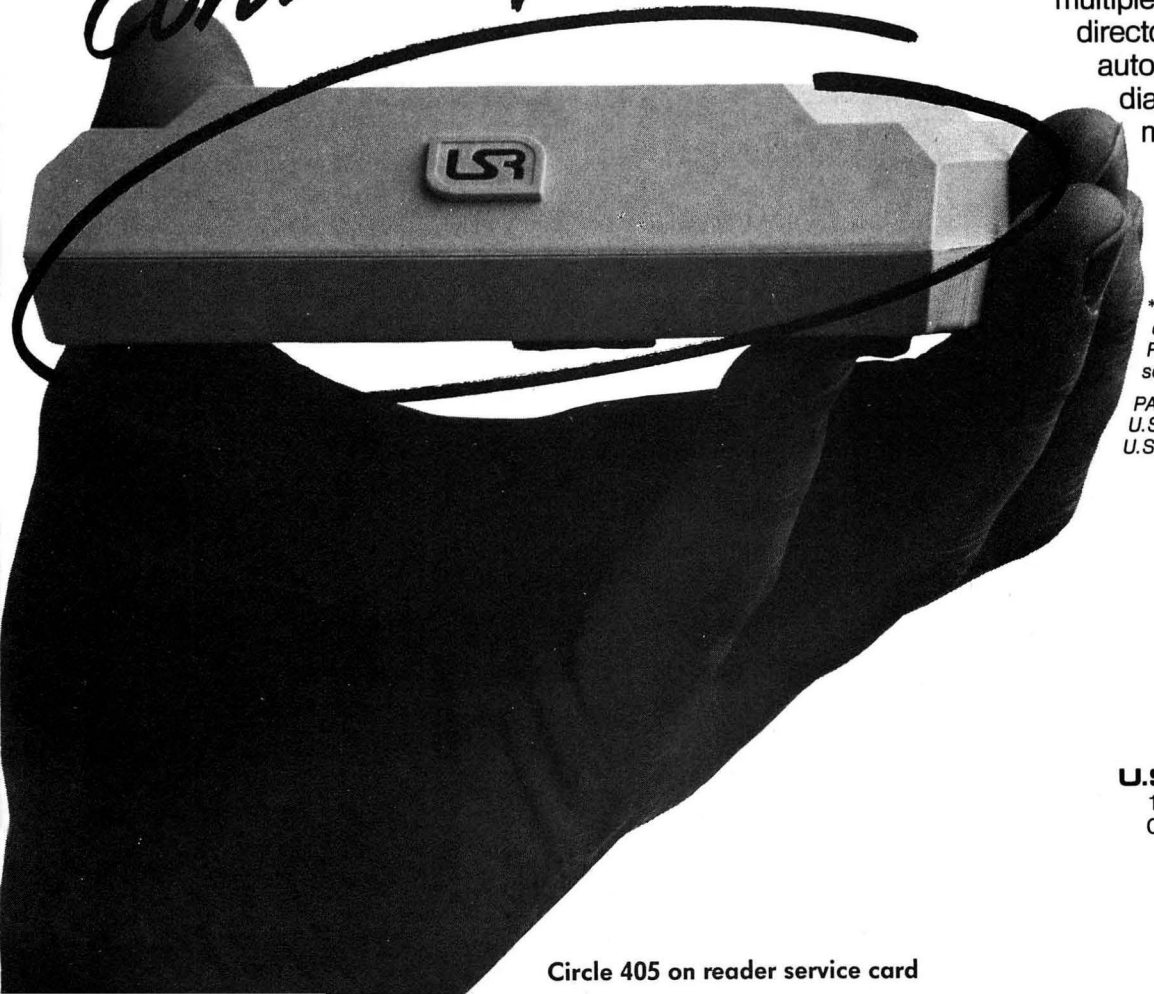

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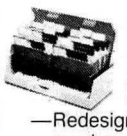

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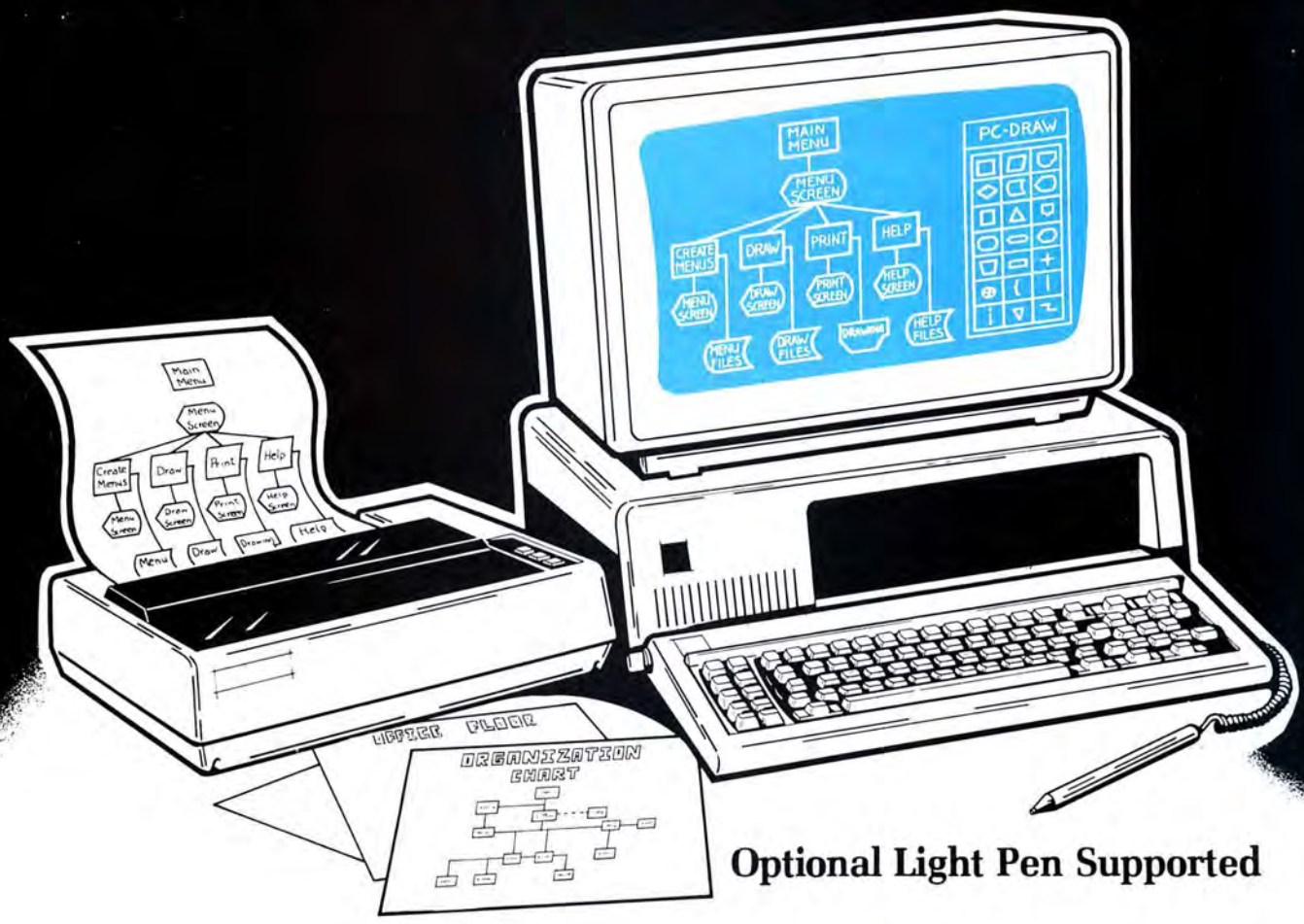

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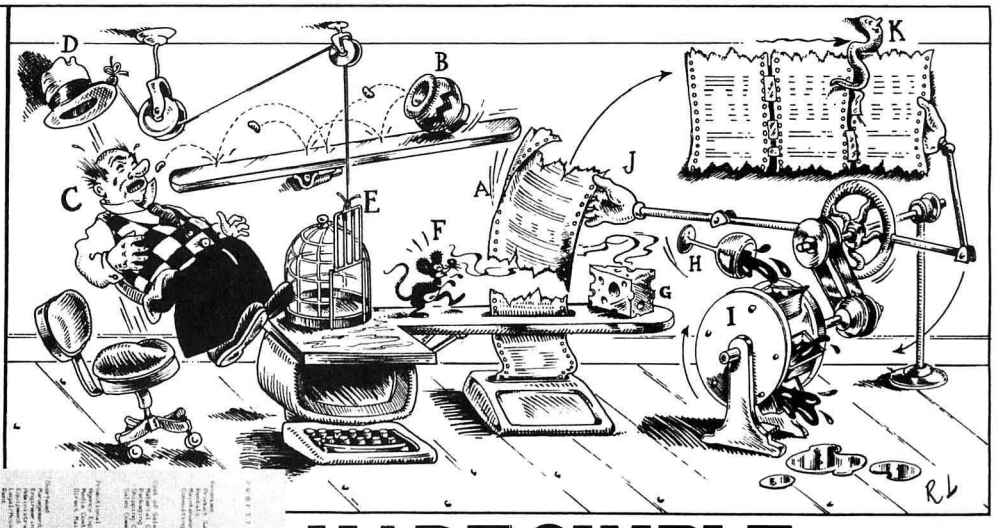
MOUSE, INSPIRED BY SCENT OF PERFECTLY AGED CAMEMBERT CHEESE, GNAWS THROUGH SPREADSHEET, ONLY TO DISCOVER HE HAS BEEN FOOLED BY AROMA OF OVER-RIPE GORGONZOLA (G).

IN A FIT OF PIQUE HE SPILLS VINTAGE WINE (H) INTO WATER-WHEEL (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).



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World Events

PC World attends 1984 computer shows.

Edited by Eric Brown

This month *World Events* strays from its standard format to list the computer trade shows that *PC World* will attend in 1984. At each of the following events you will find a booth staffed with employees from all major departments available to answer questions. Next month *World Events* will return with a full listing of upcoming computer-related events.

February 2-5
IBM World Expo
Astro Hall
Houston
Exposition and conferences concentrating on IBM PC hardware, software, and compatibles. The first two days of the show are for dealers, the last two for users.
IBM PC World Exposition
Mitch Hall Associates
P.O. Box 860
Westwood, MA 02090
617/329-7466

February 21-23
Softcon
Superdome
New Orleans
An international conference and trade fair for the software industry. The show will feature 1800 booths and 100 seminars, panels, conferences, and workshops.
Northeast Expositions
822 Boylston St.
Chestnut Hill, MA 01267
800/841-7000, 617/739-2000

March 22-25
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 Ave.
Redwood City, CA 94063
415/364-4294

May 22-25
COMDEX/Spring
World Congress Center and Apparel Mart
Atlanta
Computer trade show with emphasis on small computers, peripherals, and software.
The Interface Group
300 First Ave.
Needham, MA 02194
617/449-6600

June 14-17
IBM World Expo
McCormick Place West
Chicago
Exposition and conferences on IBM PC hardware, software, and compatibles. The first two days of the show are for dealers, the last two for users.
IBM PC World Exposition
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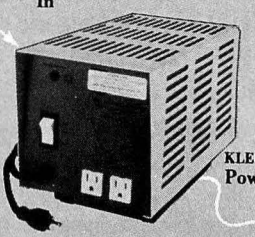

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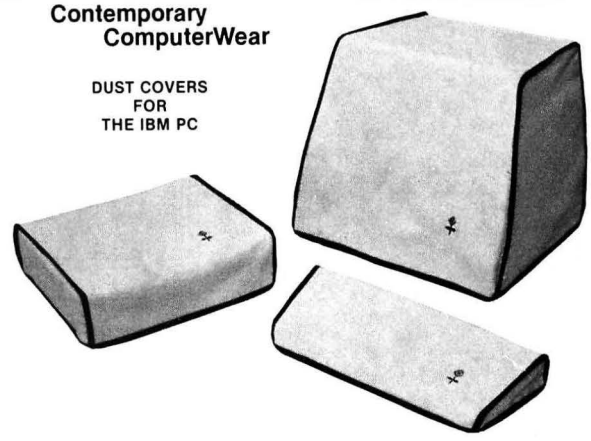

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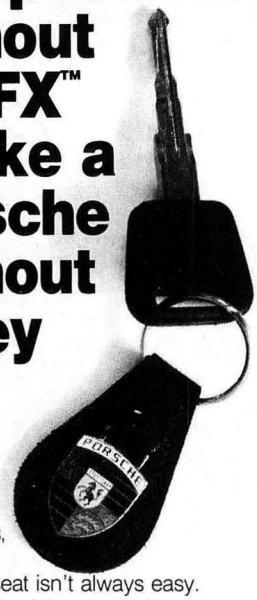

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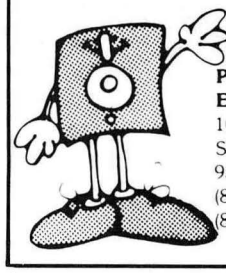

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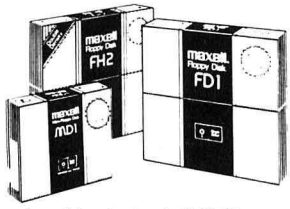

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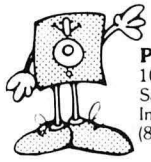

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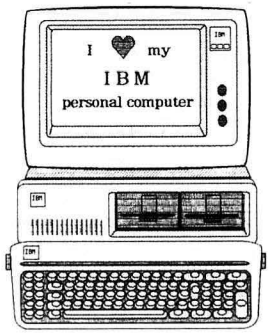

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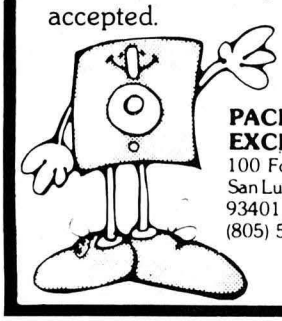

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A. Total no. of copies (net press run)	204,200	255,000
B. Paid Circulation		
1. Sales through dealers and carriers, street vendors and counter sales	64,048	73,500
2. Mail subscription	55,160	89,493
C. Total paid circulation (sum of 10B1 and 10B2)	119,208	162,993
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Comprehensive, up-to-date, comparative listing of more than 800 uniquely IBM PC compatible expansion boards & subsystems currently avail. from over 240 mfg's. Prices, specifications, availability of memory, video graphics, communications, interface boards, disk subsystems & others. Semiannual issue avail. now $19.95 Visa/MC (add $10 outside US) *Ironoak Company, 3239 Caminito Ameca, La Jolla, CA 92037, 619/450-0191*

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Too much to read? Too busy to read it? DP Management, Users: save time, money—keep up with computer literature. Expert digests of the best articles selected from about 200 journals each month. Index; book reviews; complete reference to source. Published since 1955. $99/yr, US, Canada, Mexico. $111, overseas. *Data Processing Digest, #6, P.O. Box 1249, Los Angeles, CA 90078, 213/851-3156*

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TIMECARD calculates EMPLOYEE hours from timecard data. Accepts time in hrs./min. or decimal time. Generates printout of in and out times, daily totals of reg. & O.T. hrs., vacation/holiday, pay period totals, etc. Departmentalized. Cuts payroll prep time by at least half. $195 *Chancellor Associates, 2880 S. Main #120, Salt Lake City, UT 84115, 800/221-0254, (UT) 801/486-2348*

dBASE II Accounting

dPROGRAMMER is a dBASE II accounting package consisting of GL with AR and AP ledgers. It is also an application generator which allows non-programmers to easily integrate their own applications. All dBASE II source code and a professional manual with 200 pgs. of documentation is available for only $295. *Sensible Designs, 5244 Edgepark Way, San Diego, CA 92124, 619/560-4583*

Agricultural

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MIXIT-2 ($595) finds least-cost rations for all animals. Hundreds of ingredients & 57 user-chosen nutrients. MIXIT-3 ($795) runs multiple rations. Each ration is stored on disk and summarized in a one-page output. PRICE-IT ($395) is a feed pricing and inventory program. Demo disks available. *Agricultural Software Consultants, 1706 Santa Fe, Dept. P, Kingsville, TX 78363, 512/595-1937*

Art

Art on the PC

Presents a 15 minute artistic experience on the diskette. Uses manual to teach beginners how to create their own kinetic programs on the IBM PC. Non-figurative approach by noted artist and educator, Leroy Lamis. Stimulating, imaginative, absorbing. Req. color board & monitor. Disk and Book $50. *PC Art, 3101 Oak St., Terre Haute, IN 47803*

Business Applications

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Professional Time Acct.

Time Accountant is an essential timekeeping and management tool for professionals. Functions include billing preview, invoicing and reporting by individual, client, project and activity. Includes pocket calendar-time sheets, telephone support. Requires 128K RAM, two 320K drives. $395. *Time Accountant, 1230 University Dr., Menlo Park, CA 94025, 415/328-7877*

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Linear Programming

MINI-MAX ($395) is saving a copper refiner in Ashland, IL, $10,000 a month. "It's extremely easy to use," says an investment counselor in Oakland, CA. See how linear programming can boost your profits. The demo disk ($30) includes a Beginner's Guide and 70-page manual with 7 examples from business & industry. *Agricultural Software Consultants, 1706 Santa Fe, Dept. P, Kingsville, TX 78363, 512/595-1937*

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Project scheduling for IBM PC, XT and COMPAQ. DOS 1.1 or 2.0. Time-scaled Network Diagrams & Gantt charts to monochrome display, color monitor or printer. Up to 220 activities per project. Flexible calendar. Extensive manual with samples. Easy to use. New Version 2 has many enhancements. Price: $200-330. *Sheppard Software Company, 4750 Clough Creek Rd., Redding, CA 96002, 916/222-1553*

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Calendar Plus

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Compilers

C Compiler•Debugger

Designed around the c-systems optimized C Compiler, the c-window™ package provides source statement execution and breakpoints; variable display and alteration is accomplished using C expression syntax. A must for all C programmers. 128K, two floppy drives required. C Compiler $195, c-window $195. *c-systems, P.O. Box 3253, Fullerton, CA 92634, 714/637-5362*

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The DataFiler
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Data Security

Crypt-It
Protect your important sensitive business data from unauthorized use & disclosure with Crypt-It, a data security program offering billions of password possibilities. Written in PC-DOS BASIC, it can be easily adapted to your own format. $49.95 plus $2 shipping. Charge cards welcome. AZ residents add 5% tax. *Secure Data, P.O. Box 23990, Tempe, AZ 85282, 602/966-4010*

Development

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Interactive/function key driven screen formatter lets you Create/File/Display/List/Test screens. A screen is a DOS file. Screen interface lets you Display screens/read-write data/reset data field(s) and much more via calls. Supports MS Pascal/Assem./COBOL/C/FORTRAN/Comp BASIC. $199. Demo disk $35. *OmniSoft Associates, 6917 12th Ave., Brooklyn, NY 11228, 212/748-5763*

Message File Facility
Full screen/function key driven Message Editor allows the creation/updating/listing of message (templates for reports) files. Your program gets linked to the Message Interface to get the messages with variable data insertion. Supports MS Pascal/Assembler/COBOL/Comp. BASIC, $39.95 + other facilities. *OmniSoft Associates, 6917 12th Ave., Brooklyn, NY 11228, 212/748-5763*

Program Development Tool
Single add-in board to IBM PC together with a software diskette provides complete real-time debugging & performance analysis. Major features include Debugger, Real-Time Trace, Hardware Breakpoints, Performance Analysis & others. Demo diskette available for $20 plus tax. For more info contact: *Answer Software Corp., 20863 Stevens Creek Blvd., B2-C, Cupertino, CA 95014, 408/253-7515*

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
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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 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*

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*

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Easy to use checking program for personal or small business accounts. Easy data entry, menu driven, great at tax time, searches, sorts & totals to any keyword, balances checkbook, reconciles bank statement, computes mortgage loan, compound amount & more. 2dd, 80 col. $39.95. Visa/MC & CODs. *Datacon, 2311 W. 5700 S., Roy, UT 84067, 801/773-8080*

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*

Venture Capital...
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*

Account Management
Powerful filing and data retrieval program. Creates and manages data base for bank accounts. Also useful for detailed travel expense reports. Converts currencies to normalize. No programming knowledge is required, control by function keys. Requires IBM PC, 96K, PC-DOS, 2dd, 80 column display, printer. $120 + $2 s/h. *GJM Enterprises, Inc., 813 Colony Circle, Lancaster, PA 17601, 717/299-9663*

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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 by Yours. IRA Money Maker, ONLY $29.95. IBM PC 64K, Specify Color or B/W, 320K DSDD, Printer. *Knowledge Reach Associates, Inc., P.O. Box 3407, New York, NY 10185, 212/942-4692*

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*

Games

Sfinks PC Chess Program
Awesome! The number 1 chess game for the TRS-80 is finally available for your IBM PC. Complete with all the user friendly features, color and monochrome graphics, Sfinks PC is unsurpassed. 64K disk, only $49.95 plus $2 shipping. MC/Visa. FL residents add 5% sales tax. *William Fink, 1105 N. Main, Ste. 24-B, Gainesville, FL 32601, 904/377-4847*

Classic Games
15 classic computer games are being offered on disk in Game-Pak #1. The games include Wumpus, Hangman, Craps, Slot Machine, Hamurabi, Tic-Tac-Toe, Roulette and more. Games are keyboard operational. 1dd & color graphics board required. The cost for Game-Pak #1 is $38.95 + $2 shipping to: *Dandy Line, Dept. GP1, P.O. Box 701, Leominster, MA 01453, 617/534-6960*

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QuoTrix
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The Oneliner
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*

Dedux
Play this fun, challenging deductive reasoning game AND learn to write your own computer game using the SOURCE CODE from DEDUX as a model. (Yes, commented BASIC source code is included.) $20 plus $2 s/h. Three levels of difficulty. Ages 10 to adult. Specify monochrome or color graphics. *RemRol Computer Services, Inc., 215 Brighton Ave., Boston, MA 02134, 617/783-1982*

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Keeps track of living relatives as well as genealogical data. Produces address labels, birthday lists, pedigree charts, family group sheets and more. Includes User's Manual & Sample Data Disk. Price $99.95. Requires PC-DOS, 2 drives, 64K and PC printer capabilities. Visa/MC/COD/Dealers. Add $4 s/h. *Personal Software Company, P.O. Box 776, Salt Lake City, UT 84110, 801/277-3174*

Graphics

Grafmatic: Fortran/Pascal
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*

Micro Sketch
Not your standard sketching program, but a high resolution graphics tool. Create regular geometric shapes & more: lines, curves (any angle), save/load screens via disk, superimpose screens, no programming! Uses function keys & cursor. Assorted background screens. Requires PC or MS-DOS & graphics adapter. $35. *WareSoft, P.O. Box 70234, Marietta, GA 30007-0234, 404/952-7331 after 7 e.s.t.*

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feature prints hi-res graphics on printers w/o graphics display hardware + supports most CRTs & plotters. Ideal for science eng, CAD, education & business application devlp. $200. *Mosaic Software Inc., 1972 Mass. Ave., Cambridge, MA 02140, 617/491-2434*

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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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This physician-designed diet & exercise program allows you to set your weight-loss goals & monitor your progress instantaneously. Entering foods eaten & exercise performed provides you with summaries of your caloric intake & expenditure, eating habits & more. Diet guidebook included. $69.95. *HealthWare, 1504 Leander Rd., Georgetown, TX 78626, 512/863-6910*

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Coupon Clipper

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A tool to aid homeowners in making intelligent decisions about energy-related home improvements and investments. It can be used to determine hot water usage & cost, home heat loss, solar collector sizing, investment payback, & areas to concentrate on to reduce energy usage. $50. 128K, color adapter. *Tesseract Enterprises Ltd., P.O. Box 25966, Colorado Springs, CO 80936, 303/594-6199*

Video Tape Tracker

This ready-to-run program is just what you need to manage your video library. It stores up to 1,500 titles/file, prints numbered labels, lists in tape or title sequence, searches by tape/title/performer. Fast & easy to use. Needs 64K PC with one disk. Just $39.95. Check, MC/Visa. *ProSoft, Dept. N, 7248 Bellaire Ave., North Hollywood, CA 91605, 213/764-3131, 800/824-7888, oper. 577*

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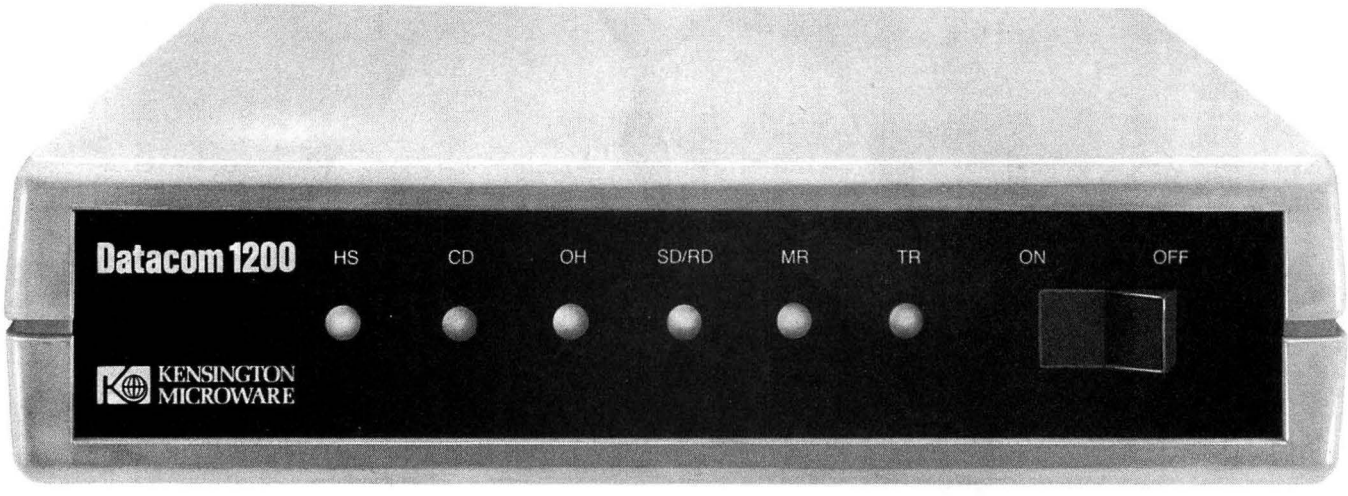

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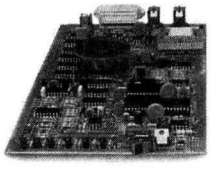
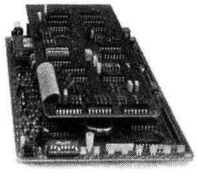


The Datacom 1200 modem



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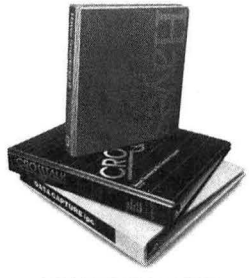

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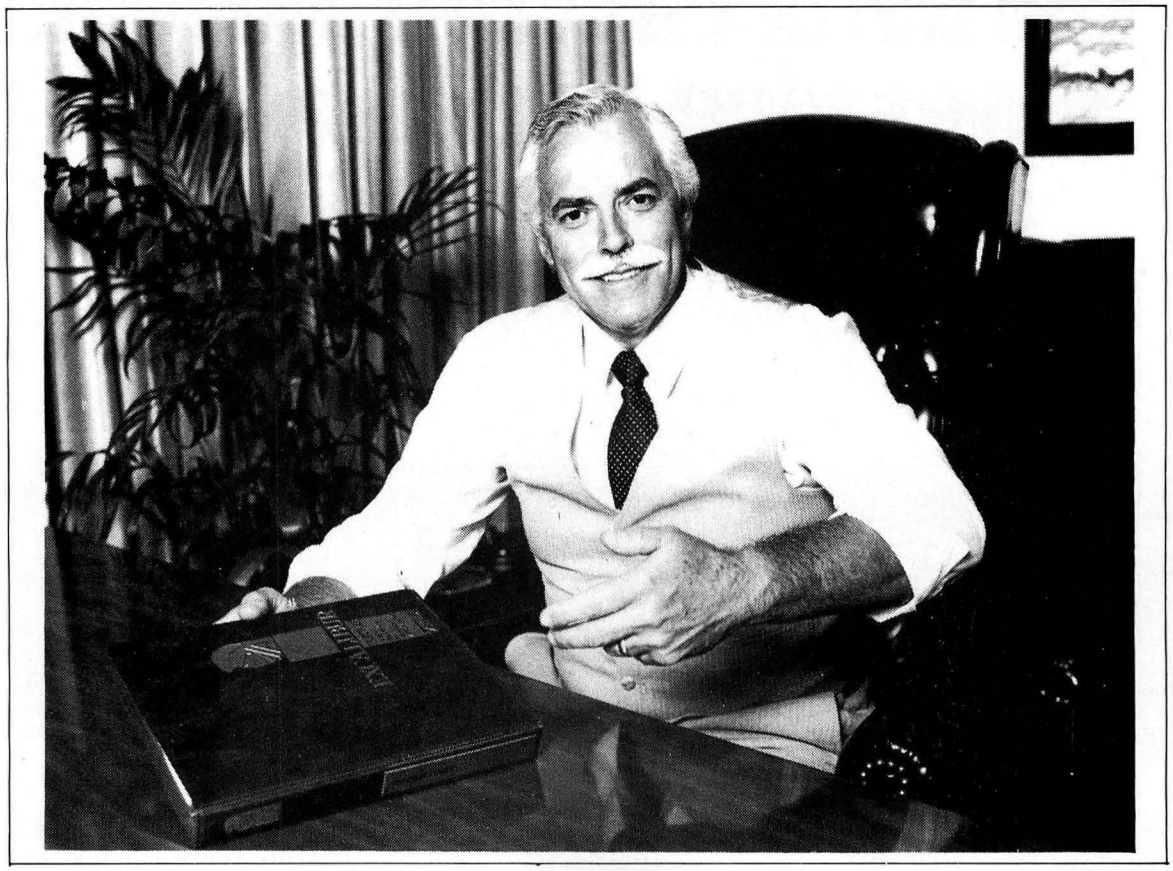

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Just Announced

The wide world of PC products

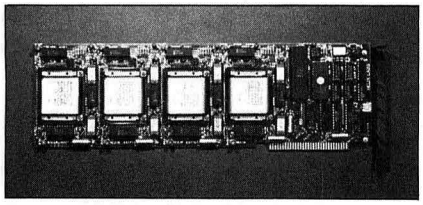
Edited by Art Wilcox

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 this or future issues.

Hardware

Boards

Helix PCBM
A memory board that provides 512K of nonvolatile bubble memory. Four Intel 7110-4 128K memory modules provide built-in error correction and protection against power failure. The



Helix PCBM bubble memory board, Helix Laboratories

PCBM is switch selectable, allowing ROM BIOS to boot DOS from either a floppy disk or the bubble memory's configured disk. The board performs read and write commands up to eight times faster than floppy disks; it also includes a hardware switch similar in operation to the protect notch on a floppy. The switch allows users to write-protect the on-board data. List price: 256K version $1000, 512K version $1500. Helix Systems and Development Corporation, 11952 Wilshire Blvd., Los Angeles, CA 90025, 800/468-0004, 213/824-0330 in California.

MasterGraphics 1 Adapter
A graphics board that combines the functions of the IBM Monochrome Adapter with those of a printer adapter and the IBM Color/Graphics Adapter. The MasterGraphics 1 Adapter increases the number of available active colors from 4 to 16 and increases the display storage provided by IBM from 16K to 64K. It offers higher resolution than standard adapters: 640 by 200 in 16 colors and 768 by 340 in monochrome.

The board is part of the modular MasterGraphics System, which includes the optional MasterSet Programmer hardware and software (allows users to define custom character sets), the Master Palette adapter (increases available colors to 4096), and the Dual Display kit (allows simultaneous attachment of color and monochrome monitors to the IBM PC or XT). The MasterGraphics 1 Adapter supports an IBM PC compatible light pen interface and includes drivers for Interpreted and Compiled BASIC, FORTRAN, and Pascal. List price: $579. MicroGraphics Technology, 1820 McCarthy Blvd., Milpitas, CA 95035, 408/996-8423, ext. 421.

Computers

TAVA PC
An IBM PC compatible desktop unit that includes the minimum configuration of 64K of memory (expandable to 256K), 8K of EPROM, five expansion slots, one parallel and two serial ports, and a detachable keyboard. In the standard configuration the TAVA PC includes, in addition to the above, two double-sided, double-density disk drives, a graphics board, and a high-resolution green monitor. The unit runs on CP/M-86, DOS 1.10, or DOS 2.00 and is claimed to be both software and hardware compatible with the IBM PC. Options include an 8087 microprocessor, an expansion chamber with four slots, internal or external hard disk drives with a capacity of 10, 15, or 20 megabytes, and an IBM 3270 terminal emulator board. List price: minimum configuration $995, standard configuration $1995. TAVA Corporation, 16861 Armstrong, Irvine, CA 92714, 714/261-0200.

Stearns Desktop Computer
An IBM PC compatible desktop unit that operates with either MS-DOS or Concurrent CP/M-86 and comes with 128K RAM, one disk drive, a monochrome monitor, and an asynchronous communications adapter. It can be expanded to 896K RAM with up to four half-height floppy disk drives or with one floppy disk drive and an internal hard drive (10M, 15M, or 20M). A color graphics board and a 15-inch screen are optional.

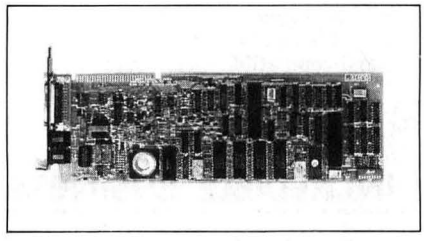
Desktop Computer, Stearns Computer Systems

The Stearns Desktop Computer uses the 8086 microprocessor (the 8087 is optional) and provides preprogrammed function keys, user-programmable keys, and five expansion slots for Stearns boards. Options include Micronetwork, a system that allows five Stearns computers to share information, equipment, and tasks; and a communications adapter that supports IBM 3270, bisynchronous, or SDLC protocols. The Stearns Computer supports BASIC, COBOL, FORTRAN, and Pascal. List price: minimum configuration $2945. Stearns Computer Systems, 3501 Raleigh Ave. S, Minneapolis, MN 55416, 612/929-4400.

Modems

PC 212A/1200

A modem board that supports data transmissions at 300 or 1200 bps in full or half duplex. It requires one expansion slot and 64K. The modem is controlled with the same commands as the Hayes Smartmodem and comes packaged with the *PC-Talk III* communications program. *PC-Talk III* features binary text transmission with the Xmodem protocol, external file manipulation, a 60-entry dialing directory, and 40 user-programmable keys. The PC 212A/1200 supports auto-dial in both pulse and tone modes as well as direct keyboard dialing. It has an on-board serial port



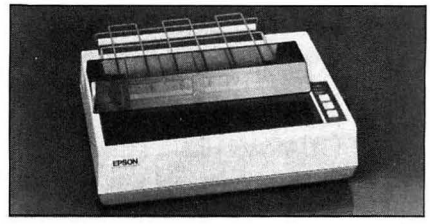
PC 212A/1200 modem board, Qubie Distributing

that can be used for other serial peripherals when the modem is not in use, and a telephone connector that can function as a regular telephone jack for voice communications. List price: $299. Qubie Distributing, 4809 Calle Alto, Camarillo, CA 93010, 805/482-9829.

Printers

Epson RX-80 F/T

A dot matrix printer that prints at 100 cps and comes with tractor and friction paper feeds. The RX-80 has two full 96-character ASCII sets, nine international print sets, and 128 available type styles, including Emphasized, Doublestrike, Elite, and Italics. Other features include bidirectional printing, an underline mode, and a low-cost disposable printhead. The printer offers a quiet mode that reduces normal printing noise by 50 percent. List price: $599. Epson America, Inc., 3415 Kashiwa St., Torrance, CA 90505, 213/539-9140.



RX-80 F/T printer, Epson America

Storage Devices

PC-8000

A memory subsystem that can attach up to one gigabyte (1000 megabytes) of disk storage to the IBM PC or compatibles. It requires 64K, one floppy disk drive, and DOS 2.00. Designed for large data base applications, the PC-8000 system includes a controller card, software utilities, cables, and one or two hard disk drives with either fixed, removable, or a combination disk media. The menu-driven utilities included in the package let users assign device drivers with DOS CONFIG.SYS commands, initialize disks, check for bad track mapping, and "swap out" errant tracks.

The PC-8000 offers 17-millisecond access time, a 12-month warranty, and the option of leasing the disk system directly from the manufacturer. List price: 50M version (25M fixed, 25M removable media) $8900;

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Database Management 3	$369	Easy Mailer	CALL	COBOL Compiler	$549	Word Plus PC w/Boss	$349	8" SS/DD	$ 30
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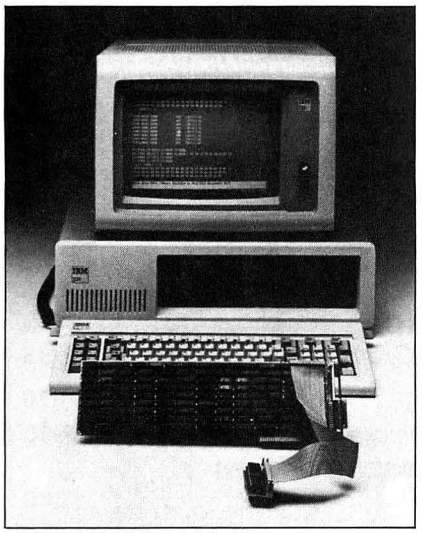
Miscellaneous

PC Probe

A hardware and software debugging tool consisting of a printed circuit board that plugs into a PC slot, a probe that plugs into the PC 8088 IC socket, and debugging software on disk. Designed for program developers, the PC Probe can access all PC bus signals and the 8088 CPU, allowing it to monitor and trap on interrupts and DMA requests as well as standard CPU operations.



PC Probe, Atron

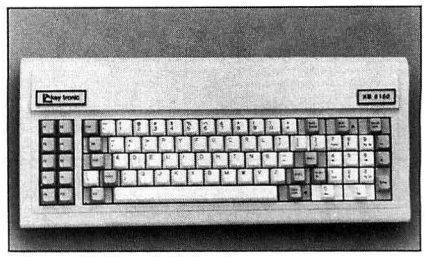
The PC Probe has 24 types of real-time hardware breakpoints that can implement eight breakpoints at one time. Once a breakpoint is reached, the PC Probe executes a real-time trace of the previous 1024 instructions and then allows up to eight channels of external information to be traced as a typical logical analyzer function. The unit also includes a serial interface that lets users connect an external CRT and keyboard without disturbing the PC display. List price: $1895. Atron Corporation, 20665 Fourth St., Saratoga, CA 95070, 408/741-5900.

PowerPad

A touch-sensitive input device that replaces the keyboard as a means of accessing the IBM PC. It requires 64K, one disk drive, and a serial port. The PowerPad provides a 12- by 12-inch active surface with multi-contact-point capability. This feature allows users having the appropriate software to play musical chords as well as single notes. Users can also redefine the pad's surface and then restrict an activity to a given area. Designed as a learning/discovery tool, PowerPad works in conjunction with Chalk Board's *Leonardo's Library.* List price: $99.95. Chalk Board, Inc., 3772 Pleasantdale Rd., Atlanta, GA 30340, 800/241-3989, 404/496-0101 in Georgia.

Model KB-5150D Keyboard

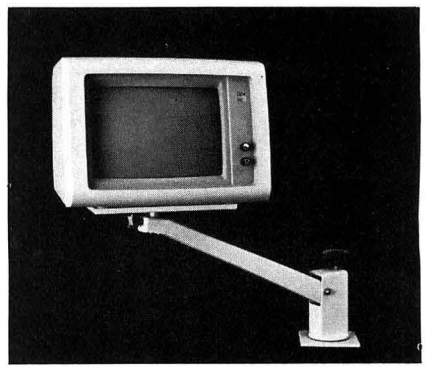
A plug-compatible IBM PC keyboard that offers the Dvorak keytop layout. Recently endorsed by the American National Standards Institute (ANSI), the Dvorak keyboard is reported to increase speed and comfort while decreasing the error level of the conventional QWERTY keyboard. By distributing the typing workload among the stronger fingers, the Dvorak keyboard results in a claimed reduction of 92 percent in finger movement. The Key Tronic KB-5150D offers traditional placement of the <Shift> and <Enter> keys and lighted indicators for the <CapsLock> and <NumLock> keys. List price: $269. Key Tronic Corporation, P.O. Box 14687, Spokane, WA 99214, 800/262-1006, 509/928-8000.



Key Tronic Dvorak keyboard

Monitor Mover

A desk-mounted, adjustable mechanical arm that holds the IBM PC display monitor up and off the user's desk. Designed to provide a cleaner desk space, the *Monitor Mover* consists of a heavy-duty desk clamp, a 360-degree swivel base, a 15-inch vertically adjustable arm, and a CRT



Monitor Mover, Lintek Computer Accessories

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Circle 237 on reader service card

mounting tray that can be tilted up to 15 degrees. Its design increases operator comfort by reducing eye, neck, and back strain. List price: $129.95. Lintek Computer Accessories, P.O. Box 8056, Grand Rapids, MI 49508, 616/241-4040.

System Software

Languages

CALL

CALL (Computer-Assisted Learning Language) is aimed at the educational and industrial training market. It requires 128K and two disk drives. CALL features an authoring system, CREATE, that allows teachers who have minimal computer experience to create CALL tutorials, electronic training manuals, and computer-monitored tests. The language uses color, sound, and character graphics to enhance tutorials and includes its own text editor. User-designed tutorials can monitor the progress of students by individual or group and provide printed gradesheets and summary statistics that include class percentiles and the results of actual classroom testing. List price: $450. TexaSoft, Inc., One Energy Square #660, Dallas, TX 75206, 214/369-0795.

Utilities

VSI Window 255

An applications programming tool that provides high-speed window management for the IBM PC and compatible machines. It requires 64K, one disk drive, and a monochrome or color graphics board. *VSI Window* (Virtual Screen Interface) allows programmers to create up to 255 separate virtual screens, each containing different data. They can then create up to 255 windows on the display screen, each displaying portions of the previously created virtual screens. Programmers can control the sizes, the visual priority, and the placement of windows on the screen. They can switch from one window to another, edit data in the second one, and return to the first without exiting the program.

VSI Window writes directly to hardware for fast operation and includes built-in diagnostics. The program can be linked to an applications package using assembly language, C, Pascal, FORTRAN, PL/I, or Compiled BASIC. List price: $295. Amber Systems, 811 Alderbrook Ln., Cupertino, CA 95014, 408/996-1883.

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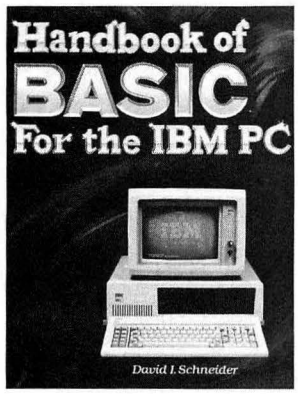

Handbook of BASIC for the IBM PC
By David I. Schneider

The Brady Co. knows you will want to get your hands on a copy of "The Handbook of BASIC for the IBM PC." Aptly named, it has been acclaimed as the epitome of what a BASIC reference should be. It is organized alphabetically by statement to allow you to quickly access specific information without wading through chapters. An invaluable tool for your IBM PC*, this manual for beginners and intermediate programmers, contains chapters on:

- BASIC Commands, Statements, Functions, and Variables
- ASCII Values
- Binary Representation of Numbers
- Specifying Coordinates in Graphics Mode
- Directories and Paths in BASIC 2.0
- Error Messages/Sequential and Random Files
- Logical Operators/Peek and Poke Locations/Scan codes

The PC Specific Library from Brady is available at Computerlands, IBM Product Centers, Sears Computer Centers, Entré Computer Centers, B. Daltons, Waldens, Crown Books and other fine bookstores and computer dealers. If you are unable to find a copy, call 800-638-0220 toll free for information.

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Just Announced

Disk Dump and Restore Utilities
Two programs that back up and restore files between hard and floppy disk drives. They require 64K and one disk drive. Similar in operation to the DOS COPY command, the utilities allow users to split files too large to fit on one disk onto two disks. During the hard-disk-to-floppy file restore mode, a 'Wrong Disk' message warns users when a disk is inserted out of a file's proper order. *Disk Dump and Restore Utilities* support the use of wild-card characters and date specifications during file copying. List price: $50 for both. Micro Systems Software, 2905-B Homestead Rd., Santa Clara, CA 95051, 408/984-0660.

Forlib-Plus
A package of FORTRAN aides including demo programs, FORTRAN-coded subroutines, and three assembly-coded libraries. *Forlib-Plus* requires 128K, one double-sided disk drive, DOS 2.00 (for the file-handling library), and either the Microsoft FORTRAN Compiler (version 3.1) or the IBM FORTRAN Compiler. The libraries are designed to supplement the FORTRAN Library contained in the user's distribution language. They include support for communications, graphics, and file handling. The communications library enables users to receive interrupt-driven buffered data at speeds of up to 9600 bps. The graphics library lets users pass data between two FORTRAN programs. The file-handling library includes all necessary software for use with DOS 2.00 Pathname functions. The programs include the sources for the FORTRAN-coded subroutines and demo programs to aid users in making calls to the libraries. List price: $69.95. Alpha Computer Service, P.O. Box 2517, Cypress, CA 90630, 714/894-6808.

Applications Software

Communications

FileLynx/3278
A communications program that enables users to capture data automatically to disk or printer from IBM mainframes. It requires 64K, one disk drive, and an RS-232C serial port. When used with any Local Data protocol converter, *FileLynx/3278* enables the PC to emulate an IBM 3278-2 terminal. All IBM 3278 terminal functions and cursor keys are supported, as well as four-color 3279 emulation. *FileLynx/3278* also features selective file capture, a parameter configuration mode, and full support for formatted screen applications. With Local Data's optional auxiliary print support, the *FileLynx/3278* program allows a local parallel printer to appear to the host as an IBM 3287 printer. List price: $200. Local Data, 2701 Toledo St. #706, Torrance, CA 90503, 213/320-7126.

Data Management

QTime
A menu-driven multiuser data management system that uses English commands to manage information and runs on mini and mainframe computers. It requires 256K, one floppy disk drive, and one 5-megabyte hard disk. Designed for users

who have minimal programming or procedural language experience, *QTime* includes a tutorial module called LEARN that prompts users with a series of questions about the nature of the task to be performed. *QTime* then assigns the data from these questions to its standard data entry forms and automatically generates a prototype application. Users can quickly modify or update this application at any time. After completing the LEARN module, users can maintain files, enter data screens, and generate reports automatically without doing any programming.

QTime features over 175 application modules including Query, Calculations, Data Link, and Application Networking. In addition, *MultiMate* files can be integrated directly into *QTime* files. List price: executive version $695, designer version $995. Quality Information Systems, Honeywell Center #505, 2801 Buford Hwy. NE, Atlanta, GA 30329, 404/325-0987.

Educational

Leonardo's Library
A collection of learning and discovery programs designed to work in conjunction with Chalk Board's computer input device, PowerPad. It requires 64K and one disk drive. The library contains programs that provide users with an artist's canvas (*Leo's 'Lectric Paint Brush*), a piano keyboard (*MicroMaestro*), a game board (*Leo's Links*), a Logo language package (*Leonardo's Logo*), and a programming kit to create new software for the PowerPad (*PowerPad Programming Kit*). List price: individual programs $24.95 to $79.95. Chalk Board, Inc., 3772 Pleasantdale Rd. #140, Atlanta, GA 30340, 800/241-3989, 404/496-0101 in Georgia.

VisiTutor
A computer-aided training product for first-time users of *VisiCalc*. It requires 128K and two disk drives. *VisiTutor* comes with programs and a user manual. The programs simulate the *VisiCalc* screen display and functions, enabling users to get hands-on experience. The user manual explains the IBM PC screen and keyboard, provides step-by-step lessons ranging from "getting started" to "extras for experts," and shows how to construct *VisiCalc* spreadsheets. Spreadsheet instructions include examples of basic and advanced budgets, price quotes, cost comparisons, and inventories. List price: $79.95. VisiCorp, 2895 Zanker Rd., San Jose, CA 95134, 408/946-9000.

Intelligent Tutor
A comprehensive math tutorial designed for high school students. It requires 64K and one disk drive. *Intelligent Tutor* consists of a family of programs including Algebra I, Geometry, Algebra II, Trigonometry and Advanced Topics, and SAT Math. Each tutorial allows students to identify their strengths and weaknesses through a series of randomly generated work problems. Students choose one of two tutorial modes: Diagnostic or Practice. The Diagnostic mode provides various tests for students and upon its completion enables students to evaluate their performance on specific problems as well as on subject categories. The Practice mode allows students to select and practice specific categories of problems and to check the correct

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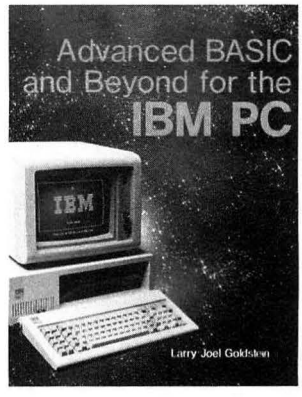

Advanced BASIC and Beyond for the IBM PC
By Larry Joel Goldstein

The Brady Co. brings you the second generation of golden information from Dr. Larry Joel Goldstein. "Advanced Basic and Beyond . . ." is an in-depth guide to the advanced techniques of BASIC programming offered in a self-study format. For those ready for the next step, this book offers chapters on:

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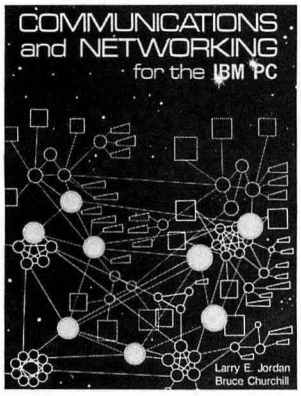

Communications and Networking for the IBM PC

By Larry E. Jordan and Bruce Churchill

The Brady Co. brings you another valuable volume for you and your personal computer. This is the one book which will never be outdated, because it will teach you exactly how to access the most current data with your IBM PC.* Jordan and Churchill introduce you to the data communications capabilities of your machine with chapters on:

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answers immediately. Students can then see an explanation of the problem, attempt to solve the problem again, or select another problem in the same or a different category. List price: five-program package $199.95, SAT Math program $69.95, other programs $49.95 each. Intelligent Software, Inc., 9609 Cypress, Munster, IN 46321, 219/923-6166.

PC Master

A self-paced IBM PC and XT tutorial that not only instructs users on computer usage but also provides an overview of the available IBM PC software. It requires 64K with DOS 1.10, 128K with DOS 2.00, and one double-sided disk drive. *PC Master* includes three instruction disks, each enhanced with computer graphics. The first disk, Computer Power, provides instructions on the keyboard and the DOS commands needed to run the computer. The second, Practical Applications, gives users hands-on experience with four widely used applications: word processing, data management, communications, and spreadsheets, and provides short practice questions on each topic. The third disk, Software Sampler, provides an overview of the kinds of software available, including computerized networks and micro-to-mainframe hookup software. Also on this disk are guidelines for purchasing software. List price: $79.50. Courseware, Inc., 10075 Carroll Canyon Rd., San Diego, CA 92131, 619/578-1700.

Entertainment

Astro*Talk

A program that allows users to create a personal horoscope. It requires 128K and one double-sided disk drive. Developed by professional astrologers, *Astro*Talk* bases its information on birth data and on the answers to a survey that resembles a personal reading. The program also features a Student Astroguide that provides answers to specific questions, an introduction to the concepts of astrology, and an illustrated user guide. List price: $39.95. Matrix Software, 315 Marion Ave., Big Rapids, MI 49307, 606/796-2483.

Financial

Profin

A financial analysis package that enables users to evaluate all criteria involved in an investment before making a decision. It requires 64K and one double-sided disk drive. Designed for small-business owners, the menu-driven program uses a question-and-answer format to forecast and budget investment possibilities. *Profin* enables users to analyze discounted cash flows, return on investments, and projected capital expenditures. The program enables users to do "what if" calculations and integrate *Profin* data with *Multiplan, VisiCalc, SuperCalc,* and other spreadsheet files. List price: $295. Business Software Pty. Ltd., 12021 Wilshire Blvd. #194, Los Angeles, CA 90025, 213/410-3912.

Integrated Applications

Open Access
A window-driven integrated software package that includes a data manager, an electronic spreadsheet, a word processor, a communications module, a graphics module, and a time-management tool. It requires 256K and two double-sided disk drives. *Open Access* allows data to be transferred directly from one on-screen program to another; up to four overlapping windows can be used simultaneously.

The data base program lets users join and manipulate up to five files of 32,000 records each simultaneously and to create screen and form-print generators. The data base also has a form-letter generator, a mathematical calculation function, and user-defined macros. The spreadsheet module features virtual memory, goal seeking ("how-to") calculations, multiple row and column insert and delete, and the capability to display up to six windows containing up to four separate spreadsheet models simultaneously.

The word processor supports insert and delete functions, search and replace, true proportional spacing, and block moves from one on-screen file to another. The communications module transfers ASCII files between the PC and information services, mainframes, and other microcomputers. The graphics mode provides three-dimensional color bar charts with user-controlled titles, textures, and sizes. The time manager mode enables users to maintain and print daily appointments and notes, and to keep a current file of clients. List price: $595. Software Products International, 10343 Roselle St., San Diego, CA 92121, 619/450-1526.

Job and Industry Specific

Ratercalc
A commercial lines insurance rating and coding system that works with the IBM PC, XT, and compatibles. It requires 192K and two double-sided disk drives. Designed for use by commercial insurance companies and agencies, *Ratercalc* is regularly updated to incorporate new industry rates as provided by the Insurance Services Office (ISO). The menu-driven program allows users to customize it for specific applications and provides audit trails for tracking rate computation factors.

Ratercalc lets users do "what if" calculations to determine the effect on total premium prices of changes in deductibles, limits, or other criteria. Printouts of resulting totals are provided in a format suitable for mailing to prospective clients. List price: determined by customer-specific licensing agreements. AIRS, Inc., 1250 E. Diehl Rd., Naperville, IL 60540, 312/369-2121.

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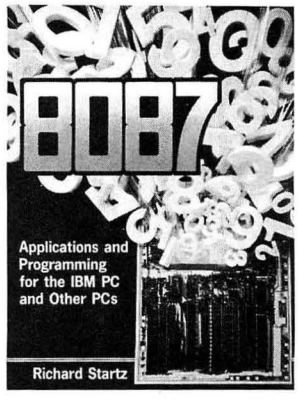

8087: Applications and Programming for the IBM PC and Other PCs
By Richard Startz

The Brady Co. brings you yet another vaulable volume for you and your IBM PC.* Richard Startz wrote this long-awaited explanation of the number-crunching 8087 microprocessor for the IBM PC* and other compatible machines. Program writers and program users will benefit from this unique guide and quickly apply the results. Read chapters on:

- The Intel 8087 Chip
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Wellness Check
A program designed to help individuals appraise health risks. It requires 64K and one disk drive. Designed for health departments, hospitals, companies, and schools, the program provides a questionnaire covering a range of lifestyle topics. The user completes the survey on disk and receives a printed report. The report includes a prognosis for the individual and advice on reducing health risks. *Wellness Check* includes software and educational booklets for two groups: teenagers (13 to 17 years) and adults (18 years and older). List price: $250. Rhode Island Department of Health, 75 Davis St., Providence, RI 02908, 401/277-6957.

Personal Management

SofTax
A tax analysis program that performs both tax preparation and simulation functions. It requires 64K (128K for preparer's version), two disk drives, and *VisiCalc*. Designed for individuals and professional tax preparers, *SofTax* provides entry routines that use *VisiCalc* for quicker data entry. Print functions include a batch print mode that allows multiple-client print returns, a pro forma function that provides printouts of a client's previous year's figures, and a print parameter file that permits users to specify the type of data on tax forms. The program also includes a one-screen simulator that enables users to do "what if" calculations. List price: individual version $199, preparer's version (1040 forms) $499,

professional version (trust, partnership, and corporate forms) $850. Design Trends, P.O. Box G, Wilton, CT 06897, 203/834-1560.

Spreadsheets

FilePlan
An electronic filing system that enables users to enter information in spreadsheet format. It requires 64K and two disk drives. *FilePlan* stores data in records and fields and automatically saves user input upon exit from the program. It enables users to view up to 15 records at once or to view one record singly and to create records containing between 128 and 1024 characters, and fields with up to 99 characters. Users can also enter data before defining the field parameters, because *FilePlan* automatically stores all entered data, even when field length is shorter than the entered text. *FilePlan* also features customized user prompts, automatic sorting, incremental query, and a mailing list generator. List price: $295. Chang Labs, 5300 Stevens Creek Blvd. #200, San Jose, CA 95129, 408/246-8020.

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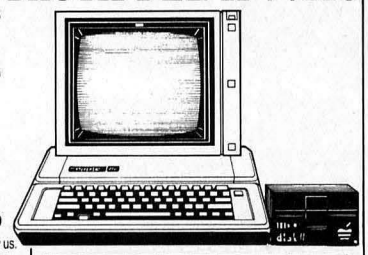

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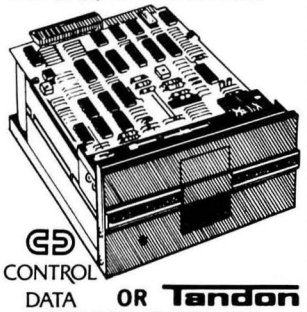

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169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196
197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224
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COMPAQ Computer Corporation, 13
48 Corona Data Systems, 28
87 Durango, 166
637 Hyperion, 18-19
79 IBM Corporation, 8-9
376 Micro Craft, Corp., 199
124 NEC Home Electronics, 90-91
248 Seequa Computer Corporation, 25
257 Tava, 123
Texas Instruments, 72-73

Hardware

Boards

10 Apparat, Inc., 211
205 Applied Computer Products, 46
18 AST Research Inc., IFC-1
24 Bizcomp, 144-45
305 California Computer Systems, 236
358 Cogent, 181
49 Corvus Systems, 131
580 Data Storage Solutions, Inc., 63
639 Dilog PC Products, 232-33
633 Forte Data Systems, 243
77 Hercules Computer Technology, 33
272 Intelligent Technologies International, 104-5
402 Interphase Corporation, 184
593 MA Systems Incorporated, 156
236 Microlog Inc., 148-49, 367
133 Orchid Technology, 205
615 Paradise Systems, Inc., 147
535 PC Products Inc., 209
143 PC+ Products Inc., 368-BC
243 Persyst Inc., 76-77
147 PureData Ltd., 231
151 Qubie' Distributing, 230
561 RIM Electronics, 227
164 Santa Clara Systems, 85
168 Seattle Computer, 185
254 STB Systems, Inc., 206
190 Tecmar Inc., 10, 11

Reader Service Number

Storage Devices

315 Alloy Computer Products, 167
204 Amdek, 14
646 Control Data Corporation, 60-61
216 Genie Computer Corporation, 365
638 Micro Computer Additions, 321
537 Micro-Design, 283
475 Micro Tech Exports, 320
188 Tallgrass Technologies Corporation, 12
187 Tall Tree Systems, 154

Monitors

296 Princeton Graphic Systems, 220-21

Printers, Plotters, and Typewriter Interfaces

387 Data Terminals and Communications, 194
57 Diablo Systems, 286
368 Dynax, Inc., 180
627 Juki America, 157
149 Quadram Corporation, 30-31
Qume, 26-27
319 Star Micronics, Inc., 279
285 Toshiba America, Inc., 296-97

Communications

474 Kensington Microware Ltd., 333
3Com Corporation, 168-69
405 US Robotics, 303
193 Ven-Tel Inc., 207

Miscellaneous

Microsoft Corporation, 29
118 Microware, 318
618 Norhtwest Instrument Systems, Inc., 263
626 PC Pipeline, 320

Systems Software

Operating Systems

521 SofTech Microsystems, 171
301 Software Solutions, 87

Utilities

31 Central Point Software, 349
636 Computer Decisions Corporation, 366

Reader Service Number

74 Funk Software, 307
408 Manx Software Systems, 71
379 Omega MicroWare, 86, 130
575 Photon Software, 204
162 RoseSoft, 47
163 RTCS Corporation, 56
410 SoftStyle, Inc., 320
630 Spies Laboratories, 190
628 Titan Technologies, Inc., 146
197 Watsoft Products, Inc., 319

Languages

406 Computer Innovations, Inc., 318
89 Laboratory Microsystems, 341
231 Mark Williams Company, 183
100 MBP Software & Systems Technology, 161
118 Microware, Inc., 318

Applications Software

General Business

6 Alpha Software Corp., 17
585 Anderson-Bell, 139
569 Ashton-Tate, 65
622 Business Solutions, Inc., 125, 126-27
601 Context Management Systems, 191
436 Cosmos, 92
450 Excel Systems Corporation, 162
495 Executec Corporation, 84
611 Fastware, Inc., 317, 319
233 Micro Data Base Systems, Inc./ISE USA, 219
76 Mosaic Software Inc., 42
544 Pyramid Data, Ltd., 112
Scitor Corporation, 210
524 SMC Software Systems, 198
562 Software Products International, 106-7
301 Software Solutions, Inc., 87
616 Transpower Corporation, 341

Financial & Spreadsheets

599 Ferox Microsystems Inc., 349
409 Heritage Computing, Inc., 41
292 Micro-Tax, 22
321 Pacific Data Systems, 247
Rocky Mountain Software Systems, 170

Reader Service Number

631 Summa Software Corporation, 158
598 VisiCorp., 20-21
Walonick Associates, 321

Job and Industry Specific

504 Professional Software Solutions, 334

Data Management

335 Ashton-Tate, 179
438 Data Technology Industries, 240
218 G.M.S. Systems, Inc., 208
225 Innovative Software, 195
441 Key Software, 197
MicroRIM, 264-69
301 Software Solutions, Inc., 87

Word Processing/Text Editing

Microsoft Corporation, 2-3
533 Office Solutions, 62
399 Palantir, Inc., 262
481 PBL Corporation, 335
165 Satellite Software International, 124
528 Select Information Systems, 88-89
301 Software Solutions, Inc., 87
396 Softword Systems, 244

Mailing Lists

612 ICA Systems, 40

Communications

632 Adax Systems Inc., 300
624 Inner Loop Software, 320
275 Microstuf, 245
142 Persoft Inc., 258
526 Software Link, Inc., 226
572 Sterling Software Marketing, 59
197 Watsoft Products, Inc., 319

Graphics

596 Autodesk, Inc., 278
582 Cactus Software, Inc., 246
640 Chalk Board, Inc., 288
309 Enertronics Research, Inc., 235

Reader Service Number

409 Heritage Computing, Inc., 41
332 MICROGRAFX, 305
506 Sam Wilson & Associates/Banner, 320

Educational, Personal, Entertainment & Misc. Software

Educational

7 American Training International, 5
325 Cdex Corporation, 238
385 Control Data Publishing, 128-29
288 Courseware, Inc., 285
Culverin Corporation, 43
NRI School of Electronics, 155

Personal

202 Best Programs, 75
385 Control Data Publishing, 128-29
625 Howard Software Services, 78

Entertainment

550 Atari, 44-45
463 Blue Chip Software, 32
577 Pacific Infotech Corp., 226
308 subLOGIC Corporation, 159

Miscellaneous

635 Living Video Text (ThinkTank), 150

General

Accessories

American Tourister Inc., 287
613 Comark, Inc., 313
44 Computer-Mate, Inc., 363
276 Contemporary ComputerWear, 319
620 Continental Engineering Group, Inc., 362
634 Creative Computer Products, 196
Curtis Manufacturing Company, Inc., 259
Disk World!, 304
66 Electronics Specialists, Inc., 318
101 MC/N, Inc., 83, 189
576 Pacific Exchanges, 320, 321
545 Prestige Envelope & Paper Corp., 366

Reader Service Number

310 3M Data Recording, 182
538 Top Down Design, 321

Services

362 Compuserve, 74
IPF Publications, 312, 348

Books, Catalogs, and Periodicals

568 Ashton-Tate, 113
246 Brady Co., 119, 120-21, 122, 342-345
InfoWorld, 301
Garland Publishing, 192-93
299 Micro Information Publishing, 364
412 Personal Systems Publications, 16

Events

29 Communications Network, 299
485 CW Communications, 314-15

Mail Order

2 Advanced Computer Products, 242
370 Alphanetics Software, 357
205 Applied Computer Products, Inc., 260-61
420 Computer Mail Order, 290-91
629 Computers and More, 317
488 Connecticut Information Services, 257
554 Conroy La Pointe, 350-51
58 Diamond Software Supply, 346-47
DirectSoftware, 309
214 800 Software, 338
MC-P Applications, 352
108 Micro Flash, 310
237 MICROMAIL, 340
386 Micro Management Systems, Inc., 316
112 Micro Mart, 360-61
619 Micro Match, 292
351 National Computer Products, 295
595 Parthenon Computers, 316
136 PC Connection, 276-77
242 PC Link Corp., 234
460 PC Network, 289
603 PC Software Interest Group, 320
586 Ramware Software Products, 298
380 Rogue River Software, 317
Scottsdale Systems Ltd., 111
602 Softline Corporation, 248
542 Transaction Storage Systems, Inc., 359

Advertisers

Reader Service Number	
632	Adax Systems, Inc., 300
2	Advanced Computer Products, 242
315	Alloy Computer Products, 167
370	Alphanetics, 357
6	Alpha Software Corp., 17
204	Amdek Corporation, 14
	American Tourister, Inc., 287
7	American Training International, 5
585	Anderson-Bell, 139
10	Apparat, Inc., 211
205	Applied Computer Products Inc., 46, 260-61
335	Ashton-Tate, 179
568	Ashton-Tate, 113
569	Ashton-Tate, 65
18	AST Research Inc., IFC-1
550	Atari, 44-45
596	Autodesk, 278
202	Best Programs, 75
24	Bizcomp, 144-45
463	Blue Chip Software, 32
246	Brady Company, 119, 120-21, 122, 342-45
622	Business Solutions, Inc., 125, 126-27
582	Cactus Software, Inc., 246
305	California Computer Systems, 236
325	Cdex Corporation, 238
31	Central Point Software, Inc., 349
640	Chalkboard Inc., 288
358	Cogent, 181
613	Comark, Inc., 313
29	Communications Network, 299
	COMPAQ Computer Corporation, 13
362	Compuserve, 74
636	Computer Decisions Corporation, 366
406	Computer Innovations, 318
420	Computer Mail Order, 290-91
44	Computer-Mate Inc., 363
629	Computers and More, 317
488	Connecticut Information Services, 257
554	Conroy La Pointe, 350-51
276	Contemporary ComputerWear, 319

Reader Service Number	
601	Context Management Systems, 191
620	Continental Engineering Group, Inc., 362
646	Control Data Corporation, 60-61
385	Control Data Publishing, 128-29
48	Corona Data Systems, 28
49	Corvus Systems, 131
436	Cosmos, 92
288	Courseware, Inc., 285
634	Creative Computer Products, 196
	Culverin Corporation, 43
	Curtis Manufacturing Company, 259
485	CW Communications, 314-15
580	Data Storage Solutions, 63
438	Data Technology Industries, 240
387	Data Terminals & Communication, 194
57	Diablo Systems, 286
58	Diamond Software Supply, 346-47
639	Dilog PC Products, 232-33
	DirectSoftware, 309
	Disk World!, 304
87	Durango, 166
368	Dynax, Inc., 180
214	800 Software, 338
66	Electronics Specialists, Inc., 318
309	Enertronics Research, Inc., 235
450	Excel Systems Corporation, 162
495	Executec Corporation, 84
611	Fastware, Inc., 317, 319
599	Ferox Microsystems, Inc., 349
633	Forte Data Systems, 243
74	Funk Software, 307
	Garland Publishing, 192-93
216	Genie Computer Corp., 365
218	G.M.S. Systems, Inc., 208
227	Guidance Software, 227
77	Hercules Computer Technology, 33
409	Heritage Computing, Inc., 41
625	Howard Software Services, 78
637	Hyperion, 18-19
79	IBM, 8-9
612	ICA Systems, Inc., 40
	InfoWorld, 301
624	Inner Loop Software, 320
225	Innovative Software, 195
272	Intelligent Technologies International, 104-5

Reader Service Number	
402	Interphase Corporation, 184
	IPF Publications/SWIG, 312, 348
627	Juki America, 157
474	Kensington Microware Ltd., 333
441	Key Software, 197
89	Laboratory Microsystems, Inc., 341
635	Living Video Text (ThinkTank), 150
408	Manx Software Systems, 71
231	Mark Williams Company, 183
593	MA Systems Incorporated, 156
100	MBP Software & Systems Technology, 161
101	MC/N, Inc., 83, 189
	MC-P Applications, 352
638	Micro Computer Additions, 321
376	Micro Craft, Corp., 199
233	Micro Data Base Systems, Inc./ISE USA, 219
537	Micro Design, 283
108	Micro Flash, 310
332	MICROGRAFX, 305
299	Micro Information Publishing, 364
236	Microlog, Inc., 148-49, 367
237	MICROMAIL, 340
386	Micro Management Systems, Inc., 316
112	Micro Mart, 360-61
619	Micro Match, 292
	MicroRIM, 264-69
275	Microstuf, 245
	Microsoft Corporation, 2-3, 29
292	Micro-Tax, 22
475	Micro Tech Exports, 320
118	MicroWare, Inc., 318
76	Mosaic Software, 42
351	National Computer Products, 295
124	NEC Home Electronics, 90-91
618	Northwest Instrument Systems, Inc., 263
	NRI School of Electronics, 155
533	Office Solutions, 62
379	Omega Microware, 86, 130
133	Orchid Technology, 205
321	Pacific Data Systems Inc., 247
576	Pacific Exchanges, 320, 321
577	Pacific Infotech Corporation, 226
399	Palantir, 262

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Advertisers

Reader Service Number	
615	Paradise Systems, Inc., 147
595	Parthenon Computers Inc., 316
481	PBL Corporation, 335
136	PC Connection, 276-77
242	PC Link Corp., 234
460	PC Network, 289
626	PC Pipeline, 320
535	PC Products Inc., 209
143	PC+ Products Inc., 368-BC
603	PC Software Interest Group, 320
142	Persoft Inc., 258
412	Personal Systems Publications, 16
243	Persyst, Inc., 76-77
575	Photon Software, 204
545	Prestige Envelope & Paper Corp., 366
296	Princeton Graphic Systems, 220-21
504	Professional Software Solutions, 334
147	Pure Data Ltd., 231
544	Pyramid Data Ltd., 112
149	Quadram Corporation, 30-31
151	Qubie' Distributing, 230
	Qume, 26, 27
586	Ramware Software Products, 298
561	RIM Electronics, 227
	Rocky Mountain Software Systems, 170
380	Rogue River Software, 317
162	RoseSoft, 47
163	RTCS Corporation, 56
506	Sam Wilson & Associates/Banner, 320
164	Santa Clara Systems Inc., 85
165	Satellite Software International, 124
	Scitor Corporation, 210
	Scottsdale Systems Ltd., 111
168	Seattle Computer, 185
248	Seequa Computer Corp., 25
528	Select Information Systems, 88-89
524	SMC Software Systems, 198

Reader Service Number	
521	SofTech Microsystems, 171
602	Softline, 248
410	SoftStyle, Inc., 320
526	Software Link, Inc., 226
562	Software Products International, 106-7
301	Software Solutions, Inc., 87
396	Softword Systems, 244
630	Spies Laboratories, 190
319	Star Micronics, Inc., 279
254	STB Systems, Inc., 206
572	Sterling Software Marketing, 59
308	subLOGIC Corporation, 159
631	Summa Software Corp., 158
188	Tallgrass Technologies Corporation, 12
187	Tall Tree Systems, 154
257	TAVA, 123
190	Tecmar Inc., 10, 11
	Texas Instruments, 72-73
	3Com Corporation, 168-69
310	3M Data Recording, 182
628	Titan Technologies, Inc., 146
538	Top Down Design, 321
285	Toshiba America, Inc., 296-97
542	Transaction Storage Systems, Inc., 359
616	Transpower Corporation, 341
405	US Robotics, 303
193	Ven-Tel Inc., 207
598	VisiCorp, 20-21
	Walonick Associates, 321
197	Watsoft Products, Inc., 319

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INDEX
AGRICULTURE
Accounting
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Accounts Payable
Accounts Receivable
Budgeting
Calendar Schedule
Programs
Cash Disbursements
Cash Receipts
Financial Modelers
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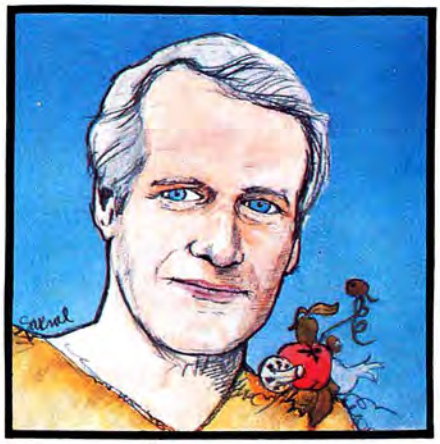

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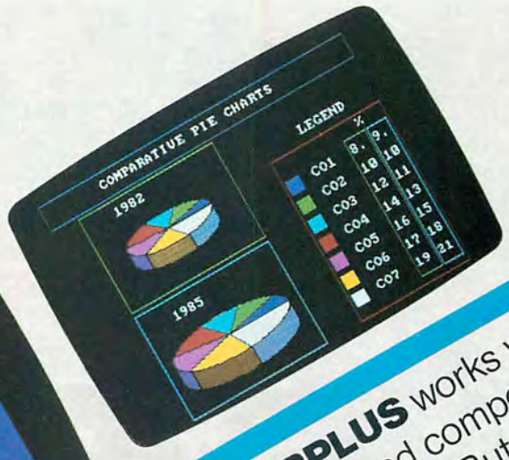

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